Preface

The Uniform Building Code is dedicated to the development of better building construction and greater safety to the public by uniformity in building laws. The code is founded on broad-based principles that make possible the use of new materials and new construction systems.

The Uniform Building Code was first enacted by the International Conference of Building Officials at the Sixth Annual Business Meeting held in Phoenix, Arizona, October 18-21, 1927. Revised editions of this code have been published since that time at approximate three-year intervals. New editions incorporate changes approved since the last edition.

The Uniform Building Code is designed to be compatible with related publications to provide a complete set of documents for regulatory use. See the publications list following this preface for a listing of the complete family of Uniform Codes and related publications.

Code Changes. Anyone may propose amendments to this code. For more information, write to the International Conference of Building Officials, 5360 Workman Mill Road, Whittier, California 90601-2298. Changes to the code are processed each year and published as supplements in a form allowing ready adoption by local communities. These changes are carefully reviewed in public hearings by experts in the field of building construction and fire and life safety. An analysis of changes between editions is published in the Analysis of Revisions to the Uniform Codes.

Marginal Markings. Solid vertical lines in the margins within the body of the code indicate a change from the requirements of the 1991 edition except where an entire chapter was revised, a new chapter was added or a change was minor. Where an entire chapter was revised or a new chapter was added, a notation appears at the beginning of that chapter. The letter F repeating in line vertically in the margin indicates that the provision is maintained under the code change procedures of the International Fire Code Institute. Deletion indicators (•) are provided in the margin where a paragraph or item listing has been deleted if the deletion resulted in a change of requirements.

Common Code Format. The provisions of the 1994 edition of the Uniform Building Code have been reformatted into the common code format established by the Council of American Building Officials. The new format establishes a common format of chapter designations for the three model building codes published in the United States. Apart from those changes approved by the conference membership, this reformatting has not changed the technical content of the code.

The chart on the page following this preface indicates how the new chapters are grouped, lists the new chapter designations and indicates the general location of the provisions from the 1991 edition. Cross-reference tables are available to assist in locating provisions of the 1991 edition in the 1994 edition.

Three-Volume Set. Provisions of the Uniform Building Code and the U.B.C. Standards have been divided into a three-volume set. Volume 1 accommodates administrative, fire- and life-safety and field inspection provisions. Chapters 1 through 15 and Chapters 24 through 35 are printed in Volume 1 in their entirety. Any appendix chapters associated with these chapters are printed in their entirety at the end of Volume 1. Excerpts of certain chapters from Volume 2 are reprinted in Volume 1 to provide greater usability.

Volume 2 accommodates structural engineering design provisions, and specifically contains Chapters 16 through 23 printed in their entirety. Included in this volume are design standards previously published in the U.B.C. Standards. Design standards have been added to their respective chapters as divisions of the chapters. Any appendix chapters associated with these chapters are printed in their entirety at the end of Volume 2. Excerpts of certain chapters from Volume 1 are reprinted in Volume 2 to provide greater usability.

Volume 3 contains material, testing and installation standards.
Metrication. The Uniform Building Code has been metricated for the 1994 edition. The metric conversions are provided in parenthesis following the English units. Where industry has made metric conversions available, the conversions conform to current industry standards.

Formulas are also provided with metric equivalents. Metric equivalent formulas immediately follow the English formula and are denoted by "For SI:" preceding the metric equivalent. Some formulas do not use dimensions and, thus, are not provided with a metric equivalent. Multiplying conversion factors have been provided for formulas where metric forms were unavailable. Tables are provided with multiplying conversion factors in subheadings for each tabulated unit of measurement. Metricated tables of the Uniform Codes are available from the Conference.
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CODES AND RELATED PUBLICATIONS

The International Conference of Building Officials (ICBO) publishes the family of Uniform Codes, each correlated with the Uniform Building Code™ to provide jurisdictions with a complete set of building-related regulations for adoption. Other reference materials and related codes are available to improve knowledge of code enforcement and administration of building inspection programs. Publications are continually being added, so inquiries should be directed to Conference headquarters for a listing of available products. The following publications are available from ICBO:

UNIFORM CODES

Uniform Building Code. Volumes 1, 2 and 3. The most widely adopted model building code in the United States, the performance-based Uniform Building Code is a proven document, meeting the needs of government units charged with the enforcement of building regulations. Volume 1 contains administrative, fire- and life-safety and field inspection provisions; Volume 2 contains structural engineering design provisions; and Volume 3 contains material, testing and installation standards.

Uniform Mechanical Code™. Provides a complete set of requirements for the design, construction, installation and maintenance of heating, ventilating, cooling and refrigeration systems; incinerators and other heat-producing appliances.

Uniform Fire Code™. Volumes 1 and 2. The premier model fire code in the United States, the Uniform Fire Code sets forth provisions necessary for fire prevention and fire protection. Published by the International Fire Code Institute, the Uniform Fire Code is endorsed by the Western Fire Chiefs Association, the International Association of Fire Chiefs and ICBO. Volume 1 contains code provisions compatible with the Uniform Building Code, and Volume 2 contains standards referenced from the code provisions.

Uniform Housing Code™. Provides complete requirements affecting conservation and rehabilitation of housing. Its regulations are compatible with the Uniform Building Code.

Uniform Code for the Abatement of Dangerous Buildings™. A code compatible with the Uniform Building Code and the Uniform Housing Code which provides equitable remedies consistent with other laws for the repair, vacation or demolition of dangerous buildings.

Uniform Sign Code™. Dedicated to the development of better sign regulation, its requirements pertain to all signs and sign construction attached to buildings.

Uniform Administrative Code™. This code covers administrative areas in connection with adoption of the Uniform Building Code, Uniform Mechanical Code and related codes. It contains provisions which relate to site preparation, construction, alteration, moving, repair and use and occupancies of buildings or structures and building service equipment, including plumbing, electrical and mechanical regulations. The code is compatible with the administrative provisions of all codes published by the Conference.

Uniform Building Security Code™. This code establishes minimum standards to make dwelling units resistant to unlawful entry. It regulates swinging doors, sliding doors, windows and hardware in connection with dwelling units of apartment houses or one- and two-family dwellings. The code gives consideration to the concerns of police, fire and building officials in establishing requirements for resistance to burglary which are compatible with fire and life safety.

Uniform Code for Building Conservation™. A building conservation guideline presented in code format which will provide a community with the means to preserve its existing buildings while achieving appropriate levels of safety. It is formatted in the same manner as the Uniform Building Code, is compatible with other Uniform Codes, and may be adopted as a code or used as a guideline.

Uniform Zoning Code™. This newest addition to the Uniform Codes family is dedicated to intelligent community development and to the benefit of the public welfare by providing a means of promoting uniformity in zoning laws and enforcement.

Dwelling Construction under the Uniform Building Code™. Designed primarily for use in home building and apprentice training, this book contains requirements applicable to the construction of one- and two-story dwellings based on the requirements of the Uniform Building Code Available in English or Spanish.

Dwelling Construction under the Uniform Mechanical Code™. This publication is for the convenience of the homeowner or contractor interested in installing mechanical equipment in a one- or two-family dwelling in conformance with the Uniform Mechanical Code.

Quick-Reference Guide to the Occupancy Requirements of the 1994 U.B.C. Code requirements are compiled in this publication by occupancy groups for quick access. These tabulations assemble requirements for each occupancy classification in the code. Provisions, such as fire-resistive ratings for occupancy separations in Table 3-B, exterior-
Supplements to U.B.C. and related codes. Published each of the two years between editions, the Supplements contain all changes approved during that year, plus an analysis of those changes.

Metrical Tables and Figures of the 1994 Uniform Codes. The tables presented in the 1994 Uniform Codes tabulate values in inch-pound units system and are provided with multiplying factors to convert values to the SI equivalent. This publication provides all the tables and figures of the Uniform Codes completely metricated. All tabulated values will be presented in SI units without reference to the inch-pound equivalent.


CABO CODES

CABO One and Two Family Dwelling Code. Jointly sponsored by ICBO and the other model building code organizations, this code eliminates conflicts and duplications among the model codes to achieve national uniformity. Covers mechanical and plumbing requirements as well as construction and occupancy.

Application and Commentary on CABO One and Two Family Dwelling Code. An interpretative commentary on the CABO One and Two Family Dwelling Code intended to enhance uniformity of interpretation and application of the code nationwide. Developed by the three model code organizations, this document includes numerous illustrations of code requirements and the rationale for individual provisions.

CABO Model Energy Code. This code includes minimum requirements for effective use of energy in the design of new buildings and structures and additions to existing buildings. It is based on American Society of Heating, Refrigeration and Air-conditioning Engineers Standard 90A-1980 and was originally developed jointly by ICBO, BOCA, SBCCI and the National Conference of States on Building Codes and Standards under a contract funded by the United States Department of Energy. The code is now maintained by CABO and is adopted by reference in the Uniform Building Code.

TECHNICAL REFERENCES AND EDUCATIONAL MATERIALS

Analysis of Revisions to the Uniform Codes™. An analysis of changes between the previous and new editions of the Uniform Codes is provided. Changes between code editions are noted either at the beginning of chapters or in the margins of the code text.


Handbook to the Uniform Building Code. The handbook is a completely detailed and illustrated commentary on the Uniform Building Code, tracing historical background and rationale of the codes through the current edition. Also included are numerous drawings and figures clarifying the application and intent of the code provisions. Also available in electronic format.

Handbook to the Uniform Mechanical Code. An indispensable tool for understanding the provisions of the current U.M.C., the handbook traces the historical background and rationale behind the U.M.C. provisions, includes 160 figures which clarify the intent and application of the code, and provides a chapter-by-chapter analysis of the U.M.C.

Uniform Building Code Application/Interpretation Manual. This manual discusses sections of the Uniform Building Code with a question-and-answer format, providing a comprehensive analysis of the intent of the code sections. Most sections include illustrative examples. The manual is in loose-leaf format so that code interpretations published in Building Standards magazine may be inserted. Also available in electronic format.

Uniform Mechanical Code Application/Interpretation Manual. As a companion document to the Uniform Mechanical Code, this manual provides a comprehensive analysis of the intent of a number of code sections in an easy-to-use question-and-answer format. The manual is available in a loose-leaf format and includes illustrative examples for many code sections.

Plan Review Manual. A practical text that will assist and guide both the field inspector and plan reviewer in applying the code requirements. This manual covers the nonstructural and basic structural aspects of plan review.

Field Inspection Manual. An important fundamental text for courses of study at the community college and trade or technical school level. It is an effective text for those studying building construction or architecture and includes sample forms and checklists for use in the field.
Building Department Administration. An excellent guide for improvement of skills in departmental management and in the enforcement and application of the Building Code and other regulations administered by a building inspection department. This textbook will also be a valuable aid to instructors, students and those in related professional fields.

Building Department Guide to Disaster Mitigation. This new, expanded guide is designed to assist building departments in developing or updating disaster mitigation plans. Subjects covered include guidelines for damage mitigation, disaster-response management, immediate response, mutual aid and inspections, working with the media, repair and recovery policies, and public information bulletins. This publication is a must for those involved in preparing for and responding to disaster.

Building Official Management Manual. This manual addresses the unique nature of code administration and the managerial duties of the building official. A supplementary insert addresses the budgetary and financial aspects of a building department. It is also an ideal resource for those preparing for the management module of the CABO Building Official Certification Examination.

Legal Aspects of Code Administration. A manual developed by the three model code organizations to inform the building official on the legal aspects of the profession. The text is written in a logical sequence with explanation of legal terminology. It is designed to serve as a refresher for those preparing to take the legal module of the CABO Building Official Certification Examination.

U.B.C. Workbook. Designed for independent study or use with instructor-led programs based on the Uniform Mechanical Code, this comprehensive study guide consists of 16 learning sessions, with the first two sessions reviewing the purpose, scope, definitions and administrative provisions and the remaining 14 sessions progressively exploring the requirements for installing, inspecting and maintaining heating, ventilating, cooling and refrigeration systems.

Concrete Manual. A publication for individuals seeking an understanding of the fundamentals of concrete field technology and inspection practices. Of particular interest to concrete construction inspectors, it will also benefit employees of concrete producers, contractors, testing and inspection laboratories and material suppliers.

Reinforced Concrete Masonry Construction Inspector's Handbook. A comprehensive information source written especially for masonry inspection covering terminology, technology, materials, quality control, inspection and standards. Published jointly by ICBO and the Masonry Institute of America.

You Can Build It! Sponsored by ICBO in cooperation with CABO, this booklet contains information and advice to aid "do-it-yourselfers" with building projects. Provides guidance in necessary procedures such as permit requirements, codes, plans, cost estimation, etc.

Guidelines for Manufactured Housing Installations. A guideline in code form, implementing the Uniform Building Code and its companion code documents to regulate the permanent installation of a manufactured home on a privately owned, nonrental site. A commentary is included to explain specific provisions, and codes applying to each component part are defined.

Accessibility Reference Guide. This guide will be a valuable resource for architects, interior designers, plan reviewers and others who design and enforce accessibility provisions. Features include accessibility requirements, along with detailed commentary and graphics to clarify the provisions; cross-references to other applicable sections of the U.B.C. and the Americans with Disabilities Act Accessibility Guidelines; a checklist of U.B.C. provisions on access and usability requirements; and many other useful references.

U.B.C. Field Inspection Workbook. A comprehensive workbook for studying the provisions of the U.B.C. Divided into 12 sessions, this workbook focuses on the U.B.C. combustible construction requirements for the inspection of wood-framed construction.

Educational and Technical Reference Materials. The Conference has been a leader in the development of texts and course material to assist in the educational process. These materials include vital information necessary for the building official and subordinates in carrying out their responsibilities and have proven to be excellent references in connection with community college curricula and higher-level courses in the field of building construction technology and inspection and in the administration of building departments. A full line of videotapes and automated products are also available.
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EFFECTIVE USE OF THE
UNIFORM BUILDING CODE

The following procedure may be helpful in using the Uniform Building Code:

1. Classify the building:
   A. OCCUPANCY CLASSIFICATION: Compute the floor area and occupant load of the building or portion thereof. See Sections 207 and 1002 and Table 10-A. Determine the occupancy group which the use of the building or portion thereof most nearly resembles. See Sections 301, 303.1.1, 304.1, 305.1, 306.1, 307.1, 308.1, 309.1, 310.1, 511.1 and 312.1. See Section 302 for buildings with mixed occupancies.
   B. TYPE OF CONSTRUCTION: Determine the type of construction of the building by the building materials used and the fire resistance of the parts of the building. See Chapter 6.
   C. LOCATION ON PROPERTY: Determine the location of the building on the site and clearances to property lines and other buildings from the plot plan. See Table 5-A and Sections 602.3, 603.3, 604.3, 605.3 and 606.3 for fire resistance of exterior walls and wall opening requirements based on proximity to property lines. See Section 503.
   D. ALLOWABLE FLOOR AREA: Determine the allowable floor area of the building. See Table 5-B for basic allowable floor area based on occupancy group and type of construction. See Section 505 for allowable increases based on location on property and installation of an approved automatic fire sprinkler system. See Section 504.2 for allowable floor area of multistory buildings.
   E. HEIGHT AND NUMBER OF STORIES: Compute the height of the building, Section 209, and determine the number of stories, Section 220. See Table 5-B for the maximum height and number of stories permitted based on occupancy group and type of construction. See Section 506 for allowable story increase based on the installation of an approved automatic fire-sprinkler system.

2. Review the building for conformity with the occupancy requirements in Sections 303 through 312.

3. Review the building for conformity with the type of construction requirements in Chapter 6.

4. Review the building for conformity with the exiting requirements in Chapter 10.

5. Review the building for other detailed code regulations in Chapters 4, 7 through 11, 14, 15, 24 through 26, and 30 through 33, and the appendix.

6. Review the building for conformity with structural engineering regulations and requirements for materials of construction. See Chapters 16 through 23.
SAMPLE ORDINANCE FOR ADOPTION OF THE

UNIFORM BUILDING CODE,
VOLUMES 1, 2 AND 3
ORDINANCE NO. _______

An ordinance of the (jurisdiction) adopting the 1994 edition of the Uniform Building Code, Volumes 1, 2 and 3, regulating the erection, construction, enlargement, alteration, repair, moving, removal, demolition, conversion, occupancy, equipment, use, height, area and maintenance of all buildings or structures in the (jurisdiction); providing for the issuance of permits and collection of fees therefor; providing for penalties for the violation thereof, repealing Ordinance No. ______ of the (jurisdiction) and all other ordinances and parts of the ordinances in conflict therewith.

The (governing body) of the (jurisdiction) does ordain as follows:

Section 1. That certain documents, three (3) copies of which are on file and are open for inspection of the public in the office of the (jurisdiction's keeper of records) of the (jurisdiction), being marked and designated as:

Uniform Building Code, 1994 Edition, published by the International Conference of Building Officials, including the generic fire-resistive assemblies listed in the Fire Resistance Design Manual, Thirteenth Edition, dated April 1992, published by the Gypsum Association as referenced in Tables 7-A, 7-B and 7-C (also reference Appendix Chapter 12, Division II, if adopted) of the specified Uniform Building Code, including Appendix Chapters ______. [Fill in the applicable appendix chapters (see Uniform Building Code Section 101.3, last paragraph). If reference is made to Appendix Chapter 30, an additional reference to ANSI/ASME A17.1, 1987, Safety Code for Elevators and Escalators, including Supplements A17.1a-1988, A17.1b-1989, and to ANSI/ASME A17.3a-1986, Safety Code for Existing Elevators and Escalators, including Supplements A17.3a-1989, published by the American Society of Mechanical Engineers, should be added and three (3) copies of this code should also be on file (see Appendix Sections 3010 and 3012), and


be and the same are hereby adopted as the code of the (jurisdiction) for regulating the erection, construction, enlargement, alteration, repair, moving, removal, demolition, conversion, occupancy, equipment, use, height, area and maintenance of all buildings or structures in the (jurisdiction) providing for issuance of permits and collection of fees therefor; and each and all of the regulations, provisions, conditions and terms of such Uniform Building Code, 1994 Edition, Volumes 1, 2 and 3, published by the International Conference of Building Officials, and the secondary publications referenced above, all of which are on file in the office of the (jurisdiction) are hereby referred to, adopted and made a part hereof as if fully set out in this ordinance.

Section 2. (Incorporate penalties for violations. See Section 205.)

Section 3. That Ordinance No. ______ of (jurisdiction) entitled (fill in the title of building ordinance or ordinances in effect at the present time) and all other ordinances or parts of ordinances in conflict herewith are hereby repealed.

Section 4. That if any section, subsection, sentence, clause or phrase of this ordinance is, for any reason, held to be invalid or unconstitutional, such decision shall not affect the validity or constitutionality of the remaining portions of this ordinance. The (governing body) hereby declares that it would have passed this ordinance, and each section, subsection, clause or phrase hereof, irrespective of the fact that any one or more sections, subsections, sentences, clauses and phrases be declared unconstitutional.

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Section 5. That the __[jurisdiction's keeper of records]__ is hereby ordered and directed to cause this ordinance to be published. (An additional provision may be required to direct the number of times the ordinance is to be published and to specify that it is to be in a newspaper in general circulation. Posting may also be required.)

Section 6. That this ordinance and the rules, regulations, provisions, requirements, orders and matters established and adopted hereby shall take effect and be in full force and effect __[time period]__ from and after the date of its final passage and adoption.
SECTION 101 — TITLE, PURPOSE AND SCOPE

101.1 Title. These regulations shall be known as the Uniform Building Code, may be cited as such and will be referred to herein as “this code.”

101.2 Purpose. The purpose of this code is to provide minimum standards to safeguard life or limb, health, property and public welfare by regulating and controlling the design, construction, quality of materials, use and occupancy, location and maintenance of all buildings and structures within this jurisdiction and certain equipment specifically regulated herein.

The purpose of this code is not to create or otherwise establish or designate any particular class or group of persons who will or should be especially protected or benefited by the terms of this code.

101.3 Scope. The provisions of this code shall apply to the construction, alteration, moving, demolition, repair, maintenance and use of any building or structure within this jurisdiction, except work located primarily in a public way, public utility towers and poles, mechanical equipment not specified in this code, and hydraulic flood control structures.

For additions, alterations, moving and maintenance of buildings and structures, see Chapter 34. For temporary buildings and structures see Section 3103 and Appendix Chapter 31.

Where, in any specific case, different sections of this code specify different materials, methods of construction or other requirements, the most restrictive shall govern. Where there is a conflict between a general requirement and a specific requirement, the specific requirement shall be applicable.

Wherever in this code reference is made to the appendix, the provisions in the appendix shall not apply unless specifically adopted.

SECTION 102 — UNSAFE BUILDINGS OR STRUCTURES

All buildings or structures regulated by this code which are structurally unsafe or not provided with adequate egress, or which constitute a fire hazard, or are otherwise dangerous to human life are, for the purpose of this section, unsafe. Any use of buildings or structures constituting a hazard to safety, health or public welfare by reason of inadequate maintenance, dilapidation, obsolescence, fire hazard, disaster, damage or abandonment is, for the purpose of this section, an unsafe use. Parapet walls, cornices, spires, towers, tanks, statuary and other appendages or structural members which are supported by, attached to, or a part of a building and which are in deteriorated condition or otherwise unable to sustain the design loads which are specified in this code are hereby designated as unsafe building appendages.

All such unsafe buildings, structures or appendages are hereby declared to be public nuisances and shall be abated by repair, rehabilitation, demolition or removal in accordance with the procedures set forth in the Dangerous Buildings Code or such alternate procedures as may have been or as may be adopted by this jurisdiction. As an alternative, the building official, or other employee or official of this jurisdiction as designated by the governing body, may institute any other appropriate action to prevent, restrain, correct or abate the violation.

SECTION 103 — VIOLATIONS

It shall be unlawful for any person, firm or corporation to erect, construct, enlarge, alter, repair, move, improve, remove, convert or demolish, equip, use, occupy or maintain any building or structure or cause or permit the same to be done in violation of this code.
SECTION 104 — ORGANIZATION AND ENFORCEMENT

104.1 Creation of Enforcement Agency. There is hereby established in this jurisdiction a code enforcement agency which shall be under the administrative and operational control of the building official.

104.2 Powers and Duties of Building Official.

104.2.1 General. The building official is hereby authorized and directed to enforce all the provisions of this code. For such purposes, the building official shall have the powers of a law enforcement officer.

The building official shall have the power to render interpretations of this code and to adopt and enforce rules and supplemental regulations in order to clarify the application of its provisions. Such interpretations, rules and regulations shall be in conformance with the intent and purpose of this code.

104.2.2 Deputies. In accordance with prescribed procedures and with the approval of the appointing authority, the building official may appoint such number of technical officers and inspectors and other employees as shall be authorized from time to time. The building official may deputize such inspectors or employees as may be necessary to carry out the functions of the code enforcement agency.

104.2.3 Right of entry. When it is necessary to make an inspection to enforce the provisions of this code, or when the building official has reasonable cause to believe that there exists in a building or upon a premises a condition which is contrary to or in violation of this code which makes the building or premises unsafe, dangerous or hazardous, the building official may enter the building or premises at reasonable times to inspect or to perform the duties imposed by this code, provided that if such building or premises be occupied that credentials be presented to the occupant and entry requested. If such building or premises be unoccupied, the building official shall first make a reasonable effort to locate the owner or other person having charge or control of the building or premises and request entry. If entry is refused, the building official shall have recourse to the remedies provided by law to secure entry.

104.2.4 Stop orders. Whenever any work is being done contrary to the provisions of this code, or other pertinent laws or ordinances implemented through the enforcement of this code, the building official may order the work stopped by notice in writing served on any persons engaged in the doing or causing such work to be done, and any such persons shall forthwith stop such work until authorized by the building official to proceed with the work.

104.2.5 Occupancy violations. Whenever any building or structure or equipment therein regulated by this code is being used contrary to the provisions of this code, the building official may order such use discontinued and the structure, or portion thereof, vacated by notice served on any person causing such use to be continued. Such person shall discontinue the use within the time prescribed by the building official after receipt of such notice to make the structure, or portion thereof, comply with the requirements of this code.

104.2.6 Liability. The building official charged with the enforcement of this code, acting in good faith and without malice in the discharge of the duties required by this code or other pertinent law or ordinance shall not thereby be rendered personally liable for damages that may accrue to persons or property as a result of an act or by reason of an act or omission in the discharge of such duties. A suit brought against the building official or employee because of such act or omission performed by the building official or employee in the enforcement of any provision of such codes or other pertinent laws or ordinances implemented through the enforcement of this code or enforced by the code enforcement agency shall be defended by this jurisdiction until final termination of such proceedings, and any judgment resulting therefrom shall be assumed by this jurisdiction.

This code shall not be construed to relieve from or lessen the responsibility of any person owning, operating or controlling any building or structure for any damages to persons or property caused by
defects, nor shall the code enforcement agency or its parent jurisdiction be held as assuming any such liability by reason of the inspections authorized by this code or any permits or certificates issued under this code.

104.2.7 Modifications. When there are practical difficulties involved in carrying out the provisions of this code, the building official may grant modifications for individual cases. The building official shall first find that a special individual reason makes the strict letter of this code impractical and that the modification is in conformance with the intent and purpose of this code and that such modification does not lessen any fire-protection requirements or any degree of structural integrity. The details of any action granting modifications shall be recorded and entered in the files of the code enforcement agency.

104.2.8 Alternate materials, alternate design and methods of construction. The provisions of this code are not intended to prevent the use of any material, alternate design or method of construction not specifically prescribed by this code, provided any alternate has been approved and its use authorized by the building official.

The building official may approve any such alternate, provided the building official finds that the proposed design is satisfactory and complies with the provisions of this code and that the material, method or work offered is, for the purpose intended, at least the equivalent of that prescribed in this code in suitability, strength, effectiveness, fire resistance, durability, safety and sanitation.

The building official shall require that sufficient evidence or proof be submitted to substantiate any claims that may be made regarding its use. The details of any action granting approval of an alternate shall be recorded and entered in the files of the code enforcement agency.

104.2.9 Tests. Whenever there is insufficient evidence of compliance with any of the provisions of this code or evidence that any material or construction does not conform to the requirements of this code, the building official may require tests as proof of compliance to be made at no expense to this jurisdiction.

Test methods shall be as specified by this code or by other recognized test standards. If there are no recognized and accepted test methods for the proposed alternate, the building official shall determine test procedures.

All tests shall be made by an approved agency. Reports of such tests shall be retained by the building official for the period required for the retention of public records.

104.2.10 Cooperation of other officials and officers. The building official may request, and shall receive, the assistance and cooperation of other officials of this jurisdiction so far as is required in the discharge of the duties required by this code or other pertinent law or ordinance.

SECTION 105 — BOARD OF APPEALS

105.1 General. In order to hear and decide appeals of orders, decisions or determinations made by the building official relative to the application and interpretation of this code, there shall be and is hereby created a board of appeals consisting of members who are qualified by experience and training to pass on matters pertaining to building construction and who are not employees of the jurisdiction. The building official shall be an ex officio member of and shall act as secretary to said board but shall have no vote on any matter before the board. The board of appeals shall be appointed by the governing body and shall hold office at its pleasure. The board shall adopt rules of procedure for conducting its business, and shall render all decisions and findings in writing to the appellant with a duplicate copy to the building official.

105.2 Limitations of Authority. The board of appeals shall have no authority relative to interpretation of the administrative provisions of this code nor shall the board be empowered to waive requirements of this code.
SECTION 106 — PERMITS

106.1 Permits Required. Except as specified in Section 106.2 of this section, no building or structure regulated by this code shall be erected, constructed, enlarged, altered, repaired, moved, improved, removed, converted or demolished unless a separate permit for each building or structure has first been obtained from the building official.

106.2 Work Exempt from Permit. A building permit shall not be required for the following:

1. One-story detached accessory buildings used as tool and storage sheds, playhouses and similar uses, provided the projected roof area does not exceed 120 square feet (11.15 m²).

2. Fences not over 6 feet (1829 mm) high.

3. Oil derricks.

4. Movable cases, counters and partitions not over 5 feet 9 inches (1753 mm) high.

5. Retaining walls which are not over 4 feet (1219 mm) in height measured from the bottom of the footing to the top of the wall, unless supporting a surcharge or impounding Class I, II or III-A liquids.

6. Water tanks supported directly upon grade if the capacity does not exceed 5,000 gallons (18 927 L) and the ratio of height to diameter or width does not exceed 2 to 1.

7. Platforms, walks and driveways not more than 30 inches (762 mm) above grade and not over any basement or story below.

8. Painting, papering and similar finish work.

9. Temporary motion picture, television and theater stage sets and scenery.

10. Window awnings supported by an exterior wall of Group R, Division 3, and Group U Occupancies when projecting not more than 54 inches (1372 mm).

11. Prefabricated swimming pools accessory to a Group R, Division 3 Occupancy in which the pool walls are entirely above the adjacent grade and if the capacity does not exceed 5,000 gallons (18 927 L).

Unless otherwise exempted, separate plumbing, electrical and mechanical permits will be required for the above-exempted items.

Exemption from the permit requirements of this code shall not be deemed to grant authorization for any work to be done in any manner in violation of the provisions of this code or any other laws or ordinances of this jurisdiction.

106.3 Application for Permit.

106.3.1 Application. To obtain a permit, the applicant shall first file an application therefor in writing on a form furnished by the code enforcement agency for that purpose. Every such application shall:

1. Identify and describe the work to be covered by the permit for which application is made.

2. Describe the land on which the proposed work is to be done by legal description, street address or similar description that will readily identify and definitely locate the proposed building or work.

3. Indicate the use or occupancy for which the proposed work is intended.

4. Be accompanied by plans, diagrams, computations and specifications and other data as required in Section 106.3.2.

5. State the valuation of any new building or structure or any addition, remodeling or alteration to an existing building.

6. Be signed by the applicant, or the applicant's authorized agent.
7. Give such other data and information as may be required by the building official.

106.3.2 Submittal documents. Plans, specifications, engineering calculations, diagrams, soil investigation reports, special inspection and structural observation programs and other data shall constitute the submittal documents and shall be submitted in one or more sets with each application for a permit. When such plans are not prepared by an architect or engineer, the building official may require the applicant submitting such plans or other data to demonstrate that state law does not require that the plans be prepared by a licensed architect or engineer. The building official may require plans, computations and specifications to be prepared and designed by an engineer or architect licensed by the state to practice as such even if not required by state law.

**EXCEPTION:** The building official may waive the submission of plans, calculations, construction inspection requirements and other data if it is found that the nature of the work applied for is such that reviewing of plans is not necessary to obtain compliance with this code.

106.3.3 Information on plans and specifications. Plans and specifications shall be drawn to scale upon substantial paper or cloth and shall be of sufficient clarity to indicate the location, nature and extent of the work proposed and show in detail that it will conform to the provisions of this code and all relevant laws, ordinances, rules and regulations.

Plans for buildings more than two stories in height of other than Group R, Division 3 and Group U Occupancies shall indicate how required structural and fire-resistive integrity will be maintained where penetrations will be made for electrical, mechanical, plumbing and communication conduits, pipes and similar systems.

106.3.4 Architect or engineer of record.

106.3.4.1 General. When it is required that documents be prepared by an architect or engineer, the building official may require the owner to engage and designate on the building permit application an architect or engineer who shall act as the architect or engineer of record. If the circumstances require, the owner may designate a substitute architect or engineer of record who shall perform all of the duties required of the original architect or engineer of record. The building official shall be notified in writing by the owner if the architect or engineer of record is changed or is unable to continue to perform the duties.

The architect or engineer of record shall be responsible for reviewing and coordinating all submittal documents prepared by others, including deferred submittal items, for compatibility with the design of the building.

106.3.4.2 Deferred submittals. For the purposes of this section, deferred submittals are defined as those portions of the design which are not submitted at the time of the application and which are to be submitted to the building official within a specified period.

Deferral of any submittal items shall have prior approval of the building official. The architect or engineer of record shall list the deferred submittals on the plans and shall submit the deferred submittal documents for review by the building official.

Submittal documents for deferred submittal items shall be submitted to the architect or engineer of record who shall review them and forward them to the building official with a notation indicating that the deferred submittal documents have been reviewed and that they have been found to be in general conformance with the design of the building. The deferred submittal items shall not be installed until their design and submittal documents have been approved by the building official.

106.3.5 Inspection and observation program. When special inspection is required by Section 1701, the architect or engineer of record shall prepare an inspection program which shall be submitted to the building official for approval prior to issuance of the building permit. The inspection program shall designate the portions of the work that require special inspection and the name or names of the individuals or firms who are to perform the special inspections, and indicate the duties of the special inspectors.
The special inspector shall be employed by the owner, the engineer or architect of record, or an agent of the owner, but not the contractor or any other person responsible for the work.

When structural observation is required by Section 1702, the inspection program shall name the individuals or firms who are to perform structural observation and describe the stages of construction at which structural observation is to occur.

The inspection program shall include samples of inspection reports and provide time limits for submission of reports.

106.4 Permits Issuance.

106.4.1 Issuance. The application, plans, specifications, computations and other data filed by an applicant for a permit shall be reviewed by the building official. Such plans may be reviewed by other departments of this jurisdiction to verify compliance with any applicable laws under their jurisdiction. If the building official finds that the work described in an application for a permit and the plans, specifications and other data filed therewith conform to the requirements of this code and other pertinent laws and ordinances, and that the fees specified in Section 107 have been paid, the building official shall issue a permit therefor to the applicant.

When the building official issues the permit where plans are required, the building official shall endorse in writing or stamp the plans and specifications APPROVED. Such approved plans and specifications shall not be changed, modified or altered without authorizations from the building official, and all work regulated by this code shall be done in accordance with the approved plans.

The building official may issue a permit for the construction of part of a building or structure before the entire plans and specifications for the whole building or structure have been submitted or approved, provided adequate information and detailed statements have been filed complying with all pertinent requirements of this code. The holder of a partial permit shall proceed without assurance that the permit for the entire building or structure will be granted.

106.4.2 Retention of plans. One set of approved plans, specifications and computations shall be retained by the building official for a period of not less than 90 days from date of completion of the work covered therein; and one set of approved plans and specifications shall be returned to the applicant, and said set shall be kept on the site of the building or work at all times during which the work authorized thereby is in progress.

106.4.3 Validity of permit. The issuance or granting of a permit or approval of plans, specifications and computations shall not be construed to be a permit for, or an approval of, any violation of any of the provisions of this code or of any other ordinance of the jurisdiction. Permits presuming to give authority to violate or cancel the provisions of this code or other ordinances of the jurisdiction shall not be valid.

The issuance of a permit based on plans, specifications and other data shall not prevent the building official from thereafter requiring the correction of errors in said plans, specifications and other data, or from preventing building operations being carried on thereunder when in violation of this code or of any other ordinances of this jurisdiction.

106.4.4 Expiration. Every permit issued by the building official under the provisions of this code shall expire by limitation and become null and void if the building or work authorized by such permit is not commenced within 180 days from the date of such permit, or if the building or work authorized by such permit is suspended or abandoned at any time after the work is commenced for a period of 180 days. Before such work can be recommenced, a new permit shall be first obtained to do so, and the fee therefor shall be one half the amount required for a new permit for such work, provided no changes have been made or will be made in the original plans and specifications for such work; and provided further that such suspension or abandonment has not exceeded one year. In order to renew action on a permit after expiration, the permittee shall pay a new full permit fee.

Any permittee holding an unexpired permit may apply for an extension of the time within which work may commence under that permit when the permittee is unable to commence work within the
time required by this section for good and satisfactory reasons. The building official may extend the
time for action by the permittee for a period not exceeding 180 days on written request by the per­mittee showing that circumstances beyond the control of the permittee have prevented action from
being taken. No permit shall be extended more than once.

106.4.5 Suspension or revocation. The building official may, in writing, suspend or revoke a per­mit issued under the provisions of this code whenever the permit is issued in error or on the basis of
incorrect information supplied, or in violation of any ordinance or regulation or any of the provi­sions of this code.

SECTION 107 — FEES

107.1 General. Fees shall be assessed in accordance with the provisions of this section or shall be
as set forth in the fee schedule adopted by the jurisdiction.

107.2 Permit Fees. The fee for each permit shall be as set forth in Table 1-A.

The determination of value or valuation under any of the provisions of this code shall be made by
the building official. The value to be used in computing the building permit and building plan re­view fees shall be the total value of all construction work for which the permit is issued, as well as all
finish work, painting, roofing, electrical, plumbing, heating, air conditioning, elevators, fire-extin­guishing systems and any other permanent equipment.

107.3 Plan Review Fees. When submittal documents are required by Section 106.3.2, a plan
review fee shall be paid at the time of submitting the submittal documents for plan review. Said plan
review fee shall be 65 percent of the building permit fee as shown in Table 1-A.

The plan review fees specified in this subsection are separate fees from the permit fees specified
in Section 107.2 and are in addition to the permit fees.

When submittal documents are incomplete or changed so as to require additional plan review or
when the project involves deferred submittal items as defined in Section 106.3.4.2, an additional
plan review fee shall be charged at the rate shown in Table 1-A.

107.4 Expiration of Plan Review. Applications for which no permit is issued within 180 days
following the date of application shall expire by limitation, and plans and other data submitted for
review may thereafter be returned to the applicant or destroyed by the building official. The build­ing official may extend the time for action by the applicant for a period not exceeding 180 days on
request by the applicant showing that circumstances beyond the control of the applicant have pre­vented action from being taken. No application shall be extended more than once. In order to renew
action on an application after expiration, the applicant shall resubmit plans and pay a new plan re­view fee.

107.5 Investigation Fees: Work without a Permit.

107.5.1 Investigation. Whenever any work for which a permit is required by this code has been
commenced without first obtaining said permit, a special investigation shall be made before a per­mit may be issued for such work.

107.5.2 Fee. An investigation fee, in addition to the permit fee, shall be collected whether or not a
permit is then or subsequently issued. The investigation fee shall be equal to the amount of the per­mit fee required by this code. The minimum investigation fee shall be the same as the minimum fee
set forth in Table 1-A. The payment of such investigation fee shall not exempt any person from com­pliance with all other provisions of this code nor from any penalty prescribed by law.

107.6 Fee Refunds. The building official may authorize refunding of any fee paid hereunder
which was erroneously paid or collected.

The building official may authorize refunding of not more than 80 percent of the permit fee paid
when no work has been done under a permit issued in accordance with this code.
The building official may authorize refunding of not more than 80 percent of the plan review fee paid when an application for a permit for which a plan review fee has been paid is withdrawn or canceled before any plan reviewing is done.

The building official shall not authorize refunding of any fee paid except on written application filed by the original permittee not later than 180 days after the date of fee payment.

SECTION 108 — INSPECTIONS

108.1 General. All construction or work for which a permit is required shall be subject to inspection by the building official and all such construction or work shall remain accessible and exposed for inspection purposes until approved by the building official. In addition, certain types of construction shall have continuous inspection as specified in Section 1701.5.

Approval as a result of an inspection shall not be construed to be an approval of a violation of the provisions of this code or of other ordinances of the jurisdiction. Inspections presuming to give authority to violate or cancel the provisions of this code or of other ordinances of the jurisdiction shall not be valid.

It shall be the duty of the permit applicant to cause the work to remain accessible and exposed for inspection purposes. Neither the building official nor the jurisdiction shall be liable for expense entailed in the removal or replacement of any material required to allow inspection.

A survey of the lot may be required by the building official to verify that the structure is located in accordance with the approved plans.

108.2 Inspection Record Card. Work requiring a permit shall not be commenced until the permit holder or an agent of the permit holder shall have posted or otherwise made available an inspection record card such as to allow the building official to conveniently make the required entries thereon regarding inspection of the work. This card shall be maintained available by the permit holder until final approval has been granted by the building official.

108.3 Inspection Requests. It shall be the duty of the person doing the work authorized by a permit to notify the building official that such work is ready for inspection. The building official may require that every request for inspection be filed at least one working day before such inspection is desired. Such request may be in writing or by telephone at the option of the building official.

It shall be the duty of the person requesting any inspections required by this code to provide access to and means for inspection of such work.

108.4 Approval Required. Work shall not be done beyond the point indicated in each successive inspection without first obtaining the approval of the building official. The building official, upon notification, shall make the inspections set forth in the following subsections.

There shall be a final inspection and approval of all buildings and structures when completed and ready for occupancy and use.

108.5 Required Inspections.

108.5.1 General. Reinforcing steel or structural framework of any part of any building or structure shall not be covered or concealed without first obtaining the approval of the building official.

The building official, upon notification, shall make the inspections set forth in the following subsections.

108.5.2 Foundation inspection. To be made after excavations for footings are complete and any required reinforcing steel is in place. For concrete foundations, any required forms shall be in place
prior to inspection. All materials for the foundation shall be on the job, except where concrete is ready mixed in accordance with U.B.C. Standard 19-3, the concrete need not be on the job. Where the foundation is to be constructed of approved treated wood, additional inspections may be required by the building official.

108.5.3 Concrete slab or under-floor inspection. To be made after all in-slab or under-floor building service equipment, conduit, piping accessories and other ancillary equipment items are in place, but before any concrete is placed or floor sheathing installed, including the subfloor.

108.5.4 Frame inspection. To be made after the roof, all framing, fire blocking and bracing are in place and all pipes, chimneys and vents are complete and the rough electrical, plumbing, and heating wires, pipes and ducts are approved.

108.5.5 Lath or gypsum board inspection. To be made after all lathing and gypsum board, interior and exterior, is in place, but before any plastering is applied or before gypsum board joints and fasteners are taped and finished.

108.5.6 Final inspection. To be made after finish grading and the building is completed and ready for occupancy.

108.6 Special Inspections. For special inspections, see Chapter 17.

108.7 Other Inspections. In addition to the called inspections specified above, the building official may make or require other inspections of any construction work to ascertain compliance with the provisions of this code and other laws which are enforced by the code enforcement agency.

108.8 Reinspections. A reinspection fee may be assessed for each inspection or reinspection when such portion of work for which inspection is called is not complete or when corrections called for are not made.

This subsection is not to be interpreted as requiring reinspection fees the first time a job is rejected for failure to comply with the requirements of this code, but as controlling the practice of calling for inspections before the job is ready for such inspection or reinspection.

Reinspection fees may be assessed when the inspection record card is not posted or otherwise available on the work site, the approved plans are not readily available to the inspector, for failure to provide access on the date for which inspection is requested, or for deviating from plans requiring the approval of the building official.

To obtain a reinspection, the applicant shall file an application therefor in writing on a form furnished for that purpose and pay the reinspection fee in accordance with Table 1-A or as set forth in the fee schedule adopted by the jurisdiction.

In instances where reinspection fees have been assessed, no additional inspection of the work will be performed until the required fees have been paid.

SECTION 109 — CERTIFICATE OF OCCUPANCY

109.1 Use and Occupancy. No building or structure shall be used or occupied, and no change in the existing occupancy classification of a building or structure or portion thereof shall be made until the building official has issued a certificate of occupancy therefor as provided herein.

EXCEPTION: Group R, Division 3 and Group U Occupancies.

Issuance of a certificate of occupancy shall not be construed as an approval of a violation of the provisions of this code or of other ordinances of the jurisdiction. Certificates presuming to give authority to violate or cancel the provisions of this code or other ordinances of the jurisdiction shall not be valid.

109.2 Change in Use. Changes in the character or use of a building shall not be made except as specified in Section 3405 of this code.
109.3 Certificate Issued. After the building official inspects the building or structure and finds no violations of the provisions of this code or other laws which are enforced by the code enforcement agency, the building official shall issue a certificate of occupancy which shall contain the following:

1. The building permit number.
2. The address of the building.
3. The name and address of the owner.
4. A description of that portion of the building for which the certificate is issued.
5. A statement that the described portion of the building has been inspected for compliance with the requirements of this code for the group and division of occupancy and the use for which the proposed occupancy is classified.
6. The name of the building official.

109.4 Temporary Certificate. If the building official finds that no substantial hazard will result from occupancy of any building or portion thereof before the same is completed, a temporary certificate of occupancy may be issued for the use of a portion or portions of a building or structure prior to the completion of the entire building or structure.

109.5 Posting. The certificate of occupancy shall be posted in a conspicuous place on the premises and shall not be removed except by the building official.

109.6 Revocation. The building official may, in writing, suspend or revoke a certificate of occupancy issued under the provisions of this code whenever the certificate is issued in error, or on the basis of incorrect information supplied, or when it is determined that the building or structure or portion thereof is in violation of any ordinance or regulation or any of the provisions of this code.
### TABLE 1-A—BUILDING PERMIT FEES

<table>
<thead>
<tr>
<th>TOTAL VALUATION</th>
<th>FEE</th>
</tr>
</thead>
<tbody>
<tr>
<td>$1.00 to $500.00</td>
<td>$21.00</td>
</tr>
<tr>
<td>$501.00 to $2,000.00</td>
<td>$21.00 for the first $500.00 plus $2.75 for each additional $100.00, or fraction thereof, to and including $2,000.00</td>
</tr>
<tr>
<td>$2,001.00 to $25,000.00</td>
<td>$62.25 for the first $2,000.00 plus $12.50 for each additional $1,000.00, or fraction thereof, to and including $25,000.00</td>
</tr>
<tr>
<td>$25,001.00 to $50,000.00</td>
<td>$349.75 for the first $25,000.00 plus $9.00 for each additional $1,000.00, or fraction thereof, to and including $50,000.00</td>
</tr>
<tr>
<td>$50,001.00 to $100,000.00</td>
<td>$574.75 for the first $50,000.00 plus $6.25 for each additional $1,000.00, or fraction thereof, to and including $100,000.00</td>
</tr>
<tr>
<td>$100,001.00 to $500,000.00</td>
<td>$887.25 for the first $100,000.00 plus $5.00 for each additional $1,000.00, or fraction thereof, to and including $500,000.00</td>
</tr>
<tr>
<td>$500,001.00 to $1,000,000.00</td>
<td>$2,887.25 for the first $500,000.00 plus $4.25 for each additional $1,000.00, or fraction thereof, to and including $1,000,000.00</td>
</tr>
<tr>
<td>$1,000,001.00 and up</td>
<td>$5,012.25 for the first $1,000,000.00 plus $2.75 for each additional $1,000.00, or fraction thereof</td>
</tr>
</tbody>
</table>

**Other Inspections and Fees:**

1. Inspections outside of normal business hours .......................... $42.00 per hour*
   (minimum charge—two hours)
2. Reinspection fees assessed under provisions of Section 108.8 .................................................. $42.00 per hour*
3. Inspections for which no fee is specifically indicated ...................... $42.00 per hour*
4. Additional plan review required by changes, additions or revisions to plans .............................................. $42.00 per hour*
   (minimum charge—one-half hour)
5. For use of outside consultants for plan checking and inspections, or both .................................................. Actual costs**

*Or the total hourly cost to the jurisdiction, whichever is the greatest. This cost shall include supervision, overhead, equipment, hourly wages and fringe benefits of the employees involved.
**Actual costs include administrative and overhead costs.
Chapter 2
DEFINITIONS AND ABBREVIATIONS

SECTION 201 -- DEFINITIONS

201.1 General. For the purpose of this code, certain terms, phrases, words and their derivatives shall be construed as specified in this chapter and elsewhere in this code where specific definitions are provided. Terms, phrases and words used in the singular include the plural and the plural the singular. Terms, phrases and words used in the masculine gender include the feminine and the feminine the masculine.

Where terms, phrases and words are not defined, they shall have their ordinary accepted meanings within the context with which they are used. Webster's Third New International Dictionary of the English Language, Unabridged, copyright 1986, shall be considered as providing ordinarily accepted meanings.

201.2 Standards of Quality.

201.2.1 General. The standards listed below labeled a "U.B.C. standard" are also listed in Chapter 35, Part II, and are part of this code. The other standards listed below are recognized standards (see Sections 3502 and 3503).

201.2.2 Noncombustible material.
   U.B.C. Standard 2-1, Noncombustible Material Test

201.2.3 Burning characteristics of building materials.
   3. U.B.C. Standard 26-5, Chamber Method of Test for Measuring the Density of Smoke from the Burning or Decomposition of Plastic Materials

201.2.4 Corrosives and irritants.
   1. 49 C.F.R. 173, Appendix A, Testing for Corrosiveness
   2. 16 C.F.R. 1500.41 and 1500.42, Methods of Testing Primary Irritant Substances and Test for Eye Irritants

201.2.5 Ranking of hazardous materials.

201.2.6 Classification of plastics.
   U.B.C. Standard 26-7, Method of Test for Determining Classification of Approved Light-transmitting Plastics

SECTION 202 -- A

ACCESS FLOOR SYSTEM is an assembly consisting of panels mounted on pedestals to provide an under-floor space for the installations of mechanical, electrical, communication or similar systems or to serve as an air-supply or return-air plenum.

ACI is the American Concrete Institute, Box 19150, Redford Station, Detroit, Michigan 48219.
ADDITION is an extension or increase in floor area or height of a building or structure.

AEROSOL is a product which is dispensed by a propellant from a metal can up to a maximum size of 33.8 fluid ounces (1000 mL) or a glass or plastic bottle up to a size of 4 fluid ounces (118.3 mL), other than a rim-vented container.

AGRICULTURAL BUILDING is a structure designed and constructed to house farm implements, hay, grain, poultry, livestock or other horticultural products. This structure shall not be a place of human habitation or a place of employment where agricultural products are processed, treated or packaged; nor shall it be a place used by the public.


ALLEY is any public way or thoroughfare less than 16 feet (4877 mm) but not less than 10 feet (3048 mm) in width which has been dedicated or deeded to the public for public use.

ALTER or ALTERATION is any change, addition or modification in construction or occupancy.

AMUSEMENT BUILDING. See Section 408.2.

ANSI is the American National Standards Institute, 1430 Broadway, New York, New York 10018.

APARTMENT HOUSE is any building or portion thereof which contains three or more dwelling units and, for the purpose of this code, includes residential condominiums.

APPROVED, as to materials and types of construction, refers to approval by the building official as the result of investigation and tests conducted by the building official, or by reason of accepted principles or tests by recognized authorities, technical or scientific organizations.

APPROVED AGENCY is an established and recognized agency regularly engaged in conducting tests or furnishing inspection services, when such agency has been approved.

APPROVED FABRICATOR is an established and qualified person, firm or corporation approved by the building official pursuant to Section 1701.7 of this code.

AREA. See "floor area."

ASSEMBLY BUILDING is a building or portion of a building used for the gathering together of 50 or more persons for such purposes as deliberation, education, instruction, worship, entertainment, amusement, drinking or dining or awaiting transportation.

ASTM is the American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, Pennsylvania 19428.

ATRIUM is an opening through two or more floor levels other than enclosed stairways, elevators, hoistways, escalators, plumbing, electrical, air-conditioning or other equipment, which is closed at the top and not defined as a mall. Floor levels, as used in this definition, do not include balconies within assembly occupancies or mezzanines which comply with Section 507.

AUTOMATIC, as applied to fire-protection devices, is a device or system providing an emergency function without the necessity of human intervention and activated as a result of a predetermined temperature rise, rate of rise of temperature or increase in the level of combustion products.

SECTION 203 — B

BALCONY is that portion of the seating space of an assembly room, the lowest part of which is raised 4 feet (1219 mm) or more above the level of the main floor and shall include the area providing access to the seating area or serving only as a foyer.

BALCONY, EXTERIOR EXIT. See Section 1001.2.
BASEMENT is any floor level below the first story in a building, except that a floor level in a building having only one floor level shall be classified as a basement unless such floor level qualifies as a first story as defined herein.

BOILER, HIGH-PRESSURE, is a boiler furnishing steam at pressures in excess of 15 pounds per square inch (psi) (103.3 kPa) or hot water at temperatures in excess of 250°F (121°C), or at pressures in excess of 160 psi (1002.4 kPa).

BOILER ROOM is any room containing a steam or hot-water boiler.

BUILDING is any structure used or intended for supporting or sheltering any use or occupancy.

BUILDING, EXISTING, is a building erected prior to the adoption of this code, or one for which a legal building permit has been issued.

BUILDING OFFICIAL is the officer or other designated authority charged with the administration and enforcement of this code, or the building official’s duly authorized representative.

BULK HANDLING is the transferring of flammable or combustible liquids from tanks or drums into smaller containers for distribution.

SECTION 204 — C

CAST STONE is a precast building stone manufactured from portland cement concrete and used as a trim, veneer or facing on or in buildings or structures.

CENTRAL HEATING PLANT is environmental heating equipment which directly utilizes fuel to generate heat in a medium for distribution by means of ducts or pipes to areas other than the room or space in which the equipment is located.


CHIEF OF THE FIRE DEPARTMENT is the head of the fire department or a regularly authorized deputy.

COMBUSTIBLE LIQUID. See the Fire Code.

CONGREGATE RESIDENCE is any building or portion thereof which contains facilities for living, sleeping and sanitation, as required by this code, and may include facilities for eating and cooking, for occupancy by other than a family. A congregate residence may be a shelter, convent, monastery, dormitory, fraternity or sorority house but does not include jails, hospitals, nursing homes, hotels or lodging houses.

CONDOMINIUM, RESIDENTIAL. See “apartment house.”

CONTROL AREA is a building or portion of a building within which the exempted amounts of hazardous materials may be stored, dispensed, handled or used.

CORROSIVE is a chemical that causes visible destruction of, or irreversible alterations in, living tissue by chemical action at the site of contact. A chemical is considered to be corrosive if, when tested on the intact skin of albino rabbits by the method described in the United States Department of Transportation in Appendix A to 49 C.F.R. 173, it destroys or changes irreversibly the structure of the tissue at the site of contact following an exposure period of four hours. This term shall not refer to action on inanimate surfaces.

COURT is a space, open and unobstructed to the sky, located at or above grade level on a lot and bounded on three or more sides by walls of a building.

SECTION 205 — D

DANGEROUS BUILDINGS CODE is the Uniform Code for the Abatement of Dangerous Buildings promulgated by the International Conference of Building Officials, as adopted by this jurisdiction.
DISPENSING is the pouring or transferring of any material from a container, tank or similar vessel, whereby vapors, dusts, fumes, mists or gases may be liberated to the atmosphere.

DISPERSEL AREA, SAFE. See Section 1021.2.

DRAFT STOP is a material, device or construction installed to restrict the movement of air within open spaces of concealed areas of building components such as crawl spaces, floor-ceiling assemblies, roof-ceiling assemblies and attics.

DWELLING is any building or portion thereof which contains not more than two dwelling units.

DWELLING UNIT is any building or portion thereof which contains living facilities, including provisions for sleeping, eating, cooking and sanitation, as required by this code, for not more than one family, or a congregate residence for 10 or less persons.

SECTION 206 — E

EFFICIENCY DWELLING UNIT is a dwelling unit containing only one habitable room.

ELECTRICAL CODE is the National Electrical Code promulgated by the National Fire Protection Association, as adopted by this jurisdiction.

ELEVATOR CODE is the safety code for elevators, dumbwaiters, escalators and moving walks as adopted by this jurisdiction (see Appendix Chapter 30).

EMERGENCY CONTROL STATION is an approved location on the premises of a Group H, Division 6 Occupancy where signals from emergency equipment are received and which is continually staffed by trained personnel.

EXISTING BUILDINGS. See "building, existing."

EXIT. See Section 1001.2.

EXIT COURT. See Section 1001.2.

EXIT PASSAGEWAY. See Section 1001.2.

SECTION 207 — F

FABRICATION AREA (fab area) is an area within a Group H, Division 6 Occupancy in which there are processes involving hazardous production materials and may include ancillary rooms or areas such as dressing rooms and offices that are directly related to the fab area processes.

FAMILY is an individual or two or more persons related by blood or marriage or a group of not more than five persons (excluding servants) who need not be related by blood or marriage living together in a dwelling unit.

FIRE ASSEMBLY. See Section 713.2.

FIRE CODE is the Uniform Fire Code promulgated by the International Fire Code Institute, as adopted by this jurisdiction.

FIRE RESISTANCE or FIRE-RESISTIVE CONSTRUCTION is construction to resist the spread of fire, details of which are specified in this code.

FIRE-RETARDANT-TREATED WOOD is any wood product impregnated with chemicals by a pressure process or other means during manufacture, and which, when tested in accordance with U.B.C. Standard 8-1 for a period of 30 minutes, shall have a flame spread of not over 25 and show no evidence of progressive combustion. In addition, the flame front shall not progress more than $10\frac{1}{2}$ feet (3200 mm) beyond the center line of the burner at any time during the test. Materials which may be exposed to the weather shall pass the accelerated weathering test and be identified as Exterior type, in accordance with U.B.C. Standard 23-5. Where material is not directly exposed to rainfall but exposed to high humidity conditions, it shall be subjected to the hygroscopic test and identified as Interior Type A in accordance with U.B.C. Standard 23-5.
All materials shall bear identification showing the fire performance rating thereof. Such identifications shall be issued by an approved agency having a service for inspection of materials at the factory.

**FLAMMABLE LIQUID.** See the Fire Code.

**FLOOR AREA** is the area included within the surrounding exterior walls of a building or portion thereof, exclusive of vent shafts and courts. The floor area of a building, or portion thereof, not provided with surrounding exterior walls shall be the usable area under the horizontal projection of the roof or floor above.

**FM** is Factory Mutual Engineering and Research, 1151 Boston-Providence Turnpike, Norwood, Massachusetts 02062.

**FOAM PLASTIC INSULATION** is a plastic which is intentionally expanded by the use of a foaming agent to produce a reduced-density plastic containing voids consisting of hollow spheres or interconnected cells distributed throughout the plastic for thermal insulating or acoustical purposes and which has a density less than 20 pounds per cubic foot (320 kg/m³).

**FOOTING** is that portion of the foundation of a structure which spreads and transmits loads directly to the soil or the piles.

**FRONT OF LOT** is the front boundary line of a lot bordering on the street and, in the case of a corner lot, may be either frontage.

**SECTION 208 — G**

**GARAGE** is a building or portion thereof in which a motor vehicle containing flammable or combustible liquids or gas in its tank is stored, repaired or kept.

**GARAGE, PRIVATE,** is a building or a portion of a building, not more than 1,000 square feet (93 m²) in area, in which only motor vehicles used by the tenants of the building or buildings on the premises are stored or kept. (See Section 312.)

**GARAGE, PUBLIC,** is any garage other than a private garage.

**GRADE (Adjacent Ground Elevation)** is the lowest point of elevation of the finished surface of the ground, paving or sidewalk within the area between the building and the property line or, when the property line is more than 5 feet (1524 mm) from the building, between the building and a line 5 feet (1524 mm) from the building.

**GRADE (Lumber)** is the classification of lumber in regard to strength and utility.

**GUARDRAIL** is a system of building components located near the open sides of elevated walking surfaces for the purpose of minimizing the possibility of an accidental fall from the walking surface to the lower level.

**GUEST** is any person hiring or occupying a room for living or sleeping purposes.

**GUEST ROOM** is any room or rooms used or intended to be used by a guest for sleeping purposes. Every 100 square feet (9.3 m²) of superficial floor area in a dormitory shall be considered to be a guest room.

**SECTION 209 — H**

**HABITABLE SPACE (ROOM)** is space in a structure for living, sleeping, eating or cooking. Bathrooms, toilet compartments, closets, halls, storage or utility space, and similar areas, are not considered habitable space.

**HANDLING** is the deliberate transport of materials by any means to a point of storage or use.

**HANDRAIL** is a railing provided for grasping with the hand for support. See also Section 208, definition of “guardrail.”
HAZARDOUS PRODUCTION MATERIAL (HPM) is a solid, liquid or gas that has a degree of hazard rating in health, flammability or reactivity of 3 or 4 and which is used directly in research, laboratory or production processes which have, as their end product, materials which are not hazardous.

HEALTH HAZARD is a classification of a chemical for which there is statistically significant evidence based on at least one study conducted in accordance with established scientific principles that acute or chronic health effects may occur in exposed persons. The term "health hazard" includes chemicals which are carcinogens, toxic or highly toxic agents, reproductive toxins, irritants, corrosives, sensitizers, hepatotoxins, nephrotoxins, neurotoxins, agents which act on the hematopoietic system, and agents which damage the lungs, skin, eyes or mucous membranes.

HEIGHT OF BUILDING is the vertical distance above a reference datum measured to the highest point of the coping of a flat roof or to the deck line of a mansard roof or to the average height of the highest gable of a pitched or hipped roof. The reference datum shall be selected by either of the following, whichever yields a greater height of building:

1. The elevation of the highest adjoining sidewalk or ground surface within a 5-foot (1524 mm) horizontal distance of the exterior wall of the building when such sidewalk or ground surface is not more than 10 feet (3048 mm) above lowest grade.

2. An elevation 10 feet (3048 mm) higher than the lowest grade when the sidewalk or ground surface described in Item 1 above is more than 10 feet (3048 mm) above lowest grade.

The height of a stepped or terraced building is the maximum height of any segment of the building.

HELIPORT is an area of land or water or a structural surface which is used, or intended for use, for the landing and take-off of helicopters, and any appurtenant areas which are used, or intended for use, for heliport buildings and other heliport facilities.

HELISTOP is the same as a heliport, except that no refueling, maintenance, repairs or storage of helicopters is permitted.

HIGHLY TOXIC MATERIAL is a material which produces a lethal dose or a lethal concentration which falls within any of the following categories:

1. A chemical that has a median lethal dose (LD₅₀) of 50 milligrams or less per kilogram of body weight when administered orally to albino rats weighing between 200 and 300 grams each.

2. A chemical that has a median lethal dose (LD₅₀) of 200 milligrams or less per kilogram of body weight when administered by continuous contact for 24 hours (or less if death occurs within 24 hours) with the bare skin of albino rabbits weighing between 2 and 3 kilograms each.

3. A chemical that has a median lethal concentration (LC₅₀) in air of 200 parts per million by volume or less of gas or vapor, or 2 milligrams per liter or less of mist, fume or dust, when administered by continuous inhalation for one hour (or less if death occurs within one hour) to albino rats weighing between 200 and 300 grams each.

Mixtures of these materials with ordinary materials, such as water, may not warrant a classification of highly toxic. While this system is basically simple in application, any hazard evaluation which is required for the precise categorization of this type of material shall be performed by experienced, technically competent persons.

HORIZONTAL EXIT. See Section 1001.2.

HOTEL is any building containing six or more guest rooms intended or designed to be used, or which are used, rented or hired out to be occupied, or which are occupied for sleeping purposes by guests.

HOT-WATER-HEATING BOILER is a boiler having a volume exceeding 120 gallons (454.2 L), or a heat input exceeding 200,000 Btu/h (149 540 kW), or an operating temperature exceeding 210°F. (99°C.) that provides hot water to be used externally to itself.
HPM STORAGE ROOM is a room used for the storage or dispensing of hazardous production materials (HPM) and which is classified as a Group H, Division 2, 3 or 7 Occupancy.

SECTION 210 — I

IRRITANT is a chemical which is not corrosive but which causes a reversible inflammatory effect on living tissue by chemical action at the site of contact. A chemical is a skin irritant if, when tested on the intact skin of albino rabbits by the methods of 16 C.F.R. 1500.41 for four hours’ exposure or by other appropriate techniques, it results in an empirical score of 5 or more. A chemical is an eye irritant if so determined under the procedure listed in 16 C.F.R. 1500.42 or other appropriate techniques.

SECTION 211 — J

JURISDICTION, as used in this code, is any political subdivision which adopts this code for administrative regulations within its sphere of authority.

SECTION 212 — K

No definitions.

SECTION 213 — L

LINTEL is a structural member placed over an opening or a recess in a wall and supporting construction above.

LIQUID is any material which has a fluidity greater than that of 300 penetration asphalt when tested in accordance with the Uniform Fire Code Standards. When not otherwise identified, the term “liquid” is both flammable and combustible liquids.

LIQUID STORAGE ROOM is a room classified as a Group H, Division 3 Occupancy used only for the storage of flammable or combustible liquids in a closed condition. The quantities of flammable or combustible liquids in storage shall not exceed the limits set forth in the Fire Code.

LIQUID STORAGE WAREHOUSE is a Group H, Division 3 Occupancy used only for the storage of flammable or combustible liquids in an unopened condition. The quantities of flammable or combustible liquids stored are not limited.

LISTED and LISTING are terms referring to equipment or materials included in a list published by an approved testing laboratory, inspection agency or other organization concerned with product evaluation that maintains periodic inspection of current productions of listed equipment or materials. The published list shall state that the material or equipment complies with approved nationally recognized codes, standards or tests and has been tested or evaluated and found suitable for use in a specified manner.

LOADS. See Chapter 16.

LODGING HOUSE is any building or portion thereof containing not more than five guest rooms where rent is paid in money, goods, labor or otherwise.

LOW-PRESSURE HOT-WATER-HEATING BOILER is a boiler furnishing hot water at pressures not exceeding 160 psi (1102.4 kPa) and at temperatures not exceeding 250°F (121°C).

LOW-PRESSURE STEAM-HEATING BOILER is a boiler furnishing steam at pressures not exceeding 15 psi (103.4 kPa).

SECTION 214 — M

MARQUEE is a permanent roofed structure attached to and supported by the building and projecting over public property. Marquees are regulated in Chapter 32.
MASONRY is that form of construction composed of stone, brick, concrete, gypsum, hollow-clay tile, concrete block or tile, glass block or other similar building units or materials or combination of these materials laid up unit by unit and set in mortar.

MASONRY, SOLID, is masonry of solid units built without hollow spaces.

MECHANICAL CODE is the Uniform Mechanical Code promulgated by the International Conference of Building Officials, as adopted by this jurisdiction.

MEMBRANE PENETRATION FIRE STOP is a material, device or construction installed to resist, for a prescribed time period, the passage of flame, heat and hot gases through openings in a protective membrane in order to accommodate cables, cable trays, conduit, tubing, pipes or similar items.

MEZZANINE or MEZZANINE FLOOR is an intermediate floor placed within a room.

MOTEL shall mean hotel as defined in this code.

MOTOR VEHICLE FUEL DISPENSING STATION is that portion of a building where flammable or combustible liquids or gases used as motor fuels are stored and dispensed from fixed equipment into the fuel tanks of motor vehicles.

SECTION 215 — N

NONCOMBUSTIBLE as applied to building construction material means a material which, in the form in which it is used, is either one of the following:

1. Material of which no part will ignite and burn when subjected to fire. Any material conforming to U.B.C. Standard 2-1 shall be considered noncombustible within the meaning of this section.

2. Material having a structural base of noncombustible material as defined in Item 1 above, with a surfacing material not over 1/8 inch (3.2 mm) thick which has a flame-spread rating of 50 or less.

"Noncombustible" does not apply to surface finish materials. Material required to be noncombustible for reduced clearances to flues, heating appliances or other sources of high temperature shall refer to material conforming to Item 1. No material shall be classed as noncombustible which is subject to increase in combustibility or flame-spread rating, beyond the limits herein established, through the effects of age, moisture or other atmospheric condition.

Flame-spread rating as used herein refers to rating obtained according to tests conducted as specified in U.B.C. Standard 8-1.

SECTION 216 — O

OCCUPANCY is the purpose for which a building, or part thereof, is used or intended to be used.

ORIEL WINDOW is a window which projects from the main line of an enclosing wall of a building and is carried on brackets or corbels.

OWNER is any person, agent, firm or corporation having a legal or equitable interest in the property.

SECTION 217 — P

PANIC HARDWARE. See Section 1001.2.

PEDESTRIAN WALKWAY is a walkway used exclusively as a pedestrian trafficway.

PENETRATION FIRE STOP is a through-penetration fire stop or a membrane-penetration fire stop.

PERMIT is an official document or certificate issued by the building official authorizing performance of a specified activity.
PERSON is a natural person, heirs, executors, administrators or assigns, and also includes a firm, partnership or corporation, its or their successors or assigns, or the agent of any of the aforesaid.

PHOTOLUMINESCENT is the property of emitting light as the result of absorption of visible or invisible light, which continues for a length of time after excitation.

PLASTIC MATERIALS, APPROVED, other than foam plastics regulated under Sections 601.5.5 and 2602, are those plastic materials having a self-ignition temperature of 650°F. (343 °C.) or greater as determined in accordance with U.B.C. Standard 26-6, and a smoke-density rating not greater than 450 when tested in accordance with U.B.C. Standard 8-1, in the way intended for use, or a smoke-density rating not greater than 75 when tested in accordance with U.B.C. Standard 26-5 in the thickness intended for use. Approved plastics shall be classified as either CC1 or CC2 in accordance with U.B.C. Standard 26-7. See also Section 207, definition of "foam plastic insulation."

PLATFORM. See Section 405.1.2.

PLUMBING CODE is the Plumbing Code, as adopted by this jurisdiction.

PROTECTIVE MEMBRANE is a surface material which forms the required outer layer or layers of a fire-resistive assembly containing concealed spaces.

PUBLIC WAY. See Section 1001.2.

SECTION 218 — Q

No definitions.

SECTION 219 — R

REPAIR is the reconstruction or renewal of any part of an existing building for the purpose of its maintenance.

SECTION 220 — S

SELF-LUMINOUS means powered continuously by a self-contained power source other than a battery or batteries, such as radioactive tritium gas. A self-luminous sign is independent of external power supplies or other energy for its operation.

SENSITIZER is a chemical that causes a substantial proportion of exposed people or animals to develop an allergic reaction in normal tissue after repeated exposure to the chemical.

SERVICE CORRIDOR is a fully enclosed passage used for transporting hazardous production materials and for purposes other than required exiting.

SHAFT is an interior space, enclosed by walls or construction, extending through one or more stories or basements which connects openings in successive floors, or floors and roof, to accommodate elevators, dumbwaiters, mechanical equipment or similar devices or to transmit light or ventilation air.

SHAFT ENCLOSURE is the walls or construction forming the boundaries of a shaft.

SHALL, as used in this code, is mandatory.

SMOKE DETECTOR is an approved, listed device that senses visible or invisible particles of combustion.

STAGE. See Chapter 4.

STORY is that portion of a building included between the upper surface of any floor and the upper surface of the floor next above, except that the topmost story shall be that portion of a building 1–20
included between the upper surface of the topmost floor and the ceiling or roof above. If the finished floor level directly above a usable or unused under-floor space is more than 6 feet (1829 mm) above grade as defined herein for more than 50 percent of the total perimeter or is more than 12 feet (3658 mm) above grade as defined herein at any point, such usable or unused under-floor space shall be considered as a story.

STORY, FIRST, is the lowest story in a building which qualifies as a story, as defined herein, except that a floor level in a building having only one floor level shall be classified as a first story, provided such floor level is not more than 4 feet (1219 mm) below grade, as defined herein, for more than 50 percent of the total perimeter, or not more than 8 feet (2438 mm) below grade, as defined herein, at any point.

STREET is any thoroughfare or public way not less than 16 feet (4877 mm) in width which has been dedicated or deeded to the public for public use.

STRUCTURAL OBSERVATION means the visual observation of the structural system, for general conformance to the approved plans and specifications, at significant construction stages and at completion of the structural system. Structural observation does not include or waive the responsibility for the inspections required by Section 108, 1701 or other sections of this code.

STRUCTURE is that which is built or constructed, an edifice or building of any kind, or any piece of work artificially built up or composed of parts joined together in some definite manner.

SURGICAL AREA is the preoperating, operating, recovery and similar rooms within an outpatient health-care center.

SECTION 221 — T

THROUGH-PENETRATION FIRE STOP is a material, device or construction installed to resist, for a prescribed time period, the passage of flame, heat and hot gases through openings which penetrate the entire fire-resistive assembly in order to accommodate cables, cable trays, conduit, tubing, pipes or similar items.

TRAVEL DISTANCE. See Section 1001.2.

SECTION 222 — U

U.B.C. STANDARDS are those standards published in Volume 3 of the Uniform Building Code promulgated by the International Conference of Building Officials, as adopted by this jurisdiction. (See Chapter 35.)

UL is the Underwriters Laboratories Inc., 333 Pfingsten Road, Northbrook, Illinois 60062.

USE with reference to flammable or combustible liquids is the placing in action or service of flammable or combustible liquids whereby flammable vapors may be liberated to the atmosphere.

USE with reference to hazardous materials other than flammable or combustible liquids is the placing in action or making available for service by opening or connecting any container utilized for confinement of material whether a solid, liquid or gas.

USE, CLOSED SYSTEM, is use of a solid or liquid hazardous material in a closed vessel or system that remains closed during normal operations where vapors emitted by the product are not liberated outside of the vessel or system and the product is not exposed to the atmosphere during normal operations; and all uses of compressed gases. Examples of closed systems for solids and liquids include product conveyed through a piping system into a closed vessel, system or piece of equipment; and reaction process operations.

USE, OPEN SYSTEM, is use of a solid or liquid hazardous material in a vessel or system that is continuously open to the atmosphere during normal operations and where vapors are liberated, or the product is exposed to the atmosphere during normal operations. Examples of open systems for
solids and liquids include dispensing from or into open beakers or containers, dip tank and plating tank operations.

SECTION 223 — V

VALUE or VALUATION of a building shall be the estimated cost to replace the building and structure in kind, based on current replacement costs, as determined in Section 107.2.

VENIER. See Section 1403.2.

SECTION 224 — W

WALLS shall be defined as follows:

Bearing Wall is any wall meeting either of the following classifications:
(a) Any metal or wood stud wall which supports more than 100 pounds per lineal foot (0.445 kN per lineal meter) of superimposed load.
(b) Any masonry or concrete wall which supports more than 200 pounds per lineal foot (0.89 kN per lineal meter) superimposed load, or any such wall supporting its own weight for more than one story.

Exterior Wall is any wall or element of a wall, or any member or group of members, which defines the exterior boundaries or courts of a building and which has a slope of 60 degrees or greater with the horizontal plane.

Faced Wall is a wall in which the masonry facing and backing are so bonded as to exert a common action under load.

Nonbearing Wall is any wall that is not a bearing wall.

Parapet Wall is that part of any wall entirely above the roof line.

Retaining Wall is a wall designed to resist the lateral displacement of soil or other materials.

WATER HEATER is an appliance designed primarily to supply hot water and is equipped with automatic controls limiting water temperature to a maximum of 210°F (98.9°C).

WEATHER-EXPOSED SURFACES are all surfaces of walls, ceilings, floors, roofs, soffits and similar surfaces exposed to the weather, excepting the following:
1. Ceilings and roof soffits enclosed by walls or by beams which extend a minimum of 12 inches (305 mm) below such ceiling or roof soffits.
2. Walls or portions of walls within an unenclosed roof area, when located a horizontal distance from an exterior opening equal to twice the height of the opening.
3. Ceiling and roof soffits beyond a horizontal distance of 10 feet (3048 mm) from the outer edge of the ceiling or roof soffits.

WINDOW WELL is a soil-retaining structure at a window having a sill height lower than the adjacent ground elevation.

SECTION 225 — X

No definitions.

SECTION 226 — Y

YARD is an open space, other than a court, unobstructed from the ground to the sky, except where specifically provided by this code, on the lot on which a building is situated.
SECTION 227 — Z

No definitions.
Chapter 3
USE OR OCCUPANCY

SECTION 301 — OCCUPANCY CLASSIFIED

Every building, whether existing or hereafter erected, shall be classified by the building official according to its use or the character of its occupancy, as set forth in Table 3-A, as a building of one of the following occupancy groups:

- Group A—Assembly (See Section 303.1.1)
- Group B—Business (See Section 304.1)
- Group E—Educational (See Section 305.1)
- Group F—Factory and Industrial (See Section 306.1)
- Group H—Hazardous (See Section 307.1)
- Group I—Institutional (See Section 308.1)
- Group M—Mercantile (See Section 309.1)
- Group R—Residential (See Section 310.1)
- Group S—Storage (See Section 311.1)
- Group U—Utility (See Section 312.1)

Any occupancy not mentioned specifically or about which there is any question shall be classified by the building official and included in the group which its use most nearly resembles, based on the existing or proposed fire and life hazard.

For changes in use, see Section 3405.

SECTION 302 — MIXED USE OR OCCUPANCY

302.1 General. When a building is used for more than one occupancy purpose, each part of the building comprising a distinct "occupancy," as described in Section 301 shall be separated from any other occupancy as specified in Section 302.4.

EXCEPTIONS: 1. When an approved spray booth constructed in accordance with the Fire Code is installed, such booth need not be separated from Group B, F, H, M or S Occupancies.

2. The following occupancies need not be separated from the uses to which they are accessory:
   2.1. Assembly rooms having a floor area of not over 750 square feet (69.7 m²).
   2.2. Administrative and clerical offices and similar rooms which do not exceed 25 percent of the floor area of the major use when not related to Group H, Division 2 and Group H, Division 3 Occupancies.
   2.3. Gift shops, administrative offices and similar rooms in Group R, Division 1 Occupancies not exceeding 10 percent of the floor area of the major use.
   2.4. The kitchen serving the dining area of which it is a part.
   2.5. Customer waiting rooms not exceeding 450 square feet (41.8 m²) when not related to Group H Occupancies and when such waiting rooms have an exit directly to the exterior.

3. An occupancy separation need not be provided between a Group R, Division 3 Occupancy and a carport having no enclosed uses above, provided the carport is entirely open on two or more sides.

4. A Group S, Division 3 Occupancy used exclusively for the parking or storage of private or pleasure-type motor vehicles need not be separated from a Group S, Division 4 Occupancy open parking garage as defined in Section 311.1.

When a building houses more than one occupancy, each portion of the building shall conform to the requirements for the occupancy housed therein.
An occupancy shall not be located above the story or height set forth in Table 5-B, except as provided in Section 306. When a mixed occupancy building contains a Group H, Division 6 Occupancy, the portion containing the Group H, Division 6 Occupancy shall not exceed three stories or 55 feet (16 764 mm) in height.

302.2 **Forms of Occupancy Separations.** Occupancy separations shall be vertical or horizontal or both, when necessary, of such other form as may be required to afford a complete separation between the various occupancy divisions in the building.

Where the occupancy separation is horizontal, structural members supporting the separation shall be protected by equivalent fire-resistive construction.

302.3 **Types of Occupancy Separations.** Occupancy separations shall be classed as "four-hour fire-resistive," "three-hour fire-resistive," "two-hour fire-resistive," and "one-hour fire-resistive."

1. A four-hour fire-resistive occupancy separation shall have no openings therein and shall not be of less than four-hour fire-resistive construction.

2. A three-hour fire-resistive occupancy separation shall not be of less than three-hour fire-resistive construction. All openings in walls forming such separation shall be protected by a fire assembly having a three-hour fire-protection rating. The total width of all openings in any three-hour fire-resistive occupancy separation wall in any one story shall not exceed 25 percent of the length of the wall in that story and no single opening shall have an area greater than 120 square feet (11 m²).

All openings in floors forming a three-hour fire-resistive occupancy separation shall be protected by vertical shaft, stairway, ramp or escalator enclosures extending above and below such openings. The walls of such vertical enclosures shall be of not less than two-hour fire-resistive construction and all openings therein shall be protected by a fire assembly having a one- and one-half-hour fire-protection rating.

**EXCEPTION:** When the walls of such vertical enclosure extending below the three-hour fire-resistive occupancy separation to the foundation are provided with a fire-resistive rating of not less than three hours with openings therein protected as required for walls forming three-hour occupancy separations, the enclosure walls extending above such floor used as the three-hour fire-resistive occupancy separation may have a one-hour fire-resistive rating provided:

1. The occupancy above is not required to be of Type I or Type II fire-resistive construction, and

2. The enclosure walls do not enclose an exit stairway, a ramp or an escalator required to have enclosure walls of not less than two-hour fire-resistive construction.

3. A two-hour fire-resistive occupancy separation shall not be of less than two-hour fire-resistive construction. All openings in such separation shall be protected by a fire assembly having a one- and one-half-hour fire-protection rating.

4. A one-hour fire-resistive occupancy separation shall not be of less than one-hour fire-resistive construction. All openings in such separation shall be protected by a fire assembly having a one-hour fire-protection rating.

302.4 **Fire Ratings for Occupancy Separations.** Occupancy separations shall be provided between the various groups and divisions of occupancies as set forth in Table 3-B. For required separation of specific uses in Group I, Division 1 hospitals and nursing homes, see Table 3-C. See also Section 304.6.1.

**EXCEPTIONS:** 1. A three-hour occupancy separation may be used between a Group A, Division 1 and a Group S, Division 3 Occupancy used exclusively for the parking or storage of private or pleasure-type motor vehicles provided no repair or fueling is done. A two-hour occupancy separation may be used between a Group A, Division 2, 2.1, 3 or 4 or E or I Occupancy and a Group S, Division 3 Occupancy used exclusively for the parking or storage of private or pleasure-type motor vehicles provided no repair or fueling is done. 2. Unless required by Section 311.2.2, the three-hour occupancy separation between a Group R, Division 1 Occupancy and a Group S, Division 3 Occupancy used only for the parking or storage of private or pleasure-type motor vehicles with no repair or fueling may be reduced to two hours.
may be further reduced to one hour where the area of such Group S, Division 3 Occupancy does not exceed 3,000 square feet (279 m²).
3. In the one-hour occupancy separation between Group R, Division 3 and Group U Occupancies, the separation may be limited to the installation of materials approved for one-hour fire-resistive construction on the garage side and a self-closing, tight-fitting solid-wood door 13/8 inches (35 mm) in thickness, or a self-closing, tight-fitting door having a fire-protection rating of not less than 20 minutes when tested in accordance with Part II of U.B.C. Standard 7-2, which is a part of this code, is permitted in lieu of a one-hour fire assembly. Fire dampers need not be installed in air ducts passing through the wall, floor or ceiling separating a Group R, Division 3 Occupancy from a Group U Occupancy, provided such ducts within the Group U Occupancy are constructed of steel having a thickness not less than 0.019 inch (0.48 mm) (No. 26 galvanized sheet gage) and have no openings into the Group U Occupancy.
4. Group H, Division 2 and Group H, Division 3 Occupancies need not be separated from Group H, Division 7 Occupancies when such occupancies also comply with the requirements for a Group H, Division 7 Occupancy.

302.5 Heating Equipment Room Occupancy Separation. In Groups A; B; E; F; I; M; R, Division 1; and S Occupancies, rooms containing a boiler, central heating plant or hot-water supply boiler shall be separated from the rest of the building by not less than a one-hour occupancy separation.

EXCEPTIONS: 1. In Groups A, B, E, F, M and S Occupancies, boilers, central heating plants or hot-water supply boilers where the largest piece of fuel equipment does not exceed 400,000 Btu per hour (117.2 kW) input.
2. In Group R, Division 1 Occupancies, a separation need not be provided for such rooms with equipment serving only one dwelling unit.

In Group E Occupancies, when the opening for a heater or equipment room is protected by a pair of fire doors, the inactive leaf shall be normally secured in the closed position and shall be openable only by the use of a tool. An astragal shall be provided and the active leaf shall be self-closing.

In Group H Occupancies, rooms containing a boiler, central heating plant or hot-water supply boiler shall be separated from the rest of the building by not less than a two-hour occupancy separation. In Divisions 1 and 2, there shall be no openings in such occupancy separation except for necessary ducts and piping.

For opening in exterior walls of equipment rooms in Groups A, E or I Occupancies, see Section 303.8.

302.6 Water Closet Room Separation. A room in which a water closet is located shall be separated from food preparation or storage rooms by a tight-fitting door.

SECTION 303 — REQUIREMENTS FOR GROUP A OCCUPANCIES

303.1 General.

303.1.1 Group A Occupancies defined. Group A Occupancies include the use of a building or structure, or a portion thereof, for the gathering together of 50 or more persons for purposes such as civic, social or religious functions, recreation, education or instruction, food or drink consumption, or awaiting transportation. A room or space used for assembly purposes by less than 50 persons and accessory to another occupancy shall be included as a part of that major occupancy. Assembly occupancies shall include the following:

Division 1. A building or portion of a building having an assembly room with an occupant load of 1,000 or more and a legitimate stage.

Division 2. A building or portion of a building having an assembly room with an occupant load of less than 1,000 and a legitimate stage.

Division 2.1. A building or portion of a building having an assembly room with an occupant load of 300 or more without a legitimate stage, including such buildings used for educational purposes and not classed as Group B or E Occupancies.

Division 3. A building or portion of a building having an assembly room with an occupant load of less than 300 without a legitimate stage, including such buildings used for educational purposes and not classed as Group B or E Occupancies.
Division 4. Stadiums, reviewing stands and amusement park structures not included within other Group A Occupancies. Specific and general requirements for grandstands, bleachers and reviewing stands are to be found in Chapter 10.

303.1.2 Occupancy separations. For occupancy separations, see Table 3-B.

303.1.3 Amusement buildings. Amusement buildings shall conform with the requirements of this code for their occupancy classification in addition to the provisions set forth in Sections 408, 904.2.3 and 1013.6.

EXCEPTION: Amusement buildings or portions thereof which are without walls or a roof and constructed to prevent the accumulation of smoke in assembly areas.

303.2 Construction, Height and Allowable Area.

303.2.1 General. Unless otherwise specified in this section, buildings or portions of buildings classed in Group A Occupancy, because of the use or character of the occupancy, shall be limited to the types of construction set forth in Table 5-B, and shall not exceed in area or height the limits specified in Sections 504, 505 and 506.

303.2.2 Special provisions.

The roof-framing system for the roof-ceiling assembly in one-story portions of buildings of Type II One-hour, Type III One-hour or Type V One-hour construction may be of unprotected construction when such roof-framing system is open to the assembly area and does not contain concealed spaces.

Stages and platforms shall be constructed in accordance with the provisions of Section 405.

The slope of the main floor of an assembly room shall not exceed the slope permitted in Section 1007.

Group A assembly rooms having an aggregate occupant load of 1,000 or more shall not be located in a basement, except basements in buildings of Type I or Type II-F.R. construction.

Gymnasiums and similar occupancies may have floor surfaces constructed of wood or unprotected steel or iron.

In gymnasiums having an area not greater than 3,200 square feet (297 m²), 1-inch (25 mm) nominal thickness tight tongue-and-grooved boards or 3/4-inch (19 mm) plywood wall covering may be used on the inner side in lieu of fire-resistive plaster.

For attic space partitions and draft stops, see Section 708.

303.2.2.1 Division 2.1 provisions. Division 2.1 Occupancies with an occupant load of 1,000 or more shall be of Type I, Type II-F.R., Type II One-hour, Type III One-hour or Type IV construction, except that the roof-framing system for one-story portions of buildings of Type II One-hour or Type III One-hour construction may be of unprotected construction when such roof-framing system is open to the assembly area and does not contain concealed spaces.

303.2.2.2 Division 3 provisions. Division 3 Occupancies located in a basement or above the first floor shall not be of less than one-hour fire-resistive construction.

Division 3 Occupancies with an occupant load of 50 or more which are located over usable space shall be separated from such space by not less than one-hour fire-resistive construction.

For Division 3 Occupancies with a Group S, Division 3 parking garage in the basement or first floor, see Section 311.2.2.

303.2.2.3 Division 4 provisions. Grandstands, bleachers or reviewing stands of Type III One-hour, Type IV or Type V One-hour construction shall not exceed 40 feet (12 192 mm) to the highest level of seat boards; 20 feet (6096 mm) in cases where construction is Type III-N or Type V-N; and 12 feet (3658 mm) in cases where construction is with combustible members in the structural frame and located indoors.
Division 4 structures other than Type III-N and Type V-N grandstands, bleachers, reviewing stands and folding and telescoping seating of open skeleton-frametype without roof, cover or enclosed usable space are not limited in area or height.

Erection and structural maintenance shall conform to these special requirements as well as with other applicable provisions of this code.

When the space under a Division 4 Occupancy is used for any purpose, including exits, it shall be separated from all parts of such Division 4 Occupancy, including exits, by walls, floor and ceiling of not less than one-hour fire-resistant construction.

**EXCEPTIONS:**
1. Exits under temporary grandstands need not be separated.
2. The underside of continuous steel deck grandstands when erected outdoors need not be fire protected when occupied for public toilets.

The building official may cause Division 4 structures to be reinspected at least once every six months.

Grandstands, bleachers or folding and telescoping seating may have seat boards, toeboards, bearing or base pads and footboards of combustible materials regardless of construction type.

Seating and exiting requirements for reviewing stands, grandstands, bleachers, and folding and telescoping seating are provided under Section 1021.

**303.3 Location on Property.** Buildings housing Group A Occupancies shall front directly on or have access to a public street not less than 20 feet (6096 mm) in width. The access to the public street shall be a minimum 20-foot-wide (6096 mm) right-of-way, unobstructed and maintained only as access to the public street. The main entrance to the building shall be located on a public street or on the access way.

For fire-resistive protection of exterior walls and openings, as determined by location on property, see Section 503 and Chapter 6.

**303.4 Access and Exit Facilities.** Exits shall be provided as specified in Chapter 10. (For special exiting requirements, see Section 1016.) Access to, and egress from, buildings required to be accessible shall be provided as specified in Chapter 11.

For amusement buildings, see Section 408.

**303.5 Light, Ventilation and Sanitation.** Light and ventilation shall be in accordance with Chapter 12. The number of plumbing fixtures shall not be less than specified in Section 2902.2.

**303.6 Shaft and Exit Enclosures.** Exits shall be enclosed as specified in Chapter 10.

Elevator shafts, vent shafts and other vertical openings shall be enclosed and the enclosure shall be as specified in Section 711.

**303.7 Sprinkler and Standpipe Systems.** When required by Section 904.2.1 or other provisions of this code, automatic sprinkler systems and standpipes shall be designed and installed as specified in Chapter 9.

**303.8 Special Hazards.** Stages shall be equipped with automatic ventilators as required in Section 405.3.3.

Chimneys and heating apparatus shall conform to the requirements of Chapter 31 of this code and the Mechanical Code.

Motion picture machine booths shall conform to the requirements of Section 408.

Proscenium curtains shall conform to the requirements set forth in U.B.C. Standard 4-1, which is a part of this code. (See Chapter 35, Part II.)

Class I, II or III-A liquids shall not be placed or stored in any Group A Occupancy.

When heating equipment rooms are required to be separated in accordance with Section 302.5, exterior openings in a boiler room or room containing central heating equipment if located below
openings in another story or if less than 10 feet (3048 mm) from other doors or windows of the same building shall be protected by a fire assembly having a three-fourths-hour fire-protection rating. Such fire assemblies shall be fixed, automatic or self-closing. For heating equipment occupancy separation see Section 302.5.

303.9 Fire Alarm Systems. An approved fire alarm system shall be installed as set forth in the Fire Code in Group A, Divisions 1, 2 and 2.1 Occupancies.

For amusement building alarm systems see Section 408.5.1.

SECTION 304 — REQUIREMENTS FOR GROUP B OCCUPANCIES

304.1 Group B Occupancies Defined.

Group B Occupancies shall include buildings, structures, or portions thereof, for office, professional or service-type transactions, which are not classified as Group H Occupancies. Such occupancies include occupancies for the storage of records and accounts, and eating and drinking establishments with an occupant load of less than 50. Business occupancies shall include, but not be limited to, the following:

1. Animal hospitals, kennels, pounds.
2. Automobile and other motor vehicle showrooms.
4. Barber shops.
5. Beauty shops.
6. Car washes.
7. Civic administration.
8. Outpatient clinic and medical offices (where five or less patients in a tenant space are incapable of unassisted self-preservation).
9. Dry cleaning pick-up and delivery stations and self-service.
10. Educational occupancies above the 12th grade.
11. Electronic data processing.
12. Fire stations.
13. Florists and nurseries.
14. Laboratories—testing and research.
15. Laundry pick-up and delivery stations and self-service.
17. Post offices.
18. Print shops.
19. Professional services such as attorney, dentist, physician, engineer.
21. Telephone exchanges.

For occupancy separations, see Table 3-B.

304.2 Construction, Height and Allowable Area.

304.2.1 General. Buildings or parts of buildings classed as Group B Occupancies because of the use or character of the occupancy shall be limited to the types of construction set forth in Table 5-B.
Such occupancies shall not exceed, in area or height, the limits specified in Sections 504, 505 and 506 and shall comply with the provisions of this section.

304.2.2 Special provisions.

304.2.2.1 Laboratories and vocational shops. Laboratories and vocational shops in buildings used for educational purposes, and similar areas containing hazardous materials, shall be separated from each other and other portions of the building by not less than a one-hour fire-resistant occupancy separation. When the quantities of hazardous materials in such uses do not exceed those listed in Table 3-D or 3-E, the requirements of Sections 307.5 and 307.8 shall apply. When the quantities of hazardous materials in such uses exceed those listed in Table 3-D or 3-E, the use shall be classified as the appropriate Group H Occupancy.

Occupants in laboratories having an area in excess of 200 square feet (18.6 m²) shall have access to at least two exits from the room and all portions of the room shall be within 75 feet (22860 mm) of an exit.

304.2.2.2 Amusement buildings. Amusement buildings with an occupant load of less than 50 shall comply with Section 408.

304.3 Location on Property. For fire-resistant protection of exterior walls and openings, as determined by location on property, see Section 503 and Chapter 6.

304.4 Access and Exit Facilities. Exits shall be provided as specified in Chapter 10. See also Section 304.2.2.1 for exits from laboratories.

Access to, and egress from, buildings required to be accessible shall be provided as specified in Chapter 11.

304.5 Light, Ventilation and Sanitation. Light, ventilation and sanitation shall be in accordance with Chapters 12 and 29 and this section.

304.5.1 Ventilation of flammable vapors. See Section 1202.2.2 for ventilation of flammable vapors.

304.5.2 Sanitation. The number of plumbing fixtures shall not be less than specified in Section 2902.3.

304.6 Shaft and Exit Enclosures. Exits shall be enclosed as specified in Chapter 10.

Elevator shafts, vent shafts and other openings through floors shall be enclosed, and the enclosure shall be as specified in Section 711.

In buildings housing Group B Occupancies equipped with automatic sprinkler systems throughout, enclosures need not be provided for escalators where the top of the escalator opening at each story is provided with a draft curtain and automatic fire sprinklers are installed around the perimeter of the opening within 2 feet (610 mm) of the draft curtain. The draft curtain shall enclose the perimeter of the unenclosed opening and extend from the ceiling downward at least 12 inches (305 mm) on all sides. The spacing between sprinklers shall not exceed 6 feet (1829 mm).

304.7 Sprinkler and Standpipe Systems. When required by Section 904.2.1 or other provisions of this code, automatic sprinkler systems and standpipes shall be installed as specified in Chapter 9.

304.8 Special Hazards. Chimneys and heating apparatus shall conform to the requirements of Chapter 31 of this code and the Mechanical Code.

Storage and use of flammable and combustible liquids shall be in accordance with the Fire Code.

Devices generating a glow, spark or flame capable of igniting flammable vapors shall be installed such that sources of ignition are at least 18 inches (457 mm) above the floor of any room in which Class I flammable liquids or flammable gases are used or stored.
SECTION 305 — REQUIREMENTS FOR GROUP E OCCUPANCIES

305.1 Group E Occupancies Defined. Group E Occupancies shall be:

Division 1. Any building used for educational purposes through the 12th grade by 50 or more persons for more than 12 hours per week or four hours in any one day.

Division 2. Any building used for educational purposes through the 12th grade by less than 50 persons for more than 12 hours per week or four hours in any one day.

Division 3. Any building or portion thereof used for day-care purposes for more than six persons.

For occupancy separations, see Table 3-B.

305.2 Construction, Height and Allowable Area.

305.2.1 General. Buildings or parts of buildings classed in Group E because of the use or character of the occupancy shall be limited to the types of construction set forth in Table 5-B and shall not exceed, in area or height, the limits specified in Sections 504, 505 and 506, except that the area may be increased by 50 percent when the maximum travel distance specified in Section 1003.4 is reduced by 50 percent.

305.2.2 Atmospheric separation requirements.

305.2.2.1 Definitions. For the purpose of this chapter and Section 1017, the following definitions are applicable:

COMMON ATMOSPHERE. A common atmosphere exists between rooms, spaces or areas within a building which are not separated by an approved smoke- and draft-stop barrier.

SEPARATE ATMOSPHERE. A separate atmosphere exists between rooms, spaces or areas that are separated by an approved smoke barrier.

SMOKE BARRIER. A smoke barrier consists of walls, partitions, floors and openings therein as will prevent the transmission of smoke or gases through the construction. See Section 905.

305.2.2.2 General provisions. The provisions of this section apply when a separate exit system is required in accordance with Section 1017.

Walls, partitions and floors forming all or part of an atmospheric separation shall be as required by Section 905.2.3. Glass lights of approved wired glass set in steel frames may be installed in such walls or partitions.

All automatic-closing fire assemblies installed in the atmospheric separation shall be activated by approved smoke detectors.

The specific requirements of this section are not intended to prevent the design or use of other systems, equipment or techniques which will effectively prevent the products of combustion from breaching the atmospheric separation.

305.2.3 Special provisions. Rooms in Divisions 1 and 2 Occupancies used for kindergarten, first- or second-grade pupils, and Division 3 Occupancies shall not be located above or below the first story.

EXCEPTIONS: 1. Basements or stories having floor levels located within 4 feet (1219 mm), measured vertically, from adjacent ground level at the point of exit, provided the basement or story has exits directly to the exterior at that level.

2. In buildings equipped with an automatic sprinkler system throughout, rooms used for kindergarten, first- and second-grade children or for day-care purposes may be located on the second story, provided there are at least two exits directly to the exterior for the exclusive use of such occupants.

3. Division 3 Occupancies may be located above the first story in buildings of Type I construction and in Types II-F.R., II One-hour and III One-hour construction, subject to the limitation of Section 506 when:

3.1 Division 3 Occupancies with children under the age of seven or containing more than 12 children per story shall not be located above the fourth floor; and
3.2 The entire story in which the day-care facility is located is equipped with an approved manual fire alarm and smoke-detection system. (See the Fire Code.) Activation of an initiating device shall sound an audible alarm throughout the entire story. When a building fire alarm system is required by other provisions of this code or the Fire Code, the alarm system shall be connected to the building alarm system.

An approved alarm signal shall sound at an approved location in the day-care occupancy to indicate a fire alarm or sprinkler flow condition in other portions of the building; and

3.3 The day-care facility, if more than 1,000 square feet (92.9 m²) in area, is divided into at least two compartments of approximately the same size by a smoke barrier with door openings protected by smoke- and draft-control assemblies having a fire-protection rating of not less than 20 minutes. Smoke barriers shall have a fire-resistive rating of not less than one hour. In addition to the requirements of Section 302, occupancy separations between Division 3 Occupancies and other occupancies shall be constructed as smoke barriers. Door openings in the smoke barrier shall be tight fitting with gaskets installed as required by Section 1005, and shall be automatic closing by actuation of the automatic sprinklers, fire alarm or smoke-detection system. Openings for ducts and other heating, ventilating and air-conditioning openings shall be equipped with a minimum Class I, 250°F (121°C) smoke damper as defined and tested in accordance with approved recognized standards. See Chapter 35, Part III. The damper shall close upon detection of smoke by an approved smoke detector located within the duct, or upon the activation of the fire alarm system; and

3.4 Each compartment formed by the smoke barrier has not less than two exits, one of which is permitted to pass through the adjoining compartment; and

3.5 At least one exit from the Division 3 Occupancy shall be into a separate exiting system as defined in Section 1017; and

3.6 The building is equipped with an automatic sprinkler system throughout.

Stages and platforms shall be constructed in accordance with Chapter 4. For attic space partitions and draft stops, see Section 708.

305.2.4 Special hazards. Laboratories, vocational shops and similar areas containing hazardous materials shall be separated from each other and from other portions of the building by not less than a one-hour fire-resistive occupancy separation. When the quantities of hazardous materials in such uses do not exceed those listed in Table 3-D or 3-E, the requirements of Sections 307.5.2 and 307.8 shall apply. When the quantities of hazardous materials in such uses exceed those listed in Table 3-D or 3-E, the use shall be classified as the appropriate Group H Occupancy.

See Section 1017.7 for exiting from laboratories in Group E Occupancies.

Equipment in rooms or groups of rooms sharing a common atmosphere where flammable liquids, combustible dust or hazardous materials are used, stored, developed or handled shall conform to the requirements of the Fire Code.

305.3 Location on Property. All buildings housing Group E Occupancies shall front directly on or have access to a public street not less than 20 feet (6096 mm) in width. The access to the public street shall be a minimum 20-foot-wide (6096 mm) right-of-way, unobstructed and maintained only as access to the public street. At least one required exit shall be located on the public street or on the access way.

For fire-resistive protection of exterior walls and openings, as determined by location on property, see Section 503 and Chapter 6.

305.4 Access and Exit Facilities. Exits shall be provided as specified in Chapter 10. (For special provisions see Section 1017.)

Access to, and egress from, buildings required to be accessible shall be provided as specified in Chapter 11.

305.5 Light, Ventilation and Sanitation. All portions of Group E Occupancies customarily occupied by human beings shall be provided with light and ventilation, either natural or artificial, as specified in Chapter 12. See Section 1012 for required exit illumination.

The number of urinals and drinking fountains shall be as specified in Section 2902.4.
305.6 Shaft and Exit Enclosures. Exits shall be enclosed as specified in Chapter 10. Elevator shafts, vent shafts and other vertical openings shall be enclosed, and the enclosure shall be as specified in Section 711.

305.7 Sprinkler and Standpipe Systems. When required by Section 904.2.1 or other provisions of this code, automatic sprinkler systems and standpipes shall be designed and installed as specified in Chapter 9.

305.8 Special Hazards. Chimneys and heating apparatus shall conform to the requirements of Chapter 31 of this code and the Mechanical Code.

Motion picture machine rooms shall conform to the requirements of Chapter 4.

All exterior openings in a boiler room or rooms containing central heating equipment, if located below openings in another story or if less than 10 feet (3048 mm) from other doors or windows of the same building, shall be protected by a fire assembly having a three-fourths-hour fire-protection rating. Such fire assemblies shall be fixed, automatic closing or self-closing.

Class I, II or III-A liquids shall not be placed, stored or used in Group E Occupancies, except in approved quantities as necessary in laboratories and classrooms and for operation and maintenance as set forth in the Fire Code.

305.9 Fire Alarm Systems. An approved fire alarm system shall be provided for Group E Occupancies with an occupant load of 50 or more persons. In Group E Occupancies provided with an automatic sprinkler or detection system, the operation of such system shall automatically activate the school fire alarm system, which shall include an alarm mounted on the exterior of the building.

See Chapter 10 for smoke-detection requirements.

For installation requirements, see the Fire Code.

SECTION 306 — REQUIREMENTS FOR GROUP F OCCUPANCIES

306.1 Group F Occupancies Defined. Group F Occupancies shall include the use of a building or structure, or a portion thereof, for assembling, disassembling, fabricating, finishing, manufacturing, packaging, repair or processing operations that are not classified as Group H Occupancies. Factory and industrial occupancies shall include the following:

Division 1. Moderate-hazard factory and industrial occupancies shall include factory and industrial uses which are not classified as Group F, Division 2 Occupancies, but are not limited to facilities producing the following:

1. Aircraft.
2. Appliances.
3. Athletic equipment.
5. Bakeries.
6. Alcoholic beverages.
7. Bicycles.
8. Boats.
11. Canvas or similar fabric.
12. Cameras and photo equipment.
13. Carpets and rugs, including cleaning.
15. Construction and agricultural machinery.
16. Dry cleaning and dyeing.
17. Electronics assembly.
18. Engines, including rebuilding.
20. Food processing.
22. Hemp products.
24. Laundries.
25. Leather products.
26. Machinery.
27. Metal.
28. Motion pictures and television filming and videotaping.
29. Musical instruments.
30. Optical goods.
31. Paper mills or products.
32. Plastic products.
33. Printing or publishing.
34. Recreational vehicles.
35. Refuse incineration.
36. Shoes.
37. Soaps and detergents.
38. Tobacco.
39. Trailers.
40. Wood, distillation.
41. Millwork (sash and door).
42. Woodworking, cabinet.

Division 2. Low-hazard factory and industrial occupancies shall include facilities producing noncombustible or nonexplosive materials which, during finishing, packing or processing, do not involve a significant fire hazard, including, but not limited to, the following:

1. Nonalcoholic beverages.
2. Brick and masonry.
3. Ceramic products.
4. Foundries.
5. Glass products.
7. Steel products—fabrication and assembly.
   For occupancy separations, see Table 3-B.

306.2 Construction, Height and Allowable Area.

306.2.1 General. Buildings or parts of buildings classed as Group F Occupancies because of the
   use or character of the occupancies shall be limited to the types of construction set forth in Table 5-B
   and shall not exceed, in area or height, the limits specified in Sections 504, 505 and 506.

306.2.2 Special provisions, Group F, Division 2 roof framing. In Division 2 Occupancies, the
   roof-framing system may be of unprotected construction.

306.3 Location on Property. For fire-resistive protection of exterior walls and openings, as
determined by location on property, see Section 503.

306.4 Access and Exit Facilities. Exits shall be provided as specified in Chapter 10.
   Access to, and egress from, buildings required to be accessible shall be provided as specified in
   Chapter 11.

306.5 Light, Ventilation and Sanitation. In Group F Occupancies, light, ventilation and sanita­
tion shall be as specified in Chapters 12 and 29.

306.6 Shaft and Exit Enclosures. Exits shall be enclosed as specified in Chapter 10.
   Elevator shafts, vent shafts and other openings through floors shall be enclosed, and the enclo­
sure shall be as specified in Section 711.
   EXCEPTION: In Group F, Division 2 Occupancies, exits shall be enclosed as specified in Chapter 10, but
   other through-floor openings need not be enclosed.
   In buildings housing Group F Occupancies equipped with automatic sprinkler systems through­
   out, enclosures need not be provided for escalators where the top of the escalator opening at each
   story is provided with a draft curtain and automatic fire sprinklers are installed around the perimeter
   of the opening within 2 feet (610 mm) of the draft curtain. The draft curtain shall enclose the perim­
  eter of the enclosed opening and extend from the ceiling downward at least 12 inches (305 mm)
on all sides. The spacing between sprinklers shall not exceed 6 feet (1829 mm).

306.7 Sprinkler and Standpipe Systems. When required by Section 904.2 or other provisions of
   this code, automatic sprinkler systems and standpipes shall be installed as specified in Chapter 9.

306.8 Special Hazards. For special hazards of Group F Occupancies, see Section 304.8.
   Storage and use of flammable and combustible liquids shall be in accordance with the Fire Code.
   Buildings erected or converted to house high-piled combustible stock or aerosols shall comply
   with the Fire Code.
   Equipment, machinery or appliances which generate finely divided combustible waste or which
   use finely divided combustible material shall be equipped with an approved method of collection
   and removal. An automatic sprinkler system shall be installed in woodworking occupancies over
   2,500 square feet (232.3 m²) in area containing such operations.

SECTION 307 — REQUIREMENTS FOR GROUP H OCCUPANCIES

307.1 Group H Occupancies Defined.

307.1.1 General. Group H Occupancies shall include buildings or structures, or portions thereof,
that involve the manufacturing, processing, generation or storage of materials that constitute a high
fire, explosion or health hazard. For definitions, identification and control of hazardous materials
307.1.1

and pesticides, and the display of nonflammable solid and nonflammable and noncombustible liquid hazardous materials in Group B, F, M or S Occupancies, see the Fire Code. For the application and use of control areas, see Footnote 1 of Tables 3-D and 3-E. Group H Occupancies shall be:

Division 1. Occupancies with a quantity of material in the building in excess of those listed in Table 3-D which present a high explosion hazard, including, but not limited to:

1. Explosives, blasting agents, fireworks and black powder.
   
   EXCEPTION: Storage and the use of pyrotechnic special effect materials in motion picture, television, theatrical and group entertainment production when under permit as required in the Fire Code. The time period for storage shall not exceed 90 days.

2. Unclassified detonatable organic peroxides.
3. Class 4 oxidizers.
4. Class 4 or Class 3 detonatable unstable (reactive) materials.

Division 2. Occupancies where combustible dust is manufactured, used or generated in such a manner that concentrations and conditions create a fire or explosion potential; occupancies with a quantity of material in the building in excess of those listed in Table 3-D, which present a moderate explosion hazard or a hazard from accelerated burning, including, but not limited to:

1. Class I organic peroxides.
2. Class 3 non-detonatable unstable (reactive) materials.
3. Pyrophoric gases.
4. Flammable or oxidizing gases.
5. Class I, II or III-A flammable or combustible liquids which are used or stored in normally open containers or systems, or in closed containers or systems pressurized at more than 15-pounds-per-square-inch (103.4 kPa) gage.
   
   EXCEPTION: Aerosols.

6. Class 3 oxidizers.
7. Class 3 water-reactive materials.

Division 3. Occupancies where flammable solids, other than combustible dust, are manufactured, used or generated.

Division 3 Occupancies also include uses in which the quantity of material in the building in excess of those listed in Table 3-D presents a high physical hazard, including, but not limited to:

1. Class II, III or IV organic peroxides.
2. Class 1 or 2 oxidizers.

3. Class I, II or III-A flammable or combustible liquids which are used or stored in normally closed containers or systems and containers or systems pressurized at 15-pounds-per-square-inch gage or less, and aerosols.

4. Class III-B combustible liquids.
5. Pyrophoric liquids or solids.
6. Class 1 or 2 water-reactive materials.
7. Flammable solids in storage.
8. Flammable or oxidizing cryogenic fluids (other than inert).
9. Class 1 unstable (reactive) gas or Class 2 unstable (reactive) materials.

Division 4. Repair garages not classified as Group S, Division 3 Occupancies.

Division 5. Aircraft repair hangars not classified as Group S, Division 5 Occupancies and heliports.

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Division 6. Semiconductor fabrication facilities and comparable research and development areas in which hazardous production materials (HPM) are used and the aggregate quantity of materials are in excess of those listed in Table 3-D or 3-E. Such facilities and areas shall be designed and constructed in accordance with Section 307.11.

Division 7. Occupancies having quantities of materials in excess of those listed in Table 3-E that are health hazards, including:

1. Corrosives.
2. Toxic and highly toxic materials.
3. Irritants.
4. Sensitizers.
5. Other health hazards.

307.1.2 Multiple hazards. When a hazardous material has multiple hazards, all hazards shall be addressed and controlled in accordance with the provisions of this chapter.

307.1.3 Liquid use, dispensing and mixing rooms. Rooms in which Class I, Class II and Class III-A flammable or combustible liquids are used, dispensed or mixed in open containers shall be constructed in accordance with the requirements for a Group H, Division 2 Occupancy and the following:

1. Rooms in excess of 500 square feet (46.5 m²) shall have at least one exterior door approved for fire department access.
2. Rooms shall be separated from other areas by an occupancy separation having a fire-resistive rating of not less than one hour for rooms up to 150 square feet (13.9 m²) in area and not less than two hours where the room is more than 150 square feet (13.9 m²) in area. Separations from other occupancies shall not be less than required by Section 302 and Table 3-B.
3. Shelving, racks and wainscoting in such areas shall be of noncombustible construction or wood not less than 1-inch (25 mm) nominal thickness.
4. Liquid use, dispensing and mixing rooms shall not be located in basements.

307.1.4 Liquid storage rooms. Rooms in which Class I, Class II and Class III-A flammable or combustible liquids are stored in closed containers shall be constructed in accordance with the requirements for a Group H, Division 3 Occupancy and to the following:

1. Rooms in excess of 500 square feet (46.5 m²) shall have at least one exterior door approved for fire department access.
2. Rooms shall be separated from other areas by an occupancy separation having a fire-resistive rating of not less than one hour for rooms up to 150 square feet (13.9 m²) in area and not less than two hours where the room is more than 150 square feet (13.9 m²) in area. Separations from other occupancies shall not be less than required by Section 302 and Table 3-B.
3. Shelving, racks and wainscoting in such areas shall be of noncombustible construction or wood not less than 1-inch (25 mm) nominal thickness.
4. Rooms used for the storage of Class I flammable liquids shall not be located in a basement.

307.1.5 Flammable or combustible liquid storage warehouses. Liquid storage warehouses in which Class I, Class II and Class III-A flammable or combustible liquids are stored in closed containers shall be constructed in accordance with the requirements for a Group H, Division 3 Occupancy and the following:

1. Liquid storage warehouses shall be separated from all other uses by a four-hour area separation wall.
2. Shelving, racks and wainscoting in such warehouses shall be of noncombustible construction or wood not less than 1-inch (25 mm) nominal thickness.
3. Rooms used for the storage of Class I flammable liquids shall not be located in a basement.

307.1.6 Requirement for report. The building official may require a technical opinion and report to identify and develop methods of protection from the hazards presented by the hazardous material. The opinion and report shall be prepared by a qualified person, firm or corporation approved by the building official and shall be provided without charge to the enforcing agency.

The opinion and report may include, but is not limited to, the preparation of a hazardous material management plan (HMMP); chemical analysis; recommendations for methods of isolation, separation, containment or protection of hazardous materials or processes, including appropriate engineering controls to be applied; the extent of changes in the hazardous behavior to be anticipated under conditions of exposure to fire or from hazard control procedures; and the limitations or conditions of use necessary to achieve and maintain control of the hazardous materials or operations. The report shall be entered into the files of the code enforcement agencies. Proprietary and trade secret information shall be protected under the laws of the state or jurisdiction having authority.

307.2 Construction, Height and Allowable Area.

307.2.1 General. Buildings or parts of buildings classed in Group H because of the use or character of the occupancy shall be limited to the types of construction set forth in Table 5-B and shall not exceed, in area or height, the limits specified in Sections 504, 505 and 506.

307.2.2 Floors. Except for surfacing, floors in areas containing hazardous materials and in areas where motor vehicles, boats, helicopters or airplanes are stored, repaired or operated shall be of noncombustible, liquid-tight construction.

EXCEPTION: In Group H, Divisions 4 and 5 Occupancies, floors may be surfaced or waterproofed with asphaltic paving materials in that portion of the facility where no repair work is done.

307.2.3 Spill control. When required by the Fire Code, floors shall be recessed a minimum of 4 inches (102 mm) or shall be provided with a liquid-tight raised sill with a minimum height of 4 inches (102 mm) so as to prevent the flow of liquids to adjoining areas. Except for surfacing, the sill shall be constructed of noncombustible material, and the liquid-tight seal shall be compatible with the material being stored. When liquid-tight sills are provided, they may be omitted at door openings by the installation of an open-grate trench which connects to an approved drainage system.

307.2.4 Drainage. When required by the Fire Code, the room, building or area shall be provided with a drainage system to direct the flow of liquids to an approved location or, the room, building or area shall be designed to provide secondary containment for the hazardous materials and fire-protection water.

Drains from the area shall be sized to carry the sprinkler system design flow rate over the sprinkler system design area. The slope of drains shall not be less than 1 percent. Materials of construction for the drainage system shall be compatible with the stored materials.

Incompatible materials shall be separated from each other in the drain systems. They may be combined when they have been rendered acceptable for discharge by an approved means into the public sewer. Drainage of spillage and fire-protection water directed to a neutralizer or treatment system shall comply with the following:

1. The system shall be designed to handle the maximum worst-case spill from the single largest container plus the volume of fire-protection water from the system over the minimum design area for a period of 20 minutes.

2. Overflow from the neutralizer or treatment system shall be provided to direct liquid leakage and fire-protection water to a safe location away from the building, any material or fire-protection control valve, means of egress, adjoining property, or fire department access roadway.

307.2.5 Containment. When required by the Fire Code, drains shall be directed to a containment system or other location designed as secondary containment for the hazardous material liquids and
fire-protection water, or the building, room or area shall be designed to provide secondary containment of hazardous material liquids and fire-protection water through the use of recessed floors or liquid-tight raised sills.

Secondary containment shall be designed to retain the spill from the largest single container plus the design flow rate of the sprinkler system for the area of the room or area in which the storage is located or the sprinkler system design area, whichever is smaller. The containment capacity shall be capable of containing the flow for a period of 20 minutes.

Overflow from the secondary containment system shall be provided to direct liquid leakage and fire-protection water to a safe location away from the building, any material or fire-protection control valve, means of egress, fire access roadway, adjoining property or storm drains.

If the storage area is open to rainfall, the secondary containment shall be designed to accommodate the volume of a 24-hour rainfall as determined by a 25-year storm.

When secondary containment is required, a monitoring method capable of detecting hazardous material leakage from the primary containment into the secondary containment shall be provided. When visual inspection of the primary containment is not practical, other approved means of monitoring may be provided. When secondary containment may be subject to the intrusion of water, a monitoring method for such water shall be provided. Whenever monitoring devices are provided, they shall be connected to distinct visual or audible alarms.

307.2.6 Smoke and heat vents. Smoke and heat venting shall be provided in areas containing hazardous materials as set forth in the Fire Code in addition to the provisions of this code.

307.2.7 Standby power. Standby power shall be provided in Group H, Divisions 1 and 2 Occupancies and in Group H, Division 3 Occupancies in which Class I or II organic peroxides are stored. The standby power system shall be designed and installed in accordance with the Electrical Code to automatically supply power to all required electrical equipment when the normal electrical supply system is interrupted.

307.2.8 Emergency power. An emergency power system shall be provided in Group H, Divisions 6 and 7 Occupancies. The emergency power system shall be designed and installed in accordance with the Electrical Code to automatically supply power to all required electrical equipment when the normal electrical supply system is interrupted.

The exhaust system may be designed to operate at not less than one half the normal fan speed on the emergency power system when it is demonstrated that the level of exhaust will maintain a safe atmosphere.

307.2.9 Special provisions for Group H, Division 1 Occupancies. Group H, Division 1 Occupancies shall be in buildings used for no other purpose, without basements, crawl spaces or other under-floor spaces. Roofs shall be of lightweight construction with suitable thermal insulation to prevent sensitive material from reaching its decomposition temperature.

Group H, Division 1 Occupancies containing materials which are in themselves both physical and health hazards in quantities exceeding the exempt amounts in Table 3-E shall comply with requirements for both Group H, Division 1 and Group H, Division 7 Occupancies.

307.2.10 Special provisions for Group H, Divisions 2 and 3 Occupancies. Group H, Divisions 2 and 3 Occupancies containing quantities of hazardous materials in excess of those set forth in Table 3-G shall be in buildings used for no other purpose, shall not exceed one story in height and shall be without basements, crawl spaces or other under-floor spaces.

Group H, Divisions 2 and 3 Occupancies containing water-reactive materials shall be resistant to water penetration. Piping for conveying liquids shall not be over or through areas containing water reactives, unless isolated by approved liquid-tight construction.

EXCEPTION: Fire-protection piping may be installed over reactives without isolation.
307.2.11 Special provisions for Group H, Division 4 Occupancies. A Division 4 Occupancy having a floor area not exceeding 2,500 square feet (232 m²) may have exterior walls of not less than two-hour fire-resistive construction when less than 5 feet (1524 mm) from a property line and of not less than one-hour fire-resistive construction when 5 feet (1524 mm) or more but less than 20 feet (6096 mm) from a property line.

307.2.12 Special provisions for Group H, Division 6 Occupancies. See Section 307.11.

307.3 Location on Property. Group H Occupancies shall be located on property in accordance with Section 503, Table 3-F and other provisions of this chapter. In Group H, Division 2 or 3 Occupancies, not less than 25 percent of the perimeter wall of the occupancy shall be an exterior wall.

EXCEPTIONS: 1. Liquid use, dispensing and mixing rooms having a floor area of not more than 500 square feet (46.5 m²) need not be located on the outer perimeter of the building when they are in accordance with Section 307.1.3.

2. Liquid storage rooms having a floor area of not more than 1,000 square feet (93 m²) need not be located on the outer perimeter when they are in accordance with Section 307.1.4.

3. Spray paint booths which comply with the Fire Code need not be located on the outer perimeter.

307.4 Access and Exit Facilities. Exits shall be provided as specified in Chapter 10. (For special provisions see Section 1018.)

Access to, and egress from, buildings required to be accessible shall be provided as specified in Chapter 11.

307.5 Light, Ventilation and Sanitation.

307.5.1 General. Light, ventilation and sanitation in Group H Occupancies shall comply with requirements in this section and Chapters 12 and 29.

307.5.2 Ventilation in hazardous locations. See Section 1202.2.3 for ventilation requirements in hazardous locations.

307.5.3 Ventilation in Group H, Division 4 Occupancies. See Section 1202.2.4 for ventilation requirements in Group H, Division 4 Occupancies.

307.5.4 Sanitation. The number of plumbing fixtures shall not be less than specified in Section 2902.3.

307.6 Shaft and Exit Enclosures. Exits shall be enclosed as specified in Chapter 10.

Elevator shafts, vent shafts and other openings through floors shall be enclosed, and the enclosure shall be as specified in Section 711.

Doors which are a part of an automobile ramp enclosure shall be equipped with automatic-closing devices.

For Group H, Division 6 Occupancies, see Section 307.11.2.3.

307.7 Sprinkler and Standpipe Systems. When required by Section 904.2.1 or other provisions of this code, automatic fire-extinguishing systems and standpipes shall be designed and installed as specified in Chapter 9.

307.8 Special Hazards. Chimneys and heating apparatus shall conform to the requirements of Chapter 31 of this code and the Mechanical Code.

In Divisions 4 and 5 Occupancies, devices which generate a glow, spark or flame capable of igniting flammable vapors shall be installed with sources of ignition at least 18 inches (457 mm) above the floor. See the Mechanical Code for additional restrictions.

Equipment or machinery which generates or emits combustible or explosive dust or fibers shall be provided with an adequate dust-collecting and exhaust system installed in conformance with the
Mechanical Code. Equipment or systems that are used to collect, process or convey combustible
dusts or fibers shall be provided with an approved explosion venting or containment system.
Combustible fiber storage rooms with a fiber storage capacity not exceeding 500 cubic feet (14.2
m³) shall be separated from the remainder of the building by a one-hour fire-resistive occupancy
separation. Combustible fiber storage vaults having a fiber storage capacity of more than 500 cubic
feet (14.2 m³) shall be separated from the remainder of the building by a two-hour fire-resistive
occupancy separation.
Cellulose nitrate film storage and handling shall be in accordance with Section 407.

307.9 Fire Alarm Systems. An approved manual fire alarm system shall be provided in Group H
Occupancies used for the manufacturing of organic coatings. Approved automatic smoke detection
shall be provided for rooms used for the storage, dispensing, use and handling of hazardous materi-
als when required by the Fire Code.
For Group H, Division 6 Occupancies, see Section 307.11.
For installation requirements, see the Fire Code.
For aerosol storage warehouses, see the Fire Code.

307.10 Explosion Control. Explosion control, equivalent protective devices or suppression sys-
tems; or barricades shall be provided to control or vent the gases resulting from deflagrations of
dusts, gases or mists in rooms, buildings or other enclosures as required by the Fire Code so as to
minimize structural or mechanical damage. If detonation rather than deflagration is considered
likely, protective devices or systems such as fully contained barricades shall be provided, except
that explosion venting to minimize damage from less than 2.0 grams of trinitrotoluene (TNT)
(equivalence) is permitted. Walls, floors and roofs separating a use from an explosion exposure
shall be designed to resist a minimum internal pressure of 100 pounds per square foot (4.79 kPa) in
addition to the loads required by Chapter 16.
Explosion venting shall be provided in exterior walls or roof only. The venting shall be designed
to prevent serious structural damage and production of lethal projectiles. The aggregate clear vent
relief area shall be regulated by the pressure resistance of the nonrelieving portions of the building
and be designed by persons competent in such design. The design shall recognize the nature of the
material and its behavior in an explosion. Vents shall consist of any one or any combination of the
following to relieve at a maximum internal pressure of 20 pounds per square foot (958 Pa), but not
less than the loads required by Chapter 16:
1. Walls of lightweight material.
2. Lightly fastened hatch covers.
4. Lightly fastened walls or roof.

Venting devices shall discharge vertically or directly to an unoccupied yard not less than 50 feet
(15 240 mm) in width on the same lot. Releasing devices shall be so located that the discharge end
shall not be less than 10 feet (3048 mm) vertically and 20 feet (6096 mm) horizontally from window
openings or exits in the same or adjoining buildings or structures. The exhaust shall always be in the
direction of least exposure and never into the interior of the building unless a suitably designed shaft
is provided which discharges to the exterior. See Footnote 12 of Table 3-D.

307.11 Group H, Division 6 Occupancies.

307.11.1 General. In addition to the requirements set forth elsewhere in this code, Group H, Divi-
sion 6 Occupancies shall comply with the provisions of this section and the Fire Code.

307.11.2 Fabrication area.

307.11.2.1 Separation. Fabrication areas, whose sizes are limited by the quantity of hazardous
production materials (HPM) permitted by the Fire Code, shall be separated from each other, from
exit corridors, and from other parts of the building by not less than one-hour fire-resistant occupancy separations.

**EXCEPTIONS:**
1. Doors within such occupancy separation, including doors to corridors, shall be only self-closing fire assemblies having a fire-protection rating of not less than three-fourths hour.
2. Windows between fabrication areas and exit corridors may be in accordance with Section 1005.8.2.

### 307.11.2.2 Floors.
Except for surfacing, floors within fabrication areas shall be of noncombustible construction. Openings through floors of fabrication areas may be unprotected when the interconnected levels are used solely for mechanical equipment directly related to such fabrication area. See also Section 307.11.2.3. When forming a part of an occupancy separation, floors shall be liquid tight.

### 307.11.2.3 Shaft and exit enclosures.
Exits shall be enclosed as specified in Chapter 10.

- Elevator shafts, vent shafts and other openings through floors shall be enclosed and the enclosure shall be as specified in Section 711. A fabrication area may have mechanical, duct piping penetrations which extend through not more than two floors within that fabrication area. The annular space around penetrations for cables, cable trays, tubing, piping, conduit or ducts shall be sealed at the floor level to restrict the movement of air. The fabrication area, including the areas through which the ductwork and piping extend, shall be considered a single conditioned environment.

### 307.11.2.4 Ventilation.
See Section 1202.2.5 for ventilation requirements.

### 307.11.2.5 Transporting hazardous production materials.
Hazardous production materials shall be transported to fabrication areas through enclosed piping or tubing systems that comply with Section 307.11.6, through service corridors or in exit corridors as permitted in the exception to Section 307.11.2.3. The handling or transporting of hazardous production materials within service corridors shall comply with the Fire Code.

### 307.11.2.6 Electrical.
Electrical equipment and devices within the fabrication area shall comply with the Electrical Code. The requirements for hazardous locations need not be applied when the average air change is at least four times that set forth in Section 307.11.2.4 and when the number of air changes at any location is not less than three times that required by Section 307.11.2.4 and the Fire Code.

### 307.11.3 Exit corridors.
Exit corridors shall comply with Section 1005 and shall be separated from fabrication areas as specified in Section 307.11.2.1. Exit corridors shall not be used for transporting hazardous production materials except as provided in Section 307.11.6.2.

**EXCEPTION:** In existing Group H, Division 6 Occupancies when there are alterations or modifications to existing fabrication areas, the building official may permit the transportation of hazardous production materials in exit corridors subject to the requirements of the Fire Code and as follows:
1. Corridors adjacent to the fabrication area where the alteration work is to be done shall comply with Section 1005 for a length determined as follows:
   1.1 The length of the common wall of the corridor and the fabrication area, and  
   1.2 For the distance along the exit corridor to the point of entry of HPM into the exit corridor serving that fabrication area.
2. There shall be an emergency telephone system or a local alarm manual pull station or approved signal device within exit corridors at not more than 150-foot (45 720 mm) intervals or fraction thereof and at each exit stair doorway. The signal shall be relayed to the emergency control station and a local signaling device shall be provided.
3. Sprinkler protection shall be designed in accordance with U.B.C. Standard 9-1 for Ordinary Hazard Group 3, except that when one row of sprinklers is used in the corridor protection, the maximum number of sprinklers that need be calculated is 13. U.B.C. Standard 9-1 is a part of this code. (See Chapter 35, Part II.)

### 307.11.4 Service corridors.
Service corridors shall be classified as Group H, Division 6 Occupancies. Service corridors shall be separated from exit corridors as required by Section 307.11.2.1.

Service corridors shall be mechanically ventilated as required by Section 307.11.2.4 or at not less than six air changes per hour, whichever is greater.

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The maximum distance of travel from any point in a service corridor to an exterior exit door, horizontal exit, exit passageway, enclosed stairway or door into a fabrication area shall not exceed 75 feet (22,860 mm). Dead ends shall not exceed 4 feet (1,219 mm) in length. There shall be not less than two exits, and not more than one half of the required exits shall be into the fabrication area. Doors from service corridors shall swing in the direction of exit travel and shall be self-closing.

307.11.5 Storage of hazardous production materials.

307.11.5.1 Construction. The storage of hazardous production materials in quantities greater than those listed in Table 3-D or 3-E shall be in inside rooms complying with Section 307.1.4 or shall be in HPM storage rooms not exceeding 6,000 square feet (557.4 m²) in area. Such HPM storage rooms shall be separated from all other areas by not less than a two-hour fire-resistive occupancy separation when the area is 300 square feet (27.9 m²) or more and not less than one-hour fire-resistive construction when the area is less than 300 square feet (27.9 m²). The provisions of Section 302.1 shall apply.

When an HPM storage room is also used for dispensing of Class I or II flammable liquids or flammable gases, the area of the room shall not exceed 1,000 square feet (93 m²). Except for surfacing, floors of storage rooms shall be of noncombustible liquid-tight construction. Raised grating over floors shall be of noncombustible materials. See Section 307.2.3 for sill requirements for liquid storage rooms.

307.11.5.2 Location within building. When HPM storage rooms are provided, they shall have at least one exterior wall and such wall shall be not less than 30 feet (9144 mm) from property lines, including property lines adjacent to public ways. Explosion control shall be provided when required by Section 307.10.

307.11.5.3 Exits. When two exits are required from HPM storage rooms, one shall be directly to the outside of the building. See Section 307.11.2.1, Exception 1.

307.11.5.4 Ventilation. Mechanical exhaust ventilation shall be provided in storage rooms at the rate of not less than 1 cubic foot per minute per square foot (0.044 L/s/m²) of floor area or six air changes per hour, whichever is greater, for all categories of material.

307.11.5.5 Fire and emergency alarm. An approved manual fire alarm system shall be provided.

An approved initiating device connected to a local alarm system shall be provided outside of each interior exit door from HPM storage rooms. Operation of an alarm bar or an alarm-initiating device shall initiate a local alarm and initiate a signal at the emergency control station.

For installation requirements, see the Fire Code.

307.11.5.6 Electrical. Hazardous production materials storage rooms containing flammable liquids or gases shall be classified as Class I, Division 1 hazardous locations. Electrical wiring and equipment within such rooms shall comply with the Electrical Code for such location.

307.11.6 Piping and tubing.

307.11.6.1 General. Hazardous production materials piping and tubing shall comply with this subsection and shall be installed in accordance with nationally recognized standards. Piping and tubing systems shall be metallic unless the material being transported is incompatible with such system. Systems supplying gaseous HPM having a health hazard ranking of 3 or 4 shall be welded throughout, except for connections, valves and fittings, to the systems which are within a ventilated enclosure. Hazardous production materials supply piping or tubing in service corridors shall be exposed to view.

307.11.6.2 Installations in exit corridors and above other occupancies. Hazardous production materials shall not be located within exit corridors or above areas not classified as Group H, Division 6 Occupancies except as permitted by this subsection.
Hazardous production material piping and tubing may be installed within the space defined by the walls of exit corridors and the floor or roof above or in concealed spaces above other occupancies under the following conditions:

1. Automatic sprinklers shall be installed within the space unless the space is less than 6 inches (152 mm) in least dimension.
2. Ventilation at not less than six air changes per hour shall be provided. The space shall not be used to convey air from any other area.
3. When the piping or tubing is used to transport HPM liquids, a receptor shall be installed below such piping or tubing. The receptor shall be designed to collect any discharge or leakage and drain it to an approved location. The one-hour enclosure shall not be used as part of the receptor.
4. All HPM supply piping and tubing and HPM nonmetallic waste lines shall be separated from the exit corridor and from any occupancy other than Group H, Division 6 by construction as required for walls or partitions that have a fire-protection rating of not less than one hour. When gypsum wallboard is used, joints on the piping side of the enclosure need not be taped, provided the joints occur over framing members. Access openings into the enclosure shall be protected by approved fire assemblies.
5. Readily accessible manual or automatic remotely activated fail-safe emergency shutoff valves shall be installed on piping and tubing other than waste lines at the following locations:
   5.1 At branch connections into the fabrication area.
   5.2 At entries into exit corridors.
   Excess flow valves shall be installed as required by the Fire Code.
6. Electrical wiring and equipment located in the piping space shall be approved for Class I, Division 2 hazardous locations.

**EXCEPTION:** Occasional transverse crossings of the corridors by supply piping which is enclosed within a ferrous pipe or tube for the width of the corridor need not comply with Items 1 through 6.

307.11.6.3 Identification. Piping, tubing and HPM waste lines shall be identified in accordance with nationally recognized standards to indicate the material being transported.

307.12 Heliports. Heliports may be erected on buildings or other locations if they are constructed in accordance with this chapter and with Section 311.10.

**SECTION 308 — REQUIREMENTS FOR GROUP I OCCUPANCIES**

308.1 Group I Occupancies Defined. Group I Occupancies shall be:

- **Division 1.1.** Nurseries for the full-time care of children under the age of six (each accommodating more than five children).
  Hospitals, sanitariums, nursing homes with nonambulatory patients and similar buildings (each accommodating more than five patients).

- **Division 1.2.** Health-care centers for ambulatory patients receiving outpatient medical care which may render the patient incapable of unassisted self-preservation (each tenant space accommodating more than five such patients).

- **Division 2.** Nursing homes for ambulatory patients, homes for children six years of age or over (each accommodating more than five patients or children).

- **Division 3.** Mental hospitals, mental sanitariums, jails, prisons, reformatories and buildings where personal liberties of inmates are similarly restrained.

For occupancy separations, see Table 3-B.

**EXCEPTION:** Group I Occupancies shall not include buildings used only for private residential purposes for a family group.
308.2 Construction, Height and Allowable Area.

308.2.1 General. Buildings or parts of buildings classed in Group I because of the use or character of the occupancy shall be limited to the types of construction set forth in Table 5-B and shall not exceed, in area or height, the limits specified in Sections 504, 505 and 506.

EXCEPTIONS: 1. Hospitals and nursing homes classified as Group I, Division 1.1 Occupancies, and health-care centers for ambulatory patients classified as Group I, Division 1.2 Occupancies that are equipped with an automatic sprinkler system throughout shall not exceed one story in height when in Type III One-hour, Type IV or Type V One-hour construction.

2. Hospitals and nursing homes classified as Group I, Division 1.1 Occupancies, and health-care centers for ambulatory patients classified as Group I, Division 1.2 Occupancies that are equipped with automatic sprinkler systems throughout may be five stories when of Type II-F.R. construction and three stories when of Type II One-hour construction. The allowable area increase specified in Section 505.3 applies only when the number of stories in the building is one less than set forth above.

3. Hospitals and nursing homes classified as Group I, Division 1.1 Occupancies, and health-care centers for ambulatory patients classified as Group I, Division 1.2 Occupancies that are equipped with automatic sprinkler systems throughout may be housed within one-story buildings of Type II-N construction. The area of such building shall not exceed 13,500 square feet (1254 m²) plus the allowable area increase for separation by public space or yards as set forth in Section 505.1.

308.2.2 Specific-use provisions.

308.2.2.1 Group I, Division 1.1 smoke barriers. Floor levels of Group I, Division 1.1 Occupancies used by inpatients for sleeping or treatment, or having an occupant load of 50 or more, shall be divided into at least two compartments by smoke barriers of not less than one-hour fire resistance meeting the requirements of Section 905.2.3. The area within a smoke-control zone shall not exceed 22,500 square feet (2090 m²) and its width or length shall not exceed 50 feet (45 720 mm). The area of a smoke zone shall not be less than that required to accommodate the occupants of the zone plus the occupants from any adjoining zone. Not less than 30 square feet (2.8 m²) net clear floor area for bed and litter patients and 6 square feet (0.6 m²) net clear floor area for other occupants shall be used to compute the required areas.

Doors in smoke barriers shall be tight-fitting smoke- and draft-control assemblies having a fire-protection rating of not less than 20 minutes and shall comply with Section 1019.2. When doors are installed across corridors, a pair of opposite-swinging doors without a center mullion or horizontal sliding doors that comply with U.B.C. Standard 7-8, which is part of this code (see Chapter 35, Part II), shall be installed. Smoke barrier doors shall:

1. When installed across corridors, have vision panels. The area of the vision panels shall not exceed that tested.

2. Be close fitting with only the clearance necessary for proper operation and shall be without undercuts, louvers or grilles.

3. Have stops at the head and jambs. Opposite-swinging corridor doors shall have rabbets or astragals at the meeting edges.

4. Have positive latching devices, except on doors installed across corridors.

5. Be self-closing or automatic closing. An approved sign shall be adjacent to self-closing doors specifying that they are to be maintained in a closed position. Doors installed across corridors shall comply with Section 713.6.1, Item 3, and doors on the floor or in the affected zone shall automatically close if the fire alarm or sprinkler system is activated.

At least two exits shall be provided from each smoke zone. Exits may pass through adjacent zones, provided at least one exit does not return through the compartment zone from which exiting originated. Exit doors at zone boundaries shall be equipped with approved vision panels.

308.2.2.2 Group I, Division 3 Occupancies. Group I, Division 3 Occupancies shall be housed in buildings of Type I or Type II-F.R. construction.
EXCEPTION: Such occupancies may be housed in one-story buildings of Type II One-hour, Type III One-hour or Type V One-hour construction provided the floor area does not exceed 3,900 square feet (362 m²) between separation walls of two-hour fire-resistive construction with openings protected by fire assemblies having one- and one-half-hour fire-protection rating.

Rooms occupied by inmates or patients whose personal liberties are restrained shall have non-combustible floor surfaces.

308.3 Location on Property. For fire-resistive protection of exterior walls and openings, as determined by location on property, see Section 503 and Chapter 6.

308.4 Access and Exit Facilities. Exits shall be provided as specified in Chapter 10. (For special provisions, see Section 1019.) Access to, and egress from, buildings required to be accessible shall be provided as specified in Chapter 11.

308.5 Light, Ventilation and Sanitation.

308.5.1 Light and ventilation. All portions of enclosed Group I Occupancies customarily occupied by human beings shall be provided with light and ventilation, either natural or artificial, as specified in Section 1202. See Section 1012 for required exit illumination.

308.5.2 Sanitation. The number of plumbing fixtures shall not be less than specified in Section 2902.5.

308.6 Shaft and Exit Enclosures. Exits shall be enclosed as specified in Chapter 10. Elevator shafts, vent shafts and other vertical openings shall be enclosed, and the enclosure shall be as specified in Section 711.

308.7 Sprinkler and Standpipe Systems. When required by Section 904.2.1 or other provisions of this code, automatic sprinkler systems and standpipes shall be designed and installed as specified in Chapter 9.

308.8 Special Hazards. Chimneys and heating apparatus shall conform to the requirements of Chapter 31 of this code and the Mechanical Code.

Motion picture projection rooms shall conform to the requirements of Section 406.

Specific use areas shall be separated from Group I Occupancies used for hospitals or nursing homes in accordance with Table 3-C. Doors shall be maintained self-closing or shall be automatic closing by actuation of a smoke detector.

Storage and handling of flammable and combustible liquids shall be in accordance with the Fire Code.

All exterior openings in a boiler room or room containing central heating equipment if located below openings in another story, or if less than 10 feet (3048 mm) from the other coors or windows of the same building, shall be protected by a fire assembly having a three-fourths-hour fire-protection rating.

308.9 Fire Alarm Systems. An approved manual and automatic fire alarm system shall be provided for Group I Occupancies. Audible alarm devices shall be used in nonpatient areas. Visible alarm devices may be used in lieu of audible devices in patient-occupied areas. For installation requirements, see the Fire Code.

308.10 Smoke Detectors. Smoke detectors which receive their primary power from the building wiring shall be installed in patient sleeping rooms of hospital and nursing homes. Actuation of such detectors shall cause a visual display on the corridor side of the room in which the detector is located and shall cause an audible and visual alarm at the respective nurses’ station. When single-station detectors and related devices are combined with a nursing call system, the nursing call system shall be listed for the intended combined use.
EXCEPTION: In rooms equipped with automatic door closers having integral smoke detectors on the room side, the integral detector may substitute for the room smoke detector, provided it performs the required alerting functions.

SECTION 309 — REQUIREMENTS FOR GROUP M OCCUPANCIES

309.1 Group M Occupancies Defined. Group M Occupancies shall include buildings, structures, or portions thereof, used for the display and sale of merchandise, and involving stocks of goods, wares or merchandise incidental to such purposes and accessible to the public. Mercantile occupancies shall include, but are not limited to, the following:

1. Department stores.
2. Drug stores.
4. Paint stores without bulk handling.
5. Shopping centers.
6. Sales rooms.
7. Wholesale and retail stores.

For occupancy separations, see Table 3-B.

309.2 Construction, Height and Allowable Area.

309.2.1 General. Buildings or parts of buildings classed in Group M Occupancy because of the use or character of the occupancy shall be limited to the types of construction set forth in Table 5-B and shall not exceed, in area or height, the limits specified in Sections 504, 505 and 506.

309.2.2 Special provisions. Storage areas in connection with wholesale or retail sales shall be separated from the public area by a one-hour fire-resistive occupancy separation.

EXCEPTION: Occupancy separations need not be provided when any one of the following conditions exist:

1. The storage area does not exceed 1,000 square feet (93 m²),
2. The storage area is sprinklered and does not exceed 3,000 square feet (279 m²), or
3. The building is provided with an approved automatic sprinkler system throughout.

309.3 Location on Property. For fire-resistive protection of exterior walls and openings, as determined by location on property, see Section 503.

309.4 Access and Exit Facilities. Exits shall be provided as specified in Chapter 10.

Access to, and egress from, buildings required to be accessible shall be provided as specified in Chapter 11.

309.5 Light, Ventilation and Sanitation. In Group M Occupancies, light, ventilation and sanitation shall be as specified in Chapters 12 and 29.

309.6 Shaft and Exit Enclosures. Exits shall be enclosed as specified in Chapter 10.

Elevator shafts, vent shafts and other openings through floors shall be enclosed, and the enclosure shall be as specified in Section 711.

In buildings housing Group M Occupancies equipped with automatic sprinkler systems throughout, enclosures need not be provided for escalators where the top of the escalator opening at each story is provided with a draft curtain and automatic fire sprinklers are installed around the perimeter of the opening within 2 feet (610 mm) of the draft curtain. The draft curtain shall enclose the perimeter of the unenclosed opening and extend from the ceiling downward at least 12 inches (305 mm) on all sides. The spacing between sprinklers shall not exceed 6 feet (1829 mm).
309.7 Sprinkler and Standpipe Systems. When required by other provisions of this code, automatic sprinkler systems and standpipes shall be installed as specified in Chapter 9.

309.8 Special Hazards. For special hazards of Group M Occupancies, see Section 304.8.

Storage and use of flammable and combustible liquids shall be in accordance with the Fire Code.
Buildings erected or converted to house high-piled combustible stock or aerosols shall comply with the Fire Code.

SECTION 310 — REQUIREMENTS FOR GROUP R OCCUPANCIES

310.1 Group R Occupancies Defined. Group R Occupancies shall be:

Division 1. Hotels and apartment houses.
Congregate residences (each accommodating more than 10 persons).
Division 2. Not used.
Division 3. Dwellings and lodging houses.
Congregate residences (each accommodating 10 persons or less).
For occupancy separations, see Table 3-B.

A complete code for construction of detached one- and two-family dwellings is in Appendix Chapter 3, Division III, of this code. When adopted, as set forth in Section 101.3, it will take precedence over the other requirements set forth in Chapter 35 of this code.

310.2 Construction, Height and Allowable Area.

310.2.1 General. Buildings or parts of buildings classed in Group R because of the use or character of the occupancy shall be limited to the types of construction set forth in Table 5-B and shall not exceed, in area or height, the limits specified in Sections 504, 505 and 506.

310.2.2 Special provisions. Walls and floors separating dwelling units in the same building, or guest rooms in Group R, Division 1 hotel occupancies, shall not be of less than one-hour fire-resistant construction.

Group R, Division 1 Occupancies more than two stories in height or having more than 3,000 square feet (279 m²) of floor area above the first story shall not be of less than one-hour fire-resistant construction throughout except as provided in Section 601.5.2.2.

Storage or laundry rooms that are within Group R, Division 1 Occupancies that are used in common by tenants shall be separated from the rest of the building by not less than one-hour fire-resistant occupancy separation.

For Group R, Division 1 Occupancies with a Group S, Division 3 parking garage in the basement or first story, see Section 311.2.2.

For attic space partitions and draft stops, see Section 708.

310.3 Location on Property. For fire-resistant protection of exterior walls and openings, as determined by location on property, see Section 503 and Chapter 6.

310.4 Access and Exit Facilities and Emergency Escapes. Exits shall be provided as specified in Chapter 10. (See also Section 1013 for exit markings.)

Access to, and egress from, buildings required to be accessible shall be provided as specified in Chapter 11.

Basements in dwelling units and every sleeping room below the fourth story shall have at least one operable window or door approved for emergency escape or rescue which shall open directly into a public street, public alley, yard or exit court. The emergency door or window shall be operable from the inside to provide a full, clear opening without the use of separate tools.
EXCEPTION: The window or door may open into an atrium complying with Section 402 provided the window or door opens onto an exit balcony and the dwelling unit or guest room has an exit which does not open into the atrium.

Escape or rescue windows shall have a minimum net clear openable area of 5.7 square feet (0.53 m²). The minimum net clear openable height dimension shall be 24 inches (610 mm). The minimum net clear openable width dimension shall be 20 inches (508 mm). When windows are provided as a means of escape or rescue, they shall have a finished sill height not more than 44 inches (1118 mm) above the floor.

Escape and rescue windows with a finished sill height below the adjacent ground elevation shall have a window well. Window wells at escape or rescue windows shall comply with the following:

1. The clear horizontal dimensions shall allow the window to be fully opened and provide a minimum accessible net clear opening of 9 square feet (0.84 m²), with a minimum dimension of 36 inches (914 mm).

2. Window wells with a vertical depth of more than 44 inches (1118 mm) shall be equipped with an approved permanently affixed ladder or stairs that are accessible with the window in the fully open position. The ladder or stairs shall not encroach into the required dimensions of the window well by more than 6 inches (152 mm).

Bars, grilles, grates or similar devices may be installed on emergency escape or rescue windows, doors or window wells, provided:

1. The devices are equipped with approved release mechanisms which are openable from the inside without the use of a key or special knowledge or effort; and

2. The building is equipped with smoke detectors installed in accordance with Section 310.9.

310.5 Light, Ventilation and Sanitation. Light and ventilation shall be as specified in Chapter 12. The number of plumbing fixtures shall not be less than specified in Section 2902.6.

310.6 Room Dimensions.

310.6.1 Ceiling heights. Habitable space shall have a ceiling height of not less than 7 feet 6 inches (2286 mm) except as otherwise permitted in this section. Kitchens, halls, bath rooms and toilet compartments may have a ceiling height of not less than 7 feet (2134 mm) measured to the lowest projection from the ceiling. Where exposed beam ceiling members are spaced at less than 48 inches (1219 mm) on center, ceiling height shall be measured to the bottom of these members. Where exposed beam ceiling members are spaced at 48 inches (1219 mm) or more on center, ceiling height shall be measured to the bottom of the deck supported by these members, provided that the bottom of the members is not less than 7 feet (2134 mm) above the floor.

If any room in a building has a sloping ceiling, the prescribed ceiling height for the room is required in only one half the area thereof. No portion of the room measuring less than 5 feet (1524 mm) from the finished floor to the finished ceiling shall be included in any computation of the minimum area thereof.

If any room has a furred ceiling, the prescribed ceiling height is required in two thirds the area thereof, but in no case shall the height of the furred ceiling be less than 7 feet (2134 mm).

310.6.2 Floor area. Dwelling units and congregate residences shall have at least one room which shall have not less than 120 square feet (11.2 m²) of floor area. Other habitable rooms except kitchens shall have an area of not less than 70 square feet (6.5 m²). Efficiency dwelling units shall comply with the requirements of Section 310.7.

310.6.3 Width. Habitable rooms other than a kitchen shall not be less than 7 feet (2134 mm) in any dimension.

310.7 Efficiency Dwelling Units. An efficiency dwelling unit shall conform to the requirements of the code except as herein provided:
1. The unit shall have a living room of not less than 220 square feet (20.4 m²) of superficial floor area. An additional 100 square feet (9.3 m²) of superficial floor area shall be provided for each occupant of such unit in excess of two.

2. The unit shall be provided with a separate closet.

3. The unit shall be provided with a kitchen sink, cooking appliance and refrigeration facilities, each having a clear working space of not less than 30 inches (762 mm) in front. Light and ventilation conforming to this code shall be provided.

4. The unit shall be provided with a separate bathroom containing a water closet, lavatory and bathtub or shower.

310.8 Shaft and Exit Enclosures. Exits shall be enclosed as specified in Chapter 10.

Elevator shafts, vent shafts, dumbwaiter shafts, clothes chutes and other vertical openings shall be enclosed and the enclosure shall be as specified in Section 711.

In nonsprinklered Group R, Division 1 Occupancies, corridors serving an occupant load of 10 or more shall be separated from corridors and other areas on adjacent floors by not less than approved fixed wired glass set in steel frames or by 20-minute smoke- and draft-control assemblies which are automatic closing by smoke detection.

310.9 Smoke Detectors and Sprinkler Systems.

310.9.1 Smoke detectors.

310.9.1.1 General. Dwelling units, congregate residences and hotel or lodging house guest rooms that are used for sleeping purposes shall be provided with smoke detectors. Detectors shall be installed in accordance with the approved manufacturer's instructions.

310.9.1.2 Additions, alterations or repairs to Group R Occupancies. When the valuation of an addition, alteration or repair to a Group R Occupancy exceeds $1,000 and a permit is required, or when one or more sleeping rooms are added or created in existing Group R Occupancies, smoke detectors shall be installed in accordance with Sections 310.9.1.3, 310.9.1.4 and 310.9.1.5 of this section.

EXCEPTION: Repairs to the exterior surfaces of a Group R Occupancy are exempt from the requirements of this section.

310.9.1.3 Power source. In new construction, required smoke detectors shall receive their primary power from the building wiring when such wiring is served from a commercial source and shall be equipped with a battery backup. The detector shall emit a signal when the batteries are low. Wiring shall be permanent and without a disconnecting switch other than those required for overcurrent protection. Smoke detectors may be solely battery operated when installed in existing buildings; or in buildings without commercial power; or in buildings which undergo alterations, repairs or additions regulated by Section 310.9.1.2.

310.9.1.4 Location within dwelling units. In dwelling units, a detector shall be installed in each sleeping room and at a point centrally located in the corridor or area giving access to each separate sleeping area. When the dwelling unit has more than one story and in dwellings with basements, a detector shall be installed on each story and in the basement. In dwelling units where a story or basement is split into two or more levels, the smoke detector shall be installed on the upper level, except that when the lower level contains a sleeping area, a detector shall be installed on each level. When sleeping rooms are on an upper level, the detector shall be placed at the ceiling of the upper level in close proximity to the stairway. In dwelling units where the ceiling height of a room open to the hallway serving the bedrooms exceeds that of the hallway by 24 inches (610 mm) or more, smoke detectors shall be installed in the hallway and in the adjacent room. Detectors shall sound an alarm audible in all sleeping areas of the dwelling unit in which they are located.

310.9.1.5 Location in efficiency dwelling units, congregate residences and hotels. In efficiency dwelling units, hotel suites and in hotel and congregate residence sleeping rooms, detectors shall
be located on the ceiling or wall of the main room or each sleeping room. When sleeping rooms within an efficiency dwelling unit or hotel suite are on an upper level, the detector shall be placed at the ceiling of the upper level in close proximity to the stairway. When actuated, the detector shall sound an alarm audible within the sleeping area of the dwelling unit or congregate residence, hotel suite, or sleeping room in which it is located.

310.9.2 Sprinkler and standpipe systems. When required by Section 904.2.1 or other provisions of this code, automatic sprinkler systems and standpipes shall be designed and installed as specified in Chapter 9.

310.10 Fire Alarm Systems. Group R, Division 1 Occupancies shall be provided with an approved manual and automatic fire alarm system in apartment houses three or more stories in height or containing 16 or more dwelling units, in hotels three or more stories in height or containing 20 or more guest rooms and in congregate residences three or more stories in height or having an occupant load of 20 or more. A fire alarm and communication system shall be provided in Group R, Division 1 Occupancies located in a high-rise building.

**EXCEPTIONS:**
1. A manual fire alarm system need not be provided in buildings not over two stories in height when all individual dwelling units and contiguous attic and crawl spaces are separated from each other and public or common areas by at least one-hour fire-resistive occupancy separations and each individual dwelling unit or guest room has an exit directly to a public way, exit court or yard.
2. A separate fire alarm system need not be provided in buildings which are protected throughout by an approved supervised fire sprinkler system having a local alarm to notify all occupants.

The alarm signal shall be a distinctive sound which is not used for any other purpose other than the fire alarm. Alarm-signaling devices shall produce a sound that exceeds the prevailing equivalent sound level in the room or space by 15 decibels minimum, or exceeds any maximum sound level with a duration of 30 seconds minimum by 5 decibels minimum, whichever is louder. Sound levels for alarm signals shall be 120 decibels maximum.

For the purposes of this section, area separation walls shall not define separate buildings.

310.11 Heating. Dwelling units, guest rooms and congregate residences shall be provided with heating facilities capable of maintaining a room temperature of 70°F. (21°C.) at a point 3 feet (914 mm) above the floor in all habitable rooms.

310.12 Special Hazards. Chimneys and heating apparatus shall conform to the requirements of Chapter 31 and the Mechanical Code.

The storage, use and handling of flammable and combustible liquids in Division 1 Occupancies shall be in accordance with the Fire Code.

In Division 1 Occupancies, doors leading into rooms in which Class I flammable liquids are stored or used shall be protected by a fire assembly having a one-hour fire-protection rating. Such fire assembly shall be self-closing and shall be posted with a sign on each side of the door in 1-inch (25.4 mm) block letters stating: FIRE DOOR—KEEP CLOSED.

**SECTION 311 — REQUIREMENTS FOR GROUP S OCCUPANCIES**

311.1 Group S Occupancies Defined. Group S Occupancies shall include the use of a building or structure, or a portion thereof, for storage not classified as a hazardous occupancy. Storage occupancies shall include the following:

Division 1. Moderate hazard storage occupancies shall include buildings or portions of buildings used for storage of combustible materials that are not classified as a Group S, Division 2 or as a Group H Occupancy.

Division 2. Low-hazard storage occupancies shall include buildings, structures, or portions thereof, used for storage of noncombustible materials, such as products on wood pallets or in paper cartons with or without single-thickness divisions, or in paper wrappings and shall include ice plants, power plants and pumping plants. Such products may have a negligible amount of plastic...
trim such as knobs, handles or film wrapping. Low-hazard storage occupancies shall include, but are not limited to, storage of the following items:

1. Beer or wine (in metal, glass or ceramic containers).
2. Cement in bags.
3. Cold storage and creameries.
5. Dry-cell batteries.
6. Dryers.
7. Dry pesticides in a building not classed as a Group H Occupancy.
8. Electrical coils.
10. Electrical motors.
11. Empty cans.
13. Fresh fruits in nonplastic trays or containers.
15. Glass bottles (empty or filled with nonflammable liquids).
17. Inert pigments.
18. Meats.
19. Metal cabinets.
20. Metal furniture.
21. Oil-filled distribution transformers.
22. Stoves.
23. Washers.

Division 3. Division 3 Occupancies shall include repair garages where work is limited to exchange of parts and maintenance requiring no open flame or welding, motor vehicle fuel-dispensing stations, and parking garages not classed as Group S, Division 4 open parking garages or Group U private garages.

For the use of flammable and combustible liquids, see Section 307 and the Fire Code.

Division 4. Open parking garages per Section 311.9.

Division 5. Aircraft hangars where work is limited to exchange of parts and maintenance requiring no open flame or welding and helistops.

For occupancy separations, see Table 3-B.

311.2 Construction, Height and Allowable Area.

311.2.1 General. Buildings or parts of buildings classed in Group S Occupancy because of the use or character of the occupancy shall be limited to the types of construction set forth in Table 5-B and shall not exceed, in area or height, the limits specified in Sections 504, 505 and 506.

311.2.2 Special provisions.

311.2.2.1 Group S, Division 3 with Group A, Division 3; Group B; Group M or R, Division 1 Occupancy above. Other provisions of this code notwithstanding, a basement or first story of a
building may be considered as a separate and distinct building for the purpose of area limitations, limitation of number of stories and type of construction, when all of the following conditions are met:

1. The basement or first story is of Type I construction and is separated from the building above with a three-hour occupancy separation. See Section 302.3.

2. The building above the three-hour occupancy separation contains only Group A, Division 3; Group B; or Group M or R, Division 1 Occupancies.

3. The building below the three-hour occupancy separation is a Group S, Division 3 Occupancy used exclusively for the parking and storage of private or pleasure-type motor vehicles.

EXCEPTIONS: 1. Entry lobbies, mechanical rooms and similar uses incidental to the operation of the building.

2. Group A, Division 3 and Group B office, drinking and dining establishments and Group M retail occupancies in addition to those uses incidental to the operation of the building (including storage areas), provided that the entire structure below the three-hour occupancy separation is protected throughout by an automatic sprinkler system.

4. The maximum building height in feet shall not exceed the limits set forth in Table 5-B for the least type of construction involved.

311.2.2.2 Group S, Division 3 Occupancy with Group S, Division 4 Occupancy above. Other provisions of this code notwithstanding, a Group S, Division 3 Occupancy, located in the basement or first story below a Group S, Division 4 Occupancy, as defined in Section 311.9, may be classified as a separate and distinct building for the purpose of determining the type of construction when all of the following conditions are met:

1. The allowable area of the structure shall be such that the sum of the ratios of the actual area divided by the allowable area for each separate occupancy shall not exceed one.

2. The Group S, Division 3 Occupancy is of Type I or II construction and is at least equal to the fire resistance of the Group S, Division 4 Occupancy.

3. The height and the number of the tiers above the basement shall be limited as specified in Table 3-H or Section 311.9.5.

4. The floor-ceiling assembly separating the Group S, Division 3 and Group S, Division 4 Occupancy shall be protected as required for the floor-ceiling assembly of the Group S, Division 3 Occupancy. Openings between the Group S, Division 3 and Group S, Division 4 Occupancy, except exit openings, need not be protected.

5. The Group S, Division 3 Occupancy is used exclusively for the parking or storage of private or pleasure-type motor vehicles, but may contain (i) mechanical equipment rooms incidental to the operation of the building and (ii) an office, and waiting and toilet rooms having a total area of not more than 1,000 square feet (93 m²).

311.2.3 Specific use provisions.

311.2.3.1 Group S, Divisions 3 and 5 Occupancies. In areas where motor vehicles, boats or aircraft are stored, and in motor vehicle fuel-dispensing stations and repair garages, floor surfaces shall be of noncombustible, nonabsorbent materials. Floors shall drain to an approved oil separator or trap discharging to sewers in accordance with the Plumbing Code.

EXCEPTION: Floors may be surfaced or waterproofed with asphaltic paving materials in areas where motor vehicles or airplanes are stored or operated.

311.2.3.2 Marine or motor vehicle fuel-dispensing stations. Marine or motor vehicle fuel-dispensing stations, including canopies and supports over pumps, shall be of noncombustible, fire-retardant-treated wood or of one-hour fire-resistive construction.

EXCEPTIONS: 1. Roofs of one-story fuel-dispensing stations may be of heavy-timber construction.
2. Canopies conforming to Section 2603.13 may be erected over pumps.

Canopies under which fuels are dispensed shall have a clear, unobstructed height of not less than 13 feet 6 inches (4114 mm) to the lowest projecting element in the vehicle drive-through area.

A one-hour occupancy separation need not be provided between fuel-dispensing pumps covered with a canopy that is open on three or more sides, and a Group M Occupancy retail store having an area of less than 2,500 square feet (225 m²) when the following conditions exist:

1. The Group M Occupancy is provided with two exits separated as required by Section 1003 and not located in the same exterior wall.

2. Pump islands are not located within 20 feet (6096 mm) of the Group M Occupancy retail store.

311.2.3.3 Parking garage headroom. Parking garages shall have an unobstructed headroom clearance of not less than 7 feet (2134 mm) above the finish floor to any ceiling, beam, pipe or similar obstruction, except for wall-mounted shelves, storage surfaces, racks or cabinets.

311.2.3.4 Group S, Division 2 Occupancy roof framing. In Division 2 Occupancies, the roof-framing system may be of unprotected construction.

311.2.3.5 Vehicle barriers. In parking garages where any parking area is located more than 5 feet (1524 mm) above the adjacent grade, vehicle barriers shall be provided.

EXCEPTION: Parking garages of Group U, Division 1 Occupancies.

Vehicle barriers shall have a minimum vertical dimension of 12 inches (305 mm) and shall be centered at 18 inches (457 mm) above the parking surface. See Table 16-B for load criterion.

311.3 Location on Property. For fire-resistive protection of exterior walls and openings, as determined by location on property, see Section 503.

311.4 Access and Exit Facilities. Exits shall be provided as specified in Chapter 10.

Access to, and egress from, buildings required to be accessible shall be provided as specified in Chapter 11.

311.5 Light, Ventilation and Sanitation. In Group S Occupancies, light, ventilation and sanitation shall be as contained in Chapters 12 and 29, except as noted below:

311.5.1 Repair and storage garages, aircraft hangars. See Section 1202.2.6 for ventilation requirements for Group S, Division 3 repair garages, storage garages and Group S, Division 5 aircraft hangars.

311.5.2 Parking garages. See Section 1202.2.7 for ventilation requirements for parking garages.

311.6 Shaft and Exit Enclosures. Exits shall be enclosed as specified in Chapter 10.

Elevator shafts, vent shafts and other openings through floors shall be enclosed, and the enclosure shall be as specified in Section 711.

EXCEPTION: In Group S, Division 2 Occupancies, exits shall be enclosed as specified in Chapter 10, but other through-floor openings need not be enclosed.

In buildings housing Group S Occupancies equipped with automatic sprinkler systems throughout, enclosures need not be provided for escalators where the top of the escalator opening at each story is provided with a draft curtain and automatic fire sprinklers are installed around the perimeter of the opening within 2 feet (610 mm) of the draft curtain. The draft curtain shall enclose the perimeter of the unenclosed opening and extend from the ceiling downward at least 12 inches (305 mm) on all sides. The spacing between sprinklers shall not exceed 6 feet (1829 mm)

311.7 Sprinkler and Standpipe Systems. When required by Section 904.2 or other provisions of this code, automatic sprinkler systems and standpipes shall be installed as specified in Chapter 9.
311.8 Special Hazards. For special hazards of Group S Occupancies, see Section 304.8.

Storage and use of flammable and combustible liquids shall be in accordance with the Fire Code.

Buildings erected or converted to house high-piled combustible stock or aerosols shall comply with the Fire Code.

311.9 Group S, Division 4 Open Parking Garages.

311.9.1 Scope. Except where specific provisions are made in the following subsections, other requirements of this code shall apply.

311.9.2 Definitions.

311.9.2.1 General. For the purpose of this section, certain terms are defined as follows:

MECHANICAL-ACCESS OPEN PARKING GARAGES are open parking garages employing parking machines, lifts, elevators or other mechanical devices for vehicles moving from and to street level and in which public occupancy is prohibited above the street level.

OPEN PARKING GARAGE is a structure of Type I or II construction with the openings as described in Section 311.9.2.2 on two or more sides and which is used exclusively for the parking or storage of private or pleasure-type motor vehicles.

EXCEPTION: The grade-level tier may contain an office, and waiting and toilet rooms having a total area of not more than 1,000 square feet (93 m²). Such area need not be separated from the open parking garage.

RAMP-ACCESS OPEN PARKING GARAGES are open parking garages employing a series of continuously rising floors or a series of interconnecting ramps between floors permitting the movement of vehicles under their own power from and to the street level.

311.9.2.2 Openings. For natural ventilation purposes, the exterior side of the structure shall have uniformly distributed openings on two or more sides. The area of such openings in exterior walls on a tier must be at least 20 percent of the total perimeter wall area of each tier. The aggregate length of the openings considered to be providing natural ventilation shall constitute a minimum of 40 percent of the perimeter of the tier. Interior wall lines and column lines shall be at least 20 percent open with uniformly distributed openings.

311.9.3 Construction. Construction shall be of noncombustible materials. Open parking garages shall meet the design requirements of Chapter 16. For vehicle barriers, see Section 311.2.3.5.

311.9.4 Area and height. Area and height of open parking garages shall be limited as set forth in Table 3-H, except for increases allowed by Section 311.9.5.

In structures having a spiral or sloping floor, the horizontal projection of the structure at any cross section shall not exceed the allowable area per parking tier. In the case of a structure having a continuous spiral floor, each 9 feet 6 inches (2896 mm) of height, or portion thereof, shall be considered a tier.

The clear height of a parking tier shall not be less than 7 feet (2134 mm), except that a lower clear height may be permitted in mechanical-access open parking garages when approved by the building official.

311.9.5 Area and height increases. The area and height of structures with cross ventilation throughout may be increased in accordance with provisions of this subsection. Structures with sides open on three fourths of the building perimeter may be increased by 25 percent in area and one tier in height. Structures with sides open around the entire building perimeter may be increased 50 percent in area and one tier in height. For a side to be considered open under the above provisions, the total area of openings along the side shall not be less than 50 percent of the interior area of the side at each tier, and such openings shall be equally distributed along the length of the tier.

Open parking garages constructed to heights less than the maximums established by Table 3-H may have individual tier areas exceeding those otherwise permitted, provided the gross tier area of
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the structure does not exceed that permitted for the higher structure. At least three sides of each such larger tier shall have continuous horizontal openings not less than 30 inches (752 mm) in clear height extending for at least 80 percent of the length of the sides, and no part of such larger tier shall be more than 200 feet (60 960 mm) horizontally from such an opening. In addition, each such opening shall face a street or yard accessible to a street with a width of at least 30 feet (9144 mm) for the full length of the opening, and standpipes shall be provided in each such tier.

Structures of Type II-F.R., Type II One-hour or Type II-N construction, with all sides open, may be unlimited in area when the height does not exceed 75 feet (22 860 mm). For a side to be considered open, the total area of openings along the side shall not be less than 50 percent of the interior area of the side at each tier, and such openings shall be equally distributed along the length of the tier. All portions of tiers shall be within 200 feet (60 960 mm) horizontally from such openings.

311.9.6 Location on property. Exterior walls and openings in exterior walls shall comply with Table 5-A. The distance from an adjacent property line shall be determined in accordance with Section 503.

311.9.7 Stairs and exits. Where persons other than parking attendants are permitted, stairs and exits shall meet the requirements of Chapter 10, based on an occupant load of 200 square feet (18.6 m²) per occupant. Where no persons other than parking attendants are permitted, there shall not be less than two 3-foot-wide (914 mm) stairs. Lifts may be installed for use of employees only, provided they are completely enclosed by noncombustible materials.

311.9.8 Standpipes. Standpipes shall be installed when required by the provisions of Chapter 9.

311.9.9 Sprinkler systems. When required by other provisions of this code, automatic sprinkler systems and standpipes shall be installed in accordance with the provisions of Chapter 9.

311.9.10 Enclosure of vertical openings. Enclosure shall not be required for vertical openings except as specified in Section 311.9.7 for lifts.

311.9.11 Ventilation. Ventilation, other than the percentage of openings specified in Section 311.9.2.2, shall not be required.

311.9.12 Prohibitions. The following uses and alterations are not permitted:
1. Automobile repair work.
2. Parking of buses, trucks and similar vehicles.
3. Partial or complete closing of required openings in exterior walls by tarpaulins or any other means.
4. Dispensing of fuel.

311.10 Helistops.

311.10.1 General. Helistops may be erected on buildings or other locations if they are constructed in accordance with this section.

311.10.2 Size. The touchdown or landing area for helicopters of less than 3,500 pounds (1588 kg) shall be a minimum of 20 feet by 20 feet (6096 mm by 6096 mm) in size. The touchdown area shall be surrounded on all sides by a clear area having a minimum average width at roof level of 15 feet (4572 mm) but with no width less than 5 feet (1524 mm).

311.10.3 Design. Helicopter landing areas and supports therefor on the roof of a building shall be of noncombustible construction. Landing areas shall be designed to confine any Class I, II or III-A liquid spillage to the landing area itself and provision shall be made to drain such spillage away from any exit or stairway serving the helicopter landing area or from a structure housing such exit or stairway.

311.10.4 Exits and stairways. Exits and stairways from helistops shall comply with the provisions of Chapter 10 of this code, except that all landing areas located on buildings or structures shall
have two or more exits. For landing platforms or roof areas less than 60 feet (18 288 mm) in length, or less than 2,000 square feet (186 m²) in area, the second exit may be a fire escape or ladder leading to the floor below.

311.10.5 Federal Aviation Administration approval. Before operating helicopters from heli­tops, approval must be obtained from the Federal Aviation Administration.

SECTION 312 — REQUIREMENTS FOR GROUP U OCCUPANCIES

312.1 Group U Occupancies Defined. Group U Occupancies shall include buildings or struc­tures, or portions thereof, and shall be:

Division 1. Private garages, carports, sheds and agricultural buildings.

EXCEPTION: Where applicable (see Section 101.3) for agricultural buildings, see Appendix Chapter 3.

Division 2. Fences over 6 feet (1829 mm) high, tanks and towers.

For occupancy separations, see Table 3-B.

312.2 Construction, Height and Allowable Area.

312.2.1 General. Buildings or parts of buildings classed as Group U, Division 1 Occupancies be­cause of the use or character of the occupancy shall not exceed 1,000 square feet (92.9 m²) in area or one story in height except as provided in Section 312.2.2. Any building or portion thereof that ex­ceeds the limitations specified in this chapter shall be classed in the occupancy group other than Group U, Division 1 that it most nearly resembles.

312.2.2 Special area provisions. The total area of a private garage used only as a parking garage for private or pleasure-type motor vehicles where no repair work is done or fuel dispensed may be 3,000 square feet (279 m²), provided the provisions set forth in Item 1 or 2 below are satisfied. More than one 3,000-square-foot (279 m²) Group U, Division 1 Occupancy may be within the same building, provided each 3,000-square-foot (279 m²) area is separated by area separation walls com­plying with Section 504.6.

1. For a mixed-occupancy building, the exterior wall and opening protection for the Group U, Division 1 portion of the building shall be as required for the major occupancy of the building. For such mixed-occupancy building, the allowable floor area of the building shall be as permitted for the major occupancy contained therein.

2. For a building containing only a Group U, Division 1 Occupancy, the exterior wall and opening protection shall be as required for a building classified as a Group R, Division 1 Occupancy.

312.2.3 Headroom clearance. Garages in connection with Group R, Division 1 Occupancies shall have an unobstructed headroom clearance of not less than 7 feet (2134 mm) above the finish floor to any ceiling, beam, pipe or similar construction except for wall-mounted shelves, storage surfaces, racks or cabinets.

312.3 Location on Property. For fire-resistive protection of exterior walls and openings, as de­termined by location on property, see Section 503 and Chapter 6.

312.4 Special Hazards. Chimneys and heating apparatus shall conform to the requirements of Chapter 31 and the Mechanical Code.

Under no circumstances shall a private garage have any opening into a room used for sleeping purposes.

Class I, II or III-A liquids shall not be stored, handled or used in Group U Occupancies unless such storage or handling shall comply with the Fire Code.

312.5 Garage Floor Surfaces. In areas where motor vehicles are stored or operated, floor sur­faces shall be of noncombustible materials or asphaltic paving materials.
312.6 Agricultural Buildings. Where applicable (see Section 101.3) for agricultural buildings, see Appendix Chapter 3.

**TABLE 3-A—DESCRIPTION OF OCCUPANCIES BY GROUP AND DIVISION**

<table>
<thead>
<tr>
<th>GROUP AND DIVISION</th>
<th>SECTION</th>
<th>DESCRIPTION OF OCCUPANCY</th>
</tr>
</thead>
<tbody>
<tr>
<td>A-1</td>
<td></td>
<td>A building or portion of a building having an assembly room with an occupant load of 1,000 or more and a legitimate stage.</td>
</tr>
<tr>
<td>A-2</td>
<td></td>
<td>A building or portion of a building having an assembly room with an occupant load of less than 1,000 and a legitimate stage.</td>
</tr>
<tr>
<td>A-2.1</td>
<td>303.1.1</td>
<td>A building or portion of a building having an assembly room with an occupant load of 300 or more without a legitimate stage, including such buildings used for educational purposes and not classed as a Group E or Group B Occupancy.</td>
</tr>
<tr>
<td>A-3</td>
<td></td>
<td>Any building or portion of a building having an assembly room with an occupant load of less than 300 without a legitimate stage, including such buildings used for educational purposes and not classed as a Group E or Group B Occupancy.</td>
</tr>
<tr>
<td>A-4</td>
<td></td>
<td>Stadiums, reviewing stands and amusement park structures not included within other Group A Occupancies.</td>
</tr>
<tr>
<td>B</td>
<td>304.1</td>
<td>A building or structure, or a portion thereof, for office, professional or service-type transactions, including storage of records and accounts; eating and drinking establishments with an occupant load of less than 50.</td>
</tr>
<tr>
<td>E-1</td>
<td>305.1</td>
<td>Any building used for educational purposes through the 12th grade by 50 or more persons for more than 12 hours per week or four hours in any one day.</td>
</tr>
<tr>
<td>E-2</td>
<td>305.1</td>
<td>Any building used for educational purposes through the 12th grade by less than 50 persons for more than 12 hours per week or four hours in any one day.</td>
</tr>
<tr>
<td>E-3</td>
<td></td>
<td>Any building or portion thereof used for day-care purposes for more than six persons.</td>
</tr>
<tr>
<td>F-1</td>
<td>306.1</td>
<td>Moderate-hazard factory and industrial occupancies include factory and industrial uses not classified as Group F, Division 2 Occupancies.</td>
</tr>
<tr>
<td>F-2</td>
<td>306.1</td>
<td>Low-hazard factory and industrial occupancies include facilities producing noncombustible or nonexplosive materials which during finishing, packing or processing do not involve a significant fire hazard.</td>
</tr>
<tr>
<td>H-1</td>
<td>307.1</td>
<td>Occupancies with a quantity of material in the building in excess of those listed in Table 3-D which present a high explosion hazard as listed in Section 307.1.1.</td>
</tr>
<tr>
<td>H-2</td>
<td>307.1</td>
<td>Occupancies with a quantity of material in the building in excess of those listed in Table 3-D which present a moderate explosion hazard or a hazard from accelerated burning as listed in Section 307.1.1.</td>
</tr>
<tr>
<td>H-3</td>
<td>307.1</td>
<td>Occupancies with a quantity of material in the building in excess of those listed in Table 3-D which present a high fire or physical hazard as listed in Section 307.1.1.</td>
</tr>
<tr>
<td>H-4</td>
<td></td>
<td>Repair garages not classified as Group S, Division 3 Occupancies.</td>
</tr>
<tr>
<td>H-5</td>
<td></td>
<td>Aircraft repair hangars not classified as Group S, Division 3 Occupancies and heliports.</td>
</tr>
<tr>
<td>H-6</td>
<td>307.1</td>
<td>Semiconductor fabrication facilities and comparable research and development areas when the facilities in which hazardous production materials are used, and the aggregate quantity of material is in excess of those listed in Table 3-D or 3-E.</td>
</tr>
<tr>
<td>H-7</td>
<td>307.1</td>
<td>Occupancies having quantities of materials in excess of those listed in Table 3-E that are health hazards as listed in Section 307.1.1.</td>
</tr>
<tr>
<td>GROUP AND DIVISION</td>
<td>SECTION</td>
<td>DESCRIPTION OF OCCUPANCY</td>
</tr>
<tr>
<td>--------------------</td>
<td>---------</td>
<td>-------------------------</td>
</tr>
<tr>
<td>1-1.1</td>
<td></td>
<td>Nurseries for the full-time care of children under the age of six (each accommodating more than five children), hospitals, sanitariums, nursing homes with nonambulatory patients and similar buildings (each accommodating more than five patients).</td>
</tr>
<tr>
<td>1-1.2</td>
<td>308.1</td>
<td>Health-care centers for ambulatory patients receiving outpatient medical care which may render the patient incapable of unassisted self-preservation (each tenant space accommodating more than five such patients).</td>
</tr>
<tr>
<td>1-2</td>
<td></td>
<td>Nursing homes for ambulatory patients, homes for children six years of age or over (each accommodating more than five persons).</td>
</tr>
<tr>
<td>1-3</td>
<td></td>
<td>Mental hospitals, mental sanitariums, jails, prisons, reformatories and buildings where personal liberties of inmates are similarly restrained.</td>
</tr>
<tr>
<td>M</td>
<td>309.1</td>
<td>A building or structure, or a portion thereof, for the display and sale of merchandise, and involving stocks of goods, wares or merchandise, incidental to such purposes and accessible to the public.</td>
</tr>
<tr>
<td>R-1</td>
<td>310.1</td>
<td>Hotels and apartment houses, congregate residences (each accommodating more than 10 persons).</td>
</tr>
<tr>
<td>R-3</td>
<td></td>
<td>Dwellings, lodging houses, congregate residences (each accommodating 10 or fewer persons).</td>
</tr>
<tr>
<td>S-1</td>
<td>311.1</td>
<td>Moderate hazard storage occupancies including buildings or portions of buildings used for storage of combustible materials not classified as Group S, Division 2 or Group H Occupancies.</td>
</tr>
<tr>
<td>S-2</td>
<td></td>
<td>Low-hazard storage occupancies including buildings or portions of buildings used for storage of noncombustible materials.</td>
</tr>
<tr>
<td>S-3</td>
<td></td>
<td>Repair garages where work is limited to exchange of parts and maintenance not requiring open flame or welding, and parking garages not classified as Group S, Division 4 Occupancies.</td>
</tr>
<tr>
<td>S-4</td>
<td></td>
<td>Open parking garages.</td>
</tr>
<tr>
<td>S-5</td>
<td></td>
<td>Aircraft hangars and helistops.</td>
</tr>
<tr>
<td>U-1</td>
<td>312.1</td>
<td>Private garages, carports, sheds and agricultural buildings.</td>
</tr>
<tr>
<td>U-2</td>
<td></td>
<td>Fences over 6 feet (1829 mm) high, tanks and towers.</td>
</tr>
</tbody>
</table>

1 For detailed descriptions, see the occupancy definitions in the noted sections.
### TABLE 3-B—REQUIRED SEPARATION IN BUILDINGS OF MIXED OCCUPANCY¹ (HOURS)

|      | A-1 | A-2 | A-2.1 | A-3 | A-4 | B | E  | F-1 | F-2 | H-2 | H-3 | H-4,5 | H-6,7² | I  | M  | R-1 | R-3 | S-1 | S-2 | S-3 | U-1³ |
|------|-----|-----|-------|-----|-----|---|----|-----|-----|-----|-----|-------|-------|----|----|-----|-----|-----|-----|-----|-----|-----|
| A-1  | N   | N   | N     | N   | N   | 3 | 3  | 4   | 4   | 4   | 4   | 3     | 3    | 3  | 3  | 3   | 3   | 3  | 3   | 3   | 3   | 3   |
| A-2  | N   | N   | N     | 1   | N   | 1 | 1  | 4   | 4   | 4   | 4   | 3     | 1    | 1  | 1  | 1   | 1   | 1  | 1   | 3   | 5   | 1   |
| A-2.1| N   | N   | N     | N   | N   | 4 | 4  | 4   | 4   | 3   | 2   | N     | 1    | 1  | N  | 1   | N   | 1  | N   | 1   | 1   | 1   |
| A-3  | N   | N   | N     | N   | N   | 4 | 4  | 3   | 3   | 2   | N   | 1     | 1    | 1  | N  | 1   | N   | 1  | N   | 1   | 1   | 1   |
| A-4  | 1   | N   | N     | 2   | N   | 3 | 3  | 3   | 3   | 2   | N   | 1     | 1    | 1  | N  | 1   | N   | 1  | N   | 1   | 1   | 1   |
| B    | 1   | N   | N     | 2   | 1   | 1  | 1  | 2   | 1   | 1   | 1   | 2     | 1    | 1  | N  | 1   | N   | 1  | N   | 1   | 1   | 1   |
| E    | 1   | 1   | 4     | 4   | 4   | 3 | 1  | 1   | 1   | 1   | 1   | 1     | 1    | 3  | 1  | 1   | N   | 1  | 1   | 1   | 1   | 1   |
| F-1  | 1   | 2   | 1     | 1   | 1   | 3 | 2   | N   | 1   | 1   | 1   | 3     | N    | 1  | N  | 1   | 1   | 1  | N   | 1   | 1   | 1   |
| F-2  | 2   | 1   | 1     | 1   | 1   | 1 | 1  | 1   | 1   | 1   | 1   | 1     | 1    | 1  | N  | 1   | 1   | 1  | N   | 1   | 1   | 1   |

**NOT PERMITTED IN MIXED OCCUPANCIES. SEE SECTION 307.2.9**

| H-1  | 1   | 1   | 2   | 4   | 2   | 4   | 4   | 2   | 2   | 2   | 2   | 1     |     | 1  | 1  | 1    | 1   | 1  | 1   | 1   | 1   | 1   |
| H-2  |     | 1   | 1   | 4   | 1   | 3   | 3   | 1   | 1   | 1   | 1   | 1     |     | 1  | 1  | 1    | 1   | 1  | 1   | 1   | 1   | 1   |
| H-3  |     | 1   | 1   | 4   | 1   | 3   | 3   | 1   | 1   | 1   | 1   | 1     |     | 1  | 1  | 1    | 1   | 1  | 1   | 1   | 1   | 1   |
| H-4,5|     |     |     |     | 4   | 1   | 4   | 4   | 1   | 1   | 1   | 1     |     | 3  | 1  | 1    | 1   | 1  | 1   | 1   | 1   | 1   |
| H-6,7²|     |     |     |     | 2   | 1   | 1   | 2   | 4   | 3   | 3   | 1     |     | 3  | 1  | 1    | 1   | 1  | 1   | 1   | 1   | 1   |
| I    |     |     |     |     |     |     |     |     |     |     |     |     | 1     |     | 1  | 1  | 1    | 1   | 1  | 1   | 1   | 1   | 1   |
| M    |     |     |     |     |     |     |     |     |     |     |     |     | 3     |     | 1  | 3  | 1    | 1   | 1  | 1   | 1   | 1   | 1   |
| R-1  |     |     |     |     |     |     |     |     |     |     |     |     | N     |     | 1  | 1  | 1    | 1   | 1  | 1   | 1   | 1   | 1   |
| R-3  |     |     |     |     |     |     |     |     |     |     |     |     | 1     |     | 1  | 1  | 1    | 1   | 1  | 1   | 1   | 1   | 1   |
| S-1  |     |     |     |     |     |     |     |     |     |     |     |     | 1     |     | 1  | 1  | 1    | 1   | 1  | 1   | 1   | 1   | 1   |
| S-2  |     |     |     |     |     |     |     |     |     |     |     |     | 1     |     | 1  | 1  | 1    | 1   | 1  | 1   | 1   | 1   | 1   |
| S-3  |     |     |     |     |     |     |     |     |     |     |     |     | 1     |     | 1  | 1  | 1    | 1   | 1  | 1   | 1   | 1   | 1   |
| S-4  |     |     |     |     |     |     |     |     |     |     |     |     | 1     |     | 1  | 1  | 1    | 1   | 1  | 1   | 1   | 1   | 1   |
| S-5  |     |     |     |     |     |     |     |     |     |     |     |     | 1     |     | 1  | 1  | 1    | 1   | 1  | 1   | 1   | 1   | 1   |

OPEN PARKING GARAGES ARE EXCLUDED EXCEPT AS PROVIDED IN SECTION 311.2

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |

N—No requirements for fire resistance.

¹For detailed requirements and exceptions, see Section 302.4.

²For special provisions on highly toxic materials, see the Fire Code.

³For agricultural buildings, see also Appendix Chapter 3.

⁴See Section 309.2.2 for exception.

⁵Group S, Division 3 Occupancies used exclusively for parking or storage of pleasure-type motor vehicles and provided no repair or refueling is done may have the occupancy separation reduced one hour.

⁶For Group F, Division 1 woodworking establishments with more than 2,500 square feet (232.3 m²), the occupancy separation shall be one hour.
### TABLE 3-C—REQUIRED SEPARATION OF SPECIFIC-USE AREAS IN GROUP I, DIVISION 1.1 HOSPITAL AND NURSING HOMES

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>OCCUPANCY SEPARATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Employee locker rooms</td>
<td>None</td>
</tr>
<tr>
<td>2. Gift/retail shops</td>
<td>None</td>
</tr>
<tr>
<td>3. Handicraft shops</td>
<td>None</td>
</tr>
<tr>
<td>4. Kitchens</td>
<td>None</td>
</tr>
<tr>
<td>5. Laboratories which employ hazardous materials in quantities less than that which would cause classification as a Group H Occupancy</td>
<td>One hour</td>
</tr>
<tr>
<td>6. Laundries greater than 100 sq. ft. (9.3 m²)</td>
<td>One hour</td>
</tr>
<tr>
<td>7. Paint shops employing hazardous substances and materials in quantities less than that which would cause classification as a Group H Occupancy</td>
<td>One hour</td>
</tr>
<tr>
<td>8. Physical plant maintenance shop</td>
<td>One hour</td>
</tr>
<tr>
<td>9. Soiled linen room</td>
<td>One hour</td>
</tr>
<tr>
<td>10. Storage rooms 100 sq. ft. (9.3 m²) or less in area storing combustible material</td>
<td>None</td>
</tr>
<tr>
<td>11. Storage rooms more than 100 sq. ft. (9.3 m²) storing combustible material</td>
<td>One hour</td>
</tr>
<tr>
<td>12. Trash-collection rooms</td>
<td>One hour</td>
</tr>
</tbody>
</table>
## TABLE 3-D—EXEMPT AMOUNTS OF HAZARDOUS MATERIALS PRESENTING A PHYSICAL HAZARD

### Maximum Quantities per Control Area

When two units are given, values within parentheses are in cubic feet (cu. ft.) or pounds (lbs.).

<table>
<thead>
<tr>
<th>Material</th>
<th>Class</th>
<th>Condition</th>
<th>Storage Use</th>
<th>Closed Systems</th>
<th>Open Systems</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Solid Lbs. (Cu. Ft.)</td>
<td>Liquid Gallons (Lbs.)</td>
<td>Gas Cu. Ft.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>x 0.4536 for kg</td>
<td>x 3.785 for L</td>
<td>x 0.0283 for m³</td>
</tr>
<tr>
<td>1.1 Combustible liquid 5.6.7.8.9</td>
<td>II</td>
<td>N.A.</td>
<td>120³</td>
<td>N.A.</td>
<td>N.A.</td>
</tr>
<tr>
<td></td>
<td>III-A</td>
<td>N.A.</td>
<td>330³</td>
<td>N.A.</td>
<td>N.A.</td>
</tr>
<tr>
<td></td>
<td>III-B</td>
<td>N.A.</td>
<td>13,200¹⁰,¹¹</td>
<td>N.A.</td>
<td>N.A.</td>
</tr>
<tr>
<td>1.2 Combustible fiber (loose) (baled)</td>
<td>N.A.</td>
<td>(100)</td>
<td>N.A.</td>
<td>N.A.</td>
<td>(100)</td>
</tr>
<tr>
<td></td>
<td>N.A.</td>
<td>(1,000)</td>
<td>N.A.</td>
<td>N.A.</td>
<td>(1,000)</td>
</tr>
<tr>
<td>1.3 Cryogenic, flammable or oxidizing</td>
<td>N.A.</td>
<td>45</td>
<td>N.A.</td>
<td>N.A.</td>
<td>45</td>
</tr>
<tr>
<td>2.1 Explosives</td>
<td>¹⁰,¹³</td>
<td>N.A.</td>
<td>1/₄¹²</td>
<td>N.A.</td>
<td>1/₄¹²</td>
</tr>
<tr>
<td>3.1 Flammable solid</td>
<td>¹²⁵,¹⁰</td>
<td>N.A.</td>
<td>¹⁴</td>
<td>N.A.</td>
<td>¹⁴</td>
</tr>
<tr>
<td>3.2 Flammable gas (gaseous) (liquefied)</td>
<td>N.A.</td>
<td>150¹⁰</td>
<td>750⁶.¹⁰</td>
<td>N.A.</td>
<td>N.A.</td>
</tr>
<tr>
<td>3.3 Flammable liquid 5.6.7.8.9</td>
<td>I-A</td>
<td>N.A.</td>
<td>30²</td>
<td>N.A.</td>
<td>N.A.</td>
</tr>
<tr>
<td></td>
<td>I-B</td>
<td>N.A.</td>
<td>60¹⁰</td>
<td>N.A.</td>
<td>N.A.</td>
</tr>
<tr>
<td></td>
<td>I-C</td>
<td>N.A.</td>
<td>90¹⁰</td>
<td>N.A.</td>
<td>N.A.</td>
</tr>
<tr>
<td></td>
<td>Combination 1-A, I-B, I-C</td>
<td>N.A.</td>
<td>120¹⁰</td>
<td>N.A.</td>
<td>N.A.</td>
</tr>
<tr>
<td>4.1 Organic peroxide, unclassified detonable</td>
<td>¹⁰,¹²</td>
<td>N.A.</td>
<td>¹/₄¹²</td>
<td>N.A.</td>
<td>¹/₄¹²</td>
</tr>
<tr>
<td>4.2 Organic peroxide</td>
<td>⁵⁶.¹⁰</td>
<td>(5)⁶.¹⁰</td>
<td>N.A.</td>
<td>(1)⁶</td>
<td>N.A.</td>
</tr>
<tr>
<td></td>
<td>II</td>
<td>⁸⁵.¹⁰</td>
<td>(80)⁶.¹⁰</td>
<td>N.A.</td>
<td>50⁶</td>
</tr>
<tr>
<td></td>
<td>III</td>
<td>¹²⁵.¹⁰</td>
<td>(125)⁶.¹⁰</td>
<td>N.A.</td>
<td>125⁶</td>
</tr>
<tr>
<td></td>
<td>IV</td>
<td>⁵⁰⁰.¹⁰</td>
<td>(500)⁶.¹⁰</td>
<td>N.A.</td>
<td>500⁶</td>
</tr>
<tr>
<td></td>
<td>V</td>
<td>N.L.</td>
<td>N.L.</td>
<td>N.L.</td>
<td>N.L.</td>
</tr>
</tbody>
</table>
### 4.3 Oxidizer

<table>
<thead>
<tr>
<th></th>
<th>4</th>
<th>3⅛</th>
<th>2</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.3</td>
<td>109.12</td>
<td>(1/4)10.12</td>
<td>N.A.</td>
<td>1/412</td>
</tr>
<tr>
<td>4.3</td>
<td>109.12</td>
<td>(1/4)10.12</td>
<td>N.A.</td>
<td>1/412</td>
</tr>
<tr>
<td>4.3</td>
<td>109.12</td>
<td>(1/4)10.12</td>
<td>N.A.</td>
<td>1/412</td>
</tr>
<tr>
<td>4.3</td>
<td>109.12</td>
<td>(1/4)10.12</td>
<td>N.A.</td>
<td>1/412</td>
</tr>
</tbody>
</table>

### 4.4 Oxidizer—gas

<table>
<thead>
<tr>
<th></th>
<th>4</th>
<th>3⅛</th>
<th>2</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.4</td>
<td>109.12</td>
<td>(1/4)10.12</td>
<td>N.A.</td>
<td>N.A.</td>
</tr>
<tr>
<td>4.4</td>
<td>109.12</td>
<td>(1/4)10.12</td>
<td>N.A.</td>
<td>N.A.</td>
</tr>
<tr>
<td>4.4</td>
<td>109.12</td>
<td>(1/4)10.12</td>
<td>N.A.</td>
<td>N.A.</td>
</tr>
</tbody>
</table>

### 5.1 Pyrophoric

<table>
<thead>
<tr>
<th></th>
<th>4</th>
<th>3⅛</th>
<th>2</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.1</td>
<td>109.12</td>
<td>(1/4)10.12</td>
<td>N.A.</td>
<td>N.A.</td>
</tr>
</tbody>
</table>

### 6.1 Unstable (reactive)

<table>
<thead>
<tr>
<th></th>
<th>4</th>
<th>3⅛</th>
<th>2</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.1</td>
<td>109.12</td>
<td>(1/4)10.12</td>
<td>N.A.</td>
<td>N.A.</td>
</tr>
<tr>
<td>6.1</td>
<td>109.12</td>
<td>(1/4)10.12</td>
<td>N.A.</td>
<td>N.A.</td>
</tr>
</tbody>
</table>

### 7.1 Water reactive

<table>
<thead>
<tr>
<th></th>
<th>4</th>
<th>3⅛</th>
<th>2</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.1</td>
<td>109.12</td>
<td>(1/4)10.12</td>
<td>N.A.</td>
<td>N.A.</td>
</tr>
</tbody>
</table>

N.A.—Not applicable.  N.L.—Not limited.

1 Control areas shall be separated from each other by not less than a one-hour fire-resistive occupancy separation. The number of control areas within a building used for retail or wholesale sales shall not exceed two. The number of control areas in buildings with other uses shall not exceed four. See Section 204.

2 The aggregate quantity in use and storage shall not exceed the quantity listed for storage.

3 The aggregate quantity of nonflammable solid and nonflammable or noncombustible liquid hazardous materials within a single control area of Group M Occupancies used for retail sales may exceed the exempt amounts when such areas are in compliance with the Fire Code.

4 The quantities of alcoholic beverages in retail sales uses are unlimited provided the liquids are packaged in individual containers not exceeding four liters.

5 The quantities of medicines, foodstuffs and cosmetics containing not more than 50 percent of volume of water-miscible liquids and with the remainder of the solutions not being flammable in retail sales or storage occupancies are unlimited when packaged in individual containers not exceeding four liters.

6 For aerosols, see the Fire Code.

7 Quantities may be increased 100 percent in sprinklered buildings. When Footnote 10 also applies, the increase for both footnotes may be applied.

8 Quantities may be increased 100 percent when stored in approved storage cabinets, gas cabinets or exhausted enclosures as specified in the Fire Code. When Footnote 6 also applies, the increase for both footnotes may be applied.

9 The quantities permitted in a sprinklered building are not limited.

10 Permitted in sprinklered buildings only. None is allowed in unsprinklered buildings.

11 One pound of black sporting powder and 20 pounds (9 kg) of smokeless powder are permitted in sprinklered or unsprinklered buildings.

12 See definitions of Divisions 2 and 3 in Section 307.1.

13 Containing not more than the exempt amounts of Class 1-A, Class 1-B or Class 1-C flammable liquids.

14 A maximum quantity of 200 pounds (90.7 kg) of solid or 20 gallons (75.7 L) of liquid Class 3 oxidizers may be permitted in Groups I, R and U Occupancies when such materials are necessary for maintenance purposes or operation of equipment as set forth in the Fire Code.
### TABLE 3-E—EXEMPT AMOUNTS OF HAZARDOUS MATERIALS PRESENTING A HEALTH HAZARD

#### MAXIMUM QUANTITIES PER CONTROL AREA

When two units are given, values within parentheses are in pounds (lbs.)

<table>
<thead>
<tr>
<th>MATERIAL</th>
<th>STORAGE[^1]</th>
<th>USE[^1]—CLOSED SYSTEMS</th>
<th>USE[^2]—OPEN SYSTEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>× 0.4536 for kg</td>
<td>× 3.785 for L x 3.785 for L</td>
<td>× 0.028 for m[^3]</td>
</tr>
</tbody>
</table>

[^1] Control areas shall be separated from each other by not less than a one-hour fire-resistive occupancy separation. The number of control areas within a building used for retail or wholesale sales shall not exceed two. The number of control areas in buildings with other uses shall not exceed four. See Section 204.

[^2] The quantities of medicines, foodstuffs and cosmetics, containing not more than 50 percent by volume of water-miscible liquids and with the remainder of the solutions not being flammable, in retail sales uses are unlimited when packaged in individual containers not exceeding 4 liters.

[^3] The aggregate quantity in use and storage shall not exceed the quantity listed for storage.

[^4] The aggregate quantity of nonflammable solid and nonflammable or noncombustible liquid health hazard materials within a single control area of Group M Occupancies used for retail sales may exceed the exempt amounts when such areas are in compliance with the Fire Code.

[^5] Quantities may be increased 100 percent when stored in approved storage cabinets, gas cabinets or exhausted enclosures as specified in the Fire Code. When Footnote 5 also applies, the increase for both footnotes may be applied.

[^6] Permitted only when stored in approved exhausted gas cabinets, exhausted enclosures or fume hoods.

[^7] Irritants, sensitizers and other health hazards do not include commonly used building materials and consumer products which are not otherwise regulated by this code.
<table>
<thead>
<tr>
<th>Quantity of Explosive Material</th>
<th>MINIMUM DISTANCE (feet)</th>
<th>Separation of Margined Magazines4,5,6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Over 1 Pounds per 0.4536 for kg</td>
<td>Barbaded2</td>
<td>Unbarraded</td>
</tr>
<tr>
<td>2</td>
<td>70</td>
<td>140</td>
</tr>
<tr>
<td>5</td>
<td>90</td>
<td>180</td>
</tr>
<tr>
<td>10</td>
<td>110</td>
<td>220</td>
</tr>
<tr>
<td>20</td>
<td>125</td>
<td>250</td>
</tr>
<tr>
<td>30</td>
<td>140</td>
<td>280</td>
</tr>
<tr>
<td>40</td>
<td>150</td>
<td>300</td>
</tr>
<tr>
<td>50</td>
<td>170</td>
<td>340</td>
</tr>
<tr>
<td>75</td>
<td>190</td>
<td>380</td>
</tr>
<tr>
<td>100</td>
<td>200</td>
<td>400</td>
</tr>
<tr>
<td>125</td>
<td>215</td>
<td>430</td>
</tr>
<tr>
<td>150</td>
<td>235</td>
<td>470</td>
</tr>
<tr>
<td>200</td>
<td>255</td>
<td>510</td>
</tr>
<tr>
<td>250</td>
<td>270</td>
<td>540</td>
</tr>
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<td>300</td>
<td>295</td>
<td>590</td>
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<td>400</td>
<td>320</td>
<td>640</td>
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<tr>
<td>500</td>
<td>340</td>
<td>680</td>
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<tr>
<td>600</td>
<td>355</td>
<td>710</td>
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<tr>
<td>700</td>
<td>375</td>
<td>750</td>
</tr>
<tr>
<td>800</td>
<td>390</td>
<td>780</td>
</tr>
<tr>
<td>900</td>
<td>400</td>
<td>800</td>
</tr>
<tr>
<td>1,000</td>
<td>425</td>
<td>850</td>
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<tr>
<td>1,200</td>
<td>450</td>
<td>900</td>
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<tr>
<td>1,400</td>
<td>470</td>
<td>940</td>
</tr>
<tr>
<td>1,600</td>
<td>490</td>
<td>980</td>
</tr>
<tr>
<td>1,800</td>
<td>505</td>
<td>1,010</td>
</tr>
<tr>
<td>2,000</td>
<td>545</td>
<td>1,090</td>
</tr>
<tr>
<td>2,500</td>
<td>580</td>
<td>1,160</td>
</tr>
<tr>
<td>3,000</td>
<td>635</td>
<td>1,270</td>
</tr>
<tr>
<td>4,000</td>
<td>685</td>
<td>1,370</td>
</tr>
<tr>
<td>5,000</td>
<td>730</td>
<td>1,460</td>
</tr>
<tr>
<td>6,000</td>
<td>770</td>
<td>1,540</td>
</tr>
<tr>
<td>7,000</td>
<td>800</td>
<td>1,600</td>
</tr>
<tr>
<td>8,000</td>
<td>835</td>
<td>1,670</td>
</tr>
<tr>
<td>9,000</td>
<td>865</td>
<td>1,730</td>
</tr>
<tr>
<td>10,000</td>
<td>875</td>
<td>1,750</td>
</tr>
<tr>
<td>12,000</td>
<td>885</td>
<td>1,770</td>
</tr>
<tr>
<td>14,000</td>
<td>900</td>
<td>1,800</td>
</tr>
<tr>
<td>16,000</td>
<td>940</td>
<td>1,880</td>
</tr>
<tr>
<td>18,000</td>
<td>975</td>
<td>1,950</td>
</tr>
<tr>
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</tr>
<tr>
<td>25,000</td>
<td>1,130</td>
<td>2,000</td>
</tr>
<tr>
<td>30,000</td>
<td>1,205</td>
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<tr>
<td>40,000</td>
<td>1,340</td>
<td>2,000</td>
</tr>
<tr>
<td>45,000</td>
<td>1,400</td>
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</tr>
</tbody>
</table>
### TABLE 3-F—MINIMUM DISTANCES FOR BUILDINGS CONTAINING EXPLOSIVE MATERIALS—(Continued)

<table>
<thead>
<tr>
<th>QUANTITY OF EXPLOSIVE MATERIAL</th>
<th>MINIMUM DISTANCE (feet)</th>
<th>× 0.4536 for mm</th>
<th>Separation of Magazines 4, 5, 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pounds Over</td>
<td>Pounds Not Over</td>
<td>Property Lines 2 and Inhabited Buildings 3</td>
<td></td>
</tr>
<tr>
<td>× 0.4536 for kg</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>50,000</td>
<td>55,000</td>
<td>1.460</td>
<td>2,000</td>
</tr>
<tr>
<td>55,000</td>
<td>60,000</td>
<td>1.515</td>
<td>2,000</td>
</tr>
<tr>
<td>60,000</td>
<td>65,000</td>
<td>1.565</td>
<td>2,000</td>
</tr>
<tr>
<td>65,000</td>
<td>70,000</td>
<td>1.610</td>
<td>2,000</td>
</tr>
<tr>
<td>70,000</td>
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<td>2,000</td>
</tr>
<tr>
<td>85,000</td>
<td>90,000</td>
<td>1.760</td>
<td>2,000</td>
</tr>
<tr>
<td>90,000</td>
<td>95,000</td>
<td>1.790</td>
<td>2,000</td>
</tr>
<tr>
<td>95,000</td>
<td>100,000</td>
<td>1.815</td>
<td>2,000</td>
</tr>
<tr>
<td>100,000</td>
<td>110,000</td>
<td>1.835</td>
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<td>110,000</td>
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<td>120,000</td>
<td>130,000</td>
<td>1.875</td>
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<td>140,000</td>
<td>1.890</td>
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<td>150,000</td>
<td>160,000</td>
<td>1.935</td>
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<tr>
<td>160,000</td>
<td>170,000</td>
<td>1.965</td>
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<td>170,000</td>
<td>180,000</td>
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<td>180,000</td>
<td>190,000</td>
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<td>2,010</td>
</tr>
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<td>190,000</td>
<td>200,000</td>
<td>2.030</td>
<td>2,030</td>
</tr>
<tr>
<td>200,000</td>
<td>210,000</td>
<td>2.055</td>
<td>2,055</td>
</tr>
<tr>
<td>210,000</td>
<td>230,000</td>
<td>2.100</td>
<td>2,100</td>
</tr>
<tr>
<td>230,000</td>
<td>250,000</td>
<td>2.155</td>
<td>2,155</td>
</tr>
<tr>
<td>250,000</td>
<td>275,000</td>
<td>2.215</td>
<td>2,215</td>
</tr>
<tr>
<td>275,000</td>
<td>300,000</td>
<td>2.275</td>
<td>2,275</td>
</tr>
</tbody>
</table>

1The number of pounds (kg) of explosives listed is the number of pounds of trinitrotoluene (TNT) or the equivalent pounds (kg) of other explosive.

2The distance listed is the distance to property line, including property lines at public ways.

3Inhabited building is any building on the same property which is regularly occupied by human beings. When two or more buildings containing explosives or magazines are located on the same property, each building or magazine shall comply with the minimum distances specified from inhabited buildings, and, in addition, they shall be separated from each other by not less than the distances shown for “Separation of Magazines,” except that the quantity of explosive materials contained in detonator buildings or magazines shall govern in regard to the spacing of said detonator buildings or magazines from buildings or magazines containing other explosive materials. If any two or more buildings or magazines are separated from each other by less than the specified “Separation of Magazines” distances, then such two or more buildings or magazines, as a group, shall be considered as one building or magazine, and the total quantity of explosive materials stored in such group shall be treated as if the explosive were in a single building or magazine located on the site of any building or magazine of the group, and shall comply with the minimum distance specified from other magazines or inhabited buildings.

4Barricades shall effectively screen the building containing explosives from other buildings, public ways or magazines. When mounds or revetted walls of earth are used for barricades, they shall not be less than 3 feet (914 mm) in thickness. A straight line from the top of any side wall of the building containing explosive materials to the cave line of any other building, magazine or a point 12 feet (3658 mm) above the center line of a public way shall pass through the barricades.

5Magazine is a building or structure approved for storage of explosive materials. In addition to the requirements of this code, magazines shall comply with the Fire Code.

6The distance listed may be reduced by 50 percent when approved natural or artificial barriers are provided in accordance with the requirements in Footnote 4.
TABLE 3-G—REQUIRED DETACHED STORAGE

<table>
<thead>
<tr>
<th>Material</th>
<th>Solids and Liquids (tons)(^{1,2})</th>
<th>Gases (cubic feet)(^{1,2})</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(\times 907.2) for kg</td>
<td>(\times 0.0283) for m(^3)</td>
</tr>
<tr>
<td>1. Explosives, blasting agents, black powder, fireworks, detonatable organic peroxides</td>
<td>Over exempt amounts</td>
<td>Over exempt amounts</td>
</tr>
<tr>
<td>2. Class 4 oxidizers</td>
<td>Class 3</td>
<td>N.A.</td>
</tr>
<tr>
<td>3. Class 4 or Class 3 detonatable unstable (reactives)</td>
<td>Class 2</td>
<td>N.A.</td>
</tr>
<tr>
<td>4. Oxidizers, liquids and solids</td>
<td>Class 3</td>
<td>1,200</td>
</tr>
<tr>
<td></td>
<td>Class 2</td>
<td>2,000</td>
</tr>
<tr>
<td>5. Organic peroxides</td>
<td>Class I</td>
<td>Over exempt amounts</td>
</tr>
<tr>
<td></td>
<td>Class II</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>Class III</td>
<td>N.A.</td>
</tr>
<tr>
<td>6. Unstable (reactives)</td>
<td>Class 4</td>
<td>1/1,000</td>
</tr>
<tr>
<td></td>
<td>Class 3</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Class 2</td>
<td>2,000</td>
</tr>
<tr>
<td>7. Water reactives</td>
<td>Class 3</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Class 2</td>
<td>25</td>
</tr>
<tr>
<td>8. Pyrophoric gases</td>
<td>N.A.</td>
<td>N.A.</td>
</tr>
</tbody>
</table>

N.A.—Not applicable.

\(^1\)For materials which are detonable, the distance to other buildings or property lines shall be as specified in Table 3-F based on trinitrotoluene (TNT) equivalence of the material. For all other materials, the distance shall be as indicated in Table 5-A.

\(^2\)Over exempt amounts mean over the quantities listed in Table 3-D.

TABLE 3-H—OPEN PARKING GARAGES AREA AND HEIGHT

<table>
<thead>
<tr>
<th>TYPE OF CONSTRUCTION</th>
<th>AREA PER TIER (square feet)</th>
<th>HEIGHT (in tiers)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(\times 0.0929) for m(^2)</td>
<td>Ramp Access</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No</td>
</tr>
<tr>
<td>I</td>
<td>Unlimited</td>
<td>Unlimited</td>
</tr>
<tr>
<td>II-F.R.</td>
<td>125,000</td>
<td>12 tiers</td>
</tr>
<tr>
<td>II One-hour</td>
<td>50,000</td>
<td>10 tiers</td>
</tr>
<tr>
<td>II-N</td>
<td>30,000</td>
<td>8 tiers</td>
</tr>
</tbody>
</table>

1-67
Chapter 4
SPECIAL USE AND OCCUPANCY

SECTION 401 — SCOPE
In addition to the occupancy and construction requirements in this code the provisions of this chapter apply to the special uses described herein.

SECTION 402 — ATRIA

402.1 General. Buildings, of other than Group H Occupancy, with automatic sprinkler protection throughout may have atria complying with the provisions of this section. Such atria shall have a minimum opening area and dimension as set forth in Table 4-A.

402.2 Smoke-control System. A smoke-control system meeting the requirements of Section 905 shall be provided within the atrium and areas open to the atrium. The smoke-control system shall operate automatically upon actuation of the automatic sprinkler system within the atrium or areas open to the atrium and as required by Section 905.9.

402.3 Enclosure of Atria. Atria shall be separated from adjacent spaces by not less than one-hour fire-resistive construction.

   EXCEPTIONS: 1. The separation between atria and tenant spaces that are not guest rooms, congregate residences or dwelling units may be omitted at three floor levels.
   2. Open exit balconies are permitted within the atrium.

   Openings in the atrium enclosure other than fixed glazing shall be protected by smoke- and draft-control assemblies conforming to Section 1005.8.

   EXCEPTION: Other tight-fitting doors which are maintained automatic closing, in accordance with Section 713.2, by actuation of a smoke detector, or self-closing may be used when protected as required for glazed openings in Exception 2 below.

   Fixed glazed openings in the atrium enclosure shall be equipped with fire windows having a fire-resistive rating of not less than three-fourths hour, and the total area of such openings shall not exceed 25 percent of the area of the common wall between the atrium and the room into which the opening is provided.

   EXCEPTIONS: 1. In Group R, Division 1 Occupancies, openings may be unprotected when the floor area of each guest room, congregate residence or dwelling unit does not exceed 1,000 square feet (93 m²) and each room or unit has an approved exit not entering the atrium.
   2. Guest rooms, dwelling units, congregate residences and tenant spaces may be separated from the atrium by approved fixed wired glass set in steel frames. In lieu thereof, tempered or laminated glass or listed glass block may be used. subject to the following:

      2.1 The glass shall be protected by a sprinkler system equipped with listed quick response sprinklers. The sprinkler system shall completely wet the entire surface of the glass when actuated. Where there are walking surfaces on both sides of the glass, both sides of the glass shall be so protected.
      2.2 The tempered or laminated glass shall be in a gasketed frame so installed that the glazing system may deflect without breaking (loading) the glass before the sprinkler system operates.
      2.3 The glass block wall assembly shall be installed in accordance with its listing for a three-fourths-hour fire-resistive rating and Section 2110.
      2.4 Obstructions such as curtain rods, drapery traverse rods, curtains, drapes or similar materials shall not be installed between the sprinkler and the glass.

402.4 Travel Distance. When a required exit enters the atrium space, the travel distance from the doorway of the tenant space to an enclosed stairway, horizontal exit, exterior door or exit passageway shall not exceed 100 feet (30 480 mm).

402.5 Group I Occupancy Exits. In Group I Occupancies, other than jails, prisons and reformatories, sleeping rooms shall not be permitted to have required exits through the atrium.
402.6 Occupancy Separation Exceptions. The vertical portion of the occupancy separation which is adjacent to the atrium may be omitted between a Group B Occupancy office, Group M Occupancy sales area or Group A, Division 3 Occupancy and Group R, Division 1 apartment, congregate residence or guest room located on another level.

402.7 Standby Power. Smoke control for the atrium and the smoke-control system for the tenant space shall be provided with standby power as required in Section 905.8.

402.8 Interior Finish. The interior finish of walls and ceilings of the atrium and all unseparated tenant spaces allowed under Exception 1 to the first paragraph of Section 402.3 shall be Class I with no reduction in class for sprinkler protection.

402.9 Acceptance of the Smoke-control System. Acceptance shall be as required by Section 905.15.

402.10 Combustible Furnishings in Atria. The quantity of combustible furnishings in atria shall not exceed that specified in the Fire Code.

SECTION 403 — SPECIAL PROVISIONS FOR GROUP B OFFICE BUILDINGS AND GROUP R, DIVISION 1 OCCUPANCIES

403.1 Scope. This section applies to all Group B office buildings and Group R, Division 1 Occupancies, each having floors used for human occupancy located more than 75 feet (22 860 mm) above the lowest level of fire department vehicle access. Such buildings shall be of Type I or II-F.R. construction and shall be provided with an approved automatic sprinkler system in accordance with Section 403.2.

403.2 Automatic Sprinkler System.

403.2.1 System Design. The automatic sprinkler system shall be provided throughout the building as specified by U.B.C. Standard 9-1, and shall be designed in accordance with that standard and the following.

1. Shutoff valves and a water-flow device shall be provided for each floor. The sprinkler riser may be combined with the standpipe riser.

2. In Seismic Zones 2, 3 and 4, in addition to the main water supply, a secondary on-site supply of water equal to the hydraulically calculated sprinkler design demand plus 100 gallons per minute (378.5 L/min.) additional for the total standpipe system shall be provided. This supply shall be automatically available if the principal supply fails and shall have a duration of 30 minutes.

403.2.2 Modifications. The following modifications of code requirements are permitted:

1. In buildings of Type I construction the fire-resistive time periods set forth in Table 6-A may be reduced by one hour for interior bearing walls, exterior bearing and non-bearing walls, roofs and the beams supporting roofs, provided they do not frame into columns. In buildings of Type II-F.R. construction the fire-resistive time period set forth in Table 6-A may be reduced by one hour for exterior bearing walls, exterior bearing and non-bearing walls, but no reduction is allowed for roofs. The fire-resistive time period reduction as specified herein shall not apply to exterior bearing and non-bearing walls whose fire-resistive rating is less than four hours.

Vertical shafts other than stairway enclosures and elevator shafts may be reduced to one hour when sprinklers are installed within the shafts at alternate floors.

2. Except for corridors in Group B offices and Group R, Division 1 Occupancies and partitions separating dwelling units or guest rooms, all interior non-bearing partitions required to be one-hour fire-resistive construction by Table 6-A may be of noncombustible construction without a fire-resistive time period.

3. Fire dampers, other than those needed to protect floor-ceiling assemblies to maintain the fire resistance of the assembly, are not required.
403.3 Smoke Detection. Smoke detectors shall be provided in accordance with this subsection. Smoke detectors shall be connected to an automatic fire alarm system installed in accordance with the Fire Code. The actuation of any detector required by this subsection shall operate the emergency voice alarm signaling system and shall place into operation all equipment necessary to prevent the recirculation of smoke.

Smoke detectors shall be located as follows:

1. In every mechanical equipment, electrical, transformer, telephone equipment, elevator machine or similar room and in elevator lobbies. Elevator lobby detectors shall be connected to an alarm verification zone or be listed as releasing devices.

2. In the main return-air and exhaust-air plenum of each air-conditioning system. Such detector shall be located in a serviceable area downstream of the last duct inlet.

3. At each connection to a vertical duct or riser serving two or more stories from a return-air duct or plenum of an air-conditioning system. In Group R, Division 1 Occupancies, an approved smoke detector may be used in each return-air riser carrying not more than 5,000 cubic feet per minute (2360 L/s) and serving not more than 10 air inlet openings.

4. For Group R, Division 1 Occupancies in all interior corridors serving as a required exit for an occupant load of 10 or more.

403.4 Smoke Control. A smoke-control system meeting the requirements of Chapter 9 shall be provided.

403.5 Fire Alarm and Communication Systems.

403.5.1 General. The fire alarm, emergency voice/alarm signaling system and fire department communication systems shall be designed and installed as set forth in this code and the Fire Code.

403.5.2 Emergency voice alarm signaling system. The operation of any automatic fire detector, sprinkler or water-flow device shall automatically sound an alert tone followed by voice instructions giving appropriate information and direction on a general or selective basis to the following terminal areas:

1. Elevators.
2. Elevator lobbies.
3. Corridors.
4. Exit stairways.
5. Rooms and tenant spaces exceeding 1,000 square feet (93 m²) in area.
6. Dwelling units in apartment houses.
7. Hotel guest rooms or suites.

A manual override for emergency voice communication shall be provided for all paging zones.

403.5.3 Fire department communication system. A two-way, approved fire department communication system shall be provided for fire department use. It shall operate between the central control station and elevators, elevator lobbies, emergency and standby power rooms and at entries into enclosed stairways.

403.6 Central Control Station.

403.6.1 General. A central control station room for fire department operations shall be provided. The location and accessibility of the central control station room shall be approved by the fire department. The central control station room shall be separated from the remainder of the building by not less than a one-hour fire-resistive occupancy separation. The room shall be a minimum of 96
403.6.1—403.7

square feet (9 m²) with a minimum dimension of 8 feet (2438 mm). It shall contain the following as a minimum:

1. The voice alarm and public address system panels.
2. The fire department communications panel.
3. Fire-detection and alarm system annunciator panels.
4. Annunciator visually indicating the location of the elevators and whether they are operational.
5. Status indicators and controls for air-handling systems.
6. Controls for unlocking all stairway doors simultaneously.
7. Sprinkler valve and water-flow detector display panels.
8. Emergency and standby power status indicators.
9. A telephone for fire department use with controlled access to the public telephone system.
10. Fire pump status indicators.
11. Schematic building plans indicating the typical floor plan and detailing the building core, exit facilities, fire-protection systems, firefighting equipment and fire department access.

403.6.2 Annunciation identification. Control panels in the central control station shall be permanently identified as to function.

Alarm, supervisory and trouble signals as required by Items 3 and 7 above shall be annunciated in compliance with the Fire Code in the central control station by means of an audible and visual indicator. For purposes of annunciation, zoning shall be in accordance with the following:

1. When the system serves more than one building, each building shall be considered separately.
2. Each floor shall be considered a separate zone. When one or more sprinkler risers serve the same floor, each riser shall be considered a separate zone.

EXCEPTION: When more than one riser serves the same system on the floor.

403.7 Elevators. Elevators and elevator lobbies shall comply with the provisions of Chapter 30 and the following:

NOTE: A bank of elevators is a group of elevators or a single elevator controlled by a common operating system; that is, all those elevators which respond to a single call button constitute a bank of elevators. There is no limit on the number of cars which may be in a bank or group, but there may not be more than four cars within a common hoistway.

1. Elevators on all floors shall open into elevator lobbies which are separated from the remainder of the building, including corridors and other exits, by walls extending from the floor to the underside of the fire-resistive floor or roof above. Such walls shall not be of less than one-hour fire-resistive construction. Openings through such walls shall conform to Section 1005.8.

EXCEPTIONS: 1. The main entrance-level elevator lobby in office buildings.
2. Elevator lobbies located within an atrium complying with the provisions of Section 402.
3. In fully sprinklered office buildings, corridors may lead through enclosed elevator lobbies if all areas of the building have access to at least one required exit without passing through the elevator lobby.

2. Each elevator lobby shall be provided with an approved listed smoke detector located on the lobby ceiling. When the detector is activated, elevator doors shall not open and all cars serving that lobby are to return to the main floor and be under manual control only. If the main floor detector or a transfer floor detector is activated, all cars serving the main floor or transfer floor shall return to a location approved by the fire department and building official and be under manual control only. The detector may serve to close the lobby doors, additional doors at the hoistway opening allowed in Section 3007 and smoke dampers serving the lobby.
3. Elevator hoistways shall not be vented through an elevator machine room. Cable slots entering the machine room shall be sleeved into the machine room. Such sleeves shall be no larger than necessary for free passage of the cables. Each elevator machine room shall be treated as a separate smoke-control zone.

403.8 Standby Power, Light and Emergency Systems.

403.8.1 Standby power. A standby power-generator set conforming to the Electrical Code shall be provided on the premises. The set shall supply all functions required by this section at full power. Set supervisions with manual start and transfer override features shall be provided at the central control station.

An on-premises fuel supply sufficient for not less than two hours' full-demand operation of the system shall be provided.

The standby system shall have a capacity and rating that would supply all equipment required to be operational at the same time. The generating capacity need not be sized to operate all the connected electrical equipment simultaneously.

All power, lighting, signal and communication facilities specified in Sections 403.3, 403.4, 403.5, 403.6, 403.7 and 403.8, as applicable; fire pumps required to maintain pressure, standby lighting and normal circuits supplying exit signs and exit illumination shall be transferable to the standby source.

403.8.2 Standby lighting. Standby lighting shall be provided as follows:

1. Separate lighting circuits and fixtures sufficient to provide light with an intensity of not less than 1 footcandle (10.8 lx) measured at floor level in all exit corridors, stairways, pressurized enclosures, elevator cars and lobbies and other areas which are clearly a part of the escape route.

2. All circuits supply lighting for the central control station and mechanical equipment room.

403.8.3 Emergency systems. The following are classified as emergency systems and shall operate within 10 seconds of failure of the normal power supply:

1. Exit sign and exit illumination as required by Sections 1012 and 1013.

2. Elevator car lighting.

403.9 Exits. Exits shall comply with other requirements of this code and the following:

1. All stairway doors which are locked from the stairway side shall have the capability of being unlocked simultaneously without unlatching upon a signal from the central control station.

2. A telephone or other two-way communications system connected to an approved emergency service which operates continuously shall be provided at not less than every fifth floor in each required stairway where other provisions of this code permit the doors to be locked.

403.10 Seismic Considerations. In Seismic Zones 2, 3 and 4, the anchorage of mechanical and electrical equipment required for life-safety systems, including fire pumps and elevator drive and suspension systems, shall be designed in accordance with the requirements of Section 1624.

SECTION 404 — COVERED MALL BUILDINGS

404.1 General.

404.1.1 Purpose. The purpose of this section is to establish minimum standards of safety for the construction and use of covered mall buildings having not more than three levels.

404.1.2 Scope. The provisions of Section 404 shall apply to buildings or structures defined herein as covered mall buildings and shall supersede other similar requirements in other chapters of the code.
EXCEPTIONS: 1. Covered mall buildings conforming with all other applicable provisions of this code. 2. Terminals for transportation facilities and lobbies of hotels, apartments and office buildings.

404.1.3 Definitions. For the purpose of this chapter, certain terms are defined as follows:

ANCHOR BUILDING is an exterior perimeter department store, major merchandising center or Group R, Division 1 Occupancy having direct access to a covered mall building but having all required exits independent of the mall.

COVERED MALL BUILDING is a single building enclosing a number of tenants and occupancies such as retail stores, drinking and dining establishments, entertainment and amusement facilities, offices and other similar uses wherein two or more tenants have a main entrance into the mall.

GROSS LEASABLE AREA is the total floor area designed for tenant occupancy and exclusive use. The area of tenant occupancy is measured from the center lines of joint partitions to the outside of the tenant walls. All tenant areas, including areas used for storage, shall be included in calculating gross leasable area.

MALL is a roofed or covered common pedestrian area within a covered mall building which serves as access for two or more tenants and may have three levels that are open to each other.

404.1.4 Applicability of other provisions. Except as specifically required by this chapter, covered mall buildings shall meet all applicable provisions of this code.

404.2 Types of Construction and Required Yards for Unlimited Area.

404.2.1 Type of construction. One- and two-level covered mall buildings may be of any type of construction permitted by this code. Three-level covered mall buildings shall be at least Type II One-hour construction.

Anchor buildings and parking garages shall be limited in height and area in accordance with Sections 504, 505 and 506.

404.2.2 Required yards for unlimited area. Covered mall buildings may be of unlimited area, provided the covered mall building, attached anchor buildings and parking garages are adjoined by public ways, streets or yards not less than 60 feet (18 288 mm) in width along all exterior walls.

404.3 Special Provisions.

404.3.1 Automatic sprinkler systems. The covered mall building shall be provided with an automatic sprinkler system conforming to the provisions of U.B.C. Standard 9-1 which is a part of this code. See Chapter 35. In addition to these standards, the automatic sprinkler systems shall comply with the following:

1. All automatic sprinkler system control valves shall be electrically supervised by an approved central, proprietary or remote station or a local alarm service which will give an audible signal at a constantly attended location.

2. The automatic sprinkler system shall be complete and operative throughout the covered mall building prior to occupancy of any of the tenant spaces. The separation between an unoccupied tenant space and the covered mall building shall be subject to the approval of the building official and fire department.

3. Sprinkler protection for the mall shall be independent from that provided for tenant spaces. However, tenant spaces may be supplied by the same system if they can be independently controlled.

The respective increases for area and height for covered mall buildings, including anchor buildings, specified in Sections 311.9, 505 and 506 of this code, shall be permitted.

404.3.2 Standpipes. There shall be a combined Class I standpipe outlet connected to a system sized to deliver 250 gallons per minute (946.4 L/min.) at the most hydraulically remote outlet. The
outlet shall be supplied from the mall zone sprinkler system and shall be hydraulically calculated. Standpipe outlets shall be provided at each of the following locations:
1. Within the mall at the entrance to each exit passage or exit corridor.
2. At each floor-level landing within enclosed stairways opening directly onto the mall.
3. At exterior public entrances to the mall.

404.3.3 Smoke-control system. A smoke-control system meeting the requirements of Section 905 shall be provided.

   EXCEPTION: A smoke-control system need not be provided when both of the following conditions exist:
   1. The mall does not exceed one story and
   2. The gross leasable area does not exceed 24,000 square feet (2230 m²).

404.3.4 Fire department access to equipment. Rooms or areas containing controls for air-conditioning systems, automatic fire-extinguishing systems or other detection, suppression or control elements shall be identified for use by the fire department.

404.3.5 Tenant separation. Each tenant space shall be separated from other tenant spaces by a wall having a fire-resistive rating of not less than one hour. The separation wall shall extend from the floor to the underside of the ceiling above. Except as required by other provisions of this code, the ceiling need not be a fire-resistive assembly. A separation is not required between any tenant space and a mall except for occupancy separations required by Section 404.5 or for smoke-control purposes.

404.3.6 Public address system. Covered mall buildings exceeding 50,000 square feet (4645.2 m²) in total floor area shall be provided with a public address system accessible for use by the fire department. Covered mall buildings of 50,000 square feet (4645.2 m²) or less in total floor area, when provided with a public address system, shall have such system accessible for use by the fire department.

404.3.7 Plastic panels and plastic signs. Within every story or level and from side wall to side wall of each tenant space or mall, approved plastic panels and signs shall be limited as follows:
1. They shall not exceed 20 percent of the wall area facing the mall;
2. They shall not exceed a height of 36 inches (914 mm) except that if the sign is vertical then the height shall not exceed 96 inches (2438 mm) and the width shall not exceed 36 inches (914 mm);
3. They shall be located a minimum distance of 18 inches (457 mm) from adjacent tenants.

404.3.8 Lease plan. Each covered mall building owner shall provide both the building and fire departments with a lease plan showing the location of each occupancy and its exits after the certificate of occupancy has been issued. Such plans shall be kept current. No modifications or changes in occupancy or use shall be made from that shown on the lease plan without prior approval of the building official.

404.3.9 Openings between anchor building and mall. Except for the occupancy separation between Group R, Division 1 sleeping rooms and the mall, openings between anchor buildings of Type I, II-F-R, II One-hour or II-N construction and the mall need not be protected.

404.3.10 Standby power. Covered mall buildings exceeding 50,000 square feet (4645.2 m²) shall be provided with standby power systems which are capable of operating the public address system, the smoke-control activation system and the smoke-control equipment as required by Section 905.

404.4 Exits.

404.4.1 General. Each tenant space and the covered mall building shall be provided with exits as required by this section and Chapter 10 of this code. Where there is a conflict between the require-
ments of Chapter 10 and the requirements of this section, the requirements of this section shall apply.

404.4.2 Determination of occupant load. The occupant load permitted in any individual tenant space in a covered mall building shall be determined as required by Section 1002 of this code. Exit requirements for individual tenant spaces shall be based on the occupant load thus determined.

The occupant load permitted for the covered mall building, assuming all portions, including individual tenant spaces and the mall to be occupied at the same time, shall be determined by dividing the gross leasable area by 30 for covered mall buildings containing up to 150,000 square feet (13,935 m²) of gross leasable area, by 40 for covered mall buildings containing between 150,001 and 350,000 square feet (13,935 m² and 32,516 m²) of gross leasable area, and by 50 for covered mall buildings containing more than 350,000 square feet (32,516 m²) of gross leasable area. Exit requirements for the covered mall building shall be based on the occupant load thus determined.

The occupant load of anchor buildings opening into the mall shall not be included in determining exit requirements for the mall.

404.4.3 Number of exits. When the distance of travel to the mall exceeds 75 feet (22,860 mm) within the public area of a tenant space or when the occupant load served by the exit to the mall exceeds 50, not less than two exits shall be provided. The occupant load of a public sales area shall be computed at 30 square feet (2.8 m²) per occupant. Occupant loads for other areas shall be computed in accordance with Table 10-A.

404.4.4 Arrangement of exits. Group A, Divisions 1, 2 and 2.1 Occupancies, other than drinking and dining establishments, shall be so located in the covered mall building that their entrance will be immediately adjacent to a principal entrance to the mall and shall have not less than one half of their required exits opening directly to the exterior of the covered mall building.

Required exits for anchor buildings shall be provided independently from the mall exit system.

Malls shall not exit through anchor buildings. Malls terminating at an anchor building where no other means of exit has been provided shall be considered as a dead-end mall.

404.4.5 Distance to exits. Within each individual tenant space in a covered mall building the maximum distance of travel from any point to an exterior exit door, horizontal exit, exit passageway, enclosed stairway or entrance to the mall shall not exceed 200 feet (60,960 mm).

The maximum distance of travel from any point within a mall to an exterior exit door, horizontal exit, exit passageway or an enclosed stairway shall not exceed 200 feet (60,960 mm).

404.4.6 Access to exits. Exits shall be so arranged that it is possible to go in either direction from any point in a mall to a separate exit, except for dead ends not exceeding a length equal to twice the width of the mall measured at the narrowest location within the dead-end portion of the mall.

The minimum width of exit from a mall shall be 66 inches (1676 mm).

Storage is prohibited in exit passageways which are also used for service to the tenants. Such exit passageways shall be posted with conspicuous signs so stating.

404.4.7 Malls. For the purpose of providing required egress, malls may be considered as corridors but need not comply with the requirements of Sections 1005.7 and 1005.8 of this code when the width of mall is as specified in this section.

The minimum aggregate clear width of the mall shall be 20 feet (6096 mm). There shall be a minimum of 10 feet (3048 mm) clear width to a height of 8 feet (2438 mm) or each side of the mall between any projection from a tenant space bordering the mall and the nearest kiosk, vending machine, bench, display or other obstruction to egress. Kiosks, vending machines and similar uses shall be spaced at least 20 feet (6096 mm) from each other and shall not be more than 300 square feet (28 m²) in area.
Malls which do not conform to the requirements of this section shall comply with the requirements of Sections 1005.7 and 1005.8 of this code.

404.4.8 Security grilles and doors. Horizontal sliding or vertical security grilles or doors which are a part of a required means of egress shall conform to the following:

1. They must remain secured in the full open position during the period of occupancy by the general public.
2. Doors or grilles shall not be brought to the closed position when there are more than 10 persons occupying spaces served by a single exit or 50 persons occupying spaces served by more than one exit.
3. The doors or grilles shall be openable from within without the use of any special knowledge or effort when the space is occupied.
4. When two or more exits are required, not more than one half of the exits may be equipped with horizontal sliding or vertical rolling grilles or doors.

404.5 Occupancy.

404.5.1 General. Covered mall buildings shall be classified as a Group B or M Occupancy and may contain accessory uses consisting of Group A, B, E or R, Division 1 Occupancies. The area of individual accessory uses within a covered mall building shall not exceed three times the basic area permitted by Table 5-B of this code for the type of construction and the occupancy involved. The aggregate area of all accessory uses within a covered mall building shall not exceed 25 percent of the gross leasable area.

An attached garage for the parking or storage of private or pleasure-type motor vehicles having a capacity of not more than nine persons and open parking garages may be considered as separate buildings when they are separated from the covered mall building by an occupancy separation having a fire-endurance time period of at least two hours.

404.5.2 Mixed occupancy. Individual tenant spaces within a covered mall building which comprise a distinct “occupancy,” as described in Chapter 3 of this code, shall be separated from any other occupancy as specified in Section 302.4 of this code.

EXCEPTION: A main entrance which opens onto a mall need not be separated.

SECTION 405 — STAGES AND PLATFORMS

405.1 Scope.

405.1.1 Standards of quality. Stages, platforms and accessory spaces in assembly occupancies shall conform with the requirements of Section 405.

The standards listed below labeled a “U.B.C. standard” are also listed in Chapter 35, Part II, and are part of this code.

1. U.B.C. Standard 4-1, Proscenium Curtains
2. U.B.C. Standard 9-1, Installation of Sprinkler Systems

405.1.2 Definitions. For the purpose of this chapter, certain terms are defined as follows:

BATTEN is a flown metal pipe or shape on which lights or scenery are fastened.
DROP is a large piece of scenic canvas or cloth which hangs vertically, usually across the stage area.
FLY is the space over the stage of a theater where scenery and equipment can be hung out of view. Also called lofts and rigging lofts.
FLY GALLERY is a raised floor area above a stage from which the movement of scenery and operation of other stage effects are controlled.

GRIDIRON is the structural framing over a stage supporting equipment for hanging or flying scenery and other stage effects.

LEG DROP is a long narrow strip of fabric used for masking. When used on either or both sides of the acting area, it is provided to designate an entry onto the stage by the actors. It is also used to mask the side stage area. They may also be called “wings.”

PINRAIL is a rail on or above a stage through which belaying pins are inserted and to which lines are fastened.

PLATFORM is that raised area within a building used for the presentation of music, plays or other entertainment; the head table for special guests; the raised area for lectures and speakers; boxing and wrestling rings; theater in the round; and similar purposes wherein there are not overhead hanging curtains, drops, scenery or stage effects other than lighting.

PLATFORM, PERMANENT, is a platform used within an area for more than 30 days.

PLATFORM, TEMPORARY, is a platform used within an area for not more than 30 days.

PROSCENIUM WALL is the wall that separates the stage from the auditorium or house.

STAGE is a space within a building used for entertainment or presentations, with a stage height of 50 feet (15 240 mm) or less. Curtains, drops, scenery, lighting devices and other stage effects are hung and not retractable except for a single lighting bank; single main curtain, border and legs; and single backdrop.

STAGE AREAS are the entire performance area and adjacent backstage and support areas not separated from the performance area by fire-resistive construction.

STAGE HEIGHT is the dimension between the lowest point on the stage floor and the highest point of the roof or floor deck above the stage.

STAGE, LEGITIMATE, is a stage wherein curtains, drops, leg drops, scenery, lighting devices or other stage effects are retractable horizontally or suspended overhead and the stage height is greater than 50 feet (15 240 mm).

THEATER-IN-THE-ROUND is an acting area in the middle of a room with the audience sitting all around it.

405.1.3 Materials and design. Materials used in the construction of platforms and stages shall conform to the applicable materials and design requirements as set forth in this code. All assumed design live loads shall be indicated on the construction documents submitted for approval.

405.2 Platforms. Temporary platforms may be constructed of any materials. The space between the floor and the platform above shall not be used for any purpose other than electrical wiring or plumbing to platform equipment.

Platforms shall be constructed of materials as required for the type of construction of the building in which the platform is located. When the space beneath a raised platform is used for storage or any purpose other than equipment wiring or plumbing, the floor construction shall not be less than one-hour fire-resistive construction. When the space beneath the platform is not used for any purpose other than equipment wiring or plumbing, the underside of the platform shall be firestopped and may be constructed of any type of materials permitted by this code. The floor finish may be of wood in all types of construction.

405.3 Stages.

405.3.1 Construction. The minimum type of construction for stages shall be as required for the building except that the finish floor, in all types of construction, may be of wood.

Stages having a stage height exceeding 50 feet (15 240 mm) shall be separated from the balance of the building by not less than a two-hour occupancy separation.
EXCEPTION: The opening in the proscenium wall used for viewing performances may be protected by a proscenium firesafety curtain conforming to U.B.C. Standard 4-1.

Where permitted by the building construction type or where the stage is separated from all other areas as required in the paragraph above, the stage floor may be of unprotected noncombustible or heavy-timber framing members with a minimum 1 1/2-inch-thick (38 mm) wood deck.

Where a stage floor is required to be of one-hour fire-resistive-rated construction, the stage floor may be unprotected when the space below the stage is sprinklered throughout.

Where the stage height is 50 feet (15 240 mm) or less, the stage area shall be separated from accessory spaces by a one-hour fire-resistive occupancy separation.

EXCEPTION: Control rooms and follow spot rooms may be open to the audience.

405.3.2 Accessory rooms. Dressing rooms, workshops, storerooms and other accessory spaces contiguous to stages shall be separated from each other and other building areas by a one-hour fire-resistive occupancy separation.

EXCEPTION: A separation is not required for stages having a floor area not exceeding 500 square feet (46.5 m²).

405.3.3 Ventilation. Emergency ventilation shall be provided for all stage areas greater than 1,000 square feet (93 m²) or with a stage height of greater than 50 feet (15 240 mm) to provide a means of removing smoke and combustion gases directly to the outside in the event of a fire. Ventilation shall be by one or a combination of the following methods:

405.3.3.1 Smoke control. A means shall be provided to maintain the smoke level not less than 6 feet (1829 mm) above the highest level of assembly seating or above the top of the proscenium opening where proscenium wall and opening protection is provided. The system shall be activated independently by each of the following: (1) activation of the sprinkler system in the stage area and (2) by a manually operated switch at an approved location. The emergency ventilation system shall be connected to both normal and standby power. The fan(s) power wiring and ducts shall be located and properly protected to assure a minimum 20 minutes of operation in the event of activation.

405.3.3.2 Roof vents. Two or more vents shall be located near the center of and above the highest part of the stage area. They shall be raised above the roof and provide a net free vent area equal to 5 percent of the stage area. Vents shall be constructed to open automatically by approved heat-activated devices. Supplemental means shall be provided for manual operation of the ventilator from the stage floor. Vents shall be labeled by an approved agency.

405.3.4 Proscenium walls. The proscenium opening shall be protected by an approved fire curtain or an approved water curtain complying with U.B.C. Standard 4-1. The fire curtain shall be designed to close automatically upon automatic detection of a fire and upon manual activation and shall resist the passage of flame and smoke for 20 minutes between the stage area and the audience area.

405.3.5 Gridirons, fly galleries and pinrails. Beams designed only for the attachment of portable or fixed theater equipment, gridirons, galleries and catwalks shall be constructed of materials consistent with the building type of construction. A fire-resistance rating is not required.

EXCEPTION: Combustible materials shall be permitted for use as the floors of galleries and catwalks of all types of construction.

405.3.6 Flame-retardant requirements. Combustible scenery of cloth, film, dry vegetation and similar materials shall meet the requirements of the Fire Code. Foam plastics shall have a maximum heat release rate of 100 kilowatts.

SECTION 406 — MOTION PICTURE PROJECTION ROOMS

406.1 General.

406.1.1 Scope. The provisions of this section shall apply where ribbon-type cellulose acetate or other safety film is used in conjunction with electric arc, xenon or other light-source projection
equipment which develops hazardous gases, dust or radiation. Where cellulose nitrate film is used, projection rooms shall comply with the Fire Code.

406.1.2 Projection room required. Every motion picture machine projecting film as mentioned within the scope of this chapter shall be enclosed in a projection room. Appurtenant electrical equipment, such as rheostats, transformers and generators, may be within the projection room or in an adjacent room of equivalent construction.

There shall be posted on the outside of each projection room door and within the projection room itself a conspicuous sign with 1-inch (25.4 mm) block letters stating: SAFETY FILM ONLY PERMITTED IN THIS ROOM.

406.2 Construction. Every projection room shall be of permanent construction consistent with the construction requirements for the type of building in which the projection room is located. Openings need not be protected.

The room shall have a floor area of not less than 80 square feet (7.4 m²) for a single machine and at least 40 square feet (3.7 m²) for each additional machine. Each motion picture projector, floodlight, spotlight or similar piece of equipment shall not be used unless approved and shall have a clear working space not less than 30 inches by 30 inches (762 mm by 762 mm) on each side and at the rear thereof, but only one such space shall be required between two adjacent projectors.

The projection room and the rooms appurtenant thereto shall have a ceiling height of not less than 7 feet 6 inches (2286 mm).

406.3 Exits. Exits shall be provided as required in Chapter 10. Motion picture projection rooms used for projection of safety film only are required to have only one exit.

406.4 Projection Ports and Openings. The aggregate of openings for projection equipment shall not exceed 25 percent of the area of the wall between the projection room and the auditorium. All openings shall be provided with glass or other approved material so as to completely close the opening.

406.5 Ventilation.

406.5.1 General. Ventilation shall be provided in accordance with the provisions of this section.

406.5.2 Projection booth.

406.5.2.1 Supply air. Each projection room shall be provided with adequate air-supply inlets so arranged as to provide well-distributed air throughout the room. Air-inlet ducts shall provide an amount of air equivalent to the amount of air being exhausted by projection equipment. Air may be taken from the outside; from adjacent spaces within the building, provided the volume and infiltration rate is sufficient; or from the building air-conditioning system, provided it is so arranged as to provide sufficient air when other systems are not in operation.

406.5.2.2 Exhaust air. Projection booths may be exhausted through the lamp exhaust system. The lamp exhaust system shall be positively interconnected with the lamp so that the lamp will not operate unless there is the air flow required for the lamp. Exhaust air ducts shall terminate at the exterior of the building in such a location that the exhaust air cannot be readily recirculated into any air-supply system. The projection room ventilation system may also serve appurtenant rooms such as the generator room and the rewind room.

Each projection machine shall be provided with an exhaust duct that will draw air from each lamp and exhaust it directly to the outside of the building. The lamp exhaust may serve to exhaust air from the projection room to provide room air circulation. Such ducts shall be of rigid materials, except for a flexible connector approved for the purpose. The projection lamp or projection room exhaust system or both may be combined but shall not be interconnected with any other exhaust or return system, or both, within the building.
406.5.3 Projection equipment ventilation.

406.5.3.1 General. Each projection machine shall be provided with an exhaust duct which will draw air from each lamp and exhaust it directly to the outside of the building in such a fashion that it will not be picked up by supply inlets. Such a duct shall be of rigid materials, except for a continuous flexible connector approved for the purpose. The lamp exhaust system shall not be interconnected with any other system.

406.5.3.2 Electric arc projection equipment. The exhaust capacity shall be 200 cubic feet per minute (94.4 L/s) for each lamp connected to the lamp exhaust system, or as recommended by the equipment manufacturer. Auxiliary air may be introduced into the system through a screened opening to stabilize the arc.

406.5.3.3 Xenon projection equipment. The lamp exhaust system shall exhaust not less than 300 cubic feet per minute (142 L/s) per lamp or not less than that exhaust volume required or recommended by the equipment manufacturer, whichever is the greater. The external temperature of the lamp housing shall not exceed 130°F (54.5 °C.) when operating.

406.6 Miscellaneous Equipment. Each projection room shall be provided with rewind and film storage facilities.

A maximum of four containers for flammable liquids not greater than 16-ounce (473.2 mL) capacity and of a nonbreakable type may be permitted in each projection booth.

406.7 Sanitary Facilities. Every projection room shall be provided with a lavatory. Every projection room serving an assembly occupancy shall be provided with a water closet.

EXCEPTION: A water closet is not required in a projection room where completely automated projection equipment is installed which does not require a projectionist in attendance for projection or rewinding film.

SECTION 407 — CELLULOSE NITRATE FILM

The handling and storage of cellulose nitrate film shall be in accordance with the Fire Code. For exits, see Section 1020.4.

SECTION 408 — AMUSEMENT BUILDINGS

408.1 General. Amusement buildings having an occupant load of 50 or more shall comply with the requirements for the appropriate Group A Occupancy and this section. Amusement buildings having an occupant load of less than 50 shall comply with the requirements for a Group B Occupancy and this section.

EXCEPTION: Amusement buildings or portions thereof which are without walls or a roof and constructed to prevent the accumulation of smoke in assembly areas.

For flammable decorative materials, see the Fire Code.

408.2 Definition. For the purposes of this code the following definition applies:

AMUSEMENT BUILDING is a building or portion thereof, temporary or permanent, used for entertainment or educational purposes and which contains a system which transports passengers or provides a walkway through a course so arranged that the required exits are no apparent due to theatrical distractions, are disguised or not readily available due to the method of transportation through the building or structure.

408.3 Exit and Exit Signs. Exits and exit signs for amusement buildings shall be approved by the building official and, where practical, shall comply with the requirements specified in Chapter 10. For exit marking, see Section 1013.6.

408.4 Automatic Fire-extinguishing Systems. An automatic fire-extinguishing system shall be installed in amusement buildings as set forth in Section 904.2.3.6.

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408.5 Alarm Systems.

408.5.1 General. An approved smoke-detection system installed in accordance with the Fire Code shall be provided in amusement buildings.

*EXCEPTION*: In areas where ambient conditions will cause a smoke-detector system to alarm, an approved alternate type of automatic detector shall be installed.

408.5.2 Alarm system. Activation of any single smoke detector, the automatic sprinkler system or other automatic fire-detection device shall immediately sound an alarm in the building at a constantly supervised location from which the manual operation of systems noted in Section 408.5.3, Items 1, 2 and 3, may be initiated.

408.5.3 System response. The activation of two or more smoke detectors, a single smoke detector monitored by an alarm verification zone, the automatic sprinkler system or other approved automatic fire-detection device shall automatically:

1. Stop confusing sounds and visual effects, and
2. Activate an approved directional exit marking, and
3. Cause illumination of the exit path with light of not less than 1 footcandle at the walking surface.

408.5.4 Public address system. A public address system which is audible throughout the amusement building shall be provided. The public address system may also serve as an alarm system.

SECTION 409 — PEDESTRIAN WALKWAYS

409.1 General. A pedestrian walkway shall be considered a building when determining the roof covering permitted by Table 15-A. Pedestrian walkways connecting separate buildings need not be considered as buildings and need not be considered in the determination of the allowable floor area of the connected buildings when the pedestrian walkway complies with the provisions of this section.

409.2 Construction. Pedestrian walkways shall be constructed of noncombustible materials.

*EXCEPTIONS*: 1. Pedestrian walkways connecting buildings of Type III, IV or V construction may be constructed of one-hour fire-resistive construction or of heavy-timber construction in accordance with Section 605.6.

2. Pedestrian walkways located on grade having both sides open by at least 50 percent and connecting buildings of Type III, IV or V construction may be constructed with any materials allowed by this code.

409.3 Openings between Pedestrian Walkways and Buildings. Openings from buildings to pedestrian walkways shall conform to the requirements of Table 5-A and Sections 503.3, 602.3, 603.3, 604.3, 605.3 and 606.3. In addition, pedestrian walkways connecting buildings shall be either provided with opening protection at connections to buildings in accordance with Section 1005.8 or constructed with both sides of the pedestrian walkway at least 50 percent open with the open area distributed so as to prevent the accumulation of smoke and toxic gases.

409.4 Width. The unobstructed width of pedestrian walkways shall not be less than 44 inches (1118 mm). The total width of a pedestrian walkway shall not exceed 30 feet (9144 mm).

409.5 Maximum Length. The length of a pedestrian walkway shall not exceed 300 feet (91.44 m).

*EXCEPTIONS*: 1. Pedestrian walkways that are fully sprinklered may be 400 feet (121.92 m) in length.

2. Unenclosed walkways at grade.

409.6 Multiple Pedestrian Walkways. The distance between any two pedestrian walkways on the same horizontal plane shall not be less than 40 feet (12 192 mm).
409.7 **Required Exits.** Pedestrian walkways at other than grade shall not be used as required exits. Pedestrian walkways at grade level used as required exits shall provide an unobstructed means of egress to a public way and shall have a minimum width in accordance with Section 1003.2.

**EXCEPTION:** Pedestrian walkways conforming to the requirements of a horizontal exit may be used as a required exit.

409.8 **Pedestrian Walkways over Public Streets.** Pedestrian walkways over public streets shall be subject to the approval of local jurisdictions.

### SECTION 410 — MEDICAL GAS SYSTEMS IN GROUPS B AND I OCCUPANCIES

Medical gas systems in Groups B and I Occupancies shall be installed and maintained in accordance with this section and the Fire Code. When nonflammable gas cylinders for such systems are located inside buildings, they shall be in a separate room or enclosure separated from the rest of the building by not less than one-hour fire-resistive construction. Doors to the room or enclosure shall be self-closing smoke- and draft-control assemblies having a fire-protection rating of not less than one hour. Rooms shall have at least one exterior wall in which there are not less than two vents of not less than 36 square inches (0.023 m²) in area per vent. One vent shall be within 6 inches (152 mm) of the floor and one shall be within 6 inches (152 mm) of the ceiling.

**EXCEPTION:** When an exterior wall cannot be provided for the room, automatic sprinklers shall be installed within the room and the room shall be vented to the exterior through ducting contained within a one-hour-rated shaft enclosure. Approved mechanical ventilation shall provide six air changes per hour for the room.

### SECTION 411 — COMPRESSED GASES

The storage and handling of compressed gases shall comply with the Fire Code.

### SECTION 412 — AVIATION CONTROL TOWERS

Where applicable (see Section 101.3) for aviation control towers, see Appendix Chapter 4, Division II.

### SECTION 413 — DETENTION AND CORRECTION FACILITIES

Where applicable (see Section 101.3) for detention and correction facilities, see Appendix Chapter 3, Division I.

### SECTION 414 — AGRICULTURAL BUILDINGS

Where applicable (see Section 101.3) for agricultural buildings, see Appendix Chapter 3, Division II.

### SECTION 415 — GROUP R, DIVISION 3 OCCUPANCIES

Where applicable (see Section 101.3) for Group R, Division 3 Occupancies, see Appendix Chapter 3, Division III.

### SECTION 416 — GROUP R, DIVISION 4 OCCUPANCIES

Where applicable (see Section 101.3) for Group R, Division 4 Occupancies, see Appendix Chapter 3, Division IV.
SECTION 417 — BARRIERS FOR SWIMMING POOLS

Where applicable (see Section 101.3) for barriers for swimming pools, see Appendix Chapter 4, Division I.

SECTION 418 — FALLOUT SHELTERS

Where applicable (see Section 101.3) for fallout shelters, see Appendix Chapter 4, Division III.

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<td>900</td>
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<tr>
<td>8 or more</td>
<td>40</td>
<td>1,600</td>
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$^1$ The specified dimensions are the diameters of inscribed circles whose centers fall on a common axis for the full height of the atrium.
Chapter 5
GENERAL BUILDING LIMITATIONS

SECTION 501 — SCOPE
Buildings and structures shall comply with the location on property, area, height and other provisions of this chapter.
For additional limitations or allowances for special uses or occupancies, see the following:

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SECTION 502 — PREMISES IDENTIFICATION
Approved numbers or addresses shall be provided for all new buildings in such a position as to be plainly visible and legible from the street or road fronting the property.

SECTION 503 — LOCATION ON PROPERTY

503.1 General. Buildings shall adjoin or have access to a public way or yard on not less than one side. Required yards shall be permanently maintained.
For the purpose of this section, the center line of an adjoining public way shall be considered an adjacent property line. (See also Section 1203.4.)

503.2 Fire Resistance of Walls.

503.2.1 General. Exterior walls shall have fire resistance and opening protection as set forth in Table 5-A and in accordance with such additional provisions as are set forth in Chapter 6. Distance shall be measured at right angles from the property line. The above provisions shall not apply to walls at right angles to the property line.
1. Projections beyond the exterior wall shall comply with Section 705 and shall not extend beyond:
   1. A point one third the distance to the property line from an assumed vertical plane located where fire-resistive protection of openings is first required due to location on property; or
   2. More than 12 inches (305 mm) into areas where openings are prohibited.

503.2.2 Area of openings. When openings in exterior walls are required to be protected due to distance from property line, the sum of the area of such openings shall not exceed 50 percent of the total area of the wall in each story.

503.3 Buildings on Same Property and Buildings Containing Courts. For the purposes of determining the required wall and opening protection and roof-covering requirements, buildings on the same property and court walls of buildings over one story in height shall be assumed to have a property line between them.
EXCEPTION: In court walls where opening protection is required such protection may be omitted, provided (1) not more than two levels open into the court, (2) the aggregate area of the building including the court is within the allowable area, and (3) the building is not classified as a Group I Occupancy.

When a new building is to be erected on the same property as an existing building, the location of the assumed property line with relation to the existing building shall be such that the exterior wall and opening protection of the existing building meet the criteria as set forth in Table 5-A and Chapter 6.

EXCEPTION: Two or more buildings on the same property may be considered as portions of one building if the aggregate area of such buildings is within the limits specified in Section 504 for a single building.

When the buildings so considered house different occupancies or are of different types of construction, the area shall be that allowed for the most restricted occupancy or construction.

503.4 Special Provisions and Exceptions to Table 5-A.

503.4.1 General. The provisions of this section are exceptions to, or special provisions of, the construction requirements of Table 5-A, Chapters 3 and 6.

503.4.2 One-story Groups B, F, M and S Occupancies. In Groups B, F, M and S Occupancies, a fire-resistive time period will not be required for an exterior wall of a one-story, Type II-N building, provided the floor area of the building does not exceed 1,000 square feet (93 m²) and such wall is located not less than 5 feet (1524 mm) from a property line.

503.4.3 Fire-retardant-treated wood framing. In Types III and IV construction, approved fire-retardant-treated wood framing may be used within the assembly of exterior walls when Table 5-A allows a fire-resistive rating of two hours or less provided the required fire resistance is maintained and the exposed outer and inner faces of such walls are noncombustible.

503.4.4 Wood columns and arches. In Types III and IV construction, wood columns and arches conforming to heavy-timber sizes may be used externally when exterior walls are permitted to be unprotected, noncombustible construction or when one-hour fire-resistive noncombustible exterior walls are permitted.

503.4.5 Group H Occupancies—minimum distance to property lines. Regardless of any other provisions, Group H Occupancies shall be set back a minimum distance from property lines as set forth in Items 1 through 4 below. Distances shall be measured from the walls enclosing the occupancy to all property lines, including those on a public way.

1. Group H, Division 1 Occupancies. Not less than 75 feet (22 860 mm) and not less than required by Table 3-F.

2. Group H, Division 2 Occupancies. Not less than 30 feet (9144 mm) when the area of the occupancy exceeds 1,000 square feet (93 m²) and it is not required to be located in a detached building.

3. Group H, Divisions 2 and 3 Occupancies. Not less than 50 feet (15 240 mm) when a detached building is required. See Table 3-G.

4. Group H, Divisions 2 and 3 Occupancies containing materials with explosive characteristics. Not less than the distances required by Table 3-F.

503.4.6 Group H, Division 1, 2 or 3 Occupancies—detached buildings. When a detached building is required by Table 3-G, there are no requirements for wall and opening protection based on location on property.

503.4.7 Group H, Division 4 Occupancies. Group H, Division 4 Occupancies having a floor area not exceeding 2,500 square feet (232 m²) may have exterior bearing walls of not less than two-hour fire-resistive construction when less than 5 feet (1524 mm) from a property line, and not less than one hour when less than 20 feet (6096 mm) to a property line.

503.4.8 Group U, Division 1 Occupancies. In Group U, Division 1 Occupancies, exterior walls that are required to be of one-hour fire-resistive construction due to location on property may be protected only on the exterior side with materials approved for one-hour fire-resistive construction.
503.4.9  Exterior wall assemblies. Exterior wall assemblies complying with Section 2602.5.2 may be used in all types of construction.

SECTION 504 — ALLOWABLE FLOOR AREAS

504.1  One-story Areas. The area of a one-story building shall not exceed the limits set forth in Table 5-B except as provided in Section 505.

504.2  Areas of Buildings over One Story. The total combined floor area for multistory buildings may be twice that permitted by Table 5-B for one-story buildings, and the floor area of any single story shall not exceed that permitted for a one-story building.

504.3  Allowable Floor Area of Mixed Occupancies. When a building houses more than one occupancy, the area of the building shall be such that the sum of the ratios of the actual area for each separate occupancy divided by the total allowable area for each separate occupancy shall not exceed one.

EXCEPTIONS: 1. The major occupancy classification of a building may be used to determine the allowable area of such building when the major use occupies not less than 90 percent of the area of any floor of the building and provided that other minor accessory uses shall not exceed the basic area permitted by Table 5-B for such minor uses and that various uses are separated as specified in Section 302.4.

2. Groups B, F, M and S and Group H, Division 5 Occupancies complying with the provisions of Section 505.2 may contain other occupancies provided that such occupancies do not occupy more than 10 percent of the area of any floor of a building, nor more than the basic area permitted in the occupancy by Table 5-B for such occupancy, and further provided that such occupancies are separated as specified in Section 302.4.

504.4  Mezzanines. Unless considered as a separate story, the floor area of all mezzanines shall be included in calculating the allowable floor area of the stories in which the mezzanines are located.

504.5  Basements. A basement need not be included in the total allowable area, provided such basement does not exceed the area permitted for a one-story building.

504.6  Area Separation Walls.

504.6.1  General. Each portion of a building separated by one or more area separation walls which comply with the provisions of this subsection may be considered a separate building. The extent and location of such area separation walls shall provide a complete separation.

When an area separation wall also separates occupancies that are required to be separated by an occupancy separation, the most restrictive requirements of each separation shall apply.

504.6.2  Fire resistance and openings. Area separation walls shall not be less than four-hour fire-resistive construction in Types I, II-F.R., III and IV buildings and two-hour fire-resistive construction in Types II One-hour, II-N or V buildings. The total width of all openings in such walls shall not exceed 25 percent of the length of the wall in each story. All openings shall be protected by a fire assembly having a three-hour fire-protection rating in four-hour fire-resistive walls and one-and one-half-hour fire-protection rating in two-hour fire-resistive walls.

504.6.3  Extensions beyond exterior walls. Area separation walls shall extend horizontally to the outer edges of horizontal projecting elements such as balconies, roof overhangs, canopies, marquees or architectural projections extending beyond the floor area as defined in Section 207.

EXCEPTIONS: 1. When horizontal projecting elements do not contain concealed spaces, the area separation wall may terminate at the exterior wall.

2. When the horizontal projecting elements contain concealed spaces, the area separation wall need only extend through the concealed space to the outer edges of the projecting elements.

In either Exception 1 or 2, the exterior walls and the projecting elements above shall not be of less than one-hour fire-resistive construction for a distance not less than the depth of the projecting elements on both
504.6.4 Terminating. Area separation walls shall extend vertically from the foundation to a point at least 30 inches (762 mm) above the roof.

EXCEPTIONS: 1. Any area separation wall may terminate at the underside of the roof sheathing, deck or slab, provided the roof-ceiling assembly is of at least two-hour fire-resistive construction.

2. Two-hour area separation walls may terminate at the underside of the roof sheathing, deck or slab, provided:
   2.1 When the roof-ceiling framing elements are parallel to the wall, such framing and elements supporting such framing shall not be of less than one-hour fire-resistive construction for a width of not less than 5 feet (1524 mm) on each side of the wall.
   2.2 When roof-ceiling framing elements are perpendicular to the wall, the entire span of such framing and elements supporting such framing shall not be of less than one-hour fire-resistive construction.
   2.3 Openings in the roof shall not be located within 5 feet (1524 mm) of the area separation wall.
   2.4 The entire building shall be provided with not less than a Class B roof covering as specified in Table 15-A.

3. Two-hour area separation walls may terminate at the underside of noncombustible roof sheathing, deck or slabs of roofs of noncombustible construction provided:
   3.1 Openings in the roof are not located within 5 feet (1524 mm) of the area separation wall.
   3.2 The entire building is provided with not less than a Class B roof covering as specified in Table 15-A.

504.6.5 Parapet faces. Parapets of area separation walls shall have noncombustible faces for the uppermost 18 inches (457 mm), including counterflashing and coping materials.

504.6.6 Building of different heights. Where an area separation wall separates portions of a building having different heights, such wall may terminate at a point 30 inches (762 mm) above the lower roof level, provided the exterior wall for a height of 10 feet (3048 mm) above the lower roof is of one-hour fire-resistive construction with openings protected by assemblies having a three-fourths-hour fire-protection rating.

EXCEPTION: Two-hour area separation walls may terminate at the underside of the roof sheathing, deck or slab of the lower roof, provided:

1. When the roof-ceiling framing elements are parallel to the wall, such framing and elements supporting such framing shall not be of less than one-hour fire-resistive construction for a width of 10 feet (3048 mm) along the wall at the lower roof.

2. When the lower roof-ceiling framing elements are perpendicular to the wall, the entire span of framing and elements supporting such framing shall not be of less than one-hour fire-resistive construction.

3. Openings in the lower roof shall not be located within 10 feet (3048 mm) of the area separation wall.

See Chapters 3 and 4 for special occupancy provisions.

SECTION 505 — ALLOWABLE AREA INCREASES

505.1 General. The floor areas specified in Section 504 may be increased by employing one of the provisions of this section.

505.1.1 Separation on two sides. Where public ways or yards more than 20 feet (6096 mm) in width extend along and adjoin two sides of the building, floor areas may be increased at a rate of 1 1/4 percent for each foot (305 mm) by which the minimum width exceeds 20 feet (6096 mm), but the increase shall not exceed 50 percent.

505.1.2 Separation on three sides. Where public ways or yards more than 20 feet (6096 mm) in width extend along and adjoin three sides of the building, floor areas may be increased at a rate of 2 1/2 percent for each foot (305 mm) by which the minimum width exceeds 20 feet (6096 mm), but the increase shall not exceed 100 percent.

505.1.3 Separation on all sides. Where public ways or yards more than 20 feet (6096 mm) in width extend on all sides of a building and adjoin the entire perimeter, floor areas may be in-
creased at a rate of 5 percent for each foot (305 mm) by which the minimum width exceeds 20 feet (6096 mm). Such increases shall not exceed 100 percent, except that greater increases shall be permitted for the following occupancies:

1. Group S, Division 5 aircraft storage hangars not exceeding one story in height.
2. Group S, Division 2 or Group F, Division 2 Occupancies not exceeding two stories in height.
3. Group H, Division 5 aircraft repair hangars not exceeding one story in height. Area increases shall not exceed 500 percent for aircraft repair hangars except as provided in Section 505.2.

**505.2 Unlimited Area.** The area of any one- or two-story building of Groups B; F, Division 1 or 2; M; S, Division 1, 2, 3, 4 or 5; and H, Division 5 Occupancies shall not be limited if the building is provided with an approved automatic sprinkler system throughout as specified in Chapter 9, and entirely surrounded and adjoined by public ways or yards not less than 60 feet (18 288 mm) in width.

The area of a Group S, Division 2 or Group F, Division 2 Occupancy in a one-story Type II, Type III One-hour or Type IV building shall not be limited if the building is entirely surrounded and adjoined by public ways or yards not less than 60 feet (18 288 mm) in width.

**505.3 Automatic Sprinkler Systems.** The areas specified in Table 5-B and Section 504.2 may be tripled in one-story buildings and doubled in buildings of more than one story if the building is provided with an approved automatic sprinkler system throughout. The area increases permitted in this subsection may be compounded with that specified in Section 505.1.1, 505.1.2 or 505.1.3. The increases permitted in this subsection shall not apply when automatic sprinkler systems are installed under the following provisions:

1. Section 506 for an increase in allowable number of stories.
2. Section 904.2.5.1 for Group H, Divisions 1 and 2 Occupancies.
3. Substitution for one-hour fire-resistive construction pursuant to Section 508.
4. Section 402, Atria.

**SECTION 506 — MAXIMUM HEIGHT OF BUILDINGS AND INCREASES**

The maximum height and number of stories of buildings shall be dependent on the character of the occupancy and the type of construction and shall not exceed the limits set forth in Table 5-B, except as provided in this section and as specified in Section 302.1 for mixed occupancy buildings.

**EXCEPTIONS:**

1. Towers, spires and steeples erected as a part of a building and not used for habitation or storage are limited as to height only by structural design if completely of noncombustible materials, or may extend not to exceed 20 feet (6096 mm) above the height limit in Table 5-B if of combustible materials.
2. The height of one-story aircraft hangars shall not be limited if the building is provided with automatic sprinkler systems throughout as specified in Chapter 9 and is entirely surrounded by public ways or yards not less in width than one and one-half times the height of the building.

The story limits set forth in Table 5-B may be increased by one story if the building is provided with an approved automatic sprinkler system throughout. The increase in the number of stories for automatic sprinkler systems shall not apply when the automatic sprinkler systems are installed under the following provisions:

1. Section 904.2.5 for Group H, Divisions 1, 2, 3, 6 and 7 Occupancies.
2. Section 505 for an increase in allowable area.
3. Substitution for one-hour fire-resistive construction pursuant to Section 508.
4. Section 402, Atria.
5. Section 904.2.6 for Group I, Divisions 1.1 and 1.2 Occupancies used as hospitals, nursing homes or health-care centers in Type II One-hour, Type III One-hour, Type IV or Type V One-hour construction.

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SECTION 507 — MEZZANINES

A mezzanine need not be counted as a story for determining the allowable number of stories when constructed in accordance with the following:

1. The construction of a mezzanine shall be consistent with the requirements for the type of construction in which the mezzanine is located, but the fire-resistive time period need not exceed one hour for unenclosed mezzanines. The clear height above and below the mezzanine floor construction shall not be less than 7 feet (2134 mm).

2. There shall not be more than two levels of mezzanines in a room. However, there is no limitation on the number of mezzanines within a room.

3. The aggregate area of mezzanines within a room shall not exceed one third of the area of the room in which they are located.

4. All portions of a mezzanine shall be open and unobstructed to the room in which they are located, except for columns and posts and protective walls or railings not more than 44 inches (1118 mm) in height.

   EXCEPTIONS: 1. Partitioning may be installed if either of the following conditions exist:

   1.1 The aggregate floor area of the enclosed space does not exceed 10 percent of the mezzanine area.
   1.2 The occupant load of the enclosed area of the mezzanine does not exceed 10.

   2. A mezzanine having two or more exits need not be open into the room in which it is located, provided at least one of the exits gives direct access to a protected exit corridor, an exit court, enclosed exit stairway, exterior exit, exterior exit balcony or exit passageway.

   3. In industry facilities, mezzanines used for control equipment may be glazed on all sides.

5. Two exits shall be provided from a mezzanine when two exits are required by Table 10-A.

6. If any required exit enters the room below, the occupant load of the mezzanine shall be added to the occupant load of the room in which it is located.

SECTION 508 — FIRE-RESISTIVE SUBSTITUTION

When an approved automatic sprinkler system is not required throughout a building by other sections of this code, it may be used in a building of Type II One-hour, Type III One-hour and Type V One-hour construction to substitute for the one-hour fire-resistive construction. Such substitution shall not waive or reduce the required fire-resistive construction for:

1. Occupancy separations (Section 302.3).
2. Exterior wall protection due to proximity of property lines (Section 503.2).
3. Area separations (Section 504.6).
4. Dwelling unit separations (Section 310.2.2)
5. Shaft enclosures (Section 711).
6. Corridors (Sections 1005.7 and 1005.8).
7. Stair enclosures (Section 1009).
8. Exit passageways (Section 1011.1).
9. Type of construction separation (Section 601.1).
10. Boiler, central heating plant or hot-water supply boiler room enclosures (Section 302.5).

SECTION 509 — GUARDRAILS

509.1 Where Required. Unenclosed floor and roof openings, open and glazed sides of stairways, landings and ramps, balconies or porches, which are more than 30 inches (762 mm) above grade or floor below, and roofs used for other than service of the building shall be protected by a guardrail.
EXCEPTION: Guardrails need not be provided at the following locations:
1. On the loading side of loading docks.
2. On the auditorium side of a stage, raised platforms and other raised floor areas such as runways, ramps and side stages used for entertainment or presentation. Along the side of an elevated walking surface when used for the normal functioning of special lighting or for access and use of other special equipment. At vertical openings in the performance area of stages.
3. Along vehicle service pits not accessible to the public.

509.2 Height. The top of guardrails shall not be less than 42 inches (1067 mm) in height.
EXCEPTIONS: 1. The top of guardrails for Group R, Division 3 and Group U, Division 1 Occupancies and interior guardrails within individual dwelling units, Group R, Division 3 congregate residences and guest rooms of Group R, Division 1 Occupancies may be 36 inches (914 mm) in height.
2. The top of guardrails on a balcony immediately in front of the first row of fixed seats and which are not at the end of an aisle may be 26 inches (660 mm) in height.
3. The top of guardrails for stairways, exclusive of their landings, may have a height as specified in Section 1006.9 for handrails.

509.3 Openings. Open guardrails shall have intermediate rails or an ornamental pattern such that a sphere 4 inches (102 mm) in diameter cannot pass through.
EXCEPTIONS: 1. The open space between the intermediate rails or ornamental pattern of guardrails in areas of commercial and industrial-type occupancies which are not accessible to the public may be such that a sphere 12 inches (305 mm) in diameter cannot pass through.
2. The triangular openings formed by the riser, tread and bottom element of a guardrail at the open side of a stairway may be of such size that a sphere 6 inches (152 mm) in diameter cannot pass through.

For guardrail requirements at grandstands, bleachers or other elevated seating facilities, see Section 1021.5.7.
### TABLE 5-A—EXTERIOR WALL AND OPENING PROTECTION BASED ON LOCATION ON PROPERTY FOR ALL CONSTRUCTION TYPES\(^1,2,3\)

For exceptions, see Section 503.4.

Distances are measured to property lines (see Section 503).

<table>
<thead>
<tr>
<th>OCCUPANCY GROUP(^4)</th>
<th>CONSTRUCTION TYPE</th>
<th>EXTERIOR WALLS</th>
<th>OPENINGS(^5)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Bearing</td>
<td>Nonbearing</td>
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<tr>
<td>I-F.R.</td>
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<td>Four-hour N/C</td>
<td></td>
</tr>
<tr>
<td>II-F.R.</td>
<td></td>
<td>Four-hour N/C</td>
<td></td>
</tr>
<tr>
<td>II One-hour</td>
<td></td>
<td>Four-hour N/C</td>
<td></td>
</tr>
<tr>
<td>II-N</td>
<td></td>
<td>Four-hour N/C</td>
<td></td>
</tr>
<tr>
<td>III One-hour</td>
<td></td>
<td>Four-hour N/C</td>
<td></td>
</tr>
<tr>
<td>III-N</td>
<td></td>
<td>Four-hour N/C</td>
<td></td>
</tr>
<tr>
<td>IV-H.T.</td>
<td></td>
<td>Four-hour N/C</td>
<td></td>
</tr>
<tr>
<td>V One-hour</td>
<td></td>
<td>Four-hour N/C</td>
<td></td>
</tr>
</tbody>
</table>

Group A, Division 1 Occupancies are not allowed in these construction types.

<table>
<thead>
<tr>
<th>OCCUPANCY GROUP(^4)</th>
<th>CONSTRUCTION TYPE</th>
<th>EXTERIOR WALLS</th>
<th>OPENINGS(^5)</th>
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</tr>
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<td></td>
</tr>
<tr>
<td>A-4</td>
<td></td>
<td>Four-hour N/C</td>
<td></td>
</tr>
<tr>
<td>II One-hour</td>
<td></td>
<td>Two-hour N/C</td>
<td>Same as bearing except NR, N/C 40 feet or greater</td>
</tr>
<tr>
<td>II-N</td>
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<td></td>
<td>Two-hour N/C</td>
<td>Same as bearing except NR, N/C 40 feet or greater</td>
</tr>
<tr>
<td>V One-hour</td>
<td></td>
<td>Two-hour N/C</td>
<td>Same as bearing except NR, N/C 40 feet or greater</td>
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</table>

Group A, Divisions 2 and 2.1 Occupancies are not allowed in these construction types.

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<tr>
<th>OCCUPANCY GROUP(^4)</th>
<th>CONSTRUCTION TYPE</th>
<th>EXTERIOR WALLS</th>
<th>OPENINGS(^5)</th>
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</thead>
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<tr>
<td></td>
<td></td>
<td>Four-hour N/C</td>
<td></td>
</tr>
<tr>
<td>II One-hour</td>
<td></td>
<td>Two-hour N/C</td>
<td>Same as bearing</td>
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<tr>
<td>II-N</td>
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<td></td>
<td>Two-hour N/C</td>
<td>Same as bearing</td>
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(Continued)
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<tbody>
<tr>
<td>A-3 cont.</td>
<td>V One-hour</td>
<td>Two-hour less than 5 feet One-hour elsewhere</td>
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</tr>
<tr>
<td></td>
<td>V-N</td>
<td>Two-hour less than 5 feet One-hour less than 20 feet NR elsewhere</td>
<td>Same as bearing</td>
</tr>
<tr>
<td>A-4</td>
<td>II One-hour</td>
<td>One-hour N/C</td>
<td>Same as bearing except NR, N/C 40 feet or greater</td>
</tr>
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<td>II-N</td>
<td>One-hour N/C less than 10 feet NR, N/C elsewhere</td>
<td>Same as bearing</td>
</tr>
<tr>
<td></td>
<td>III-N</td>
<td>Four-hour N/C</td>
<td>Four-hour N/C less than 5 feet Two-hour N/C less than 20 feet</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>One-hour N/C less than 40 feet NR, N/C elsewhere</td>
</tr>
<tr>
<td>B, F-1, M, S-1, S-3</td>
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<td>One-hour</td>
<td>Same as bearing</td>
</tr>
<tr>
<td></td>
<td>V-N</td>
<td>One-hour less than 10 feet NR elsewhere</td>
<td>Same as bearing</td>
</tr>
<tr>
<td></td>
<td>I-F.R.</td>
<td>Four-hour N/C less than 5 feet Two-hour N/C elsewhere</td>
<td>Four-hour N/C less than 5 feet Two-hour N/C less than 20 feet</td>
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<tr>
<td></td>
<td>II-F.R.</td>
<td></td>
<td>One-hour N/C less than 40 feet NR, N/C elsewhere</td>
</tr>
<tr>
<td></td>
<td>III-N</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>IV-H.T.</td>
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<td></td>
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<tr>
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<td>V One-hour</td>
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<tr>
<td></td>
<td>V-N</td>
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Distances are measured to property lines (see Section 503).
<table>
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<th>I-F.R.</th>
<th>II-F.R.</th>
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<th>IV-H.T.</th>
<th>Four-hour N/C</th>
<th>Four-hour N/C less than 5 feet</th>
<th>Not permitted less than 5 feet</th>
</tr>
</thead>
<tbody>
<tr>
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<td>II-One-hour</td>
<td>Two-hour N/C less than 5 feet</td>
<td>One-hour N/C elsewhere</td>
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<td>Not permitted less than 5 feet</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>II-N</td>
<td>Two-hour N/C less than 5 feet</td>
<td>One-hour N/C less than 10 feet</td>
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<td>Protected less than 10 feet</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>V One-hour</td>
<td>Two-hour less than 5 feet</td>
<td>One-hour elsewhere</td>
<td>Same as bearing</td>
<td>Not permitted less than 5 feet</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>V-N</td>
<td>Two-hour less than 5 feet</td>
<td>One-hour less than 10 feet</td>
<td>Same as bearing</td>
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<th>I-F.R.</th>
<th>II-F.R.</th>
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<th>IV-H.T.</th>
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<th>Four-hour N/C less than 5 feet</th>
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<td>One-hour N/C</td>
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<td>II-N</td>
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<td>One-hour N/C less than 10 feet</td>
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<tr>
<td></td>
<td>V One-hour</td>
<td>One-hour</td>
<td></td>
<td>Same as bearing</td>
<td>Not permitted less than 5 feet</td>
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<td></td>
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<tr>
<td></td>
<td>V-N</td>
<td>One-hour less than 5 feet</td>
<td>One-hour elsewhere</td>
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<td>Protected less than 10 feet</td>
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<table>
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<th>II-F.R.</th>
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<td>II-N</td>
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<td>Not restricted</td>
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**Group H, Division 1 Occupancies are not allowed in buildings of these construction types.**

*(Continued)*
<table>
<thead>
<tr>
<th>OCCUPANCY GROUP</th>
<th>CONSTRUCTION TYPE</th>
<th>EXTERIOR WALLS</th>
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<td>Distances are measured to property lines (see Section 503).</td>
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<td>H-2,3 H-3,3 H-4 H-6 H-7</td>
<td>I-F.R. II-F.R. III One-hour III-N IV-H.T.</td>
<td>Four-hour N/C</td>
<td>Four-hour N/C less than 5 feet Two-hour N/C less than 10 feet One-hour N/C less than 40 feet NR, N/C elsewhere</td>
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<td>II One-hour</td>
<td>Four-hour N/C less than 5 feet Two-hour N/C less than 10 feet One-hour N/C elsewhere</td>
<td>Four-hour N/C less than 5 feet Two-hour N/C less than 10 feet One-hour N/C less than 20 feet NR, N/C elsewhere</td>
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</tr>
<tr>
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<td>V One-hour</td>
<td>Four-hour less than 5 feet Two-hour less than 10 feet One-hour elsewhere</td>
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</tr>
<tr>
<td></td>
<td>V-N</td>
<td>Four-hour less than 5 feet Two-hour less than 10 feet One-hour elsewhere</td>
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<td>H-5$</td>
<td>I-F.R. II-F.R. III One-hour III-N IV-H.T.</td>
<td>Four-hour N/C</td>
<td>Four-hour N/C less than 40 feet One-hour N/C less than 60 feet NR, N/C elsewhere</td>
</tr>
<tr>
<td></td>
<td>II One-hour</td>
<td>One-hour N/C</td>
<td>Same as bearing, except NR, N/C 60 feet or greater</td>
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<tr>
<td></td>
<td>II-N</td>
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<td></td>
<td>V One-hour</td>
<td>One-hour</td>
<td>Same as bearing</td>
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<td>V-N</td>
<td>One-hour less than 60 feet NR elsewhere</td>
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<td></td>
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<td>I-1.2</td>
<td>I-1.3</td>
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<td>I-3</td>
<td>V One-hour</td>
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<td>II-N</td>
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<td>II-N</td>
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<td>II-N</td>
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<td>I-2</td>
<td>I-2</td>
<td>V-N</td>
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<tr>
<td>I-3</td>
<td>I-2</td>
<td>V-N</td>
<td></td>
</tr>
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</table>

These occupancies are not allowed in buildings of these construction types. 6

Group I, Division 3 Occupancies are not allowed in buildings of this construction type.

<table>
<thead>
<tr>
<th></th>
<th>I-1.1</th>
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<th>I-1.3</th>
<th>I-2</th>
<th>I-3</th>
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<th></th>
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<td>One-hour N/C</td>
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<td></td>
<td></td>
</tr>
<tr>
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<td>One-hour</td>
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<th>EXTERIOR WALLS</th>
<th>OPENINGS</th>
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<td>R-3</td>
<td>I-F.R.</td>
<td>Four-hour N/C</td>
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<td>II-F.R.</td>
<td>Four-hour N/C</td>
<td>Protected less than 20 feet</td>
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<tr>
<td></td>
<td>III One-hour</td>
<td>Four-hour N/C</td>
<td>Protected less than 20 feet</td>
</tr>
<tr>
<td></td>
<td>III-N</td>
<td>One-hour N/C</td>
<td>Not permitted less than 3 feet</td>
</tr>
<tr>
<td></td>
<td>IV-H.T.</td>
<td>Same as bearing</td>
<td>Not permitted less than 3 feet</td>
</tr>
<tr>
<td></td>
<td>II One-hour</td>
<td>One-hour N/C</td>
<td>Not permitted less than 3 feet</td>
</tr>
<tr>
<td></td>
<td>II-N</td>
<td>One-hour N/C</td>
<td>Not permitted less than 3 feet</td>
</tr>
<tr>
<td></td>
<td>V One-hour</td>
<td>One-hour N/C</td>
<td>Not permitted less than 3 feet</td>
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<tr>
<td></td>
<td>V-N</td>
<td>One-hour N/C</td>
<td>Not permitted less than 3 feet</td>
</tr>
<tr>
<td>S-4</td>
<td>I-F.R.</td>
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<td>One-hour N/C</td>
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<td>II One-hour</td>
<td>One-hour N/C</td>
<td>Protected less than 10 feet</td>
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<td>II-N</td>
<td>One-hour N/C</td>
<td>Protected less than 10 feet</td>
</tr>
<tr>
<td></td>
<td>III One-hour</td>
<td>One-hour N/C</td>
<td>Not permitted less than 3 feet</td>
</tr>
<tr>
<td></td>
<td>III-N</td>
<td>One-hour N/C</td>
<td>Not permitted less than 3 feet</td>
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<tr>
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<td>IV-H.T.</td>
<td>One-hour N/C</td>
<td>Not permitted less than 3 feet</td>
</tr>
<tr>
<td></td>
<td>V One-hour</td>
<td>One-hour N/C</td>
<td>Not permitted less than 3 feet</td>
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<td></td>
<td>V-N</td>
<td>One-hour N/C</td>
<td>Not permitted less than 3 feet</td>
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Group S, Division 4 open parking garages are not permitted in these types of construction.

Distances are measured to property lines (see Section 503).
<table>
<thead>
<tr>
<th>S-5</th>
<th>II One-hour</th>
<th>One-hour N/C</th>
<th>Same as bearing except NR, N/C 40 feet or greater</th>
<th>Not permitted less than 5 feet Protected less than 20 feet</th>
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</thead>
<tbody>
<tr>
<td>II-N³</td>
<td>One-hour N/C less than 20 feet NR, N/C elsewhere</td>
<td>Same as bearing</td>
<td>Not permitted less than 5 feet Protected less than 20 feet</td>
<td></td>
</tr>
<tr>
<td>V One-hour</td>
<td>One-hour</td>
<td>Same as bearing</td>
<td>Not permitted less than 5 feet Protected less than 20 feet</td>
<td></td>
</tr>
<tr>
<td>V-N³</td>
<td>One-hour less than 20 feet NR elsewhere</td>
<td>Same as bearing</td>
<td>Not permitted less than 5 feet Protected less than 20 feet</td>
<td></td>
</tr>
</tbody>
</table>

| U-1³ | I-F.R. | Four-hour N/C | Four-hour N/C less than 3 feet Two-hour N/C less than 20 feet One-hour N/C less than 40 feet NR, N/C elsewhere | Not permitted less than 3 feet Protected less than 20 feet |
|      | II-F.R. | One-hour N/C | Same as bearing except NR, N/C 40 feet or greater | Not permitted less than 3 feet |
|      | III One-hour | One-hour | Same as bearing | Not permitted less than 3 feet |
|      | IV-H.T. | One-hour N/C less than 3 feet³ NR, N/C elsewhere | Same as bearing | Not permitted less than 3 feet |
|      | V-N | One-hour less than 3 feet³ NR elsewhere | Same as bearing | Not permitted less than 3 feet |

| U-2 | All | Not regulated |

N/C — Noncombustible.
NR — Nonrated.
H.T. — Heavy timber.
F.R. — Fire resistive.

¹See Section 503 for types of walls affected and requirements covering percentage of openings permitted in exterior walls. For walls facing streets, yards and public ways, see also Section 601.5.
²For additional restrictions see Chapters 3 and 6.
³For special provisions and exceptions, see also Section 503.4.
⁴See Table 3-A for a description of each occupancy type.
⁵Openings requiring protection in exterior occupancy type shall be protected by a fire assembly having at least a three-fourths-hour fire-protection rating.
⁶See Section 308.2.1, Exception 3.
Chapter 6
TYPES OF CONSTRUCTION

SECTION 601 — CLASSIFICATION OF ALL BUILDINGS BY TYPES OF CONSTRUCTION AND GENERAL REQUIREMENTS

601.1 General. The requirements of this chapter are for the various types of construction and represent varying degrees of public safety and resistance to fire. Every building shall be classified by the building official into one of the types of construction set forth in Table 6-A. Any building which does not entirely conform to a type of construction set forth in Table 6-A shall be classified by the building official into a type having an equal or lesser degree of fire resistance.

A building or portion thereof shall not be required to conform to the details of a type of construction higher than that type which meets the minimum requirements based on occupancy even though certain features of such building actually conform to a higher type of construction.

When specific materials, types of construction or fire-resistive protection are required, such requirements shall be the minimum requirements, and any materials, types of construction or fire-resistive protection which will afford equal or greater public safety or resistance to fire, as specified in this code, may be used.

For additional limitations or allowances for special uses or occupancies, see the following:

- 402 Atria
- 403 High-rise office buildings and Group R, Division 1 Occupancies
- 404 Malls
- 405 Open parking structures
- 307.11 Group H, Division 6 Occupancies
- 411 Aviation control structures
- 413 Agricultural buildings
- 3111 Membrane structures

601.2 Mixed Types of Construction. When a building contains more than one distinct type of construction, the area of the entire building shall not exceed the least area permitted for the types of construction involved.

EXCEPTION: Each portion of a building separated by one or more area separation walls as specified in Section 504.6 may be considered a separate building for the purpose of classification of types of construction. The fire-resistive time period for such type of construction separation shall not be less than the most restrictive requirement in Section 504.6.2 based on the types of construction involved.

601.3 Standards of Quality. The standards listed below labeled a “U.B.C. standard” are also listed in Chapter 35, Part II, and are part of this code. The other standards listed below are recognized standards. (See Sections 3502 and 3503.)

1. Building paper.
   - 1.1 U.B.C. Standard 14-1, Kraft Waterproof Building Paper
   - 1.2 Asphalt-saturated Rag Felt, Underwriters Laboratories Inc. Standard Specification 55A, Materials for Construction of Built-up Roof Coverings

   - U.B.C. Standard 26-1, Test Method to Determine Potential Heat of Building Materials

3. Foam plastic tests.
3.2 Factory Mutual Standard Fire Test Standard for Insulated Roof Deck Construction
3.3 Underwriters Laboratories Inc. 1256, Fire Test Standard for Insulated Roof Deck Construction

4. Roof coverings.
4.2 U.B.C. Standard 15-2, Test Standard for Determining the Fire Retardancy of Roof Covering Material

5. Surface-burning characteristics and fire resistance of building materials and assemblies.
5.2 U.B.C. Standard 7-1, Fire Test of Building Construction and Materials

ASTM D 1929, Ignition Properties of Plastics

7. Fire dampers.
UL 555, Fire Dampers

601.4 Structural Frame. The structural frame shall be considered to be the columns and the girders, beams, trusses and spandrels having direct connections to the columns and all other members which are essential to the stability of the building as a whole. The members of floor or roof panels which have no connection to the columns shall be considered secondary members and not a part of the structural frame.

601.5 Exceptions to Table 6-A.
601.5.1 General. The provisions of this section are exceptions to the construction requirements of Table 6-A, Chapter 3 and Sections 602 through 606.

601.5.2 Fixed partitions.
601.5.2.1 Stores and offices. Interior nonload-bearing partitions dividing portions of stores, offices or similar places occupied by one tenant only and which do not establish a corridor serving an occupant load that would require it to be of fire-resistive construction under the provisions of Section 1005.7 may be constructed of:
1. Noncombustible materials.
2. Fire-retardant-treated wood.
3. One-hour fire-resistive construction.
4. Wood panels or similar light construction up to three fourths the height of the room in which placed; when more than three fourths the height of the room, such partitions shall not have less than the upper one fourth of the partition constructed of glass.

601.5.2.2 Hotels and apartments. Interior nonload-bearing partitions within individual dwelling units in apartment houses and guest rooms or suites in hotels when such dwelling units, guest
rooms or suites are separated from each other and from corridors by not less than one-hour fire-resistant construction may be constructed of:

1. Noncombustible materials or fire-retardant-treated wood in buildings of any type of construction; or
2. Combustible framing with noncombustible materials applied to the framing in buildings of Type III or V construction.

Openings to such corridors shall be equipped with doors conforming to Section 1005.8 regardless of the occupant load served.

For use of plastics in partitions, see Section 2603.10.

601.5.3 Folding, portable or movable partitions. Approved folding, portable or movable partitions need not have a fire-resistive rating, provided:

1. They do not block required exits (without providing alternative conforming exits) and they do not establish an exit corridor.
2. Their location is restricted by means of permanent tracks, guides or other approved methods.
3. Flammability shall be limited to materials having a flame-spread classification as set forth in Table 8-B for rooms or areas.

601.5.4 Walls fronting on streets or yards. Regardless of fire-resistive requirements for exterior walls, certain elements of the walls fronting on streets or yards having a width of 40 feet (12 192 mm) may be constructed as follows:

1. Bulkheads below show windows, show-window frames, aprons and showcases may be of combustible materials, provided the height of such construction does not exceed 15 feet (4572 mm) above grade.
2. Wood veneer of boards not less than 1-inch (25 mm) nominal thickness or exterior-type panels not less than 3/8-inch (9.5 mm) nominal thickness may be applied to walls, provided the veneer does not exceed 15 feet (4572 mm) above grade, and further provided such veneer shall be placed either directly against noncombustible surfaces or furred out from such surfaces not to exceed 1 5/8 inches (41 mm) with all concealed spaces fire-blocked as provided in Section 708. Where boards, panels and furring as described above comply with Section 207 as fire-retardant-treated wood suitable for exterior exposure, the height above grade may be increased to 35 feet (10 668 mm).

601.5.5 Trim. Trim, picture molds, chair rails, baseboards, handrails and show-window backing may be of wood. Unprotected wood doors and windows may be used except where openings are required to be fire protected.

Foam plastic trim covering not more than 10 percent of the wall or ceiling area may be used, provided such trim (1) has a density of no less than 20 pounds per cubic foot (320.4 kg/m³), (2) has a maximum thickness of 1/2 inch (12.7 mm) and a maximum width of 4 inches (102 mm) and (3) has a flame-spread rating no greater than 75.

Materials used for interior finish of walls and ceilings, including wainscoting, shall be as specified in Chapter 8.

601.5.6 Loading platforms. Exterior loading platforms may be of noncombustible construction or heavy-timber construction with wood floors not less than 2-inch (51 mm) nominal thickness. Such wood construction shall not be carried through the exterior walls.

601.5.7 Insulating boards. Combustible insulating boards may be used under finished flooring.

SECTION 602 — TYPE I FIRE-RESISTIVE BUILDINGS

602.1 Definition. The structural elements in Type I fire-resistive (F.R.) buildings shall be of steel, iron, concrete or masonry.
1994 UNIFORM BUILDING CODE

Walls and permanent partitions shall be of noncombustible fire-resistive construction except that permanent nonbearing partitions of one-hour or two-hour fire-resistive construction, which are not part of a shaft enclosure, may have fire-retardant-treated wood (see Section 207) within the assembly.

Materials of construction and fire-resistive requirements shall be as specified in Section 601 and Chapter 7.

602.2 Structural Framework. Structural framework shall be of structural steel or iron as specified in Chapter 22, reinforced concrete as in Chapter 19, or reinforced masonry as in Chapter 21.

For additional requirements for Group H Occupancies, see Section 307.2.

602.3 Exterior Walls and Openings.

602.3.1 Exterior walls. Exterior walls and all structural members shall comply with the requirements specified in Section 503 and Table 5-A and the fire-resistive provisions set forth in Table 6-A.

602.3.2 Openings in walls. All openings in exterior walls shall conform to the requirements of Section 503.2 and Table 5-A.

602.4 Stairway Construction. Stairways shall be constructed of reinforced concrete, iron or steel with treads and risers of concrete, iron or steel. Brick, marble, tile or other hard noncombustible materials may be used for the finish of such treads and risers.

Stairways shall comply with the requirements of Chapter 10.

602.5 Roofs. Except in retail sales and storage areas classified as Groups M and S, Division 1 Occupancies and in Group H Occupancies, roofs and their members, other than the structural frame, may be of unprotected noncombustible materials when every part of the roof framing, including the structural frame, is 25 feet (7620 mm) or more above the floor, balcony or gallery immediately below. Heavy-timber members in accordance with Section 605.6 may be used for such unprotected members in one-story buildings.

When every part of the structural framework of the roof of a Group A or E Occupancy or of an atrium is not less than 25 feet (7620 mm) above any floor, balcony or gallery, fire protection of all members of the roof construction, including those of the structural frame, may be omitted. Heavy-timber members in accordance with Section 605.6 may be used for such unprotected members in one-story buildings.

Roofs of unprotected noncombustible or heavy-timber construction conforming to Section 605.6.4 may be less than 25 feet (7620 mm) above any floor, balcony or gallery of a Group A, Division 2.1 Occupancy having an occupant load of 10,000 or more when all of the following conditions are met:

1. The building is not more than one story in height, except for multilevel areas located under the roof and used for locker rooms, exiting, concession stands, mechanical rooms and other accessory to the assembly room.
2. The area in which the roof clearance is less than 25 feet (7620 mm) does not exceed 35 percent of the area encompassed by the exterior walls.
3. An approved supervised automatic sprinkler system shall be installed throughout.

Where every part of the structural steel framework of the roof of a Group A or E Occupancy is more than 18 feet (5486 mm) and less than 25 feet (7620 mm) above any floor, balcony or gallery, the roof construction shall be protected by a ceiling of not less than one-hour fire-resistive construction.

Roof coverings shall be as specified in Chapter 15.

SECTION 603 — TYPE II BUILDINGS

603.1 Definition. The structural elements in Type II-F.R. buildings shall be of steel, iron, concrete or masonry.
The structural elements of Type II One-hour or II-N buildings shall be of noncombustible materials.

Floor construction of Type II One-hour and Type II-N buildings shall be of noncombustible material, provided, however, that a wood surface or finish may be applied over such noncombustible material.

Walls and permanent partitions of Type II-F.R. buildings shall be of noncombustible fire-resistive construction, except that permanent nonbearing partitions of one-hour or two-hour fire-resistive construction, which are not part of a shaft enclosure, may have fire-retardant-treated wood (see Section 207) within the assembly.

Type II One-hour buildings shall be of noncombustible construction and one-hour fire resistive throughout except that permanent nonbearing partitions may use fire-retardant-treated wood (see Section 207) within the assembly, provided fire-resistive requirements are maintained.

Walls and permanent partitions of Type II-N buildings shall be of noncombustible materials.

Materials of construction and fire-resistive requirements shall be as specified in Section 601.

For requirements due to occupancy, see Chapter 3.

603.2 Structural Framework. Structural framework shall be as specified in Chapter 22 for iron and steel, Chapter 19 for concrete and Chapter 21 for masonry.

603.3 Exterior Walls and Openings.

603.3.1 Exterior walls. Exterior walls and all structural members shall comply with the requirements specified in Section 503 and Table 5-A and the fire-resistive provisions set forth in Table 6-A.

603.3.2 Openings in walls. All openings in exterior walls of Type II-F.R. buildings shall conform to the requirements of Section 503.2 and Table 5-A.

603.4 Stairway Construction. Stairways of Type II-F.R. buildings shall be constructed of reinforced concrete, iron or steel with treads and risers of concrete, iron or steel. Brick, marble, tile or other hard noncombustible materials may be used for the finish of such treads and risers. Stairways of Type II One-hour and Type II-N buildings shall be of noncombustible construction.

Stairways shall comply with the requirements of Chapter 10.

603.5 Roofs. Roofs shall be of noncombustible construction, except that in Type II-F.R. and Type II One-hour buildings, roofs may be as specified in Section 602.5.

Roof coverings shall be as specified in Chapter 15.

SECTION 604 — TYPE III BUILDINGS

604.1 Definition. Structural elements in Type III buildings may be of any materials permitted by this code.

Type III One-hour buildings shall be of one-hour fire-resistive construction throughout.

604.2 Structural Framework. Structural framework shall be of steel or iron as specified in Chapter 22, concrete as in Chapter 19, masonry as in Chapter 21, or wood as in Chapter 23 and this chapter.

604.3 Exterior Walls, Openings and Partitions.

604.3.1 Exterior walls. Exterior walls shall be constructed of noncombustible materials and shall comply with the fire-resistive requirements set forth in Section 503 and Tables 5-A and 6-A.

604.3.2 Openings in walls. Openings in exterior walls shall conform to the requirements of Section 503.2 and Table 5-A.
604.3.3 Partitions. Bearing partitions, when constructed of wood, shall comply with Section 2318.

604.4 Stairway Construction.

604.4.1 General. Stairways shall comply with the requirements of Chapter 10.

604.4.2 Interior. Interior stairways serving buildings not exceeding three stories in height may be constructed of any material permitted by this code.

In buildings more than three stories in height, interior stairways shall be constructed as required for Type I buildings.

604.4.3 Exterior. Exterior stairways shall be of noncombustible material except that on buildings not exceeding two stories in height, they may be of wood not less than 2 inches (51 mm) in nominal thickness.

604.5 Roofs. Roof coverings shall be as specified in Chapter 15.

Except in retail sales and storage areas classified as Group M or S, Division 1 Occupancies and in Group H Occupancies, roofs and their members other than the structural frame may be of unprotected noncombustible materials when every part of the roof framing, including the structural frame, is 25 feet (7620 mm) or more above the floor, balcony or gallery immediately below. Heavy-timber members in accordance with Section 605.6 may be used for such unprotected members in one-story buildings.

SECTION 605 — TYPE IV BUILDINGS

605.1 Definition. Structural elements of Type IV buildings may be of any materials permitted by this code.

Type IV construction shall conform to Section 605.6 except that permanent partitions and members of the structural frame may be of other materials, provided they have a fire resistance of not less than one hour.

605.2 Structural Framework. Structural framework shall be of steel or iron as specified in Chapter 22, concrete as in Chapter 19, masonry as in Chapter 21, or wood as in Chapter 23 and this chapter.

605.3 Exterior Walls, Openings and Partitions.

605.3.1 Exterior walls. Exterior walls shall be constructed of noncombustible materials and shall comply with the fire-resistive requirements set forth in Section 503 and Tables 5-A and 6-A.

605.3.2 Openings in walls. Openings in exterior walls shall conform to the requirements of Section 503.2 and Table 5-A.

605.3.3 Partitions. Bearing partitions, when constructed of wood, shall comply with Section 2318.

605.4 Stairway Construction.

605.4.1 General. Stairways shall comply with the requirements of Chapter 10.

605.4.2 Interior. Interior stairways serving buildings not exceeding three stories in height may be constructed of wood or as required for Type I buildings. If constructed of wood, treads and risers shall not be less than 2 inches (51 mm) in thickness, except where built on laminated or plank inclines as required for floors, where they may be of 1-inch (25 mm) thickness. Wood stair stringers shall be a minimum of 3 inches (76 mm) in thickness and not less than 10 inches (254 mm) in depth.

In buildings more than three stories in height, interior stairways shall be constructed as required for Type I buildings.
605.4.3 Exterior. Exterior stairways shall be of noncombustible material except that on buildings not exceeding two stories in height they may be of wood not less than 2 inches (51 mm) in nominal thickness.

605.5 Roofs. Roof coverings shall be as specified in Chapter 15.

605.6 Heavy-timber Construction.

605.6.1 General. Details of heavy-timber construction shall be in accordance with the provisions of this section. Unless otherwise specified, all dimensions are nominal as defined in Section 2302.

605.6.2 Columns. Wood columns may be of sawn timber or structural glued-laminated timber not less than 8 inches (203 mm) in any dimension when supporting roof or floor loads except as specified in Section 605.6.4.

Columns shall be continuous or superimposed and connected in an approved manner.

605.6.3 Floor framing. Beams and girders may be of sawn timber or structural glued-laminated timber and shall not be less than 6 inches (152 mm) in width and not less than 10 inches (254 mm) in depth.

Framed sawn timber or structural glued-laminated timber arches, which spring from the floor line and support floor loads, shall not be less than 8 inches (203 mm) in any dimension.

Framed lumber or structural glued-laminated timber trusses supporting floor loads shall have members of not less than 8 inches (203 mm) in any dimension.

605.6.4 Roof framing. Framed sawn timber arches or structural glued-laminated timber arches for roof construction, which spring from the floor line and do not support floor loads, shall have members not less than 6 inches (152 mm) in width and not less than 8 inches (203 mm) in depth for the lower half of the height and not less than 6 inches (152 mm) in depth for the upper half.

Framed sawn timber or structural glued-laminated timber arches for roof construction, which spring from the top of walls or wall abutments, framed lumber or structural glued-laminated timber trusses, and other roof framing which does not support floor loads, shall have members not less than 4 inches (102 mm) in width and not less than 6 inches (152 mm) in depth. Spaced members may be composed of two or more pieces not less than 3 inches (76 mm) in thickness, when blocked solidly throughout their intervening spaces, or when such spaces are tightly closed by a continuous wood cover plate of not less than 2 inches (51 mm) in thickness, secured to the underside of the members. Splice plates shall not be less than 3 inches (76 mm) in thickness. When protected by an approved automatic sprinkler system under the roof deck, framing members shall not be less than 3 inches (76 mm) in thickness.

605.6.5 Floors. Floors shall be without concealed spaces. Floors shall be of planks, splined or tongue and groove, of not less than 3 inches (76 mm) in thickness covered with 1-inch (25 mm) tongue-and-groove flooring laid crosswise or diagonally, or 15/32-inch (12 mm) wood structural panels, or of plank not less than 4 inches (102 mm) in width set on edge close together and well spiked, and covered with 1-inch (25 mm) flooring or 15/32-inch (12 mm) wood structural panels. The lumber shall be laid so that no continuous line of joints will occur except at points of support. Floors shall not extend closer than 1/2 inch (13 mm) to walls. Such 1/2-inch (13 mm) space shall be covered by a molding fastened to the wall and so arranged that it will not obstruct the swelling or shrinkage movements of the floor. Corbeling of masonry walls under floors may be used in place of such molding.

605.6.6 Roof decks. Roofs shall be without concealed spaces and roof decks shall be of planks, splined or tongue and groove, of not less than 2-inch (51 mm) thickness, or 1 1/8-inch (29 mm) tongue-and-groove wood structural panels with exterior glue, or of a double thickness of 1-inch (25 mm) boards with tongue-and-groove joints, or with staggered joints, of lumber not less than 3 inches (76 mm) nominal in width, set on edge close together and laid as required for floors.
605.6.7 Construction details. Approved wall plate boxes or hangers shall be provided where wood beams, girders or trusses rest on masonry or concrete walls.

Girders and beams shall be closely fitted around columns, and adjoining ends shall be cross tied to each other, or intertied by caps or ties, to transfer horizontal loads across the joints. Wood bolsters may be placed on top of columns which support roof loads only.

Where intermediate beams are used to support a floor, they shall rest on top of the girders, or shall be supported by ledgers or blocks securely fastened to the sides of the girders or they may be supported by approved metal hangers into which the ends of the beams shall be closely fitted.

In heavy-timber roof construction, every roof girder and at least every alternate roof beam shall be anchored to its supporting member; roof decks, where supported by a wall, shall be anchored to such wall at intervals not exceeding 20 feet (6096 mm); every monitor and every sawtooth construction shall be anchored to the main roof construction. Such anchors shall consist of steel or iron bolts of sufficient strength to resist vertical uplift of the roof.

605.6.8 Mechanically laminated floors and roof decks. Mechanically laminated floors and roof decks conforming to Section 2323 may be used as heavy-timber floors or roof decks, provided the minimum thickness and other applicable requirements of the section are followed.

605.6.9 Partitions. Partitions shall be of solid wood construction formed by not less than two layers of 1-inch (25 mm) matched boards or laminated construction of 4-inch (102 mm) thickness, or of one-hour fire-resistive construction.

SECTION 606 — TYPE V BUILDINGS

606.1 Definition. Type V buildings may be of any materials allowed by this code.

Type V One-hour buildings shall be of one-hour fire-resistive construction throughout.

Materials of construction and fire-resistive requirements shall be as specified in Section 601.

For requirements due to occupancy, see Chapter 3.

606.2 Structural Framework. Structural framework shall be of steel or iron as specified in Chapter 22, concrete as in Chapter 19, masonry as in Chapter 21, or wood as in Chapter 23 and this chapter.

606.3 Exterior Walls and Openings. Exterior walls shall comply with fire-resistive requirements set forth in Section 503 and Tables 5-A and 6-A. Openings in exterior walls shall conform to requirements of Section 503.2 and Table 5-A.

606.4 Stairway Construction.

606.4.1 General. Stairways shall comply with the requirements of Chapter 10.

606.4.2 Interior. Interior stairways may be constructed of any materials permitted by this code.

606.4.3 Exterior. Exterior stairways shall be constructed of wood not less than 2 inches (51 mm) in nominal thickness, or may be of noncombustible materials.

606.5 Roofs. Roof coverings shall be as specified in Chapter 15.

Except in retail sales and storage areas classified as Group M or S, Division 1 Occupancies and in Group H Occupancies, roofs and their members other than the structural frame may be of unprotected noncombustible materials when every part of the roof framing, including the structural frame, is 25 feet (7620 mm) or more above the floor, balcony or gallery immediately below. Heavy-timber members in accordance with Section 605.6 may be used for such unprotected members in one-story buildings.
TABLE 6-A—TYPES OF CONSTRUCTION—FIRE-RESISTIVE REQUIREMENTS (In Hours)
For details, see occupancy section in Chapter 3, type of construction sections in this chapter and sections referenced in this table.

<table>
<thead>
<tr>
<th>BUILDING ELEMENT</th>
<th>TYPE I</th>
<th>TYPE II</th>
<th>TYPE III</th>
<th>TYPE IV</th>
<th>TYPE V</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Bearing walls—exterior</td>
<td>4</td>
<td>4</td>
<td>1</td>
<td>N</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Sec. 602.3.1</td>
<td>Sec. 603.3.1</td>
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<td>Sec. 604.3.1</td>
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<tr>
<td>2. Bearing walls—interior</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>N</td>
<td>1</td>
</tr>
<tr>
<td>3. Nonbearing walls—exterior</td>
<td>4</td>
<td>4</td>
<td>1</td>
<td>N</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Sec. 602.3.1</td>
<td>Sec. 603.3.1</td>
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<td>Sec. 604.3.1</td>
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<tr>
<td>4. Structural frame(^1)</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>N</td>
<td>1</td>
</tr>
<tr>
<td>5. Partitions—permanent</td>
<td>2(^2)</td>
<td>2(^2)</td>
<td>I(^2)</td>
<td>N</td>
<td>1</td>
</tr>
<tr>
<td>6. Shaft enclosures(^3)</td>
<td>2</td>
<td>2</td>
<td>I</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>7. Floors and floor-ceilings</td>
<td>2</td>
<td>2</td>
<td>I</td>
<td>N</td>
<td>1</td>
</tr>
<tr>
<td>8. Roofs and roof-ceilings</td>
<td>2</td>
<td>1</td>
<td>I</td>
<td>N</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Sec. 602.5</td>
<td>Sec. 603.5</td>
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<td>Sec. 603.5</td>
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<tr>
<td>9. Exterior doors and windows</td>
<td>Sec. 602.3.2</td>
<td>Sec. 603.3.2</td>
<td>Sec. 603.3.2</td>
<td>Sec. 603.3.2</td>
<td>Sec. 604.3.2</td>
</tr>
<tr>
<td>10. Stairway construction</td>
<td>Sec. 602.4</td>
<td>Sec. 603.4</td>
<td>Sec. 603.4</td>
<td>Sec. 603.4</td>
<td>Sec. 604.4</td>
</tr>
</tbody>
</table>

N—No general requirements for fire resistance.  
H.T.—Heavy timber.

\(^1\) Structural frame elements in an exterior wall that is located where openings are not permitted or where protection of openings is required, shall be protected against external fire exposure as required for exterior bearing walls or the structural frame, whichever is greater.

\(^2\) Fire-retardant-treated wood (see Section 207) may be used in the assembly, provided fire-resistance requirements are maintained. See Sections 602 and 603.

\(^3\) For special provisions, see Sections 304.6, 306.6 and 711.
Chapter 7
FIRE-RESISTANT MATERIALS AND CONSTRUCTION

SECTION 701 — SCOPE
This chapter applies to materials and systems used in the design and construction of a building to safeguard against the spread of fire and smoke within a building and the spread of fire to or from buildings.

SECTION 702 — DEFINITIONS
For the purposes of this chapter, the terms, phrases and words listed in this section and their derivatives shall have the indicated meanings.

CONCRETE, CARBONATE AGGREGATE, is concrete made with aggregates consisting mainly of calcium or magnesium carbonate, e.g., limestone or dolomite, and containing 40 percent or less quartz, chert or flint.

CONCRETE, LIGHTWEIGHT AGGREGATE, is concrete made with aggregates of expanded clay, shale, slag or slate or sintered fly ash and weighing 85 to 115 pounds per cubic foot (pcf) (1360 to 1840 kg/m³).

CONCRETE, SAND-LIGHTWEIGHT, is concrete made with a combination of expanded clay, shale, slag or slate or sintered fly ash and natural sand. Its unit weight is generally between 105 and 120 pcf (1680 and 1920 kg/m³).

CONCRETE, SILICEOUS AGGREGATE, is concrete made with normal-weight aggregates consisting mainly of silica or compounds other than calcium or magnesium carbonate, and may contain more than 40 percent quartz, chert or flint.

F RATING is the time period that a through-penetration fire stop limits the spread of fire, flame and hot gases through the fire-stop assembly, including penetrating elements, when tested in accordance with the time-temperature curve defined in U.B.C. Standard 7-1.

T RATING is the time period that a through-penetration fire stop limits temperature rise through the fire-stop assembly, including penetrating elements, when tested in accordance with the time-temperature curve defined in U.B.C. Standard 7-1.

SECTION 703 — FIRE-RESISTIVE MATERIALS AND SYSTEMS

703.1 General. Materials and systems used for fire-resistive purposes shall be limited to those specified in this chapter unless accepted under the procedure given in Section 703.2 or 703.3.

The materials and details of construction for the fire-resistive systems described in this chapter shall be in accordance with all other provisions of this code except as modified herein.

For the purpose of determining the degree of fire resistance afforded, the materials of construction listed in this chapter shall be assumed to have the fire-resistance rating indicated in Table 7-A, 7-B or 7-C.

As an alternate to Table 7-A, 7-B or 7-C, fire-resistive construction may be approved by the building official on the basis of evidence submitted showing that the construction meets the required fire-resistive classification.

703.2 Qualification by Testing. Material or assembly of materials of construction tested in accordance with the requirements set forth in U.B.C. Standard 7-1 shall be rated for fire resistance in accordance with the results and conditions of such tests.

EXCEPTION: The acceptance criteria of U.B.C. Standard 7-1 for exterior bearing walls shall not be required to be greater with respect to heat transmission and passage of flame or hot gases than would be required
of a nonbearing wall in the same building with the same distance to the property line. The fire exposure time period, water pressure and duration of application for the hose stream test shall be based on the fire-resistive rating determined by this exception.

Fire-resistive assemblies tested under U.B.C. Standard 7-1 shall not be considered to be restrained unless evidence satisfactory to the building official is furnished by the person responsible for the structural design showing that the construction qualifies for a restrained classification in accordance with U.B.C. Standard 7-1. Restrained construction shall be identified on the plans.

703.3 Calculating Fire Resistance. The fire-resistive rating of a material or assembly may be established by calculations. The procedures used for such calculations shall be in accordance with U.B.C. Standard 7-7.

703.4 Standards of Quality. In addition to all the other requirements of this code, fire-resistive materials shall meet the requirements for fire-resistive construction given in this chapter.

The standards listed below labeled a “U.B.C. standard” are also listed in Chapter 35, Part II, and are part of this code. The other standards listed below are recognized standards. (See Sections 3502 and 3503.)

2. U.B.C. Standard 7-2, Fire Tests of Door Assemblies
5. U.B.C. Standard 7-5, Fire Tests of Through-penetration Fire Stops
6. U.B.C. Standard 7-6, Thickness and Density Determination for Spray-applied Fireproofing
7. U.B.C. Standard 7-7, Methods for Calculating Fire Resistance of Steel, Concrete Masonry and Wood Construction
8. ASTM C 516, Vermiculite Loose-fill Insulation
9. ASTM C 549, Perlite Loose-fill Insulation
10. ANSI/NFPA 80, Standard for Fire Doors and Windows
11. ASTM C 587 and C 588, Gypsum Base for Veneer Plaster and Gypsum Veneer
12. ASTM C 330 and C 332, Lightweight Aggregates for Structural and Insulating Concrete
13. ASTM C 331, Lightweight Aggregates for Concrete Masonry Units
14. UL 555, Fire Dampers
15. UL 555C, Ceiling Dampers
16. UL 555S, Leakage Rated Dampers for Use in Smoke Control Systems
17. UL 33, Heat Response Links for Fire Protection Service
18. UL 353, Limit Controls

SECTION 704 — PROTECTION OF STRUCTURAL MEMBERS

704.1 General. Structural members having the fire-resistive protection set forth in Table 7-A shall be assumed to have the fire-resistance ratings set forth therein.

704.2 Protective Coverings.

704.2.1 Thickness of protection. The thickness of fire-resistive materials required for protection of structural members shall be not less than set forth in Table 7-A, except as modified in this section. The figures shown shall be the net thickness of the protecting materials and shall not include any hollow space back of the protection.
704.2.2 **Unit masonry protection.** Where required, metal ties shall be embedded in transverse joints of unit masonry for protection of steel columns. Such ties shall be as set forth in Table 7-A or be equivalent thereto.

704.2.3 **Reinforcement for cast-in-place concrete column protection.** Cast-in-place concrete protection for steel columns shall be reinforced at the edges of such members with wire ties of not less than 0.18 inch (4.6 mm) in diameter wound spirally around the columns on a pitch of not more than 8 inches (203 mm) or by equivalent reinforcement.

704.2.4 **Embedment of pipes.** Conduits and pipes shall not be embedded in required fire protection of structural members.

704.2.5 **Column jacketing.** Where the fire-resistant covering on columns is exposed to injury from moving vehicles, the handling of merchandise or other means, it shall be protected in an approved manner.

704.2.6 **Ceiling membrane protection.** When a ceiling forms the protective membrane for fire-resistant assemblies, the assemblies and their supporting horizontal structural members need not be individually fire protected except where such members support directly applied loads from a floor and roof of more than one floor. The required fire resistance shall not be less than that required for individual protection of members.

704.2.7 **Plaster application.** Plaster protective coatings may be applied with the finish coat omitted when they comply with the design mix and thickness requirements of Tables 7-A, 7-B and 7-C.

704.2.8 **Truss protection.** Where trusses are used as all or part of the structural frame and protection is required by Table 6-A, such protection may be provided by fire-resistant materials enclosing the entire truss assembly on all sides for its entire length and height. The required thickness and construction of fire-resistant assemblies enclosing trusses shall be based on the results of full-scale tests or combinations of tests on truss components or on approved calculations based on such tests which satisfactorily demonstrate that the assembly has the required fire resistance.

704.3 **Protected Members.**

704.3.1 **Attached metal members.** The edges of lugs, brackets, rivets and bolt heads attached to structural members may extend to within 1 inch (25 mm) of the surface of the fire protection.

704.3.2 **Reinforcing.** Thickness of protection for concrete or masonry reinforcement shall be measured to the outside of the reinforcement except that stirrups and spiral reinforcement ties may project not more than 1/2 inch (12.7 mm) into the protection.

704.3.3 **Bonded prestressed concrete tendons.** For members having a single tendon or more than one tendon installed with equal concrete cover measured from the nearest surface, the cover shall not be less than that set forth in Table 7-A.

For members having multiple tendons installed with variable concrete cover, the average tendon cover shall not be less than that set forth in Table 7-A, provided:

1. The clearance from each tendon to the nearest exposed surface is used to determine the average cover.
2. In no case can the clear cover for individual tendons be less than one half of that set forth in Table 7-A. A minimum cover of 3/4 inch (19.1 mm) for slabs and 1 inch (25.4 mm) for beams is required for any aggregate concrete.
3. For the purpose of establishing a fire-resistant rating, tendons having a clear covering less than that set forth in Table 7-A shall not contribute more than 50 percent of the required ultimate moment capacity for members less than 350 square inches (0.226 m²) in cross-sectional area and 65 percent for larger members. For structural design purposes, however, tendons having a reduced cover are assumed to be fully effective.
704.4 Members Carrying Masonry or Concrete. All members carrying masonry or concrete walls in buildings over one story in height shall be fire protected with one-hour fire protection or the fire-resistant requirement of the wall, whichever is greater.

704.5 Fire Protection Omitted. Fire protection may be omitted from the bottom flange of lintels spanning not over 6 feet (1829 mm), shelf angles, or plates that are not a part of the structural frame.

704.6 Spray-applied Fireproofing. The density and thickness of spray-applied fireproofing shall be determined following the procedures set forth in U.B.C. Standard 7-6.

SECTION 705 — PROJECTIONS
Cornices, eave overhangs, exterior balconies and similar architectural appendages extending beyond the floor area as defined in Section 207 shall conform to the requirements of this section. (See Sections 1005 and 1006 for additional requirements applicable to exterior balconies and stairways.)

Projections from walls of Type I or II construction shall be of noncombustible materials.

Projections from walls of Type III, IV or V construction may be of noncombustible or combustible materials.

Combustible projections located where openings are not permitted or where protection of openings is required shall be of one-hour fire-resistive or heavy-timber construction conforming to Section 605.6.

For projections extending over public property, see Chapter 32.

For combustible ornamentation, see Section 601.5.4.

For limitations on projection distances, see Sections 503.2 and 1204.

SECTION 706 — CONSTRUCTION JOINTS
A construction joint, for the purpose of this section and Sections 709.8 and 710.6, is a division of a building that allows independent movement of the building, in any plane, which may be caused by thermal, seismic, wind loading or any other load. Construction joints installed in fire-resistive walls required to have protected openings or in fire-resistive floors or floor-ceiling assemblies shall be protected with an approved material or construction assembly designed to provide the same degree of fire resistance as the floor or wall in which it is installed when tested in accordance with U.B.C. Standard 7-1. See Section 703.2.

Such material or construction assembly shall be securely installed in or on the joint for its entire length so as not to dislodge, loosen or otherwise impair its ability to accommodate expected building movements and to resist the spread of fire and hot gases.

SECTION 707 — INSULATION
707.1 General. Thermal and acoustical insulation located on or within floor-ceiling and roof-ceiling assemblies, crawl spaces, walls, partitions and insulation on pipes and tubing shall comply with this section. Duct insulation and insulation in plenums shall conform to the requirements of the Mechanical Code.

EXCEPTION: Roof insulation shall comply with Section 1510.

707.2 Insulation and Covering on Pipe and Tubing. Insulation and covering on pipe and tubing shall have a flame-spread rating not to exceed 25 and a smoke density not to exceed 450 when tested in accordance with U.B.C. Standard 8-1.

EXCEPTION: Foam plastic insulation shall comply with Section 2602.
707.3 Insulation. All insulation materials, including facings, such as vapor barriers or breather papers installed within floor-ceiling assemblies, roof-ceiling assemblies, walls, crawl spaces or attics, shall have a flame-spread rating not to exceed 25 and a smoke density not to exceed 450 when tested in accordance with U.B.C. Standard 8-1.

EXCEPTIONS: 1. Foam plastic insulation shall comply with Section 2602.
2. When such materials are installed in concealed spaces of Types III, IV and V construction, the flame-spread and smoke-developed limitations do not apply to facings, provided that the facing is installed in substantial contact with the unexposed surface of the ceiling, floor or wall finish.
3. This section shall not apply to cellulose insulation regulated by the Consumer Product Safety Commission as provided in CPSC 16 CFR, Parts 1209 and 1404.

SECTION 708 — FIRE BLOCKS AND DRAFT STOPS

708.1 General. In combustible construction, fireblocking and draftstopping shall be installed to cut off all concealed draft openings (both vertical and horizontal) and shall form an effective barrier between floors, between a top story and a roof or attic space, and shall subdivide attic spaces, concealed roof spaces and floor-ceiling assemblies. The integrity of all fire blocks and draft stops shall be maintained.

708.2 Fire Blocks.

708.2.1 Where required. Fireblocking shall be provided in the following locations:
1. In concealed spaces of stud walls and partitions, including furred spaces, at the ceiling and floor levels and at 10-foot (3048 mm) intervals both vertical and horizontal. See also Section 803, Item 1.

   EXCEPTION: Fire blocks may be omitted at floor and ceiling levels when approved smoke-actuated fire dampers are installed at these levels.

2. At all interconnections between concealed vertical and horizontal spaces such as occur at soffits, drop ceilings and cove ceilings.
3. In concealed spaces between stair stringers at the top and bottom of the run and between studs along and in line with the run of stairs if the walls under the stairs are unfinished.
4. In openings around vents, pipes, ducts, chimneys, fireplaces and similar openings which afford a passage for fire at ceiling and floor levels, with noncombustible materials.
5. At openings between attic spaces and chimney chases for factory-built chimneys.
6. Where wood sleepers are used for laying wood flooring on masonry or concrete fire-resisteive floors, the space between the floor slab and the underside of the wood flooring shall be filled with noncombustible material or fire blocked in such a manner that there will be no open spaces under the flooring which will exceed 100 square feet (9.3 m²) in area and such space shall be filled solidly under all permanent partitions so that there is no communication under the flooring between adjoining rooms.

EXCEPTIONS: 1. Fire blocking need not be provided in such floors when at or below grade level in gymnasiums.
2. Fire blocking need be provided only at the juncture of each alternate lane and at the ends of each lane in a bowling facility.

708.2.2 Fire block construction. Except as provided in Item 4 above, fireblocking shall consist of 2 inches (51 mm) nominal lumber or two thicknesses of 1-inch (25 mm) nominal lumber with broken lap joints or one thickness of 3/4-inch (18.3 mm) wood structural panel with joints backed by 3/4-inch (18.3 mm) wood structural panel or one thickness of 3/4-inch (19.1 mm) Type 2-M particleboard with joints backed by 3/4-inch (19.1 mm) Type 2-M particleboard.

Fire blocks may also be of gypsum board, cement asbestos board, mineral fiber, glass fiber or other approved materials securely fastened in place. Loose-fill insulation material shall not be used as a fire block unless specifically fire tested.
Walls having parallel or staggered studs for sound-transmission control shall have fire blocks of mineral fiber or glass fiber or other approved nonrigid materials.

708.3 Draft Stops.

708.3.1 Where required. Draftstopping shall be provided in the locations set forth in this section.

708.3.1.1 Floor-ceiling assemblies.

708.3.1.1.1 Single-family dwellings. When there is usable space above and below the concealed space of a floor-ceiling assembly in a single-family dwelling, draft stops shall be installed so that the area of the concealed space does not exceed 1,000 square feet (93 m²). Draftstopping shall divide the concealed space into approximately equal areas.

708.3.1.1.2 Two or more dwelling units and hotels. Draft stops shall be installed in floor-ceiling assemblies of buildings having more than one dwelling unit and in hotels. Such draft stops shall be in line with walls separating individual dwelling units and guest rooms from each other and from other areas.

708.3.1.1.3 Other uses. Draft stops shall be installed in floor-ceiling assemblies of buildings or portions of buildings used for other than dwelling or hotel occupancies so that the area of the concealed space does not exceed 1,000 square feet (93 m²) and so that the horizontal dimension between stops does not exceed 60 feet (18 288 mm).

EXCEPTION: Where approved automatic sprinklers are installed within the concealed space, the area between draft stops may be 3,000 square feet (279 m²) and the horizontal dimension may be 100 feet (30 480 mm).

708.3.1.2 Attics.

708.3.1.2.1 Two or more dwelling units and hotels. Draft stops shall be installed in the attics, mansards, overhangs, false fronts set out from walls and similar concealed spaces of buildings containing more than one dwelling unit and in hotels. Such draft stops shall be above and in line with the walls separating individual dwelling units and guest rooms from each other and from other uses.

EXCEPTIONS: 1. Draft stops may be omitted along one of the corridor walls, provided draft stops at walls separating individual dwelling units and guest rooms from each other and from other uses, extend to the remaining corridor draft stop.

2. Where approved sprinklers are installed, draftstopping may be as specified in the exception to Section 708.3.1.2.2 below.

708.3.1.2.2 Other uses. Draft stops shall be installed in attics, mansards, overhangs, false fronts set out from walls and similar concealed spaces of buildings having uses other than dwellings or hotels so that the area between draft stops does not exceed 3,000 square feet (279 m²) and the greatest horizontal dimension does not exceed 60 feet (18 288 mm).

EXCEPTION: Where approved automatic sprinklers are installed, the area between draft stops may be 9,000 square feet (836 m²) and the greatest horizontal dimension may be 100 feet (30 480 mm).

708.3.1.3 Draft stop construction. Draftstopping materials shall not be less than 1/2-inch (12.7 mm) gypsum board, 3/8-inch (9.5 mm) wood structural panel, 3/8-inch (9.5 mm) Type 2-M particleboard or other approved materials adequately supported.

Openings in the partitions shall be protected by self-closing doors with automatic latches constructed as required for the partitions.

Ventilation of concealed roof spaces shall be maintained in accordance with Section 1505.

708.4 Draft Stops or Fire Blocks in Other Locations. Fireblocking of veneer on noncombustible walls shall be in accordance with Section 708.2.1, Item 1, above.

For fireblocking ceilings applied against noncombustible construction, see Section 803, Item 1.
SECTION 709 — WALLS AND PARTITIONS

709.1 General. Fire-resistive walls and partitions shall be assumed to have the fire-resistive ratings set forth in Table 7-B.

709.2 Combustible Members. Combustible members framed into a wall shall be protected at their ends by not less than one half the required fire-resistive thickness of such wall.

709.3 Exterior Walls.

709.3.1 Extension through attics and concealed spaces. In fire-resistive exterior wall construction, the fire-resistive rating shall be maintained for such walls passing through attic areas or other areas containing concealed spaces.

709.3.2 Vertical fire spread at exterior walls.

709.3.2.1 General. The provisions of this section are intended to restrict the passage of smoke, flame and hot gases from one floor to another at exterior walls. See Section 710 for floor penetrations.

709.3.2.2 Interior. When fire-resistive floor or floor-ceiling assemblies are required, voids created at the intersection of the exterior wall assemblies and such floor assemblies shall be sealed with an approved material. Such material shall be securely installed and capable of preventing the passage of flame and hot gases sufficient to ignite cotton waste when subjected to U.B.C. Standard 7-1 time-temperature fire conditions under a minimum positive pressure differential of 0.01 inch of water column (2.5 Pa) for the time period at least equal to the fire-resistence rating of the floor assembly.

709.3.2.3 Exterior. When openings in an exterior wall are above and within 5 feet (1524 mm) laterally of an opening in the story below, such openings shall be separated by an approved flame barrier extending 30 inches (762 mm) beyond the exterior wall in the plane of the floor or by approved vertical flame barriers not less than 3 feet (914 mm) high measured vertically above the top of the lower opening. Flame barriers shall have a fire resistance of not less than three-fourths hour.

EXCEPTIONS: 1. Flame barriers are not required in buildings equipped with an approved automatic sprinkler system throughout.

2. This section shall not apply to buildings of three stories or less in height.

709.4 Parapets.

709.4.1 General. Parapets shall be provided on all exterior walls of buildings.

EXCEPTION: A parapet need not be provided on an exterior wall when any of the following conditions exist:

1. The wall is not required to be of fire-resistive construction.
2. The wall, due to location on property line, may have unprotected openings.
3. The building has an area of not more than 1,000 square feet (93 m²) on any floor.
4. Walls which terminate at roofs of not less than two-hour fire-resistive construction or roofs constructed entirely of noncombustible materials.

5. One-hour fire-resistive exterior walls may terminate at the underside of the roof sheathing, deck or slab, provided:

5.1 Where the roof-ceiling framing elements are parallel to the walls, such framing and elements supporting such framing shall not be of less than one-hour fire-resistive construction for a width of 5 feet (1524 mm) measured from the interior side of the wall for Groups R and U Occupancies and 10 feet (3048 mm) for all other occupancies.

5.2 Where roof-ceiling framing elements are perpendicular to the wall, the entire span of such framing and elements supporting such framing shall not be of less than one-hour fire-resistive construction.

5.3 Openings in the roof shall not be located within 5 feet (1524 mm) of the one-hour fire-resistive exterior wall for Groups R and U Occupancies and 10 feet (3048 mm) for all other occupancies.
5.4 The entire building shall be provided with not less than a Class B roof covering.

709.4.2 Construction. Parapets shall have the same degree of fire resistance required for the wall upon which they are erected, and on any side adjacent to a roof surface, shall have noncombustible faces for the uppermost 18 inches (457 mm), including counterflashing and coping materials. The height of the parapet shall not be less than 30 inches (762 mm) above the point where the roof surface and the wall intersect. Where the roof slopes toward a parapet at slopes in no case shall the height be less than 709.5 Nonsymmetrical Wall Construction. Walls and partitions of nonsymmetrical construction shall be tested with both faces exposed to the furnace, and the assigned fire-resistant rating will be the shortest duration obtained from the two tests conducted in conformance with U.B.C. Standard 7-1. When evidence is furnished to show that the wall was tested with the least fire-resistant side exposed to the furnace, subject to acceptance of the building official, the wall need not be subjected to tests from the opposite side.

709.6 Through Penetration. Penetrating items passing entirely through both protective membranes of bearing walls required to have a fire-resistance rating and walls requiring protected openings shall be protected with through-penetration fire stops suitable for the method of penetration.

**EXCEPTIONS:**
1. Penetrations not larger than a 4-inch (100 mm) nominal pipe or 16 square inches (10 320 mm²) in overall cross-sectional area containing noncombustible penetrating items, where the annular space between the penetrating items and the wall assembly being penetrated is filled with a material which will prevent the passage of flame and hot gases sufficient to ignite cotton waste when subjected to U.B.C. Standard 7-1 time-temperature fire conditions under a minimum positive pressure differential of 0.01-inch water column (2.5 Pa) at the location of the penetration for the time period at least equal to the fire-resistance rating of the wall assembly.
2. Penetrations not larger than a 4-inch (100 mm) nominal copper or ferrous pipe and conduit or 16 square inches (10 320 mm²) of overall cross-sectional area containing copper or ferrous penetrating items, where the annular space between the penetrating items and the wall assembly being penetrated is filled with concrete, grout or mortar for the full thickness of the wall assembly (or the thickness necessary to provide the required fire-resistance rating of the assembly being penetrated) at the location of the penetration in concrete and masonry wall assemblies.

The T rating for through-penetration fire stops in fire-rated walls requiring protected openings shall apply to penetrations in the following locations:
1. Above corridor ceilings which are not part of a fire-resistive assembly.
2. Below any ceiling.

**EXCEPTION:** Any through-penetrating item not larger than a 4-inch (100 mm) nominal pipe or 16 square inches (10 320 mm²) for any conduit or 16 square inches (10 320 mm²) in area, provided the aggregate area of such openings is not larger than 30 square inches (9.3 mm²) of wall or partition area. Outlet boxes on opposite sides of walls and partitions shall be separated by a horizontal distance of at least 24 inches (610 mm).

Where wall-protective membranes are penetrated by other materials or where larger openings are required than permitted above, the penetrating items shall be:
1. Protected with membrane-penetration fire stops suitable for the methods of penetration, or
2. Installed in accordance with the installation instructions of their listing for such use.

**EXCEPTION:** Penetrations not larger than a 4-inch (100 mm) nominal pipe or 16 square inches (10 320 mm²) in overall cross-sectional area containing noncombustible penetrating items, where the annular space between the penetrating items and the protective membrane being penetrated is filled with a material which will prevent the passage of flame and hot gases sufficient to ignite cotton waste when subjected to U.B.C. Stan-
standard 7-1 time-temperature fire conditions under a minimum positive pressure differential of 0.01-inch water column (2.5 Pa) at the location of the penetration for the time period at least equal to the fire-resistance rating of the wall assembly.

709.8 Construction Joints. Construction joints shall comply with the requirements of Section 706.

SECTION 710 — FLOOR-CEILINGS OR ROOF-CEILINGS

710.1 General. Fire-resistive floors, floor-ceiling or roof-ceiling assemblies shall be assumed to have the fire-resistance ratings set forth in Table 7-C. When materials are incorporated into an otherwise fire-resistive assembly which may change the capacity for heat dissipation, fire test results or other substantiating data shall be made available to the building official to show that the required fire-resistive time period is not reduced.

710.2 Ceiling Membrane Protection. When a ceiling forms the protective membrane for a fire-resistive floor-ceiling or roof-ceiling assembly, the ceiling shall be without openings in order to protect structural elements.

EXCEPTIONS: 1. Openings for noncombustible sprinkler pipe and openings for steel electrical outlet boxes not greater than 16 square inches (10 320 mm²) in area may be installed, provided the aggregate area of such openings through the ceiling is not more than 100 square inches (64 500 mm²) for any 100 square feet (9.3 m²) of ceiling area.
2. Duct openings protected with approved ceiling fire dampers.
3. In other than corridors that are required to have fire-resistive ceilings, duct openings may be unprotected when tests, conducted in accordance with U.B.C. Standard 7-1, have shown that opening protection is not required to maintain the fire resistance of the assembly.
4. Other ceiling openings and penetrations may be installed where such openings and penetrations and the assemblies in which they are utilized are tested in accordance with the provisions of U.B.C. Standard 7-1.
5. Openings enclosed in fire-resistance-rated shaft enclosures.
6. Access doors may be installed in such ceilings when they are approved horizontal access door assemblies listed for such purpose.

Where the weight of lay-in ceiling panels used as part of fire-resistive floor-ceiling or roof-ceiling assemblies is not adequate to resist an upward force of 1 pound per square foot (47.9 Pa), wire holdowns or other approved devices shall be installed above the panels to prevent vertical displacement under such upward force.

710.3 Floors. Fire-resistive floors and floors which are part of a floor-ceiling assembly shall be continuous without openings or penetrations in order to completely separate one story or basement from another.

EXCEPTIONS: 1. Openings enclosed in fire-resistive-rated shaft enclosures in accordance with Section 711.1.
2. Exit enclosures in accordance with Chapter 10.
3. Openings permitted in accordance with Section 711.3.
4. Atria constructed in accordance with Section 402.
5. Penetrations protected through-penetration fire stops installed to provide an F rating or a T rating in accordance with Section 702. The T rating shall apply only to:
6. Penetrations not larger than a 4-inch (100 mm) nominal pipe or 16 square inches (10 320 mm²) in overall cross-sectional area containing noncombustible penetrating items, where the annular space between the penetrating items and the floor assembly being penetrated is filled with a material which will prevent the passage of flame and hot gases sufficient to ignite cotton waste when subjected to U.B.C. Standard 7-1 time-temperature fire conditions under a minimum positive pressure differential of 0.01-inch water column (2.5 Pa) at the location of the penetration for the time period at least equal to the fire-resistance rating of the floor assembly.
710.3-711.4

7. Penetrations not larger than a 4-inch (100 mm) nominal copper or ferrous pipe and conduit or 16 square inches (10320 mm²) of overall cross-sectional area containing copper or ferrous penetrating items, where the annular space between the penetrating items and the floor assembly being penetrated is filled with concrete, grout or mortar for the full thickness of the floor assembly (or the thickness necessary to provide the required fire-resistance rating of the assembly being penetrated) at the location of the penetration in concrete floor assemblies.

710.4 Roofs. Fire-resistive roofs may have unprotected openings. See Chapter 24 for skylight construction.

710.5 Wiring in Plenums. Wiring in plenums shall comply with the Mechanical Code.

710.6 Construction Joints. Construction joints in fire-resistive floors shall comply with the requirements of Section 706.

SECTION 711 — SHAFT ENCLOSURES

711.1 General. Openings through floors shall be enclosed in a shaft enclosure of fire-resistive construction having the time period set forth in Table 6-A for “shaft enclosures” except as permitted in Sections 711.3, 711.5 and 711.6. See also Section 304.6 for shafts in Group B Occupancies, Section 306.6 for shafts in Group F Occupancies, Sections 307.6 and 307.11.2.3 for shafts in Group H Occupancies, Section 309.6 for shafts in Group M Occupancies and Section 311.6 for shafts in Group S Occupancies.

711.2 Extent of Enclosures. Shaft enclosures shall extend from the lowest floor opening through successive floor openings and shall be enclosed at the top and bottom.

EXCEPTIONS: 1. Shafts extending through or to the underside of the roof sheathing, deck or slab need not be enclosed at the top.

2. Noncombustible ducts, vents or chimneys used to convey vapors, dusts or combustion products may penetrate the enclosure at the bottom.

3. Shafts need not be enclosed at the bottom when protected by fire dampers conforming to approved recognized standards, installed at the lowest floor level within the shaft enclosure.

Shaft enclosures shall be constructed to continuously maintain the required fire-resistive integrity.

711.3 Special Provision. In other than Group I Occupancies, openings which penetrate only one floor and are not connected with openings communicating with other stories or basements and which are not concealed within building construction assemblies need not be enclosed.

Exit enclosures shall conform to the applicable provisions of Section 1009.

In one- and two-story buildings other than Group I Occupancies, gas vents, ducts, piping and factory-built chimneys which extend through not more than two floors need not be enclosed, provided the openings around the penetrations are fire stopped at each floor.

EXCEPTION: BW gas vents installed in accordance with their listing.

Gas vents and factory-built chimneys shall be protected as required by the Mechanical Code.

Walls containing gas vents or noncombustible piping which pass through three floors or less need not provide the fire-resistance rating specified in Table 6-A for “shaft enclosures,” provided the annular space around the vents or piping is filled at each floor or ceiling with noncombustible materials.

EXCEPTION: BW gas vents installed in accordance with their listing.

Openings made through a floor for penetrations such as cables, cable trays, conduit, pipes or tubing which are protected with approved through-penetration fire stops to provide the same degree of fire resistance as the floor construction need not be enclosed. For floor-ceiling assemblies, see Section 710.

711.4 Protection of Openings. Openings into a shaft enclosure shall be protected by a self-closing or an automatic-closing fire assembly conforming to Section 713 and having a fire-protection
rating of one hour for openings through one-hour fire-resistive walls and one and one-half hours for
openings through two-hour fire-resistive walls.

EXCEPTIONS: 1. Openings to the exterior may be unprotected when permitted by Table 5-A.
2. Openings protected by through-penetration fire stops to provide the same degree of fire resistance as the
shaft enclosure. See Sections 709 and 710.

Openings in shaft enclosures penetrating smoke barriers shall be further protected by smoke
dampers conforming with approved recognized standards. See Chapter 35, Part III.

EXCEPTIONS: 1. Exhaust-only openings serving continuously operating fans and protected using the
provisions of Chapter 9.
2. Smoke dampers are not required when their operation would interfere with the function of a
smoke-control system.

711.5 Rubbish and Linen Chute Termination Rooms. In other than Group R, Division 3 Occupa-
cancies, rubbish and linen chutes shall terminate in rooms separated from the remainder of the
building by an occupancy separation having the same fire resistance as required for the shaft enclo-
sure, but not less than one hour. Openings into chutes and chute termination rooms shall not be
located in exit corridors or stairways. For sprinklers, see Section 904.2.2.

711.6 Chute and Dumbwaiter Shafts. In buildings of Type V construction, chutes and dumb-
waiter shafts with a cross-sectional area of not more than 9 square feet (0.84 m²) may be either of
approved fire-resistive wall construction or may have the inside layers of the approved fire-resis-
tive assembly replaced by a lining of not less than 0.019-inch (0.48 mm) No. 26 galvanized sheet
gage metal with all joints locklapped. The outside layers of the wall shall be as required for the ap-
proved construction. All openings into any such enclosure shall be protected by not less than a self-
closing solid-wood door 1 3/8 inches (35 mm) thick or equivalent.

SECTION 712 — USABLE SPACE UNDER FLOORS
Usable space under the first story shall be enclosed, and such enclosure, when constructed of metal
or wood, shall be protected on the side of the usable space as required for one-hour fire-resistive
construction. Doors shall be self-closing, tight-fitting of solid-wood construction 1 3/8 inches (35
mm) in thickness or self-closing, tight-fitting doors acceptable as a part of an assembly having a
fire-protection rating of not less than 20 minutes when tested in accordance with Part II of U.B.C.
Standard 7-2.

2. Basements in single-story Group S, Division 3 repair garages where 10 percent or more of the area of
the floor-ceiling is open to the first floor.
3. Under-floor spaces protected by an automatic sprinkler system.

SECTION 713 — FIRE-RESISTIVE ASSEMBLIES FOR PROTECTION OF
OPENINGS
713.1 General. Where required by this code for the fire protection of openings, fire assemblies
shall meet the requirements of this section.

713.2 Definitions.

FIRE ASSEMBLY is the assembly of a fire door, fire windows or fire damper, including all re-
quired hardware, anchorage, frames and sills.

FIRE ASSEMBLY, AUTOMATIC-CLOSING, is a fire assembly which may remain in an
open position and which will close automatically when subjected to one or the other of the follow-
ing:
1. An increase in temperature.
Unless otherwise specified, the closing device shall be one rated at a maximum temperature of 165°F (74°C).

2. Actuation of a smoke detector.

The closing device shall operate by the activation of an approved listed smoke detector. Smoke detectors shall be installed and maintained as set forth in Uniform Fire Code Standard 10-3.

**FIRE ASSEMBLY, SELF-CLOSING**, is a fire assembly which is kept in a normally closed position and is equipped with an approved device to ensure closing and latching after having been opened for use.

713.3 Identification of Fire Doors, Fire Windows and Fire Dampers. Fire doors, fire windows and fire dampers shall have an approved label or listing mark, indicating the fire-protection rating, which is permanently affixed at the factory where fabrication and assembly are done. Periodic inspections shall be made by an approved inspection agency during fabrication and assembly.

Oversized fire doors may be installed when approved by the building official. The doors shall be labeled or be furnished with a certificate of inspection from an approved agency.

713.4 Installation of Fire Doors, Hardware and Frames, and Fire Dampers. Approved fire door hardware and fire door frames including the anchorage thereof shall be installed in accordance with their listing. Fire dampers shall be fabricated and installed in an approved manner.

713.5 Fire-resistive Tests. The fire-protection rating of all types of required fire assemblies shall be determined in accordance with the requirements specified in U.B.C. Standards 7-2, 7-3 and 7-4. The fire-protection rating of fire dampers shall be determined in accordance with the requirements specified within approved recognized standards.

713.6 Hardware.

713.6.1 Closing devices. Every fire assembly shall be provided with a closing device as follows:

1. Fire assemblies required to have a three-hour fire-protection rating shall be automatic-closing fire assemblies. Automatic-closing fire assemblies to be activated by an increase in temperature shall have one heat-actuating device installed on each side of the wall at the top of the opening and one on each side of the wall at the ceiling height where the ceiling is more than 3 feet (914 mm) above the top of the opening.

2. Fire assemblies required to have a one- and one-half-hour, one-hour or three-fourths-hour fire-protection rating shall be either automatic- or self-closing fire assemblies. Automatic-closing fire assemblies to be activated by an increase in temperature shall have heat-actuating devices located as required in Item 1 or by a single fusible link in the opening incorporated in the closing device.

3. Fire door assemblies required to have fire-protection rating, which are installed across a corridor, shall be automatic-closing fire assemblies. Such fire assemblies shall be activated by a smoke detector. All hold-open devices shall be listed for the purpose and shall release or close the door in the event of a power failure at the device.

4. Fire assemblies required by provisions of Chapter 10 shall have closing devices as specified in Chapter 10.

5. Doors which are a part of an automobile ramp enclosure shall be equipped with automatic-closing devices.

Fire doors which are automatic closing by smoke detection shall not have a closing or reclosing delay of more than 10 seconds.

713.6.2 Hinges. Swinging fire doors shall not have less than two hinges, and when such door exceeds 60 inches (1524 mm) in height, an additional hinge shall be installed for each additional 30 inches (762 mm) of height or fraction thereof. Hinges, except for spring hinges, shall be of the...
ball-bearing or antifriction type. When spring hinges are used for door-closing purposes, not less than one half of the hinges shall be spring hinges.

**713.6.3 Latch.** Unless otherwise specifically permitted, all single doors and both leaves of pairs of side-hinged swinging doors shall be provided with an automatic latch which will secure the door when it is closed.

**713.7 Glazed Openings in Fire Doors.** Glazed openings in fire doors shall not be permitted in a fire assembly required to have a three-hour fire-resistive rating.

The area of glazed openings in a fire door required to have one- and one-half-hour or one-hour fire-resistive rating shall be limited to 100 square inches (64500 mm²) with a minimum dimension of 4 inches (102 mm). When both leaves of a pair of doors have observation panels, the total area of the glazed openings shall not exceed 100 square inches (64500 mm²) for each leaf.

Glazed openings shall be limited to 1,296 square inches (0.84 m²) in wood and plastic-faced composite or hollow metal doors, per light, when fire-resistive assemblies are required to have a three-fourths-hour fire-resistive rating.

**713.8 Fire Window Size.** Fire windows required to have a three-fourths-hour fire-protection rating for protection of openings in exterior walls shall have an area not greater than 84 square feet (7.8 m²) with neither width nor height exceeding 12 feet (3658 mm) and for protection of openings in interior walls shall be limited in area and size to that tested.

**713.9 Glazing.** Glazing materials and glass block assemblies shall be qualified by tests in accordance with U.B.C. Standard 7-2 (for fire doors) or U.B.C. Standard 7-4 (for fire windows) as appropriate for the use, and they shall be labeled for the required fire-protection rating and installed in accordance with their listing. Glazing in fire door assemblies and in fire window assemblies subject to human impact in hazardous locations as indicated in Section 2406.4 shall comply with Section 2406.3.

**713.10 Smoke Dampers.** Not less than Class II, 250°F (121°C.) smoke dampers complying with approved recognized standards (see Chapter 35, Part III) shall be installed and be accessible for inspection and servicing in the following ducted or unducted air openings at:

1. Penetrations of area or occupancy separation walls.
2. Penetrations of the fire-resistive construction of horizontal exit walls or corridors serving as required exits.
   
   **EXCEPTION:** Openings for steel ducts penetrating the required fire-resistive construction of corridors are not required to have smoke dampers when such ducts are of not less than 0.019-incl (0.48 mm) thickness (No. 26 galvanized sheet steel gage) and have no openings serving the corridor.
3. Penetrations of shaft enclosures.
   
   **EXCEPTION:** Exhaust-only openings serving continuously operating fans and protected using the provisions of Chapter 9.
5. Penetrations of elevator lobbies required by Section 3002.
6. Penetrations of areas of refuge.
   
   **EXCEPTION:** Ventilation systems specifically designed and protected to supply outside air to these areas during an emergency.

A smoke damper need not be provided when it can be demonstrated that the smoke damper is not essential to limit the passage of smoke under passive conditions and the proper function of a smoke-control system complying with Chapter 9 does not depend on the operation of the damper. Smoke dampers may be omitted at openings which must be maintained open for proper operation of a mechanical smoke-control system provided that adequate protection against smoke migration, in the event of system failure, has been provided.
713.11 Fire Dampers. Fire dampers complying with the requirements of approved recognized standards (see Chapter 35, Part III) shall be installed and be accessible for inspection and servicing in the following ducted and unducted air openings at:

1. Penetrations through area separation walls or occupancy separations.
2. Penetrations of the fire-resistive construction of horizontal exit walls or corridors serving as required exits.
   
   EXCEPTION: Openings for steel ducts penetrating the required fire-resistive construction of corridors are not required to have fire dampers when such ducts are of not less than 0.019-inch (0.48 mm) thickness (No. 26 galvanized sheet steel gage) and have no openings serving the corridor.
3. Penetrations of shaft enclosures.
   
   EXCEPTIONS: 1. Duct penetrations by steel exhaust air subducts extending vertically upward at least 22 inches (559 mm) above the top of the opening in a vented shaft where the airflow is upward.
   
   2. Penetrations of a fire-resistive floor forming the base of a shaft enclosure may be protected by fire dampers listed for installation in the horizontal position.
4. Penetrations of the ceiling of fire-resistive floor-ceiling or roof-ceiling assemblies shall be protected in accordance with Section 710.2.
5. Penetrations of an atrium enclosure element.
6. Penetrations of the building exterior required to have protected openings by Section 503.
7. Penetrations of areas of refuge.
   
   EXCEPTION: Ventilation systems specifically designed and protected to supply outside air to these areas during an emergency.

A fire damper is not required where fire tests have demonstrated that fire dampers are not required to maintain the fire resistance of the construction.

The operating temperature of the fire-damper actuating device shall be approximately 50°F. (27.8°C.) above the normal temperature within the duct system, but not less than 160°F. (71°C.). The operating temperature of the actuating device may be increased to not more than 286°F. (141°C.) when located in a smoke-control system complying with Chapter 9.

713.12 Installation. Fire assemblies shall be installed in accordance with their listing. Only fire dampers labeled for use in dynamic systems shall be installed in heating, ventilation and air-conditioning systems intended to operate with fans on during a fire.

713.13 Signs. When required by the building official, a sign shall be displayed permanently near or on each required fire door in letters not less than 1 inch (25 mm) high to read as follows:

FIRE DOOR
DO NOT OBSTRUCT

SECTION 714 — THROUGH-PENETRATION FIRE STOPS

Through-penetration fire stops required by this code shall have an F or T rating as determined by tests conducted in accordance with U.B.C. Standard 7-5.

Through-penetration fire stops may be used for membrane penetrations.

The F rating shall apply to all through penetrations and shall not be less than the required fire-resistance rating of the assembly penetrated.

The T rating shall apply to those through-penetration locations required to have T ratings as specified in Sections 709.6 and 710.3 and shall not be less than the required fire-resistance rating of the assembly penetrated.

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### TABLE 7-A—MINIMUM PROTECTION OF STRUCTURAL PARTS BASED ON TIME PERIODS FOR VARIOUS NONCOMBUSTIBLE INSULATING MATERIALS

<table>
<thead>
<tr>
<th>STRUCTURAL PARTS TO BE PROTECTED</th>
<th>ITEM NUMBER</th>
<th>INSULATING MATERIAL USED</th>
<th>4 Hr.</th>
<th>3 Hr.</th>
<th>2 Hr.</th>
<th>1 Hr.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-1.1</td>
<td>1-1.1</td>
<td>Carbonate, lightweight and sand-lightweight aggregate concrete, members 6&quot; by 6&quot; (153 mm by 153 mm) or greater (not including sandstone, granite and siliceous gravel).</td>
<td>2 1/2</td>
<td>2</td>
<td>1 1/2</td>
<td>1</td>
</tr>
<tr>
<td>1-1.2</td>
<td>1-1.2</td>
<td>Carbonate, lightweight and sand-lightweight aggregate concrete, members 8&quot; by 8&quot; (203 mm by 203 mm) or greater (not including sandstone, granite and siliceous gravel).</td>
<td>2</td>
<td>1 1/2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>1-1.3</td>
<td>1-1.3</td>
<td>Carbonate, lightweight and sand-lightweight aggregate concrete, members 12&quot; by 12&quot; (305 mm by 305 mm) or greater (not including sandstone, granite and siliceous gravel).</td>
<td>1 1/2</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>1-1.4</td>
<td>1-1.4</td>
<td>Siliceous aggregate concrete and concrete excluded in Item 1-1.1, members 6&quot; by 6&quot; (153 mm by 153 mm) or greater.</td>
<td>3</td>
<td>2</td>
<td>1 1/2</td>
<td>1</td>
</tr>
<tr>
<td>1-1.5</td>
<td>1-1.5</td>
<td>Siliceous aggregate concrete and concrete excluded in Item 1-1.1, members 8&quot; by 8&quot; (203 mm by 203 mm) or greater.</td>
<td>2 1/2</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>1-1.6</td>
<td>1-1.6</td>
<td>Siliceous aggregate concrete and concrete excluded in Item 1-1.1, members 12&quot; by 12&quot; (305 mm by 305 mm) or greater.</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>1-2.1</td>
<td>1-2.1</td>
<td>Clay or shale brick with brick and mortar fill.</td>
<td>3 3/4</td>
<td></td>
<td>2 1/4</td>
<td></td>
</tr>
<tr>
<td>1-3.1</td>
<td>1-3.1</td>
<td>4&quot; (102 mm) hollow clay tile in two 2&quot; (51 mm) layers; 1/8&quot; (13 mm) mortar between tile and column; 1/8&quot; (9.5 mm) metal mesh [0.046&quot; (1.2 mm) wire diameter] in horizontal joints; tile fill.</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-3.2</td>
<td>1-3.2</td>
<td>2&quot; (51 mm) hollow clay tile; 3/16&quot; (19 mm) mortar between tile and column; 3/16&quot; (9.5 mm) metal mesh [0.046&quot; (1.2 mm) wire diameter] in horizontal joints; limestone concrete fill; plastered with 3/16&quot; (19 mm) gypsum plaster.</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-3.3</td>
<td>1-3.3</td>
<td>2&quot; (51 mm) hollow clay tile with outside wire ties [0.08&quot; (2 mm) diameter] at each course of tile or 3/16&quot; (9.5 mm) metal mesh [0.046&quot; (1.2 mm) diameter wire] in horizontal joints; limestone or trap-rock concrete fill extending 1&quot; (25 mm) outside column on all sides.</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-3.4</td>
<td>1-3.4</td>
<td>2&quot; (51 mm) hollow clay tile with outside wire ties [0.08&quot; (2 mm) diameter] at each course of tile with or without concrete fill; 3/16&quot; (19 mm) mortar between tile and column.</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-4.1</td>
<td>1-4.1</td>
<td>Cement plaster over metal lath wire tied to 3/16&quot; (19 mm) cold-rolled vertical channels with 0.049 inch (1.24 mm) (No. 18 B.W. gage) wire ties spaced 3&quot; to 6&quot; (76 mm to 152 mm) on center. Plaster mixed 1:2 1/2 by volume, cement to sand.</td>
<td>2 1/2</td>
<td>2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(Continued)
<table>
<thead>
<tr>
<th>STRUCTURAL PARTS TO BE PROTECTED</th>
<th>ITEM NUMBER</th>
<th>INSULATING MATERIAL USED</th>
<th>4 Hr.</th>
<th>3 Hr.</th>
<th>2 Hr.</th>
<th>1 Hr.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-5.1 Vermiculite concrete, 1:4 mix by volume over paper backed wire fabric lath wrapped directly around column with additional 2&quot; by 2&quot; (51 mm by 51 mm) 0.065 inch/0.065 inch (1.65 mm/1.65 mm) (No. 16/16 B.W. gage) wire fabric placed 1/4&quot; (19 mm) from outer concrete surface. Wire fabric tied with 0.049 inch (1.24 mm) (No. 18 B.W. gage) wire spaced 6&quot; on center for inner layer and 2&quot; (51 mm) on center for outer layer.</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-6.1 Perlite or vermiculite gypsum plaster over metal lath wrapped around column and furred 1 1/4&quot; (32 mm) from column flanges. Sheets lapped at ends and tied at 6&quot; (153 mm) intervals with 0.049 inch (1.24 mm) (No. 18 B.W. gage) tie wire. Plaster pushed through to flanges.</td>
<td>1(\frac{1}{2})</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-6.2 Perlite or vermiculite gypsum plaster over self-furring metal lath wrapped directly around column, lapped 1&quot; (25 mm) and tied at 6&quot; (153 mm) intervals with 0.049 inch (1.24 mm) (No. 18 B.W. gage) wire.</td>
<td>1(\frac{3}{4})</td>
<td>1(\frac{3}{8})</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-6.3 Perlite or vermiculite gypsum plaster on metal lath applied to 3/4&quot; (19 mm) cold rolled channels spaced 24 inches (610 mm) apart vertically and wrapped flatwise around column.</td>
<td>1(\frac{1}{2})</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-6.4 Perlite or vermiculite gypsum plaster over 2 layers of 1/4&quot; (12.7 mm) plain full-length gypsum lath applied tight to column flanges. Lath wrapped with 1&quot; (25.4 mm) hexagonal mesh of No. 20 gage wire and tied with doubled 0.035 inch diameter (0.89 mm) (No. 18 B.W. gage) wire ties spaced 23&quot; (584 mm) on center. For three-coat work the plaster mix for the second coat shall not exceed 100 pounds (45.4 kg) of gypsum to 2(\frac{1}{2}) cubic feet (0.07 m(^3)) of aggregate for the three-hour system.</td>
<td>2(\frac{1}{2})</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-6.5 Perlite or vermiculite gypsum plaster over one layer of 1/4&quot; (12.7 mm) plain full-length gypsum lath applied tight to column flanges. Lath tied with doubled 0.049 inch (1.24 mm) (No. 18 gage) wire ties spaced 23&quot; (584 mm) on center and scratch coat wrapped with 1&quot; (25 mm) hexagonal mesh 0.035 inch (0.89 mm) (No. 20 B.W. gage) wire fabric. For three-coat work, the plaster mix for the second coat shall not exceed 100 pounds (45.4 kg) of gypsum to 2(\frac{1}{2}) cubic feet (0.07 m(^3)) of aggregate.</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-7.1 Multiple layers of 1/2&quot; (12.7 mm) gypsum wallboard(^3) adhesively(^4) secured to column flanges and successive layers. Wallboard applied without horizontal joints. Corner edges of each layer stoppped. Wallboard layer below outer layer secured to column with doubled 0.049 inch (1.24 mm) (No. 18 B.W. gage) steel wire ties spaced 15&quot; (381 mm) on center. Exposed corners taped and treated.</td>
<td>2</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*TABLE 7-A—MINIMUM PROTECTION OF STRUCTURAL PARTS BASED ON TIME PERIODS FOR VARIOUS NONCOMBUSTIBLE INSULATING MATERIALS*—(Continued)
<table>
<thead>
<tr>
<th>1. Steel columns and all members of primary trusses (cont.)</th>
<th></th>
<th>17/8</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.7.2</td>
<td>Three layers of $\frac{5}{16}$&quot; (15.9 mm) Type X gypsum wallboard; first and second layer held in place by $\frac{1}{8}$&quot; (3.2 mm) diameter long ring shank nails with $\frac{1}{16}$&quot; (7.9 mm) diameter heads spaced 24&quot; (610 mm) on center at corners. Middle layer also secured with metal straps at mid-height and 18&quot; (457 mm) from each end, and by metal corner bead at each corner held by the metal straps. Third layer attached to corner bead with 1&quot; (25.4 mm) long gypsum wallboard screws spaced 12&quot; (305 mm) on center.</td>
<td>17/8</td>
</tr>
<tr>
<td>1.7.3</td>
<td>Three layers of $\frac{3}{16}$&quot; (15.9 mm) Type X gypsum wallboard, each layer screw attached to $\frac{1}{8}$&quot; (41 mm) steel studs 0.018 inch thick (0.46 mm) (No. 25 carbon sheet steel gage) at each corner of column. Middle layer also secured with 0.049 inch (0.12 mm) (No. 18 B.W. gage) double strand steel wire ties 24&quot; (610 mm) on center. Screws are No. 6 by 1&quot; (25 mm) spaced 24&quot; (610 mm) on center for inner layer, No. 6 by $\frac{1}{8}$&quot; (41 mm) spaced 12&quot; (305 mm) on center for middle layer and No. 8 by $\frac{2}{16}$&quot; (57 mm) spaced 12&quot; (305 mm) on center for outer layer.</td>
<td>17/8</td>
</tr>
<tr>
<td>1.8.1</td>
<td>Wood-fibered gypsum plaster mixed 1:1 by weight gypsum to sand aggregate applied over metal lath. Lath lapped 1&quot; (25 mm) and tied 6&quot; (153 mm) on center at all ends, edges and spacers with 0.049 inch (0.12 mm) (No. 18 B.W. gage) steel tie wires. Lath applied over $\frac{1}{8}$&quot; (13 mm) spacers made of $\frac{3}{4}$&quot; (19 mm) furring channel with 2&quot; (51 mm) legs bent around each corner. Spacers located 1&quot; (25 mm) from top and bottom of member and a maximum of 40&quot; (1016 mm) on center and wire tied with a single strand of 0.049 inch (0.12 mm) (No. 18 B.W. gage) steel tie wires. Corner bead tied to the lath at 6&quot; (153 mm) on center along each corner to provide plaster thickness.</td>
<td>$\frac{15}{16}$</td>
</tr>
<tr>
<td>2.1.1</td>
<td>Carbonate, lightweight and sand-lightweight aggregate concrete (not including sandstone, granite and siliceous gravel) with 3&quot; (76 mm) or finer metal mesh placed 1&quot; (25 mm) from the finished surface anchored to the top flange and providing not less than 0.025 square inch of steel area per foot (53 mm² of steel area per meter) in each direction.</td>
<td>2</td>
</tr>
<tr>
<td>2.1.2</td>
<td>Siliceous aggregate concrete and concrete excluded in Item 2-1.1 with 3&quot; (76 mm) or finer metal mesh placed 1&quot; (25 mm) from the finished surface anchored to the top flange and providing not less than 0.025 square inch of steel area per foot (53 mm² of steel area per meter) in each direction.</td>
<td>$2\frac{1}{2}$</td>
</tr>
<tr>
<td>2.2.1</td>
<td>Cement plaster on metal lath attached to $\frac{3}{4}$&quot; (19 mm) cold-rolled channels with 0.049 inch (1.24 mm) (No. 18 B.W. gage) wire ties spaced 3&quot; to 6&quot; (76 mm to 153 mm) on center. Plaster mixed 1:2:1/2 by volume, cement to sand.</td>
<td>$2\frac{1}{2}$</td>
</tr>
<tr>
<td>2.3.1</td>
<td>Vermiculite gypsum plaster on a metal lath cage, wire tied to 0.165 inch (4.19 mm) diameter (No. 8 B.W. gage) steel wire hangers wrapped around beam and spaced 16&quot; (400 mm) on center. Metal lath ties spaced approximately 5&quot; (127 mm) on center at cage sides and bottom.</td>
<td>$\frac{7}{8}$</td>
</tr>
</tbody>
</table>

(Continued)
<table>
<thead>
<tr>
<th>STRUCTURAL PARTS TO BE PROTECTED</th>
<th>ITEM NUMBER</th>
<th>INSULATING MATERIAL USED</th>
<th>MINIMUM THICKNESS OF INSULATING MATERIAL FOR FOLLOWING FIRE-RESISTANT PERIODS (Inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Webs or flanges of steel beams and girders</td>
<td>2-4.1</td>
<td>Two layers of 5/8&quot; (15.9 mm) Type X gypsum wallboard3 are attached to U-shaped brackets spaced 24&quot; (610 mm) on center. 0.018 inch (0.46 mm) (No. 25 carbon sheet steel gage) 1/2&quot; deep by 1&quot; (41 mm deep by 25 mm) galvanized steel runner channels are first installed parallel to and on each side of the top beam flange to provide a 1/2&quot; (13 mm) clearance to the flange. The channel runners are attached to steel deck or concrete floor construction with approved fasteners spaced 12&quot; (305 mm) on center. U-shaped brackets are formed from members identical to the channel runners. At the bent portion of the U-shaped bracket, the flanges of the channel are cut out so that 1/2&quot; (41 mm) deep corner channels can be inserted without attachment parallel to each side of the lower flange. As an alternate, 0.021 inch (0.41 mm) (No. 24 carbon sheet steel gage) 1&quot; by 2&quot; (25 mm by 51 mm) runner and corner angles may be used in lieu of channels, and the web cutouts in the U-shaped brackets may be omitted. Each angle is attached to the bracket with 1/2&quot; (13 mm) long No. 8 self-drilling screws. The vertical legs of the U-shaped bracket are attached to the runners with one 1/2&quot; (13 mm) long No. 8 self-drilling screw. The completed steel framing provides a 2 1/2&quot; and 1 1/2&quot; (54 mm and 38 mm) space between the inner layer of wallboard and the sides and bottom of the steel beam, respectively. The inner layer of wallboard is attached to the top runners and bottom corner channels or corner angles with 3/4&quot; (19 mm) long No. 6 self-drilling screws spaced 24&quot; (610 mm) on center. The outer layer of wallboard is applied with 1 1/4&quot; (44.5 mm) long No. 6 self-drilling screws spaced 8&quot; (203 mm) on center. Bottom corners are reinforced with metal corner beads.</td>
<td>1 1/4</td>
</tr>
<tr>
<td>2-4.2</td>
<td>Three layers of 5/8&quot; (15.9 mm) Type X gypsum wallboard3 attached to a steel suspension system as described immediately above utilizing the 0.018 inch (0.46 mm) (No. 25 carbon sheet steel gage) 1&quot; by 2&quot; (25 mm by 51 mm) lower corner angles. The framing is located so that a 2 1/2&quot; and 2&quot; (54 mm and 51 mm) space is provided between the inner layer of wallboard and the sides and bottom of the steel beam, respectively. The first two layers of wallboard are attached as described immediately above. A layer of 0.035 inch (0.89 mm) (No. 20 B.W. gage) 1&quot; (25 mm) hexagonal galvanized wire mesh is applied under the soffit of the middle layer and up the sides approximately 2&quot; (51 mm). The mesh is held in position with the No. 6 2 1/8&quot; (37 mm) long screws installed in the vertical leg of the bottom corner angles. The outer layer of wallboard is attached with No. 6 2 1/8&quot; (57 mm) long screws spaced 8&quot; (203 mm) on center. One screw is also installed at the mid-depth of the bracket in each layer. Bottom corners are finished as described above.</td>
<td>1 1/8</td>
<td></td>
</tr>
</tbody>
</table>
### Table 7-A

<table>
<thead>
<tr>
<th>Section</th>
<th>Type</th>
<th>Reinforcement</th>
<th>Tendon Cover</th>
<th>Slab Cover</th>
<th>Girder Cover</th>
</tr>
</thead>
<tbody>
<tr>
<td>3. Bonded pretensioned reinforcement in prestressed concrete⁶</td>
<td>Carbonate, lightweight, sand-lightweight and siliceous aggregate concrete Beams or girders Solid slabs⁶</td>
<td>3-1.1</td>
<td>47</td>
<td>3</td>
<td>2/1₄</td>
</tr>
<tr>
<td>4. Bonded or unbonded posttensioned tendons in prestressed concrete⁸,¹⁰</td>
<td>Carbonate, lightweight, sand-lightweight and siliceous aggregate concrete Unrestrained members: Solid slabs⁶ Beams and girders¹¹ 8 in. (203 mm) wide &gt; 12 in. (305 mm) wide</td>
<td>4-1.1</td>
<td>2</td>
<td>1/₂</td>
<td>2/1₄</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4-1.2</td>
<td>3</td>
<td>2/1₄</td>
<td>2/1₂</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2</td>
<td>1/₂</td>
<td>2/1₄</td>
</tr>
<tr>
<td>5. Reinforcing steel in reinforced concrete columns, beams, girders and trusses</td>
<td>Carbonate, lightweight and sand-lightweight aggregate concrete, members 12&quot; (305 mm) or larger, square or round. (Size limit does not apply to beams and girders monolithic with floors.)</td>
<td>5-1.1</td>
<td>1/₂</td>
<td>1/₂</td>
<td>1/₂</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5-1.2</td>
<td>2</td>
<td>1/₂</td>
<td>1/₂</td>
</tr>
<tr>
<td>6. Reinforcing steel in reinforced concrete joists⁹</td>
<td>Carbonate, lightweight and sand-lightweight aggregate concrete.</td>
<td>6-1.1</td>
<td>1/₄</td>
<td>1/₄</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6-1.2</td>
<td>1/₃</td>
<td>1/₂</td>
<td>1</td>
</tr>
<tr>
<td>7. Reinforcing and tie rods in floor and roof slabs⁹</td>
<td>Carbonate, lightweight and sand-lightweight aggregate concrete.</td>
<td>7-1.1</td>
<td>1/₂</td>
<td>1/₂</td>
<td>1/₂</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7-1.2</td>
<td>1/₂</td>
<td>1/₂</td>
<td>1/₂</td>
</tr>
</tbody>
</table>

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⁶Generic fire-resistance ratings (those not designated as PROPRIETARY* in the listing) in the Fire-Resistance Design Manual, Thirteenth Edition, dated April 1992, as published by the Gypsum Association, may be accepted as if herein listed.  
⁷Reentrant parts of protected members to be filled solidly.  
⁸Two layers of equal thickness with a 3/₄-inch (19 mm) air space between.  
¹¹For all of the construction with gypsum wallboard described in Tabule 7-A, gypsum base for veneer plaster of the same size, thickness and core type may be substituted for gypsum wallboard, provided attachment is identical to that specified for the wallboard and the joints on the face layer are reinforced, and the entire surface is covered with a minimum of 1/₁₆-inch (1.6 mm) gypsum veneer plaster.  
¹²An approved adhesive qualified under U.B.C. Standard 7-1.  
⁹Where lightweight or sand-lightweight concrete having an oven-dry weight of 110 pounds per cubic foot (1762 kg/m³) or less is used, the tabulated minimum cover may be reduced 25 percent, except that in no case shall the cover be less than 3/₄ inch (19 mm) in slabs or 1/₁₄ inches (38 mm) in beams or girders.  
¹⁰For solid slabs of siliceous aggregate concrete, increase tendon cover 20 percent.  
¹¹Adequate provisions against spalling shall be provided by U-shaped or hooped stirrups spaced not to exceed the depth of the member with a clear cover of 1 inch (25 mm).

(Continued)
FOOTNOTES TO TABLE 7-A—(Continued)

9Sprestressed slabs shall have a thickness not less than that required in Table 7-C for the respective fire-resistive time period.

9For use with concrete slabs having a comparable fire endurance where members are framed into the structure in such a manner as to provide equivalent performance to that of monolithic concrete construction.

9Fire coverage and end anchorages shall be as follows: Cover to the prestressing steel at the anchor shall be 1/2 inch (12.7 mm) greater than that required away from the anchor. Minimum cover to steel bearing plate shall be 1 inch (25 mm) in beams and 3/4 inch (19 mm) in slabs.

9For beam widths between 8 inches and 12 inches (203 mm and 305 mm), cover thickness can be determined by interpolation.

9Interior spans of continuous slabs, beams and girders may be considered restrained.

### TABLE 7-B—RATED FIRE-RESISTIVE PERIODS FOR VARIOUS WALLS AND PARTITIONS³,¹

<table>
<thead>
<tr>
<th>MATERIAL</th>
<th>ITEM NUMBER</th>
<th>CONSTRUCTION</th>
<th>MINIMUM FINISHED THICKNESS FACE-TO-FACE² (Inches)</th>
<th>4 Hr.</th>
<th>3 Hr.</th>
<th>2 Hr.</th>
<th>1 Hr.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Brick of clay or shale</td>
<td>1-1.1</td>
<td>Solid units (at least 75 percent solid).</td>
<td></td>
<td>8</td>
<td>6³</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1-2.1</td>
<td>Hollow brick units (at least 71 percent solid).</td>
<td></td>
<td>8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1-2.2</td>
<td>Hollow brick units (at least 60 percent solid, cells filled with loose-fill insulation).</td>
<td></td>
<td>8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1-2.3</td>
<td>Hollow brick units at least 64 percent solid.</td>
<td></td>
<td>12</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1-2.4</td>
<td>Hollow brick, not filled.</td>
<td></td>
<td>5.0</td>
<td>4.3</td>
<td>3.4</td>
<td>2.3</td>
</tr>
<tr>
<td></td>
<td>1-2.5</td>
<td>Hollow brick unit wall, grout or filled with perlite vermiculite or expanded shale aggregate.</td>
<td></td>
<td>6.6</td>
<td>5.5</td>
<td>4.4</td>
<td>3.0</td>
</tr>
<tr>
<td>1.3.1</td>
<td>Hollow (rowlock⁶).</td>
<td></td>
<td>12</td>
<td>8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-4.1</td>
<td>Cavity wall consisting of two 3&quot; (76 mm) (actual) solid clay brick units separated by 2&quot; (51 mm) air space, joint reinforcement every 16&quot; (406 mm) on center vertically.</td>
<td></td>
<td>8</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-4.2</td>
<td>Cavity wall consisting of two 4&quot; (100 mm) nominal solid clay brick units separated by 2&quot; (51 mm) air space, 1/4&quot; (6.4 mm) metal ties for 3 square feet (0.28 m²) of wall area.</td>
<td></td>
<td>10</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-5.1</td>
<td>4&quot; (100 mm) nominal thick units at least 75 percent solid backed with a hat-shaped metal furring channel 1/4&quot; (19 mm) thick formed from 0.021&quot; (0.53 mm) sheet metal attached to the brick wall on 24&quot; (610 mm) centers with approved fasteners, and 1/2&quot; (12.7 mm) Type X gypsum wallboard³ attached to the metal furring strips with 1&quot; (25 mm) long Type S screws spaced 8&quot; (203 mm) on center.</td>
<td></td>
<td>5⁴</td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>
### 2. Hollow clay tile, nonload-bearing

<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-1.1</td>
<td>Two cells in wall thickness, units at least 40 percent solid.</td>
<td>8</td>
</tr>
<tr>
<td>2-1.2</td>
<td>Two cells in wall thickness, units at least 43 percent solid.</td>
<td>8</td>
</tr>
<tr>
<td>2-1.3</td>
<td>Two cells in wall thickness, units at least 46 percent solid.</td>
<td>8</td>
</tr>
<tr>
<td>2-1.4</td>
<td>Two cells in wall thickness, units at least 49 percent solid.</td>
<td>8</td>
</tr>
<tr>
<td>2-1.5</td>
<td>Three or four cells in wall thickness, units at least 40 percent solid.</td>
<td>8</td>
</tr>
<tr>
<td>2-1.6</td>
<td>Three or four cells in wall thickness, units at least 43 percent solid.</td>
<td>8</td>
</tr>
<tr>
<td>2-1.7</td>
<td>Three or four cells in wall thickness, units at least 48 percent solid.</td>
<td>8</td>
</tr>
<tr>
<td>2-1.8</td>
<td>Three or four cells in wall thickness, units at least 53 percent solid.</td>
<td>8</td>
</tr>
<tr>
<td>2-1.9</td>
<td>Three cells in wall thickness, units at least 40 percent solid.</td>
<td>12</td>
</tr>
<tr>
<td>2-1.10</td>
<td>Three cells in wall thickness, units at least 45 percent solid.</td>
<td>12</td>
</tr>
<tr>
<td>2-1.11</td>
<td>Three cells in wall thickness, units at least 49 percent solid.</td>
<td>12</td>
</tr>
<tr>
<td>2-1.12</td>
<td>Two units and three or four cells in wall thickness, units at least 40 percent solid.</td>
<td>12</td>
</tr>
<tr>
<td>2-1.13</td>
<td>Two units and three or four cells in wall thickness, units at least 45 percent solid.</td>
<td>12</td>
</tr>
<tr>
<td>2-1.14</td>
<td>Two units and three or four cells in wall thickness, units at least 53 percent solid.</td>
<td>12</td>
</tr>
<tr>
<td>2-1.15</td>
<td>Two or three units and four or five cells in wall thickness, units at least 40 percent solid.</td>
<td>16</td>
</tr>
</tbody>
</table>

### 3. Structural clay tile, load-bearing

<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>3-1.1</td>
<td>One cell in wall thickness, units at least 40 percent solid.</td>
<td>4</td>
</tr>
<tr>
<td>3-1.2</td>
<td>One cell in wall thickness, units at least 30 percent solid.</td>
<td>6</td>
</tr>
<tr>
<td>3-1.3</td>
<td>Two cells in wall thickness, units at least 43 percent solid.</td>
<td>4</td>
</tr>
<tr>
<td>3-1.4</td>
<td>Two cells in wall thickness, units at least 46 percent solid.</td>
<td>6</td>
</tr>
<tr>
<td>3-1.5</td>
<td>One cell in wall thickness, units at least 30 percent solid.</td>
<td>6</td>
</tr>
</tbody>
</table>

### 4. Hollow structural clay tile, load bearing

<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>4-1.1</td>
<td>Two cells in wall thickness, units at least 40 percent solid.</td>
<td>8</td>
</tr>
<tr>
<td>4-1.2</td>
<td>Two cells in wall thickness, units at least 49 percent solid.</td>
<td>8</td>
</tr>
<tr>
<td>4-1.3</td>
<td>Three or four cells in wall thickness, units at least 53 percent solid.</td>
<td>8</td>
</tr>
<tr>
<td>4-1.4</td>
<td>Two cells in wall thickness, units at least 46 percent solid.</td>
<td>8</td>
</tr>
<tr>
<td>4-1.5</td>
<td>Three cells in wall thickness, units at least 40 percent solid.</td>
<td>12</td>
</tr>
<tr>
<td>4-1.6</td>
<td>Two units and three cells in wall thickness, units at least 40 percent solid.</td>
<td>12</td>
</tr>
<tr>
<td>4-1.7</td>
<td>Two units and three or four cells in wall thickness, units at least 45 percent solid.</td>
<td>12</td>
</tr>
<tr>
<td>4-1.8</td>
<td>Three cells in wall thickness, units at least 45 percent solid.</td>
<td>12</td>
</tr>
<tr>
<td>4-1.9</td>
<td>Three cells in wall thickness, units at least 49 percent solid.</td>
<td>12</td>
</tr>
</tbody>
</table>

(Continued)
TABLE 7-8—RATED FIRE-RESISTIVE PERIODS FOR VARIOUS WALLS AND PARTITIONS<sup>a,1</sup>—(Continued)

<table>
<thead>
<tr>
<th>MATERIAL</th>
<th>ITEM NUMBER</th>
<th>CONSTRUCTION</th>
<th>MINIMUM FINISHED THICKNESS FACE-TO-FACE&lt;sup&gt;2&lt;/sup&gt; (inches)</th>
<th>4 Hr.</th>
<th>3 Hr.</th>
<th>2 Hr.</th>
<th>1 Hr.</th>
</tr>
</thead>
<tbody>
<tr>
<td>4. Hollow structural clay tile, load bearing (cont.)</td>
<td>4-1.10</td>
<td>Two units and four cells in wall thickness, units at least 43 percent solid.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4-1.11</td>
<td>Two or three units and four or five cells in wall thickness, units at least 40 percent solid.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Combination of clay brick and load-bearing hollow clay tile</td>
<td>5.1.1</td>
<td>4&quot; (100 mm) solid brick and 4&quot; (100 mm) tile (at least 40 percent solid).</td>
<td>8</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5.1.2</td>
<td>4&quot; (100 mm) solid brick and 8&quot; (200 mm) tile (at least 40 percent solid).</td>
<td>12</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Concrete masonry units</td>
<td>6-1.1&lt;sup&gt;16,17&lt;/sup&gt;</td>
<td>Expanded slag or pumice.</td>
<td>4.7</td>
<td>4.0</td>
<td>3.2</td>
<td>2.1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6-1.2&lt;sup&gt;16,17&lt;/sup&gt;</td>
<td>Expanded clay, shale or slate.</td>
<td>5.1</td>
<td>4.4</td>
<td>3.6</td>
<td>2.6</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6-1.3&lt;sup&gt;16&lt;/sup&gt;</td>
<td>Limestone, cinders or air-cooled slag.</td>
<td>5.9</td>
<td>5.0</td>
<td>4.0</td>
<td>2.7</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6-1.4&lt;sup&gt;16,17&lt;/sup&gt;</td>
<td>Siliceous or siliceous gravel.</td>
<td>6.2</td>
<td>5.1</td>
<td>4.2</td>
<td>3.6</td>
<td></td>
</tr>
<tr>
<td>7. Solid concrete&lt;sup&gt;11,18&lt;/sup&gt;</td>
<td>7-1.1</td>
<td>Siliceous aggregate concrete.</td>
<td>7.0</td>
<td>6.2</td>
<td>5.0</td>
<td>3.5</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Carbonate aggregate concrete.</td>
<td>6.6</td>
<td>5.7</td>
<td>4.6</td>
<td>3.2</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sand-lightweight concrete.</td>
<td>5.4</td>
<td>4.6</td>
<td>3.8</td>
<td>2.7</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Lightweight concrete.</td>
<td>5.1</td>
<td>4.4</td>
<td>3.6</td>
<td>2.5</td>
<td></td>
</tr>
<tr>
<td>8. Glazed or unglazed facing tile, nonload-bearing</td>
<td>8-1.1</td>
<td>One 2&quot; (50 mm) unit cored 15 percent maximum and one 4&quot; (100 mm) unit cored 25 percent maximum with 3/4&quot; (19 mm) mortar-filled collar joint. Unit positions reversed in alternate courses.</td>
<td>63&lt;sup&gt;3&lt;/sup&gt;/&lt;sub&gt;6&lt;/sub&gt;</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>8-1.2</td>
<td>One 2&quot; (50 mm) unit cored 15 percent maximum and one 4&quot; (100 mm) unit cored 20 percent maximum with 3/4&quot; (10 mm) mortar-filled collar joint. Plastered one side with 3/4&quot; (19 mm) gypsum plaster. Two wythes tied together every fourth course with No. 22 gage corrugated metal ties.</td>
<td>63&lt;sup&gt;3&lt;/sup&gt;/&lt;sub&gt;4&lt;/sub&gt;</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td></td>
<td>8-1.3</td>
<td>One unit with three cells in wall thickness, cored 29 percent maximum.</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>8-1.4</td>
<td>One 2&quot; (50 mm) unit cored 22 percent maximum and one 4&quot; (100 mm) unit cored 41 percent maximum with 3/4&quot; (6 mm) mortar-filled collar joint. Two wythes tied together every third course with 0.030 inch (0.76 mm) (No. 22 galvanized sheet steel gage) corrugated metal ties.</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>8-1.5</td>
<td>One 4&quot; (100 mm) unit cored 25 percent maximum with 3/4&quot; (19 mm) gypsum plaster on one side.</td>
<td>43&lt;sup&gt;3&lt;/sup&gt;/&lt;sub&gt;4&lt;/sub&gt;</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>8-1.6</td>
<td>One 4&quot; (100 mm) unit with two cells in wall thickness, cored 22 percent maximum.</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Section</td>
<td>Description</td>
<td>Material Details</td>
<td>Rating</td>
<td></td>
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<tr>
<td>8.</td>
<td>Glazed or un-glazed facing tile, non-load-bearing (cont.)</td>
<td>One 4&quot; (100 mm) unit cored 30 percent maximum with 3/4&quot; (19 mm) vermiculite gypsum plaster on one side.</td>
<td>4 1/2</td>
<td></td>
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<td></td>
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<tr>
<td>8-1.7</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8-1.8</td>
<td></td>
<td></td>
<td>4 1/2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9-1.1</td>
<td>Solid gypsum plaster</td>
<td>3/4&quot; (19 mm) by 0.055 inch (1.4 mm) (No. 16 carbon sheet steel gage) cold-rolled channels, 16&quot; (406 mm) on center with 2.5-pound (1.13 kg) flat metal lath applied to one face and tied with 0.049 inch (1.24 mm) (No. 18 B.W. gage) wire at 6&quot; (153 mm) spacing. Gypsum plaster each side mixed 1:2 by weight, gypsum to sand aggregate.</td>
<td>2 4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9-1.2</td>
<td></td>
<td>3/4&quot; (19 mm) by 0.055 inch (1.4 mm) (No. 16 carbon sheet steel gage) cold-rolled channels, 16&quot; (406 mm) on center with metal lath applied to one face and tied with 0.049 inch (1.24 mm) (No. 18 B.W. gage) wire at 6&quot; (153 mm) spacing. Perlite or vermiculite gypsum plaster each side. For three-coat work, the plaster mix for the second coat shall not exceed 100 pounds (45.4 kg) of gypsum to 3/4 cubic feet (0.071 m³) of aggregate for the one-hour system.</td>
<td>2 3/4  2 4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9-1.3</td>
<td></td>
<td>3/4&quot; (19 mm) by 0.055 inch (1.4 mm) (No. 16 carbon sheet steel gage) cold-rolled channels, 16&quot; (406 mm) on center, with 3/6&quot; (9.5 mm) gypsum lath applied to one face and attached with sheet metal clips. Gypsum plaster each side mixed 1:2 by weight, gypsum to sand aggregate.</td>
<td>2 4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9-2.1</td>
<td>Studless with 1/2&quot; (12.7 mm) full-length plain gypsum lath and gypsum plaster each side. Plaster mixed 1:1 for scratch coat and 1:2 for brown coat, by weight, gypsum to sand aggregate.</td>
<td></td>
<td>2 4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9-2.2</td>
<td>Studless with 1/2&quot; (12.7 mm) full-length plain gypsum lath and perlite or vermiculite gypsum plaster each side.</td>
<td></td>
<td>2 3/4  2 4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9-2.3</td>
<td>Studless partition with 3/6&quot; (9.5 mm) rib metal lath installed vertically, adjacent edges tied 6&quot; (153 mm) on center with No. 18 gage wire ties, gypsum plaster each side mixed 1:2 by weight, gypsum to sand aggregate.</td>
<td></td>
<td>2 4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10-1.1</td>
<td>Solid perlite and portland cement</td>
<td>Perlite mixed in the ratio of 3 cubic feet (0.085 m³) to 100 pounds (45.4 kg) of portland cement and machine applied to stud side of 1 1/2&quot; (38 mm) mesh by 0.058 inch (1.47 mm) (No. 17 B.W. gage) paper-backed woven wire fabric lath wire-tied to 4&quot; (102 mm) deep steel trussed wire 16&quot; (406 mm) on center. Wire ties of 0.049 inch (1.24 mm) (No. 18 B.W. gage) galvanized steel wire 6&quot; (153 mm) on center vertically.</td>
<td>3 1/8</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11-1.1</td>
<td>Solid coat wood fibered gypsum plaster</td>
<td>3/4&quot; (19 mm) by 0.055 inch (1.4 mm) (No. 16 carbon sheet steel gage) cold rolled channels, 12&quot; (305 mm) on center with 2.5-pound (1.13 kg) flat metal lath applied to one face and tied with 0.049 inch (1.24 mm) (No. 18 B.W. gage) wire at 6&quot; (153 mm) spacing. Neat gypsum plaster applied each side.</td>
<td>2 4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12-1.1</td>
<td>Solid gypsum wallboard partition</td>
<td>One full-length 1/2&quot; (12.7 mm) Type X gypsum wallboard laminated to each side of 1&quot; (25.4 mm) full-length V-edge gypsum coreboard with approved laminating compound. Vertical joints of face layer and coreboard staggered at least 3&quot; (76 mm).</td>
<td>2 4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### TABLE 7-B—RATED FIRE-RESISTIVE PERIODS FOR VARIOUS WALLS AND PARTITIONS<sup>1</sup>—(Continued)

<table>
<thead>
<tr>
<th>MATERIAL</th>
<th>ITEM NUMBER</th>
<th>CONSTRUCTION</th>
<th>MINIMUM FINISHED THICKNESS FACE-TO-FACE&lt;sup&gt;2&lt;/sup&gt; (inches)</th>
<th>4 Hr.</th>
<th>3 Hr.</th>
<th>2 Hr.</th>
<th>1 Hr.</th>
</tr>
</thead>
<tbody>
<tr>
<td>13. Hollow (stud-less) gypsum wallboard partition</td>
<td>13-1.1</td>
<td>One full-length layer of 3/16&quot; (15.9 mm) Type X gypsum wallboard&lt;sup&gt;2&lt;/sup&gt; attached to both sides of wood or metal top and bottom runners laminated to each side of 1&quot; by 6&quot; (25 mm by 153 mm) full-length gypsum coreboard ribs spaced 24&quot; (610 mm) on center with approved laminating compound. Ribs centered at vertical joints of face plies and joints staggered 24&quot; (610 mm) in opposing faces. Ribs may be recessed 6&quot; (153 mm) from the top and bottom.</td>
<td><img src="https://via.placeholder.com/150" alt="Image" /></td>
<td>2 1/4 4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>13-1.2</td>
<td>1&quot; (25.4 mm) regular gypsum V-edge full-length backing board attached to both sides of wood or metal top and bottom runners with nails or 1/2&quot; (41 mm) drywall screws at 24&quot; (610 mm) on center. Minimum width of runners 1 1/2&quot; (41.3 mm). Face layer of 1/2&quot; (12.7 mm) regular full-length gypsum wallboard laminated to outer faces of backing board with approved laminating compound.</td>
<td><img src="https://via.placeholder.com/150" alt="Image" /></td>
<td>4 1/4 4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14. Noncombustible studs—interior partition with plaster each side</td>
<td>14-1.1</td>
<td>3 1/4&quot; (82 mm) by 0.044 inch (1.12 mm) (No. 18 carbon sheet steel gage) steel studs spaced 24&quot; (610 mm) on center. 5/6&quot; (15.9 mm) gypsum plaster on metal lath each side mixed 1:2 by weight, gypsum to sand aggregate.</td>
<td><img src="https://via.placeholder.com/150" alt="Image" /></td>
<td>4 3/4 4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>14-1.2</td>
<td>3 1/4&quot; (92 mm) 0.055 inch (1.4 mm) (No. 16 carbon sheet steel gage) approved nailable&lt;sup&gt;13&lt;/sup&gt; studs spaced 24&quot; (610 mm) on center. 5/6&quot; (15.9 mm) neat gypsum wood fibered plaster each side over 3/8&quot; (9.5 mm) rib metal lath nailed to studs with 6d common nails, 8&quot; (203 mm) on center. Nails driven 1 1/4&quot; (32 mm) and bent over.</td>
<td><img src="https://via.placeholder.com/150" alt="Image" /></td>
<td>5 1/8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>14-1.3</td>
<td>4&quot; (102 mm) 0.044 inch (1.12 mm) (No. 18 carbon sheet steel gage) channel-shaped steel studs at 16&quot; (406 mm) on center. On each side approved resilient clips pressed onto stud flange at 16&quot; (406 mm) vertical spacing. 1/4&quot; (6.4 mm) pencil rods snapped into or wire-tied onto outer loop of clips, metal lath wire-tied to pencil rods at 6&quot; (153 mm) intervals, 1&quot; (25 mm) perlite gypsum plaster, each side.</td>
<td><img src="https://via.placeholder.com/150" alt="Image" /></td>
<td>7 1/8 4</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>14-1.4</td>
<td>2 1/2&quot; (63.5 mm) 0.044 inch (1.12 mm) (No. 18 carbon sheet steel gage) steel studs spaced 16&quot; (406 mm) on center. Wood fibered gypsum plaster mixed 1:1 by weight gypsum to sand aggregate applied on 3.4-pound (1.54 kg) metal lath wire tied to studs, each side. 3/4&quot; (19 mm) plaster applied over each face, including finish coat.</td>
<td><img src="https://via.placeholder.com/150" alt="Image" /></td>
<td>4 1/4 4</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>15. Wood studs interior partition with plaster each side</td>
<td>15-1.1,14,19</td>
<td>2&quot; by 4&quot; (51 mm by 102 mm) wood studs 16&quot; (406 mm) on center with 5/16&quot; (15.9 mm) gypsum plaster on metal lath. Lath attached by 6d common nails bent over or No. 14 gage by 1/4&quot; (31.7 mm by 19 mm) crown width staples spaced 6&quot; (153 mm) on center. Plaster mixed 1:1 1/2 for scratch coat and 1:3 for brown coat, by weight, gypsum to sand aggregate.</td>
<td><img src="https://via.placeholder.com/150" alt="Image" /></td>
<td>5 1/8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>15-1.2,14</td>
<td>2&quot; by 4&quot; (51 mm by 102 mm) wood studs 16&quot; (406 mm) on center with metal lath and 3/8&quot; (22 mm) neat wood fibered gypsum plaster each side. Lath attached by 6d common nails, 7&quot; (178 mm) on center. Nails driven 1 1/4&quot; (31.7 mm) and bent over.</td>
<td><img src="https://via.placeholder.com/150" alt="Image" /></td>
<td>5 1/4 4</td>
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<tr>
<td><strong>15. Wood studs interior partition with plaster each side</strong> (cont.)</td>
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</tr>
<tr>
<td>15-1.314.16</td>
<td>2&quot; by 4&quot; (51 mm by 102 mm) wood studs 16&quot; (406 mm) on center with 3/4&quot; (9.5 mm) perforated or plain gypsum lath and 1/2&quot; (12.7 mm) gypsum plaster each side. Lath nailed with 13/32&quot; (28.6 mm) by No. 13 gage head plasterboard blued nails, 4&quot; (102 mm) on center. Plaster mixed 1.2 by weight, gypsum to sand aggregate.</td>
<td></td>
<td></td>
<td></td>
<td>5 1/4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15-1.414.16</td>
<td>2&quot; by 4&quot; (51 mm by 102 mm) wood studs 16&quot; (406 mm) on center with 3/4&quot; (9.5 mm) Type X gypsum lath and 1/2&quot; (12.7 mm) gypsum plaster each side. Lath nailed with 13/32&quot; (28.6 mm) by No. 13 gage head plasterboard blued nails, 5&quot; (127 mm) on center. Plaster mixed 1.2 by weight, gypsum to sand aggregate.</td>
<td></td>
<td></td>
<td></td>
<td>5 1/4</td>
<td></td>
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</tbody>
</table>

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</thead>
<tbody>
<tr>
<td><strong>16. Noncombustible studs—interior partition with gypsum wallboard each side</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16-1.1</td>
<td>0.018 inch (0.46 mm) (No. 25 carbon sheet steel gage) channel-shaped studs 24&quot; (610 mm) on center with one full-length layer of 3/4&quot; (15.9 mm) Type X gypsum wallboard applied vertically attached with 1&quot; (25.4 mm) long No. 6 drywall screws to each stud. Screws are 8&quot; (203 mm) on center around the perimeter and 12&quot; (305 mm) on center on the intermediate stud. The wallboard may be applied horizontally when attached to 3/4&quot; (92 mm) studs and the horizontal joints are staggered with those on the opposite side. Screws for the horizontal application shall be 8&quot; (203 mm) on center at vertical edges and 12&quot; (305 mm) on center at intermediate studs.</td>
<td></td>
<td></td>
<td></td>
<td>2 7/8</td>
</tr>
<tr>
<td>16-1.2</td>
<td>0.018 inch (0.46 mm) (No. 25 carbon sheet steel gage) channel-shaped studs 24&quot; (610 mm) on center with two full-length layers of 3/4&quot; (15.9 mm) Type X gypsum wallboard applied vertically each side. First layer attached with 1&quot; (25.4 mm) long, No. 6 drywall screws, 8&quot; (203 mm) on center around the perimeter and 12&quot; (305 mm) on center on the intermediate stud. Second layer applied with vertical joints offset one stud space from first layer using 3/8&quot; (14.3 mm) long, No. 6 drywall screws spaced 9&quot; (229 mm) on center along vertical joints, 12&quot; (305 mm) on center at intermediate studs and 24&quot; (610 mm) on center along top and bottom runners.</td>
<td></td>
<td></td>
<td></td>
<td>3 5/8</td>
</tr>
<tr>
<td>16-1.3</td>
<td>0.055 inch (1.40 mm) (No. 16 carbon sheet steel gage) approved nailable metal studs applied vertically or horizontally nailed 7&quot; (178 mm) on center with 6d cement-coated common nails. Approved metal fastener grips used with nails at vertical butt joints along studs.</td>
<td></td>
<td></td>
<td></td>
<td>4 7/8</td>
</tr>
</tbody>
</table>

<p>| | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>17. Wood studs—interior partition with gypsum wallboard each side</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17-1.111.19</td>
<td>2&quot; by 4&quot; (51 mm by 102 mm) wood studs 16&quot; (406 mm) on center with two layers of 3/4&quot; (9.5 mm) regular gypsum wallboard each side, 4d cooler or wallboard nails at 8&quot; (203 mm) on center first layer, 5d cooler or wallboard nails at 8&quot; (203 mm) on center second layer with laminating compound between layers. Joints staggered. First layer applied full length vertically, second layer applied horizontally or vertically.</td>
<td></td>
<td></td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>17-1.214.19</td>
<td>2&quot; by 4&quot; (51 mm by 102 mm) wood studs 16&quot; (406 mm) on center with two layers 1/2&quot; (12.7 mm) regular gypsum wallboard applied vertically or horizontally each side, joints staggered. Nail base layer with 5d cooler or wallboard nails at 8&quot; (203 mm) on center, face layer with 8d cooler or wallboard nails at 8&quot; (203 mm) on center.</td>
<td></td>
<td></td>
<td></td>
<td>5 1/2</td>
</tr>
<tr>
<td>17-1.314.19</td>
<td>2&quot; by 4&quot; (51 mm by 102 mm) wood studs 24&quot; (610 mm) on center with 3/4&quot; (15.9 mm) Type X gypsum wallboard applied vertically or horizontally nailed with 6d cooler or wallboard nails at 7&quot; (178 mm) on center with end joints on nailing members. Stagger joints each side.</td>
<td></td>
<td></td>
<td></td>
<td>4 3/4</td>
</tr>
</tbody>
</table>

(Continued)
<table>
<thead>
<tr>
<th>MATERIAL</th>
<th>ITEM NUMBER</th>
<th>CONSTRUCTION</th>
<th>MINIMUM FINISHED THICKNESS FACE-TO-FACE² (Inches)</th>
<th>4 Hr.</th>
<th>3 Hr.</th>
<th>2 Hr.</th>
<th>1 Hr.</th>
</tr>
</thead>
<tbody>
<tr>
<td>17. Wood studs—interior partition with gypsum wallboard each side</td>
<td>17-1.4¹⁴</td>
<td>2&quot; by 4&quot; (51 mm by 102 mm) fire-retardant-treated wood studs spaced 24&quot; (610 mm) on center with one layer of 5/8&quot; (15.9 mm) thick Type X gypsum wallboard¹ attached with face paper grain (long dimension) parallel to studs. Wallboard attached with 6d cooler¹⁵ or wallboard¹⁵ nails at 7&quot; (178 mm) on center.</td>
<td>4³/₄¹⁴</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>17-1.5¹⁴¹⁹</td>
<td>2&quot; by 4&quot; (51 mm by 102 mm) wood studs 16&quot; (406 mm) on center with two layers 5/8&quot; (15.9 mm) Type X gypsum wallboard¹ each side. Base layers applied vertically and nailed with 6d cooler¹⁵ or wallboard¹⁵ nails at 9&quot; (229 mm) on center. Face layer applied vertically or horizontally and nailed with 8d cooler¹⁵ or wallboard¹⁵ nails at 7&quot; (178 mm) on center. For nail-adhesive application, base layers are nailed 6&quot; (153 mm) on center. Face layers applied with coating of approved wallboard adhesive and nailed 12&quot; (305 mm) on center.</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>17-1.6¹⁴</td>
<td>2&quot; by 3&quot; (51 mm by 76 mm) fire-retardant-treated wood studs spaced 24&quot; (610 mm) on center with one layer of 5/8&quot; (15.9 mm) thick Type X gypsum wallboard¹ applied with face paper grain (long dimension) at right angles to studs. Wallboard attached with 6d cement-coated box nails spaced 7&quot; (178 mm) on center.</td>
<td>3³/₈¹⁴</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18. Exterior or interior walls</td>
<td>18-1.1¹¹¹⁴¹⁹</td>
<td>Exterior surface with 3/4&quot; (19 mm) drop siding over 1/2&quot; (12.7 mm) gypsum sheathing on 2&quot; by 4&quot; (51 mm by 102 mm) wood studs at 16&quot; (406 mm) on center; interior surface treatment as required for one-hour-rated exterior or interior walls. 2&quot; by 4&quot; (51 mm by 102 mm) wood stud partitions. Gypsum sheathing nailed with 1/2&quot; (12.4 mm) head galvanized nails at 8&quot; (203 mm) on center. Siding nailed with 7d galvanized smooth box nails.</td>
<td>Varies</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>18-1.2¹²¹⁴¹⁹</td>
<td>2&quot; by 4&quot; (51 mm by 102 mm) wood studs 16&quot; (406 mm) on center with metal lath and 3/4&quot; (19 mm) cement plaster on each side. Lath attached with 6d common nails 7&quot; (178 mm) on center driven to 1&quot; (25 mm) minimum penetration and bent over. Plaster mix 1:4 for scratch coat and 1:5 for brown coat, by volume, cement to sand.</td>
<td>5³/₈</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>18-1.3¹²¹⁴¹⁹</td>
<td>2&quot; by 4&quot; (51 mm by 102 mm) wood studs 16&quot; (406 mm) on center with 3/4&quot; (22 mm) cement plaster (measured from the face of studs) on the exterior surface with interior surface treatment as required for interior wood stud partitions in this table. Plaster mix 1:4 for scratch coat and 1:5 for brown coat, by volume, cement to sand.</td>
<td>Varies</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>18-1.4</td>
<td>3/4&quot; (9.5 mm) No. 15 gage noncombustible stud 16&quot; (406 mm) on center with 3/4&quot; (22 mm) cement plaster (measured from the face of the studs) on the exterior surface with interior surface treatment as required for interior, nonbearing, noncombustible stud partitions in this table. Plaster mix 1:4 for scratch coat and 1:5 for brown coat, by volume, cement to sand.</td>
<td>Varies</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18. Exterior or interior walls (cont.)</td>
<td>18-1.51⁹</td>
<td>2⁷⁄₄&quot; by 3²⁄₄&quot; (57 mm by 95 mm) clay face brick with cored holes over ⁷⁄₈&quot; (12.7 mm) gypsum sheathing on exterior surface of 2&quot; by 4&quot; (51 mm by 102 mm) wood studs at 16&quot; (406 mm) on center and two layers ⁵⁄₈&quot; (15.9 mm) Type X gypsum wallboard on exterior surface. Sheathing placed horizontally or vertically with vertical joints over studs nailed 6&quot; (153 mm) on center with ⁷⁄₈&quot; (11.1 mm) head galvanized nails. Inner layer of wallboard placed horizontally or vertically and nailed 8&quot; (203 mm) on center with 6d cooler or wallboard nails. Outer layer of wallboard placed horizontally or vertically and nailed 8&quot; (203 mm) on center with 8d cooler or wallboard nails. All joints staggered with vertical joints over studs. Outer layer joints taped and finished with compound. Nail heads covered with joint compound. 0.035 inch (0.91 mm) (No. 20 galvanized sheet gage) corrugated galvanized steel wall ties ⁷⁄₈&quot; by 6⁵⁄₈&quot; (19 mm by 168 mm) attached to each stud with two 8d cooler or wallboard nails every sixth course of bricks.</td>
<td>10</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-------------------------------------</td>
<td>-----------------</td>
<td>------------------</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18-1.61⁹</td>
<td>2&quot; by 6&quot; (51 mm by 153 mm) fire-retardant-treated wood studs 16&quot; (406 mm) on center. Interior face has two layers of ⁵⁄₈&quot; (15.9 mm) Type X gypsum wallboard with the base layer placed vertically and attached with 6d box nails ¹²⁄₈&quot; (305 mm) on center. The face layer is placed horizontally and attached with 6d box nails 8&quot; (203 mm) on center. Type X gypsum wallboard placed vertically with 6d box nails 8&quot; (203 mm) on center. An approved building paper is next applied, followed by self-furred exterior lath attached with ⁴⁄₃&quot; (63.5 mm). No. 12 gage galvanized roofing nails with a ⁵⁄₈&quot; (9.5 mm) diameter head and spaced 6&quot; (153 mm) on center along each stud. Cement plaster consisting of a ¹⁄₂&quot; (13 mm) brown coat is then applied. The scratch coat is mixed in the proportion of 1:3 by weight, cement to sand with 10 pounds (4.54 kg) of hydrated lime and 3 pounds (1.36 kg) of approved additives or admixtures per sack of cement. The brown coat is mixed in the proportion of 1:4 by weight, cement to sand with the same amounts of hydrated lime and approved additives or admixtures used in the scratch coat.</td>
<td>8¹⁄₄</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## TABLE 7-B—RATED FIRE-RESISTIVE PERIODS FOR VARIOUS WALLS AND PARTITIONS\(^1\)—(Continued)

<table>
<thead>
<tr>
<th>MATERIAL</th>
<th>ITEM NUMBER</th>
<th>CONSTRUCTION</th>
<th>MINIMUM FINISHED THICKNESS FACE-TO-FACE(^2) (Inches)</th>
<th>4 Hr.</th>
<th>3 Hr.</th>
<th>2 Hr.</th>
<th>1 Hr.</th>
</tr>
</thead>
<tbody>
<tr>
<td>18. Exterior or interior walls (cont.)</td>
<td>18-1.714.19</td>
<td>2(^\prime) by 6(^\prime) (51 mm by 153 mm) wood studs 16(^\prime) (406 mm) on center. The exterior face has a layer of (\frac{3}{8})(^\prime) (15.9 mm) Type X gypsum wallboard(^3) placed vertically with 6d box nails 8(^\prime) (203 mm) on center at joints and 12(^\prime) (305 mm) on center elsewhere. An approved building paper is next applied, followed by 1(^\prime) (25.4 mm) by No. 18 gage self-furred exterior lath attached with 8d by (\frac{2}{16})(^\prime) (63.5 mm) long galvanized roofing nails spaced 6(^\prime) (153 mm) on center along each stud. Cement plaster consisting of a (\frac{1}{2})(^\prime) (13 mm) scratch coat, a bonding agent and a (\frac{1}{2})(^\prime) (13 mm) brown coat and a finish coat is then applied. The scratch coat is mixed in the proportion of 1:3 by weight, cement to sand with 10 pounds (4.54 kg) of hydrated lime and 3 pounds (1.36 kg) of approved additives or admixtures per sack of cement. The brown coat is mixed in the proportion of 1:4 by weight, cement to sand with the same amounts of hydrated lime and approved additives or admixtures used in the scratch coat. The interior is covered with (\frac{3}{8})(^\prime) (9.5 mm) gypsum lath with (\frac{1}{16})(^\prime) (0.16 mm) hexagonal mesh of No. 20 B.W. gage woven wire lath furred out (\frac{3}{8})(^\prime) (8 mm) and (\frac{1}{2})(^\prime) (25 mm) perlite or vermiculite gypsum plaster. Lath nailed with (\frac{1}{2})(^\prime) (28.6 mm) by No. 13 gage by (\frac{3}{8})(^\prime) (9.5 mm) head plasterboard blued nails spaced 5(^\prime) (127 mm) on center. Mesh attached by (\frac{3}{8})(^\prime) (4.5 mm) by No. 12 gage by (\frac{3}{8})(^\prime) (9.5 mm) furrings, spaced 8(^\prime) (203 mm) on center. The plaster mix shall not exceed 100 pounds (45.4 kg) of gypsum to (\frac{2}{16})(^\prime) cubic feet (0.071 m(^3)) of aggregate.</td>
<td>(\frac{8}{3})(^\prime)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18-1.814.19</td>
<td>2(^\prime) by 6(^\prime) (51 mm by 153 mm) wood studs 16(^\prime) (406 mm) on center. The exterior face has a layer of (\frac{3}{8})(^\prime) (15.9 mm) Type X gypsum wallboard(^3) placed vertically with 6d box nails 8(^\prime) (203 mm) on center at joints and 12(^\prime) (305 mm) on center elsewhere. An approved building paper is next applied, followed by 1(^\prime) (25.4 mm) by No. 18 gage self-furred exterior lath attached with 8d by (\frac{2}{16})(^\prime) (63.5 mm) long galvanized roofing nails spaced 6(^\prime) (153 mm) on center along each stud. Cement plaster consisting of a (\frac{1}{2})(^\prime) (13 mm) scratch coat, a bonding agent and a (\frac{1}{2})(^\prime) (13 mm) brown coat and a finish coat is then applied. The scratch coat is mixed in the proportion of 1:3 by weight, cement to sand with 10 pounds (4.54 kg) of hydrated lime and 3 pounds (1.36 kg) of approved additives or admixtures per sack of cement. The brown coat is mixed in the proportion of 1:4 by weight, cement to sand with the same amounts of hydrated lime and approved additives or admixtures used in the scratch coat. The interior is covered with (\frac{3}{8})(^\prime) (9.5 mm) gypsum lath with (\frac{1}{16})(^\prime) (0.16 mm) hexagonal mesh of No. 20 B.W. gage woven wire lath furred out (\frac{3}{8})(^\prime) (8 mm) and (\frac{1}{2})(^\prime) (25 mm) perlite or vermiculite gypsum plaster. Lath nailed with (\frac{1}{2})(^\prime) (28.6 mm) by No. 13 gage by (\frac{3}{8})(^\prime) (9.5 mm) head plasterboard blued nails spaced 5(^\prime) (127 mm) on center. Mesh attached by (\frac{3}{8})(^\prime) (4.5 mm) by No. 12 gage by (\frac{3}{8})(^\prime) (9.5 mm) furrings, spaced 8(^\prime) (203 mm) on center. The plaster mix shall not exceed 100 pounds (45.4 kg) of gypsum to (\frac{2}{16})(^\prime) cubic feet (0.071 m(^3)) of aggregate.</td>
<td>(\frac{8}{3})(^\prime)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\(^1\) From Uniform Building Code 1994

\(^2\) Where noted, the thickness is determined by the thickness of all components

\(^3\) Where noted, the thickness is determined by the thickness of all components
18. Exterior or interior walls (cont.)

| 18-1.9 | 4" (102 mm) No. 18 gage, nonload-bearing metal studs, 16" (406 mm) on center, with 1" (25 mm) portland cement lime plaster [measured from the back side of the 3.4-pound (1.54 kg) expanded metal lath] on the exterior surface. Interior surface to be covered with 1" (25 mm) gypsum plaster on 3.4-pound (1.54 kg) expanded metal lath proportioned by weight—1:2 for scratch coat, 1:3 for brown, gypsum to sand. Lath on one side of the partition fastened to 1/4" (6.4 mm) diameter pencil rods supported by No. 20 gage metal clips, located 16" (406 mm) on center vertically, on each stud. 3" (76 mm) thick mineral fiber insulating batts friction fitted between the studs. |
| 6 1/2" |

*Generic fire-resistance ratings (those not designated as PROPRIETARY* in the listing) in the Fire-Resistance Design Manual, Thirteenth Edition, dated April 1992, as published by the Gypsum Association, may be accepted as if herein listed, except systems WP 8106, WP 8107 and WP 8108 on page 51 of the manual.

1Staples with equivalent holding power and penetration may be used as alternate fasteners to nails for attachment to wood framing.

2Thickness shown for brick and clay tile are nominal thicknesses unless plastered, in which case thicknesses are net. Thickness shown for concrete masonry and hollow clay or shale brick is equivalent thickness defined as the average thickness of solid material in the wall and is represented by the formula:

\[ T_e = \frac{V}{L \times H} \]

WHERE:

- \( L \) = length of block or brick using specified dimensions as defined in Chapter 21, in inches (mm).
- \( H \) = height of block or brick using specified dimensions as defined in Chapter 21, in inches (mm).
- \( T_e \) = equivalent thickness, in inches (mm).
- \( V \) = net volume (gross volume less volume of voids), in cubic inches (mm³).

When all cells are solid grouted or filled with silicon-treated perlite loose-fill insulation; vermiculite loose-fill insulation; or expanded clay, shale or slate lightweight aggregate, the equivalent thickness shall be the thickness of the block or brick using specified dimensions as defined in Chapter 21. Equivalent thickness may also include the thickness of applied plaster and lath or gypsum wallboard, where specified.

3Single-wythe brick.

4Shall be used for nonbearing purposes only.

5Hollow brick units 4-inch by 8-inch by 12-inch (102 mm by 203 mm by 305 mm) nominal with two interior cells having a 1 1/2-inch (38 mm) web thickness between cells and 1 1/4-inch-thick (34 mm) face shells.

6Rowlock design employs clay brick with all or part of bricks laid on edge with the bond broken vertically.

7For all of the construction with gypsum wallboard described in Table 7-B, gypsum base for veneer plaster of the same size, thickness and core type may be substituted for gypsum wallboard, provided attachment is identical to that specified for the wallboard, and the joints on the face layer are reinforced and the entire surface is covered with a minimum of 1/16 inch (1.6 mm) gypsum veneer plaster.

8Ratings are for hard-burned clay or shale tile.

9Cells filled with tile, stone, cinders or sand mixed with mortar.

10Ratings are for medium-burned clay tile.

11Equivalent thickness may include the thickness of concrete plaster or 1.5 times the thickness of gypsum plaster applied in accordance with the requirements of Chapter 25 of the code.

12Studs are welded truss wire studs with 0.18 inch (4.57 mm) (No. 7 B.W. gage) flange wire and 0.18 inch (4.57 mm) (No. 7 B.W. gage) truss wires.

13Aluminum metal studs consist of two channel studs spot welded back to back with a crimped web forming a nailing groove.

14Wood structural panels may be installed between the fire protection and the wood studs on either the interior or exterior side of the wood-frame assemblies in this table, provided the length of the fasteners used to attach the fire protection are increased by an amount at least equal to the thickness of the wood structural panel.

15For properties of cooler or wallboard nails, see approved national standards.

(Continued)
FOOTNOTES TO TABLE 7-B—(Continued)

16 The fire-resistive time period for concrete masonry units meeting the equivalent thicknesses required for a two-hour fire-resistive rating in Item 6, and having a thickness of not less than 7\(\frac{3}{8}\) inches (194 mm) is four hours when cores which are not grouted are filled with silicone-treated perlite loose-fill insulation; vermiculite loose-fill insulation; or expanded clay, shale or slate lightweight aggregate, sand or slag having a maximum particle size of \(\frac{3}{8}\) inch (9.5 mm).

17 For determining the fire-resistance rating of concrete masonry units composed of a combination of aggregate types or where plaster is applied directly to the concrete masonry, see U.B.C. Standard 7-7, Part III. Lightweight aggregates shall have a maximum combined density of 65 pounds per cubic foot (1049 kg/m³).

18 Concrete walls shall be reinforced with horizontal and vertical temperature reinforcement as required by Sections 1914.3.2 and 1914.3.3.

19 The design stress of studs shall be reduced to 78 percent of allowable \(F'_{c}\) with the maximum not greater than 78 percent of the calculated stress with studs having a slenderness ratio \(L/d\) of 33.
### Table 7-C: Minimum Protection for Floor and Roof Systems

<table>
<thead>
<tr>
<th>Floor or Roof Construction</th>
<th>Item Number</th>
<th>Ceiling Construction</th>
<th>Thickness of Floor or Roof (inches)</th>
<th>Minimum Thickness of Ceiling (inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Siliceous aggregate concrete</td>
<td>1-1.1</td>
<td>Slab (no ceiling required). Minimum cover over nonprestressed reinforcement shall not be less than ( \frac{3}{4} ) inch (19 mm).(^2)</td>
<td>7.0 7.0 7.0 7.0 7.0 7.0 7.0 7.0</td>
<td>x 25.4 for mm</td>
</tr>
<tr>
<td>2. Carbonate aggregate concrete</td>
<td>2-1.1</td>
<td>Slab with suspended ceiling of vermiculite or gypsum plaster over metal lath attached to ( \frac{3}{8} ) inch (19 mm) cold-rolled channels spaced 12&quot; (305 mm) on center. Ceiling located 6&quot; (153 mm) minimum below joists.</td>
<td>3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5</td>
<td>5.1 4.4 3.6 2.5</td>
</tr>
<tr>
<td>3. Sand-lightweight concrete</td>
<td>3-1.1</td>
<td>Slab with suspended ceiling of vermiculite or gypsum plaster over metal lath attached to ( \frac{3}{8} ) inch (19 mm) cold-rolled channels spaced 12&quot; (305 mm) on center. Ceiling located 6&quot; (153 mm) minimum below joists.</td>
<td>3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5</td>
<td>5.1 4.4 3.6 2.5</td>
</tr>
<tr>
<td>4. Lightweight concrete</td>
<td>4-1.1</td>
<td>Slab with suspended ceiling of vermiculite or gypsum plaster over metal lath attached to ( \frac{3}{8} ) inch (19 mm) cold-rolled channels spaced 12&quot; (305 mm) on center. Ceiling located 6&quot; (153 mm) minimum below joists.</td>
<td>3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5</td>
<td>5.1 4.4 3.6 2.5</td>
</tr>
<tr>
<td>5. Reinforced concrete joists</td>
<td>5-2.1</td>
<td>Slab with suspended ceiling of vermiculite or gypsum plaster over metal lath attached to ( \frac{3}{8} ) inch (19 mm) cold-rolled channels spaced 12&quot; (305 mm) on center. Ceiling located 6&quot; (153 mm) minimum below joists.</td>
<td>3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5</td>
<td>5.1 4.4 3.6 2.5</td>
</tr>
</tbody>
</table>

\(^2\)When ceiling required, minimum cover over nonprestressed reinforcement shall not be less than \( \frac{3}{4} \) inch (19 mm).
### TABLE 7-C—MINIMUM PROTECTION FOR FLOOR AND ROOF SYSTEMSa,1—(Continued)

<table>
<thead>
<tr>
<th>FLOOR OR ROOF CONSTRUCTION</th>
<th>ITEM NUMBER</th>
<th>CEILING CONSTRUCTION</th>
<th>THICKNESS OF FLOOR OR ROOF SLAB (inches)</th>
<th>MINIMUM THICKNESS OF CEILING SLAB (inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>4 Hr.</td>
<td>3 Hr.</td>
</tr>
<tr>
<td>6. Steel joists constructed with a poured reinforced concrete slab on metal lath forms or steel form units.4,5</td>
<td>6-1.1</td>
<td>Gypsum plaster on metal lath attached to the bottom chord with single No. 16 gage or doubled No. 18 gage wire ties spaced 6” (153 mm) on center. Plaster mixed 1:2 for scratch coat, 1:3 for brown coat, by weight, gypsum to sand aggregate for two-hour system. For three-hour system plaster is neat.</td>
<td>2 1/2</td>
<td>2 1/4</td>
</tr>
<tr>
<td></td>
<td>6-2.1</td>
<td>Vermiculite gypsum plaster on metal lath attached to the bottom chord with single No. 16 gage or doubled 0.049 inch (1.24 mm) (No. 18 B.W. gage) wire ties 6” (153 mm) on center.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>6-3.1</td>
<td>Cement plaster over metal lath attached to the bottom chord of joists with single No. 16 gage or doubled 0.049 inch (1.24 mm) (No. 18 B.W. gage) wire ties spaced 6” (153 mm) on center. Plaster mixed 1:2 for scratch coat, 1:3 for brown coat for one-hour system and 1:1 for scratch coat, 1:1 1/2 for brown coat for two-hour system, by weight, cement to sand.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>6-4.1</td>
<td>Ceiling of 5/8” (15.9 mm) Type X wallboard2 attached to 5/8” deep by 2 1/4” (22.2 mm deep by 66.7 mm) by 0.021 inch (0.53 mm) (No. 25 carbon sheet steel gage) hat-shaped furring channels 12” (305 mm) on center with 1” (25.4 mm) long No. 6 wallboard screws at 8” (203 mm) on center. Channels wire tied to bottom chord of joists with doubled 0.049 inch (1.24 mm) (No. 18 B.W. gage) wire or suspended below joists on wire hangers.7</td>
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<td></td>
<td>6. Steel joists constructed with a poured reinforced concrete slab on metal lath forms or steel form units.(^{4,5}) (cont.)</td>
<td>Wood-fibered gypsum plaster mixed 1:1 by weight gypsum to sand aggregate applied over metal lath. Lath tied 6&quot; (153 mm) on center to (\frac{3}{4})&quot; (19 mm) channels spaced (13\frac{1}{2})&quot; (343 mm) on center. Channels secured to joists at each intersection with two strands of 0.049 inch (1.24 mm) (No. 18 B.W. gage) galvanized wire.</td>
<td>6-5.1</td>
<td>2(\frac{1}{2})</td>
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<td>7.</td>
<td>Reinforced concrete slab and joists with hollow clay tile fillers laid end to end in rows (2\frac{1}{2})&quot; (63.5 mm) or more apart; reinforcement placed between rows and concrete cast around and over tile.</td>
<td>7-1.1</td>
<td>(\frac{5}{8}) (15.9 mm) gypsum plaster on bottom of floor or roof construction.</td>
<td>7-1.2</td>
</tr>
<tr>
<td>8.</td>
<td>Steel joists constructed with a reinforced concrete slab on top poured on a (\frac{1}{2})&quot; (13 mm) deep steel deck.(^{5})</td>
<td>8-1.1</td>
<td>Vermiculite gypsum plaster on metal lath attached to (\frac{1}{2})&quot; (19 mm) cold-rolled channels with 0.049 inch (1.24 mm) (No. 18 B.W. gage) wire ties spaced 6&quot; (153 mm) on center.</td>
<td>8-1.2</td>
</tr>
<tr>
<td>9.</td>
<td>3&quot; (76 mm) deep cellular steel deck with concrete slab on top. Slab thickness measured to top of cells.</td>
<td>9-1.1</td>
<td>Suspended ceiling of vermiculite gypsum plaster base coat and vermiculite acoustical plaster on metal lath attached at 6&quot; (153 mm) intervals to (\frac{1}{2})&quot; (19 mm) cold-rolled channels spaced 12&quot; (305 mm) on center and secured to (1\frac{1}{2})&quot; (38 mm) cold-rolled channels spaced 36&quot; (914 mm) on center with 0.065 inch (1.65 mm) (No. 16 B.W. gage) wire. (1\frac{1}{2})&quot; (38 mm) channels supported by No. 8 gage wire hangers at 36&quot; (914 mm) on center. Beams within envelope and with a (2\frac{1}{2})&quot; (63.5 mm) air space between beam soffit and lath have a 4-hour rating.</td>
<td>9-1.2</td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>FLOOR OR ROOF CONSTRUCTION</th>
<th>ITEM NUMBER</th>
<th>CEILING CONSTRUCTION</th>
<th>THICKNESS OF FLOOR OR ROOF SLAB (inches)</th>
<th>MINIMUM THICKNESS OF CEILING SLAB (inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10. 1 1/2&quot; (38 mm) deep steel roof deck on steel framing. Insulation board, 30 pcf density (480 kg/m³), composed of wood fibers with cement binders of thickness shown bonded to deck with unified asphalt adhesive. Covered with a Class A or B roof covering.</td>
<td>10-1.1</td>
<td>Ceiling of gypsum plaster on metal lath. Lath attached to 5/16&quot; (19 mm) furring channels with 0.049 inch (1.24 mm) (No. 18 B.W. gage) wire ties spaced 6&quot; (153 mm) on center. 3/16&quot; (19 mm) channel saddle-tied to 2&quot; (51 mm) channels with doubled 0.065 inch (1.65 mm) (No. 16 B.W. gage) wire ties. 2&quot; (51 mm) channels spaced 36&quot; (914 mm) on center suspended 2&quot; (51 mm) below steel framing and saddle-tied with 0.165 inch (4.19 mm) (No. 8 B.W. gage) wire. Plaster mixed 1:2 by weight, gypsum to sand aggregate.</td>
<td>1 1/8</td>
<td>1</td>
</tr>
<tr>
<td>11. 1 1/2&quot; (38 mm) deep steel roof deck on steel-framing wood fiber insulation board, 17.5 pcf density (280 kg/m³) on top applied over a 15-lb. (6.8 kg) asphalt-saturated felt. Class A or B roof covering.</td>
<td>11-1.1</td>
<td>Ceiling of gypsum plaster on metal lath. Lath attached to 5/16&quot; (19 mm) furring channels with 0.049 inch (1.24 mm) (No. 18 B.W. gage) wire ties spaced 6&quot; (153 mm) on center. 3/16&quot; (19 mm) channels saddle tied to 2&quot; (51 mm) channels with doubled 0.065 inch (1.65 mm) (No. 16 B.W. gage) wire ties. 2&quot; (51 mm) channels spaced 36&quot; (914 mm) on center suspended 2&quot; (51 mm) below steel framing and saddle tied with 0.165 inch (4.19 mm) (No. 8 B.W. gage) wire. Plaster mixed 1:2 for scratch coat and 1:3 for brown coat, by weight, gypsum to sand aggregate.</td>
<td>1 1/8</td>
<td>1</td>
</tr>
</tbody>
</table>
12. **11/2" (38 mm) deep steel roof deck on steel-framing insulation of rigid board consisting of expanded perlite and fibers impregnated with integral asphalt waterproofing; density 9 to 12 pcf (144 to 192 kg/m³) secured to metal roof deck by 1/2" (13 mm) wide ribbons of waterproof, cold-process liquid adhesive spaced 6" (153 mm) apart. Steel joist or light steel construction with metal roof deck, insulation, and Class A or B built-up roof covering.**

<table>
<thead>
<tr>
<th>12-1.1</th>
<th>Gypsum-vermiculite plaster on metal lath wire tied at 6&quot; (153 mm) intervals to 3/8&quot; (19 mm) furring channels spaced 12&quot; (305 mm) on center and wire tied to 2&quot; (51 mm) runner channels spaced 32&quot; (813 mm) on center. Runners wire tied to bottom chord of steel joists.</th>
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<td>1</td>
<td>1/8</td>
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</table>

13. **Double wood floor over wood joists spaced 16" (406 mm) on center.**

<table>
<thead>
<tr>
<th>13-1.1</th>
<th>Gypsum plaster over 3/16&quot; (9.5 mm) Type X gypsum lath. Lath initially applied with not less than four 1 1/8&quot; (28.6 mm) by No. 13 gage by 19/64&quot; (7.5 mm) head plasterboard blued nails per bearing. Continuous stripping over lath along all joist lines. Stripping consists of 3&quot; (76 mm) wide strips of metal lath attached by 1 1/2&quot; (38 mm) by No. 11 gage by 1/2&quot; (13 mm) head roofing nails spaced 6&quot; (153 mm) on center. Alternate stripping consists of 3&quot; wide 0.049&quot; (76 mm 1.24 mm) diameter wire stripping weighing one pound per sq. yd. (0.38 kg/m²) and attached by No. 16 gage by 1 1/2&quot; by 3/4&quot; (38 mm by 19 mm) crown width staples, spaced 4&quot; (102 mm) on center. Where alternate stripping is used, the lath nailing may consist of two nails at each end and one nail at each intermediate bearing. Plaster mixed 1:2 by weight, gypsum to sand aggregate.</th>
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<td>7/8</td>
<td>7/8</td>
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</table>

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<tr>
<th>FLOOR OR ROOF CONSTRUCTION</th>
<th>ITEM NUMBER</th>
<th>CEILING CONSTRUCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>13. Double wood floor over wood joists spaced 16&quot; (406 mm) on center.</td>
<td>13.1.2</td>
<td>Cement or gypsum plaster on metal lath. Lath fastened with 1 1/2&quot; (38 mm) by No. 11 gage by 7/16&quot; (11.1 mm) head barbed shank roofing nails spaced 5&quot; (127 mm) on center. Plaster mixed 1:2 for scratch coat and 1:3 for brown coat, by weight, cement to sand aggregate.</td>
</tr>
<tr>
<td>13.1.3</td>
<td>Perlite or vermiculite gypsum plaster on metal lath secured to joists with 1 1/2&quot; (38 mm) by No. 11 gage by 7/16&quot; (11.1 mm) head barbed shank roofing nails spaced 5&quot; (127 mm) on center.</td>
<td></td>
</tr>
<tr>
<td>13.1.4</td>
<td>1/2&quot; (12.7 mm) Type X gypsum wallboard3 nailed to joists with 5d common wire nails at 6&quot; (153 mm) on center. End joints of wallboard centered on joists.</td>
<td></td>
</tr>
<tr>
<td>14. Plywood stressed skin panels consisting of 5/8&quot; (15.9 mm) thick interior C-D (exterior glue) top stressed skin on 2&quot; by 6&quot; (51 mm by 153 mm) nominal (minimum) stringers. Adjacent panel edges joined with 8d common wire nails spaced 6&quot; (153 mm) on center. Stringers spaced 12&quot; (305 mm) maximum on center.</td>
<td>14.1.1</td>
<td>1/2&quot; (12.7 mm) thick wood fiberboard weighing 15 to 18 lbs. per cu. ft. (240 to 288 kg/m³) installed with long dimension parallel to stringers or 1/4&quot; (9.5 mm) C-D (exterior glue) plywood glued and/or nailed to stringers. Nailing to be with 5d common or wallboard nails at 12&quot; (305 mm) on center. Second layer of 1/2&quot; (12.7 mm) Type X gypsum wallboard3 applied with long dimension perpendicular to joists and attached with 8d common or wallboard nails at 6&quot; (153 mm) on center at end joints and 8&quot; (203 mm) on center elsewhere. Wallboard joints staggered with respect to fiberboard joints.</td>
</tr>
</tbody>
</table>
15. Vermiculite concrete slab proportioned 1:4 (portland cement to vermiculite aggregate) on a 1\(\frac{1}{2}\)" (38 mm) deep steel deck supported on individually protected steel framing. Maximum span of deck 6' 10" (2083 mm) where deck is less than 0.019 inch (0.48 mm) (No. 26 carbon steel sheet gage) and 8' 0" (2438 mm) where deck is 0.019 inch (0.48 mm) (No. 26 carbon steel sheet gage) or greater. Slab reinforced with 4" by 8" (102 mm by 203 mm) 0.109/0.083 inch (0.277/0.211 mm) (No. 12/14 B.W. gage) welded wire mesh.

16. Perlite concrete slab proportioned 1:6 (portland cement to perlite aggregate) on a 1\(\frac{1}{2}\)" (32 mm) deep steel deck supported on individually protected steel framing. Slab reinforced with 4" by 8" (102 by 203 mm) 0.109/0.083 inch (0.277/0.211 mm) (No. 12/14 B.W. gage) welded wire mesh.

17. Perlite concrete slab proportioned 1:6 (portland cement to perlite aggregate) on a 9/16" (14 mm) deep steel deck supported by steel joists 4' (1219 mm) on center. Class A or B roof covering on top.

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<tbody>
<tr>
<td>15-1.1</td>
<td>None.</td>
<td></td>
<td>310</td>
</tr>
<tr>
<td>16-1.1</td>
<td>None.</td>
<td></td>
<td>31/4</td>
</tr>
<tr>
<td>17-1.1</td>
<td>Perlite gypsum plaster on metal lath wire tied to 3/4&quot; (19 mm) furring channels attached with 0.065 inch (1.65 mm) (No. 16 B.W. gage) wire ties to lower chord of joists.</td>
<td>216</td>
<td>216</td>
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<thead>
<tr>
<th>FLOOR OR ROOF CONSTRUCTION</th>
<th>ITEM NUMBER</th>
<th>CEILING CONSTRUCTION</th>
<th>THICKNESS OF FLOOR OR ROOF SLAB (inches)</th>
<th>MINIMUM THICKNESS OF CEILING SLAB (inches)</th>
<th>× 25.4 for mm</th>
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<tbody>
<tr>
<td>18. Perlite concrete slab proportioned 1:6 (portland cement to perlite aggregate) on 1(\frac{1}{4})&quot; (32 mm) deep steel deck supported on individually protected steel framing. Maximum span of deck 6' 10&quot; (2083 mm) where deck is less than 0.019 inch (0.48 mm) (No. 26 carbon sheet steel gage) and 8' 0&quot; (2438 mm) where deck is 0.019 inch (0.48 mm) (No. 26 carbon sheet steel gage) or greater. Slab reinforced with 0.042 inch (1.07 mm) (No. 19 B.W. gage) hexagonal wire mesh. Class A or B roof covering on top.</td>
<td>18-1.1</td>
<td>None.</td>
<td></td>
<td>2(\frac{1}{4})</td>
<td>16</td>
</tr>
<tr>
<td>19. Floor and beam construction consisting of 3&quot; (76 mm) deep cellular steel floor units mounted on steel members with 1:4 (proportion of portland cement to perlite aggregate) perlite-concrete floor slab on top.</td>
<td>19-1.1</td>
<td>Suspended envelope ceiling of perlite gypsum plaster on metal lath attached to 3(\frac{1}{4})&quot; (19 mm) cold-rolled channels, secured to 1(\frac{1}{2})&quot; (38 mm) cold-rolled channels spaced 42&quot; (1067 mm) on center supported by 0.203 inch (5.16 mm) (No. 6 B.W. gage) wire 36&quot; (914 mm) on center. Beams in envelope with 3&quot; (76 mm) minimum air space between beam soffit and lath have a 4-hour rating.</td>
<td></td>
<td>216</td>
<td>1(\frac{1}{2})</td>
</tr>
</tbody>
</table>
20. Perlite concrete proportioned 1:6 (portland cement to perlite aggregate) poured to 1/8-inch (3 mm) thickness above top of corrugations of 1 1/16-inch-deep (33 mm) galvanized steel deck maximum span 8' 0" (2438 mm) for 0.024 inch (0.61 mm) (No. 24 galvanized sheet gage) or 6' 0" (1829 mm) for 0.019 inch (0.48 mm) (No. 26 galvanized sheet gage) with deck supported by individually protected steel framing. Approved polystyrene foam plastic insulation board having a flame spread not exceeding 75 [1" to 4"
(25 mm to 102 mm) thickness with vent holes which approximate 3 percent of the board surface area] placed on top of perlite slurry. A 2' by 4' (610 mm by 1219 mm) insulation board contains six 2 3/4" (70 mm) diameter holes. Board covered with 2 3/4" (57 mm) minimum perlite concrete slab. Slab reinforced with mesh consisting of 0.042 inch (1.07 mm) (No. 19 B.W. gage) galvanized steel wire twisted together to form 2" (51 mm) hexagons with straight 0.065 inch (1.65 mm) (No. 16 B.W. gage) galvanized steel wire woven into mesh and spaced 3" (76 mm). Alternate slab reinforcement may consist of 4" by 8" (102 mm by 203 mm), 0.109/0.238 inch (2.77/6.05 mm) (No. 12/4 B.W. gage), or 2" by 2" (51 mm by 51 mm), 0.083/0.083 inch (2.11/2.11 mm) (No. 14/14 B.W. gage) welded wire fabric. Class A or B roof covering on top.
<table>
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<tr>
<th>FLOOR OR ROOF CONSTRUCTION</th>
<th>ITEM NUMBER</th>
<th>CEILING CONSTRUCTION</th>
<th>THICKNESS OF FLOOR OR ROOF SLAB (INCHES)</th>
<th>MINIMUM THICKNESS OF CEILING (INCHES)</th>
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<tbody>
<tr>
<td>21. Wood joist, floor trusses and roof trusses spaced 24&quot; (610 mm) o.c. with 1/2&quot; (12.7 mm) wood structural panels with exterior glue applied at right angles to top of joist or truss with 8d nails. The wood structural panel thickness shall not be less than 1/2&quot; (12.7 mm) nor less than required by Chapter 23.</td>
<td>21-1.1</td>
<td>Base layer 5/8&quot; (15.9 mm) Type X gypsum wallboard applied at right angles to joist or truss 24&quot; (610 mm) o.c. with 1 1/4&quot; (32 mm) Type S or Type W drywall screws 24&quot; (610 mm) o.c. Face layer 5/8&quot; (15.9 mm) Type X gypsum wallboard or veneer base applied at right angles to joist or truss through base layer with 1 1/4&quot; (38 mm) Type S or Type W drywall screws 12&quot; (305 mm) o.c. at joints and intermediate joist or truss. Face layer joints offset 24&quot; (610 mm) from base layer joints, 1 1/2&quot; (38 mm) Type G drywall screws placed 2&quot; (51 mm) back on either side of face layer end joints, 12&quot; (305 mm) o.c.</td>
<td>4 Hr.</td>
<td>3 Hr.</td>
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4 Generic fire-resistance ratings (those not designated as PROPRIETARY* in the listing) in the Fire-Resistance Design Manual, Thirteenth Edition, dated April 1992, as published by the Gypsum Association, may be accepted as if herein listed.

1 Staples with equivalent holding power and penetration may be used as alternate fasteners to nails for attachment to wood framing.

2 When the slab is in an unrestrained condition, minimum reinforcement cover shall not be less than 1/8 inches (41 mm) for four-hour (siliceous aggregate only); 1 1/4 inches (32 mm) for four- and three-hour; 1 inch (25 mm) for all other restrained and unrestrained conditions.

3 For all of the construction with gypsum wallboard described in Table 7-C, gypsum base for veneer plaster of the same size, thickness and core type may be substituted for gypsum wallboard, provided attachment is identical to that specified for the wallboard, and the joints on the face layer are reinforced and the entire surface is covered with a minimum of 1/16-inch (1.6 mm) gypsum veneer plaster.

4 Slab thickness over steel joists measured at the joists for metal lath form and at the top of the form for steel form units.

5(a) The maximum allowable stress level for H-Series joists shall not exceed 22,000 pounds per square inch (psi) (152 MPa).

(b) The allowable stress for K-Series joists shall not exceed 26,000 psi (179 MPa), the nominal depth of such joist shall not be less than 10 inches (254 mm) and the nominal joist weight shall not be less than 5 pounds per lineal foot (7.4 kg/m).

6 Gypsum wallboard ceilings attached to steel framing may be suspended with 1 1/2-inch (38 mm) cold-formed carrying channels spaced 48 inches (1219 mm) on center which are suspended with No. 8 SWG galvanized wire hangers spaced 48 inches (1219 mm) on center. Cross-furring channels are tied to the carrying channels with No. 8 SWG galvanized wire (double strand) and spaced as required for direct attachment to the framing. This alternative is also applicable to those steel framing assemblies recognized under Footnote a.

7 Six-inch (152 mm) hollow clay tile with 2-inch (51 mm) concrete slab above.

8 Four-inch (102 mm) hollow clay tile with 1 1/2-inch (38 mm) concrete slab above.

9 Thickness measured to bottom of steel form units.

10 Five-eighths inch (15.9 mm) of vermiculite gypsum plaster plus 1/2 inch (13 mm) of approved vermiculite acoustical plastic.

12 Slab thickness over steel joists measured at the joists for metal lath form and at the top of the form for steel form units.

15 1/2-inch (30 mm) of approved vermiculite acoustical plastic. 16 Five-eighths inch (15.9 mm) of vermiculite gypsum plaster plus 1/2 inch (13 mm) of approved vermiculite acoustical plastic.
Double wood floor may be either of the following:

(a) Subfloor of 1-inch (25 mm) nominal boarding, a layer of asbestos paper weighing not less than 14 pounds per 100 square feet (0.7 kg/m²) and a layer of 1-inch (25 mm) nominal tongue-and-groove finish flooring; or

(b) Subfloor of 1-inch (25 mm) nominal tongue-and-groove boarding or 15/32-inch (11.9 mm) wood structural panels with exterior glue and a layer of 1-inch (25 mm) nominal tongue-and-groove finish flooring or 15/32-inch (15.1 mm) wood structural panel finish flooring or a layer of Type I Grade M-1 particleboard not less than 3/8 inch (15.9 mm) thick.

14 The ceiling may be omitted over unusable space, and flooring may be omitted where unusable space occurs above.

15 For properties of cooler or wallboard nails, see approved national standards.

16 Thickness measured on top of steel deck unit.
SECTION 801 — GENERAL

801.1 Scope. Interior wall and ceiling finish shall mean interior wainscoting, paneling or other finish applied structurally or for decoration, acoustical correction, surface insulation, sanitation or similar purposes. Requirements for finishes in this chapter shall not apply to trim defined as picture molds, chair rails, baseboards and handrails; to doors and windows or their frames; or to materials which are less than 1/8 inch (0.9 mm) in thickness applied directly to the surface of walls or ceilings, if these materials have surface-burning characteristics no greater than paper of this thickness applied directly to a noncombustible backing in the same manner.

Foam plastics shall not be used as interior finish except as provided in Section 602. For foam plastic trim, see Section 601.5.5.

See Section 1403 for veneer.

801.2 Standards of Quality. The standards listed below labeled a “U.B.C. standard” are also listed in Chapter 35, Part II, and are part of this code.


801.3 Veneer. Veneers shall comply with Section 1403.

SECTION 802 — TESTING AND CLASSIFICATION OF MATERIALS

802.1 Testing. Tests shall be made by an approved testing agency to establish surface-burning characteristics and to show that materials when cemented or otherwise fastened in place will not readily become detached when subjected to room temperatures of 300°F (149°C.) for 25 minutes. Surface-burning characteristics shall be determined by one of the following methods:

1. The surface-burning characteristics as set forth in U.B.C. Standard 8-1.
2. Any other recognized method of test procedure for determining the surface-burning characteristics of finish materials that will give comparable results to those specified in method Item 1 above.

802.2 Classification. The classes of materials based on their flame-spread index shall be as set forth in Table 8-A. The smoke density shall be no greater than 450 when tested in accordance with U.B.C. Standard 8-1 in the way intended for use.

SECTION 803 — APPLICATION OF CONTROLLED INTERIOR FINISH

Interior finish materials applied to walls and ceilings shall be tested as specified in Section 802 and regulated for purposes of limiting surface-burning by the following provisions:

1. When walls and ceilings are required by any provision in this code to be of fire-resistive or noncombustible construction, the finish material shall be applied directly against such fire-resistive or noncombustible construction or to furring strips not exceeding 1 3/4 inches (44 mm) applied directly against such surfaces. The intervening spaces between such furring strips shall be filled with inorganic or Class I material or shall be fire blocked not to exceed 8 feet (2438 mm) in any direction. See Section 708 for fire blocking.
2. Where walls and ceilings are required to be of fire-resistive or noncombustible construction and walls are set out or ceilings are dropped distances greater than specified in paragraph 1 of this section, Class I finish materials shall be used except where the finish materials are protected on both sides by automatic sprinkler systems or are attached to a noncombustible backing or to furring strips installed as specified in paragraph 1. The hangers and assembly members of such dropped ceilings that are below the main ceiling line shall be of noncombustible materials except that in Type III and Type V construction, fire-retardant-treated wood may be used. The construction of each set-out wall shall be of fire-resistant construction as required elsewhere in this code. See Section 708 for fire blocks and draft stops.

3. Wall and ceiling finish materials of all classes as permitted in this chapter may be installed directly against the wood decking or planking of Type IV heavy-timber construction, or to wood furring strips applied directly to the wood decking or planking installed and fire blocked as specified in Item 1.

4. An interior wall or ceiling finish that is not more than 1/4 inch (6.4 mm) thick shall be applied directly against a noncombustible backing.

**EXCEPTIONS:**
1. Class I materials.
2. Materials where the qualifying tests were made with the material suspended or furred out from the noncombustible backing.

**SECTION 804 — MAXIMUM ALLOWABLE FLAME SPREAD**

804.1 General. The maximum flame-spread class of finish materials used on interior walls and ceilings shall not exceed that set forth in Table 8-B.

**EXCEPTIONS:**
1. Except in Group I Occupancies and in enclosed vertical exits, Class III may be used in other exits and rooms as wainscoting extending not more than 48 inches (1219 mm) above the floor and for tack and bulletin boards covering not more than 5 percent of the gross wall area of the room.
2. When a sprinkler system complying with U.B.C. Standard 9-1 or 9-3 is provided, the flame-spread classification rating may be reduced one classification, but in no case shall materials having a classification greater than Class III be used.
3. The exposed faces of Type IV-H.T., structural members and Type IV-H.T., decking and planking, where otherwise permissible under this code, are excluded from flame-spread requirements.

804.2 Carpeting on Ceilings. When used as interior ceiling finish, carpeting and similar materials having a napped, tufted, looped or similar surface shall have a Class I flame spread.

**SECTION 805 — TEXTILE WALL COVERINGS**

When used as interior wall finish, textile wall coverings, including materials such as those having a napped, tufted, looped, nonwoven, woven or similar surface shall comply with the following:

1. Textile wall coverings shall have a Class I flame spread and shall be protected by automatic sprinklers complying with U.B.C. Standard 9-1 or 9-3, or
2. The textile wall covering shall meet the acceptance criteria of U.B.C. Standard 8-2 when tested using a product mounting system, including adhesive, representative of actual use.

**SECTION 806 — INSULATION**

Thermal and acoustical insulation installed on walls or ceilings shall comply with Section 707.

**SECTION 807 — SANITATION**

807.1 Floors and Walls in Water Closet Compartment and Showers.
807.1.1 Floors. In other than dwelling units, toilet room floors shall have a smooth, hard nonabsorbent surface such as portland cement, concrete, ceramic tile or other approved material which extends upward onto the walls at least 5 inches (127 mm).

807.1.2 Walls. Walls within 2 feet (610 mm) of the front and sides of urinals and water closets shall have a smooth, hard nonabsorbent surface of portland cement, concrete, ceramic tile or other smooth, hard nonabsorbent surface to a height of 4 feet (1219 mm), and except for structural elements, the materials used in such walls shall be of a type which is not adversely affected by moisture. See Section 2512 for other limitations.

EXCEPTIONS: 1. Dwelling units and guest rooms.
   2. Toilet rooms which are not accessible to the public and which have not more than one water closet.

In all occupancies, accessories such as grab bars, towel bars, paper dispensers and soap dishes, provided on or within walls, shall be installed and sealed to protect structural elements from moisture.

807.1.3 Showers. Showers in all occupancies shall be finished as specified in Sections 807.1.1 and 807.1.2 to a height of not less than 70 inches (1778 mm) above the drain inlet. Materials other than structural elements used in such walls shall be of a type which is not adversely affected by moisture. See Section 2512 for other limitations.

807.1.4 Shower doors. For shower doors, see Sections 2406.4 and 2407.

807.2 Water Closet Room Separation. See Section 302.6 for requirements to separate water closet rooms.

### TABLE 8-A—FLAME-SPREAD CLASSIFICATION

<table>
<thead>
<tr>
<th>Class</th>
<th>Flame-spread Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>0-25</td>
</tr>
<tr>
<td>II</td>
<td>26-75</td>
</tr>
<tr>
<td>III</td>
<td>76-200</td>
</tr>
</tbody>
</table>

### TABLE 8-B—MAXIMUM FLAME-SPREAD CLASS

<table>
<thead>
<tr>
<th>OCCUPANCY GROUP</th>
<th>ENCLOSED VERTICAL EXITWAYS</th>
<th>OTHER EXITWAYS</th>
<th>ROOMS OR AREAS</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>I</td>
<td>II</td>
<td>II^3</td>
</tr>
<tr>
<td>E</td>
<td>I</td>
<td>II</td>
<td>III</td>
</tr>
<tr>
<td>I</td>
<td>I</td>
<td>I^4</td>
<td>II^5</td>
</tr>
<tr>
<td>H</td>
<td>I</td>
<td>II</td>
<td>III^6</td>
</tr>
<tr>
<td>B, F, M and S</td>
<td>I</td>
<td>II</td>
<td>III</td>
</tr>
<tr>
<td>R-1</td>
<td>I</td>
<td>II</td>
<td>III</td>
</tr>
<tr>
<td>R-3</td>
<td>III</td>
<td>III</td>
<td>III^7</td>
</tr>
</tbody>
</table>

U NO RESTRICTIONS

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1 Flame-plastics shall comply with the requirements specified in Section 2602. Carpeting on ceilings and textile wall coverings shall comply with the requirements specified in Sections 804.2 and 805, respectively.
2 Finish classification is not applicable to interior walls and ceilings of exterior exit balconies.
3 In Group A, Divisions 3 and 4 Occupancies, Class III may be used.
4 In Group I, Divisions 2 and 3 Occupancies, Class II may be used or Class III when the Division 2 or 3 is sprinkled.
5 In rooms in which personal liberties of inmates are forcibly restrained, Class I material only shall be used.
6 Over two stories shall be of Class II.
7 Flame-spread provisions are not applicable to kitchens and bathrooms of Group R, Division 3 Occupancies.
Chapter 9
FIRE-PROTECTION SYSTEMS

SECTION 901 — SCOPE
This chapter applies to the design and installation of fire-extinguishing systems, smoke-control systems and smoke and heat venting systems.

For requirements on fire alarm systems, see the following:

SECTION SUBJECT
303.9 Group A, Divisions 1 and 2 Occupancies
305.2.3, 305.9 Group E Occupancies
307.9 Group H Occupancies
308.9 Group I Occupancies
310.10 Group R Occupancies
403.5 High-rise buildings
408.5 Amusement buildings
307.11.5.5 Group H, Division 6 Occupancies

For smoke detectors in Group R Occupancies, see Section 310.9.

SECTION 902 — STANDARDS OF QUALITY
Fire-extinguishing systems, including automatic sprinkler systems, Class I, Class II and Class III standpipe systems, special automatic extinguishing systems, basement pipe inlets, smoke-control systems, and smoke and heat vents shall be approved and shall be subject to such periodic tests as may be required.

The standards listed below labeled a "U.B.C. standard" are also listed in Chapter 35, Part II, and are part of this code. The other standards listed below are recognized standards (see Sections 3502 and 3503).

1. Fire-extinguishing system.
   1.1 U.B.C. Standard 9-1, Installation of Sprinkler Systems
   1.2 U.B.C. Standard 9-3, Installation of Sprinkler Systems in Group R Occupancies Four Stories or Less
2. Standpipe systems.
   U.B.C. Standard 9-2, Standpipe Systems
3. Smoke control.
   3.1 U.B.C. Standard 7-2, Fire Tests of Door Assemblies
   3.2 UL 555, Fire Dampers
   3.3 UL 555C, Ceiling Dampers
   3.4 UL 555S, Leakage Rated Dampers for Use in Smoke Control Systems
   3.5 UL 33, Heat Response Links for Fire Protection Service
   3.6 UL 353, Limit Controls
4. Smoke and heat vents.
   U.B.C. Standard 15-7, Automatic Smoke and Heat Vents

SECTION 903 — DEFINITIONS
For the purpose of this chapter, certain terms are defined as follows:
AUTOMATIC FIRE-EXTINGUISHING SYSTEM is an approved system of devices and equipment which automatically detects a fire and discharges an approved fire-extinguishing agent onto or in the area of a fire.

FIRE DEPARTMENT INLET CONNECTION is a connection through which the fire department can pump water into a standpipe system, or sprinkler system.

PRESSURIZATION is the creation and maintenance of pressure levels in zones of a building, including elevator shafts and stairwells that are higher than the pressure level at the smoke source, such pressure levels being produced by positive pressures of a supply of uncontaminated air, by exhausting air and smoke at the smoke source, or by a combination of these methods.

PRESSURIZED STAIRWAY ENCLOSURE is a type of smoke-control system in which stairway enclosures are mechanically pressurized to minimize smoke contamination of them during a fire incident.

SMOKE is the airborne solid and liquid particulates and gases evolved when a material undergoes pyrolysis or combustion, including the quantity of air that is entrained or otherwise mixed into the mass.

SMOKE BARRIER is a continuous membrane, either vertical or horizontal, such as a wall, floor or ceiling assembly that is designed and constructed to restrict the movement of smoke.

SMOKE-CONTROL MODE is a predefined operational configuration of a system or device for the purpose of smoke control.

SMOKE-CONTROL SYSTEM, MECHANICAL, is an engineered system that uses mechanical fans to produce pressure differences across smoke barriers or establish airflows to limit and direct smoke movement.

SMOKE-CONTROL SYSTEM, PASSIVE, is a system of smoke barriers arranged to limit the migration of smoke.

SMOKE-CONTROL ZONE is a space within a building enclosed by smoke barriers.

SMOKE DAMPER is a device that meets the requirements of approved recognized standards, and is designed to resist the passage of air or smoke. A combination fire and smoke damper shall meet the requirements of approved recognized standards. See Chapter 35, Part III.

SMOKE EXHAUST SYSTEM is a mechanical or gravity system intended to move smoke from the smoke zone to the exterior of the building, including smoke removal, purging and ventilating systems, as well as the function of exhaust fans utilized to reduce the pressure in a smoke zone.

STACK EFFECT is the vertical airflow within buildings caused by temperature differences.

STANDPIPE SYSTEM is a wet or dry system of piping, valves, outlets and related equipment designed to provide water at specified pressures and installed exclusively for the fighting of fires, including the following:

Class I is a standpipe system equipped with 21/2-inch (63.5 mm) outlets.

Class II is a standpipe system directly connected to a water supply and equipped with 11/2-inch (38.1 mm) outlets and hose.

Class III is a standpipe system directly connected to a water supply and equipped with 21/2-inch (63.5 mm) outlets or 21/2-inch (63.5 mm) and 11/2-inch (38.1 mm) outlets when a 11/2-inch (38.1 mm) hose is required. Hose connections for Class III systems may be made through 21/2-inch (63.5 mm) hose valves with easily removable 21/2-inch by 11/2-inch (63.5 mm by 38.1 mm) reducers.

TENABLE ENVIRONMENT is an environment in which the quantity and location of smoke is limited or otherwise restricted to allow for ready evacuation through the space.

ZONED SMOKE CONTROL is a smoke-control system utilizing pressure differences between adjacent smoke-control zones.
SECTION 904 — FIRE-EXTINGUISHING SYSTEMS

904.1 Installation Requirements.

904.1.1 General. Fire-extinguishing systems required in this code shall be installed in accordance with the requirements of this section.

Fire hose threads used in connection with fire-extinguishing systems shall be national standard hose thread or as approved by the fire department.

The location of fire department hose connections shall be approved by the fire department.

In buildings used for high-piled combustible storage, fire protection shall be in accordance with the Fire Code.

904.1.2 Standards. Fire-extinguishing systems shall comply with U.B.C. Standards 9-1 and 9-2.

EXCEPTIONS: 1. Automatic fire-extinguishing systems not covered by U.B.C. Standard 9-1 or 9-2 shall be approved and installed in accordance with approved standards.

2. Automatic sprinkler systems may be connected to the domestic water-supply main when approved by the building official, provided the domestic water supply is of adequate pressure, capacity and sizing for the combined domestic and sprinkler requirements. In such case, the sprinkler system connection shall be made between the public water main or meter and the building shutoff valve, and there shall not be intervening valves or connections. The fire department connection may be omitted when approved by the fire department.

3. Automatic sprinkler systems in Group R Occupancies four stories or less may be in accordance with U.B.C. Standard 9-3.

904.1.3 Modifications. When residential sprinkler systems as set forth in U.B.C. Standard 9-3 are provided, exceptions to, or reductions in, code requirements based on the installation of an automatic fire-extinguishing system are not allowed.

904.2 Automatic Fire-extinguishing Systems.

904.2.1 Where required. An automatic fire-extinguishing system shall be installed in the occupancies and locations as set forth in this section.

For provisions on special hazards and hazardous materials, see the Fire Code.

904.2.2 All occupancies except Group R, Division 3 and Group U Occupancies. Except for Group R, Division 3 and Group U Occupancies, an automatic sprinkler system shall be installed:

1. In every story or basement of all buildings when the floor area exceeds 1,500 square feet (139.4 m²) and there is not provided at least 20 square feet (1.86 m²) of opening entirely above the adjoining ground level in each 50 lineal feet (15 240 mm) or fraction thereof of exterior wall in the story or basement on at least one side of the building. Openings shall have a minimum dimension of not less than 30 inches (762 mm). Such openings shall be accessible to the fire department from the exterior and shall not be obstructed in a manner that firefighting or rescue cannot be accomplished from the exterior.

When openings in a story are provided on only one side and the opposite wall of such story is more than 75 feet (22 860 mm) from such openings, the story shall be provided with an approved automatic sprinkler system, or openings as specified above shall be provided on at least two sides of an exterior wall of the story.

If any portion of a basement is located more than 75 feet (22 860 mm) from openings required in this section, the basement shall be provided with an approved automatic sprinkler system.

2. At the top of rubbish and linen chutes and in their terminal rooms. Chutes extending through three or more floors shall have additional sprinkler heads installed within such chutes at alternate floors. Sprinkler heads shall be accessible for servicing.

3. In rooms where nitrate film is stored or handled.

4. In protected combustible fiber storage vaults as defined in the Fire Code.
5. Throughout all buildings with a floor level with an occupant load of 30 or more that is located 55 feet (16,764 mm) or more above the lowest level of fire department vehicle access.

**EXCEPTION:**
1. Airport control towers.
2. Open parking structures.
3. Group F, Division 2 Occupancies.

### 904.2.3 Group A Occupancies.

#### 904.2.3.1 Drinking establishments
An automatic sprinkler system shall be installed in rooms used by the occupants for the consumption of alcoholic beverages and unseparated accessory uses where the total area of such unseparated rooms and assembly uses exceeds 5,000 square feet (465 m²). For uses to be considered as separated, the separation shall not be less than as required for a one-hour occupancy separation. The area of other uses shall be included unless separated by at least a one-hour occupancy separation.

#### 904.2.3.2 Basements
An automatic sprinkler system shall be installed in basements classified as a Group A Occupancy when the basement is larger than 1,500 square feet (139.4 m²) in floor area.

#### 904.2.3.3 Exhibition and display rooms
An automatic sprinkler system shall be installed in Group A Occupancies which have more than 12,000 square feet (1115 m²) of floor area which can be used for exhibition or display purposes.

#### 904.2.3.4 Stairs
An automatic sprinkler system shall be installed in enclosed usable space below or over a stairway in Group A, Divisions 2, 2.1, 3 and 4 Occupancies. See Section 1009.6.

#### 904.2.3.5 Multitheater complexes
An automatic sprinkler system shall be installed in every building containing a multitheater complex.

#### 904.2.3.6 Amusement buildings
An automatic sprinkler system shall be installed in all amusement buildings. The main water-flow switch shall be electrically supervised. The sprinkler main cutoff valve shall be supervised. When the amusement building is temporary, the sprinkler water-supply system may be of an approved temporary type.

**EXCEPTION:** An automatic sprinkler system need not be provided when the floor area of a temporary amusement building is less than 1,000 square feet (92.9 m²) and the exit travel distance from any point is less than 50 feet (15 240 mm).

#### 904.2.3.7 Stages
All stages shall be provided with an automatic sprinkler system. Such sprinklers shall be provided throughout the stage and in dressing rooms, workshops, storerooms and other accessory spaces contiguous to such stages.

**EXCEPTIONS:**
1. Sprinklers are not required for stages 1,000 square feet (92.9 m²) or less in area and 50 feet (15 240 mm) or less in height where curtains, scenery or other combustible hangings are not retractable vertically. Combustible hangings shall be limited to a single main curtain, borders, legs and a single backdrop.
2. Under stage areas less than 4 feet (1.219 m) in clear height used exclusively for chair or table storage and lined on the inside with 1/8-inch (16 mm) Type X gypsum wallboard or an approved equal.

### 904.2.4 Group E Occupancies.

#### 904.2.4.1 General
An automatic fire sprinkler system shall be installed throughout all buildings containing a Group E, Division 1 Occupancy.

**EXCEPTIONS:**
1. When each room used for instruction has at least one exit door directly to the exterior at ground level and when rooms used for assembly purposes have at least one half of the required exits directly to the exterior ground level, a sprinkler system need not be provided.
2. When area separation walls, or occupancy separations having a fire-resistive rating of not less than two hours subdivide the building into separate compartments such that each compartment contains an aggregate floor area not greater than 20,000 square feet (1858 m²), an automatic sprinkler system need not be provided.

#### 904.2.4.2 Basements
An automatic sprinkler system shall be installed in basements classified as Group E, Division 1 Occupancies.
904.2.4.3 Stairs. An automatic sprinkler system shall be installed in enclosed usable space below or over a stairway in Group E, Division 1 Occupancies. See Section 1009.6.

904.2.5 Group H Occupancies.

904.2.5.1 General. An automatic fire-extinguishing system shall be installed in Group H, Divisions 1, 2, 3 and 7 Occupancies.

904.2.5.2 Group H, Division 4 Occupancies. An automatic fire-extinguishing system shall be installed in Group H, Division 4 Occupancies having a floor area of more than 3,000 square feet (279 m²).

904.2.5.3 Group H, Division 6 Occupancies. An automatic fire-extinguishing system shall be installed throughout buildings containing Group H, Division 6 Occupancies. The design of the sprinkler system shall not be less than that required under U.B.C. Standard 9-1 for the occupancy hazard classifications as follows:

<table>
<thead>
<tr>
<th>LOCATION</th>
<th>OCCUPANCY HAZARD CLASSIFICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fabrication areas</td>
<td>Ordinary Hazard Group 2</td>
</tr>
<tr>
<td>Service corridors</td>
<td>Ordinary Hazard Group 2</td>
</tr>
<tr>
<td>Storage rooms without dispensing</td>
<td>Ordinary Hazard Group 2</td>
</tr>
<tr>
<td>Storage rooms with dispensing</td>
<td>Extra Hazard Group 2</td>
</tr>
<tr>
<td>Exit corridors</td>
<td>Ordinary Hazard Group 2</td>
</tr>
</tbody>
</table>

1When the design area of the sprinkler system consists of a corridor protected by one row of sprinklers, the maximum number of sprinklers that needs to be calculated is 13.

904.2.6 Group I Occupancies. An automatic sprinkler system shall be installed in Group I Occupancies.

EXCEPTION: In jails, prisons and reformatories, the piping system may be dry, provided a manually operated valve is installed at a continuously monitored location. Opening of the valve will cause the piping system to be charged. Sprinkler heads in such systems shall be equipped with fusible elements or the system shall be designed as required for deluge systems in U.B.C. Standard 9-1.

904.2.7 Group M Occupancies. An automatic sprinkler system shall be installed in retail sales rooms classed as Group M Occupancies where the floor area exceeds 12,000 square feet (1115 m²) on any floor or 24,000 square feet (2230 m²) on all floors or in Group M retail sales occupancies more than three stories in height. The area of mezzanines shall be included in determining the areas where sprinklers are required.

904.2.8 Group R, Division 1 Occupancies. An automatic sprinkler system shall be installed throughout every apartment house three or more stories in height or containing 16 or more dwelling units, every congregate residence three or more stories in height or having an occupant load of 20 or more, and every hotel three or more stories in height or containing 20 or more guest rooms. Residential or quick-response standard sprinklers shall be used in the dwelling units and guest room portions of the building.

904.3 Sprinkler System Monitoring and Alarms.

904.3.1 Where required. All valves controlling the water supply for automatic sprinkler systems and water-flow switches on all sprinkler systems shall be electrically monitored where the number of sprinklers are:

1. Twenty or more in Group I, Divisions 1.1 and 1.2 Occupancies.
2. One hundred or more in all other occupancies.

Valve monitoring and water-flow alarm and trouble signals shall be distinctly different and shall be automatically transmitted to an approved central station, remote station or proprietary monitor-
ing station as defined by national standards, or, when approved by the building official with the concurrence of the chief of the fire department, sound an audible signal at a constantly attended location.

**EXCEPTION:** Underground key or hub valves in roadway boxes provided by the municipality or public utility need not be monitored.

**904.3.2 Alarms.** An approved audible sprinkler flow alarm shall be provided on the exterior of the building in an approved location. An approved audible sprinkler flow alarm to alert the occupants shall be provided in the interior of the building in a normally occupied location. Actuation of the alarm shall be as set forth in U.B.C. Standard 9-1.

**904.4 Permissible Sprinkler Omissions.** Subject to the approval of the building official and with the concurrence of the chief of the fire department, sprinklers may be omitted in rooms or areas as follows:

1. When sprinklers are considered undesirable because of the nature of the contents or in rooms or areas which are of noncombustible construction with wholly noncombustible contents and which are not exposed by other areas. Sprinklers shall not be omitted from any room merely because it is damp, of fire-resistant construction or contains electrical equipment.

2. Sprinklers shall not be installed when the application of water or flame and water to the contents may constitute a serious life or fire hazard, as in the manufacture or storage of quantities of aluminum powder, calcium carbide, calcium phosphide, metallic sodium and potassium, quicklime, magnesium powder and sodium peroxide.

3. Safe deposit or other vaults of fire-resistant construction, when used for the storage of records, files and other documents, when stored in metal cabinets.

4. Communication equipment areas under the exclusive control of a public communication utility agency, provided:

   4.1 The equipment areas are separated from the remainder of the building by one-hour fire-resistant occupancy separation; and

   4.2 Such areas are used exclusively for such equipment; and

   4.3 An approved automatic smoke-detection system is installed in such areas and is supervised by an approved central, proprietary or remote station service or a local alarm which will give an audible signal at a constantly attended location; and

   4.4 Other approved fire-protection equipment such as portable fire extinguishers or Class II standpipes are installed in such areas.

5. Other approved automatic fire-extinguishing systems may be installed to protect special hazards or occupancies in lieu of automatic sprinklers.

**904.5 Standpipes.**

**904.5.1 General.** Standpipes shall comply with the requirements of this section and U.B.C. Standard 9-2.

**904.5.2 Where required.** Standpipe systems shall be provided as set forth in Table 9-A.

**904.5.3 Location of Class I standpipes.** There shall be a Class I standpipe outlet connection at every floor-level landing of every required stairway above or below grade and on each side of the wall adjacent to the exit opening of a horizontal exit. Outlets at stairways shall be located within the exit enclosure or, in the case of pressurized enclosures, within the vestibule or exterior balcony, giving access to the stairway.

Risers and laterals of Class I standpipe systems not located within an enclosed stairway or pressurized enclosure shall be protected by a degree of fire resistance equal to that required for vertical enclosures in the building in which they are located.

1–158
EXCEPTION: In buildings equipped with an approved automatic sprinkler system, risers and laterals which are not located within an enclosed stairway or pressurized enclosure need not be enclosed within fire-resistant construction.

There shall be at least one outlet above the roof line when the roof has a slope of less than 4 units vertical in 12 units horizontal (33.3% slope).

In buildings where more than one standpipe is provided, the standpipes shall be interconnected at the bottom.

904.5.4 Location of Class II standpipes. Class II standpipe outlets shall be accessible and shall be located so that all portions of the building are within 30 feet (9144 mm) of a nozzle attached to 100 feet (30 480 mm) of hose.

In Group A, Divisions 1 and 2.1 Occupancies, with occupant loads of more than 1,000, outlets shall be located on each side of any stage, on each side of the rear of the auditorium and on each side of the balcony.

Fire-resistant protection of risers and laterals of Class II standpipe systems is not required.

904.5.5 Location of Class III standpipes. Class III standpipe systems shall have outlets located as required for Class I standpipes in Section 904.5.3 and shall have Class II outlets as required in Section 904.5.4.

Risers and laterals of Class III standpipe systems shall be protected as required for Class I systems.

EXCEPTIONS: 1. In buildings equipped with an approved automatic sprinkler system, risers and laterals which are not located within an enclosed stairway or pressurized enclosure need not be enclosed within fire-resistant construction.

2. Laterals for Class II outlets on Class III systems need not be protected.

In buildings where more than one Class III standpipe is provided, the standpipes shall be interconnected at the bottom.

904.6 Buildings under Construction.

904.6.1 General. During the construction of a building and until the permanent fire-extinguishing system has been installed and is in service, fire protection shall be provided in accordance with this section.

904.6.2 Where required. Every building four stories or more in height shall be provided with not less than one standpipe for use during construction. Such standpipes shall be installed when the progress of construction is not more than 35 feet (10 668 mm) in height above the lowest level of fire department access. Such standpipe shall be provided with fire department hose connections at accessible locations adjacent to usable stairs and the standpipe outlets shall be located adjacent to such usable stairs. Such standpipe systems shall be extended as construction progresses to within one floor of the highest point of construction having secured decking or flooring.

In each floor there shall be provided a 2 1/2-inch (63.5 mm) valve outlet for fire department use. Where construction height requires installation of a Class III standpipe, fire pumps and water main connections shall be provided to serve the standpipe.

904.6.3 Temporary standpipes. Temporary standpipes may be provided in place of permanent systems if they are designed to furnish a minimum of 500 gallons (1893 L) of water per minute at 50 pounds per square inch (345 kPa) pressure with a standpipe size of not less than 4 inches (102 mm). All outlets shall not be less than 2 1/2 inches (63.5 mm). Pumping equipment sufficient to provide this pressure and volume shall be available at all times when a Class III standpipe system is required.

904.6.4 Detailed requirements. Standpipe systems for buildings under construction shall be installed as required for permanent standpipe systems.
SECTION 905 — SMOKE CONTROL

905.1 Scope and Purpose. This section applies to mechanical or passive smoke-control systems when they are required by other provisions of this code. The purpose of this section is to establish minimum requirements for the design, installation and acceptance testing of smoke-control systems which are intended to provide a tenable environment for the evacuation or relocation of occupants. These provisions are not intended for the preservation of contents or for assistance in fire-suppression or overhaul activities. Smoke-control systems need not comply with the requirements of Section 609 in the Mechanical Code unless their normal use would otherwise require compliance. Nothing within these requirements is intended to apply when smoke control is not otherwise required by this code. Smoke-control systems are not a substitute for sprinkler protection.

905.2 Design Methods.

905.2.1 General. Buildings or portions thereof required by this code to have a smoke-control system shall have such systems designed in accordance with the requirements of this section.

EXCEPTION: Smoke and heat venting required by Section 906.

905.2.2 Rationality.

905.2.2.1 General. Systems or methods of construction to be used in smoke control shall be based on a rational analysis in accordance with well-established principles of engineering. The analysis shall include, but not be limited by, Sections 905.2.2.2 through 905.2.2.6 below.

905.2.2.2 Stack effect. The system shall be designed such that the maximum probable normal or reverse stack effects will not adversely interfere with the system's capabilities. In determining the maximum probable stack effects, altitude, elevation, weather history and interior temperatures shall be used.

905.2.2.3 Temperature effect of fire. Buoyancy and expansion caused by the design fire (Section 905.6) shall be analyzed. The system shall be designed such that these effects do not adversely interfere with the system's capabilities.

905.2.2.4 Wind effect. The design shall consider the adverse effects of wind. Such consideration shall be consistent with the requirements of Chapter 16, Part II—Wind Design.

905.2.2.5 HVAC systems. The design shall consider the effects of the heating, ventilating and air-conditioning (HVAC) systems on both smoke and fire transport. The analysis shall include all permutations of systems status. The design shall consider the effects of the fire on the heating, ventilating and air-conditioning systems.

905.2.2.6 Climate. The design shall consider the effects of low temperatures on systems, property and occupants. Air inlets and exhausts shall be located so as to prevent snow or ice blockage.

905.2.3 Smoke barrier construction. A smoke barrier may or may not have a fire-resistive rating. Smoke barriers shall be constructed and sealed to limit leakage areas exclusive of protected openings. Maximum allowable leakage area shall be the aggregate area calculated using the following leakage area ratios:

1. Walls:
   \( \frac{A}{A_W} = 0.00100 \)
2. Exit enclosures:
   \( \frac{A}{A_W} = 0.00035 \)
3. All other shafts:
   \( \frac{A}{A_W} = 0.00150 \)
4. Floors and roofs:
\[ A/A_F = 0.00050 \]

WHERE:
- \( A \) = total leakage area, square feet \((m^2)\).
- \( A_F \) = unit floor or roof area of barrier, square feet \((m^2)\).
- \( A_W \) = unit wall area of barrier, square feet \((m^2)\).

Total leakage area of the barrier is then the product of the smoke barrier gross area times the allowable leakage area ratio. Compliance shall be determined by achieving the minimum air pressure difference across the barrier with the system in the smoke-control mode for mechanical smoke-control systems. Passive smoke-control systems may be tested using other approved means such as door fan testing.

905.2.4 Opening protection. Openings in smoke barriers shall be protected by automatic-closing devices actuated by the required controls for the mechanical smoke-control system.

EXCEPTIONS:
1. Passive smoke-control systems may have automatic-closing devices actuated by spot-type smoke detectors listed for releasing service.
2. The airflow method may be used to protect fixed openings between smoke zones.

Door openings shall be protected by an unslurred tight-fitting smoke- and draft-control assembly having a fire-protection rating of not less than 20 minutes when tested in accordance with U.B.C. Standard 7-2. The door and frame shall bear an approved label or other identification showing the rating thereof, the name of the manufacturer and the identification of the service conducting the inspection of materials and workmanship at the factory during fabrication and assembly. Doors shall be maintained self-closing or shall be automatic-closing by actuation of a smoke detector in accordance with Section 713.2. Smoke- and draft-control door assemblies shall be provided with a gasket so installed as to provide a seal where the door meets the stop on both sides, across the top and at the sill.

EXCEPTIONS:
1. In Group I, Division I Occupancies when such doors are installed across corridors, a pair of opposite-swinging doors without a center mullion shall be installed having vision panels with approved fire-rated glazing materials in approved fire-rated frames, the area of which shall not exceed that tested. The doors shall be close fitting within operational tolerances, and shall not have undercuts, louvers or grilles. The doors shall have head and jamb stops, astragals or rabbets at meeting edges and automatic-closing devices. Positive latching devices may be omitted.
2. Group I, Division 3 Occupancies.

Duct and other heating, ventilating and air-conditioning openings shall be equipped with a minimum Class II, 250°F. \((121\degree C.)\) smoke damper as defined and tested in accordance with approved recognized standards. See Chapter 35, Part III.

905.2.5 Duration of operation. All portions of active or passive smoke-control systems shall be capable of continued operation after detection of the fire event for not less than 20 minutes.

905.3 Pressurization Method.

905.3.1 General. The primary means of controlling smoke shall be pressure differences across smoke barriers. Maintenance of a tenable environment is not required in the smoke-control zone of fire origin.

905.3.2 Minimum pressure difference. The minimum pressure difference across a smoke barrier shall be 0.05 inch water gage \((12.4 \text{ Pa})\) in fully sprinklered buildings.

EXCEPTION: Smoke-control systems serving other than fully sprinklered buildings may be approved by the building official provided the system is designed to achieve pressure differences at least two times the maximum calculated pressure difference produced by the design fire.

905.3.3 Maximum pressure difference. The maximum air pressure difference across a smoke barrier shall be determined by required door-opening forces. The actual force required to open exit
doors when the system is in the smoke-control mode shall be in accordance with Section 1004. The calculated force to set a side-hinged, swinging door in motion shall be determined by:

\[ F = F_{dc} + K(WA\Delta P)/(W - d) \]  

(5-1)

**WHERE:**
- \( A \) = door area, square feet (m²).
- \( d \) = distance from door handle to latch edge of door, feet (m).
- \( F \) = total door opening force, pounds (N).
- \( F_{dc} \) = force required to overcome closing device, pounds (N).
- \( K \) = 5.2 (9.6).
- \( W \) = door width, feet (m).
- \( \Delta P \) = design pressure difference, inches (mm) water gage.

Opening forces for other doors shall be determined by standard engineering methods for the resolution of forces and reactions.

### 905.4 Airflow Method.

**905.4.1 General.** When approved by the building official, smoke may be prevented from migrating through fixed openings between smoke-control zones by the use of the airflow method. The design airflows shall be in accordance with this section.

**905.4.2 Velocity.** The minimum average velocity through a fixed opening shall not be less than:

\[ v = 217.2 \{ h (T_f - T_o)/(T_f + 460)\}^{1/2} \]  

For SI:

\[ v = 119.9 \{ h (T_f - T_o)/T_f\}^{1/2} \]  

(5-2)

**WHERE:**
- \( h \) = height of opening, feet (m).
- \( T_f \) = temperature of smoke, °F. (K).
- \( T_o \) = temperature of ambient air, °F. (K).
- \( v \) = air velocity, feet per minute (m/s).

Airflow shall be directed to limit smoke migration from the fire zone. The geometry of openings shall be considered to prevent flow reversal from turbulent effects.

**905.4.3 Prohibited conditions.** This method shall not be employed where either the quantity of air or the velocity of the airflow will adversely affect other portions of the smoke-control system, unduly intensify the fire, disrupt plume dynamics or interfere with exiting. In no case shall airflows toward the fire exceed 200 feet per minute (60 960 mm per minute). Where Formula (5-2) requires airflow to exceed this limit, the airflow method shall not be used.

### 905.5 Exhaust Method.

**905.5.1 General.** When approved by the building official, for large enclosed volume, such as in atria or malls, the exhaust method may be used. The design exhaust volumes shall be in accordance with this section.

**905.5.2 Exhaust rate.**

**905.5.2.1 General.** The height of the lowest horizontal surface of the accumulating smoke layer shall be maintained at least 10 feet (3048 mm) above any walking surface within the smoke zone. The required exhaust rate for the zone shall be the largest of the calculated plume mass flow rates for the possible plume configurations. Provisions shall be made for natural or mechanical supply of outside air to make up an equal volume of the air exhausted at flow rates not to exceed 200 feet per minute (60 960 mm per minute) toward the fire.
905.5.2.2 Axisymmetric plumes. The plume mass flow rate \( m_p \), lbs./sec. (\( \text{g/s} \)) shall be determined by placing the design fire center on the axis of the space being analyzed. The limiting flame height shall be determined by:

\[
\begin{align*}
z_l &= 0.533 Q_c^{2/5} \\
&= 0.166 Q_c^{2/5}
\end{align*}
\]

**WHERE:**
- \( Q \) = total heat output.
- \( Q_c \) = convective heat output, Btu/s (kW). (The value of \( Q_c \) shall not be taken as less than 0.70\( Q \).)
- \( z \) = height from top of fuel surface to bottom of smoke layer, feet (m).
- \( z_l \) = limiting flame height, feet (m). (\( z_l \) must be greater than the fuel equivalent diameter. See Section 905.6.)

For \( z > z_l \)
\[
m_p = 0.022 Q_c^{1/3} z_l^{5/3} + 0.0042 Q_c
\]

For SI:
\[
m_p = 0.071 Q_c^{1/3} z_l^{5/3} + 0.0018 Q_c
\]

For \( z = z_l \)
\[
m_p = 0.011 Q_c
\]

For SI:
\[
m_p = 0.035 Q_c
\]

For \( z < z_l \)
\[
m_p = 0.0208 Q_c^{3/5} z
\]

For SI:
\[
m_p = 0.032 Q_c^{3/5} z
\]

To convert \( m_p \) from pounds per second of mass flow to a volumetric rate, the following formula shall be used:

\[
V = 60 m_p / \rho
\]

**WHERE:**
- \( V \) = volumetric flow rate, cubic feet per minute (m\(^3\)/s).
- \( \rho \) = density of air at the temperature of the smoke layer, lbs./ft.\(^3\) (\( \text{T:in °F} \)) [kg/m\(^3\) (\( \text{T:in °C} \))].

905.5.2.3 Balcony spill plumes. The plume mass flow rate \( m_p \) for spill plumes shall be determined using the geometrically probable width based on architectural elements and projections in the following formula:

\[
m_p = 0.124 (Q W^2)^{1/3} (z_b + 0.3 H) [1 + 0.063 (z_b + 0.6 H) / W]^{2/3}
\]

For SI:
\[
m_p = 0.41 (Q W^2)^{1/3} (z_b + 0.3 H) [1 + 0.063 (z_b + 0.6 H) / W]^{2/3}
\]

**WHERE:**
- \( H \) = height above fire to underside of balcony, feet (m).
- \( W \) = plume width at point of spill, feet (m).
- \( z_b \) = height from balcony, feet (m).

905.5.2.4 Window plumes. The plume mass flow rate \( m_p \) shall be determined from:

\[
m_p = 0.077 (A_w H_w)^{1/2} (z_w + a)^{5/3} + 0.18 A_w H_w^{1/2}
\]

For SI:
\[
m_p = 0.68 (A_w H_w)^{1/2} (z_w + a)^{5/3} + 1.5 A_w H_w^{1/2}
\]

**WHERE:**
- \( A_w \) = area of the opening, square feet (m\(^2\)).
905.5.2.4-905.7.1 1994 UNIFORM BUILDING CODE

\[ H_w = \text{height of the opening, feet (m)} \]
\[ z_w = \text{height from the top of the window or opening to the bottom of the smoke layer, feet (m)} \]
\[ a = 2.4A_w^{2/5}H_w^{1/5} - 2.1H_w \]  

(5-10)

905.5.2.5 Plume contact with walls. When the axisymmetric plume contacts the surrounding walls, the mass flow rate may be considered to be constant from the point of contact and beyond provided that contact remains constant. Use of this provision requires calculation of the plume diameter, which shall be calculated by:

\[ d = 0.48 ([T_c + 460]/[T_a + 460])^{1/2}z \]

For SI:
\[ d = 0.48 (T_c/T_a)^{1/2}z \]

WHERE:
- \( d \) = plume diameter, feet (m).
- \( T_a \) = ambient air temperature, °F (K).
- \( T_c \) = plume centerline temperature, °F (K).
\[ = (318 Q^{2/3} H^{-5/3}) + T_a \]

For SI:
\[ = (23.3 Q^{2/3} H^{-5/3} + 273.15) + T_a \]
- \( z \) = height at which \( T_c \) is determined, feet (m).

905.6 Design Fire.

905.6.1 General. The design fire shall be based on a \( Q \) of not less than 5,000 Btu per second (5275 kW) unless a rational analysis is performed by the designer and approved by the building official.

905.6.2 Rational analysis.

905.6.2.1 Factors considered. The engineering analysis shall include the characteristics of the fuel, fuel load, effects included by the fire, whether the fire is likely to be steady or unsteady.

905.6.2.2 Separation distance. Determination of the design fire shall include consideration of the type of fuel, fuel spacing and configuration. The design fire shall be increased if other combustibles are within the separation distance as determined by:

\[ R = [Q/(12\pi q^*)]^{1/2} \]

(5-12)

WHERE:
- \( q^* \) = incident radiant heat flux required for nonpiloted ignition, Btu/ft²·s (W/m²).
- \( Q \) = heat release from fire, Btu/s (kW).
- \( R \) = separation distance from target to center of fuel package, feet (m).

The ratio of the separation distance to the fuel equivalent radius shall not be less than 4. The fuel equivalent radius shall be the radius of a circle of equal area to floor area of the fuel package.

905.6.2.3 Heat-release assumptions. The analysis shall make use of best available data and shall not be based on excessively stringent limitations of combustible material. For offices, the heat release rate shall be 25 Btu/ft²·s (284 kW/m²) or greater. For mercantile and residential occupancies, the heat release rate shall be 50 Btu/ft²·s (567 kW/m²) or greater.

905.6.2.4 Sprinkler effectiveness assumptions. The effect of sprinklers may be assumed to have halted fire growth at time of activation only upon a documented engineering analysis.

905.7 Equipment.

905.7.1 General. Equipment such as, but not limited to, fans, ducts and balance dampers shall be suitable for their intended use, suitable for the probable temperatures to which they may be exposed and approved by the building official.
905.7.2 Exhaust fans. Components of exhaust fans shall be rated and certified by the manufacturer for the probable temperature rise to which the components may be exposed. This temperature rise shall be computed by:

\[ T_r = \frac{Q_c}{mc} + (T_s) \quad (5-13) \]

WHERE:

- \( c \) = specific heat of smoke at smoke-layer temperature, Btu/lb. °F. (kJ/kg·K).
- \( m \) = exhaust rate, pounds per second (kg/s).
- \( Q_c \) = convective heat output of fire, Btu/sec. (kW).
- \( T_s \) = ambient temperature, °F. (K).
- \( T_e \) = smoke temperature, °F. (K).

EXCEPTION: \( T_r \) may be reduced if dilution air is assured and the new \( T_r \) is calculated.

905.7.3 Ducts. Duct materials and joints shall be capable of withstanding the probable temperatures and pressures to which they are exposed as determined by Formula (5-13). Ducts shall be constructed and supported in accordance with the Mechanical Code. Ducts shall be leak tested to 1.5 times the maximum design pressure in accordance with nationally accepted practices. Measured leakage shall not exceed 5 percent of design flow. Results of such testing shall be a part of the documentation procedure. Ducts shall be supported directly from fire-resistive structural elements of the building by substantial, noncombustible supports.

EXCEPTION: Flexible connections, for the purpose of vibration isolations complying with the Mechanical Code, may be used if constructed of approved fire-resistive materials.

905.7.4 Equipment, inlets and outlets. Equipment shall be located so as to not expose uninvolved portions of the building to an additional fire hazard. Outside air inlets shall be located so as to minimize the potential for introducing smoke or flame into the building. Exhaust outlets shall be so located as to minimize reintroduction of smoke into the building and to limit exposure of the building or adjacent buildings to an additional fire hazard.

905.7.5 Automatic dampers. Automatic dampers installed within the smoke-control system shall be listed and conform to the requirements of approved recognized standards. See Chapter 35, Part III.

905.7.6 Fans. In addition to other requirements, belt-driven fans shall have 1.5 times the number of belts required for the design duty with the minimum number of belts being two. Fans shall be selected for stable performance based on normal temperature and, where applicable, elevated temperature. Calculations and manufacturer's fan curves shall be part of the documentation procedures. Fans shall be supported and restrained by noncombustible devices in accordance with the requirements of Chapter 16. Motors driving fans shall not be operating beyond their name plate horsepower (kilowatts) as determined from measurement of actual current draw. Motors driving fans shall have a minimum service factor of 1.15.

905.8 Power Systems.

905.8.1 General. The smoke-control system shall be supplied with two sources of power. Primary power shall be the normal building power systems. Secondary power shall be from an approved standby source complying with the Electrical Code. The standby power source and its transfer switches shall be in a separate room from the normal power transformers and switchgear and shall be enclosed in a room of not less than one-hour fire-resistive construction, ventilated directly to and from the exterior. Power distribution from the two sources shall be by independent routes.

Transfer to full standby power shall be automatic and within 60 seconds of failure of the primary power. The systems shall comply with the Electrical Code.

905.8.2 Power sources and power surges. Elements of the smoke-management system relying on volatile memories or the like shall be supplied with uninterruptable power sources of sufficient
duration to span 15-minute primary power interruption. Elements of the smoke-management system susceptible to power surges shall be suitably protected by conditioners, suppressors or other approved means.

905.9 Detection and Control Systems.

905.9.1 General. Fire-detection and control systems for mechanical smoke-control systems shall be supervised in accordance with the Fire Code. Supervision shall include positive confirmation of actuation, testing, manual override, and the presence of power downstream of all disconnects.

905.9.2 Wiring. In addition to meeting requirements of the Electrical Code, all wiring, regardless of voltage, shall be fully enclosed within continuous raceways.

905.9.3 Activation. Smoke-control systems shall be activated as follows:

1. Mechanical smoke-control systems, using the pressurization method, serving buildings having no occupied floor more than 300 feet (91 440 mm) above or 75 feet (22 860 mm) below exit grade shall have automatic control of pressurized stairwell enclosure systems. All other portions of the smoke-control system may be manual in accordance with Section 905.13.

   EXCEPTION: When required in Group I Occupancies, they shall be entirely automatic.

2. Mechanical smoke-control systems, using the pressurization method, serving buildings having occupied floors more than 300 feet (91 440 mm) above or 75 feet (22 860 mm) below exit grade shall have completely automatic control.

3. Mechanical smoke-control systems using the airflow or exhaust method shall have completely automatic control.

4. Passive smoke-control systems may be actuated by approved spot-type detectors listed for releasing service.

905.9.4 Automatic control. Whenever completely automatic control is required or used, the automatic-control sequences shall be initiated from an appropriately zoned automatic sprinkler system meeting the requirements of U.B.C. Standard 9-1 or from an appropriately zoned, total coverage smoke-detection system meeting the requirements of the Fire Code.

905.9.5 Smoke detection. Smoke detectors shall be listed and shall be installed in accordance with the Fire Code.

905.10 Control Air Tubing.

905.10.1 General. Control-air tubing shall be of sufficient size to meet the required response times. Tubing shall be flushed clean and dry prior to final connections. Tubing shall be adequately supported and protected from damage. Tubing passing through concrete or masonry shall be sleeved and protected from abrasion and electrolytic action.

905.10.2 Materials. Control-air tubing shall be hard drawn copper, Type L, ACR, see ASTM B 42-92, B 43-91, B 68-88, B 88-92, B 251-88 and B 280-92. Fittings shall be wrought copper or brass, solder type, see ANSI B16.22-89 or ANSI B16.18-84. Changes in direction may be made with appropriate tool bends. Brass, compression-type fittings may be used at final connection to devices; other joints shall be brazed using a BCuP₅ brazing alloy with solidus above 1,100°F. (593°C.) and liqudus below 1,500°F. (816°C.) Brazing flux shall be used on copper to brass joints only.

   EXCEPTION: Nonmetallic tubing may be used within control panels and at the final connection to devices providing all of the following conditions are met:

   1. Tubing shall be listed by an approved agency for flame and smoke characteristics.

   2. Tubing and connected device shall be completely enclosed within galvanized or paint grade steel enclosure of not less than 0.030 inch (0.76 mm) (No. 22 galvanized sheet gage) thickness. Entry to the enclosure shall be by copper tubing with a protective grommet of neoprene or teflon or by suitable brass compression to male barbed adapter.
3. Tubing shall be identified by appropriately documented coding.
4. Tubing shall be neatly tied and supported within enclosure. Tubing bridging cabinet and door or moveable device shall be of sufficient length to avoid tension and excessive stress. Tubing shall be protected against abrasion. Tubing serving devices on doors shall be fastened along hinges.

905.10.3 Isolation from other functions. All control tubing serving other than smoke-control functions shall be isolated by automatic isolation valves or shall be an independent system.

905.10.4 Testing. Test all control-air tubing at three times operating pressure for not less than 30 minutes without any noticeable loss in gage pressure prior to final connection to devices.

905.11 Marking and Identification. The detection and control systems shall be clearly marked at all junctions, accesses and terminations.

905.12 Control Diagrams. Identical control diagrams showing all devices in the system and identifying their location and function shall be maintained current and kept on file with the building official, the fire department and in the central control station in an approved format and manner.

905.13 Firefighter's Control Panel.

905.13.1 General. A firefighter's control panel shall be provided for manual control or override of automatic control for mechanical smoke-control systems. Such panel shall be designed to graphically depict the building arrangement and smoke-control system zones served by the systems. The status of each smoke-control zone shall be indicated by lamps and appropriate legends.

Fans, major ducts and dampers within the building that are portions of the smoke-control systems shall be shown on the firefighter's control panel and shall be shown connected to their respective ducts with a clear indication of the direction of airflow.

Devices, switches, indicators and the like shall bear plain English identifying legends having a size and stroke equivalent to 12 point helvetica bold.

Status indicators shall be provided for all smoke-control equipment by pilot lamp-type indicators as follows:
1. Fans, dampers and other operating equipment in their normal status—YELLOW.
2. Fans, dampers and other operating equipment in their off or closed status—RED.
3. Fans, dampers and other operating equipment in their on or open status—GREEN.
4. Fans, dampers and other operating equipment in a fault status—AMBER/ORANGE.

Provision for testing the pilot lamp on the firefighter's control panel by means of one or more "lamp test" momentary push buttons or other self-restoring means shall be included.
The fault status shall be further identified by pulsing the indicator lamp.

EXCEPTION: Light-emitting diodes may be used in lieu of pilot lamps with prior approval.

The firefighter's control panel layout shall be submitted at full scale for approval prior to installation.

905.13.2 Smoke-control capability. The firefighter's control panel shall provide control capability over the complete smoke-control system equipment within the building as follows:

1. ON-AUTO-OFF control over each individual piece of operating smoke-control equipment that can also be controlled from other sources within the building. This includes stairway pressurization fans; smoke exhaust fans; supply, return and exhaust fans; elevator shaft fans; and other operating equipment used or intended for smoke-control purposes.

2. OPEN-AUTO-CLOSE control over all individual dampers relating to smoke control and that are also controlled from other sources within the building.

3. ON-OFF or OPEN-CLOSE control over all smoke-control and other critical equipment associated with a fire or smoke emergency and that can only be controlled from the firefighter's control panel.
EXCEPTIONS: 1. For complex systems, with prior approval, the controls and indicators may be combined to control and indicate all elements of a single smoke zone as a unit.
2. For complex systems, with prior approval, the control may be accomplished by computer interface using approved, plain English commands.

905.13.3 Control action and priorities. The firefighter’s control panel actions shall be as follows:

1. **ON-OFF, OPEN-CLOSE** control actions shall have the highest priority of any control point within the building. Once issued from the firefighter’s control panel, no automatic or manual control from any other control point within the building shall contradict the control action.

   Where automatic means is provided to interrupt normal, nonemergency equipment operation or produce a specific result to safeguard the building or equipment (i.e., duct freezestats, duct smoke detectors, high-temperature cutouts, temperature-actuated linkage and similar devices), such means shall be capable of being overridden by the firefighter’s control panel control action and the last control action as indicated by each firefighter’s control panel switch position shall prevail.

   **EXCEPTION:** Power disconnects required by the Electrical Code.

2. Only the AUTO position of each three-position firefighter’s control panel switch shall allow automatic or manual control action from other control points within the building. The AUTO position shall be the NORMAL, nonemergency, building control position. When a firefighter’s control panel is in the AUTO position, the actual status of the device (on, off, open, closed) shall continue to be indicated by the status indicator described above.

905.14 Response Time. Smoke-control system activation shall be initiated immediately after receipt of an appropriate automatic or manual activation command. Smoke-control systems shall activate individual components (such as dampers and fans) in the sequence necessary to prevent physical damage to the fans, dampers, ducts and other equipment. The total response time for individual components to achieve their desired operating mode shall not exceed the following:

1. Control air isolation valves
   - Immediately
2. Smoke damper closing
   - 15 seconds
3. Smoke damper opening
   - 15 seconds maximum
4. Fan starting (energizing)
   - 15 seconds maximum
5. Fan stopping (de-energizing)
   - Immediately
6. Fan volume modulation
   - 30 seconds maximum
7. Pressure control modulation
   - 15 seconds maximum
8. Temperature control safety override
   - Immediately
9. Positive indication of status
   - 15 seconds maximum

For purposes of smoke control, the firefighter’s control panel response time shall be the same for automatic or manual smoke-control action initiated from any other building control point.

905.15 Acceptance Testing.

905.15.1 General. Devices, equipment, components and sequences shall be individually tested. These tests, in addition to those required above or by other provisions of this code, shall consist of determination of function, sequence and, where applicable, capacity of their installed condition.

905.15.2 Detection devices. Smoke or fire detectors which are a part of a smoke-control system shall be tested in accordance with the Fire Code in their installed condition. When applicable, this testing shall include verification of airflow in both minimum and maximum conditions.

905.15.3 Ducts. Ducts which are part of a smoke-control system shall be traversed using generally accepted practices to determine actual air quantities.

905.15.4 Dampers. Dampers shall be tested for function in their installed condition.

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905.15.5 Inlets and outlets. Inlets and outlets shall be read using generally accepted practices to determine air quantities.

905.15.6 Fans. Fans shall be examined for correct rotation. Measurements of voltage, amperage, revolutions per minute and belt tension shall be made.

905.15.7 Smoke barriers. Measurements using inclined manometers shall be made of the pressure differences across smoke barriers. Such measurements shall be conducted for each possible smoke-control condition.

905.15.8 Controls. Each smoke zone, equipped with an automatic initiation device, shall be put into operation by the actuation of one such device. Each additional such device within the zone shall be verified to cause the same sequence but the operation of fan motors may be bypassed to prevent damage.

Control sequences shall be verified throughout the system, including verification of override from the firefighter’s control panel and simulation of standby power conditions.

905.15.9 Reports. A complete report of testing shall be prepared by the required special inspector or special inspection agency. The report shall include identification of all devices by manufacturer, nameplate data, design values, measured values and identification tag or mark. The report shall be reviewed by the responsible designer, and when satisfied that the design intent has been achieved, the responsible designer shall affix the designer’s signature and date to the report with a statement as follows:

I have reviewed this report and by personal knowledge and on-site observation certify that the smoke-control system is in substantial compliance with the design intent, and to the best of my understanding complies with requirements of the code.

A copy of the final report shall be filed with the building official and an identical copy shall be maintained in an approved location at the building.

905.15.10 Identification and documentation. Charts, drawings and other documents identifying and locating each component of the smoke-control system, and describing their proper function and maintenance requirements shall be maintained on file at the building with the above-described report.

Devices shall have an approved identifying tag or mark on them consistent with the other required documentation and shall be dated indicating the last time they were successfully tested and by whom.

905.16 Acceptance. Buildings, or portions thereof, required by this code to comply with this section shall not be issued a certificate of occupancy until such time that the building official determines that the provisions of this section have been fully complied with and that the fire department has received satisfactory instruction on the operation, both automatic and manual, of the system.

EXCEPTION: In buildings of phased construction, the building official may issue a temporary certificate of occupancy if those portions of the building to be occupied meet the requirements of this section and that the remainder does not pose a significant hazard to the safety of the proposed occupants or adjacent buildings.

SECTION 906 — SMOKE AND HEAT VENTING

906.1 When Required. Smoke and heat vents complying with U.B.C. Standard 15-7 or fixed openings shall be installed in accordance with the provisions of this section as follows:

1. In single-story Groups B, F, M, and S Occupancies having over 50,000 square feet (4645 m²) in undivided area.

EXCEPTIONS: 1. Office buildings and retail sales areas where storage does not exceed 12 feet (3658 mm) in height.
2. Group S, Division 2 Occupancies used for bulk frozen food storage when the building is protected by a complete automatic sprinkler system.
2. In Group H, Divisions 1, 2, 3, 4 or 5 Occupancies any of which are over 15,000 square feet (1394 m²) in single floor area.

For requirements on smoke and heat venting in buildings with high-piled combustible stock, see the Fire Code.

906.2 Mixed Occupancies. Venting facilities shall be installed in buildings of mixed occupancy on the basis of the individual occupancy involved.

906.3 Types of Vents. Vents shall be fixed in the open position or vents shall be activated by temperature and shall open automatically in the event of fire.

Fixed openings may consist of skylights or other openings which provide venting directly to exterior above the plane of the main roof in which they are located. Vents shall meet the design criteria of this subsection regarding elevation, and Section 906.5 of this section regarding venting area, dimensions, spacing and venting ratios. The building official may require documentation of the design to assure proper performance of required venting.

Temperature activation of vents shall be at or near the highest elevation of the ceiling and in no case lower than the upper one third of the smoke curtain. Where plain glass is used, provisions shall be made to protect the occupants from glass breakage. In no case shall vents be located closer than 20 feet (6096 mm) to an adjacent property line.


906.5 Size and Spacing of Vents.

906.5.1 Effective venting area. The effective venting area is the minimum cross-sectional area through which the hot gases must pass en route to atmosphere. The effective venting area shall not be less than 16 square feet (1.5 m²) with no dimension less than 4 feet (1219 mm), excluding ribs or gutters whose total width does not exceed 6 inches (152 mm).

906.5.2 Spacing. The maximum center-to-center spacing between vents within the building shall be:

1. In Groups B, F, M and S Occupancies: 120 feet (36 600 mm).
2. In Group H Occupancies: 100 feet (30 480 mm).

906.5.3 Venting ratios. The following ratios of effective area of vent openings to floor areas shall be:

2. In Group H Occupancies: 1:50.

906.6 Curtain Boards.

906.6.1 General. Curtain boards shall be provided to subdivide a vented building in accordance with the provisions of this section.

906.6.2 Construction. Curtain boards shall be sheet metal, asbestos board, lath and plaster, gypsum wallboard or other approved materials which provide equivalent performance that will resist the passage of smoke. All joints and connections shall be smoke tight.

906.6.3 Location and depth. Curtain boards shall extend down from the ceiling; for a minimum depth of 6 feet (1829 mm), but need not extend closer than 8 feet (2438 mm) to the floor. In Group H Occupancies, the minimum depth shall be 12 feet (3658 mm) except that it need not be closer than 8 feet (2436 mm) to the floor, provided the curtain is not less than 6 feet (1829 mm) in depth.

906.6.4 Spacing. The distance between curtain boards shall not exceed 250 feet (76 200 mm) and the curtained area shall be limited to 50,000 square feet (4645 m²). In Group H Occupancies, the distance between curtain boards shall not exceed 100 feet (30 480 mm) and the curtained area shall be limited to 15,000 square feet (1394 m²).

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## TABLE 9-A—STANDPIPE REQUIREMENTS

<table>
<thead>
<tr>
<th>OCCUPANCY</th>
<th>NONSPRINKLERED BUILDING$^1$</th>
<th>SPRINKLERED BUILDING$^{2,3}$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Standpipe Class</td>
<td>Hose Requirement</td>
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<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Occupancies exceeding 150 ft. in height and more than one story</td>
<td>III</td>
<td>Yes</td>
</tr>
<tr>
<td>2. Occupancies 4 stories or more but less than 150 ft. in height, except</td>
<td>[I and II$^4$]</td>
<td>5</td>
</tr>
<tr>
<td>Group R, Division 3$^7$</td>
<td>(or III)</td>
<td>Yes</td>
</tr>
<tr>
<td>3. Group A Occupancies with occupant load exceeding 1,000$^6$</td>
<td>II</td>
<td>Yes</td>
</tr>
<tr>
<td>4. Group A, Division 2.1 Occupancies over 5,000 square feet in area used</td>
<td>II</td>
<td>Yes</td>
</tr>
<tr>
<td>for exhibition</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Groups I; H; B; S; M; F; Division 1 Occupancies less than 4 stories in</td>
<td>II$^4$</td>
<td>Yes</td>
</tr>
<tr>
<td>height but greater than 20,000 square feet per floor$^7$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Stages more than 1,000 square feet in area</td>
<td>II</td>
<td>No</td>
</tr>
</tbody>
</table>

$^1$Except as otherwise specified in Item 4 of this table, Class II standpipes need not be provided in basements having an automatic fire-extinguishing system throughout.

$^2$The standpipe system may be combined with the automatic sprinkler system.

$^3$Portions of otherwise sprinklered buildings which are not protected by automatic sprinklers shall have Class II standpipes installed as required for the unsprinklered portions.

$^4$In open structures where Class II standpipes may be damaged by freezing, the building official may authorize the use of Class I standpipes which are located as required for Class II standpipes.

$^5$Hose is required for Class II standpipes only.

$^6$Class II standpipes need not be provided in assembly areas used solely for worship.

$^7$For the purposes of this table, occupied roofs of parking structures shall be considered an additional story. In parking structures, a tier is a story.
Chapter 10
MEANS OF EGRESS

SECTION 1001 — GENERAL

1001.1 Scope and Standards of Quality. Every building or portion thereof shall be provided with exits as required by this chapter.

The standards listed below labeled a "U.B.C. standard" are also listed in Chapter 35, Part II, and are part of this code. The other standards listed below are recognized standards (see Sections 3502 and 3503).

1. Power doors.
   1.1 U.B.C. Standard 10-1, Power-operated Exit Doors
   1.2 U.B.C. Standard 7-8, Horizontal Sliding Fire Doors Used in an Exit

2. Stairway numbering system.
   U.B.C. Standard 10-2, Stairway Identification

3. Hardware.
   U.B.C. Standard 10-4, Panic Hardware

1001.2 Definitions. For the purpose of this chapter, certain terms are defined as follows:

BALCONY, EXTERIOR EXIT, is a landing or porch projecting from the wall of a building, and which serves as a required exit. The long side shall be at least 50 percent open, and the open area above the guardrail shall be so distributed as to prevent the accumulation of smoke or toxic gases.

EXIT is a continuous and unobstructed means of egress to a public way and shall include intervening aisles, doors, doorways, gates, corridors, exterior exit balconies, ramps, stairways, pressurized enclosures, horizontal exits, exit passageways, exit courts and yards.

EXIT COURT is a yard or court providing access to a public way for one or more required exits.

EXIT PASSAGEWAY is an enclosed exit connecting a required exit or exit court with a public way.

EXTERIOR STAIRWAY is a stairway that is open on two adjacent sides, except for required structural columns and open-type handrails and guardrails. The adjoining open areas shall be either yards, courts or public ways; the other two sides may be enclosed by the exterior walls of the building.

HORIZONTAL EXIT is an exit from one building into another building on approximately the same level, or through or around a wall constructed as required for a two-hour occupancy separation and which completely divides a floor into two or more separate areas so as to establish an area of refuge affording safety from fire or smoke coming from the area from which escape is made.

INTERIOR STAIRWAY is any stairway not meeting the definition of an exterior stairway.

MULTITHEATER COMPLEX is a building or portion thereof containing two or more motion picture auditoriums which are served by a common lobby.

PANIC HARDWARE is a door-latching assembly incorporating an unlatching device, the activating portion of which extends across at least one half the width of the door leaf on which it is installed.

PRIVATE STAIRWAY is a stairway serving one tenant only.

PUBLIC WAY is any street, alley or similar parcel of land essentially unobstructed from the ground to the sky which is deeded, dedicated or otherwise permanently appropriated to the public for public use and having a clear width of not less than 10 feet (3048 mm).
SMOKE-PROTECTED ASSEMBLY SEATING is seating served by means of egress which is not subject to blockage by smoke accumulation within or under a structure.

SPIRAL STAIRWAY is a stairway having a closed circular form in its plan view with uniform section shaped treads attached to and radiating about a minimum diameter supporting column. The effective tread is delineated by the nosing radius line, the exterior arc (center line of railing) and the overlap radius line (nosing radius line of tread above). Effective tread dimensions are taken along a line perpendicular to the center line of the tread.

TRAVEL DISTANCE is the total length of the exit path an occupant must travel from any point within the occupied portions of a building to reach an exterior exit door, horizontal exit door, exit passageway door or an enclosed exit stairway door.

1001.3 Exit Obstruction. Obstructions shall not be placed in the required width of an exit except projections permitted by this chapter.

1001.4 Changes in Elevation. Elevation changes in an exit shall comply with Section 1006.3 or 1007.

Within a building, changes in elevation of less than 12 inches (305 mm) along an exit serving an occupant load of 10 or more shall be by ramps.

**EXCEPTION:** Group R, Division 3 Occupancies and along aisles adjoining seating areas.

1001.5 Guardrails. See Section 509 for guardrail requirements.

1001.6 Yards, Patios and Courts. Yards, patios, courts and similar outdoor areas accessible to and usable by the building occupants shall be provided with exits as required by this chapter. The occupant load of such outdoor areas shall be assigned by the building official in accordance with their anticipated use. When outdoor areas are to be used by persons in addition to the occupants of the building, and exits from the outdoor areas pass through the building, exit requirements for the building shall be based on the sum of the occupant loads of the building plus the outdoor areas.

**EXCEPTIONS:**
1. Outdoor areas used exclusively for service of the building may have only one exit.
2. Outdoor areas associated with Group R, Division 3 Occupancies.

1001.7 Building Accessibility. In addition to provisions of this chapter, exits which provide access to, or egress from, buildings for persons with disabilities shall also comply with Chapter 11.

1001.8 Elevators or Escalators. Elevators or escalators shall not be used as a required exit.

**SECTION 1002 — OCCUPANT LOAD**

1002.1 Determination of Occupant Load.

1002.1.1 Areas to be included. In determining the occupant load, all portions of a building shall be presumed to be occupied at the same time.

**EXCEPTION:** Accessory use areas which ordinarily are used only by persons who occupy the main areas of an occupancy shall be provided with exits as though they are completely occupied, but their occupant load need not be included in computing the total occupant load of the building.

The occupant load for a building shall be determined in accordance with the provisions of this section.

1002.1.2 General. For areas without fixed seats, the occupant load shall not be less than the number determined by dividing the floor area assigned to that use by the occupant load factor set forth in Table 10-A. Where an intended use is not listed in Table 10-A, the building official shall establish an occupant load factor based on a listed use which most nearly resembles the intended use.

For a building or portion thereof which has more than one use, the occupant load shall be determined by the use which gives the largest number of persons.
The occupant load for buildings or areas containing two or more occupancies shall be determined by adding the occupant loads of the various use areas as computed in accordance with the applicable provisions of this section.

1002.1.3 Fixed seating. For areas having fixed seats and aisles, the occupant load shall be determined by the number of fixed seats installed therein. The required width of aisles serving fixed seats shall not be used for any other purpose.

For areas having fixed benches or pews, the occupant load shall not be less than the number of seats based on one person for each 18 inches (457 mm) of length of pew or bench.

Where booths are used in dining areas, the occupant load shall be based on one person for each 24 inches (610 mm) of booth length or major portion thereof.

1002.1.4 Reviewing stands, grandstands and bleachers. The occupant load for reviewing stands, grandstands and bleachers shall be calculated in accordance with this section and the specific requirements contained in Section 1021.

1002.2 Maximum Occupant Load.

1002.2.1 Assembly occupancies. The maximum occupant load for assembly occupancies shall not exceed the occupant load determined in accordance with Section 1002.1.

EXCEPTION: When approved by the building official, the occupant load for an assembly occupancy may be increased provided the maximum occupant load served does not exceed the capacity of the exit system for such increased number of persons. The building official may require an aisle, seating or fixed equipment diagram to substantiate such an increase, and may require that such diagram be posted.

1002.2.2 Other occupancies. For other than assembly occupancies, an occupant load greater than that determined in accordance with Section 1002.1 is permitted; however, the exit system shall comply with the provisions of this chapter for such increased number of persons.

1002.3 Posting of Room Capacity. Any room having an occupant load of 50 or more where fixed seats are not installed, and which is used for assembly purpose, shall have the capacity of the room posted in a conspicuous place on an approved sign near the main exit from the room. Such signs shall be maintained legible by the owner or the owner’s authorized agent and shall indicate the number of occupants permitted for each room use.

1002.4 Revised Occupant Load. After a building is occupied, any change in use or increase in occupant load shall comply with this chapter. See Section 3405.

SECTION 1003 — EXITS REQUIRED

1003.1 Number of Exits. Every building or usable portion thereof shall have at least one exit, not less than two exits where required by Table 10-A and additional exits as required by this section.

For purposes of this section, basements and occupied roofs shall be provided with exits as required for stories.

EXCEPTION: Occupied roofs on Group R, Division 3 Occupancies may have one exit if such occupied areas are less than 500 square feet (46.45 m²) and are located no higher than immediately above the second story.

Floors complying with the provisions for mezzanines as specified in Section 507 shall be provided with exits as specified therein.

Occupants on stories above the first and in basements shall have access to not less than two separate exits from the story or basement.

EXCEPTIONS: 1. Second stories having an occupant load less than 10 may be provided with only one exit.

2. Two or more dwelling units on the second story or in a basement may have access to only one common exit when the total occupant load served by that exit does not exceed 10.
3. Except as provided in Table 10-A, only one exit need be provided from the second floor or a basement within an individual dwelling unit or a Group R, Division 3 congregate residence.

4. When the third floor within an individual dwelling unit or a Group R, Division 3 congregate residence does not exceed 500 square feet (46.45 m²), only one exit need be provided from that floor.

5. Floors and basements used exclusively for service of the building may have one exit. For the purposes of this exception, storage rooms, laundry rooms, maintenance offices and similar uses shall not be considered as providing service to the building.

6. Storage rooms, laundry rooms and maintenance offices not exceeding 300 square feet (27.87 m²) in floor area may be provided with only one exit.

7. Elevator lobbies may have one exit provided the use of such exit does not require keys, tools, special knowledge or effort.

For special requirements see the following sections: Group A, Section 1016; Group E, Section 1017; Group H, Section 1018; Group I, Section 1019; Rooms Containing Fuel-fired Equipment and Cellulose Nitrate Handling Rooms, Section 1020; Reviewing Stands, Grandstands and Bleachers, Section 1021; Laboratories, Sections 304.2.2 and 305.2.4; and Open Parking Garages, Section 311.9.

Every story or portion thereof having an occupant load of 501 to 1,000 shall not have less than three exits.

Every story or portion thereof having an occupant load of 1,001 or more shall not have less than four exits.

The number of exits required from any story of a building shall be determined by using the occupant load of that story.

The maximum number of exits required for any story shall be maintained until egress is provided from the structure. (See Section 1010.)

1003.2 Width. The total width of exits in inches (mm) shall not be less than the total occupant load served by an exit multiplied by 0.3 (7.62) for stairways and 0.2 (5.08) for other exits nor less than specified elsewhere in this code. Such widths of exits shall be divided approximately equally among the separate exits.

The maximum exit width required from any story of a building shall be maintained.

1003.3 Arrangement of Exits. If only two exits are required, they shall be placed a distance apart equal to not less than one half of the length of the maximum overall diagonal dimension of the building or area to be served measured in a straight line between exits.

EXCEPTION: The separation between exit doors in the exit enclosures which are interconnected by a one-hour fire-resistant corridor conforming to the requirements of Section 1005 may be measured along a direct line of travel within the exit corridor. Enclosure walls shall not be less than 30 feet (9144 mm) apart at any point in a direct line of measurement.

Where three or more exits are required, at least two exits shall be placed a distance apart equal to not less than one half of the length of the maximum overall diagonal dimension of the building or area to be served measured in a straight line between the exits, and the additional exits shall be arranged a reasonable distance apart so that if one becomes blocked the others will be available.

1003.4 Travel Distance. The maximum travel distance shall not exceed 150 feet (45 720 mm), unless otherwise allowed by this section. The maximum travel distance may be increased in accordance with the following:

1. In a building equipped with an automatic sprinkler system throughout, the maximum travel distance may be 200 feet (60 960 mm).

2. The maximum travel distance of 150 feet (45 720 mm) and the maximum travel distance of 200 feet (60 960 mm) allowed by Item 1 may be increased up to an additional 100 feet (30 480 mm) when this increase in travel distance occurs in the last portion of the travel distance and is entirely within a one-hour fire-resistant corridor complying with Section 1005.

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3. In one-story buildings classified as Group F, Division 2 or Group S, Division 2 Occupancies, and in one-story Group S, Division 5 and Group H, Division 5 Occupancy airplane hangars, the travel distance may be 400 feet (121.9 m) if the building is equipped with an automatic sprinkler system throughout and provided with smoke and heat ventilation as specified in Section 906.

4. In an open parking garage as defined in Section 311.9, the exit travel distance may be 300 feet (91 440 mm) in a building not equipped with an automatic sprinkler system throughout and may be increased to 400 feet (121.9 m) in a building equipped with an automatic sprinkler system throughout. Travel distances may be measured to open stairways which are permitted in accordance with Section 1009.1.

Special travel distance provisions are contained in other sections of this code as follows:

1. For atria, see Section 402.4.
2. For Group E Occupancies, see Section 1017.
3. For Group H Occupancies, see Section 1018.
4. For malls, see Section 404.4.3 and 404.4.5.

1003.5 Exits through Adjoining Rooms. Rooms may have one required exit that passes through an adjoining or intervening room which provides a direct, obvious and unobstructed means of travel to an exit corridor, exterior exit door, horizontal exit, exit passageway or enclosed stairway, provided the total travel distance does not exceed that permitted by other provisions of this code.

EXCEPTIONS: 1. Rooms within dwelling units may exit through more than one intervening room.
2. Rooms with a cumulative occupant load of 10 or less may exit through more than one intervening room.

In other than dwelling units, exits shall not pass through kitchens, store rooms, restrooms, closets or spaces used for similar purposes.

Foyers, lobbies and reception rooms constructed as required for corridors shall not be construed as intervening rooms.

SECTION 1004 — DOORS

1004.1 General. This section shall apply to every exit door serving an area having an occupant load of 10 or more, or serving hazardous rooms or areas, except that Sections 1004.3, 1004.9, 1004.10 and 1004.11 shall apply to all exit doors regardless of occupant load. Buildings or structures used for human occupancy shall have at least one exterior exit door that meets the requirements of Section 1004.6. Doors and landings at doors which are located within an accessible route of travel shall also comply with Chapter 11.

1004.2 Swing and Opening Force. Exit doors shall be of the pivoted or side-hinged swinging type. Exit doors shall swing in the direction of exit travel when serving any hazardous area or when the area served has an occupant load of 50 or more. The door shall swing to full-open position when an opening force not to exceed 30 pounds (133.45 N) is applied to the latch side. For other door-opening forces, see Chapter 11 and Section 905.3. See Section 3207 for doors swinging over public property.

EXCEPTIONS: 1. Group I, Division 3 Occupancy used as a place of detention.
2. Doors within or serving an individual dwelling unit.
3. Special door conforming with Section 1004.8.

Double-acting doors shall not be used as exits when any of the following conditions exist:

1. The occupant load served by the door is 100 or more.
2. The door is part of a fire assembly.
3. The door is part of a smoke- and draft-control assembly.
4. Panic hardware is required or provided on the door.

A double-acting door shall be provided with a view panel of not less than 200 square inches (0.129 m²).

**1004.3 Type of Lock or Latch.** Exit doors shall be openable from the inside without the use of a key or any special knowledge or effort.

**EXCEPTIONS:**
1. In Groups B, F, M and S Occupancies, key-locking hardware may be used on the main exit when the main exit consists of a single door or a pair of doors if there is a readily visible, durable sign on or adjacent to the door stating THIS DOOR MUST REMAIN UNLOCKED DURING BUSINESS HOURS. The sign shall be in letters not less than 1 inch (25 mm) high on a contrasting background. When unlocked, the single door or both leaves of a pair of doors must be free to swing without operation of any latching device. The use of this exception may be revoked by the building official for due cause.
2. Exit doors from individual dwelling units; Group R, Division 3 congregate residences; and guest rooms of Group R Occupancies having an occupant load of 10 or less may be provided with a night latch, dead bolt or security chain, provided such devices are openable from the inside without the use of a key or tool and mounted at a height not to exceed 48 inches (1219 mm) above the finished floor.

Manually operated edge- or surface-mounted flush bolts and surface bolts are prohibited. When exit doors are used in pairs and approved automatic flush bolts are used, the door leaf having the automatic flush bolts shall have no doorknob or surface-mounted hardware. The unlatching of any leaf shall not require more than one operation.

**EXCEPTIONS:**
1. Group R, Division 3 Occupancies.
2. When a pair of doors serving a room not normally occupied are needed for the movement of equipment, manually operated edge or surface bolts may be used and a door closer need not be provided on the inactive leaf.

**1004.4 Panic Hardware.** Panic hardware, when installed, shall comply with the requirements of U.B.C. Standard 10-4. The activating member shall be mounted at a height of not less than 30 inches (762 mm) or more than 44 inches (1118 mm) above the floor. The unlatching force shall not exceed 15 pounds (66.72 N) when applied in the direction of exit travel.

When balanced doors are used and panic hardware is required, panic hardware shall be of the push-pad type and the pad shall not extend across more than one half of the width of the door measured from the latch side.

**1004.5 Special Egress-control Devices.** When approved by the building official, exit doors in Group B; Group F, Division 1; Group I, Division 2; Group M; and Group R, Division 1 congregate residences serving as group-care facilities may be equipped with approved listed special egress-control devices of the time-delay type, provided the building is protected throughout by an approved automatic sprinkler system and an approved automatic smoke-detection system. Such devices shall conform to all of the following:
1. Automatically deactivate the egress-control device upon activation of either the sprinkler system or the detection system.
2. Automatically deactivate the egress-control device upon loss of electrical power to any one of the following:
   2.1 The egress-control device.
   2.2 The smoke-detection system.
   2.3 Exit illumination as required by Section 1012.
3. Be capable of being deactivated by a signal from a switch located in an approved location.
4. Initiate an irreversible process which will deactivate the egress-control device whenever a manual force of not more than 15 pounds (66.72 N) is applied for two seconds to the panic bar or other door-latching hardware. The egress-control device shall deactivate within an approved time...
period not to exceed a total of 15 seconds. The time delay established for each egress-control device shall not be field adjustable.

5. Actuation of the panic bar or other door-latching hardware shall activate an audible signal at the door.

6. The unlatching shall not require more than one operation.

A sign shall be provided on the door located above and within 12 inches (305 mm) of the panic bar or other door-latching hardware reading:

   KEEP PUSHING. THIS DOOR WILL OPEN IN __________ SECONDS. ALARM WILL SOUND.

Sign letter shall be at least 1 inch (25 mm) in height and shall have a stroke of not less than 1/8 inch (3.2 mm).

Regardless of the means of deactivation, relocking of the egress-control device shall be by manual means only at the door.

1004.6 Width and Height. Every required exit doorway shall be of a size as to permit the installation of a door not less than 3 feet (914 mm) in width and not less than 6 feet 8 inches (2032 mm) in height. When installed, exit doors shall be capable of opening so that the clear width of the exit is not less than 32 inches (813 mm). In computing the exit width required by Section 1003.2, the net dimension of the exitway shall be used.

1004.7 Door Leaf Width. A single leaf of an exit door shall not exceed 4 feet (1219 mm) in width.

1004.8 Special Doors. Revolving, sliding and overhead doors shall not be used as required exits.

   EXCEPTION: Horizontal sliding doors complying with U.B.C. Standard 7-8 may be used:
   1. In elevator lobby separations.
   2. Other than Groups A and H Occupancies, where smoke barriers are required.
   3. When serving an occupant load of less than 50 in any occupancy other than a Group H Occupancy.

Power-operated doors complying with U.B.C. Standard 10-1 may be used for exit purposes. Such doors when swinging shall have two guide rails installed on the swing side project ng out from the face of the door jambs for a distance not less than the widest door leaf. Guide rails shall not be less than 30 inches (762 mm) in height with solid or mesh panels to prevent penetration into door swing and shall be capable of resisting a horizontal load at top of rail of not less than 50 pounds per lineal foot (730 N/m).

   EXCEPTIONS: 1. Walls or other type separators may be used in lieu of the above guide rail, provided all the criteria are met.
   2. Guide rails in industrial or commercial occupancies not accessible to the public may conform with the exception to Section 509.3.
   3. Doors swinging toward flow of traffic shall not be permitted for use by untrained pedestrian traffic unless actuating devices start to function at least 8 feet 11 inches (2718 mm) beyond the door in an open position and guide rails extend 6 feet 5 inches (1956 mm) beyond the door in an open position.

Clearances for guide rails shall be as follows:

1. Six inches (152 mm) maximum between rails and leading edge of door at the closest point in its arc of travel.
2. Six inches (152 mm) maximum between rails and the door in an open position.
3. Two inches (51 mm) minimum between rail at hinge side and door in an open position.
4. Two inches (51 mm) maximum between freestanding rails and jamb or other adjacent surface.

1004.9 Floor Level at Doors. Regardless of the occupant load, there shall be a floor or landing on each side of a door. When access for persons with disabilities is required by Chapter 11, the floor or landing shall not be more than 1/2 inch (13 mm) lower than the threshold of the doorway. When such
access is not required, such dimension shall not exceed 1 inch (25 mm). Landings shall be level except for exterior landings, which may have a slope not to exceed \( \frac{1}{4} \) unit vertical in 12 units horizontal (2% slope).

**EXCEPTIONS:**

1. In Group R, Division 3, and Group U Occupancies and within individual units of Group R, Division 1 Occupancies:
   1.1 A door may open at the top step of an interior flight of stairs, provided the door does not swing over the top step.
   1.2 A door may open at a landing that is not more than 8 inches (203 mm) lower than the floor level, provided the door does not swing over the landing.
   1.3 Screen doors and storm doors may swing over stairs, steps or landings.
2. Doors serving building equipment rooms which are not normally occupied.

**1004.10 Landings at Doors.** Landings shall have a width not less than the width of the stairway or the width of the door, whichever is the greater. Doors in the fully open position shall not reduce a required dimension by more than 7 inches (178 mm). When a landing serves an occupant load of 50 or more, doors in any position shall not reduce the landing dimension to less than one half its required width. Landings shall have a length measured in the direction of travel of not less than 44 inches (1118 mm).

**EXCEPTION:** In Group R, Division 3, and Group U Occupancies and within individual units of Group R, Division 1 Occupancies, such length need not exceed 36 inches (914 mm).

A landing which has no adjoining door shall comply with Section 1006.7.

**1004.11 Door Identification.** Glass doors shall conform to the requirements specified in Section 2406.

Exit doors shall be marked so that they are readily distinguishable from the adjacent construction.

**1004.12 Additional Doors.** When additional doors are provided for egress purposes, they shall conform to all provisions of this chapter.

**EXCEPTION:** Approved revolving doors having leaves which will collapse under opposing pressures may be used in exit situations, provided:

1. Such doors have a minimum width of 6 feet 6 inches (1981 mm).
2. At least one conforming exit door is located adjacent to each revolving door.
3. The revolving door shall not be considered to provide any exit width.

**SECTION 1005 — CORRIDORS AND EXTERIOR EXIT BALCONIES**

**1005.1 General.** This section shall apply to every corridor serving as a required exit for an occupant load of 10 or more except that Section 1005.2 shall apply to all corridors. For the purpose of this section, the term “corridor” shall include exterior exit balconies and covered or enclosed walkways, tunnels and malls. Partitions, rails, counters and similar space dividers not over 5 feet 9 inches (1753 mm) in height above the floor shall not be construed to form corridors.

Exit corridors shall not be interrupted by intervening rooms.

**EXCEPTION:** Foyers, lobbies or reception rooms constructed as required for corridors shall not be construed as intervening rooms.

Corridors which are located within an accessible route of travel shall also comply with Chapter 11.

For Group I Occupancies see Section 1019.3.

**1005.2 Width.** The minimum corridor width shall be determined as specified in Section 1003.2, but shall not be less than 44 inches (1118 mm), except as specified herein. Corridors serving an occupant load of 49 or less shall not be less than 36 inches (914 mm) in width. For special requirements for Groups E and I Occupancies, see Sections 1017 and 1019.
1005.3 Height. Corridors and exterior exit balconies shall have a clear height of not less than 7 feet (2134 mm) measured to the lowest projection from the ceiling.

1005.4 Projections. The required width of corridors shall be unobstructed.

**EXCEPTION:** Handrails and doors, when fully opened, shall not reduce the required width by more than 7 inches (178 mm). Doors in any position shall not reduce the required width by more than one half. Other nonstructural projections such as trim and similar decorative features may project into the required width 1½ inches (38 mm) on each side.

1005.5 Access to Exits. When more than one exit is required, they shall be so arranged that it is possible to go in either direction from any point in a corridor to a separate exit, except for dead ends not exceeding 20 feet (6096 mm) in length.

1005.6 Changes in Elevation. When a corridor or exterior exit balcony is accessible to the handicapped, changes in elevation of the floor shall be made by means of a ramp, except as provided for doors by Section 1004.9.

1005.7 Construction. Walls of corridors serving a Group R, Division 1 or Group I Occupancy having an occupant load of 10 or more and walls of corridors serving other occupancies having an occupant load of 30 or more shall be of not less than one-hour fire-resistive construction and the ceilings shall not be less than that required for a one-hour fire-resistive floor or roof system.

**EXCEPTIONS:**
1. One-story buildings housing Group S, Division 2 and Group F, Division 2 Occupancies.
2. Corridors more than 30 feet (9144 mm) in width where occupancies served by such corridors have at least one exit independent from the corridor. (See Chapter 4 for covered malls.)
3. Exterior sides of exterior exit balconies.
4. In Group I, Division 3 Occupancies such as jails, prisons, reformatories and similar buildings with open-barred cells forming corridor walls, the corridors and cell doors need not be fire resistive.
5. Corridor walls and ceilings need not be of fire-resistive construction within office spaces having an occupant load of 100 or less when the entire story in which the space is located is equipped with an automatic sprinkler system throughout and an automatic smoke-detection system installed within the corridor. The activation of any detector shall activate alarms audible in all areas served by the corridor.
6. In other than Type I or II construction, exterior exit balcony roof assemblies may be of heavy-timber construction without concealed spaces.
7. Within office spaces occupied by a single tenant, partial height partitions which form corridors and which do not exceed 6 feet (1829 mm) in height need not be fire resistive, provided they are constructed in accordance with Section 604.5 and are not more than three fourths of the floor-to-ceiling height.
8. Corridor walls and ceilings need not be of fire-resistive construction within office spaces having an occupant load of 100 or less when the building in which the space is located is equipped with an automatic sprinkler system throughout.

When the ceiling of the entire story is an element of a one-hour fire-resistive floor or roof system, the corridor walls may terminate at the ceiling. When the room-side fire-resistant membrane of the corridor wall is carried through to the underside of a fire-resistant floor or roof above, the corridor side of the ceiling may be protected by the use of ceiling materials as required for one-hour floor or roof system construction or the corridor ceiling may be of the same construction as the corridor walls.

Ceilings of noncombustible construction may be suspended below the fire-resistive ceiling.

For wall and ceiling finish requirements, see Table 8-B.

For restrictions on the use of corridors to convey air, see Chapter 6 of the Mechanical Code.

1005.8 Openings.

1005.8.1 Doors. When corridor walls are required to be of one-hour fire-resistive construction by Section 1005.7, every interior door opening shall be protected by a tight-fitting smoke- and draft-control assembly having a fire-protection rating of not less than 20 minutes when tested in...
according to U.B.C. Standard 7-2. Said doors shall not have louvers. The door and frame shall bear an approved label or other identification showing the rating thereof, the name of the manufacturer and the identification of the service conducting the inspection of materials and workmanship at the factory during fabrication and assembly. Doors shall be maintained self-closing or shall be automatic closing by actuation of a smoke detector in accordance with Section 713.2. Smoke- and draft-control door assemblies shall be provided with a gasket so installed as to provide a seal where the door meets the stop on both sides and across the top.

EXCEPTION: 1. Viewports may be installed if they require a hole not larger than 1 inch (25 mm) in diameter through the door, have at least a 1/8-inch-thick (6.4 mm) glass disc and the holder is of metal which will not melt out when subject to temperatures of 1,700°F (927°C).

2. Protection of openings in the interior walls of exterior exit balconies is not required when it is possible to exit in two directions.

1005.8.2 Openings other than doors. Where corridor walls are required to be of one-hour fire-resistant construction by Section 1005.7, interior openings for other than doors or ducts shall be protected by fixed glazing listed and labeled for a fire-protection rating of at least three-fourths hour in accordance with Section 713.9. The total area of all openings, other than doors, in any portion of an interior corridor shall not exceed 25 percent of the area of the corridor wall of the room which it is separating from the corridor. For duct openings, see Sections 713.10 and 713.11.

EXCEPTION: Protection of openings in the interior walls of exterior exit balconies is not required when it is possible to exit in two directions.

1005.9 Location on Property. Exterior exit balconies shall not be located in areas where openings are not permitted or where openings are required to be protected due to location on the property.

1005.10 Elevators. Elevators opening into a corridor serving a Group R, Division 1 or Group I Occupancy having an occupant load of 10 or more, or a corridor serving other occupancies having an occupant load of 30 or more shall be provided with an elevator lobby at each floor containing such a corridor. The lobby shall completely separate the elevators from the corridor by construction conforming to Section 1005.7 and all openings into the lobby wall contiguous with the corridor shall be protected as required by Section 1005.8.

EXCEPTIONS: 1. In office buildings classed as Group B Occupancies, separations need not be provided from a street floor lobby, provided the entire street floor is protected with an automatic sprinkler system.

2. Elevators not required to meet the shaft enclosure requirements of Section 711.

3. When additional doors are provided in accordance with Section 3007.

Elevator lobbies shall comply with Section 3002.

In fully sprinklered office buildings, corridors may lead through enclosed elevator lobbies if all areas of the building have access to at least one required exit without passing through the elevator lobby.

SECTION 1006 — STAIRWAYS

1006.1 General. Every stairway having two or more risers serving any building or portion thereof shall conform to the requirements of this section. When aisles in assembly rooms have steps, they shall conform with the provisions in Section 1014.

EXCEPTION: Stairs or ladders used only to attend equipment or window wells are exempt from the requirements of this section.

1006.2 Width. The minimum stairway width shall be determined as specified in Section 1003.2, but shall not be less than 44 inches (1118 mm) except as specified herein and in Chapter 11. Stairways serving an occupant load of 49 or less shall not be less than 36 inches (914 mm) in width.

Handrails may project into the required width a distance of 3 1/2 inches (89 mm) from each side of a stairway. Stringers and other projections such as trim and similar decorative features may project into the required width 1 1/2 inches (38 mm) on each side.
1006.3 Rise and Run. The rise of steps shall not be less than 4 inches (102 mm) or greater than 7 inches (178 mm). Except as permitted in Sections 1006.4 and 1006.6, the run shall not be less than 11 inches (279 mm) as measured horizontally between the vertical planes of the furthermost projection of adjacent treads. Except as permitted in Sections 1006.4, 1006.5 and 1006.6, the largest tread run within any flight of stairs shall not exceed the smallest by more than \( \frac{3}{8} \) inch (9.5 mm). The greatest riser height within any flight of stairs shall not exceed the smallest by more than \( \frac{3}{8} \) inch (9.5 mm).

**EXCEPTIONS:**
1. Private steps and stairways serving an occupant load of less than 10 and stairways to unoccupied roofs may be constructed with an 8-inch-maximum (203 mm) rise and a 9-inch-minimum (229 mm) run.
2. Where the bottom or top riser adjoins a sloping public way, walk or driveway having an established grade and serving as a landing, the bottom or top riser may be reduced along the slope to less than 4 inches (102 mm) in height with the variation in height of the bottom or top riser not to exceed 3 inches (76 mm) in every 3 feet (914 mm) of stairway width.

1006.4 Winding Stairways. In Group R, Division 3 Occupancies and in private stairways in Group R, Division 1 Occupancies, winders may be used if the required width of run is provided at a point not more than 12 inches (305 mm) from the side of the stairway where the treads are narrower, but in no case shall any width of run be less than 6 inches (152 mm) at any point.

1006.5 Circular Stairways. Circular stairways may be used as an exit, provided the minimum width of run is not less than 10 inches (254 mm) and the smaller radius is not less than twice the width of the stairway. The largest tread width or riser height within any flight of stairs shall not exceed the smallest by more than \( \frac{3}{8} \) inch (9.5 mm).

1006.6 Spiral Stairways. In Group R, Division 3 Occupancies and in private stairways within individual units of Group R, Division 1 Occupancies, spiral stairways may be installed. Such stairways may be used for required exits when the area served is limited to 400 square feet (37.16 m²).

The tread must provide a clear walking area measuring at least 26 inches (660 mm) from the outer edge of the supporting column to the inner edge of the handrail. A run of at least \( 7\frac{1}{2} \) inches (191 mm) is to be provided at a point 12 inches (305 mm) from where the tread is the narrowest. The rise must be sufficient to provide 6-foot 6-inch (1981 mm) headroom. The rise shall not exceed \( 9\frac{1}{2} \) inches (241 mm).

1006.7 Landings. Every landing shall have a dimension measured in the direction of travel not less than the width of the stairway. Such dimension need not exceed 44 inches (1118 mm) when the stair has a straight run. There shall not be more than 12 feet (3658 mm) vertically between landings. For landings with adjoining doors, see Section 1004.10.

**EXCEPTION:** Stairs serving an unoccupied roof are exempt from these provisions.

1006.8 Basement Stairways. When a basement stairway and a stairway to an upper story terminate in the same exit enclosure, an approved barrier shall be provided to prevent persons from continuing on into the basement. Directional exit signs shall be provided as specified in Section 1013.

1006.9 Handrails. Stairways shall have handrails on each side, and every stairway required to be more than 88 inches (2235 mm) in width shall be provided with not less than one intermediate handrail for each 88 inches (2235 mm) of required width. Intermediate handrails shall be spaced approximately equally across with the entire width of the stairway.

**EXCEPTIONS:**
1. Stairways less than 44 inches (1118 mm) in width or stairways serving one individual dwelling unit in Group R, Division 1 or 3 Occupancies or a Group R, Division 3 congregate residence may have one handrail.
2. Private stairways 30 inches (762 mm) or less in height may have handrails on one side only.
3. Stairways having less than four risers and serving one individual dwelling unit in Group R, Division 1 or 3, or a Group R, Division 3 congregate residence or serving Group U Occupancies need not have handrails.

The top of handrails and handrail extensions shall be placed not less than 34 inches (864 mm) or more than 38 inches (965 mm) above the nosing of treads and landings. Handrails shall be continu-
ous the full length of the stairs and, except for private stairways, at least one handrail shall extend in the direction of the stair run not less than 12 inches (305 mm) beyond the top riser nor less than 12 inches (305 mm) beyond the bottom riser. Ends shall be returned or shall terminate in newel posts or safety terminals.

The handgrip portion of handrails shall not be less than $1\frac{3}{4}$ (32 mm) inches nor more than 2 inches (51 mm) in cross-sectional dimension or the shape shall provide an equivalent gripping surface. The handgrip portion of handrails shall have a smooth surface with no sharp corners.

Handrails projecting from a wall shall have a space of not less than $1\frac{1}{2}$ inches (38 mm) between the wall and the handrail.

1006.10 Guardrails. Stairways open on one or both sides shall have guardrails as required by Section 509.

1006.11 Protection of Exterior Wall Openings. Except in Group R, Division 3 Occupancies, all openings in the exterior wall below and within 10 feet (3048 mm), measured horizontally, of an exterior exit stairway or unprotected openings in an interior exit stairway serving a building over two stories in height or a floor level having such openings in two or more floors below shall be protected by fixed, self-closing, or automatic-closing fire assemblies having a three-fourths-hour fire-protection rating.

**EXCEPTIONS:**
1. Openings may be unprotected when two separated exterior stairways serve an exterior exit balcony.
2. Protection of openings is not required for open parking garages conforming to Section 311.9.

1006.12 Interior Stairway Construction. Interior stairways shall be constructed as specified in Sections 602.4, 603.4, 604.4, 605.4 and 606.4.

Except when enclosed usable space under stairs is prohibited by Section 1009.6, the walls and soffits of the enclosed space shall be protected on the enclosed side as required for one-hour fire-resistant construction.

All required interior stairways which extend to the top floor in any building four or more stories in height shall have, at the highest point of the stair shaft, an approved hatch openable to the exterior not less than 16 square feet (1.5 m²) in area with a minimum dimension of 2 feet (610 mm).

**EXCEPTION:** The hatch need not be provided on pressurized enclosures or on stairways that extend to the roof with an opening onto that roof.

Stairways exiting directly to the exterior of a building four or more stories in height shall be provided with means for emergency entry for fire department access.

1006.13 Exterior Stairway Construction. Exterior stairways shall be constructed as specified in Sections 602.4, 603.4, 604.4, 605.4 and 606.4.

Enclosed usable space under stairs shall not project into yards where openings are not permitted or protection of openings is required.

Enclosed usable space under stairs shall have the walls and soffits protected on the enclosed side as required for one-hour fire-resistant construction.

Stairways exiting directly to the exterior of a building four or more stories in height shall be provided with means for emergency entry for fire department access.

1006.14 Stairway to Roof. In buildings four or more stories in height, one stairway shall extend to the roof surface, unless the roof has a slope greater than 4 in 12. See Section 1006.12 for roof hatch requirements.

1006.15 Headroom. Every stairway shall have a headroom clearance of not less than 6 feet 8 inches (2032 mm). Such clearances shall be measured vertically from a plane parallel and tangent to the stairway tread nosings to the soffit above at all points.
1006.16 Stairway Identification. Approved stairway identification signs shall be located at each floor level in all enclosed stairways in buildings four or more stories in height. The sign shall identify the stairway, indicate whether there is roof access, the floor level, and the upper and lower terminus of the stairway. The sign shall be located approximately 5 feet (1524 mm) above the floor landing in a position which is readily visible when the door is in the open or closed position. Signs shall comply with requirements of U.B.C. Standard 10-2.

SECTION 1007 — RAMPS

1007.1 General. Except for ramped aisles in assembly rooms, ramps used as exits shall conform to the provisions of this section. Ramped aisles within assembly rooms shall conform with the provisions in Section 1014. Ramps which are located within an accessible route of travel shall also comply with Chapter 11.

1007.2 Width. The width of ramps shall be determined as specified in Section 003.2, but shall not be less than 44 inches (1118 mm), except as specified herein. Ramps serving an occupant load of 49 or less shall not be less than 36 inches (914 mm) in width.

Handrails may project into the required width a distance of 3 1/2 inches (89 mm) from each side of a ramp. Other projections, such as trim and similar decorative features, may project into the required width 1 1/2 inches (38 mm) on each side.

1007.3 Slope. The slope of ramps required by Chapter 11 which are located within an accessible route of travel shall not be steeper than 1 unit vertical in 12 units horizontal (8.33% slope). The slope of other ramps shall not be steeper than 1 unit vertical in 8 units horizontal (12.5% slope).

1007.4 Landings. Ramps having slopes steeper than 1 unit vertical in 15 units horizontal (6.7% slope) shall have landings at the top and bottom, and at least one intermediate landing shall be provided for each 5 feet (1524 mm) of rise. Top landings and intermediate landings shall have a dimension measured in the direction of ramp run of not less than 5 feet (1524 mm). Landings at the bottom of ramps shall have a dimension in the direction of ramp run of not less than 6 feet (1829 mm).

Doors in any position shall not reduce the minimum dimension of the landing to less than 42 inches (1067 mm) and shall not reduce the required width by more than 3 1/2 inches (89 mm) when fully open.

When ramp access is provided to comply with Chapter 11 and a door swings over a landing, the landing shall extend at least 24 inches (610 mm) beyond the latch edge of the door measured parallel to the door in the closed position, and shall have a length parallel to the direction of travel through the doorway of not less than 5 feet (1524 mm).

1007.5 Handrails. Ramps having slopes steeper than 1 unit vertical in 15 units horizontal (6.7% slope) shall have handrails as required for stairways, except that intermediate handrails shall not be required. Ramped aisles need not have handrails on sides serving fixed seating.

1007.6 Construction. Ramps shall be constructed as required for stairways.

1007.7 Surface. The surface of ramps shall be roughened or shall be of slip-resistant materials.

1007.8 Guardrails. Ramps open on one or both sides shall have guardrails as required by Section 509.

1007.9 Headroom. Ramps shall have a headroom clearance of not less than 7 feet (2134 mm). Such clearances shall be measured vertically from the finished floor surface of the ramp and landings to the soffit above at all points.

SECTION 1008 — HORIZONTAL EXIT

1008.1 Used as a Required Exit. A horizontal exit may be considered as a required exit when conforming to the provisions of this chapter. A horizontal exit shall not serve as the only exit from a 1-184
portion of a building, and when two or more exits are required, not more than one half of the total number of exits or total exit width may be horizontal exits.

1008.2 Openings. Openings in a horizontal exit shall be protected by a fire assembly having a fire-protection rating of not less than one and one-half hours.

Such fire assemblies shall be self-closing or automatic closing upon the activation of a smoke detector installed in accordance with Section 713. All hold-open devices shall be listed for the purpose and shall close or release the fire assembly to the closed position in the event of a power failure.

1008.3 Discharge Areas. A horizontal exit shall lead into a floor area having capacity for an occupant load not less than the occupant load served by such exit. The capacity shall be determined by allowing 3 square feet (0.27 m²) of net clear floor area for each occupant to be accommodated therein, not including areas of stairs, elevators and other shafts or courts. In Group I, Division 1.1 Occupancies, the capacity shall be determined by allowing 15 square feet (1.4 m²) of net clear floor area per ambulatory occupant and 30 square feet (2.8 m²) per nonambulatory occupant. The area into which a horizontal exit leads shall be provided with exits adequate to meet the requirements of this chapter but need not include the added capacity imposed by persons entering it through horizontal exits.

SECTION 1009 — STAIRWAY, RAMP AND ESCALATOR ENCLOSURES

1009.1 General. Interior stairways, ramps or escalators shall be enclosed as specified in this section.

EXCEPTIONS: 1. In other than Groups H and I Occupancies, an enclosure need not be provided for a stairway, ramp or escalator serving only one adjacent floor. Any two such interconnected floors shall not be open to other floors. For enclosure of escalators serving Groups B, F, M and S Occupancies, see Sections 304.6, 306.6, 309.6 and 311.6.

2. Stairs in Group R, Division 3 Occupancies and stairs within individual dwelling units in Group R, Division 1 Occupancies need not be enclosed.

3. Stairs in open parking garages, as defined in Section 311.9, need not be enclosed.

1009.2 Enclosure Construction. Enclosure walls shall not be of less than two-hour fire-resistive construction in buildings four or more stories in height or of Types I and II fire-resistive construction and shall not be of less than one-hour fire-resistive construction elsewhere.

EXCEPTION: In sprinkler-protected parking garages restricted to the storage of private or pleasure-type motor vehicles, stairway enclosures may be enclosed with glazing meeting the requirements of Sections 713.7, 713.8 and 713.9.

1009.3 Openings into Enclosures. Openings into exit enclosures other than permitted exterior openings shall be limited to those necessary for exiting from a normally occupied space into the enclosure and exiting from the enclosure. Other penetrations into and opening through the exit enclosure are prohibited except for ductwork and equipment necessary for independent stair pressurization, sprinkler piping, standpipes and electrical conduit serving the stairway and terminating in a listed box not exceeding 16 square inches (10323 mm²) in area. Penetrations and communicating openings between adjacent exit enclosures are not permitted regardless of whether the opening is protected.

All exit doors in an exit enclosure shall be protected by a fire assembly having a fire-protection rating of not less than one hour where one-hour enclosure construction is permitted in Section 1009.2 and one and one-half hours where two-hour enclosure construction is required by Section 1009.2. Doors shall be maintained self-closing or shall be automatic closing by actuation of a smoke detector as provided for in Section 713.2. The maximum transmitted temperature end point shall not exceed 450°F (232°C.) above ambient at the end of 30 minutes of the fire exposure specified in U.B.C. Standard 7-2.

1009.4 Extent of Enclosure. Stairway and ramp enclosures shall include landings and parts of floors connecting stairway flights and shall also include a corridor or exit passegway on the ground.
floor leading from the stairway to the exterior of the building. Openings into the corridor or exit passageway shall comply with the requirements of Section 1009.3.

**EXCEPTIONS:**
1. Enclosed corridors or exit passageways are not required from unenclosed stairways or ramps.
2. In office buildings, a maximum of 50 percent of the exits may discharge through a street-floor lobby, provided the required exit width is free and unobstructed and the entire street floor is protected with an automatic sprinkler system.

### 1009.5 Barrier
A stairway in an exit enclosure shall not continue below the grade level exit unless an approved barrier is provided at the ground-floor level to prevent persons from accidentally continuing into the basement.

### 1009.6 Use of Space under Stair and Ramp
There shall be no enclosed usable space under stairways or ramps in an exit enclosure, nor shall the open space under such stairways be used for any purpose.

### 1009.7 Pressurized Enclosure
In a building having a floor used for human occupancy which is located more than 75 feet (22,860 mm) above the lowest level of fire department vehicle access, the entire required enclosure shall be pressurized in accordance with Section 905 of this code and this section. Pressurization shall occur automatically upon activation of an approved fire alarm system.

**EXCEPTION:** When the building is not equipped with a fire alarm system, pressurization shall be upon activation of a spot-type smoke detector listed for releasing service installed within 5 feet (1,524 mm) of each vestibule entry.

The upper portion of such enclosures shall be provided with controlled relief vent capable of discharging a minimum of 2,500 cubic feet per minute (1180 L/s) of air at the design pressure difference.

Such enclosures shall be provided with a pressurized entrance vestibule.

### 1009.8 Vestibules
When required by Section 1009.7, vestibules shall meet the following requirements:

1. A level surface of not less than the area required by Section 1104.2 for two wheelchair spaces shall be provided. Such space shall not obstruct the required exit width and shall not interfere with access to or use of fire department hose connections and valves.
2. Two-way communication for the occupants shall be provided directly to the fire-control room.
3. Emergency illumination shall be provided to maintain a minimum of 30 foot-candles (323 lx) on the floor.
4. An approved occupant-sensing device shall be provided. Such device shall visually indicate the presence of an occupant within the vestibule in an approved manner at the fire-control room.
5. Fire department connections and valves serving the floor shall be located within the vestibule and in such a manner as to not obstruct exiting when hose lines are connected and charged.
6. The minimum pressure differences within the vestibule with the doors closed shall be 0.05 inch water gage (12.44 Pa) positive pressure relative to the fire floor and 0.05 inch water gage (12.44 Pa) negative relative to the exit enclosure. No pressure difference is required relative to a nonfire floor.

### SECTION 1010 — EXIT COURTS

#### 1010.1 General
Exit courts shall discharge into a public way or exit passageway.

#### 1010.2 Width
Exit court minimum widths shall be determined in accordance with provisions of Section 1003 based on the occupant load and such required width shall be unobstructed to a height
of 7 feet (2134 mm), except for projections permitted in corridors by Section 1005. The width of exit courts shall not be less than 44 inches (1118 mm) except Group R, Division 3 and Group U Occupancies, where the width may be reduced to 36 inches (914 mm).

When the width is reduced from any cause, the reduction shall be effected gradually by a guardrail at least 3 feet (914 mm) in height and making an angle of not more than 30 degrees with the axis of the exit court.

1010.3 Number of Exits. Exit courts shall be provided with exits as determined by Section 1003.

1010.4 Construction and Openings. When an exit court serving a building or portion thereof having an occupant load of 10 or more is less than 10 feet (3048 mm) in width, the exit court walls shall be a minimum of one-hour fire-resistive construction for a distance of 10 feet (3048 mm) above the floor of the court, and all openings therein shall be protected by fire assemblies having a fire-protection rating of not less than three-fourths hour.

SECTION 1011 — EXIT PASSAGEWAYS

1011.1 Construction and Openings. The walls of exit passageways shall be without openings other than required exits from normally occupied spaces and shall have walls, floors and ceilings of the same period of fire resistance as required for the walls, floors and ceilings of the building served with a minimum of one-hour fire-resistive construction. Exit openings through the enclosing walls of exit passageways shall be protected by fire assemblies having a three-fourths-hour fire-protection rating.

1011.2 Detailed Requirements. Except for construction and openings protection as specified in Section 1011.1 above, exit passageways shall comply with the requirements for corridors as specified in Section 1005.

SECTION 1012 — EXIT ILLUMINATION

1012.1 General. Except within individual dwelling units, guest rooms and sleeping rooms, exits shall be illuminated at any time the building is occupied with light having intensity of not less than 1 footcandle (10.76 lx) at floor level.

EXCEPTION: In auditoriums, theaters, concert or opera halls and similar assembly uses, the illumination at floor level may be reduced during performances to not less than 0.2 footcandle (2.15 lx).

Fixtures required for exit illumination shall be supplied from separate sources of power where required by Section 1012.2.

1012.2 Separate Sources of Power. The power supply for exit illumination shall normally be provided by the premises’ wiring system. In the event of its failure, illumination shall be automatically provided from an emergency system for Group I, Divisions 1.1 and 1.2 Occupancies and for all other occupancies where the exiting system serves an occupant load of 100 or more.

For high-rise buildings, see Section 403.

Emergency systems shall be supplied from storage batteries or an on-site generator set and the system shall be installed in accordance with the requirements of the Electrical Code.

SECTION 1013 — EXIT SIGNS

1013.1 Where Required. When two or more exits from a story are required by Section 1003, exit signs shall be installed at stair enclosure doors, horizontal exits and other required exits from the story. When two or more exits are required from a room or area, exit signs shall be installed at the required exits from the room or area and where otherwise necessary to clearly indicate the direction of egress.
EXCEPTIONS: 1. Main exterior exit doors which obviously and clearly are identifiable as exits need not be signed when approved by the building official.
2. Group R, Division 3, and individual units of Group R, Division 1 Occupancies.
3. Exits from rooms or areas with an occupant load of less than 50 when located within a Group I, Division 1.1, 1.2 or 2 Occupancy or a Group E, Division 3 day-care occupancy.

1013.2 Graphics. The color and design of lettering, arrows and other symbols on exit signs shall be in high contrast with their background. Words on the sign shall be in block letters 6 inches (152 mm) in height with a stroke of not less than \( \frac{3}{4} \) inch (19 mm).

1013.3 Illumination. Signs shall be internally or externally illuminated by two electric lamps or shall be of an approved self-luminous type. When the luminance on the face of an exit sign is from an external source, it shall have an intensity of not less than 5.0 footcandles (53.82 lx) from either lamp. Internally illuminated signs shall provide equivalent luminance.

1013.4 Power Supply. Current supply to one of the lamps for exit signs shall be provided by the premises' wiring system. Power to the other lamp shall be from storage batteries or an on-site generator set and the system shall be installed in accordance with the Electrical Code. For high-rise buildings, see Section 403.

1013.5 Floor-level Exit Signs. When exit signs are required by Section 1013.1, additional approved low-level exit signs which are internally or externally illuminated, photoluminescent or self-luminous, shall be provided in all interior exit corridors serving guest rooms of hotels in Group R, Division 1 Occupancies.

The bottom of the sign shall not be less than 6 inches (152 mm) or more than 8 inches (203 mm) above the floor level. For exit doors, the sign shall be on the door or adjacent to the door with the closest edge of the sign within 4 inches (102 mm) of the door frame.

1013.6 Amusement Building Exit Marking. Approved direction exit marking and exit signs shall be provided. Approved low-level exit signs and directional marking shall be located not more than 8 inches (203 mm) above the walking surface and at the exit path. Such marking shall be activated in accordance with Section 408.5.3.

SECTION 1014 — AISLES

1014.1 General. Aisles leading to required exits shall be provided from all portions of buildings. Aisles located within an accessible route of travel shall also comply with Chapter 11.

1014.2 Width in Occupancies without Fixed Seats. The width of aisles in occupancies without fixed seats shall comply with this section. Aisle widths shall be provided in accordance with the following:

1. In areas serving employees only, the minimum aisle width shall be 24 inches (510 mm) but not less than the width required by the number of employees served.

2. In public areas of Groups B and M Occupancies, and in assembly occupancies without fixed seats, the minimum clear aisle width shall be 36 inches (914 mm) where tables, counters, furnishings, merchandise or other similar obstructions are placed on one side of the aisle or they and 44 inches (1118 mm) when such obstructions are placed on both sides of the aisle.

1014.3 Width in Assembly Occupancies with Fixed Seats. Aisles in assembly occupancies with fixed seats shall comply with this section. The clear width of aisles shall be based on the number of occupants within the portion of the seating areas served by the aisle.

The minimum clear width of aisles and other means of egress shall be in accordance with Table 10-B or, for buildings providing smoke-protected assembly seating and for which an approved life-safety evaluation is conducted, in accordance with Table 10-C. For Table 10-C, the number of seats specified must be within a single assembly place, and interpolation shall be permitted between the
specified values shown. For both tables, the minimum clear widths shall be modified in accordance with the following:

1. If risers exceed 7 inches (178 mm) in height, multiply the stair width in the tables by factor $A$, where:

$$A = 1 + \frac{\text{riser height} - 7.0 \text{ in.}}{5}$$

For SI:

$$A = 1 + \frac{\text{riser height} - 178 \text{ mm}}{127}$$

2. Stairs not having a handrail within a 30-inch (760 mm) horizontal distance shall be 25 percent wider than otherwise calculated, i.e., multiply by $B = 1.25$.

3. Ramps steeper than 1 in 10 slope where used in ascent shall have their width increased by 10 percent, i.e., multiply factor $C = 1.10$.

Where exiting is possible in two directions, the width of such aisles shall be uniform throughout their length.

When aisles converge to form a single path of exit travel, the aisle width shall not be less than the combined required width of the converging aisles.

In assembly rooms with fixed seats arranged in rows, the clear width of aisles shall not be less than set forth above or less than the following:

- Forty-eight inches (1219 mm) for stairs having seating on both sides.
- Thirty-six inches (914 mm) for stairs having seating on one side.
- Twenty-three inches (584 mm) between a stair handrail and seating when the aisles are subdivided by the handrail.
- Forty-two inches (1067 mm) for level or ramped aisles having seating on both sides.
- Thirty-six inches (914 mm) for level or ramped aisles having seating on one side.
- Twenty-three inches (584 mm) between a stair handrail and seating when an aisle does not serve more than five rows on one side.

1014.4 Aisle Termination. Aisles shall terminate at a cross aisle, foyer, doorway or vomitory. Aisles shall not have a dead end greater than 20 feet (6096 mm) in length.

**EXCEPTION:** A longer dead-end aisle is permitted when seats served by the dead-end aisle are not more than 24 seats from another aisle measured along a row of seats having a minimum clear width of 12 inches (305 mm) plus 0.6 inch (15 mm) for each additional seat above seven in a row.

Each end of a cross aisle shall terminate at an aisle, foyer, doorway or vomitory.

1014.5 Ramp Slope. The slope of ramped aisles shall not be more than 1 unit vertical in 8 units horizontal (12.5% slope). Ramped aisles shall have a slip-resistant surface.

1014.6 Aisle Steps.

1014.6.1 When prohibited. Steps shall not be used in aisles having a slope of 1 unit vertical in 8 units horizontal (12.5% slope) or less.

1014.6.2 When required. Aisles with a slope steeper than 1 unit vertical in 8 units horizontal (12.5% slope) shall consist of a series of risers and treads extending across the entire width of the aisle.

The height of risers shall not be more than 7 inches (178 mm) or less than 4 inches (102 mm) and the tread run shall not be less than 11 inches (279 mm). The riser height shall be uniform within each flight and the tread run shall be uniform throughout the aisle. Variations in run or height between adjacent treads or risers shall not exceed $\frac{3}{16}$ inch (4.8 mm). A contrasting marking stripe or other
approved marking shall be provided on each tread at the nosing or leading edge such that the location of each tread is readily apparent when viewed in descent. Such stripe shall be a minimum of 1 inch (25 mm) wide and a maximum of 2 inches (51 mm) wide.

EXCEPTION: When the slope of aisle steps and the adjoining seating area is the same, the riser heights may be increased to a maximum of 9 inches (229 mm) and may be nonuniform but only to the extent necessitated by changes in the slope of the adjoining seating area to maintain adequate sightlines. Variations may exceed \(\frac{1}{16}\) inch (4.8 mm) between adjacent risers provided the exact location of such variations is identified with a marking stripe on each tread at the nosing or leading edge adjacent to the nonuniform riser. The marking stripe shall be distinctively different from the contrasting marking stripe.

1014.7 Handrails. Handrails shall comply with the height, size and shape dimensions set forth in Section 1006.9 and shall have rounded terminations or bends. Ramped aisles having a slope steeper than 1 unit vertical in 15 units horizontal (6.7% slope) and aisle stairs (two or more adjacent steps) shall have handrails located either at the side or within the aisle width. Handrails may project into the required aisle width a distance of \(3\frac{1}{2}\) inches (89 mm).

EXCEPTIONS: 1. Handrails may be omitted on ramped aisles having a slope not greater than 1 unit vertical in 8 units horizontal (12.5% slope) when fixed seating is on both sides of the aisle.

2. Handrails may be omitted when a guardrail is at the side of an aisle which conforms to the size and shape requirements for handrails.

Handrails located within the aisle width shall be discontinuous with gaps or breaks at intervals not to exceed five rows. These gaps or breaks shall have a clear width of not less than 22 inches (559 mm) or more than 36 inches (914 mm) measured horizontally. Such handrails shall have an additional intermediate handrail located 12 inches (305 mm) below the main handrail.

SECTION 1015 — SEAT SPACING

When seating rows have 14 or less seats, the minimum clear width between rows shall not be less than 12 inches (305 mm) measured as the clear horizontal distance from the back of the row ahead and the nearest projection of the row behind. Where seats are automatic or self-rising, measurement may be made with the seats in the raised position. Where seats are not automatic or self-rising, the minimum clear width shall be measured with the seat in the down position.

The clear width shall be increased as follows:

1. For rows of seating served by aisles or doorways at both ends, there shall be at most 100 seats per row and the minimum clear width of 12 inches (305 mm) between rows shall be increased by 0.3 inch (7.62 mm) for every additional seat beyond 14, but the minimum clear width need not exceed 22 inches (559 mm). If the aisles are dead ended, see Section 1014.4 for further limitations.

2. For rows of seating served by an aisle or doorway at one end only, the minimum clear width of 12 inches (305 mm) between rows shall be increased by 0.6 inch (15 mm) for every additional seat beyond seven, but the minimum clear width need not exceed 22 inches (559 mm). In addition, the distance to the point where the occupant has a choice of two directions of travel to an exit shall not exceed 30 feet (9144 mm) from the point where the occupant is seated.

SECTION 1016 — GROUP A OCCUPANCIES

1016.1 Main Exit. Group A, Division 1, 2 or 2.1 Occupancies shall be provided with a main exit.

The main exit shall be of sufficient width to accommodate one half of the total occupant load but shall not be less than the total required width of all aisles, exit passageways and stairways leading thereto and shall connect to a continuous and unobstructed means of egress to a public way.

1016.2 Side Exits. Auditoriums of Group A, Division 1, 2 or 2.1 Occupancies shall be provided with exits on each side. The exits on each side of the auditorium shall be of sufficient width to accommodate one third of the total occupant load served. Side exits shall open directly to a public way.
or into an exit court, approved stairway, exterior stairway or exit passageway leading to a public
way. Side exits shall be accessible from a cross aisle.

1016.3 Balcony Exits. Balconies having an occupant load of 10 or more shall be provided with a
minimum of two exits. Balcony exits shall open directly to an exterior stairway or other approved
stairway or ramp. When there is more than one balcony, exits shall open into an exterior or enclosed
stairway or ramp. Balcony exits shall be accessible from a cross aisle. The number and distribution
of exits shall be as otherwise specified in this chapter.

1016.4 Panic Hardware. Exit doors from Group A Occupancies having an occupant load of 50 or
more shall not be provided with a latch or lock unless it is panic hardware.

**EXCEPTIONS:**
1. In Group A, Division 3 Occupancies and in all churches, panic hardware may be
omitted from the main exit when the main exit consists of a single door or pair of doors. A key-locking device
may be used in place of the panic hardware, provided there is a readily visible durable sign adjacent to the
doorway stating THIS DOOR MUST REMAIN UNLOCKED DURING BUSINESS HOURS. The sign shall
be in letters not less than 1 inch (25 mm) high on a contrasting background. When unlocked, the single door
or both leaves of a pair of doors must be free to swing without operation of any latching device. When a pair
of doors is installed, one leaf shall have no locking devices whatsoever, and the second leaf shall be arranged
to latch or lock into the frame and into the first leaf in such a manner that a single unlocking action will unlock
both leaves simultaneously. Flush, edge or surface bolts or any other type of device that may be used to close
or restrain the door other than by operation of the locking device are prohibited. The use of this exception may
be revoked by the building official for due cause.

2. Panic hardware may be waived on gates surrounding stadiums when the gates are under constant immedi­
ate supervision while the public is present, and provided safe dispersal areas based on 3 square feet
(0.28 m²) per occupant are located between the stadium and the fence. Gates may be horizon­al sliding or swinging and
may exceed the 4-foot-width (1219 mm) limitation. The required dispersal area shall be located not less than
50 feet (15 240 mm) from the stadium.

1016.5 Multitheater Complex. The main exit from the multitheater complex shall be of suffi­
cient width to accommodate one half of the aggregate occupant load of the complex.

Corridor walls and ceilings shall be of not less than one-hour fire-resistant construction with
openings protected as required in Section 1005.8.

**EXCEPTION:** Opening protection is not required when each motion picture auditorium has at least one
half of its required exits opening directly to the exterior or into an exit passageway.

SECTION 1017—GROUP E OCCUPANCIES

1017.1 Definitions. For the purpose of this section, the following definitions apply:

**INTERIOR ROOM** is a room whose only exit is through an adjoining or intervening room
which is not an exit corridor.

**ROOM** is a space or area bounded by any obstructions to exit passage which at any time enclose
more than 80 percent of the perimeter of the area. In computing the unobstructed perimeter, openings
less than 3 feet (914 mm) in clear width and less than 6 feet 8 inches (2032 mm) high shall not be
considered.

**SEPARATE EXIT SYSTEM** is a path of exit travel separated in such a manner from other re­
quired exits as to provide an atmospheric separation which precludes contamination of both paths
by the same fire.

1017.2 Separate Exit Systems Required. Every room with an occupant load of more than 300
shall have one of its exits into a separate exit system. When three or more exits are required from a
room, no more than two required exits shall enter into the same exit system.

1017.3 Travel Distance.

1017.3.1 In rooms. The distance from any point in a room shall not be more than 75 feet (22 860
mm) from an exit corridor, an enclosed stairway or the exterior of the building.

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1017.3.1—1017.9

**EXCEPTIONS:**
1. In buildings not more than two stories in height and protected throughout with smoke detectors, the distance may be increased to 90 feet (27,432 mm).
2. In buildings protected throughout by an automatic sprinkler system, the distance may be increased to 110 feet (33,528 mm).

**1017.3.2 From any location.** All portions of unsprinklered buildings shall not be more than 150 feet (45,720 mm) from either an exterior exit door, a horizontal exit, an exit passageway or an enclosed stairway measured along the line of travel. In a building protected throughout with an automatic sprinkler system such distance may be increased to 225 feet (68,580 mm). In buildings not more than two stories in height protected throughout with smoke detectors, the distance may be increased to 175 feet (53,340 mm).

**1017.4 Exits through Adjoining Rooms.** Interior rooms may exit through adjoining or intervening rooms, provided the total travel distance through such rooms to an exit corridor does not exceed that specified in Section 1017.3.1 and is a direct, obvious and unobstructed path of travel. Such paths of exit travel shall not pass through kitchens, storerooms, restrooms, closets, laboratories using hazardous materials, industrial shops or other similar places.

Foyers and lobbies constructed as required for exit corridors shall not be construed as adjoining or intervening rooms.

When the only means of exit from a room is through an adjoining or intervening room, smoke detectors shall be installed throughout the area of the common atmosphere through which the exit must pass. The detectors shall be connected to the school fire alarm system.

**EXCEPTIONS:**
1. When the aggregate occupant load of the interior room or rooms is 10 or less.
2. When the enclosures forming interior rooms are less than two thirds of the floor-to-ceiling height and do not exceed 8 feet (2438 mm).
3. Rooms used exclusively for mechanical and public utility service to the buildings.

**1017.5 Corridors and Exterior Exit Balconies.** Corridor walls and ceilings shall be of not less than one-hour fire-resistive construction with openings protected as required in Section 1005.8.

**EXCEPTION:** When each room used for instruction has at least one exit door directly to the exterior at ground level and when rooms used for assembly purposes have at least one half of the required exits directly to the exterior ground level, one-hour fire-resistive construction of corridor walls and ceilings is not required.

Any change in elevation of less than 2 feet (610 mm) in a corridor or exterior exit balcony shall be by means of ramps.

The width of a corridor in a Group E, Division 1 Occupancy shall be the width required by Section 1003, plus 2 feet (610 mm), but not less than 6 feet (1829 mm).

**EXCEPTION:** When the total number of occupants served is less than 100, the corridor may be 44 inches (1118 mm) wide.

**1017.6 Exit Serving Auditoriums in Group E, Division 1 Occupancy.** An exit serving an auditorium and other rooms need provide only for the capacity of whichever requires the greater width if the auditorium is not to be used simultaneously with the other rooms.

**1017.7 Laboratories.** Occupants in laboratories having an area in excess of 200 square feet (18.6 m²) shall have access to at least two exits from the room and all portions of the room shall be within 75 feet (22,860 mm) of an exit.

**1017.8 Stairs.** Each floor above or below the ground floor level shall have not less than two exit stairs and the required exit width shall be equally divided between such stairs, provided that stairs serving an occupant load of 100 or more shall be not less than 5 feet (1524 mm) in clear width.

**EXCEPTION:** This section does not apply to rooms used for maintenance, storage and similar purposes.

**1017.9 Doors.** The width of exit doors shall be sufficient to accommodate the occupant load served.
1017.10 **Basement Rooms.** Exit stairways from a basement shall open directly to the exterior of the building without entering the first floor corridor.

1017.11 **Panic Hardware.** Exit doors from rooms having an occupant load of 50 or more and from corridors shall not be provided with a latch or lock unless it is panic hardware.

1017.12 **Fences and Gates.** School grounds may be fenced and gates therein equipped with locks, provided safe dispersal areas are located not less than 50 feet (15 240 mm) from the buildings. Dispersal areas shall be sized to provide an area of not less than 3 square feet (0.28 m²) per occupant. Gates shall not be installed across corridors or passageways leading to such dispersal areas unless they comply with exit requirements. See Section 1021 for exits from dispersal areas.

**SECTION 1018 — GROUP H OCCUPANCIES**

Every portion of a Group H Occupancy having a floor area of 200 square feet (18.58 m²) or more shall be served by at least two separate exits.

**EXCEPTION:** Group H, Division 4 Occupancies having a floor area of less than 1,000 square feet (92.9 m²) may have one exit.

Within Group H, Divisions 1, 2 and 3 Occupancies, all portions of any room shall be within 75 feet (22 860 mm) of an exit door. Exit doors from a room classified as Group F, Divisions 1, 2 and 3 Occupancies shall not be provided with a latch or lock unless it is panic hardware.

Doors leading to a corridor of fire-resistive construction shall have a minimum three-fourths-hour fire-protection rating; shall not have more than 100 square inches (0.0645 m²) of wired glass set in steel frames; shall be maintained self-closing or shall be automatic closing as defined in Section 713.2; and shall open in the direction of exit travel.

Within Group H, Division 7 and within fabrication areas of Group H, Division 6 Occupancies, the distance of travel to an exterior exit door, exit corridor, horizontal exit, exit passageway or an enclosed stairway shall not exceed 100 feet (30 480 mm).

**SECTION 1019 — GROUP I OCCUPANCIES**

1019.1 **Exterior Doors.** All required exterior exit doors shall open in the direction of exit travel.

1019.2 **Minimum Size of Exits.** The clear width of exits serving areas occupied or used by bed or litter patients shall be such that it will allow ready passage of such equipment, but shall not be less than 44 inches (1118 mm). Other exits shall have a clear width of not less than 32 inches (813 mm). There shall be no projections into the clear width.

1019.3 **Corridors.** The minimum clear width of a corridor shall be determined as specified in Section 1003.2, but shall not be less than 44 inches (1118 mm), except that corridors serving any area housing one or more nonambulatory persons shall not be less than 8 feet (2438 mm) in width.

**EXCEPTION:** Corridors serving surgical areas of Group I, Division 1.2 Occupancies shall not be less than six feet (1829 mm) in width until reaching an exterior door, enclosed exit stairway or horizontal exit and shall not pass through an adjoining room.

Any change in elevation of the floor in a corridor serving nonambulatory persons shall be made by means of a ramp.

Corridors shall comply with Section 1005 except that in hospitals and nursing homes classified as Group I, Division 1.1 Occupancies the following exceptions apply:

1. Nurses' stations including space for doctors' and nurses' charting and communications constructed as required for corridors need not be separated from corridors.

2. Waiting areas and similar spaces constructed as required for corridors need not be separated from corridors, provided:
2.1 Each space is located to permit direct visual supervision by the facility staff, and
2.2 The space and corridors into which the space opens are in the same smoke compartment
and the space is protected by an approved electrically supervised automatic smoke-de­
tection system.

3. Door closers need not be installed on doors to sleeping rooms.

4. Fixed fully tempered or laminated glass in wood or metal frames may be used in corridor
walls, provided the glazed area does not exceed 25 percent of the area of the corridor wall of the
room.

5. The total area of glass in corridor walls is not limited when the glazing is fixed 1/4-inch-thick
(6.4 mm) wired glass in steel frames and the size of individual glazed panel does not exceed 1,296
square inches (0.836 m²).

1019.4 Basement Exits. One exit accessible to every room below grade shall lead directly to the
exterior at grade level.

1019.5 Ramps. Group I, Divisions 1.1 and 1.2 Occupancies housing nonambulatory patients
shall have access to a ramp leading from the first story to the exterior of the building at the ground
floor level.

1019.6 Hardware. Exit doors serving an area having an occupant load of 50 or more shall not be
provided with a latch or lock unless it is panic hardware. Patient room doors shall be readily open­
able from either side without the use of keys.

EXCEPTIONS: 1. In Group I, Division 1.1 hospitals and nursing homes, locking devices, when ap­
proved, may be installed on patient sleeping rooms, provided such devices are readily operable from the pa­
tient room side and are readily operable by the facility staff on the other side. When key locks are used on
patient room doors, keys shall be located on the floor involved at a prominent location accessible to the staff.
2. In Group I, Division 3 Occupancies, approved locks or safety devices may be used where it is necessary
to forcibly restrain the personal liberties of inmates or patients.

SECTION 1020 — SPECIAL HAZARDS

1020.1 Rooms Containing Fuel-fired Equipment. Except in Group R, Division 1.3 Occupancies,
any room containing a boiler, furnace, incinerator or other fuel-fired equipment shall be provided
with two exits when both of the following conditions exist:
1. The area of the room exceeds 500 square feet (46.45 m²), and
2. The largest piece of fuel-fired equipment exceeds 400,000 Btu per hour (117 228 W) input
capacity.

If two exits are required, one may be a fixed ladder. Exits shall be separated by a horizontal dis­
tance not less than half the greatest horizontal dimension of the room. Interior openings between a
Group H Occupancy and an incinerator room are prohibited.

1020.2 Refrigeration Machinery Rooms. Exits shall be of sufficient number and arrangement
such that no portion of the machinery room is more than 50 feet (15 240 mm) in direction of travel
from an exit. Doors shall swing in the direction of exit travel and shall be operable from the inside
without the use of a key or any special knowledge or effort. Doors shall be tight fitting and self-clos­
ing. Machinery rooms containing other than Group A1 refrigerants shall be provided with a mini­
mum of two exits as required in Section 1020.1.

1020.3 Refrigerated Rooms or Spaces. Rooms or spaces containing a refrigerant evaporator and
maintained at a temperature below 68°F. (20°C.), when having a floor area of 1,000 square feet
(92.9 m²) or more, shall be served by at least two exits. All portions of the room or space shall be
within 100 feet (30 480 mm) of an exit. Exiting is allowed through adjoining refrigerated rooms or
spaces.
EXCEPTION: When using Group A1 refrigerants in quantities limited to the amounts based on the volume set forth in the Mechanical Code.

1020.4 Cellulose Nitrate Film Handling. When cellulose nitrate film is handled in film laboratories, projection rooms and film processing rooms, two exits shall be provided. Doors shall be self-closing and have a fire-protection rating of not less than one hour.

SECTION 1021 — REVIEWING STANDS, GRANDSTANDS, BLEACHERS AND FOLDING AND TELESCOPING SEATING

1021.1 Scope. The provisions of this section apply to reviewing stands, grandstands, bleachers, and folding and telescoping seating.

1021.2 Definitions. For the purpose of this section certain terms are defined as follows:

BLEACHERS are tiered or stepped seating facilities without backrests in which an area of 3 square feet (0.28 m²) or less is assigned per person for computing the occupant load.

DISPERsal AREA, SAFE, is an area which will accommodate a number of persons equal to the total capacity of the stand and building which it serves such that a person within the area will not be closer than 50 feet (15240 mm) from the stand or building. Dispersal area capacity shall be determined by allowing 3 square feet (0.28 m²) of net clear area per person.

FOLDING AND TELESCOPING SEATING is a structure that is used for tiered seating of persons, and which overall shape and size may be reduced without being dismantled, for purposes of moving or storing.

FOOTBOARDS are that part of a raised seating facility other than an aisle or cross aisle upon which the occupant walks to reach a seat.

GRANDSTANDS are tiered or stepped seating facilities wherein an area of more than 3 square feet (0.28 m²) is provided for each person.

OPEN-AIR GRANDSTANDS AND BLEACHERS are seating facilities which are located so that the side toward which the audience faces is unroofed and without an enclosing wall.

PERMANENT STANDS are those seating facilities which remain at a location for more than 90 days.

REVIEWING STANDS are elevated platforms accommodating not more than 50 persons. Seating facilities, if provided, are normally in the nature of loose chairs. Reviewing stands accommodating more than 50 persons shall be regulated as grandstands.

TEMPORARY SEATING FACILITIES are those which are intended for use at a location for not more than 90 days.

1021.3 Height of Reviewing Stands, Grandstands, Bleachers, and Folding and Telescoping Seating. See Section 303.2.

1021.4 Design Requirements. See Chapter 16 and Section 1806.9.

1021.5 General Requirements.

1021.5.1 Row spacing. There shall be a clear space of not less than 12 inches (305 mm) measured horizontally between the back or backrest of each seat and the front of the seat immediately behind it. The minimum spacing of rows of seats measured from back to back shall be:

1. Twenty-two inches (559 mm) for seats without backrests.
2. Thirty inches (762 mm) for seats with backrests.
3. Thirty-three inches (838 mm) for chair seating.

1021.5.2 Rise between rows. The maximum rise from one row of seats to the next shall not exceed 16 inches (406 mm) unless the seat spacing from back to back measured horizontally is 40 inches (1016 mm) or more.
EXCEPTION: When automatic- or self-rising seats are installed, the rise between rows may be increased to 24 inches (610 mm) with the horizontal spacing back to back of 33 inches (838 mm).

1021.5.3 Seating capacity determination. When bench-type seating is used, the number of seats shall be based on one person for each 18 inches (457 mm) of length of the bench.

1021.5.4 Aisles.

1021.5.4.1 Aisles required. Aisles shall be provided in all seating facilities except that aisles may be omitted when all of the following conditions exist:

1. Seats are without backrests.
2. The rise from row to row does not exceed 12 inches (305 mm) per row.
3. The number of rows does not exceed 11 in height.
4. The top seating board is not over 10 feet (3048 mm) above grade.
5. The first seating board is not more than 20 inches (508 mm) above grade.

1021.5.4.2 Obstructions. No obstruction shall be placed in the required width of any aisle or exitway.

1021.5.4.3 Width. Aisles serving seats on both sides shall have a minimum width of 42 inches (1067 mm). When serving seats on only one side, the aisle shall have a minimum width of 36 inches (914 mm). Except for temporary seating facilities, the required width for aisles shall equal the greater of the minimum required widths determined in accordance with Section 1014 and this subsection.

1021.5.5 Cross aisles and vomitories. Cross aisles and vomitories shall not be less than 54 inches (1372 mm) in clear width and shall extend to an exit, enclosed stairway or exterior perimeter ramp. Except for temporary seating facilities, the required width for cross aisles shall equal the greater of the minimum required widths determined in accordance with Section 1014 and this section.

1021.5.6 Stairways and ramps. Except as otherwise provided in this item, grandstands, bleachers, and folding and telescoping seating shall comply with other applicable sections of this chapter. Stairways and ramps shall have a maximum rise and run as provided in Section 1006.3 and Section 1007, except those within the seating facility which serve as aisles at right angles to the rows of seats where the rise shall not exceed 8 inches (203 mm). When an aisle terminates at an elevation more than 8 inches (203 mm) above grade or floor below, the aisle shall be provided with a stairway or ramp which width is not less than the width of the aisle.

Stairways and ramps shall have handrails as provided in Sections 1006 and 1007, except stairways within the seating facility which serve as aisles at right angles where handrails shall be provided at one side or along the center line. A minimum clear width of 48 inches (1219 mm) between seats shall be provided for aisle stairways having center-aisle handrails. When there is seating on both sides of the aisle, handrails shall be discontinuous with openings at intervals not exceeding five rows for access to seating. The opening shall have a clear width of at least 22 inches (559 mm) and not greater than 36 inches (914 mm) measured horizontally, and the handrail shall have rounded terminations. When handrails are provided in the middle of the aisle stairs, there shall be an additional intermediate rail located approximately 12 inches (305 mm) below the top of the handrail.

EXCEPTION: Temporary seating facility stairways within the seating area which serve as aisles at right angles need not be provided with handrails.

1021.5.7 Guardrails. Perimeter guardrails or enclosing walls or fencing shall be provided for all portions of elevated seating facilities which are more than 30 inches (762 mm) above grade or floor. Construction of guardrails shall comply with Section 509 and Table 16-B. Guardrails shall be 42 inches (1067 mm) above the rear of a seat board or 42 inches (1067 mm) above the rear of the steps in an aisle when the guardrail is parallel and adjacent to the aisle.

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EXCEPTION: Guardrails at the front of the front row of seats, which are not located at the end of an aisle and where there is no cross aisle, may have a height of 26 inches (660 mm) and need not meet the 4-inch-maximum (102 mm) spacing specified in Section 509; however, a midrail shall be installed.

The open vertical space between footboards and seats shall not exceed 9 inches (229 mm) when footboards are more than 30 inches (762 mm) above grade.

1021.5.8 Toeboards. A 4-inch-high (102 mm) vertical barrier shall be installed along the edge of walking platforms whenever guardrails are required.

EXCEPTION: Toeboards shall not be required at the ends of footboards.

1021.5.9 Footboards. Footboards shall be provided for all rows of seats above the third row or beginning at such a point where the seat is more than 2 feet (610 mm) above the grade or floor below. When the same platform is used for both seating and footrests, footrests are not required, provided each level or platform is not less than 24 inches (610 mm) wide. When aisles are required by Section 1021.5.4, footboards not less than 18 inches (457 mm) in width shall be installed between each row of seats.

1021.6 Grandstands, Bleachers, and Folding and Telescoping Seating within Buildings. Except as otherwise provided in Section 1021.6 and 1021.7, grandstands, bleachers, and folding and telescoping seating within a building shall comply with the other applicable sections of this chapter.

EXCEPTIONS: 1. When seats are without backrests, there may be nine seats between any seat and an aisle.
2. When seats are without backrests, dead ends in vertical aisles shall not exceed a depth of 16 rows.

1021.7 Open-air Grandstands, Bleachers, and Folding and Telescoping Seating.

1021.7.1 General. Except as otherwise provided in Sections 1021.7.2 through 1021.7.10, open-air grandstands, bleachers, and folding and telescoping seating shall comply with the other applicable sections of this chapter.

1021.7.2 Number of seats between aisles. The number of seats between any seat and an aisle shall not be greater than 20 when the seats are without backrests and nine if the seats have backrests.

1021.7.3 Dead ends. Dead ends in vertical aisles shall not exceed a depth of 16 rows for permanent grandstands and 26 rows for temporary grandstands.

1021.7.4 Distance to exit. The line of travel from any seat to a safe dispersal area exit ramp, enclosed stairway or vomitory shall not be more than 200 feet (60 960 mm). When the seats have no backrests, the distance may be a direct line measurement.

1021.7.5 Safe dispersal area. Each safe dispersal area shall have a minimum of two exits. If more than 6,000 persons are to be accommodated within a dispersal area, there shall be a minimum of three exits and for more than 9,000 persons there shall be at least four exits. The aggregate clear width of exits from a safe dispersal area shall be determined on the basis of not less than one exit unit of 22 inches (559 mm) for each 500 persons to be accommodated, and no exit shall be less than 44 inches (1118 mm) in width.

1021.7.6 Two exits required. Two exits shall be provided from every facility which accommodates more than 300 persons.

1021.7.7 Three exits required. Three exits shall be required when a facility or section thereof accommodates more than 1,000 persons.

1021.7.8 Four exits required. Four exits shall be required when a facility or section thereof accommodates more than 3,000 persons.

1021.7.9 Determination of exit width. The total width of exits in feet (mm) shall not be less than the total occupant load served divided by 150 (0.492) when exiting by stairs and divided by 200 (0.656) when exiting by ramps, corridors, tunnels or vomitories.
1021.7.10 Minimum exit width. No exit shall be less than 42 inches (1067 mm) in width.

SECTION 1022 — BUILDING SECURITY
See Appendix Chapter 10 for requirements governing building security.

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<td></td>
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<tr>
<td>Drinking establishments</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exhibit rooms</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gymnasiums</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lounges</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stages</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Bowling alley (assume no occupant load for bowling lanes)</td>
<td>50</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>6. Children’s homes and homes for the aged</td>
<td>6</td>
<td>80</td>
<td></td>
</tr>
<tr>
<td>7. Classrooms</td>
<td>50</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>8. Congregate residences</td>
<td>10</td>
<td>200</td>
<td></td>
</tr>
<tr>
<td>9. Courtrooms</td>
<td>50</td>
<td>40</td>
<td></td>
</tr>
<tr>
<td>10. Dormitories</td>
<td>10</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td>11. Dwellings</td>
<td>10</td>
<td>300</td>
<td></td>
</tr>
<tr>
<td>12. Exercising rooms</td>
<td>50</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td>13. Garage, parking</td>
<td>30</td>
<td>200</td>
<td></td>
</tr>
<tr>
<td>14. Hospitals and sanitariums—</td>
<td>10</td>
<td>80</td>
<td></td>
</tr>
<tr>
<td>Health-care center</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nursing homes</td>
<td>6</td>
<td>80</td>
<td></td>
</tr>
<tr>
<td>Sleeping rooms</td>
<td>10</td>
<td>80</td>
<td></td>
</tr>
<tr>
<td>Treatment rooms</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15. Hotels and apartments</td>
<td>10</td>
<td>200</td>
<td></td>
</tr>
<tr>
<td>16. Kitchen—commercial</td>
<td>30</td>
<td>200</td>
<td></td>
</tr>
<tr>
<td>17. Library reading room</td>
<td>50</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td>18. Locker rooms</td>
<td>30</td>
<td>50</td>
<td></td>
</tr>
</tbody>
</table>

(Continued)
### TABLE 10-A—MINIMUM EGRESS REQUIREMENTS1—(Continued)

<table>
<thead>
<tr>
<th>USE</th>
<th>MINIMUM OF TWO EXITS OTHER THAN ELEVATORS ARE REQUIRED WHERE NUMBER OF OCCUPANTS IS AT LEAST</th>
<th>OCCUPANT LOAD FACTOR$^3$ (square feet) $\times 0.0929$ for m²</th>
</tr>
</thead>
<tbody>
<tr>
<td>19. Malls (see Chapter 4)</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>20. Manufacturing areas</td>
<td>30</td>
<td>200</td>
</tr>
<tr>
<td>21. Mechanical equipment room</td>
<td>30</td>
<td>300</td>
</tr>
<tr>
<td>22. Nurseries for children (day care)</td>
<td>7</td>
<td>35</td>
</tr>
<tr>
<td>23. Offices</td>
<td>30</td>
<td>100</td>
</tr>
<tr>
<td>24. School shops and vocational rooms</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>25. Skating rinks</td>
<td>50</td>
<td>50 on the skating area; 15 on the deck</td>
</tr>
<tr>
<td>26. Storage and stock rooms</td>
<td>30</td>
<td>300</td>
</tr>
<tr>
<td>27. Stores—retail sales rooms Basements and ground floor Upper floors</td>
<td>50</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>50</td>
<td>60</td>
</tr>
<tr>
<td>28. Swimming pools</td>
<td>50</td>
<td>30 for the pool area; 15 on the deck</td>
</tr>
<tr>
<td>29. Warehouses</td>
<td>30</td>
<td>500</td>
</tr>
<tr>
<td>30. All others</td>
<td>50</td>
<td>100</td>
</tr>
</tbody>
</table>

1 Access to and egress from buildings for persons with disabilities shall be provided as specified in Chapter 11.
2 For additional provisions on number of exits from Groups H and I Occupancies and from rooms containing fuel-fired equipment or cellulose nitrate, see Sections 1018, 1019 and 1020, respectively.
3 This table shall not be used to determine working space requirements per person.
4 Occupant load based on five persons for each alley, including 15 feet (4572 mm) of runway.

### TABLE 10-B—CALCULATION FOR MINIMUM WIDTH IN BUILDINGS WITHOUT SMOKE-PROTECTED ASSEMBLY SEATING

<table>
<thead>
<tr>
<th>NUMBER OF SEATS</th>
<th>CLEAR WIDTH FOR STAIRS (inches)</th>
<th>CLEAR WIDTH PER SEAT SERVED FOR PASSAGEWAYS, RAMPS AND DOORWAYS (inches) $\times 25.4$ for mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unlimited</td>
<td>0.300 AB</td>
<td>0.223 C</td>
</tr>
</tbody>
</table>

1 See Section 1014.3 for determination of values A, B and C.

### TABLE 10-C—CALCULATION FOR MINIMUM WIDTH IN BUILDINGS WITH SMOKE-PROTECTED ASSEMBLY SEATING

<table>
<thead>
<tr>
<th>NUMBER OF SEATS</th>
<th>CLEAR WIDTH FOR STAIRS (inches)</th>
<th>CLEAR WIDTH PER SEAT SERVED FOR PASSAGEWAYS, RAMPS AND DOORWAYS (inches) $\times 25.4$ for mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>2,000</td>
<td>0.300 AB</td>
<td>0.220 C</td>
</tr>
<tr>
<td>5,000</td>
<td>0.200 AB</td>
<td>0.150 C</td>
</tr>
<tr>
<td>10,000</td>
<td>0.130 AB</td>
<td>0.100 C</td>
</tr>
<tr>
<td>15,000</td>
<td>0.096 AB</td>
<td>0.070 C</td>
</tr>
<tr>
<td>20,000</td>
<td>0.076 AB</td>
<td>0.056 C</td>
</tr>
<tr>
<td>25,000 or more</td>
<td>0.060 AB</td>
<td>0.044 C</td>
</tr>
</tbody>
</table>

1 See Section 1014.3 for determination of values A, B and C.
Chapter 11
ACCESSIBILITY

NOTE: This chapter has been revised in its entirety.

SECTION 1101 — SCOPE

1101.1 General. Buildings or portions of buildings shall be accessible to persons with disabilities as required by this chapter.

See also Appendix Chapter 11 for requirements governing the provision of accessible site facilities not regulated by this chapter. See Section 101.3 for applicability of appendix.

1101.2 Design. The design and construction of accessible building elements shall be in accordance with this chapter and the Council of American Building Officials (CABO)/American National Standards Institute (ANSI) A117.1-1992, which is a part of this code as though set out at length herein. For a building to be considered to be accessible, it shall be designed and constructed to the minimum provisions of this chapter and CABO/ANSI A117.1.

SECTION 1102 — DEFINITIONS

For the purpose of this chapter, certain terms are defined as follows:

ACCESSIBLE describes a site, building, facility, or portion thereof, that complies with this chapter and that can be approached, entered and used by persons with physical disabilities.

ACCESSIBLE MEANS OF EGRESS is a path of travel, usable by a mobility impaired person, that leads to a public way.

ACCESSIBLE ROUTE is a continuous path connecting accessible elements and spaces in a building or facility that is usable by persons with disabilities.

ADAPTABILITY is the capability of altering or adding to certain building spaces and elements, such as kitchen counters, sinks and grab bars, so as to accommodate the needs of persons with and without disabilities, or to accommodate the needs of persons with different types or degrees of disability.

AREA OF REFUGE is an area with direct access to an exit or an elevator where persons unable to use stairs can remain temporarily in safety to await instructions or assistance during emergency evacuation.


COMMON-USE AREAS are rooms, spaces or elements that are made available for use by a specific group of people.

ELEMENT is an architectural or mechanical component of a building, facility, space or site that is used in making spaces accessible.

FACILITY is all or any portion of a building, structure or area, including the site on which such building, structure, or area is located, wherein specific services are provided or activities are performed.

PERSON WITH DISABILITY is an individual who has an impairment, including a mobility, sensory or cognitive impairment, which results in a functional limitation in access to and use of a building or facility.

PUBLIC-USE AREAS are rooms or spaces that are made available to the general public.

SITE is a parcel of land bounded by a property line or a designated portion of a public right-of-way.
SECTION 1103 — BUILDING ACCESSIBILITY

1103.1 Where Required.

1103.1.1 General. Accessibility to temporary or permanent buildings, or portions thereof, shall be provided for all occupancy classifications except as modified by this chapter. See also Appendix Chapter 11.

EXCEPTIONS: 1. Floors or portions of floors not customarily occupied, including, but not limited to, elevator pits; observation galleries used primarily for security purposes; elevator penthouses; nonoccupiable spaces accessed only by ladders, catwalks, crawl spaces or freight elevators; piping and equipment catwalks; and machinery, mechanical and electrical equipment rooms.

2. Subject to the approval of the building official, areas where work cannot reasonably be performed by persons having a severe impairment (mobility, sight or hearing) need not have specific features which provide accessibility to such persons.

3. Temporary structures, sites and equipment directly associated with the construction process such as construction site trailers, scaffolding, bridging or material hoists are not required to be accessible. This exception does not include walkways or pedestrian protection required by Chapter 33.

1103.1.2 Group A Occupancies.

1103.1.2.1 General. Group A Occupancies shall be accessible as provided in this chapter.

EXCEPTION: In the assembly area of dining and drinking establishments which are located within non-elevator buildings, when the area of mezzanine seating is not more than 25 percent of the total seating, an accessible means of vertical access to the mezzanine is not required, provided the same services are provided in an accessible space.

Stadiums, theaters, auditoriums and similar occupancies shall be provided with wheelchair spaces in accordance with Table 11-A. Removable seats shall be permitted in the wheelchair positions.

When the seating capacity of an individual assembly area exceeds 300, wheelchair spaces shall be provided in more than one location and shall be on an accessible route of travel. Dispersion of wheelchair spaces shall be based on the availability of accessible routes to various seating areas, including seating at various levels in multilevel facilities. Services provided in inaccessible areas shall also be provided on an accessible level and shall be accessible.

1103.1.2.2 Assistive listening systems. Assistive listening systems complying with CABO/ANSI A117.1 shall be installed in stadiums, theaters, auditoriums, lecture halls and similar areas when these areas have fixed seats and where audible communications are integral to the use of the space as follows:

1. Areas with an occupant load of 50 or more.

2. Areas where an audio-amplification system is installed.

Receivers for assistive listening systems shall be provided at a rate of 4 percent of the total number of seats, but in no case less than two receivers.

Stadiums, theaters, auditoriums, lecture halls and similar areas not equipped with an audio-amplification system or having an occupant load of less than 50 shall have a permanently installed assistive listening system, or shall have electrical outlets or other supplementary wiring necessary to support a portable assistive listening system.

Signage shall be installed to notify patrons of the availability of the listing system.

1103.1.3 Group B Occupancies. Group B Occupancies shall be accessible as provided in this chapter. Assembly spaces in Group B Occupancies shall comply with Section 1103.1.2.2.

1103.1.4 Group E Occupancies. Group E Occupancies shall be accessible as provided in this chapter. Assembly spaces in Group E Occupancies shall comply with Section 1103.1.2.2.

1103.1.5 Group F Occupancies. Group F Occupancies shall be accessible as provided in this chapter.
1103.1.6 **Group H Occupancies.** Group H Occupancies shall be accessible as provided in this chapter.

1103.1.7 **Group I Occupancies.** Group I Occupancies shall be accessible in public-use, common-use and employee-use areas, and shall have accessible patient rooms, cells and treatment or examination rooms as follows:

1. In Group I, Division 1.1 patient-care units within hospitals which specialize in treating conditions that affect mobility, all patient rooms, including associated toilet rooms and bathrooms.

2. In Group I, Division 1.1 patient-care units within hospitals that do not specialize in treating conditions that affect mobility, at least one in every 10 patient rooms, or fraction thereof, including associated toilet rooms and bathrooms.

3. In Group I, Divisions 1.1 and 2 nursing homes and long-term care facilities; at least one in every two patient rooms, or fraction thereof, including associated toilet rooms and bathrooms.

4. In Group I, Division 3 mental health occupancies, at least one in every 10 patient rooms, or fraction thereof, including associated toilet rooms and bathrooms.

5. In Group I, Division 3 jail, prison and similar occupancies, at least one in every 20 rooms or cells, or fraction thereof, including associated toilet rooms and bathrooms.

6. In Group I Occupancies, all treatment and examination rooms shall be accessible.

1103.1.8 **Group M Occupancies.** Group M Occupancies shall be accessible as provided in this chapter. Assembly spaces in Group M Occupancies shall comply with Section 1103.1.2.2.

1103.1.9 **Group R Occupancies.**

1103.1.9.1 **General.** Group R Occupancies shall be accessible as provided in this chapter.

When accessible dwelling units, guest and sleeping rooms are required, public- and common-use areas and facilities such as recreational facilities, laundry facilities, garbage and recycling collection areas, mailbox locations, lobbies, foyers and management offices shall be accessible.

**EXCEPTION:** When recreational facilities are provided accessory to accessible dwelling units, only 25 percent of recreational facilities need be accessible, provided not less than one of each type in each group of such facilities shall be accessible. All recreational facilities of each type on a site shall be considered in determining the total number of each type which are required to be accessible.

1103.1.9.2 **Apartment houses.** In apartment houses containing more than 20 dwelling units, at least 2 percent, but not less than one, of the dwelling units shall be accessible. All dwelling units on a site shall be considered to determine the total number of accessible dwelling units.

**EXCEPTIONS:**

1. Dwelling units required to be accessible may be adaptable dwelling units.

2. Dwelling units with two or more stories in a nonelevator building need not be accessible.

1103.1.9.3 **Hotels and lodging houses.** In hotels and lodging houses containing six or more guest rooms, one of the first 30 guest rooms and one additional guest room for each additional 100 guest rooms, or fraction thereof, shall be accessible. Bathing, toilet and other facilities accessory to an accessible guest room shall be accessible. In hotels with 51 or more guest rooms, 50 percent, but not less than one, of the accessible guest rooms shall have a roll-in shower.

In addition to the accessible guest rooms required above, guest rooms for persons with hearing impairments shall be provided in accordance with Table 11-B. Guest rooms for persons with hearing impairments shall be provided with visible and audible alarm-indicating appliances, activated by both the in-room smoke detector and the building fire-protective signaling system.

1103.1.9.4 **Congregate residences.** In congregate residences with more than 30 occupants, at least 2 percent, but in no case less than one, of the sleeping rooms shall be accessible.

1103.1.10 **Group S Occupancies.** Group S Occupancies shall be accessible as provided in this chapter.
1103.1.11 Group U Occupancies. Group U, Division 1 Occupancies shall be accessible as follows:

1. Private garages and carports which contain accessible parking.
2. In Group U, Division 1 agricultural buildings, access need be provided only to paved work areas and areas open to the general public.

1103.2 Design and Construction.

1103.2.1 General. When accessibility is required by this chapter, it shall be designed and constructed in accordance with this chapter and CABO/ANSI A117.1.

1103.2.2 Accessible route. When a building, or portion of a building, is required to be accessible, an accessible route shall be provided to all portions of the building, to accessible building entrances, connecting accessible pedestrian walkways and the public way.

**EXCEPTION:** In other than the offices of health-care providers, transportation facilities and airports, multitenant Group M retail and wholesale occupancies, floors above and below accessible levels that have an aggregate area of not more than 3,000 square feet (278.7 m²) and an aggregate occupant load of not more than 50 need not be served by an accessible route from an accessible level.

When floor levels are required to be connected by an accessible route, and an interior path of travel is provided between the levels, an interior accessible route between the levels shall be provided. When only one accessible route is provided it shall not pass through kitchens, storage rooms, toilet rooms, bathrooms, closets or other similar spaces.

**EXCEPTION:** A single accessible route may pass through a kitchen or storage room in an accessible or adaptable dwelling unit.

When more than one building or facility is located on a site, accessible routes shall be provided connecting accessible buildings and accessible site facilities.

**EXCEPTION:** For Group R, Division 1 apartment occupancies, when the slope of the finished grade between accessible buildings and facilities exceeds 1 unit vertical in 12 units horizontal (8.33% slope), or when physical barriers of the site prevent the installation of an accessible route, a vehicular route with parking at each accessible building or facility may be provided in place of an accessible route.

1103.2.3 Accessible entrances. Each building and structure, and each separate tenancy within a building or structure, shall be provided with at least one entrance which complies with the accessible route provisions of CABO/ANSI A117.1. At least 50 percent of all entrances shall be accessible.

**EXCEPTION:** Entrances used exclusively for loading and service.

When a building or facility has entrances which normally serve accessible parking facilities, transportation facilities, passenger loading zones, taxi stands, public streets and sidewalks, or accessible interior vertical access, then at least one of the entrances serving each such function shall comply with the accessible route provisions of CABO/ANSI A117.1.

1103.2.4 Signs.

1103.2.4.1 International symbol of accessibility. The following elements and spaces of accessible facilities shall be identified by the international symbol of accessibility:

1. Accessible parking spaces, except where the total parking spaces provided are five or less.
2. Accessible areas of refuge.
3. Accessible passenger loading zones.
4. Accessible toilet and bathing facilities.

1103.2.4.2 Other signs. Inaccessible building entrances, inaccessible public toilets and bathing facilities, and elevators not on an accessible route shall be provided with directional signage indicating the route to the nearest similar accessible element.
In assembly areas, a sign notifying the general public of the availability of assistive listening systems shall be provided at ticket offices or similar locations.

Each door to an exit stairway shall have a tactile sign, including raised letters and Braille, stating EXIT and shall comply with CABO/ANSI A117.1.

At exits and elevators serving a required accessible space, but not providing an approved accessible means of egress, signs shall be installed indicating the location of accessible means of egress.

SECTION 1104 — EGRESS AND AREAS OF REFUGE

1104.1 Means of Egress.

1104.1.1 General. All required accessible spaces shall be provided with not less than one accessible means of egress. When more than one exit is required from any accessible space, each accessible portion of the space shall be served by not less than two accessible means of egress. The maximum travel distance from any accessible space to an area of refuge shall not exceed the travel distance set forth in Chapter 10.

Each accessible means of egress shall be continuous from each required accessible occupied area to a public way and shall include accessible routes, ramps, exit stairs, elevators, horizontal exits or smoke barriers.

1104.1.2 Stairways. When an exit stairway is part of an accessible means of egress, the stairway shall have a clear width of not less than 48 inches (1219 mm) between handrails. The stairway shall either incorporate an area of refuge within an enlarged story-level landing or shall be accessed from an area of refuge complying with Section 1104.2 or a horizontal exit.

EXCEPTIONS: 1. Exit stairways serving a single dwelling unit or guest room.
2. Exit stairways serving buildings protected throughout by an approved automatic sprinkler system.
3. The clear width of 48 inches (1219 mm) between handrails is not required for exit stairways accessed from a horizontal exit.
4. Areas of refuge are not required in open parking garages.

1104.1.3 Elevators. When an accessible floor is four or more stories above or below the level of exit discharge serving that floor, at least one elevator shall serve as one required accessible means of egress.

EXCEPTION: In fully sprinklered buildings, the elevator need not be provided to floors provided with a horizontal exit and located at or above the level of exit discharge.

When an elevator is part of an accessible means of egress, standby power shall be provided. The elevator shall be accessed from either an area of refuge complying with Section 1104.2 or a horizontal exit.

EXCEPTIONS: 1. Elevators are not required to be accessed by an area of refuge or a horizontal exit in buildings protected throughout by an approved automatic sprinkler system.
2. Areas of refuge are not required in open parking garages.

1104.1.4 Platform lifts. Platform (wheelchair) lifts shall not serve as part of an accessible means of egress.

EXCEPTION: Within a dwelling unit.

1104.2 Areas of Refuge.

1104.2.1 Access. Required areas of refuge shall be accessible from the space it serves by an accessible means of egress. Required areas of refuge shall have direct access to a stairway or an elevator complying with Section 1104.1.

1104.2.2 Pressurization. When an elevator lobby is used as an area of refuge, the elevator shaft and lobby shall be pressurized in accordance with the requirements of Section 905.
EXCEPTION: When elevators are in an area of refuge formed by a horizontal exit or smoke barrier.

1104.2.3 Size. Each area of refuge shall be sized to accommodate one wheelchair space not less than 30 inches by 48 inches (762 mm by 1219 mm) for each 200 occupants, or portion thereof, based on the occupant load of the area of refuge and areas served by the area of refuge.

Wheelchair spaces shall not reduce the required exit width. Access to required wheelchair spaces in an area of refuge shall not be obstructed by more than one adjoining wheelchair space.

1104.2.4 Construction. Each area of refuge shall be separated from the remainder of the story by a smoke barrier having at least a one-hour fire-resistance rating. Smoke barriers shall extend to the roof or floor deck above. Doors in the smoke barrier shall be tight-fitting smoke- and draft-control assemblies having a fire-protection rating of not less than 20 minutes. Doors shall be self-closing or automatic closing by smoke detection. An approved damper designed to resist the passage of smoke shall be provided at each point a duct penetrates the smoke barrier.

EXCEPTION: Areas of refuge located within a stairway enclosure.

1104.2.5 Two-way communication. Areas of refuge shall be provided with a two-way communication system between the area of refuge and a central control point. If the central control point is not constantly attended, the area of refuge shall also have controlled access to a public telephone system. Location of the central control point shall be approved by the fire department.

EXCEPTION: Buildings four stories or less in height.

1104.2.6 Instructions. In areas of refuge that have a two-way emergency communication system, instructions on the use of the area under emergency conditions shall be posted adjoining the communications system. The instructions shall include:

1. Directions to find other exits;
2. Advice that persons able to use the exit stairway do so as soon as possible, unless they are assisting others;
3. Information on planned availability of assistance in the use of stairs or supervised operation of elevators and how to summon such assistance; and
4. Directions for use of the emergency communications system.

1104.2.7 Identification. Each area of refuge shall be identified by a sign stating AREA OF REFUGE and the international symbol of accessibility. The sign shall be located at each door providing access to the area of refuge. The sign shall be illuminated as required for exit signs when exit sign illumination is required. Tactile signage shall be located at each door to an area of refuge.

SECTION 1105 — FACILITY ACCESSIBILITY

1105.1 General. When buildings or portions of buildings are required to be accessible, building facilities shall be accessible as provided in this section.

Building facilities or elements required by this section to be accessible shall be designed and constructed in accordance with CABO/ANSI A117.1.

1105.2 Bathing and Toilet Facilities.

1105.2.1 Bathing facilities. When bathing facilities are provided, at least one of each type of fixture or element shall be accessible.

EXCEPTION: A bathing facility for a single occupant and not for common or public use may be adaptable.

1105.2.2 Toilet facilities. Toilet facilities located within accessible dwelling units, guest rooms and congregate residences shall comply with CABO/ANSI A117.1.

In other occupancies, each toilet room shall be accessible. At least one of each type of fixture or element in each accessible toilet room shall be accessible. When toilet stalls are provided in a toilet
room, at least one toilet stall shall be wheelchair accessible. When six or more toilet stalls are pro-
vided in a toilet room, at least one ambulatory accessible toilet stall shall be provided in addition to
the wheelchair accessible toilet stall.

EXCEPTION: A toilet facility for a single occupant and not for common or public use may be adaptable.

1105.2.3 Lavatories, mirrors and towel fixtures. At least one accessible lavatory shall be pro-
vided within toilet facilities. When mirrors, towel fixtures and other toilet and bathroom accesso-
ries are provided, at least one of each shall be accessible.

1105.3 Elevators and Stairway and Platform Lifts. Elevators on an accessible route shall be
accessible.

EXCEPTION: Private elevators serving only one dwelling unit.

Elevators required to be accessible shall be designed and constructed to comply with CABO/
ANSI A117.1.

Stairways in buildings, or portions of buildings, required to be accessible shall be designed and
constructed to comply with CABO/ANSI A117.1.

Platform lifts may be used in lieu of an elevator under one of the following conditions subject to
approval by the building official:
1. To provide an accessible route of travel to a performing area in a Group A Occupancy.
2. To provide unobstructed sight lines and distribution for wheelchair viewing positions in
   Group A Occupancies.
3. To provide access to spaces with an occupant load of less than five.
4. To provide access where existing site constraints or other constraints make use of a ramp or
elevator infeasible.

All platform lifts used in lieu of an elevator shall be capable of independent operation.

1105.4 Other Building Facilities.

1105.4.1 Drinking fountains. On any floor where drinking fountains are provided, at least 50
percent, but not less than one fountain, shall be accessible.

1105.4.2 Fixed or built-in seating or tables. When fixed or built-in seating or tables are provided
at least 5 percent, but not less than one, shall be accessible. In dining and drinking establishments,
such seating or tables shall be distributed throughout the facility.

1105.4.3 Storage. When storage facilities such as cabinets, shelves, closets, lockers and drawers
are provided in required accessible or adaptable spaces, at least one of each type provided shall con-
tain storage space complying with CABO/ANSI A117.1.

1105.4.4 Customer service facilities.

1105.4.4.1 Dressing and fitting rooms. When dressing or fitting rooms are provided, at least
5 percent, but not less than one, in each group of rooms serving distinct and different functions shall
be accessible.

1105.4.4.2 Counters and windows. Where customer sales and service counters or windows are
provided, a portion of the counter or at least one window shall be accessible.

1105.4.4.3 Checkout aisles. Accessible checkout aisles shall be installed in accordance with
Table 11-C. Traffic control devices, security devices and turnstiles located in accessible checkout
aisles or lanes shall be accessible.

1105.4.5 Controls, operating mechanisms and hardware. Controls, operating mechanisms
and hardware intended for operation by the occupant, including switches that control lighting and
ventilation and electrical convenience outlets, in accessible spaces, along accessible routes or as parts of accessible elements shall be accessible.

**1105.4.6 Alarms.** Alarm systems, when provided, shall include both audible and visible alarms. The alarm devices shall be located in hotel guest rooms as required by Section 1103.1.9.3; accessible public- and common-use areas, including toilet rooms and bathing facilities; hallways; and lobbies.

**1105.4.7 Rail transit platforms.** Rail transit platform edges bordering a drop-off and not protected by platform screens or guardrails shall be provided with detectable warnings in accordance with CABO/ANSI A117.1.

### TABLE 11-A—WHEELCHAIR SPACES REQUIRED IN ASSEMBLY AREAS

<table>
<thead>
<tr>
<th>CAPACITY OF SEATING</th>
<th>NUMBER OF REQUIRED WHEELCHAIR SPACES</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 to 25</td>
<td>1</td>
</tr>
<tr>
<td>26 to 50</td>
<td>2</td>
</tr>
<tr>
<td>51 to 300</td>
<td>4</td>
</tr>
<tr>
<td>301 to 500</td>
<td>6</td>
</tr>
<tr>
<td>over 500</td>
<td>6 plus 1 for each 250 over 500</td>
</tr>
</tbody>
</table>

### TABLE 11-B—NUMBER OF ROOMS FOR PERSONS WITH HEARING IMPAIRMENTS

<table>
<thead>
<tr>
<th>TOTAL NUMBER OF ROOMS</th>
<th>MINIMUM REQUIRED NUMBER</th>
</tr>
</thead>
<tbody>
<tr>
<td>6-25</td>
<td>1</td>
</tr>
<tr>
<td>26-50</td>
<td>2</td>
</tr>
<tr>
<td>51-75</td>
<td>3</td>
</tr>
<tr>
<td>76-100</td>
<td>4</td>
</tr>
<tr>
<td>101-150</td>
<td>5</td>
</tr>
<tr>
<td>151-200</td>
<td>6</td>
</tr>
<tr>
<td>201-300</td>
<td>7</td>
</tr>
<tr>
<td>301-400</td>
<td>8</td>
</tr>
<tr>
<td>401-500</td>
<td>9</td>
</tr>
<tr>
<td>501-1000</td>
<td>2% of total rooms</td>
</tr>
<tr>
<td>Over 1000</td>
<td>20 plus 1 for every 100 rooms, or fraction thereof, over 1,000</td>
</tr>
</tbody>
</table>

### TABLE 11-C—REQUIRED CHECKOUT AISLES

<table>
<thead>
<tr>
<th>TOTAL CHECKOUT AISLES</th>
<th>MINIMUM NUMBER OF ACCESSIBLE CHECKOUT AISLES</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-4</td>
<td>1</td>
</tr>
<tr>
<td>5-8</td>
<td>2</td>
</tr>
<tr>
<td>9-15</td>
<td>3</td>
</tr>
<tr>
<td>Over 15</td>
<td>3 plus 20% of additional aisles over 15</td>
</tr>
</tbody>
</table>
Chapter 12
INTERIOR ENVIRONMENT

SECTION 1201 — GENERAL
Buildings and portions thereof shall provide occupants with light and ventilation as set forth in this chapter. For ventilation of hazardous vapors or fumes, see Section 306.5 and the Mechanical Code.

SECTION 1202 — LIGHT AND VENTILATION IN GROUPS A, B, E, F, H, I, M AND S OCCUPANCIES

1202.1 Light. All enclosed portions of Groups A, B, E, F, H, I, M and S Occupancies customarily occupied by human beings shall be provided with natural light by means of exterior glazed openings with an area not less than one tenth of the total floor area, or shall be provided with artificial light. Such exterior openings shall open directly onto a public way or a yard or court as set forth in Section 1203.4. See Section 1012 for required exit illumination.

1202.2 Ventilation.

1202.2.1 General. All enclosed portions of Groups A, B, E, F, H, I, M and S Occupancies customarily occupied by human beings shall be provided with natural ventilation by means of openable exterior openings with an area not less than $\frac{1}{100}$ of the total floor area or shall be provided with a mechanically operated ventilation system. Such exterior openings shall open directly onto a public way or a yard or court as set forth in Section 1203.4. Such mechanically operated ventilation system shall be capable of supplying a minimum of 15 cubic feet per minute (7 L/s) of outside air per occupant in all portions of the building during such time as the building is occupied. If the velocity of the air at a register exceeds 10 feet per second (3 m/s), the register shall be placed more than 8 feet (2438 mm) above the floor directly beneath.

Toilet rooms shall be provided with a fully openable exterior window with an area not less than 3 square feet (0.279 m²), or a vertical duct not less than 100 square inches (64516 mm²) in area for the first water closet plus 50 square inches (32258 mm²) additional of area for each additional water closet, or a mechanically operated exhaust system capable of providing a complete change of air every 15 minutes. Such mechanically operated exhaust systems shall be connected directly to the outside, and the point of discharge shall be at least 3 feet (914 mm) from any opening which allows air entry into occupied portions of the building.

1202.2.2 Groups B, F, M and S Occupancies. In all buildings classified as Groups B, F, M and S Occupancies or portions thereof where Class I, II or III-A liquids are used, a mechanically operated exhaust ventilation shall be provided sufficient to produce six air changes per hour. Such exhaust ventilation shall be taken from a point at or near the floor level.

1202.2.3 Group H Occupancies. Rooms, areas or spaces of Group H Occupancies in which explosive, corrosive, combustible, flammable or highly toxic dusts, mists, fumes, vapors or gases are or may be emitted due to the processing, use, handling or storage of materials shall be mechanically ventilated as required by the Fire Code and the Mechanical Code.

Ducts conveying explosives or flammable vapors, fumes or dusts shall extend directly to the exterior of the building without entering other spaces. Exhaust ducts shall not extend into or through ducts and plenums.
EXCEPTION: Ducts conveying vapor or fumes having flammable constituents less than 25 percent of their lower flammability limit may pass through other spaces.

Emissions generated at work stations shall be confined to the area in which they are generated as specified in the Fire Code and the Mechanical Code.

The location of supply and exhaust openings shall be in accordance with the Mechanical Code. Exhaust air contaminated by highly toxic material shall be treated in accordance with the Fire Code.

A manual shutoff control for ventilation equipment required by this subsection shall be provided outside the room adjacent to the principal access door to the room. The switch shall be of the break-glass type and shall be labeled "Ventilation System Emergency Shutoff."

1202.2.4 Group H, Division 4 Occupancies. In all buildings classified as Group H, Division 4 Occupancies used for the repair or handling of motor vehicles operating under their own power, mechanical ventilation shall be provided capable of exhausting a minimum of 1 cubic foot per minute per square foot (0.044 L/s/m²) of floor area. Each engine repair stall shall be equipped with an exhaust pipe extension duct, extending to the outside of the building, which, if over 10 feet (3048 mm) in length, shall mechanically exhaust 300 cubic feet per minute (141.6 L/s). Connecting offices and waiting rooms shall be supplied with conditioned air under positive pressure.

EXCEPTION: When approved, ventilating equipment may be omitted in repair garages, enclosed heliports and aircraft hangars when well-distributed unobstructed openings to the outer air of sufficient size to supply necessary ventilation are furnished.

1202.2.5 Group H, Division 6 Occupancies. In Group H, Division 6 Occupancies, mechanical ventilation, which may include recirculated air, shall be provided throughout the fabrication area at the rate of not less than 1 cubic foot per minute per square foot (0.044 L/s/m²) of floor area. The exhaust air duct system of one fabrication area shall not connect to another duct system outside that fabrication area within the building.

Ventilation systems shall comply with the Mechanical Code except that the automatic shutoffs need not be installed on air-moving equipment. However, smoke detectors shall be installed in the circulating airstream and shall initiate a signal at the emergency control station.

Except for exhaust systems, at least one manually operated remote control switch that will shut down the fabrication area ventilation system shall be installed at an approved location outside the fabrication area.

1202.2.6 Group S repair and storage garages and aircraft hangars. In Group S, Division 3 repair garages, storage garages and in Division 5 aircraft hangars, the mechanical ventilating system required by Section 1202.2.1 may be omitted when, in the opinion of the building official, the building is supplied with unobstructed openings to the outer air which are sufficient to provide the necessary ventilation.

1202.2.7 Group S parking garages. In Group S, Division 3 parking garages, other than open parking garages, used for storing or handling automobiles operating under their own power and on loading platforms in bus terminals, ventilation shall be provided capable of exhausting a minimum of 1.5 cubic feet per minute (cfm) per square foot (0.71 L/s) of gross floor area. The building official may approve an alternate ventilation system designed to exhaust a minimum of 14,000 cfm (6608 L/s) for each operating vehicle. Such system shall be based on the anticipated instantaneous movement rate of vehicles, but not less than 2.5 percent (or one vehicle) of the garage capacity. Automatic carbon monoxide-sensing devices may be employed to modulate the ventilation system to maintain a maximum average concentration of carbon monoxide of 50 parts per million during any eight-hour period, with a maximum concentration not greater than 200 parts per million for a period not exceeding one hour. Connecting offices, waiting rooms, ticket booths and similar uses shall be supplied with conditioned air under positive pressure.

EXCEPTION: Mechanical ventilation need not be provided within a Group S, Division 3 parking garage when openings complying with Section 311.9.2.2 are provided.
SECTION 1203 — LIGHT AND VENTILATION IN GROUP R OCCUPANCIES

1203.1 General. For the purpose of determining the light or ventilation for Group R Occupancies required by this section, any room may be considered as a portion of an adjoining room when one half of the area of the common wall is open and unobstructed and provides an opening of not less than one tenth of the floor area of the interior room or 25 square feet (2.3 m²), whichever is greater.

Exterior openings for natural light or ventilation required by this section shall open directly onto a public way or a yard or court as set forth in Section 1203.4.

**EXCEPTIONS:**

1. Required exterior openings may open into a roofed porch where the porch:
   1.1 Abuts a public way, yard or court; and
   1.2 Has a ceiling height of not less than 7 feet (2134 mm); and
   1.3 Has a longer side at least 65 percent open and unobstructed.
2. Skylights.

1203.2 Light. Guest rooms and habitable rooms within a dwelling unit or congregate residence shall be provided with natural light by means of exterior glazed openings with an area not less than one tenth of the floor area of such rooms with a minimum of 10 square feet (0.93 m²).

**EXCEPTION:** Kitchens in Group R Occupancies may be provided with artificial light.

1203.3 Ventilation. Guest rooms and habitable rooms within a dwelling unit or congregate residence shall be provided with natural ventilation by means of openable exterior openings with an area of not less than one twentieth of the floor area of such rooms with a minimum of 5 square feet (0.46 m²).

In lieu of required exterior openings for natural ventilation, a mechanical ventilating system may be provided. Such system shall be capable of providing two air changes per hour in guest rooms, dormitories, habitable rooms and in public corridors with a minimum of 15 cubic feet per minute (7 L/s) of outside air per occupant during such time as the building is occupied.

Bathrooms, water closet compartments, laundry rooms and similar rooms shall be provided with natural ventilation by means of openable exterior openings with an area not less than one twentieth of the floor area of such rooms with a minimum of 1½ square feet (0.14 m²).

In lieu of required exterior openings for natural ventilation in bathrooms containing a bathtub or shower or combination thereof, laundry rooms, and similar rooms, a mechanical ventilation system connected directly to the outside capable of providing five air changes per hour shall be provided.

Such systems shall be connected directly to the outside, and the point of discharge shall be at least 3 feet (914 mm) from any opening which allows air entry into occupied portions of the building.

Bathrooms which contain only a water closet or lavatory or combination thereof, and similar rooms may be ventilated with an approved mechanical recirculating fan or similar device designed to remove odors from the air.

1203.4 Yards or Courts.

1203.4.1 General. This section shall apply to yards and courts adjacent to exterior openings that provide required natural light or ventilation. Such yards and courts shall be on the same property as the building.

1203.4.2 Yards. Yards shall not be less than 3 feet (914 mm) in width for one-story and two-story buildings. For buildings more than two stories in height, the minimum width of the yard shall be increased at the rate of 1 foot (305 mm) for each additional story. For buildings exceeding 14 stories in height, the required width of the yard shall be computed on the basis of 14 stories.

1203.4.3 Courts. Courts shall not be less than 3 feet (914 mm) in width. Courts having windows opening on opposite sides shall not be less than 6 feet (1829 mm) in width. Courts bounded on three or more sides by the walls of the building shall not be less than 10 feet (3048 mm) in length unless bounded on one end by a public way or yard. For buildings more than two stories in height, the court
shall be increased 1 foot (305 mm) in width and 2 feet (610 mm) in length for each additional story. For buildings exceeding 14 stories in height, the required dimensions shall be computed on the basis of 14 stories.

Adequate access shall be provided to the bottom of all courts for cleaning purposes. Every court more than two stories in height shall be provided with a horizontal air intake at the bottom not less than 10 square feet (0.93 m²) in area and leading to the exterior of the building unless abutting a yard or public way. The construction of the air intake shall be as required for the court walls of the building, but in no case shall be less than one-hour fire resistive.

SECTION 1204 — EAVES

Eaves over required windows shall not be less than 30 inches (762 mm) from the side and rear property lines. See also Sections 503.2 and 705.

SECTION 1205 — ALTERNATE VENTILATION WHEN APPLICABLE

1205.1 General. Requirements for ventilation are included in Appendix Chapter 12 of this code. When adopted (see Section 101.3) the appendix criteria shall take precedence over the ventilation requirements set forth in Sections 1202 and 1203 of this code.

1205.2 Standards. The standard listed below is a recognized standard (see Sections 3502 and 3503).

Chapter 13
ENERGY CONSERVATION

SECTION 1301 — SOLAR ENERGY COLLECTORS
Collectors which function as building components shall comply with the applicable provisions of the code.

Collectors located above or upon a roof and not functioning as building components shall not reduce the required fire-resistance or fire-retardancy classification of the roof-covering materials.

EXCEPTIONS: 1. Collectors installed on one- and two-family dwellings.
2. Noncombustible collectors located on buildings not over three stories in height or 9,030 square feet (836 m²) in total floor area.
3. Collectors that comply with the provisions of Section 2603.14.

A complete code for energy conservation in new buildings is contained in Appendix Chapter 13. When adopted, as set forth in Section 101.3, Appendix Chapter 13 applies.
Chapter 14
EXTERIOR WALL COVERINGS

SECTION 1401 — GENERAL

1401.1 Applicability. Exterior wall coverings for the building shall provide weather protection for the building at its exterior boundaries.

Exterior wall covering shall be in accordance with this chapter and as specified by the applicable provisions elsewhere in this code. For additional provisions see Chapter 19 for concrete, Chapter 20 for lightweight metals, Chapter 21 for masonry, Chapter 22 for steel, Chapter 23 for wood, Chapter 25 for gypsum wallboard and plaster and Chapter 26 for plastics. Also, see the following:

<table>
<thead>
<tr>
<th>SECTION</th>
<th>SUBJECT</th>
</tr>
</thead>
<tbody>
<tr>
<td>601.5.4</td>
<td>Walls fronting on streets</td>
</tr>
<tr>
<td>602.1</td>
<td>Materials in Type I construction</td>
</tr>
<tr>
<td>603.1</td>
<td>Materials in Type II construction</td>
</tr>
<tr>
<td>604.3.1</td>
<td>Exterior walls in Type III construction</td>
</tr>
<tr>
<td>605.3.1</td>
<td>Exterior walls in Type IV construction</td>
</tr>
<tr>
<td>606.1</td>
<td>Materials in Type V construction</td>
</tr>
</tbody>
</table>

1401.2 Standards. The standards listed below labeled a “U.B.C. standard” are also listed in Chapter 35, Part II, and are part of this code.

1. U.B.C. Standard 14-1, Kraft Waterproof Building Paper
2. U.B.C. Standard 14-2, Vinyl Siding

SECTION 1402 — WEATHER PROTECTION

1402.1 Weather-resistive Barriers. All weather-exposed surfaces shall have a weather-resistive barrier to protect the interior wall covering. Such barrier shall be equal to that provided for in U.B.C. Standard 14-1 for kraft waterproof building paper or asphalt-saturated felt. This standard is listed in Chapter 35, Part II, and is a part of this code. Building paper and felt shall be free from holes and breaks other than those created by fasteners and construction system due to attaching of the building paper, and shall be applied over studs or sheathing of all exterior walls. Such felt or paper shall be applied horizontally, with the upper layer lapped over the lower layer not less than 2 inches (51 mm). Where vertical joints occur, felt or paper shall be lapped not less than 6 inches (152 mm).

Weather-protected barrier may be omitted in the following cases:

1. When exterior covering is of approved weatherproof panels.
2. In back-plastered construction.
3. When there is no human occupancy.
4. Over water-repellent panel sheathing.
5. Under approved paperbacked metal or wire fabric lath.
6. Behind lath and portland cement plaster applied to the underside of roof and eave projections.

1402.2 Flashing and Counterflashing. Exterior openings exposed to the weather shall be flashed in such a manner as to make them weatherproof.

All parapets shall be provided with coping of approved materials. All flashing, counterflashing and coping, when of metal, shall have a minimum thickness of 0.019 inches (0.48 mm) (No. 26 galvanized sheet metal gage) corrosion-resistant metal.
1402.3 Waterproofing Weather-exposed Areas. Balconies, landings, exterior stairways, occupied roofs and similar surfaces exposed to the weather and sealed underneath shall be waterproofed and sloped a minimum of 1/4 unit vertical in 12 units horizontal (2% slope) for drainage.

1402.4 Dampproofing Foundation Walls. Unless otherwise approved by the building official, foundation walls enclosing a basement below finished grade shall be dampproofed outside by approved methods and materials.

SECTION 1403 — VENEER

1403.1 Scope.

1403.1.1 General. All veneer and its application shall conform to the requirements of this code. Wainscots not exceeding 4 feet (1219 mm) in height measured above the adjacent ground elevation for exterior veneer or the finish floor elevation for interior veneer may be exempted from the provisions of this chapter if approved by the building official.

1403.1.2 Limitations. Exterior veneer shall not be attached to wood-frame construction at a point more than 30 feet (9144 mm) in height above the noncombustible foundation, except the 30-foot (9144 mm) limit may be increased when special construction is designed to provide for differential movement and when approved by the building official.

1403.2 Definitions. For the purpose of this chapter, certain terms are defined as follows:

- **BACKING** as used in this chapter is the surface or assembly to which veneer is attached.
- **VENEER** is nonstructural facing of brick, concrete, stone, tile, metal, plastic or other similar approved material attached to a backing for the purpose of ornamentation, protection or insulation.
- **Adhered Veneer** is veneer secured and supported through adhesion to an approved bonding material applied over an approved backing.
- **Anchored Veneer** is veneer secured to and supported by approved connectors attached to an approved backing.
- **Exterior Veneer** is veneer applied to weather-exposed surfaces as defined in Section 224.
- **Interior Veneer** is veneer applied to surfaces other than weather-exposed surfaces as defined in Section 224.

1403.3 Materials. Materials used in the application of veneer shall conform to the applicable requirements for such materials as set forth elsewhere in this code.

For masonry units and mortar, see Chapter 21.

For precast concrete units, see Chapter 19.

For portland cement plaster, see Chapter 25.

Anchors, supports and ties shall be noncombustible and corrosion resistant.

When the terms "corrosion resistant" or "noncorrosive" are used in this chapter they shall mean having a corrosion resistance equal to or greater than a hot-dipped galvanized coating of 1.5 ounces of zinc per square foot (458 g/m²) of surface area. When an element is required to be corrosion resistant or noncorrosive, all of its parts, such as screws, nails, wire, dowels, bolts, nuts, washers, shims, anchors, ties and attachments, shall be corrosion resistant.

1403.4 Design.

1403.4.1 General. The design of all veneer shall comply with the requirements of Chapter 16 and this section.

Veneer shall support no load other than its own weight and the vertical dead load of veneer above.
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Surfaces to which veneer is attached shall be designed to support the additional vertical and lateral loads imposed by the veneer.

Consideration shall be given for differential movement of supports, including that caused by temperature changes, shrinkage, creep and deflection.

1403.4.2 Adhered veneer. With the exception of ceramic tile, adhered veneer and its backing shall be designed to have a bond to the supporting element sufficient to withstand a shearing stress of 50 psi (345 kPa).

1403.4.3 Anchored veneer. Anchored veneer and its attachments shall be designed to resist a horizontal force equal to at least twice the weight of the veneer.

1403.5 Adhered Veneer.

1403.5.1 Permitted backing. Backing shall be continuous and may be of any material permitted by this code. It shall have surfaces prepared to secure and support the imposed loads of veneer.

Exterior veneer, including its backing, shall provide a weatherproof covering.

For additional backing requirements, see Section 1402.

1403.5.2 Area limitations. The height and length of veneered areas shall be unlimited except as required to control expansion and contraction and as limited by Section 1403.1.2.

1403.5.3 Unit size limitations. Veneer units shall not exceed 36 inches (914 mm) in the greatest dimension or more than 720 square inches (0.46 m²) in total area and shall weigh not more than 15 pounds per square foot (psf) (73.2 kg/m²) unless approved by the building official.

EXCEPTION: Veneer units weighing less than 3 psf (14.6 kg/m²) shall not be limited in dimension or area.

1403.5.4 Application. In lieu of the design required by Sections 1403.4.1 and 1403.4.2, adhered veneer may be applied by one of the following application methods:

1. A paste of neat portland cement shall be brushed on the backing and the back of the veneer unit. Type S mortar then shall be applied to the backing and the veneer unit. Sufficient mortar shall be used to create a slight excess to be forced out the edges of the units. The units shall be tapped into place so as to completely fill the space between the units and the backing. The resulting thickness of mortar in back of the units shall not be less than 1/8 inch (13 mm) or more than 1 1/4 inches (32 mm).

2. Units of tile, masonry, stone or terra cotta, not over 1 inch (25 mm) in thickness shall be restricted to 81 square inches (52258 mm²) in area unless the back side of each unit is ground or box screeeded to true up any deviations from plane. These units and glass mosaic units of tile not over 2 inches by 2 inches by 3/8 inch (51 mm by 51 mm by 9.5 mm) in size may be adhered by means of portland cement. Backing may be of masonry, concrete or portland cement plaster on metal lath. Metal lath shall be fastened to the supports in accordance with the requirements of Chapter 25. Mortar as described in Table 14-A shall be applied to the backing as a setting bed. The setting bed shall be a minimum of 3/8 inch (10 mm) thick and a maximum of 1/4 inch (19 mm) thick. A paste of neat portland cement or one-half portland cement and one-half graded sand shall be applied to the back of the exterior veneer units and to the setting bed and the veneer pressed and tapped into place to provide complete coverage between the mortar bed and veneer unit. A cement mortar shall be used to point the veneer.

1403.5.5 Ceramic tile. Portland cement mortars for installing ceramic tile on walls, floors and ceilings shall be as set forth in Table 14-A.

1403.6 Anchored Veneer.

1403.6.1 Permitted backing. Backing may be of any material permitted by this code. Exterior veneer including its backing shall provide a weatherproof covering.
1403.6.2 Height and support limitations. Anchored veneers shall be supported on footings, foundations or other noncombustible support except as provided under Section 2316.

In Seismic Zones 2, 3 and 4 the weight of all anchored veneers installed on structures more than 30 feet (9144 mm) in height above the noncombustible foundation or support shall be supported by noncombustible, corrosion-resistant structural framing. The structural framing shall have horizontal supports spaced not more than 12 feet (3658 mm) vertically above the initial 30-foot (9144 mm) height. The vertical spacing between horizontal supports may be increased when special design techniques, approved by the building official, are used in the construction.

Noncombustible, noncorrosive lintels and noncombustible supports shall be provided over all openings where the veneer unit is not self-spanning. The deflections of all structural lintels and horizontal supports required by this subsection shall not exceed 1/600 of the span under full load of the veneer.

1403.6.3 Area limitations. The area and length of anchored veneer walls shall be unlimited, except as required to control expansion and contraction and by Section 1403.1.2.

1403.6.4 Application.

1403.6.4.1 General. In lieu of the design required by Sections 1403.4.1 and 1403.4.3, anchored veneer may be applied in accordance with this section.

1403.6.4.2 Masonry and stone units [5 inches (127 mm) maximum in thickness]. Masonry and stone veneer not exceeding 5 inches (127 mm) in thickness may be anchored directly to structural masonry, concrete or studs in one of the following manners:

1. Wall ties shall be corrosion resistant, and if made of sheet metal, shall have a minimum thickness of 0.030 inch (0.76 mm) (No. 22 galvanized sheet gage) by 3/4 inch (19.1 mm) or, if of wire, shall have a minimum diameter of 0.148 inch (3.76 mm) (No. 9 B.W. gage). Wall ties shall be spaced so as to support not more than 2 square feet (0.19 m²) of wall area but shall not be more than 24 inches (610 mm) on center horizontally. In Seismic Zones 3 and 4, wall ties shall have a lip or hook on the extended leg that will engage or enclose a horizontal joint reinforcement wire having a diameter of 0.148 inch (3.76 mm) (No. 9 B.W. gage) or equivalent. The joint reinforcement shall be continuous with butt splices between ties permitted.

When applied over stud construction, the studs shall be spaced a maximum of 16 inches (406 mm) on center and approved paper shall first be applied over the sheathing or wires between studs except as otherwise provided in Section 1402, and mortar shall be slushed into the 1-inch (25 mm) space between facing and paper.

As an alternate, an air space of at least 1 inch (25 mm) may be maintained between the backing and the veneer in which case spot bedding at all ties shall be of cement mortar.

2. Veneer may be applied with 1-inch-minimum (25 mm) grouted backing space which is reinforced by not less than 2-inch by 2-inch (51 mm by 51 mm) 0.065 inch (1.65 mm) (No. 16 B.W. gage) galvanized wire mesh placed over waterproof paper backing and anchored directly to stud construction.

The stud spacing shall not exceed 16 inches (406 mm) on center. The galvanized wire mesh shall be anchored to wood studs by galvanized steel wire furring nails at 4 inches (102 mm) on center or by barbed galvanized nails at 6 inches (152 mm) on center with a 1 1/8-inch-minimum (29 mm) penetration. The galvanized wire mesh may be attached to steel studs by equivalent wire ties. If this method is applied over solid sheathing the mesh must be furred for embedment in grout. The wire mesh must be attached at the top and bottom with not less than 8-penny (64 mm) common wire nails. The grout fill shall be placed to fill the space intimately around the mesh and veneer facing.

1403.6.4.3 Stone units [10 inches (254 mm) maximum in thickness]. Stone veneer units not exceeding 10 inches (254 mm) in thickness may be anchored directly to structural masonry, concrete or to studs:
1. With concrete or masonry backing. Anchor ties shall not be less than 0.109 inch (2.77 mm) (No. 12 B.W. gage) galvanized wire, or approved equal, formed as an exposed eye and extending not less than 1/2 inch (13 mm) beyond the face of the backing. The legs of the loops shall not be less than 6 inches (152 mm) in length bent at right angles and laid in the masonry mortar joint and spaced so that the eyes or loops are 12 inches (254 mm) maximum on center in both directions. There shall be provided not less than a 0.109 inch (2.77 mm) (No. 12 B.W. gage) galvanized wire tie, or approved equal, threaded through the exposed loops for every 2 square feet (0.19 m²) of stone veneer. This tie shall be a loop having legs not less than 15 inches (381 mm) in length so that it will lie in the stone veneer mortar joint. The last 2 inches (51 mm) of each wire leg shall have a right angle bend. One inch (25 mm) of cement grout shall be placed between the backing and the stone veneer.

2. With stud backing. A 2-inch by 2-inch (51 mm by 51 mm) 0.065 inch (1.65 mm) (No. 16 B.W. gage) galvanized wire mesh with two layers of waterproof paper backing shall be applied directly to wood studs spaced a maximum of 16 inches (406 mm) on center. On studs the mesh shall be attached with 2-inch-long (51 mm) galvanized steel wire furring nails at 4 inches (102 mm) on center providing a minimum 1/8-inch (29 mm) penetration into each stud and with 8-penny (64 mm) common nails at 8 inches (203 mm) on center into top and bottom plates. The galvanized wire mesh may be attached to steel studs with equivalent wire ties. There shall be not less than 0.109 inch (2.77 mm) (No. 12 B.W. gage) galvanized wire, or approved equal, looped through the mesh for every 2 square feet (0.19 m²) of stone veneer. This tie shall be a loop having legs not less than 15 inches (381 mm) in length, so bent that it will lie in the stone veneer mortar joint.

The last 2 inches (51 mm) of each wire leg shall have a right angle bend. One-inch-minimum (25 mm) thickness of cement grout shall be placed between the backing and the stone veneer.

1403.6.4.4 Slab-type units [2 inches (51 mm) maximum in thickness]. For veneer units of marble, travertine, granite or other stone units of slab form, ties of corrosion-resistant dowels shall engage drilled holes located in the middle third of the edge of the units spaced a maximum of 24 inches (610 mm) apart around the periphery of each unit with not less than four ties per veneer unit. Units shall not exceed 20 square feet (1.9 m²) in area.

If the dowels are not tight fitting, the holes may be drilled not more than 1/16 inch (1.6 mm) larger in diameter than the dowel with the hole countersunk to a diameter and depth equal to twice the diameter of the dowel in order to provide a tight-fitting key of cement mortar at the dowel locations when the mortar in the joint has set.

All veneer ties shall be corrosion-resistant metal capable of resisting in tension or compression a force equal to two times the weight of the attached veneer.

If made of sheet metal, veneer ties shall not be smaller in area than 0.030 inch (0.76 mm) (No. 22 galvanized sheet gage) by 1 inch (25 mm) or, if made of wire, not smaller in diameter than 0.148 inch (3.76 mm) (No. 9 B.W. gage) wire.

1403.6.4.5 Terra cotta or ceramic units. Tied terra cotta or ceramic veneer units shall not be less than 1 1/4 inches (32 mm) in thickness with projecting dovetail webs on the back surface spaced approximately 8 inches (203 mm) on centers. The facing shall be tied to the backing wall with noncorrosive metal anchors of not less than 0.165 inch (4.19 mm) (No. 8 B.W. gage) wire installed at the top of each piece in horizontal bed joints not less than 12 inches (305 mm) or more than 18 inches (457 mm) on centers; these anchors shall be secured to 1/4-inch (6.4 mm) galvanized pencil rods which pass through the vertical aligned loop anchors in the backing wall. The veneer ties shall have sufficient strength to support the full weight of the veneer in tension. The facing shall be set with not less than a 2-inch (51 mm) space from the backing wall and the space shall be filled solidly with portland cement grout and pea gravel. Immediately prior to setting, the backing wall and the facing shall be drenched with clean water and shall be distinctly damp when the grout is poured.

SECTION 1404 — VINYL SIDING

1404.1 Vinyl siding conforming to the requirements of this section and complying with U.B.C. Standard 14-2 may be installed on exterior walls of buildings of Type V construction located in
areas where the wind speed specified in Figure 16-1 does not exceed 80 miles per hour (129 km/h) and the building height is less than 40 feet (12192 mm) in Exposure C. If construction is located in areas where wind speed exceeds 80 miles per hour (129 km/h), or building heights are in excess of 40 feet (12192 mm), data indicating compliance with Chapter 16 must be submitted. Vinyl siding shall be secured to the building so as to provide weather protection for the exterior walls of the building.

1404.2 Application. The siding shall be applied over sheathing or materials listed in Section 2320. Siding shall be applied to conform with the weather-resistive barrier requirements in Section 1402.1. Siding and accessories shall be installed in accordance with approved manufacturer's instructions.

Nails used to fasten the siding and accessories shall have a minimum \( \frac{3}{16} \)-inch (9.5 mm) head diameter and 0.120-inch (3.05 mm) Shank diameter. The nails shall be corrosion resistant and shall be long enough to penetrate the studs or nailing strip at least \( \frac{3}{16} \) inch (19 mm). Where the siding is installed horizontally, the fastener spacing shall not exceed 16 inches (406 mm) horizontally and 12 inches (305 mm) vertically. Where the siding is installed vertically, the fastener spacing shall not exceed 12 inches (305 mm) horizontally and 12 inches (305 mm) vertically.

<table>
<thead>
<tr>
<th>TABLE 14-A—CERAMIC TILE SETTING MORTARS</th>
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</thead>
<tbody>
<tr>
<td>COAT</td>
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<tr>
<td>------</td>
</tr>
<tr>
<td>1. Walls and ceilings over</td>
</tr>
<tr>
<td>10 sq. ft. (0.93 m²)</td>
</tr>
<tr>
<td>Float or leveling</td>
</tr>
<tr>
<td>2. Walls and ceilings 10 sq. ft. (0.93 m²) or less</td>
</tr>
<tr>
<td>3. Floors Setting bed</td>
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</table>
Chapter 15
ROOFS AND ROOF STRUCTURES

SECTION 1501 — SCOPE

1501.1 General. Roofs and roof structures shall be as specified in this code and as otherwise required by this chapter.

Roof coverings shall be secured or fastened to the supporting roof construction and shall provide weather protection for the building at the roof.

Subject to the requirements of this chapter, combustible roof coverings and roof insulation may be used in any type of construction.

Skylights shall be constructed as required in Chapter 24.

For use of plastics in roofs, see Chapter 26.

For solar energy collectors located above or upon a roof, see Chapter 13.

1501.2 Standards of Quality. The standards listed below labeled a "U.B.C. standard" are also listed in Chapter 35, Part II, and are part of this code. The other standards listed below are recognized standards (see Sections 3502 and 3503).

1. Roof coverings.
   1.1 UL 55-A, Materials for Use in Construction of Built-up Roof Coverings
   1.2 UL 55-B, Class C Sheet Roofing and Shingles Made from Organic Felt
   1.3 ASTM A 570 and A 611, Sheet Metals
   1.4 U.B.C. Standard 15-3, Wood Shakes
   1.5 ASTM C 222, Asbestos-Cement Shingles
   1.6 ASTM C 406, Slate Shingles
   1.7 U.B.C. Standard 15-4, Wood Shingles
   1.8 U.B.C. Standard 15-5, Roofing Tile
   1.9 U.B.C. Standard 15-6, Modified Bitumen, Thermoplastic and Thermoset Membranes

2. Roofing materials.
   2.1 ASTM D 312 and D 450, Roofing Asphalt and Coal Tar Bitumen
   2.2 U.B.C. Standard 15-1, Roofing Aggregates
   2.3 ASTM A 219 and A 239, Corrosion-resistant Metals
   2.4 ASTM B 134, B 211 and B 250, Wire

3. Roofing test.

4. Roof vents.
   U.B.C. Standard 15-7, Automatic Smoke and Heat Vents

SECTION 1502 — DEFINITIONS

For purposes of this chapter certain terms are designated as follows:

BASE PLY is one layer of felt secured to the deck over which a built-up roof is applied.

BASE SHEET is a product used as the base ply in a built-up roofing membrane.
**Built-up Roof Covering** is two or more layers of felt cemented together and surfaced with cap sheet, mineral aggregate, smooth coating or similar surfacing material.

**Cap Sheet** is roofing made of organic or inorganic fibers, saturated and coated on both sides with a bituminous compound, surfaced with mineral granules, mica, talc, ilmenite, inorganic fibers or similar materials.

**Cementing** is solidly mopped application of asphalt, cold liquid asphalt compound, coal tar pitch or other approved cementing material.

**Combination Sheet** is a glass fiber felt integrally attached to kraft paper.

**Corrosion-Resistant** is any nonferrous metal or any metal having an unbroken surfacing of nonferrous metal, or steel with not less than 10 percent chromium or with not less than 0.20 percent copper.

**Equiviscous Temperature (EVT)** is the temperature determined by the manufacturer at which the asphalt has a viscosity of 125 centistokes and is considered to be the proper temperature for asphalt applications.

**Felt** is matted organic or inorganic fibers, saturated or coated with bituminous compound.

**Felt, Nonbituminous Saturated** is a felt for special-purpose roofing weighing not less than 12 pounds per 100 square feet (0.6 kg/m²), not less than 0.022 inch (0.56 mm) in thickness, containing a fire- and water-retardant binder, and reinforced with glass fibers running lengthwise of the sheet not more than 1/4 inch (6.4 mm) apart.

**Fire-Retardant Shakes and Shingles** are wood shakes and shingles complying with U.B.C. Standard 15-3 or 15-4 impregnated by the full-cell vacuum-pressure process with fire-retardant chemicals, and have been qualified by U.B.C. Standard 15-2 for use on Class A, B or C roofs. Each bundle of treated wood shakes and shingles shall bear labels identifying their roof-covering classification and approved quality control agency.

**Interlayment** is a layer of felt or nonbituminous saturated felt not less than 18 inches (457 mm) wide, shingled between each course of roof covering.

**Interlocking Roofing Tiles** are individual units, typically of clay or concrete, possessing matching ribbed or interlocking vertical side joints that have been designed to restrict lateral movement and water penetration.

**Metal Roofing** is metal shingles or sheets for application on solid roof surfaces, and corrugated or otherwise shaped metal sheets or sections for application on roof frameworks or on solid roof surfaces.

**Modified Bitumen Membrane Roof Covering** is one or more layers of polymer modified asphalt sheet membranes complying with U.B.C. Standard 15-6. The sheet materials may be fully adhered or mechanically attached to the substrate or held in place with an appropriate ballast layer.

**Roof-Covering Classification** is the classification assigned to a roof covering or roof-covering assembly by Section 1504 or the classification of a covering established by testing in accordance with U.B.C. Standard 15-2.

**Roofing Ply** is a layer of felt in a built-up roofing membrane.

**Roofing Square** is 100 square feet (9.3 m²) of roofing surface.

**Roofing Tiles** are units, typically clay or concrete, which comply with U.B.C. Standard 15-5.

**Spot Cementing** is discontinuous application of asphalt, cold liquid asphalt compound, coal tar pitch or other approved cementing material.

**Thermoplastic Membrane Roof Covering** is a sheet membrane composed of polymers and other proprietary ingredients, in compliance with U.B.C. Standard 15-6, whose
The chemical composition allows the sheet to be welded together by either heat or solvent throughout its service life.

THERMOSET MEMBRANE ROOF COVERING is a sheet membrane composed of polymers and other proprietary ingredients, in compliance with U.B.C. Standard 15-6, whose chemical composition vulcanizes or crosslinks during manufacture or during its service life.

UNDERLAYMENT is one or more layers of felt, sheathing paper, nonbituminous saturated felt, or other approved material over which a roofing system is applied.

VAPOR RETARDER is a layer of material or a laminate used to appreciably reduce the flow of water vapor into the roofing system.

WOOD SHAKES are tapered or nontapered pieces of approved durable wood of random widths ranging from 4 inches to 14 inches (102 mm to 356 mm) and of the following four types:

1. Hand split and resawn: tapered with one sawed and one split face; semisplit: tapered with partially sawn and split faces both sides, 15 inches (380 mm), 18 inches (455 mm) or 24 inches (610 mm) in length.
2. Taper split: tapered with both split faces, 24 inches (610 mm) in length.
3. Straight split: nontapered with both split faces, either 18 inches (455 mm) or 24 inches (610 mm) in length.
4. Tapersawn: sawn both sides, edges sawn or split. Lengths 24 inches (610 mm) and longer.

Wood Shakes (treated) are taper-sawn pieces of southern pine, black gum/sweetgum wood treated in accordance with approved national standards of random widths ranging from 4 inches to 8 inches (100 mm to 200 mm) and lengths of 18 inches (455 mm) or 24 inches (610 mm). Maximum weather exposure as shown in Table 15-C, Wood Shakes.

WOOD SHINGLES are tapered pieces of approved durable wood, sawed both sides, of random widths ranging from 3 inches to 14 inches (75 mm to 356 mm) and in lengths of 16 inches (405 mm), 18 inches (455 mm) or 24 inches (610 mm).

SECTION 1503 — ROOF-COVERING REQUIREMENTS

The roof covering on any structure regulated by this code shall be as specified in Table 15-A and as classified in Section 1504.

The roof-covering assembly includes the roof deck, underlayment, interlayment, insulation and covering which is assigned a roof-covering classification.

SECTION 1504 — ROOF-COVERING CLASSIFICATION

1504.1 Class A Roof Covering. A Class A roof covering shall be one of the following roofings:

1. Any Class A roofing assembly.
2. Asbestos-cement shingles or sheets.
4. Sheet ferrous or copper roof covering.
5. Slate shingles.
6. Clay or concrete roof tile.

1504.2 Class B Roof Covering. Class B roof shall be any Class B roofing assembly.

1504.3 Class C Roof Covering. Class C shall be any Class C roofing assembly.

1504.4 Nonrated Roof Covering. A nonrated roof covering shall be one of the following roofings:
1. Any mineral aggregate surface built-up roof for application to roofs having a slope of not more than 3 units vertical in 12 units horizontal (25% slope) applied as specified in Section 1507.6, consisting of not less than the following:

**Roofing Piles**
Three layers of felt, and

**Surfacing Material**
300 pounds per roofing square (14.6 kg/m²) of gravel or other approved surfacing material, or 250 pounds per roofing square (12.2 kg/m²) of crushed slag.

2. Modified bitumen membrane assemblies not meeting Class A, B or C roofing.
3. Thermoplastic membrane assemblies not meeting Class A, B, or C roofing.
4. Thermoset membrane assemblies not meeting Class A, B, or C roofing.
5. Wood shingles.

### 1504.5 Special-purpose Roofs.

#### 1504.5.1 Wood shakes and shingles with nonbituminous saturated felt.

**1504.5.1.1 Wood shakes.** Special-purpose wood shake roofing shall conform to grading and application requirements of this chapter except that nonbituminous saturated felt is to be substituted for the asphalt felt specified in Section 1507.12. In addition, the deck shall be constructed of 19/32-inch (15 mm) wood structural panels with exterior glue or 1-inch (25 mm) nominal tongue-and-groove boards overlaid with a layer of approved nonbituminous saturated felt lapped 2 inches (51 mm) on the horizontal and vertical joints. An 18-inch-wide (457 mm) strip of the same felt shall be shingled in between each course of shakes in such manner that no felt is exposed to the weather.

**1504.5.1.2 Wood shingles.** Special-purpose wood shingle roofing shall conform to grading and application requirements of this chapter. In addition, the deck, whether of spaced boards or solid, shall be overlaid with a layer of approved nonbituminous saturated felt lapped 2 inches (51 mm) on the horizontal and vertical joints.

#### 1504.5.2 Wood shakes or shingles with gypsum board underlayment.

Special-purpose wood shake or wood shingle roofing shall conform to the grading and application requirements of this chapter. In addition, an underlayment of 1/2-inch (12.7 mm) Type X gypsum board shall be placed under 15/32-inch (11.9 mm) wood structural panel solid sheathing or 1-inch (25 mm) nominal spaced sheathing.

### SECTION 1505 — ATTICS: ACCESS, DRAFT STOPS AND VENTILATION

#### 1505.1 Access.
An attic access opening shall be provided to attics of buildings with combustible ceiling or roof construction. The opening shall be located in a corridor, hallway or other readily accessible location. Attics with a maximum vertical height of less than 30 inches (752 mm) need not be provided with access openings.

The opening shall not be less than 22 inches by 30 inches (559 mm by 762 mm). Thirty-inch (762 mm) minimum clear headroom in the attic space shall be provided at or above the access opening.

#### 1505.2 Draft Stops.
Attics, mansards, overhangs and other concealed roof spaces formed of combustible construction shall be draft stopped as specified in Section 708.

#### 1505.3 Ventilation.
Where determined necessary by the building official due to atmospheric or climatic conditions, enclosed attics and enclosed rafter spaces formed where ceilings are applied directly to the underside of roof rafters shall have cross ventilation for each separate space by venti-
lating openings protected against the entrance of rain and snow. The net free ventilating area shall not be less than $\frac{1}{150}$ of the area of the space ventilated.

**EXCEPTIONS:**
1. The area may be $\frac{1}{300}$ of the area of the space ventilated provided 50 percent of the required ventilating area is provided by ventilators located in the upper portion of the space to be ventilated at least 3 feet (914 mm) above eave or cornice vents with the balance of the required ventilation provided by eave or cornice vents.
2. The area may be $\frac{1}{300}$ of the area of the space ventilated provided a vapor retarder having a transmission rate not exceeding 1 perm [5.7 × 10^{-11} kg/(Pa·s·m²)] is installed on the warm side of the attic insulation.

The openings shall be covered with corrosion-resistant metal mesh with mesh openings of $\frac{1}{4}$ inch (6.4 mm) in dimension.

Smoke and heat venting shall be in accordance with Section 906.

### SECTION 1506 — ROOF DRAINAGE

**1506.1 General.** Unless designed for water accumulation in accordance with Section 1605.6 and approved by the building official, roof systems shall be sloped a minimum of $\frac{1}{4}$ unit vertical in 12 units horizontal (2% slope) for drainage.

**1506.2 Roof Drains.** Unless roofs are sloped to drain over roof edges, roof drains shall be installed at each low point of the roof.

Roof drains shall be sized and discharged in accordance with the Plumbing Code.

**1506.3 Overflow Drains and Scuppers.** Where roof drains are required, overflow drains having the same size as the roof drains shall be installed with the inlet flow line located 2 inches (51 mm) above the low point of the roof, or overflow scuppers having three times the size of the roof drains may be installed in adjacent parapet walls with the inlet flow line located 2 inches (51 mm) above the low point of the adjacent roof and having a minimum opening height of 4 inches (102 mm).

Overflow drains shall be connected to drain lines independent from the roof drain lines.

**1506.4 Concealed Piping.** Roof drains and overflow drains, when concealed within the construction of the building, shall be installed in accordance with the Plumbing Code.

**1506.5 Over Public Property.** Roof drainage water from a building shall not be permitted to flow over public property.

**EXCEPTION:** Group R, Division 3 and Group U Occupancies.

### SECTION 1507 — ROOF-COVERING MATERIALS AND APPLICATION

**1507.1 Materials.** The quality and design of roofing materials and their fastenings shall conform to the applicable standards listed in Chapter 35, Part II.

**1507.2 Identification.** All material shall be delivered in packages bearing the manufacturer’s label or identifying mark.

Each package of asphalt shingles, mineral surfaced roll roofing, fire-retardant-treated wood shingles and shakes, modified bitumen, thermoplastic and thermoset membranes and built-up roofing ply materials shall bear the label of an approved agency having a service for the inspection of material and finished products during manufacture.

Each bundle of wood shakes or shingles shall comply with U.B.C. Standard 15-3 or 15-4, respectively. Each bundle of wood shakes or shingles and slate shingles shall bear the label or identification mark of an approved inspection bureau or agency showing the grade.

Asphalt shall be delivered in cartons indicating the name of the manufacturer, the flash point and the type of product. Bulk shipments shall be accompanied with the same information issued in the
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form of a certification or on the bill of lading by the manufacturer. Coal tar pitch shall bear the manufacturer's name and type. Additional information such as equiviscous temperature (EVT) may be furnished.

1507.3 Asbestos-cement Roofing. Corrugated asbestos-cement roofing shall be applied in an approved manner.

1507.4 Asbestos-cement Shingles. Asbestos-cement shingles shall be installed in an approved manner.

1507.5 Asphalt Shingles. Asphalt shingles shall be fastened according to manufacturer's instructions and Table 15-B-1.

1507.6 Built-up Roofs. Built-up roofing shall be applied in accordance with the manufacturer's instructions and Tables 15-E through 15-G.

1507.7 Clay or Concrete Tile. Tile of clay or concrete shall comply with U.B.C. Standard 15-5 and shall be installed in accordance with manufacturer's instructions and Tables 15-D-1 and 15-D-2.

1507.8 Metal Roofing. Metal roofing exposed to the weather shall be corrosion resistant.

    Corrugated or ribbed steel shall not be less than 0.013 inch (0.33 mm) (No. 30 galvanized sheet gage).

    Flat steel sheets shall not be less than 0.013 inch (0.33 mm) (No. 30 galvanized sheet gage). Other ferrous sections or shapes shall not be less than No. 26 galvanized sheet gage.

    Flat nonferrous sheets shall not be less than 0.0159 inch (0.40 mm) (No. 28 B.&S. gage). Other nonferrous sections or shapes shall not be less than 0.0179 inch (0.45 mm) (No. 25 B.&S. gage).

    Corrugated or otherwise shaped sheets or sections shall be designed to support the required live load between supporting members.

    Ferrous sheets or sections shall comply with Chapter 22, Division V.

1507.9 Metal Shingles. Metal shingles shall be applied in an approved manner. Nonferrous shingles shall not be less than 0.0159 inch (0.40 mm) (No. 28 B.&S. gage).

1507.10 Sheet Roofing. Sheet roofing shall be installed in an approved manner.

1507.11 Slate Shingles. Slate shingles shall be installed in an approved manner.

1507.12 Wood Shakes. Shakes shall comply with U.B.C. Standard 15-3 and shall be installed in accordance with Table 15-B-2.

1507.13 Wood Shingles. Shingles shall comply with U.B.C. Standard 15-4 and shall be installed in accordance with Table 15-B-2.

1507.14 Modified Bitumen, Thermoplastic and Thermoset Membranes. Modified bitumen, thermoplastic and thermost set roof membranes shall be applied in accordance with the manufacturer's instructions.

SECTION 1508 — VALLEY FLASHING

1508.1 Valleys. Roof valley flashings shall be as in this subsection. Shingle application shall be consistent with applicable Table 15-B-1, 15-B-2, 15-D-1 or 15-D-2.

1508.2 Asphalt Shingles. The roof valley flashing shall be provided of not less than 0.016 inch (0.41 mm) (No. 28 galvanized sheet gage) corrosion-resistant metal, and shall extend at least 8 inches (203 mm) from the center line each way. Sections of flashing shall have an end lap of not less than 4 inches (102 mm). Alternatively, the valley shall consist of woven asphalt shingles applied in accordance with manufacturer's printed instructions.

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In each case, the roof valley flashing shall have a 36-inch-wide (914 mm) underlayment directly under it consisting of one layer of Type 15 felt running the full length of the valley, in addition to the underlayment specified in Table 15-B-1. In severe climates, the metal valley flashing underlayment shall be solid cemented to the roof underlayment for slopes under 7 units vertical in 12 units horizontal (58.3% slope).

1508.3 Metal Shingles. The roof valley flashing shall be provided of not less than 0.016 inch (0.41 mm) (No. 28 galvanized sheet gage) corrosion-resistant metal, which shall extend at least 8 inches (203 mm) from the center line each way and shall have a splash diverter rib not less than 3/4 inch (19 mm) high at the flow line formed as part of the flashing. Sections of flashing shall have an end lap of not less than 4 inches (102 mm). The metal valley flashing shall have a 36-inch-wide (914 mm) underlayment directly under it consisting of one layer of Type 15 felt running the full length of the valley, in addition to underlayment required for metal shingles. In severe climates, the metal valley flashing underlayment shall be solid cemented to the roofing underlayment for roof slopes under 7 units vertical in 12 units horizontal (58.3% slope).

1508.4 Asbestos-cement Shingles, Slate Shingles, and Clay and Concrete Tile. The roof valley flashing shall be provided of not less than 0.016 inch (0.41 mm) (No. 28 galvanized sheet gage) corrosion-resistant metal, which shall extend at least 8 inches (203 mm) from the center line each way and shall have a splash diverter rib not less than 1 inch (25 mm) high at the flow line formed as part of the flashing. Sections of flashing shall have an end lap of not less than 4 inches (102 mm). For roof slopes of 3 units vertical in 12 units horizontal (25% slope) and over, the metal valley flashing shall have a 36-inch-wide (914 mm) underlayment directly under it consisting of one layer of Type 15 felt running the full length of the valley, in addition to the underlayment specified in Tables 15-D-1 and 15-D-2. In severe climates, the metal valley flashing underlayment shall be solid cemented to the roofing underlayment for roof slopes under 7 units vertical in 12 units horizontal (58.3% slope).

EXCEPTION: Where local practice indicates satisfactory performance, the building official may permit valley flashing without underlayment.

SECTION 1509 — OTHER FLASHING

At the juncture of the roof and vertical surfaces, flashing and counterflashing shall be provided per roofing manufacturer's instructions, and when of metal, shall not be less than 0.019 inch (0.48 mm) (No. 26 galvanized sheet gage) corrosion-resistant metal.

SECTION 1510 — ROOF INSULATION

Roof insulation shall be of a rigid type suitable as a base for application of a roof covering. Foam plastic roof insulation shall conform to the requirements of Section 2602. The use of insulation in fire-retardant construction shall comply with Section 710.1.

The roof insulation, deck material and roof covering shall meet the fire-retardancy requirements of Section 1504 and Table 15-A.

Insulation for built-up roofs shall be applied in accordance with Table 15-2. Insulation for modified bitumen, thermoplastic and thermoset membrane roofs shall be applied in accordance with the
roofing manufacturer's recommendations. For other roofing materials such as shingles or tile, the insulation shall be covered with a suitable nailing base secured to the structure.

SECTION 1511 — PENTHOUSES AND ROOF STRUCTURES

1511.1 Height. In buildings other than Type I construction, penthouses or other roof structures shall not exceed 28 feet (8534 mm) in height above the roof surface.

1511.2 Area. The aggregate area of all penthouses and other roof structures shall not exceed 33 1/3 percent of the area of the supporting roof.

1511.3 Prohibited Uses. No penthouse, bulkhead or any other similar projection above the roof shall be used for purposes other than shelter of mechanical equipment or shelter of vertical shaft openings in the roof. Penthouses or bulkheads used for purposes other than permitted by this section shall conform to the requirements of this code for an additional story.

1511.4 Construction. Roof structures shall be constructed with walls, floors and roof as required for the main portion of the building.

EXCEPTIONS: 1. On Types I and II-F.R. buildings, the exterior walls and roofs of penthouses which are 5 feet (1524 mm) or more from an adjacent property line may be of one-hour fire-resistant noncombustible construction.

2. On Types III and IV buildings, walls not less than 5 feet (1524 mm) from an adjacent property line may be of one-hour fire-resistant noncombustible construction.

3. Enclosures housing only mechanical equipment and located at least 20 feet (6096 mm) from adjacent property lines may be of unprotected noncombustible construction.

4. On one-story buildings, unroofed mechanical equipment screens, fences or similar enclosures may be of combustible construction when located at least 20 feet (6096 mm) from adjacent property lines and when not exceeding 4 feet (1219 mm) in height above the roof surface.

The restrictions of this section shall not prohibit the placing of wood flagpoles or similar structures on the roof of any building.

SECTION 1512 — TOWERS AND SPIRES

Towers or spires when enclosed shall have exterior walls as required for the building to which they are attached. Towers not enclosed and which extend more than 75 feet (22 860 mm) above grade shall have their framework constructed of iron, steel or reinforced concrete. No tower or spire shall occupy more than one fourth of the street frontage of any building to which it is attached and in no case shall the base area exceed 1,600 square feet (149 m²) unless it conforms entirely to the type of construction requirements of the building to which it is attached and is limited in height as a main part of the building. If the area of the tower or spire exceeds 100 square feet (9.29 m²) at any horizontal cross section, its supporting frame shall extend directly to the ground. The roof covering of spires shall be as required for the main roof of the rest of the structure.

Skeleton towers used as radio masts and placed on the roof of any building shall be constructed entirely of noncombustible materials when more than 25 feet (7620 mm) in height and shall be directly supported on a noncombustible framework to the ground. They shall be designed to withstand a wind load from any direction as specified in Chapter 16, Part II, in addition to any other loads.

SECTION 1513 — ACCESS TO ROOFTOP EQUIPMENT

Access shall be provided to all mechanical equipment located on the roof as required by the Mechanical Code.
TABLE 15-A—MINIMUM ROOF CLASSES

<table>
<thead>
<tr>
<th>OCCUPANCY</th>
<th>TYPES OF CONSTRUCTION</th>
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</tr>
<tr>
<td>S-1, S-3</td>
<td>B</td>
</tr>
<tr>
<td>S-2, S-5</td>
<td>B</td>
</tr>
<tr>
<td>S-4</td>
<td>B</td>
</tr>
<tr>
<td>U</td>
<td>B</td>
</tr>
</tbody>
</table>

1 Buildings which are not more than two stories in height and have not more than 6,000 square feet (557 m²) of projected roof area and where there is a minimum of 10 feet (3048 mm) from the extremity of the roof to the property line or assumed property line on all sides except for street fronts may have Class C roof coverings which comply with U.B.C. Standard 15-2 and roofs of cedar or redwood shakes and No. 1 shingles constructed in accordance with Section 1504.5.

2 Buildings which are not more than two stories in height and have not more than 6,000 square feet (557 m²) of projected roof area and where there is a minimum of 10 feet (3048 mm) from the extremity of the roof to the property line or assumed property line on all sides, except for street fronts, may have roofs of No. 1 cedar or redwood shakes and No. 1 shingles constructed in accordance with Section 1504.5.

3 See Section 308.2.2.

4 Nonrated roof coverings may be used on buildings which are not more than two stories in height and have not more than 3,000 square feet (279 m²) of projected roof area and where there is a minimum of 10 feet (3048 mm) from the extremity of the roof to the property line on all sides except for street fronts.

5 Unless otherwise required because of location as specified in Parts IV and V of this code, Group U, Division 1 roof coverings shall consist of not less than one layer of cap sheet, or built up roofing consisting of two layers of felt and a surfacing material as specified in Section 1504.4, Item l.

### Table 15-B-1—Asphalt Shingle Application

<table>
<thead>
<tr>
<th>Roof Slope</th>
<th>2 Units Vertical in 12 Units Horizontal (16.7% Slope)</th>
<th>4 Units Vertical in 12 Units Horizontal (33.3% Slope) and Over</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deck requirement</td>
<td>Asphalt shingles shall be fastened to solidly sheathed roofs. Sheathing shall conform to Sections 2322.2 and 2326.12.9.</td>
<td>One layer nonperforated Type 15 felt lapped 2 inches (51 mm) horizontally and 4 inches (102 mm) vertically to shed water.</td>
</tr>
<tr>
<td>Underlayment Temperate climate</td>
<td>Asphalt strip shingles may be installed on slopes as low as 2 inches in 12 inches (305 mm), provided the shingles are approved self-sealing or are hand sealed and are installed with an underlayment consisting of two layers of nonperforated Type 15 felt applied shingle fashion. Starting with an 18-inch-wide (457 mm) sheet and a 36-inch-wide (914 mm) sheet over it at the eaves, each subsequent sheet shall be lapped 19 inches (483 mm) horizontally.</td>
<td>Same as for temperate climate, except that one layer No. 40 coated roofing or coated glass base shall be applied from the eaves to a line 12 inches (305 mm) inside the exterior wall line with all laps cemented together.</td>
</tr>
<tr>
<td>Severe climate: In areas subject to wind-driven snow or roof ice buildup,</td>
<td>Same as for temperate climate, and additionally the two layers shall be solid cemented together with approved cementing material between the plies extending from the eave up the roof to a line 24 inches (610 mm) inside the exterior wall line of the building.</td>
<td>Same as for temperate climate, except that one layer No. 40 coated roofing or coated glass base shall be applied from the eaves to a line 12 inches (305 mm) inside the exterior wall line with all laps cemented together.</td>
</tr>
<tr>
<td>Attachment combined systems, type of fasteners</td>
<td>Corrosion-resistant nails, minimum 12-gage 1/4-inch (9.5 mm) head, or approved corrosion-resistant staples, minimum 16-gage 15/16-inch (23.8 mm) crown width. Fasteners shall comply with the requirements of Chapter 23, Division III. Fasteners shall be long enough to penetrate into the sheathing 1/4 inch (19 mm) or through the thickness of the sheathing, whichever is less.</td>
<td></td>
</tr>
<tr>
<td>No. of fasteners</td>
<td>4 per 36-inch to 40-inch (914 mm to 1016 mm) strip 2 per 9-inch to 18-inch (229 mm to 457 mm) shingle</td>
<td>Per manufacturer's instructions included with packages of shingles. Hip and ridge weather exposures shall not exceed those permitted for the field of the roof.</td>
</tr>
<tr>
<td>Exposure Field of roof Hips and ridges</td>
<td>Per manufacturer's instructions included with packages of shingles.</td>
<td></td>
</tr>
<tr>
<td>Method</td>
<td>Per manufacturer's instructions included with packages of shingles.</td>
<td></td>
</tr>
<tr>
<td>4. Flashing Valleys Other flashing</td>
<td>Per Section 1508.2</td>
<td>Per Section 1509</td>
</tr>
</tbody>
</table>

1 Figures shown are for normal application. For special conditions such as mansard application and where roofs are in special wind regions, shingles shall be attached per manufacturer's instructions.
<table>
<thead>
<tr>
<th>ROOF SLOPE</th>
<th>WOOD SHINGLES</th>
<th>WOOD SHAKES</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Not Permitted below 3 Units Vertical in 12 Units Horizontal (25% Slope)</td>
<td>Not Permitted below 4 Units Vertical in 12 Units Horizontal (33.3% Slope)</td>
</tr>
<tr>
<td></td>
<td>See Table 15-C</td>
<td>See Table 15-C</td>
</tr>
</tbody>
</table>

1. **Deck requirement**

Shingles and shakes shall be applied to roofs with solid or spaced sheathing. When spaced sheathing is used, sheathing boards shall not be less than 1 inch by 4 inches (25 mm by 102 mm) nominal dimensions and shall be spaced on centers equal to the weather exposure to coincide with the placement of fasteners. When 1-inch by 4-inch (25 mm by 102 mm) spaced sheathing is installed at 10 inches (254 mm) on center, additional 1-inch by 4-inch (25 mm by 102 mm) boards must be installed between the sheathing boards. Sheathing shall conform to Sections 2322.2 and 2326.12.9.

2. **Interlayment**

- No requirements.

3. **Underlayment**

- No requirements.

4. **Severe climate:**

   - In areas subject to wind-driven snow or roof ice buildup.
   - Two layers of nonperforated Type 15 felt applied shingle fashion shall be installed and solid cemented together with approved cementing material between the plies extending from the eave up the roof to a line 36 inches (914 mm) inside the exterior wall line of the building.

5. **Exposure**

   - Field of roof
   - Hip and ridges
   - Weather exposures shall not exceed those set forth in Table 15-C.

(Continued)
## TABLE 15-B-2—WOOD SHINGLE OR SHAKE APPLICATION—(Continued)

<table>
<thead>
<tr>
<th>ROOF SLOPE</th>
<th>WOOD SHINGLES</th>
<th>WOOD SHAKEES</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Not Permitted below 3 Units Vertical in 12 Units Horizontal (25% Slope)</td>
<td>Not Permitted below 4 Units Vertical in 12 Units Horizontal (33.3% Slope)</td>
</tr>
<tr>
<td>See Table 15-C</td>
<td>See Table 15-C</td>
<td></td>
</tr>
</tbody>
</table>

### Method

<table>
<thead>
<tr>
<th></th>
<th>WOOD SHINGLES</th>
<th>WOOD SHAKEES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shingles shall be laid with a side lap of not less than 1 1/2 inches (38 mm) between joints in adjacent courses, and not in direct alignment in alternate courses. Spacing between shingles shall be approximately 1/4 inch (6 mm). Each shingle shall be fastened with two nails only, positioned approximately 3/4 inch (19 mm) from each edge and approximately 1 inch (25 mm) above the exposure line. Starter course at the eaves shall be doubled.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shakes shall be laid with a side lap of not less than 1 1/2 inches (38 mm) between joints in adjacent courses. Spacing between shakes shall not be less than 1/8 inch (9 mm) or more than 3/8 inch (16 mm) except for preservative-treated wood shakes which shall have a spacing not less than 1/4 inch (6 mm) or more than 3/8 inch (9 mm). Shakes shall be fastened to the sheathing with two nails only, positioned approximately 1 inch (25 mm) from each edge and approximately 2 inches (51 mm) above the exposure line. The starter course at the eaves shall be doubled. The bottom or first layer may be either shakes or shingles. Fifteen-inch or 18-inch (381 mm or 457 mm) shakes may be used for the starter course at the eaves and final course at the ridge.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 5. Flashing

<table>
<thead>
<tr>
<th>Valleys</th>
<th>Other flashing</th>
<th>Per Section 1508.5</th>
<th>Per Section 1509</th>
</tr>
</thead>
</table>

1 When approved by the building official, wood shakes may be installed on a slope of not less than 3 units vertical in 12 units horizontal (25% slope) when an underlayment of not less than nonperforated Type 15 felt is installed.
### TABLE 15-C—MAXIMUM WEATHER EXPOSURE

<table>
<thead>
<tr>
<th>GRADE LENGTH</th>
<th>3 UNITS VERTICAL TO LESS THAN 4 UNITS VERTICAL (25% ≤ 33.3% SLOPE)</th>
<th>4 UNITS VERTICAL IN 12 UNITS HORIZONTAL (33.3% SLOPE)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>× 25.4 for mm</td>
<td></td>
</tr>
<tr>
<td>Wood Shingles</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. No. 1 16-inch</td>
<td>3¹/₄</td>
<td>5</td>
</tr>
<tr>
<td>2. No. 2¹ 16-inch</td>
<td>3¹/₂</td>
<td>4</td>
</tr>
<tr>
<td>3. No. 3¹ 16-inch</td>
<td>3</td>
<td>3¹/₂</td>
</tr>
<tr>
<td>4. No. 1 18-inch</td>
<td>4¹/₄</td>
<td>5¹/₂</td>
</tr>
<tr>
<td>5. No. 2¹ 18-inch</td>
<td>4</td>
<td>4¹/₂</td>
</tr>
<tr>
<td>6. No. 3¹ 18-inch</td>
<td>3¹/₂</td>
<td>4</td>
</tr>
<tr>
<td>7. No. 1 24-inch</td>
<td>5³/₄</td>
<td>7¹/₂</td>
</tr>
<tr>
<td>8. No. 2¹ 24-inch</td>
<td>5¹/₂</td>
<td>6¹/₂</td>
</tr>
<tr>
<td>9. No. 3¹ 24-inch</td>
<td>5</td>
<td>5¹/₂</td>
</tr>
<tr>
<td>Wood Shakes²</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. No. 1 18-inch</td>
<td>7¹/₂</td>
<td>7¹/₂</td>
</tr>
<tr>
<td>11. No. 1 24-inch</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>12. No. 2 18-inch</td>
<td>—</td>
<td>5¹/₂</td>
</tr>
<tr>
<td>13. No. 2 24-inch</td>
<td>—</td>
<td>7¹/₂</td>
</tr>
</tbody>
</table>

¹To be used only when specifically permitted by the building official.
²Exposure of 24-inch (610 mm) by ⁵/₈-inch (9.5 mm) resawn handsplit shakes shall not exceed 5 inches (127 mm) regardless of the roof slope.
### TABLE 15-D-1—ROOFING TILE APPLICATION\(^1\) FOR ALL TILES

<table>
<thead>
<tr>
<th>Section</th>
<th>Roof Slope 21/112 Units Vertical in 12 Units Horizontal (21% Slope) to Less Than 3 Units Vertical in 12 Units Horizontal (25% Slope)</th>
<th>Roof Slope 3 Units Vertical in 12 Units Horizontal (25% Slope) and Over</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Deck requirements</td>
<td>Solid sheathing per Sections 2322.2 and 2326.12.9</td>
<td>Same as for other climate areas, except that extending from the eaves up the roof to a line 24 inches (610 mm) inside the exterior wall line of the building, two layers of underlayment shall be applied shingle fashion and solidly cemented together with an approved cementing material.</td>
</tr>
</tbody>
</table>
| 2. Underlayment  
   In climate areas subject to wind-driven snow, roof ice damming or special wind regions as shown in Figure 16-1 of Chapter 16. | Built-up roofing membrane, three plies minimum, applied per Section 1507.6. Surfacing not required. | One layer heavy-duty felt or Type 30 felt side lapped 2 inches (51 mm) and end lapped 6 inches (153 mm). |
| Other climate areas | | |
| 3. Attachment\(^2\)  
   Type of fasteners | Corrosion-resistant nails not less than No. 11 gage, 5/16-inch (7.9 mm) head. Fasteners shall comply with the requirements of Chapter 23, Division III. Fasteners shall be long enough to penetrate into the sheathing 3/4 inch (19 mm) or through the thickness of the sheathing, whichever is less. Attaching wire for clay or concrete tile shall not be smaller than 0.083 inch (2.11 mm) (No. 14 B.W. gage). | Two fasteners per tile. Only one fastener on slopes of 7 units vertical in 12 units horizontal (58.3% slope) and less for tiles with installed weight exceeding 7.5 pounds per square foot (36.6 kg/m²) having a width no greater than 16 inches (406 mm).\(^3\) |
| Number of fasteners\(^2,3\) | One fastener per tile. Flat tile without vertical laps, two fasteners per tile. | |
| 4. Tile headlap | 3 inches (76.2 mm) minimum. | |
| 5. Flashing | Per Sections 1508.4 and 1509. | |

\(^1\) In snow areas a minimum of two fasteners per tile are required.  
\(^2\) In areas designated by the building official as being subject to repeated wind velocities to excess of 80 miles per hour (129 km/h) or where the roof height exceeds 40 feet (12.192 m) above grade, all tiles shall be attached as follows:  
1. The heads of all tiles shall be nailed.  
2. The noses of all course tiles shall be fastened with approved clips.  
3. All rake tiles shall be nailed with two nails.  
4. The noses of all ridge, hip and rake tiles shall be set in a bead of approved roofer's mastic.  
\(^3\) In snow areas a minimum of two fasteners per tile are required, or battens and one fastener.  
\(^4\) On slopes over 24 units vertical in 12 units horizontal (200% slope), the nose end of all tiles shall be securely fastened.
<table>
<thead>
<tr>
<th>TABLE 15-D-2—CLAY OR CONCRETE ROOFING TILE APPLICATION INTERLOCKING TILE WITH PROJECTING ANCHOR LUGS—MINIMUM ROOF SLOPE 4 UNITS VERTICAL IN 12 UNITS HORIZONTAL (33.3% SLOPE)</th>
<th>4 UNITS VERTICAL IN 12 UNITS HORIZONTAL (33.3% SLOPE) AND OVER</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Deck requirements</td>
<td>Spaced structural sheathing boards or solid roof sheathing.</td>
</tr>
<tr>
<td>2. Underlayment</td>
<td>Solid sheathing one layer of Type 30 felt lapped 2 inches (51 mm) horizontally and 6 inches (153 mm) vertically, except that extending from the eaves up the roof to line 24 inches (610 mm) inside the exterior wall line of the building, two layers of the underlayment shall be applied shingle fashion and solid cemented together with approved cementing material.</td>
</tr>
<tr>
<td>Other climates</td>
<td>For spaced sheathing, approved reinforced membrane. For solid sheathing, one layer heavy-duty felt or Type 30 felt lapped 2 inches (51 mm) horizontally and 6 inches (153 mm) vertically.</td>
</tr>
<tr>
<td>3. Attachment 1 Type of fasteners</td>
<td>Corrosion-resistant nails not less than No. 11 gage, 5/16-inch (7.9 mm) head. Fasteners shall comply with the requirements of Chapter 23, Division III. Fasteners shall be long enough to penetrate into the battens or sheathing ¾ inch (19 mm) or through the thickness of the sheathing, whichever is less. Attaching wire for clay or concrete tile shall not be smaller than 0.083 inch (2.11 mm) (No. 14 B.W. gage). Horizontal battens are required on solid sheathing for slopes 7 units vertical in 12 units horizontal (58.3% slope) and over. Horizontal battens are required for slopes over 7 units vertical in 12 units horizontal (58.3% slope). 2</td>
</tr>
<tr>
<td>No. of fasteners with: Spaced/solid sheathing with battens, or spaced sheathing 3 Solid sheathing without battens 3</td>
<td>Below 5 units vertical in 12 units horizontal (41.7% slope), fasteners not required. Five units vertical in 12 units horizontal (41.7% slope) to less than 12 units vertical in 12 units horizontal (100% slope), one fastener per tile every other row. Twelve units vertical in 12 units horizontal (100% slope) to 24 units vertical in 12 units horizontal (200% slope), one fastener every tile. 4 All perimeter tiles require one fastener. 5 Tiles with installed weight less than 9 pounds per square foot (4.4 kg/m²) require a minimum of one fastener per tile regardless of roof slope. One fastener per tile.</td>
</tr>
<tr>
<td>4. Tile headlap</td>
<td>3-inch (76 mm) minimum.</td>
</tr>
<tr>
<td>5. Flashing</td>
<td>Per Sections 1508.4 and 1509.</td>
</tr>
</tbody>
</table>

1. In areas designated by the building official as being subject to repeated wind velocities to exceed of 80 miles per hour (129 km/h), or where the roof height exceeds 40 feet (12 192 mm) above grade, all tiles shall be attached as set forth below: 1.1 The heads of all tiles shall be nailed. 1.2 The noses of all eave course tiles shall be fastened with a special clip. 1.3 All rake tiles shall be nailed with two nails. 1.4 The noses of all ridge, hip and rake tiles shall be set in a bead of approved roofer’s mastic. 2. Battens shall not be less than 1-inch by 2-inch (25.4 mm by 51 mm) nominal. Provisions shall be made for drainage beneath battens by a minimum of 1/8-inch (3.2 mm) risers at each nail or by 4-foot-long (1219 mm) battens with at least 1/2-inch (13 mm) separation between battens. Battens shall be fastened with approved fasteners spaced at not more than 24 inches (610 mm) on center. 3. In snow areas a minimum of two fasteners per tile are required, or battens and one fastener. 4. Slopes over 24 units vertical in 12 units horizontal (200% slope), nose ends of all tiles must be securely fastened. 5. Perimeter fastening areas include three tile courses but not less than 36 inches (914 mm) from either side of hips or ridges and edges of eaves and gable rakes.
<table>
<thead>
<tr>
<th></th>
<th>MECHANICALLY FASTENED SYSTEMS</th>
<th>ADHESIVELY FASTENED SYSTEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Deck conditions</td>
<td>Decks shall be firm, broom-clean, smooth and dry. Insulated decks shall have wood insulation stops at all edges of the deck, unless an alternative suitable curbing is provided. Insulated decks with slopes greater than 2 units vertical in 12 units horizontal (16.7% slope) shall have wood insulation stops at not more than 8 feet (2438 mm) face to face. Wood nailers shall be provided where nailing is required for roofing plies.</td>
<td>Provide wood nailers where nailing is required for roofing plies (see below).</td>
</tr>
<tr>
<td></td>
<td>Solid wood sheathing shall conform to Sections 2322.2 and 2326.12.9.</td>
<td></td>
</tr>
<tr>
<td>2. Underlayment</td>
<td>One layer of sheathing paper, Type 15 felt or other approved underlayment nailed sufficiently to hold in place, is required over board decks where openings between boards would allow bitumen to drip through. No underlayment requirements for plywood decks. Underlayment on other decks shall be in accordance with deck manufacturer's recommendations.</td>
<td>Not required.</td>
</tr>
<tr>
<td>3. Base ply requirements Over noninsulated decks</td>
<td>Over approved decks, the base ply shall be nailed using not less than one fastener for each 1/3 square feet (0.124 m²).</td>
<td>Decks shall be primed in accordance with the roofing manufacturer's instructions. The base ply shall be solidly cemented or spot mopped as required by the type of deck material using adhesive application rates shown in Table 15-F.</td>
</tr>
<tr>
<td>4. Mechanical fasteners</td>
<td>Fasteners shall be long enough to penetrate 3/4 inch (19 mm) into the sheathing or through the thickness of the sheathing, whichever is less. Built-up roofing nails for wood board decks shall be minimum No. 12 gage 1/16-inch (11.1 mm) head driven through tin caps or approved nails with integral caps. For plywood, No. 11 gage ring-shank nails driven through tin caps or approved nails with integral caps shall be used. For gypsum, insulating concrete, cementitious wood fiber and other decks, fasteners recommended by the manufacturer shall be used.</td>
<td>When mechanical fasteners are required for attachment of roofing plies to wood nailers or insulation stops (see below), they shall be as required for wood board decks.</td>
</tr>
<tr>
<td>5. Vapor retarder Over insulated decks</td>
<td>A vapor retarder shall be installed where the average January temperature is below 45°F (7°C.), or where excessive moisture conditions are anticipated within the building. It shall be applied as for a base ply.</td>
<td></td>
</tr>
<tr>
<td>6. Insulation</td>
<td>When no vapor retarder is required, roof insulation shall be fastened in an approved manner. When a vapor retarder is required, roof insulation is to be solidly mopped to the vapor retarder using the adhesive application rate specified in Table 15-F. See manufacturer's instructions for the attachment of insulation over steel decks.</td>
<td>When no vapor retarder is required, roof insulation shall be solidly mopped to the deck using the adhesive application rate specified in Table 15-F. When a vapor retarder is required, roof insulation is to be solidly mopped to the vapor retarder, using the adhesive application rate specified in Table 15-F. See manufacturer's installation instructions for attachment of insulation over steel decks.</td>
</tr>
</tbody>
</table>
7. Roofing plies
Successive layers shall be solidly cemented together and to the base ply or the insulation using the adhesive rates shown in Table 15-F. On slopes greater than 1 unit vertical in 12 units horizontal (8.3% slope) for aggregate-surfaced, or 2 units vertical in 12 units horizontal (16.7% slope) for smooth-surfaced or cap sheet surfaced roofs, mechanical fasteners are required. Roofing plies shall be blind-nailed to the deck, wood nails or wood insulation stops in accordance with the roofing manufacturer’s recommendations. On slopes exceeding 3 units vertical in 12 units horizontal (25% slope), plies shall be laid parallel to the slope of the deck (strapping method).

8. Cementing materials
See Table 15-G.

9. Curbs and walls
Suitable cast strips shall be used at all vertical intersections. Adequate attachment shall be provided for both base flashing and counterflashing on all vertical surfaces. Reglets shall be provided in wall or parapets receiving metal counterflashing.

10. Surfacing
Mineral aggregate surfaced roofs shall comply with the requirements of U.B.C. Standard 15-1 and Table 15-F. Cap sheets shall be cemented to the roofing plies as set forth in Table 15-F.

### TABLE 15-F—BUILT-UP ROOFING CEMENTING ADHESIVE AND SURFACING APPLICATION RATES

<table>
<thead>
<tr>
<th>MATERIAL TO BE ADHERED</th>
<th>MINIMUM APPLICATION RATE, MATERIAL/100 FT.⁰² (9.3 m²) ROOF AREA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>HOT ASPHALT (POUNDS)</td>
</tr>
<tr>
<td></td>
<td>x 0.45 for kg x 0.45 for kg x 3.785 for liters</td>
</tr>
<tr>
<td>Base ply or vapor retarder</td>
<td></td>
</tr>
<tr>
<td>1. Spot mopping</td>
<td>15</td>
</tr>
<tr>
<td>2. Solid cementing</td>
<td>20</td>
</tr>
<tr>
<td>Insulation</td>
<td></td>
</tr>
<tr>
<td>1. Solid cementing</td>
<td>20</td>
</tr>
<tr>
<td>Roofing plies (and between layers of vapor retarder)</td>
<td></td>
</tr>
<tr>
<td>1. Felts</td>
<td>20</td>
</tr>
<tr>
<td>2. Coated felts</td>
<td>20</td>
</tr>
<tr>
<td>Cap sheets</td>
<td></td>
</tr>
<tr>
<td>1. Solid cementing</td>
<td>20</td>
</tr>
<tr>
<td>Mineral aggregate¹,²</td>
<td></td>
</tr>
<tr>
<td>1. Fire-retardant roof coverings</td>
<td></td>
</tr>
<tr>
<td>1.1 Gravel, 400 lb./sq. (20.1 kg/m²)</td>
<td>50</td>
</tr>
<tr>
<td>1.2 Slag, 300 lb./sq. (15.1 kg/m²)</td>
<td>50</td>
</tr>
<tr>
<td>1.3 Granules, 60 lb./sq. (3 kg/m²)</td>
<td>—</td>
</tr>
<tr>
<td>2. Nonrated roof coverings</td>
<td></td>
</tr>
<tr>
<td>2.1 Gravel, 300 lb./sq. (15.1 kg/m²)</td>
<td>40</td>
</tr>
<tr>
<td>2.2 Slag, 250 lb./sq. (12.6 kg/m²)</td>
<td>40</td>
</tr>
<tr>
<td>2.3 Granules, 60 lb./sq. (3 kg/m²)</td>
<td>—</td>
</tr>
</tbody>
</table>

¹Mineral aggregate shall not be used for built-up roofing membranes at roof slopes greater than 3 units vertical in 12 units horizontal (25% slope).
²A minimum of 50 percent of the required aggregate shall be embedded in the pour coat.
### TABLE 15-G—APPLICATION OF CEMENTING MATERIALS

<table>
<thead>
<tr>
<th>APPLICATION</th>
<th>MAXIMUM SLOPE, VERTICAL UNITS PER 12 UNITS HORIZONTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Type I</td>
</tr>
<tr>
<td>1. Insulation to deck</td>
<td>—</td>
</tr>
<tr>
<td>2. Felt or vapor retarder to deck</td>
<td>—</td>
</tr>
<tr>
<td>3. Felt to felt</td>
<td>—</td>
</tr>
<tr>
<td>4. Cap sheet to felt</td>
<td>1/2 (4% slope) or less</td>
</tr>
<tr>
<td>5. Gravel to felts</td>
<td>1/2 (4% slope) or less</td>
</tr>
<tr>
<td>6. Heating of cementing material, 1°F. Temperature at kettle ² (maximum)</td>
<td>475 (246°C.)</td>
</tr>
<tr>
<td>Application temperature, ²°F.</td>
<td>375-425 (190-218°C.)</td>
</tr>
</tbody>
</table>

N.P.—Not permitted

¹Bulk tanker temperatures shall be reduced to 320°F. to 350°F. (160°C. to 177°C.) at night or during periods when no roofing will occur.

²Cementing material shall not be heated above a temperature which is 25°F. (14°C.) below its flash point.

³Bitumen which is identified with the equiviscous temperature (EVT) shall be applied at the EVT ± 25°F. (14°C.).
Chapter 24
GLASS AND GLAZING

SECTION 2401 — SCOPE

2401.1 General. The provisions of this chapter apply to:

1. Exterior glass and glazing in all occupancies.

   EXCEPTION: Groups R and U Occupancies not over three stories in height and located in areas with a
   minimum basic wind speed less than 80 miles per hour (129 km/h).

2. Interior and exterior glass and glazing in all occupancies subject to human impact as specified
   in Section 2406 and hinged shower doors in all occupancies as specified in Section 2407.

2401.2 Standards. Standards for material shall be as specified in this chapter and U.B.C. Standard 24-1.

   Standards for glazing subject to human impact (hazardous location) as specified in Section 2406
   shall be as specified in U.B.C. Standard 24-2.

2401.3 Other Provisions. See Chapter 6 of this code for additional glass requirements where
   openings are required to be fire protected, and Section 2603.4 for openings glazed with plastics.

2401.4 Standards of Quality. The standards listed below labeled a “U.B.C. standard” are also
   listed in Chapter 35, Part II, and are part of this code.


2. U.B.C. Standard 24-2, Safety Glazing

SECTION 2402 — IDENTIFICATION

Each light shall bear the manufacturer’s label designating the type and thickness of glass. When
approved by the building official, labels may be omitted, provided an affidavit is furnished by the
glazing contractor certifying that each light is glazed in accordance with approved plans and speci­
fications. Identification of glazing in hazardous locations shall be in accordance with Section 2406.

SECTION 2403 — AREA LIMITATIONS

Glass in windows, curtain and window walls, skylights, doors and other exterior applications shall
be chosen to withstand the loads for cladding as set forth in Chapter 16, Par. II.

   The area of individual lights shall not be more than as set forth in Graph 24-1, as adjusted by Table
   24-A. Glass sizing for skylight applications shall be adjusted per Section 2409.5.

   Graph 24-1 is applicable to rectangular glass firmly supported on all four edges.

   When approved by the building official, alternate means for selecting glass may be used in place
   of Graph 24-1 and Table 24-A.

   Glass and glazing subject to ice or snow loads shall be designed in accordance with Chapter 16.

SECTION 2404 — GLAZING SUPPORT AND FRAMING

2404.1 Support. Glass shall be firmly supported on all four edges.

   EXCEPTION: The building official may allow the use of glass that is not firmly supported on all four edges
   when justified by an approved design.

2404.2 Framing. The framing members for each individual glass pane shall be designed so the
deflection perpendicular to the glass plane shall not exceed $\frac{1}{175}$ of the glass edge length or $\frac{3}{4}$ inch
When subjected to the larger of the positive or negative load when loads are combined as specified in Section 1603.6.

SECTION 2405 — LOUVERED WINDOWS AND JALOUSIES

Regular float, wired and patterned glass in jalousies and louvered windows shall be no thinner than nominal $\frac{3}{16}$ inch (4.76 mm) and no longer than 48 inches (1219 mm). Exposed glass edges shall be smooth.

Wired glass with wire exposed on longitudinal edges shall not be used in jalousies or louvered windows.

SECTION 2406 — SAFETY GLAZING

2406.1 General. Glazing subject to human impact shall comply with this section.

2406.2 Identification. Each light of safety glazing material installed in hazardous locations as defined in Section 2406.4 shall be identified by a permanent label which specifies the labeler, whether the manufacturer or installer, and state that safety glazing material has been utilized in such installation. For additional identification requirements and for limitation on size and use by category classification, see U.B.C. Standard 24-2, Part I.

Each unit of tempered glass shall be permanently identified by the manufacturer. The identification shall be etched or ceramic fired on the glass and be visible when the unit is glazed. Tempered spandrel glass is exempted from permanent labeling but such glass shall be identified by the manufacturer with a removable paper label.

2406.3 Human Impact Loads. Individual glazed areas in hazardous locations such as those indicated in Section 2406.4, including glazing used in fire assemblies in accordance with Section 713, shall pass the test requirements of Part I of U.B.C. Standard 24-2.

EXCEPTIONS: 1. Louvered windows and jalousies complying with Section 2405 need not comply with Section 2406.3.

2. Polished wired glass complying with Part II of U.B.C. Standard 24-2 may be used in fire-rated assemblies and in locations specified in Items 6 and 7 of Section 2406.4.

Plastic glazing used in exterior applications also shall comply with the weathering requirements in Part II of U.B.C. Standard 24-2.

2406.4 Hazardous Locations. The following shall be considered specific hazardous locations for the purposes of glazing:

1. Glazing in ingress and egress doors except jalousies.
2. Glazing in fixed and sliding panels of sliding door assemblies and panels in swinging doors other than wardrobe doors.
3. Glazing in storm doors.
4. Glazing in all unframed swinging doors.
5. Glazing in doors and enclosures for hot tubs, whirlpools, saunas, steam rooms, bathtubs and showers. Glazing in any portion of a building wall enclosing these compartments where the bottom exposed edge of the glazing is less than 60 inches (1525 mm) above a standing surface and drain inlet.
6. Glazing in fixed or operable panels adjacent to a door where the nearest exposed edge of the glazing is within a 24-inch (610 mm) arc of either vertical edge of the door in a closed position and where the bottom exposed edge of the glazing is less than 60 inches (1525 mm) above the walking surface.
7. Glazing in an individual fixed or operable panel, other than those locations described in Items 5 and 6 above, that meets all of the following conditions:

7.1 Exposed area of an individual pane greater than 9 square feet (0.84 m²).
7.2 Exposed bottom edge less than 18 inches (457 mm) above the floor.
7.3 Exposed top edge greater than 36 inches (914 mm) above the floor.
7.4 One or more walking surfaces within 36 inches (914 mm) horizontally of the plane of the glazing.

8. Glazing in railings regardless of height above a walking surface. Included are structural baluster panels and nonstructural in-fill panels.

**EXCEPTION:** The following products and applications are exempt from the requirements for hazardous locations as listed in Items 1 through 8 above:

1. Glazing in Item 6 when there is an intervening wall or other permanent barrier between the door and the glazing.
2. Glazing in Item 7 when a protective bar is installed on the accessible sides of the glazing 34 inches (864 mm) to 38 inches (965 mm) above the floor. The bar shall be capable of withstanding a horizontal load of 50 pounds per linear foot (729 N/m) without contacting the glass and be a minimum of 1 1/2 inches (38.1 mm) in height.
3. Outboard pane in insulating glass units and in other multiple glazed panels in Item 7 when the bottom exposed edge of the glass is 25 feet (7620 mm) or more above any grade, roof, walking surface or other horizontal or sloped (within 45 degrees of horizontal) surface adjacent to the glass exterior.
4. Openings in door through which a 3-inch-diameter (76.2 mm) sphere will not pass.
5. Assemblies of leaded, faceted or carved glass in Items 1, 2, 6 and 7 when used for decorative purposes.
6. Doors in commercial refrigerated cabinets.
7. Glass block panels complying with Section 2110.

9. Glazing in walls and fences used as the barrier for indoor and outdoor swimming pools and spas when all of the following conditions are present:

9.1 The bottom edge of the glazing is less than 60 inches (1525 mm) above the pool side of the glazing.
9.2 The glazing is within 5 feet (1525 mm) of a swimming pool or spa deck area.

10. Glazing in walls enclosing stairway landings or within 5 feet (1525 mm) of the bottom and top of stairways where the bottom edge of the glass is less than 60 inches (1525 mm) above a walking surface.

**2406.5 Wardrobe Doors.** Glazing in wardrobe doors shall meet the impact test requirements for safety glazing as set forth in U.B.C. Standard 24-2, Part II. Laminated glass must also meet the boil test requirements of U.B.C. Standard 24-2, Part II.

**EXCEPTION:** The impact test shall be modified so that if no breakage occurs when the impacting object is dropped from the height of 18 inches (457 mm), the test shall progress in height increments of 6 inches (152.5 mm) until the maximum of 48 inches (1219 mm) is reached.

**2406.6 Glass Railings.** Glass used as structural balustrade panels in railings shall be one of the following types:

1. Single fully tempered glass.
2. Laminated fully tempered glass.
3. Laminated heat-strengthened glass.

The panels and their support system shall be designed to withstand the load specified in Table 16-B. A safety factor of 4 shall be used.
Each handrail or guardrail section shall be supported by a minimum of three glass balusters or otherwise supported so that it remains in place should one baluster panel fail.

Glass balusters shall not be installed without a handrail or guardrail attached.

For all glazing types the minimum nominal thickness shall be \( \frac{1}{4} \) inch (6.35 mm).

Glazing materials shall not be installed in railings in parking garages except for those locations where the railing is not exposed to impact from vehicles.

SECTION 2407 — HINGED SHOWER DOORS

Hinged shower doors shall open outward.

SECTION 2408 — RACQUETBALL AND SQUASH COURTS

2408.1 Test Method. Each panel of glass (including doors) in an actual installation or test mock-up shall be impacted from the playing side at a point 59 inches (1499 mm) from the playing surface and its horizontal midpoint. The impactor and test procedure shall be as described in U.B.C. Standard 24-2, Part I, Category II, using a drop height of 48 inches (1219 mm). Results from a test mock-up shall apply only to actual installations in which the glass is no greater in either dimension and is at least as thick. Fittings and attachments for a mockup shall be identical to those used in actual installations. The conditions of Section 2408.2 shall be met.

2408.2 End Point Conditions. The following conditions shall be met when the glass is impacted as described in Section 2408.1:

1. The glass shall not break.
2. Deflection at the point of impact shall not exceed \( 1\frac{1}{2} \) inches (38 mm).
3. Door hardware shall remain intact and operable.
4. The deflection of the door edges shall be no greater than the following for the listed drop heights. The impactor and procedures shall be as indicated in Section 2408.1.

   \[
   \begin{array}{|c|c|}
   \hline
   \text{Drop Height Deflection, inches (mm)} & \text{Thickness of adjacent glass +} \frac{1}{6} \text{ (± 3.2)} \\
   24 (610) & \text{Thickness of adjacent glass +} \frac{1}{4} \text{ (± 6.4)} \\
   36 (914) & \text{Thickness of adjacent glass +} \frac{1}{2} \text{ (± 12.7)} \\
   48 (1219) & \\
   \hline
   \end{array}
   \]

SECTION 2409 — SLOPED GLAZING AND SKYLIGHTS

2409.1 Scope. This section applies to the installation of glass or other transparent, translucent or opaque glazing material installed at a slope of 15 degrees or more from the vertical plane, including glazing materials in skylights, roofs and sloped walls.

2409.2 Allowable Glazing Materials. Sloped glazing shall be of any of the following materials, subject to the limitations specified in Section 2409.3.

For single-layer glazing systems, the glazing material of the single light or layer shall be laminated glass with a minimum 30-mil (0.76 mm) polyvinyl butyral (or equivalent) interlayer, wired glass, approved plastic materials meeting the requirements of Section 2603.7, heat-strengthened glass or fully tempered glass.

For multiple-layer glazing systems, each light or layer shall consist of any of the glazing materials specified above.

Annealed glass may be used as specified within Exceptions 2 and 3 of Section 2409.3.
2409.3 Screening. Heat-strengthened glass and fully tempered glass, when used in single-layer glazing systems, shall have screens installed below glazing. The screens shall be capable of supporting the weight of the glass and shall be substantially supported below and installed within 4 inches (101.6 mm) of the glass. They shall be constructed of a noncombustible material not thinner than 0.08 inch (2.03 mm) with a mesh not larger than 1 inch (25.4 mm by 25.4 mm). In a corrosive atmosphere, structurally equivalent noncorrosive screening materials shall be used. Heat-strengthened glass, fully tempered glass and wired glass, when used in multiple-layer glazing systems as the bottom glass layer over the walking surface, shall be equipped with screening which complies with the requirements for monolithic glazing systems.

EXCEPTIONS: 1. Fully tempered glass may be installed without required protective screens when located between intervening floors at a slope of 30 degrees or less from the vertical plane if the highest point of the glass is 10 feet (3048 mm) or less above the walking surface.

2. Allowable glazing material, including annealed glass, may be installed without required screens if the walking surface or any other accessible area below the glazing material is permanently protected from falling glass for a minimum horizontal distance equal to twice the height.

3. Allowable glazing material, including annealed glass, may be installed without screens in the sloped glazing systems of commercial or detached greenhouses used exclusively for growing plants and not intended for use by the public, provided the height of the greenhouse at the ridge does not exceed 20 feet (6096 mm) above grade.

4. Screens need not be provided within individual dwelling units when fully tempered glass is used as single glazing or in both panes of an insulating glass unit when all the following conditions are met:
   4.1. The area of each pane (single glass) or unit (insulating glass) shall not exceed 16 square feet (1.49 m²).
   4.2. The highest point of the glass shall not be more than 12 feet (3658 mm) above any walking surface or other accessible area.
   4.3. The nominal thickness of each pane shall not exceed 3/16 inch (4.76 mm).

2409.4 Framing. In Types I and II construction, skylight frames shall be constructed of noncombustible materials.

EXCEPTION: In foundries or buildings where acid fumes deleterious to metal are incidental to the use of the buildings, approved pressure-treated woods or other approved noncorrosive materials may be used for sash and frames.

Skylights set at an angle of less than 45 degrees from the horizontal plane shall be mounted at least 4 inches (102 mm) above the plane of the roof on a curb constructed of materials as required for the frame. Skylights may be installed in the plane of the roof when the roof slope is 45 degrees or greater from horizontal.

2409.5 Design Loads. Sloped glazing and skylights shall be designed to withstand the tributary loads specified in Section 1605. Sizing limitations specified within Graph 24-1 and Table 24-A may be utilized for glazing materials set forth in Section 2409.2, provided the design loads are increased by a factor of 2.67.

2409.6 Floors and Sidewalks. Glass used for the transmission of light, if placed in floors or sidewalks, shall be supported by metal or reinforced concrete frames, and such glass shall not be less than 1/2 inch (12.7 mm) in thickness. Any such glass over 16 square inches (0.1 m²) in area shall have wire mesh embedded in the same or shall be provided a wire screen underneath, as specified for skylights in this section. All portions of the floor lights or sidewalk lights shall be of the same strength as is required by this code for floor or sidewalk construction, except in cases where the floor is surrounded by a railing not less than 3 feet 6 inches (1067 mm) in height, in which case the construction shall be calculated for not less than roof loads.
### TABLE 24-A—ADJUSTMENT FACTORS—RELATIVE RESISTANCE TO WIND LOADS

<table>
<thead>
<tr>
<th>GLASS TYPE</th>
<th>ADJUSTMENT FACTOR¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laminated²</td>
<td>0.75</td>
</tr>
<tr>
<td>Fully tempered</td>
<td>4.00</td>
</tr>
<tr>
<td>Heat strengthened</td>
<td>2.00</td>
</tr>
<tr>
<td>Wired</td>
<td>0.50</td>
</tr>
<tr>
<td>Insulating glass³—2 panes</td>
<td>1.70</td>
</tr>
<tr>
<td>—3 panes</td>
<td>2.55</td>
</tr>
<tr>
<td>Patterned⁴</td>
<td>1.00</td>
</tr>
<tr>
<td>Regular (annealed)</td>
<td>1.00</td>
</tr>
<tr>
<td>Sandblasted</td>
<td>0.40²</td>
</tr>
</tbody>
</table>

¹ Loads determined from Chapter 16, Division II, shall be divided by this adjustment factor for use with Graph 24-1.  
² Applies when two plies are identical in thickness and type: use total glass thickness, not thickness of one ply.  
³ Applies when each glass panel is the same thickness and type; use thickness of one panel.  
⁴ Use minimum glass thickness, i.e., measured at the thinnest part of the pattern; if necessary, interpolation of curves in Graph 24-1 may be required.  
⁵ Factor varies depending on depth and severity of sand blasting; value shown is minimum.

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**MAXIMUM GLASS AREA—SQUARE FEET**

(× 0.09 for m²)

**DESIGN WIND PRESSURE FROM CHAPTER 16, DIVISION II—POUNDS PER SQUARE FOOT**

(× 992.16 for kN/m²)

GRAPH 24-1—MAXIMUM ALLOWABLE AREA OF GLASS¹

(Thickness of glass: × 25.4 for mm)

¹ Applicable for ratios of width to length of 1:1 to 5:1. Design safety factor = 2.5.

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Chapter 25
GYPSUM BOARD AND PLASTER

SECTION 2501 — SCOPE

2501.1 General. The installation of lath, plaster and gypsum board shall be done in a manner and with materials as specified in this chapter and, when required for fire-resistant construction, also shall conform with the provisions of Chapter 7.

Other approved wall or ceiling coverings may be installed in accordance with the recommendations of the manufacturer and the conditions of approval.

2501.2 Inspection. No lath or gypsum board or their attachments shall be covered or finished until it has been inspected and approved by the building official in accordance with Section 108.5.

2501.3 Tests. The building official may require tests to be made in accordance with approved standards to determine compliance with the provisions of this chapter, provided the permit holder has been notified 24 hours in advance of the time of making such tests.

2501.4 Definitions. For purposes of this chapter, certain terms are defined as follows:

- **CEMENT PLASTER** is a mixture of portland cement, portland cement and lime, masonry cement, or plastic cement and aggregate and other approved materials as specified in the code.

- **CORNER BEAD** is a rigid formed unit or shape used at projecting or external angles to define and reinforce the corners of interior surfaces.

- **CORNERITE** is a shaped reinforcing unit of expanded metal or wire fabric used for angle reinforcing and having minimum outstanding legs of not less than 2 inches (51 mm).

- **CORROSION-RESISTANT MATERIALS** are materials that are inherently rust resistant or materials to which an approved rust-resistant coating has been applied either before or after forming or fabrication.

- **EXTERIOR SURFACES** are weather-exposed surfaces as defined in Section 224.

- **EXTERNAL CORNER REINFORCEMENT** is a shaped reinforcing unit for external corner reinforcement or cement plaster formed to ensure mechanical bond and a solid plaster corner.

- **INTERIOR SURFACES** are surfaces other than weather-exposed surfaces.

- **MOIST CURING** is any method employed to retain sufficient moisture for hydration of portland cement plaster.

- **PORTLAND CEMENT PLASTER** is a mixture of portland cement or portland cement and lime and aggregate and other approved materials as specified in this code.

- **STEEL STUDS, LOAD-BEARING AND NONLOAD-BEARING**, are prefabricated channel shapes, welded wire or combination wire and steel angle types, galvanized or coated with rust-resistive material.

- **STRIPPING** is flat reinforcing units of expanded metal or wire fabric or other materials not less than 3 inches (76.2 mm) wide to be installed as required over joints of gypsum lath.

- **TIE WIRE** is wire for securing together metal framing or supports, for tying metal and wire fabric lath and gypsum lath and wallboard together and for securing accessories.

- **WIRE BACKING** is horizontal strands of tautened wire attached to surfaces of vertical wood supports which, when covered with building paper, provide a backing of cement plaster.

SECTION 2502 — MATERIALS

Lathing, plastering, wallboard materials, ceiling suspension systems and wood structural panels shall conform to the applicable standards listed in Chapter 35.
The standards listed below labeled a “U.B.C. standard” are also listed in Chapter 35, Part II, and are part of this code. The other standards listed below are recognized standards (see Sections 3502 and 3503).

1. U.B.C. Standard 21-11, Masonry Cement
2. U.B.C. Standard 23-2, Construction and Industrial Plywood
3. Chapter 23, Division III, Section 2338, Nails and Staples
5. U.B.C. Standard 19-1, Portland Cement, Type I, II or III
7. U.B.C. Standard 25-2, Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings
8. United States Government Military Specification MIL-B-19235 (Docks), Plaster Bonding Agents
9. ASTM C 557, Adhesives for Fastening Gypsum Wallboard to Wood Framing
10. ASTM C 35, Perlite, Vermiculite and Sand Aggregates for Gypsum Plaster
11. ASTM C 1002, Drill Screws
12. ASTM C 475 and C 474, Gypsum Wallboard Tape and Joint Compound
13. ASTM C 442, Gypsum Backing Board
14. ASTM C 37, Gypsum Lath
15. ASTM C 28, Gypsum Plasters
16. ASTM C 79, Gypsum Sheathing Board
17. ASTM C 36, Gypsum Wallboard
18. ASTM C 61, Keene’s Cement
19. ASTM C 630, Water-resistant Gypsum Backing Board
20. ASTM C 588 AND C 587, Gypsum Base for Veneer Plaster and Gypsum Veneer Plaster
21. ASTM C 6 and C 206, Lime
22. ASTM C 22, C 472 and C 473, Testing Gypsum and Gypsum Products
23. ASTM C 843 and C 844, Application of Gypsum Base for Veneer Plaster and Gypsum Veneer Plaster
24. ASTM C 514, Nails for the Application of Gypsum Wallboard, Gypsum Backing Board and Gypsum Veneer Base
25. ASTM C 931, Exterior Gypsum Soffit Board
26. ANSI A42.4-1955 and Specification 2.6.73 of the California Lathing and Plastering Contractors Association, Metal Lath, Wire Lath, Wire Fabric Lath and Metal Accessories

SECTION 2503 — VERTICAL ASSEMBLIES

2503.1 General. In addition to the requirements of this section, vertical assemblies of plaster or gypsum board shall be designed to resist the loads specified in Chapter 16 of this code. For wood framing, see Chapter 23. For metal framing, see Chapter 22.

EXCEPTION: Wood-framed assemblies meeting the requirements of Section 2326 need not be designed.

2503.2 Wood Framing. Wood supports for lath or gypsum board shall not be less than 2 inches (51 mm) nominal in least dimension. Wood stripping or furring shall not be less than 2 inches (51...
mm) nominal thickness in the least dimension except that furring strips not less than 1-inch by 2-inch (25 mm by 51 mm) nominal dimension may be used over solid backing.

2503.3 Studless Partitions. The minimum thickness of vertically erected studless solid plaster partitions of $\frac{3}{8}$-inch (9.5 mm) and $\frac{1}{4}$-inch (19.1 mm) rib metal lath or $\frac{1}{4}$-inch-thick (12.7 mm) long-length gypsum lath and gypsum board partitions shall be 2 inches (51 mm).

SECTION 2504 — HORIZONTAL ASSEMBLIES

2504.1 General. In addition to the requirements of this section, supports for horizontal assemblies of plaster or gypsum board shall be designed to support all loads as specified in Chapter 16 of this code.

EXCEPTION: Wood-framed assemblies meeting the requirements of Section 2326 need not be designed.

2504.2 Wood Framing. Wood stripping or suspended wood systems, where used, shall not be less than 2 inches (51 mm) nominal thickness in the least dimension, except that furring strips not less than 1-inch by 2-inch (25 mm by 51 mm) nominal dimension may be used over solid backing.

2504.3 Hangers. Hangers for suspended ceilings shall not be less than the sizes set forth in Table 25-A, fastened to or embedded in the structural framing, masonry or concrete.

Hangers shall be saddle-tied around main runners to develop the full strength of the hangers. Lower ends of flat hangers shall be bolted with $\frac{3}{8}$-inch (9.5 mm) bolts to runner channels or bent tightly around runners and bolted to the main part of the hanger.

2504.4 Runners and Furring. The main runner and cross-furring shall not be less than the sizes set forth in Table 25-A, except that other steel sections of equivalent strength may be substituted for those set forth in this table. Cross-furring shall be secured to the main runner by saddle-tying with not less than one strand of 0.051 inch (1.30 mm) (No. 16 A.W. gage) or two strands of 0.040 inch (1.02 mm) (No. 18 A.W. gage) tie wire or approved equivalent attachments.

SECTION 2505 — INTERIOR LATH

2505.1 General. Gypsum lath shall not be installed until weather protection for the installation is provided. Where wood-frame walls and partitions are covered on the interior with cement plaster or tile of similar material and are subject to water splash, the framing shall be protected with an approved moisture barrier.

Showers and public toilet walls shall conform to Section 807.1.

2505.2 Application of Gypsum Lath. The thickness, spacing of supports and the method of attachment of gypsum lath shall be as set forth in Tables 25-B and 25-C. Approved wire and sheet metal attachment clips may be used.

Gypsum lath shall be applied with the long dimension perpendicular to supports and with end joints staggered in successive courses. End joints may occur on one support when stripping is applied the full length of the joints.

Where electrical radiant heat cables are installed on ceilings, the stripping, if conductive, may be omitted a distance not to exceed 12 inches (305 mm) from the walls.

Where lath edges are not in moderate contact and have joint gaps exceeding $\frac{3}{8}$ inch (10 mm), the joint gaps shall be covered with stripping or cornerite. Stripping or cornerite may be omitted when the entire surface is reinforced with not less than 1-inch (25.4 mm) 0.035 inch (0.89 mm) (No. 20 B.W. gage) woven wire. When lath is secured to horizontal or vertical supports not used as structural diaphragms, end joints may occur between supports when lath ends are secured together with approved fasteners. Vertical assemblies also shall conform with Section 1610.2.

Cornerite shall be installed so as to retain position during plastering at all internal corners. Cornerite may be omitted when plaster is not continuous from one plane to an adjacent plane.
2505.3 Application of Metal Plaster Bases. The type and weight of metal lath, and the gage and spacing of wire in welded or woven lath, the spacing of supports, and the methods of attachment to wood supports shall be as set forth in Tables 25-B and 25-C.

Metal lath shall be attached to metal supports with not less than 0.049 inch (1.2 mm) (No. 18 B.W. gage) tie wire spaced not more than 6 inches (152 mm) apart or with approved equivalent attachments.

Metal lath or wire fabric lath shall be applied with the long dimension of the sheet perpendicular to supports.

Metal lath shall be lapped not less than 1 1/2 inch (13 mm) at sides and 1 inch (25.4 mm) at ends. Wire fabric lath shall be lapped not less than one mesh at sides and ends, but not less than 1 inch (25.4 mm). Rib metal lath with edge ribs greater than 1/8 inch (3 mm) shall be lapped at sides by nesting outside ribs. When edge ribs are 1/8 inch (3 mm) or less, rib metal lath may be lapped 1/2 inch (13 mm) at sides, or outside ribs may be nested. Where end laps of sheets do not occur over supports, they shall be securely tied together with not less than 0.049 inch (1.2 mm) (No. 18 E.W. gage) wire.

Cornerite shall be installed in all internal corners to retain position during plastering. Cornerite may be omitted when lath is continuous or when plaster is not continuous from one plane to an adjacent plane.

SECTION 2506 — EXTERIOR LATH

2506.1 General. Exterior surfaces are weather-exposed surfaces as defined in Section 224. For eave overhangs required to be fire resistive, see Section 705.

2506.2 Corrosion Resistance. All lath and lath attachments shall be of corrosion-resistant material. See Section 2501.4.

2506.3 Backing. Backing or a lath shall provide sufficient rigidity to permit plaster application.

Where lath on vertical surfaces extends between rafters or other similar projecting members, solid backing shall be installed to provide support for lath and attachments.

Gypsum lath or gypsum board shall not be used, except that on horizontal supports of ceilings or roof soffits it may be used as backing for metal lath or wire fabric lath and cement plaster.

Backings is not required under metal lath or paperbacked wire fabric lath.

2506.4 Weather-resistive Barriers. Weather-resistive barriers shall be installed as required in Section 1402.1 and, when applied over wood base sheathing, shall include two layers of Grade D paper.

2506.5 Application of Metal Plaster Bases. The application of metal lath or wire fabric lath shall be as specified in Section 2505.3 and they shall be furred out from vertical supports or backing not less than 1/4 inch (6 mm) except as set forth in Footnote 2, Table 25-B.

Where no external corner reinforcement is used, lath shall be furred out and carried around corners at least one support on frame construction.

A minimum 0.019-inch (0.48 mm) (No. 26 galvanized sheet gage), corrosion-resistant weep screed with a minimum vertical attachment flange of 3 1/2 inches (89 mm) shall be provided at or below the foundation plate line on all exterior stud walls. The screed shall be placed a minimum of 4 inches (102 mm) above the earth or 2 inches (51 mm) above paved areas and shall be of a type which will allow trapped water to drain to the exterior of the building. The weather-resistive barrier shall lap the attachment flange, and the exterior lath shall cover and terminate on the attachment flange of the screed.

SECTION 2507 — INTERIOR PLASTER

2507.1 General. Plastering with gypsum plaster or cement plaster shall not be less than three coats when applied over metal lath or wire fabric lath and shall not be less than two coats when
applied over other bases permitted by this chapter. Showers and public toilet walls shall conform to Section 807.1.

Plaster shall not be applied directly to fiber insulation board. Cement plaster shall not be applied directly to gypsum lath, gypsum masonry or gypsum plaster except as specified in Section 2506.3.

When installed, grounds shall assure the minimum thickness of plaster as set forth in Table 25-D. Plaster thickness shall be measured from the face of lath and other bases.

2507.2 Base Coat Proportions. Proportions of aggregate to cementitious materials shall not exceed the volume set forth in Table 25-E for gypsum plaster and Table 25-F for cement plaster.

2507.3 Base Coat Application.

2507.3.1 General. Base coats shall be applied with sufficient material and pressure to form a complete key or bond.

2507.3.2 Gypsum plaster. For two-coat work, the first coat shall be brought out to grounds and straightened to a true surface, leaving the surface rough to receive the finish coat. For three-coat work, the surface of the first coat shall be scored sufficiently to provide adequate bond for the second coat and shall be permitted to harden and set before the second coat is applied. The second coat shall be brought out to grounds and straightened to a true surface, leaving the surface rough to receive the finish coat.

2507.3.3 Cement plaster. The first two coats shall be as required for the first coats of exterior plaster, except that the moist-curing time period between the first and second coats shall not be less than 24 hours and the thickness shall be as set forth in Table 25-D. Moist curing shall not be required where job and weather conditions are favorable to the retention of moisture in the cement plaster for the required time period.

2507.4 Finish Coat Application. Finish coats shall be applied with sufficient material and pressure to form a complete bond. Finish coats shall be proportioned and mixed in an approved manner. Gypsum and lime and other interior finish coats shall be applied over gypsum base coats which have hardened and set. Thicknesses shall not be less than \( \frac{1}{16} \) inch (1.6 mm).

Cement plaster finish coats may be applied over interior cement plaster base coats which have been in place not less than 24 hours.

Approved acoustical finish plaster may be applied over any base coat plaster, over clean masonry or concrete, or other approved surfaces.

2507.5 Interior Masonry or Concrete. Condition of surfaces shall be as specified in Section 2508.8. Approved specially prepared gypsum plaster designed for application to concrete surfaces or approved acoustical plaster may be used. The total thickness of base coat plaster applied to concrete ceilings shall be as set forth in Table 25-D. Should ceiling surfaces require more than the maximum thickness permitted in Table 25-D, metal lath or wire fabric lath shall be installed on such surfaces before plastering.

SECTION 2508 — EXTERIOR PLASTER

2508.1 General. Plastering with cement plaster shall not be less than three coats when applied over metal lath or wire fabric lath and shall not be less than two coats when applied over masonry, concrete or gypsum backing as specified in Section 2506.3. If plaster surface is completely covered by veneer or other facing material, or is completely concealed by another wall, plaster application need be only two coats, provided the total thickness is as set forth in Table 25-F.

On wood-frame or metal stud construction with an on-grade concrete floor slab system, exterior plaster shall be applied in such a manner as to cover, but not extend below, lath and paper. See Section 2506.5 for the application of paper and lath, and flashing or weep screens.
2508.1–2509.2 1994 UNIFORM BUILDING CODE

Only approved plasticity agents and approved amounts thereof may be added to portland cement. When plastic cement is used, no additional lime or plasticizers shall be added. Hydrated lime or the equivalent amount of lime putty used as a plasticizer may be added to cement plaster or cement and lime plaster in an amount not to exceed that set forth in Table 25-F.

Gypsum plaster shall not be used on exterior surfaces. See Section 224.

2508.2 Base Coat Proportions. The proportion of aggregate to cementitious materials shall be as set forth in Table 25-F.

2508.3 Base Coat Application. The first coat shall be applied with sufficient material and pressure to fill solidly all openings in the lath. The surface shall be scored horizontally sufficiently rough to provide adequate bond to receive the second coat.

The second coat shall be brought out to proper thickness, rodded and floated sufficiently rough to provide adequate bond for the finish coat. The second coat shall have no variation greater than 1/4 inch (6 mm) in any direction under a 5-foot (1524 mm) straight edge.

2508.4 Environmental Conditions. Portland cement-based plaster shall not be applied to frozen base or those bases containing frost. Plaster mixes shall not contain frozen ingredients. Plaster coats shall be protected from freezing for a period of not less than 24 hours after set has occurred.

2508.5 Curing and Interval. First and second coats of plaster shall be applied and moist cured as set forth in Table 25-F.

When applied over gypsum backing as specified in Section 2506.3 or directly to unit masonry surfaces, the second coat may be applied as soon as the first coat has attained sufficient hardness.

2508.6 Alternate Method of Application. As an alternate method of application, the second coat may be applied as soon as the first coat has attained sufficient rigidity to receive the second coat.

When using this method of application, calcium aluminate cement up to 15 percent of the weight of the portland cement may be added to the mix.

Curing of the first coat may be omitted and the second coat shall be cured as set forth in Table 25-F.

2508.7 Finish Coats. Finish coats shall be proportioned and mixed in an approved manner and in accordance with Table 25-F.

Cement plaster finish coats shall be applied over base coats which have been in place for the time periods set forth in Table 25-F. The third or finish coat shall be applied with sufficient material and pressure to bond to and to cover the brown coat and shall be of sufficient thickness to conceal the brown coat.

2508.8 Preparation of Masonry and Concrete. Surfaces shall be clean, free from efflorescence, sufficiently damp and rough to assure proper bond. If surface is insufficiently rough, approved bonding agents or a portland cement dash bond coat mixed in proportions of 1 1/2 part volume of sand to 1 part volume of portland cement or plastic cement shall be applied. Dash bond coat shall be left undisturbed and shall be moist cured not less than 24 hours. When dash bond is applied, first coat of base coat plaster may be omitted. See Table 25-D for thickness.

SECTION 2509 — EXPOSED AGGREGATE PLASTER

2509.1 General. Exposed natural or integrally colored aggregate may be partially embedded in a natural or colored bedding coat of cement plaster or gypsum plaster, subject to the provisions of this section.

2509.2 Aggregate. The aggregate may be applied manually or mechanically and shall consist of marble chips, pebbles or similar durable, nonreactive materials, moderately hard (three or more on the Mohs scale).
2509.3 Bedding Coat Proportions. The exterior bedding coat shall be composed of one part portland cement, one part Type S lime and a maximum three parts of graded white or natural sand by volume. The interior bedding coat shall be composed of 100 pounds (45.4 kg) neat gypsum plaster and a maximum 200 pounds (90.7 kg) of graded white sand, or exterior or interior may be a factory-prepared bedding coat. The exterior bedding coat shall have a minimum compressive strength of 1,000 pounds per square inch (6894.8 kPa).

2509.4 Application. The bedding coat may be applied directly over the first (scratch) coat of plaster, provided the ultimate overall thickness is a minimum of \( \frac{3}{8} \) inch (22 mm), including lath. Over concrete or masonry surfaces the overall thickness shall be a minimum of \( \frac{1}{2} \) inch (13 mm).

2509.5 Bases. Exposed aggregate plaster may be applied over concrete, masonry, cement plaster base coats or gypsum plaster base coats.

2509.6 Preparation of Masonry and Concrete. Masonry and concrete surfaces shall be prepared in accordance with the provisions of Section 2508.8.

2509.7 Curing. Cement plaster base coats shall be cured in accordance with Table 25-F. Cement plaster bedding coat shall retain sufficient moisture for hydration (hardening) for 24 hours minimum or, where necessary, shall be kept damp for 24 hours by light water spraying.

SECTION 2510 — PNEUMATICALLY PLACED PLASTER (GUNITE)

Pneumatically placed portland cement plaster shall be a mixture of portland cement and sand, mixed dry, conveyed by air through a pipe or flexible tube, hydrated at the nozzle at the end of the conveyor and deposited by air pressure in its final position.

Rebound material may be screened and reused as sand in an amount not greater than 25 percent of the total sand in any batch.

Pneumatically placed portland cement plaster shall consist of a mixture of one part cement to not more than five parts sand. Plasticity agents may be used as specified in Section 2508.1. Except when applied to concrete or masonry, such plaster shall be applied in not less than two coats to a minimum total thickness of \( \frac{3}{8} \) inch (22 mm). The first coat shall be rodded as specified in Section 2508.3 for the second coat. The curing period and time interval shall be as set forth in Table 25-F.

SECTION 2511 — GYPSUM WALLBOARD

2511.1 General. Gypsum wallboard shall not be installed on exterior surfaces. See Section 224. For use as backing under stucco, see Section 2506.3.

Gypsum wallboard shall not be installed until weather protection for the installation is provided.

2511.2 Supports. Supports shall be spaced not to exceed the spacing set forth in Table 25-G for single-ply application and Table 25-H for two-ply application. Vertical assemblies shall conform with Section 2503. Horizontal assemblies shall comply with Section 2504.

2511.3 Single-ply Application. All edges and ends of gypsum wallboard shall occur on the framing members, except those edges and ends which are perpendicular to the framing members. All edges and ends of gypsum wallboard shall be in moderate contact except in concealed spaces where fire-resistive construction or diaphragm action is not required.

The size and spacing of fasteners shall conform with Table 25-G except where modified by fire-resistive construction meeting the requirements of Section 703.2. Fasteners shall be spaced not less than \( \frac{3}{8} \) inch (10 mm) from edges and ends of gypsum wallboard. Fasteners at the top and bottom plates of vertical assemblies, or the edges and ends of horizontal assemblies perpendicular to supports, and at the wall line may be omitted except on shear-resisting elements or fire-resistive assemblies. Fasteners shall be applied in such a manner as not to fracture the face paper with the fastener head.
Gypsum wallboard may be applied to wood-framing members with an approved adhesive. A continuous bead of the adhesive shall be applied to the face of all framing members, except top and bottom plates, of sufficient size as to spread to an average width of 1 inch (25 mm) and thickness of \( \frac{1}{16} \) inch (1.6 mm) when the gypsum wallboard is applied. Where the edges or ends of two pieces of gypsum wallboard occur on the same framing member, two continuous parallel beads of adhesive shall be applied to the framing member. Fasteners shall be used with adhesive application in accordance with Table 25-G.

2511.4 Two-ply Application. The base of gypsum wallboard shall be applied with fasteners of the type and size as required for the nonadhesive application of single-ply gypsum wallboard. Fastener spacings shall be in accordance with Table 25-H except where modified by fire-resistive construction meeting the requirements of Section 703.2.

The face ply of gypsum wallboard may be applied with gypsum wallboard joint compound or approved adhesive furnishing full coverage between the plies or with fasteners in accordance with Table 25-H. When the face ply is installed with joint compound or adhesive, the joints of the face ply need not occur on supports. Temporary nails or shoring shall be used to hold face ply in position until the joint compound or adhesive develops adequate bond.

2511.5 Joint Treatment. Gypsum wallboard single-layer fire-rated assemblies shall have joints treated.

EXCEPTION: Joint treatment need not be provided when any of the following conditions occur:
1. Where the wallboard is to receive a decorative finish such as wood paneling, battens, acoustical finishes or any similar application which would be equivalent to joint treatment.
2. Joints occur over wood-framing members.
3. Assemblies tested without joint treatment.

SECTION 2512 — USE OF GYPSUM IN SHOWERS AND WATER CLOSETS

When gypsum is used as a base for tile or wall panels for tub, shower or water closet compartment walls (see Sections 807.1.2 and 807.1.3), water-resistant gypsum backing board shall be used. Regular gypsum wallboard is permitted under tile or wall panels in other wall and ceiling areas when installed in accordance with Table 25-G. Water-resistant gypsum board shall not be used in the following locations:
1. Over a vapor retarder.
2. In areas subject to continuous high humidity, such as saunas, steam rooms or gang shower rooms.
3. On ceilings where frame spacing exceeds 12 inches (305 mm) on center.

SECTION 2513 — SHEAR-RESISTING CONSTRUCTION WITH WOOD FRAME

2513.1 General. Cement plaster, gypsum lath and plaster, gypsum veneer base, gypsum sheathing board and gypsum wallboard may be used on wood studs for vertical diaphragms if applied in accordance with this section. Shear-resisting values shall not exceed those set forth in Table 25-1. The effects of overturning on vertical diaphragms shall be investigated in accordance with Section 1603.3.4.

The shear values tabulated shall not be cumulative with the shear value of other materials applied to the same wall. The shear values may be additive when the identical materials applied as specified in this section are applied to both sides of the wall.

2513.2 Masonry and Concrete Construction. Cement plaster, gypsum lath and plaster, gypsum veneer base, gypsum sheathing board and gypsum wallboard shall not be used in vertical diaphragms to resist forces imposed by masonry or concrete construction.
2513.3 Wall Framing. Framing for vertical diaphragms shall conform with Section 2326.11 for bearing walls, and studs shall be spaced not farther apart than 16 inches (406 mm) center to center. Sills, plates and marginal studs shall be adequately connected to framing elements located above and below to resist all design forces.

2513.4 Height-to-Length Ratio. The maximum allowable height-to-length ratio for the construction in this section shall be 2 to 1. Wall sections having height-to-length ratios in excess of 1 1/2 to 1 shall be blocked.

2513.5 Application. End joints of adjacent courses of gypsum lath, gypsum veneer base, gypsum sheathing board or gypsum wallboard sheets shall not occur over the same stud.

Where required in Table 25-1, blocking having the same cross-sectional dimensions as the studs shall be provided at all joints that are perpendicular to the studs.

The size and spacing of nails shall be as set forth in Table 25-1. Nails shall be spaced not less than 3/8 inch (10 mm) from edges and ends of gypsum lath, gypsum veneer base, gypsum sheathing board, gypsum wallboard or sides of studs, blocking and top and bottom plates.

2513.5.1 Gypsum lath. Gypsum lath shall be applied perpendicular to the studs. Maximum allowable shear values shall be as set forth in Table 25-1.

2513.5.2 Gypsum sheathing board. Four-foot-wide (1219 mm) pieces may be applied parallel or perpendicular to studs. Two-foot-wide (610 mm) pieces shall be applied perpendicular to the studs. Maximum allowable shear values shall be as set forth in Table 25-1.

2513.5.3 Gypsum wallboard or veneer base. Gypsum wallboard or veneer base may be applied parallel or perpendicular to studs. Maximum allowable shear values shall be as set forth in Table 25-1.
TABLE 25-A—SUSPENDED AND FURRED CEILINGS

[For support of ceilings weighing not more than 10 pounds per square foot (4.89 kg/m²)]

<table>
<thead>
<tr>
<th>Size and Type</th>
<th>Maximum Area Supported (square feet)</th>
<th>Size</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>× 0.09 for m²</td>
<td>× 25.4 for mm</td>
</tr>
<tr>
<td>Hangers for suspended ceilings</td>
<td>12.5</td>
<td>0.148 inch (3.76 mm) (No. 9 B.W. gage) wire</td>
</tr>
<tr>
<td></td>
<td>16</td>
<td>0.145 inch (4.19 mm) (No. 8 B.W. gage) wire</td>
</tr>
<tr>
<td></td>
<td>18</td>
<td>3/16&quot; diameter, mild steel rod²</td>
</tr>
<tr>
<td></td>
<td>20</td>
<td>7/32&quot; diameter, mild steel rod²</td>
</tr>
<tr>
<td></td>
<td>22.5</td>
<td>7/32&quot; diameter, mild steel rod²</td>
</tr>
<tr>
<td></td>
<td>22.0</td>
<td>1&quot; x 3/16&quot; mild steel flats³</td>
</tr>
<tr>
<td>For supporting runners</td>
<td>Single hangers between beams⁴</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.109 inch (2.77 mm) (No. 12 B.W gage) wire</td>
</tr>
<tr>
<td></td>
<td></td>
<td>12</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.134 inch (3.40 mm) (No. 10 B.W. gage) wire</td>
</tr>
<tr>
<td></td>
<td></td>
<td>16</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.165 inch (4.19 mm) (No. 8 B.W. gage) wire</td>
</tr>
<tr>
<td></td>
<td>Double wire loops at beams or joists³</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.083 inch (2.11 mm) (No. 14 B.W. gage) wire</td>
</tr>
<tr>
<td></td>
<td></td>
<td>12</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.109 inch (2.77 mm) (No. 12 B.W. gage) wire</td>
</tr>
<tr>
<td></td>
<td></td>
<td>16</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.120 inch (3.05 mm) (No. 11 B.W. gage) wire</td>
</tr>
<tr>
<td>For supporting furring without runners⁴ (wire loops at supports)</td>
<td>Type of support: Concrete Steel Wood</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.083 inch (2.11 mm) (No. 14 B.W. gage) wire</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.065 inch (1.65 mm) (No. 16 B.W. gage) wire</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(2 loops)³</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.083 inch (2.11 mm) (No. 14 B.W. gage) wire</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(2 loops)³</td>
</tr>
<tr>
<td>Size and Type</td>
<td>Maximum Spacing of Hangers or Supports (Along Runners)</td>
<td>Maximum Spacing of Runners (Transverse)</td>
</tr>
<tr>
<td>-------------------------------------</td>
<td>------------------------------------------------------</td>
<td>----------------------------------------</td>
</tr>
<tr>
<td>3/4&quot; x 25.4 for mm — 1.49 for kg/m</td>
<td>2'</td>
<td>3'</td>
</tr>
<tr>
<td>1 1/2&quot; x 0.475 pound per foot, cold-rolled channel</td>
<td>3'</td>
<td>4'</td>
</tr>
<tr>
<td>1 1/2&quot; x 0.475 pound per foot, cold-rolled channel</td>
<td>3.5'</td>
<td>3.5'</td>
</tr>
<tr>
<td>1 1/2&quot; x 0.475 pound per foot, cold-rolled channel</td>
<td>4'</td>
<td>3'</td>
</tr>
<tr>
<td>1 1/2&quot; x 1.12 pounds per foot, hot-rolled channel</td>
<td>4'</td>
<td>5'</td>
</tr>
<tr>
<td>2&quot; x 1.26 pounds per foot, hot-rolled channel</td>
<td>5'</td>
<td>5'</td>
</tr>
<tr>
<td>2&quot; x 0.59 pounds per foot, cold-rolled channel</td>
<td>3.5'</td>
<td>3.5'</td>
</tr>
<tr>
<td>1 1/2&quot; x 1 1/2&quot; x 3/16&quot; angle</td>
<td>5'</td>
<td>5'</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Size and Type</th>
<th>Maximum Spacing of Runners or Supports (Along Runners)</th>
<th>Maximum Spacing of Cross Furring Members (Transverse)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/4&quot; diameter pencil rods</td>
<td>2'</td>
<td>12&quot;</td>
</tr>
<tr>
<td>3/8&quot; diameter pencil rods</td>
<td>2'</td>
<td>19&quot;</td>
</tr>
<tr>
<td>3/8&quot; diameter pencil rods</td>
<td>2.5'</td>
<td>12&quot;</td>
</tr>
<tr>
<td>3/4&quot; x 0.3 pound per foot, cold- or hot-rolled channel</td>
<td>3'</td>
<td>24&quot;</td>
</tr>
<tr>
<td>3/4&quot; x 0.3 pound per foot, cold- or hot-rolled channel</td>
<td>3.5'</td>
<td>16&quot;</td>
</tr>
<tr>
<td>3/4&quot; x 0.3 pound per foot, cold- or hot-rolled channel</td>
<td>4'</td>
<td>12&quot;</td>
</tr>
<tr>
<td>1&quot; x 0.410 pound per foot, hot-rolled channel</td>
<td>4.5'</td>
<td>24&quot;</td>
</tr>
<tr>
<td>1&quot; x 0.410 pound per foot, hot-rolled channel</td>
<td>5'</td>
<td>19&quot;</td>
</tr>
</tbody>
</table>

1 Metal suspension systems for acoustical tile and lay-in panel ceiling systems weighing not more than 4 pounds per square foot (19.5 kg/m²), including light fixtures and all ceiling-supported equipment and conforming to U.B.C. Standard 25-2 are exempt from Table 25-A.

2 All rod hangers shall be protected with a zinc or cadmium coating or with a rust-inhibitive paint.

3 All flat hangers shall be protected with a zinc or cadmium coating or with a rust-inhibitive paint.

4 Inserts, special clips or other devices of equal strength may be substituted for those specified.

5 Two loops of 0.049 inch (1.24 mm) (No. 18 B.W. gage) wire may be substituted for each loop of 0.049 inch (1.24 mm) (No. 18 B.W. gage) wire for attaching steel furring to steel or wood joists.

6 Spans are based on webs of channels being erected vertically.

7 Other sections of hot- or cold-rolled members of equivalent strength may be substituted for those specified.
**TABLE 25-B**—**TYPES OF LATH**—**MAXIMUM SPACING OF SUPPORTS**

<table>
<thead>
<tr>
<th>TYPE OF LATH</th>
<th>MINIMUM WEIGHT (per square yard) ( \times 0.38 \text{ for kg/m}^2 )</th>
<th>VERTICAL (inches) ( \times 25.4 \text{ for mm} )</th>
<th>HORIZONTAL (inches) ( \times 25.4 \text{ for mm} )</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>GAGE AND MESH SIZE ( \times 25.4 \text{ for mm} )</td>
<td>Solid</td>
<td>Other</td>
</tr>
<tr>
<td>1. Expanded metal lath (diamond mesh)</td>
<td>2.5</td>
<td>16(^1)</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>3.4</td>
<td>16(^1)</td>
<td>12</td>
</tr>
<tr>
<td>2. Flat rib expanded metal lath</td>
<td>2.75</td>
<td>16</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>3.4</td>
<td>19</td>
<td>24</td>
</tr>
<tr>
<td>3. Stucco mesh expanded metal lath</td>
<td>1.8 and 3.6</td>
<td>16(^4)</td>
<td></td>
</tr>
<tr>
<td>4. 3/8&quot; (9.5 mm) rib expanded metal lath</td>
<td>3.4</td>
<td>24</td>
<td>24</td>
</tr>
<tr>
<td></td>
<td>4.0</td>
<td>24</td>
<td>24</td>
</tr>
<tr>
<td>5. Sheet lath</td>
<td>4.5</td>
<td>24</td>
<td>24</td>
</tr>
<tr>
<td>Welded</td>
<td>1.95 pounds, 0.120 inch (No. 11 B.W. gage), 2&quot; x 2&quot;</td>
<td>24</td>
<td>24</td>
</tr>
<tr>
<td></td>
<td>1.16 pounds, 0.065 inch (No. 16 B.W. gage), 2&quot; x 2&quot;</td>
<td>16</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>1.4 pounds, 0.049 inch (No. 18 B.W. gage), 1&quot; x 1&quot;</td>
<td>16(^4)</td>
<td></td>
</tr>
<tr>
<td>Woven</td>
<td>1.1 pounds, 0.049 inch (No. 18 B.W. gage), 1(1/2)&quot; hexagonal(^6)</td>
<td>24</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>1.4 pounds, 0.058 inch (No. 17 B.W. gage), 1(1/2)&quot; hexagonal(^6)</td>
<td>24</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>1.4 pounds, 0.049 inch (No. 18 B.W. gage), 1&quot; hexagonal(^6)</td>
<td>24</td>
<td>16</td>
</tr>
<tr>
<td>7. 3/8&quot; (9.5 mm) gypsum lath (plain)</td>
<td></td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>8. 1/2&quot; (12.7 mm) gypsum lath (plain)</td>
<td></td>
<td>24</td>
<td></td>
</tr>
</tbody>
</table>

\(^1\)For fire-resistive construction, see Tables 7-A, 7-B and 7-C. For shear-resisting elements, see Table 25-I.

\(^2\)Metal lath and wire fabric lath used as reinforcement for cement plaster shall be furred out away from vertical supports at least 1/4 inch (6 mm). Self-furring lath meets furring requirements.

**EXCEPTION:** Furring of expanded metal lath is not required on supports having a bearing surface width of 1\(1/8\) inches (41 mm) or less.

\(^3\)Span may be increased to 24 inches (610 mm) with self-furred metal lath over solid sheathing assemblies approved for this use.

\(^4\)Wire backing required on open vertical frame construction except under expanded metal lath and paper-backed wire fabric lath.

\(^5\)May be used for studless solid partitions.

\(^6\)Woven wire or welded wire fabric lath, not to be used as base for gypsum plaster without absorbent paper backing or slot-perforated separator.

\(^7\)Span may be increased to 24 inches (610 mm) on vertical screw or approved nailable assemblies.
<table>
<thead>
<tr>
<th>TYPE OF LATH</th>
<th>NAILS</th>
<th>SCREWS</th>
<th>STAPLES</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Type and Size</td>
<td>Maximum Spacing</td>
<td>Maximum Spacing</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Vertical</td>
<td>Horizontal</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(Inches)</td>
<td>(Inches)</td>
</tr>
<tr>
<td>1. Diamond mesh expanded metal</td>
<td>4d blued smooth box 11/2&quot; No. 14</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>lath and flat rib metal lath</td>
<td>gage 1/32&quot; head (clined)</td>
<td>6</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>11/2&quot; No. 11 gage 1/16&quot; head, barbed</td>
<td>6</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>11/2&quot; No. 11 gage 1/16&quot; head, barbed</td>
<td>6</td>
<td>—</td>
</tr>
<tr>
<td>2. 3/8&quot; (9.5 mm) rib metal lath</td>
<td>11/2&quot; No. 11 gage 1/16&quot; head, barbed</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>and sheet lath</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. 3/4&quot; (19.1 mm) rib metal lath</td>
<td>4d common 11/2&quot; No. 121/2 gage 1/16&quot; head</td>
<td>At ribs</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>2&quot; No. 11 gage 1/16&quot; head, barbed</td>
<td>6</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>4. Wire fabric lath</td>
<td>4d blued smooth box (clined)</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>11/2&quot; No. 11 gage 1/16&quot; head, barbed</td>
<td>6</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>11/2&quot; No. 11 gage 1/16&quot; head, barbed</td>
<td>6</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>11/2&quot; No. 11 gage 1/16&quot; head, barbed</td>
<td>6</td>
<td>—</td>
</tr>
<tr>
<td>5. 3/8&quot; (9.5 mm) gypsum lath</td>
<td>11/8&quot; No. 13 gage 1/16&quot; head, blued</td>
<td>810</td>
<td>810</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. 1/2&quot; (12.7 mm) gypsum lath</td>
<td>11/4&quot; No. 13 gage 1/16&quot; head, blued</td>
<td>8</td>
<td>810</td>
</tr>
</tbody>
</table>

1Metal lath, wire lath, wire fabric lath and metal accessories shall conform with approved standards.
2For nailable non-load-bearing metal supports, use annular threaded nails or approved staples.
3For fire-resistive construction, see Tables 7-B and 7-C. For shear-resisting elements, see Table 25-1. Approved wire and sheet metal attachment clips may be used.
4Screws shall be an approved type long enough to penetrate into wood framing not less than 1/4 inch (6.4 mm) and through metal supports adaptable for screw attachment not less than 1/8 inch (6.4 mm).
5With chisel or divergent points.
6Maximum spacing of attachments from longitudinal edges shall not exceed 2 inches (51 mm).
7When lath and stripping are stapled simultaneously, increase leg length of staple 1/8 inch (3.2 mm).
8For interiors only.
9Attach self-furring wire fabric lath to supports at furring device.
10Three attachments per 16-inch-wide (406.4 mm) lath per bearing. Four attachments per 24-inch-wide (610 mm) lath per bearing.
11Supports spaced 24 inches (610 mm) on center. Four attachments per 16-inch-wide (406 mm) lath per bearing. Five attachments per 24-inch-wide (610 mm) lath per bearing.
### TABLE 25-D—THICKNESS OF PLASTER

<table>
<thead>
<tr>
<th>PLASTER BASE</th>
<th>Gypsum Plaster</th>
<th>Portland Cement Plaster</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Expanded metal lath</td>
<td>5/32&quot; minimum&lt;sup&gt;2&lt;/sup&gt;</td>
<td>5/32&quot; minimum&lt;sup&gt;2&lt;/sup&gt;</td>
</tr>
<tr>
<td>2. Wire fabric lath</td>
<td>5/8&quot; minimum&lt;sup&gt;2&lt;/sup&gt;</td>
<td>3/4&quot; minimum (interior)&lt;sup&gt;3&lt;/sup&gt;</td>
</tr>
<tr>
<td>3. Gypsum lath</td>
<td>3/16&quot; minimum</td>
<td>1/2&quot; minimum</td>
</tr>
<tr>
<td>4. Masonry walls&lt;sup&gt;4&lt;/sup&gt;</td>
<td>3/16&quot; minimum</td>
<td>1/2&quot; minimum</td>
</tr>
<tr>
<td>5. Monolithic concrete walls&lt;sup&gt;4,5&lt;/sup&gt;</td>
<td>5/8&quot; maximum&lt;sup&gt;6&lt;/sup&gt;</td>
<td>7/8&quot; maximum&lt;sup&gt;6&lt;/sup&gt;</td>
</tr>
<tr>
<td>6. Monolithic concrete ceilings&lt;sup&gt;4,5&lt;/sup&gt;</td>
<td>3/16&quot; maximum&lt;sup&gt;6,7,8&lt;/sup&gt;</td>
<td>1/2&quot; maximum&lt;sup&gt;7,8&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

<sup>1</sup>For fire-resistive construction, see Tables 7-A, 7-B and 7-C.

<sup>2</sup>When measured from back plane of expanded metal lath, exclusive of ribs, or self-furring lath, plaster thickness shall be 3/4-inch (19 mm) minimum.

<sup>3</sup>When measured from face of support or backing.

<sup>4</sup>Because masonry and concrete surfaces may vary in plane, thickness of plaster need not be uniform.

<sup>5</sup>When applied over a liquid bonding agent, finish coat may be applied directly to concrete surface.

<sup>6</sup>An approved skim-coat plaster 1/16 inch (1.6 mm) thick may be applied directly to concrete.

<sup>7</sup>On concrete ceilings, where the base coat plaster thickness exceeds the maximum thickness shown, metal lath or wire fabric lath shall be attached to the concrete.

<sup>8</sup>Approved acoustical plaster may be applied directly to concrete, or over base coat plaster, beyond the maximum plaster thickness shown.

### TABLE 25-E—GYPSUM PLASTER PROPORTIONS

<table>
<thead>
<tr>
<th>NUMBER</th>
<th>COAT</th>
<th>PLASTER BASE OR LATH</th>
<th>MAXIMUM VOLUME AGGREGATE PER 100 POUNDS (45.4 kg) NEAT PLASTER&lt;sup&gt;2,3&lt;/sup&gt; (cubic feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>&lt;sup&gt;×&lt;/sup&gt; 0.028 for m³</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Damp Loose Sand&lt;sup&gt;4&lt;/sup&gt;</td>
</tr>
<tr>
<td>1. Two-coat work</td>
<td>Base coat</td>
<td>Gypsum lath</td>
<td>2&lt;sup&gt;1/2&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td>Base coat</td>
<td>Masonry</td>
<td>3</td>
</tr>
<tr>
<td>First coat</td>
<td>Lath</td>
<td>2&lt;sup&gt;5&lt;/sup&gt;</td>
<td>2</td>
</tr>
<tr>
<td>Second coat</td>
<td>Lath</td>
<td>3&lt;sup&gt;5&lt;/sup&gt;</td>
<td>2&lt;sup&gt;6&lt;/sup&gt;</td>
</tr>
<tr>
<td>First and second coats</td>
<td>Masonry</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>2. Three-coat work</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<sup>1</sup>Wood-fibered gypsum plaster may be mixed in the proportions of 100 pounds (45.4 kg) of gypsum to not more than 1 cubic foot (0.028 m³) of sand where applied on masonry or concrete.

<sup>2</sup>For fire-resistive construction, see Tables 7-A, 7-B and 7-C.

<sup>3</sup>When determining the amount of aggregate in set plaster, a tolerance of 10 percent shall be allowed.

<sup>4</sup>Combinations of sand and lightweight aggregate may be used, provided the volume and weight relationship of the combined aggregate to gypsum plaster is maintained.

<sup>5</sup>If used for both first and second coats, the volume of aggregate may be 2/3 cubic feet (0.07 m³).

<sup>6</sup>Where plaster is 1 inch (25 mm) or more in total thickness, the proportions for the second coat may be increased to 3 cubic feet (0.08 m³).
### TABLE 25-F—CEMENT PLASTERS

<table>
<thead>
<tr>
<th>Coats</th>
<th>Volume Cement</th>
<th>Maximum Weight (or Volume) Lime per Volume Cement</th>
<th>Maximum Volume Sand per Combined Volumes Cement and Lime</th>
<th>Approximate Minimum Thickness[^3] x 25.4 for mm</th>
<th>Minimum Period Moist Curing</th>
<th>Minimum Interval between Coats</th>
</tr>
</thead>
<tbody>
<tr>
<td>Second</td>
<td>1</td>
<td>20 lbs. (9.07 kg)</td>
<td>5</td>
<td>1st and 2nd coats total 3/4&quot;</td>
<td>48 hours[^5]</td>
<td>7 days[^7]</td>
</tr>
<tr>
<td>Finish</td>
<td>1</td>
<td>1[^8]</td>
<td>3</td>
<td>1st, 2nd and finish coats 3/8&quot;</td>
<td>—</td>
<td>7</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Second</td>
<td>1</td>
<td>1</td>
<td>4 1/2</td>
<td>1st and 2nd coats total 3/4&quot;</td>
<td>48 hours[^5]</td>
<td>7 days[^7]</td>
</tr>
<tr>
<td>Finish</td>
<td>1</td>
<td>1[^8]</td>
<td>3</td>
<td>1st, 2nd and finish coats 3/8&quot;</td>
<td>—</td>
<td>7</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Finish</td>
<td>1</td>
<td>—</td>
<td>3</td>
<td>1st, 2nd and finish coats 3/8&quot;</td>
<td>—</td>
<td>7</td>
</tr>
</tbody>
</table>

[^1]: Exposed aggregate plaster shall be applied in accordance with Section 2509. Minimum overall thickness shall be 3/4 inch (19 mm).
[^2]: When determining the amount of sand in set plaster, a tolerance of 10 percent may be allowed.
[^3]: See Table 25-D.
[^4]: Measured from face of support or backing to crest of scored plaster
[^5]: See Section 2507.3.3.
[^6]: Twenty-four-hour minimum interval between coats of interior cement plaster. For alternate method of application, see Section 2508.5.
[^7]: Finish coat plaster may be added to interior portland cement base coats after a 48-hour period.
[^8]: No additions of plasticizing agents shall be made.
<table>
<thead>
<tr>
<th>THICKNESS OF GYPSUM WALLBOARD (inches)</th>
<th>PLANE OF FRAMING SURFACE</th>
<th>MAXIMUM SPACING OF FASTENERS (Center to Center) (inches)</th>
<th>LONG DIMENSION OF GYPSUM WALLBOARD SHEETS IN RELATION TO DIRECTION OF FRAMING MEMBERS</th>
<th>MAXIMUM SPACING OF FASTENERS (Center to Center) (inches)</th>
<th>NAILS—TO WOOD</th>
</tr>
</thead>
<tbody>
<tr>
<td>X 25.4 for mm</td>
<td></td>
<td></td>
<td>X 25.4 for mm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1/2</td>
<td>Horizontal</td>
<td>X 25.4 for mm</td>
<td>I 16 P</td>
<td>Vertical 16 P</td>
<td>7 12</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>24 NP P</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Vertical</td>
<td></td>
<td></td>
<td>16 P</td>
<td>8 16</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>24 P</td>
<td>12 12</td>
</tr>
<tr>
<td>5/8</td>
<td>Horizontal</td>
<td>X 25.4 for mm</td>
<td>I 16 P</td>
<td>Vertical 16 P</td>
<td>7 12</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>24 NP P</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Vertical</td>
<td></td>
<td></td>
<td>16 P</td>
<td>8 16</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>24 P</td>
<td>12 12</td>
</tr>
</tbody>
</table>

**Nails**—To wood

No. 13 gage, 1/4" long, 9/64" head; 0.098" diameter, 11/4" long, annular ringed; 5d, cooler (0.086" dia., 13/64" long, 12/64" head) or wallboard (0.086" dia., 13/64" long, 13/64" head) nail.

**Screws**—To wood

No. 13 gage, 1/4" long, 13/64" head; 0.098" diameter, 11/4" long, annular ringed; 6d, cooler (0.092" dia., 11/64" long, 15/64" head) or wallboard (0.0915" dia., 17/64" long, 16/64" head) nail.

**Notes:**

Horizontal refers to applications such as ceilings. Vertical refers to applications such as walls.

II denotes parallel.

\( \perp \) denotes perpendicular.

P—Permitted. NP—Not permitted. NR—Not required.

1 A combination of fasteners consisting of nails along the perimeter and screws in the field of the gypsum board may be used with the spacing of the fasteners shown in the table.

For fire-resistive construction, see Tables 7-B and 7-C. For shear-resisting elements, see Table 25-1.

2 Where the metal framing has a clinching design formed to receive the nails by two edges of metal, the nails shall not be less than 5/8 inch (16 mm) longer than the wallboard thickness, and shall have ringed shanks. Where the metal framing has a nailing groove formed to receive the nails, the nails shall have barbed shanks or be 5d, No. 13 1/2 gage, 17/8 inches (41 mm) long, 13/64-inch (6.0 mm) head for 1/2-inch (12.7 mm) gypsum wallboard; 6d, No. 13 gage, 17/8 inches (48 mm) inches long, 13/64-inch (6.0 mm) head for 5/8-inch (16 mm) gypsum wallboard.

3 Two nails spaced 2 inches to 2 1/2 inches (51 mm to 64 mm) apart may be used where the pairs are spaced 12 inches (305 mm) on center except around the perimeter of the sheets.

4 Screws shall be long enough to penetrate into wood framing not less than 5/8 inch (16 mm) and through metal framing not less than 1/4 inch (6.4 mm).
### TABLE 25-H—APPLICATION OF TWO-PLY GYPSUM WALLBOARD

<table>
<thead>
<tr>
<th>Thickness of Gypsum Wallboard (Each Ply) (Inch)</th>
<th>Plane of Framing Surface</th>
<th>Long Dimension of Gypsum Wallboard Sheets (× 25.4 for mm)</th>
<th>Maximum Spacing of Fasteners (Center to Center) (Inches)</th>
<th>Maximum Spacing of Fasteners (Center to Center) (Inches)</th>
<th>Nail²</th>
<th>Screw³</th>
<th>Staple⁴</th>
<th>Nail²</th>
<th>Screw³</th>
</tr>
</thead>
<tbody>
<tr>
<td>× 25.4 for mm</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1/8</td>
<td>Horizontal</td>
<td>Perpendicular only</td>
<td>16</td>
<td>24</td>
<td>16</td>
<td>24</td>
<td>16</td>
<td>7</td>
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<td></td>
<td>Vertical</td>
<td>Either direction</td>
<td>16</td>
<td>16</td>
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<td>16</td>
<td>16</td>
<td>7</td>
<td>8</td>
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<tr>
<td>1/2</td>
<td>Horizontal</td>
<td>Perpendicular only</td>
<td>24</td>
<td>24</td>
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<td>24</td>
<td>24</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>Vertical</td>
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<td>24</td>
<td>24</td>
<td>24</td>
<td>24</td>
<td>24</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td>5/8</td>
<td>Horizontal</td>
<td>Perpendicular only</td>
<td>24</td>
<td>24</td>
<td>24</td>
<td>24</td>
<td>24</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
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<td>24</td>
<td>7</td>
<td>8</td>
</tr>
</tbody>
</table>

### FASTENERS AND ADHESIVES

<table>
<thead>
<tr>
<th>Thickness of Gypsum Wallboard (Each Ply) (Inch)</th>
<th>Plane of Framing Surface</th>
<th>Long Dimension of Gypsum Wallboard Sheets (× 25.4 for mm)</th>
<th>Maximum Spacing of Fasteners (Center to Center) (Inches)</th>
<th>Maximum Spacing of Fasteners (Center to Center) (Inches)</th>
<th>Nail²</th>
<th>Screw³</th>
<th>Staple⁴</th>
<th>Nail²</th>
<th>Screw³</th>
</tr>
</thead>
<tbody>
<tr>
<td>× 25.4 for mm</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3/8</td>
<td>Base ply</td>
<td>Horizontal Perpendicular only</td>
<td>16</td>
<td>7</td>
<td>16</td>
<td>7</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Vertical Either direction</td>
<td>24</td>
<td>8</td>
<td>24</td>
<td>8</td>
<td>7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1/2</td>
<td>Base ply</td>
<td>Horizontal Perpendicular only</td>
<td>24</td>
<td>7</td>
<td>24</td>
<td>7</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Vertical Either direction</td>
<td>24</td>
<td>8</td>
<td>24</td>
<td>8</td>
<td>7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5/8</td>
<td>Base ply</td>
<td>Horizontal Perpendicular only</td>
<td>24</td>
<td>7</td>
<td>24</td>
<td>7</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Vertical Either direction</td>
<td>24</td>
<td>8</td>
<td>24</td>
<td>8</td>
<td>7</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1 For fire-resistive construction, see Tables 7-B and 7-C. For shear-resisting elements, see Table 25-1.
2 Nails for wood framing shall be long enough to penetrate into wood members not less than 3/4 inch (19 mm), and the sizes shall conform with the provisions of Table 25-G.
3 For nails not included in Table 25-G, use the appropriate size cooler or wallboard nails. Nails for metal framing shall conform with the provisions of Table 25-G.
4 Screws shall conform with the provisions of Table 25-G.
5 Staples shall not be less than No. 16 gage by 3/4-inch (19.1 mm) crown width with leg length of 7/8 inch (22.2 mm), 1/8 inches (28.6 mm) and 5/8 inches (34.9 mm) for gypsum wallboard thicknesses of 3/8 inch (9.5 mm), 1/2 inch (12.7 mm) and 5/8 inch (15.9 mm), respectively.
<table>
<thead>
<tr>
<th>TYPE OF MATERIAL</th>
<th>THICKNESS OF MATERIAL</th>
<th>WALL CONSTRUCTION</th>
<th>NAIL SPACING</th>
<th>SHEAR VALUE</th>
<th>MINIMUM NAIL SIZE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>x 25.4 mm</td>
<td></td>
<td>(inches)</td>
<td>x 25.4 mm</td>
<td>x 14.6 for N/m</td>
</tr>
<tr>
<td>1. Expanded metal, or woven wire lath and portland cement plaster</td>
<td>(\frac{1}{8})&quot;</td>
<td>Unblocked</td>
<td>6</td>
<td>180</td>
<td>No. 11 gage, 1(\frac{1}{2})&quot; long, (\frac{3}{16})&quot; head No. 16 gage staple, (\frac{1}{8})&quot; legs</td>
</tr>
<tr>
<td>2. Gypsum lath</td>
<td>(\frac{3}{8})&quot; lath and (\frac{1}{2})&quot; plaster</td>
<td>Unblocked</td>
<td>5</td>
<td>100</td>
<td>No. 13 gage, 1(\frac{1}{8})&quot; long, (\frac{19}{64})&quot; head, plasterboard blued nail</td>
</tr>
<tr>
<td>3. Gypsum sheathing board</td>
<td>(\frac{1}{2})&quot; x 2' x 8'</td>
<td>Unblocked</td>
<td>4</td>
<td>75</td>
<td>No. 11 gage, 1(\frac{1}{4})&quot; long, (\frac{7}{16})&quot; head, diamond-point, galvanized</td>
</tr>
<tr>
<td></td>
<td>(\frac{1}{2})&quot; x 4'</td>
<td>Blocked</td>
<td>4</td>
<td>175</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(\frac{1}{2})&quot; x 4'</td>
<td>Unblocked</td>
<td>7</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>4. Gypsum wallboard or veneer base</td>
<td>(\frac{1}{2})&quot;</td>
<td>Unblocked</td>
<td>7</td>
<td>100</td>
<td>5d cooler (0.086&quot; dia., 1(\frac{1}{32})&quot; long, (\frac{19}{64})&quot; head) or wallboard (0.086&quot; dia., 1(\frac{1}{8})&quot; long, (\frac{7}{32})&quot; head)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Blocked</td>
<td>4</td>
<td>125</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4</td>
<td>150</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(\frac{5}{8})&quot;</td>
<td>Unblocked</td>
<td>7</td>
<td>115</td>
<td>6d cooler (0.092&quot; dia., 1(\frac{7}{8})&quot; long, (\frac{13}{64})&quot; head) or wallboard (0.0915&quot; dia., 1(\frac{7}{8})&quot; long, (\frac{19}{64})&quot; head)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Blocked</td>
<td>4</td>
<td>145</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4</td>
<td>175</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Two ply</td>
<td>Base ply: 9</td>
<td>250</td>
<td></td>
<td>Base ply—6d cooler (0.092&quot; dia., 1(\frac{7}{8})&quot; long, (\frac{13}{64})&quot; head) or wallboard (0.0915&quot; dia., 1(\frac{7}{8})&quot; long, (\frac{19}{64})&quot; head)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Face ply: 7</td>
<td></td>
<td></td>
<td>Face ply—8d cooler (0.113&quot; dia., 2(\frac{3}{8})&quot; long, (\frac{9}{32})&quot; head) or wallboard (0.113&quot; dia., 2(\frac{3}{8})&quot; long, (\frac{13}{64})&quot; head)</td>
</tr>
</tbody>
</table>

1These vertical diaphragms shall not be used to resist loads imposed by masonry or concrete construction. See Section 2513.2. Values shown are for short-term loading due to wind or due to seismic loading. Values shown must be reduced 25 percent for normal loading. The values shown in Items 2, 4 and 4 shall be reduced 50 percent for loading due to earthquake in Seismic Zones 3 and 4.

2Applies to nailing at all studs, top and bottom plates and blocking.

3Alternate nails may be used if their dimensions are not less than the specified dimensions.
Section 2601 — Scope

Foam plastics, light-transmitting plastics and plastic veneers shall comply with this chapter.
   See Section 1404 for requirements for vinyl siding.

Section 2602 — Foam Plastic Insulation

2602.1 General. The provisions of this section shall govern the requirements and uses of foam plastic insulation in buildings and structures. For trim, see Section 601.5.5.

2602.2 Labeling and Identification. Packages and containers of foam plastic insulation and foam plastic insulation components delivered to the jobsite shall bear the label of an approved agency showing the manufacturer's name, the product listing, product identification and information to show that the end use will comply with the code requirements.

2602.3 Surface-Burning Characteristics. Foam plastic insulation used in building construction shall have a flame-spread rating of not more than 75 and a smoke-developed rating of not more than 450 when tested in accordance with U.B.C. Standard 8-1 in the maximum thickness intended for use.

   Exception: Foam plastic insulation when tested in a minimum thickness of 4 inches (102 mm) may be used in a greater thickness in cold-storage buildings, ice plants, food-processing rooms and similar areas. For rooms within a building, the foam plastic insulation shall be protected by a thermal barrier on both sides having an index of 15.

2602.4 Thermal Barrier. The interior of the building shall be separated from the foam plastic insulation by an approved thermal barrier having an index of 15 when tested in accordance with U.B.C. Standard 26-2. The thermal barrier shall be installed in such a manner that it will remain in place for the time of its index classification based on approved diversified tests.

   Exception: The thermal barrier is not required:
   1. For siding backer board, provided the foam plastic insulation is not of more than 2,000 Btu per square foot (22.7 MJ/m²) as determined by U.B.C. Standard 26-1 and when it is separated from the interior of the building by not less than 2 inches (51 mm) of mineral fiber insulation or equivalent; or applied as re-siding over existing wall construction.
   2. For walk-in coolers and freezer units having an aggregate floor area less than 400 square feet (37.2 m²).
   3. In a masonry or concrete wall, floor or roof system when the foam plastic insulation is covered by a minimum of 1-inch (25 mm) thickness of masonry or concrete. Loose-fill type foam plastic insulation shall be tested as board stock for flame spread and smoke development as described above.
   4. Within an attic or crawl space where entry is made only for service of utilities, and when foam plastic insulation is covered with a material such as 1/2-inch-thick (38 mm) mineral fiber insulation, 1/4-inch-thick (6.4 mm) plywood, hardboard or gypsum wallboard, corrosion-resistant sheet metal having a base metal thickness not less than 0.0160 inch (0.4 mm) at any point, or other approved material installed in such a manner that the foam plastic insulation is not exposed.
   5. In cooler and freezer walls when:
      5.1 The foam plastic insulation has a flame-spread rating of 25 or less when tested in a minimum 4-inch (102 mm) thickness;
      5.2 Has flash and self-ignition temperatures of not less than 600°F. and 800°F. (316°C. and 427°C.), respectively;
      5.3 Is covered by not less than 0.032-inch (0.8 mm) aluminum or corrosion-resistant steel having a base metal thickness not less than 0.0160 inch (0.4 mm) at any point; and
      5.4 Is protected by an automatic sprinkler system. When the cooler or freezer is within a building, both the cooler or freezer and that part of the building in which it is located shall be sprinklered.
2602.5 Special Provisions.

2602.5.1 General. Foam plastic insulation may be used in the following applications as set forth in this section:

2602.5.2 Noncombustible exterior walls.

2602.5.2.1 One-story buildings. Foam plastic insulation may be used in exterior walls of one-story buildings where exterior walls are required to be of noncombustible construction subject to the following:

1. The building is protected throughout with automatic sprinklers.
2. Foam plastic insulation tested in the maximum thickness and density intended for use, has a flame-spread rating of 25 or less and a smoke-developed rating of 450 or less in accordance with U.B.C. Standard 8-1.
3. The foam plastic insulation has a maximum 4-inch (102 mm) thickness.
4. The thermal barrier may be omitted when the foam plastic insulation is covered by not less than 0.032-inch-thick (0.8 mm) aluminum or corrosion-resistant sheet steel, having a base metal thickness of 0.0160 (0.4 mm) inch.
5. When the wall is required to have a fire-resistive rating, data based on tests conducted in accordance with U.B.C. Standard 7-1 are provided to substantiate that the required fire-resistive rating is maintained.

2602.5.2.2 Buildings of any height. Except for foam plastic insulation in masonry or concrete construction complying with Section 2602.4, Exception 3, assemblies employing foam plastic insulation in or on exterior walls of buildings where the exterior walls are required to be of noncombustible construction shall comply with the following:

1. When the wall is required to have a fire-resistive rating, data based on tests conducted in accordance with U.B.C. Standard 7-1, are provided to substantiate that the fire-resistive rating is maintained.
2. The foam plastic insulation is separated from the interior of the building by a thermal barrier having an index of 15 unless specifically approved under Section 2602.6.
3. Combustible content of foam plastic insulation in any portion of the wall or panel does not exceed 6,000 Btu per square foot (68.2 MJ/m²) of wall area as determined by tests in accordance with U.B.C. Standard 26-1.
4. Foam plastic insulation, exterior coatings and facings tested separately, shall each have a flame-spread rating of 25 or less and a smoke-developed rating of 450 or less in accordance with U.B.C. Standard 8-1. The foam plastic shall be tested in the thickness intended for use.
5. The wall assembly is tested in accordance with U.B.C. Standard 26-4 and complies with the conditions of acceptance contained therein.
6. Foam plastic insulation is listed and the edge or face of each piece is labeled with the following information:
   6.1 Inspection agency name.
   6.2 Product for which the insulation is listed.
   6.3 Identification of the insulation manufacturer.
   6.4 Flame-spread and smoke-development classifications.

2602.5.3 Roofing. Foam plastic insulation meeting the requirements of Sections 2602.2, 2602.3 and 2602.4 may be used as part of a roof-covering assembly, provided the assembly with the foam plastic insulation is a Class A, B or C roof covering when tested in accordance with U.B.C. Standard 15-2. Foam plastic insulation which is a part of a Class A, B or C roof-covering assembly need not
meet the requirements of Sections 2602.2, 2602.3 and 2602.4, provided the assembly with the foam plastic insulation satisfactorily passes a test for insulated roof decks.

Any roof covering installed in accordance with this code and the manufacturer’s instructions may be applied over foam plastic insulation when the foam is separated from the interior of the building by wood structural panel sheathing not less than ½ inch (12.7 mm) in thickness bonded with exterior glue, with edges supported by blocking, tongue-and-groove joints or other approved type of edge support, or an equivalent material. The thermal barrier requirement is waived.

For all roof applications, the smoke-developed rating shall not be limited.

2602.5.4 Doors. Where doors are permitted without a fire-resistive rating, foam plastic insulation having a flame-spread rating of 75 or less may be used as a core material when the door facing is metal having a minimum thickness of 0.032-inch (0.8 mm) aluminum or steel having a base metal thickness not less than 0.0160 inch (0.4 mm) at any point. The thermal barrier is not required for this condition.

2602.6 Specific Approval. Foam plastic insulation or assemblies using foam plastic insulation may be used based on approved tests such as, but not limited to, tunnel tests in accordance with U.B.C. Standard 8-1, fire tests related to actual end use such as U.B.C. Standard 26-3 and an ignition temperature test establishing a minimum self-ignition temperature of 650°F (343°C.) In lieu of testing, the specific approval may be based on the end use, quantity, location and similar considerations where such tests would not be applicable or practical.

Foam plastic insulation in a thickness greater than 4 inches (102 mm) may be used if it has been tested for flame spread and smoke development at a minimum thickness of 4 inches (102 mm) provided the end use has been specifically approved in accordance with this subsection with the thickness and density intended for use.

SECTION 2603 — LIGHT-TRANSMITTING PLASTICS

2603.1 General.

2603.1.1 Scope. The provisions of this section shall govern the quality and methods of application of plastics for use as light-transmitting materials in buildings and structures. For foam plastics, see Sections 601.5.5 and 2602. Light-transmitting plastic materials which meet the other code requirements for walls and roofs may be used in accordance with the other applicable chapters of the code.

2603.1.2 Approval for use. The building official shall require that sufficient technical data be submitted to substantiate the proposed use of any light-transmitting material and, if it is determined that the evidence submitted is satisfactory for the use intended, the building official may approve its use subject to the requirements of this section.

2603.1.3 Identification. Each unit or package of plastic shall be identified with a mark or decal satisfactory to the building official, which includes identification as to the material classification.

2603.1.4 Combination of glazing and exterior wall panels. Combinations of plastic glazing and plastic exterior wall panels shall be subject to the area, height, percentage and separation requirements applicable to the class of plastics as prescribed for wall panel installation.

2603.1.5 Combination of roof panels and skylights. Combinations of plastic roof panels and plastic skylights shall be subject to the area percentage and separation requirements applicable to roof panel installation.

2603.1.6 Standards of quality. The standards listed below labeled a “U.B.C. standard” are also listed in Chapter 35, Part II, and are part of this code.
2. U.B.C. Standard 26-5, Chamber Method of Test for Measuring the Density of Smoke from the Burning or Decomposition of Plastic Materials

2603.2 Definitions. For the purpose of this section, certain terms are defined as follows:

EXTERIOR WALL PANELS are materials which are not classified as plastic glazing and which are used as light-transmitting media in exterior walls.

GLASS FIBER REINFORCED PLASTIC is plastic reinforced with glass fiber having not less than 20 percent of glass fibers by weight.

GLAZING is material which has all edges set in a frame or sash and is not held by mechanical fasteners which pass through the material.

LIGHT-DIFFUSING SYSTEM is construction consisting in whole or in part of lenses, panels, grids or baffles made with approved plastics positioned below independently mounted electrical light sources. Lenses, panels, grids and baffles which are part of an electrical fixture shall not be considered as a light-diffusing system.

PLASTIC MATERIALS, APPROVED. See Chapter 2.

ROOF PANELS are structural panels other than skylights which are fastened to structural members or structural panels or sheathing and which are used as light-transmitting media in the plane of the roof.

THERMOPLASTIC MATERIAL is a plastic material which is capable of being repeatedly softened by increase of temperature and hardened by decrease of temperature.

THERMOSETTING MATERIAL is a plastic material which is capable of being changed into a substantially nonreformable product when cured.

2603.3 Design and Installation.

2603.3.1 Structural requirements. Plastic materials in their assembly shall be of adequate strength and durability to withstand the design loads as prescribed elsewhere in this code. Technical data shall be submitted to establish stresses, maximum unsupported spans and such other information for the various thicknesses and forms used as may be deemed necessary by the building official.

2603.3.2 Fastening. Fastening shall be adequate to withstand design loads as prescribed elsewhere in this code. Proper allowance shall be made for expansion and contraction of plastic materials in accordance with accepted data on coefficient of expansion of the material and other material in conjunction with which it is employed.

2603.4 Glazing of Unprotected Openings. In Type V-N construction, doors, sash and framed openings not required to be fire protected may be glazed or equipped with approved plastic material.

In types of construction other than Type V-N, openings not required to be fire protected may be glazed or equipped with approved plastic, subject to the following requirements:

1. The aggregate area of plastic glazing shall not exceed 25 percent of the area of any wall face of the story in which it is installed. The area of a single pane of glazing installed above the first story shall not exceed 16 square feet (1.5 m²) and the vertical dimension of a single pane shall not exceed 4 feet (1219 mm).

EXCEPTION: When an approved automatic sprinkler system is provided throughout, the area of glazing may be increased to a maximum of 50 percent of the wall face of the story in which it is installed with no limit on the maximum dimension or area of a single pane of glazing.
2. Approved flame barriers extending 30 inches (762 mm) beyond the exterior wall in the plane of the floor, or vertical panels not less than 4 feet (1219 mm) in height, shall be installed between glazed units located in adjacent stories.

3. Plastics shall not be installed more than 65 feet (19 812 mm) above grade level.

2603.5 Light-transmitting Exterior Wall Panels. In Type V-N construction, approved plastics may be installed in exterior walls provided the walls are not required to have a fire-resistive rating.

In types of construction other than Type V-N, approved plastics may be installed in exterior walls, provided the walls are not required to have a fire-resistive rating, subject to the following requirements:

1. Approved exterior wall panels shall not be installed more than 40 feet (12 192 mm) above grade level.

2. Approved exterior wall panels shall not be installed in exterior walls located less than 10 feet (3048 mm) from the property line determined in accordance with Section 503.

3. The area and size shall be limited to that set forth in Table 26-A.

EXCEPTIONS: 1. In structures which are provided with approved flame barriers extending 30 inches (762 mm) beyond the exterior wall in the plane of the floor, there need be no vertical separation at the floor except that provided by the vertical thickness of the flame-barrier projection.

2. When an approved automatic sprinkler system is provided throughout the building, the maximum percentage area of plastic panels in the exterior wall and the maximum square feet of any individual panel may be increased 50 percent above that set forth in Table 26-A, and the separation requirements, both vertical and horizontal, as set forth in Table 26-A may be reduced by 50 percent.

2603.6 Roof Panels. Approved plastic roof panels may be installed in roofs of buildings not required to have a fire-resistive rating, subject to the following limitations:

1. Individual roof panels or units shall be separated from each other by distances of not less than 4 feet (1219 mm) measured in a horizontal plane.

2. Roof panels or units shall not be installed within that portion of a roof located within a distance to property line or public way where openings in exterior walls are prohibited or required to be protected, whichever is most restrictive.

3. Roof panels of Class CC1 plastics shall be limited to a maximum individual panel area of 150 square feet (13.9 m²), and the total maximum aggregate area of all panels shall not exceed 33 1/3 percent of the floor area of the room or space sheltered. Roof panels of Class CC2 plastics shall be limited to a maximum individual panel area of 100 square feet (9.3 m²), and the total maximum aggregate area of all panels shall not exceed 25 percent of the floor area of the room or space sheltered.

EXCEPTION: Swimming pool shelters are exempt from the area limitations of Section 2603.6, provided such shelters do not exceed 5,000 square feet (464.5 m²) in area and are not closer than 10 feet (3048 mm) to the property line or adjacent building.

2603.7 Skylights.

2603.7.1 General. Skylight assemblies may be glazed with approved plastic materials in accordance with the following provisions:

1. The plastics shall be mounted at least 4 inches (102 mm) above the plane of the roof by a curb constructed consistent with the requirements for the type of construction classification.

EXCEPTION: Curbs may be omitted on roofs of Group R, Division 3 Occupancies with a minimum slope of 3 units vertical in 12 units horizontal (25% slope) when self-flashing skylights are used.

2. Flat or corrugated plastic skylights shall slope at least 4 units vertical in 12 units horizontal (33.3% slope). Dome-shaped skylights shall rise above the mounting flange a minimum distance equal to 10 percent of the maximum span of the dome but not less than 5 inches (127 mm).

3. The edges of the plastic lights or domes shall be protected by metal or other noncombustible materials or shall be tested to show that equivalent fire protection is provided.

EXCEPTION: The metal or noncombustible edge is not required where non-rated roof coverings are permitted.

4. Each skylight unit may have a maximum area within the curb of 100 square feet (9.3 m²) for CC2 material and 200 square feet (18.6 m²) for CC1 material.

EXCEPTIONS: 1. The maximum area within the curb need not be limited if the building on which the skylights are located is not more than one story in height, the building has an exterior separation from other buildings of at least 30 feet (9144 mm), and the room or space sheltered by the roof is not classified in a Group 1, Division 1.1, 1.2 or 3 Occupancy or as a required means of egress.

EXCEPTIONS: 1. Serving as a fire venting system complying with this code; or

2. Used in a building completely equipped with an approved automatic sprinkler system complying with U.B.C. Standard 9-1 or 9-3.

5. The aggregate area of skylights installed in the roof shall not exceed 331/3 percent of the floor area of the room or space sheltered by the roof when CC1 materials are used and 25 percent when CC2 materials are used.

6. Skylight units shall be separated from each other by a distance of not less than 4 feet (1219 mm) measured in a horizontal plane.

EXCEPTIONS: 1. Except for Groups A, Divisions 1 and 2; I, Divisions 1.1, 1.2 and 2; and H, Divisions 1 and 2 Occupancies, the separation is not required where the skylights are:

1. Serving as a fire venting system complying with this code; or

2. Used in a building completely equipped with an approved automatic sprinkler system complying with U.B.C. Standard 9-1 or 9-3.

2. Multiple skylights located above the same room or space with a combined area not exceeding the limits set forth in Section 2603.7.1, Item 4.

7. Skylights shall not be installed within that portion of a roof located within a distance to property line or public way where openings in exterior walls are prohibited or required to be protected, whichever is most restrictive.

2603.7.2 Plastics over stair shafts. Approved plastic materials which will not automatically vent but which are able to be vented may be used over stairways and shafts, provided the installation conforms to the requirements of Section 2603.7.1.

2603.8 Light-diffusing Systems.

2603.8.1 General. Plastic diffusers in light-diffusing systems shall be supported directly or indirectly by the use of noncombustible hangers.

Light-transmitting plastic materials in light-diffusing systems shall comply with Chapter 8 unless the approved plastic used in the light-diffusing system meets the following requirements:

1. Diffusers shall fall from their mounting at an ambient temperature of at least 200°F. (93°C.) below the ignition temperature of the plastic material.

2. Diffusers shall remain in place at an ambient room temperature of 175°F. (79°C.) for a period of not less than 15 minutes.

3. The maximum length of any single plastic panel shall not exceed 10 feet (3048 mm), and the maximum area of any single plastic panel shall not exceed 30 square feet (2.8 m²).

4. The area of approved plastic materials when used in required exits as defined in Chapter 10 shall not exceed 30 percent of the aggregate area of the ceiling in which they are installed.
EXCEPTION: The aggregate area need not be limited in a building equipped with an approved automatic sprinkler system complying with U.B.C. Standard 9-1 or 9-3.

2603.8.2 Prohibited locations. Plastic light-diffusing system shall not be installed in the areas to be equipped with automatic sprinklers unless appropriate tests have shown that the system does not prevent effective operation of the sprinklers or unless sprinklers are located both above and below the light-diffusing system to give effective sprinkler protection.

2603.9 Diffusers in Electrical Fixtures. Use of approved plastics as light-diffuser panels installed in approved electrical lighting fixtures in or on walls or ceilings shall comply with Chapter 8 unless the plastic panels meet the requirements of Section 2603.8.1.

2603.10 Partitions. Approved light-transmitting plastics may be used in or as partitions, in accordance with the requirements of this code.

2603.11 Awnings and Patio Covers. Approved plastics may be used in awnings and patio covers. All such awnings shall be constructed in accordance with provisions specified in Section 3206 for projections and appendages. For patio covers, see Appendix Chapter 31.

2603.12 Greenhouses. Approved plastics may be used in lieu of plain glass in greenhouses.

2603.13 Canopies. Approved plastic panels may be installed in canopies erected over motor vehicle service station pumps, provided the panels are located at least 10 feet (3048 mm) from any building on the same property and face yards or streets not less than 40 feet (12 192 mm) in width on the other sides. The aggregate area of plastics shall not exceed 1,000 square feet (92.9 m²). The maximum area of any individual panel shall not exceed 100 square feet (9.3 m²).

2603.14 Solar Collectors. Solar collectors having noncombustible sides and bottoms may be equipped with plastic covers on buildings not over three stories in height or 9,000 square feet (836.1 m²) in total floor area, provided the plastic cover when exceeding a thickness of 0.010 inch (0.3 mm) shall be of approved plastic and the total area shall not exceed 33⅓ percent of the roof area for CC1 materials or 25 percent of the roof area for CC2 materials.

EXCEPTION: Plastic covers having a thickness of 0.010 inch (0.3 mm) or less may be of any plastic, provided the total area of the collectors does not exceed 33⅓ percent of the roof area.

SECTION 2604 — PLASTIC VENEER

When used within a building, plastic veneer shall comply with the interior finish requirements of Chapter 8. Exterior plastic veneer shall be of approved plastics materials as defined in Chapter 2 and shall comply with the following:

1. Plastic veneer shall not be attached to any exterior wall to a height greater than 50 feet (15 240 mm) above grade.

2. Sections of plastic veneer shall not exceed 300 square feet (27.9 m²) in area and shall be separated by a minimum of 4 feet (1219 mm) vertically.

EXCEPTION: The area and separation requirements and the smoke-density limitation are not applicable to plastic veneer applied to Type V-N buildings, provided the walls are not required to have a fire-resistive rating.
TABLE 26-A—AREA LIMITATION AND SEPARATION REQUIREMENTS FOR EXTERIOR WALL PANELS¹

<table>
<thead>
<tr>
<th>CLASS OF PLASTIC</th>
<th>MAXIMUM PERCENT AREA OF EXTERIOR WALLS IN PLASTIC PANELS</th>
<th>MAXIMUM SQUARE FEET SINGLE INDIVIDUAL PANELS × 0.093 for m²</th>
<th>MAXIMUM PANEL HEIGHT (feet) × 304.8 for mm</th>
<th>MINIMUM SEPARATION OF PANELS (feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CC1</td>
<td>25</td>
<td>100</td>
<td>16</td>
<td>6 Vertical</td>
</tr>
<tr>
<td>CC2</td>
<td>15</td>
<td>75</td>
<td>8</td>
<td>8 Horizontal</td>
</tr>
</tbody>
</table>

¹The maximum percent area of exterior walls limitation shall be based on the individual story wall area.
Chapter 27
ELECTRICAL SYSTEMS

SECTION 2701 — ELECTRICAL CODE

Electrical systems shall be in accordance with the Electrical Code. (See Section 206, Electrical Code.)
Chapter 28
MECHANICAL SYSTEMS

SECTION 2801 — MECHANICAL CODE
The installation and maintenance of heating, ventilating, product removal, cooling and refrigerating systems shall be in accordance with the Mechanical Code. (See Section 214, Mechanical Code.)

SECTION 2802 — REFRIGERATION SYSTEM MACHINERY ROOM
Refrigeration systems shall comply with the Mechanical Code. When a refrigeration machinery room is required, it shall be separated from the remainder of the building or located on the property as required for a Group H, Division 7 Occupancy, regardless of area. A horizontal occupancy separation may be limited to the actual floor area of the machinery room. Structural supporting elements shall be protected for the type of construction only and not the occupancy separation. Exits from the machinery room shall comply with Section 1020. Nothing contained herein shall be used to limit the height or area of the building or the machinery room. The refrigeration system, its refrigerant and its safety devices shall be maintained in accordance with the Fire Code.
Chapter 29
PLUMBING SYSTEMS

SECTION 2901 — PLUMBING CODE

Plumbing systems shall comply with the Plumbing Code.

SECTION 2902 — NUMBER OF FIXTURES

2902.1 General. The number of plumbing fixtures within a building shall not be less than set forth in Section 2902.

2902.2 Group A Occupancies. In Group A Occupancies at least one lavatory for each two water closets for each sex shall be provided at an approved location. At least one drinking fountain shall be provided at each floor level in an approved location.

EXCEPTION: A drinking fountain need not be provided in a drinking or dining establishment.

For other requirements on water closets, see Sections 807 and 2903 and Chapter 11 for access to water closets and drinking fountains.

2902.3 Groups B, F, H, M and S Occupancies. In Groups B, F, H, M and S Occupancies, buildings or portions thereof where persons are employed shall be provided with at least one water closet. Separate facilities shall be provided for each sex when the number of employees exceeds four. Such toilet facilities shall be located either in such building or conveniently in a building adjacent thereto on the same property.

Such water closet rooms in connection with food establishments where food is prepared, stored or served shall have a nonabsorbent interior finish as specified in Section 807.1, shall have hand-washing facilities therein or adjacent thereto, and shall be separated from food preparation or storage rooms as specified in Section 302.6.

For other requirements on water closets, see Section 2903.

2902.4 Group E Occupancies. Water closets shall be provided on the basis of the following ratio of water closets to the number of students:

<table>
<thead>
<tr>
<th>Boys</th>
<th>Girls</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elementary Schools</td>
<td>1:100</td>
</tr>
<tr>
<td>Secondary Schools</td>
<td>1:100</td>
</tr>
</tbody>
</table>

In addition, urinals shall be provided for boys on the basis of 1:30 in elementary and secondary schools.

There shall be provided at least one lavatory for each two water closets or urinals, and at least one drinking fountain on each floor for elementary and secondary schools.

For other requirements on water closets, see Sections 807 and 2903.

2902.5 Group I Occupancies. In Group I Occupancies, sanitation facilities for employees shall be provided as specified in Section 2902.3. Additional sanitation facilities shall be provided for other occupants when the facilities for employees are not accessible to such other occupants.

For other requirements on water closets, see Sections 807 and 2903.

2902.6 Group R Occupancies. Buildings classified as Group R Occupancies shall be provided with at least one water closet. Hotels or subdivisions thereof where both sexes are accommodated shall contain at least two separate toilet facilities which are conspicuously identified for male or female use, each of which contains at least one water closet.

1–365
EXCEPTION: Hotel guest rooms may have one unidentified toilet facility.

Additional water closets shall be provided on each floor for each sex at the rate of one for every additional 10 guests, or fractional part thereof, in excess of 10.

Dwelling units shall be provided with a kitchen equipped with a kitchen sink. Dwelling units, congregate residences and lodging houses shall be provided with a bathroom equipped with facilities consisting of a water closet, lavatory and either a bathtub or shower. Each sink, lavatory and either a bathtub or shower shall be equipped with hot and cold running water necessary for its normal operation.

For other requirements on water closets, see Sections 807 and 2903.

SECTION 2903 — ALTERNATE NUMBER OF FIXTURES
As an alternate to the minimum number of plumbing fixtures required by this chapter, see Appendix Chapter 29. When adopted, as set forth in Section 101.3, it will take precedence over the requirements of this chapter.

SECTION 2904 — ACCESS TO WATER CLOSET STOOL
The water closet stool in all occupancies shall be located in a clear space not less than 30 inches (762 mm) in width. The clear space in front of the water closet stool shall not be less than 24 inches (610 mm).

See Chapter 11 for requirements for water closets on floors required to be accessible to persons with disabilities.
Section 3001 — Scope

The provisions of this chapter shall apply to the design, construction, installation, operation, alteration and repair of elevators, dumbwaiters, escalators and moving walks and their hoistways.

Section 3002 — Elevator and Elevator Lobby Enclosures

Walls and partitions enclosing elevator and dumbwaiter hoistway shafts and escalator shafts shall not be of less than the fire-resistive construction required under Types of Construction in Chapter 6 of this code.

Elevator hoistway shaft enclosure walls not required to have a fire-resistive rating may be constructed with glass. Such glass shall be laminated glass that passes the test requirements of Part I of U.B.C. Standard 24-2.

Elevator lobbies shall have at least one exit. The use of such exit shall not require keys, tools or special knowledge or effort.

Section 3003 — Special Provisions

3003.1 Number of Cars in Hoistway. When there are three or fewer elevator cars in a building, they may be located within the same hoistway enclosure. When there are four elevator cars, they shall be divided in such a manner that at least two separate hoistway enclosures are provided. When there are more than four elevators, not more than four elevator cars may be located within a single hoistway enclosure.

3003.2 Smoke-detection Recall. When the elevator vertical travel is 25 feet (7620 mm) or more, each associated elevator lobby or entrance area and associated machine rooms shall be provided with an approved listed smoke detector for elevator recall purposes only. The detector may serve to close the elevator lobby door and additional doors at the hoistway opening allowed in Section 3006.

When the lobby or entrance area smoke detector, or machine room smoke detector is activated, elevator doors shall be prevented from opening and all cars serving that lobby or entrance area, or served by equipment in that machine room, shall return to the main floor where they shall be under manual control only. If the main floor or transfer floor lobby or entrance-area smoke detector is activated, all cars serving the main floor or transfer floor shall return to a location approved by the chief of the fire department and building official where they shall be under manual control only.

3003.3 Standby Power. Standby power when required by Section 403 shall be provided to at least one elevator in each bank. Standby power shall be manually transferable to all elevators in each bank. Standby power shall be provided by an approved self-contained generator set to operate automatically whenever there is a loss of electrical power to the building. The generator set shall be located in a separate room enclosed by at least a one-hour fire-resistive occupancy separation. The generator shall have a fuel supply adequate to operate the equipment connected to it for a minimum of two hours.

Exceptions: 1. Where a single elevator serves all floor levels in the building and is located so that all areas of the building can be reached within a travel distance of 300 feet (91.44 m) from the elevator, then only that elevator need be provided with standby power.

2. Standby power shall be capable of operating one elevator at a time in any bank or group of banks having a common lobby.
NOTE: A bank of elevators is a group of elevators or a single elevator controlled by a common operating system; that is, all those elevators which respond to a single call button constitute a bank of elevators. There is no limit on the number of cars which may be in a bank or group, but there may not be more than four cars within a common hoistway.

3003.4 Size of Cab and Control Locations.

3003.4.1 General. In buildings three or more stories in height served by an elevator or a building served by an elevator required by Chapter 11, at least one elevator serving all floors shall accommodate a wheelchair, in accordance with this section.

3003.4.2 Operation and leveling. The elevator shall be automatic and be provided with a self-leveling feature that will automatically bring the car to the floor landings within a tolerance of plus or minus \(\frac{1}{2}\) inch (13 mm) under normal loading and unloading conditions. This self-leveling shall, within its zone, be entirely automatic and independent of the operating device and shall correct the overtravel or undertravel. The car shall also be maintained approximately level with the landing, irrespective of load.

3003.4.3 Door operation. Power-operated horizontally sliding car and hoistway doors opened and closed by automatic means shall be provided.

3003.4.4 Door size. Minimum clear width for elevator doors shall be 36 inches (914 mm).

EXCEPTION: When approved by the building official, the minimum door width may be reduced to 32 inches (813 mm) for car with dimensions as permitted by the exception to Section 3003.4.7.

3003.4.5 Door protective and reopening device. Doors closed by automatic means shall be provided with a door-reopening device which will function to stop and reopen a car door and adjacent hoistway door in case the car door is obstructed while closing. This reopening device shall also be capable of sensing an object or person in the path of a closing door without requiring contact for activation at a nominal 5 inches and 29 inches (127 mm and 737 mm) above the floor.

Door-reopening devices shall remain effective for a period of not less than 20 seconds.

3003.4.6 Door delay (passenger service time).

3003.4.6.1 Hall call. The minimum acceptable time from notification that a car is answering a call (lantern and audible signal) until the doors of that car start to close shall be as indicated in the following table:

<table>
<thead>
<tr>
<th>DISTANCE, feet (mm)</th>
<th>TIME (seconds)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 to 5 (0 to 1524)</td>
<td>4</td>
</tr>
<tr>
<td>10 (3048)</td>
<td>7</td>
</tr>
<tr>
<td>15 (4572)</td>
<td>10</td>
</tr>
<tr>
<td>20 (6096)</td>
<td>13</td>
</tr>
</tbody>
</table>

The distance shall be established from a point in the center of the corridor or lobby [maximum 5 feet (1524 mm)] directly opposite the farthest hall button to the center line of the hoistway entrance.

3003.4.6.2 Car call. The minimum acceptable time for doors to remain fully open shall not be less than three seconds.

3003.4.7 Car inside. The car inside shall allow for the turning of a wheelchair. The minimum clear distance between walls or between wall and door, excluding return panels, shall not be less than 68 inches by 54 inches (1727 mm by 1372 mm). Minimum distance from wall to return panel shall not be less than 51 inches (1295 mm).

EXCEPTION: When approved by the building official, elevators provided in schools, institutions or other buildings may have a minimum clear distance between walls or between wall and door, excluding return panels, of not less than 54 inches by 54 inches (1372 mm by 1372 mm). Minimum distance from wall to return panel shall not be less than 51 inches (1295 mm).
3003.4.8 Car controls. Controls shall be readily accessible from a wheelchair upon entering an elevator.

The center line of the alarm button and emergency stop switch shall be at a nominal 35 inches (889 mm), and the highest floor button no higher than 54 inches (1372 mm) from the floor. Floor registration buttons, exclusive of border, shall be a minimum 3/4 inch (19 mm) in size, raised, flush or recessed. Visual indication shall be provided to show each call registered and extinguished when call is answered. Depth of flush or recessed buttons when operated shall not exceed 3/8 inch (10 mm).

Markings shall be adjacent to the controls on a contrasting color background to the left of the controls. Letters or numbers shall be a minimum of 5/8 inch (16 mm) high and raised or recessed 0.030 inch (0.8 mm).

Applied plates permanently attached shall be acceptable.

Emergency controls shall be grouped together at the bottom of the control panel.

Controls not essential to the automatic operation of the elevator may be located as convenient.

3003.4.9 Car position indicator and signal. A car position indicator shall be provided above the car operating panel or over the opening of each car to show the position of the car in the hoistway by illumination of the indication corresponding to the landing at which the car is stopped or passing.

Indications shall be on a contrasting color background and a minimum of 1/2 inch (13 mm) in height.

In addition, an audible signal shall sound to tell a passenger that the car is stopping or passing a floor served by the elevator.

A special button located with emergency controls may be provided. Operation of the button will activate an audible signal only for the desired trip.

3003.4.10 Telephone or intercommunicating system. A means of two-way communication shall be provided between the elevator and a point outside the hoistway.

If a telephone is provided, it shall be located a maximum of 54 inches (1372 mm) from the floor with a minimum cord length of 29 inches (737 mm). Markings or the international symbol for telephones shall be adjacent to the control on a contrasting color background. Letters or numbers shall be a minimum of 5/8 inch (16 mm) high and raised or recessed 0.030 inch (0.8 mm).

Applied plates permanently attached shall be acceptable.

3003.4.11 Floor covering. Floor covering shall have a nonslip hard surface which permits easy movement of wheelchairs.

If carpeting is used, it shall be securely attached, heavy duty, with a tight weave and low pile, installed without padding.

3003.4.12 Handrails. A handrail shall be provided on one wall of the car, preferably the rear. The rails shall be smooth and the inside surface at least 1 1/2 inches (38 mm) clear of the walls at a nominal height of 32 inches (813 mm) from the floor.

Nominal = ± 1 inch (25 mm).

NOTE: Thirty-two inches (813 mm) required to reduce interference with car controls where lowest button is centered at 35 inches (889 mm) above floor.

3003.4.13 Minimum illumination. The minimum illumination at the car controls and the landing when the car and landing doors are open shall not be less than 5 footcandles (54 lx).

3003.4.14 Hall buttons. The center line of the hall call buttons shall be a nominal 42 inches (1067 mm) above the floor.

Direction buttons, exclusive of border, shall be a minimum of 3/4 inch (19 mm) in size, raised, flush or recessed. Visual indication shall be provided to show each call registered and extinguished.
when the call is answered. Depth of flush or recessed button when operated shall not exceed \( \frac{3}{8} \) inch (10 mm).

### 3003.4.15 Hall lantern

A visual and audible signal shall be provided at each hoistway entrance indicating to the prospective passenger the car answering the call and its direction of travel.

The visual signal for each direction shall be a minimum of \( 2\frac{1}{2} \) inches (64 mm) in size and visible from the proximity of the hall call button.

The audible signal shall sound once for the up direction and twice for the down direction.

The center line of the fixture shall be located a minimum of 6 feet (1829 mm) from the floor.

The use of in-car lanterns conforming to above and located in jamb shall be acceptable.

### 3003.4.16 Doorjamb marking

The floor designation shall be provided at each hoistway entrance on both sides of jamb visible from within the car and the elevator lobby at a height of 60 inches (1524 mm) above the floor. Designations shall be on a contrasting background 2 inches (51 mm) high and raised 0.030 inch (0.8 mm).

Applied plates permanently attached shall be acceptable.

### 3003.5 Stretcher Requirements

In all structures four or more stories in height, at least one elevator shall be provided with a minimum clear distance between walls or between walls and door excluding return panels, not less than 80 inches by 54 inches (2032 mm by 1372 mm), and a minimum distance from wall to return panel not less than 51 inches (1295 mm) with a 42-inch (1067 mm) side slide door, unless otherwise designed to accommodate an ambulance-type stretcher 76 inches (1930 mm) by 24 inches (610 mm) in the horizontal position.

In buildings where one elevator does not serve all floors, two or more elevators may be used. The elevators shall be identified by the international symbol for emergency medical services (Star of Life). The symbol shall not be less than 3 inches (76 mm) and placed inside on both sides of the hoistway door frame. The symbol shall be placed no lower than 78 inches (1981 mm) from the floor level or higher than 84 inches (2134 mm) from floor level.

### 3003.6 Emergency Signs

Except at the main entrance level, an approved pictorial sign of a standardized design shall be posted adjacent to each elevator call station which will indicate that, in case of fire, the elevator will not operate and that exit stairways should be used.

### 3003.7 Restricted or Limited-use Elevators

The building official may waive the requirements of this section for any elevator designed for limited or restricted use serving only specific floors or a specific function.

### SECTION 3004 — HOISTWAY VENTING

Shafts (hoistways) housing elevators extending through more than two floor levels shall be vented to the outside. The area of the vent shall not be less than \( 3\frac{1}{2} \) percent of the area of the elevator shaft, provided a minimum of 3 square feet (0.279 m\(^2\)) per elevator is provided. Vents shall be capable of manual operation only.

The venting of each individual hoistway shall be independent from any other hoistway venting, and the interconnection of separate hoistways for the purpose of venting is prohibited.

### SECTION 3005 — ELEVATOR MACHINE ROOM

### 3005.1 Operation Solid-state Equipment

When solid-state equipment is used to operate the elevators, the elevator equipment room shall be provided with an independent ventilation or air-conditioning system to prevent the overheating of the electrical equipment. The operating temperature shall be established by the elevator equipment manufacturer's specification. When standby
power is connected to elevators, the machine room ventilation or air conditioning shall be con­
nected to standby.

3005.2 Detection. The elevator machine room serving a pressurized elevator hoistway shall be
pressurized upon activation of a heat or smoke detector located in the elevator machine room. See
Section 905, Smoke Control.

SECTION 3006 — CHANGE IN USE
Any change in use of an elevator, freight to passenger, passenger to freight or from one freight class
to another shall not be made without the approval of the building official. Said approval shall be
granted only after it is demonstrated that the installation conforms to the requirements in the Eleva­
tor Code.

SECTION 3007 — ADDITIONAL DOORS
Doors other than the hoistway door and the elevator car door shall be prohibited at the point of ac­
cess to an elevator car.

   EXCEPTION: Doors which are readily openable from the car side without a key, tool, or special knowl­
   edge or effort.
Chapter 31
SPECIAL CONSTRUCTION

SECTION 3101 — SCOPE
The provisions of this chapter shall apply to special construction described herein.

SECTION 3102 — CHIMNEYS, FIREPLACES AND BARBECUES

3102.1 Scope. Chimneys, flues, fireplaces and barbecues, and their connections, carrying products of combustion shall conform to the requirements of this section.

3102.2 Definitions.

BARBECUE is a stationary open hearth or brazier, either fuel fired or electric, used for food preparation.

CHIMNEY is a hollow shaft containing one or more passageways, vertical or nearly so, for conveying products of combustion to the outside atmosphere.

CHIMNEY CLASSIFICATIONS:

Chimney, High-heat Industrial Appliance-type, is a factory-built, masonry or metal chimney suitable for removing the products of combustion from fuel-burning high-heat appliances producing combustion gases in excess of 2,000°F. (1093°C.) measured at the appliance flue outlet.

Chimney, Low-heat Industrial Appliance-type, is a factory-built, masonry or metal chimney suitable for removing the products of combustion from fuel-burning low-heat appliances producing combustion gases not in excess of 1,000°F. (538°C.) under normal operating conditions but capable of producing combustion gases of 1,400°F. (760°C.) during intermittent forced firing for periods up to one hour. All temperatures are measured at the appliance flue outlet.

Chimney, Medium-heat Industrial Appliance-type, is a factory-built, masonry or metal chimney suitable for removing the products of combustion from fuel-burning medium-heat appliances producing combustion gases not in excess of 2,000°F. (1093°C.) measured at the appliance flue outlet.

Chimney, Residential Appliance-type, is a factory-built or masonry chimney suitable for removing products of combustion from residential-type appliances producing combustion gases not in excess of 1,000°F. (538°C.) measured at the appliance flue outlet.

CHIMNEY CONNECTOR is the pipe or breeching which connects a fuel-burning appliance to a chimney. (See Chapter 9, Mechanical Code.)

CHIMNEY, FACTORY-BUILT, is a chimney manufactured at a location other than the building site and composed of listed factory-built components assembled in accordance with the terms of the listing to form the completed chimney.

CHIMNEY LINER is a lining material of fireclay tile or approved fireclay refractory brick. For a recognized standard on fireclay refractory brick see Sections 3502 and 3503, ASTM C 27, Fireclay Refractories.

FIREBRICK is a refractory brick.

FIREPLACE is a hearth and fire chamber or similar prepared place in which a fire may be made and which is built in conjunction with a chimney.

Factory-built Fireplace is a listed assembly of a fire chamber, its chimney and related factory-made parts designed for unit assembly without requiring field construction. Factory-built fireplaces are not dependent on mortar-filled joints for continued safe use.
Masonry Fireplace is a hearth and fire chamber of solid masonry units such as bricks, stones, masonry units, or reinforced concrete provided with a suitable chimney.

MASONRY CHIMNEY is a chimney of masonry units, bricks, stones or listed masonry chimney units lined with approved flue liners. For the purpose of this chapter, masonry chimneys shall include reinforced concrete chimneys.

3102.3 Chimneys, General.

3102.3.1 Chimney support. Chimneys shall be designed, anchored, supported and reinforced as required in this chapter and applicable provisions of Chapters 16, 18, 19, 21 and 22 of this code. A chimney shall not support any structural load other than its own weight unless designed as a supporting member.

3102.3.2 Construction. Each chimney shall be so constructed as to safely convey flue gases not exceeding the maximum temperatures for the type of construction as set forth in Table 31-B and shall be capable of producing a draft at the appliance not less than that required for safe operation.

3102.3.3 Clearance. Clearance to combustible material shall be as required by Table 31-B.

3102.3.4 Lining. When required by Table 31-B, chimneys shall be lined with fireclay flue tile, firebrick, molded refractory units or other approved lining not less than \( \frac{5}{8} \text{ inch} \) (15.9 mm) thick as set forth in Table 31-B. Chimney liners shall be carefully bedded in approved mortar with close-fitting joints left smooth on the inside.

3102.3.5 Area. Chimney passageways shall not be smaller in area than the vent connection on the appliance attached thereto or not less than that set forth in Table 31-A, unless engineering methods approved by the building official have been used to design the system.

3102.3.6 Height and termination. Every chimney shall extend above the roof and the highest elevation of any part of a building as shown in Table 31-B. For altitudes over 2,000 feet (610 m), the building official shall be consulted in determining the height of the chimney.

3102.3.7 Cleanouts. Cleanout openings shall be provided within 6 inches (152 mm) of the base of every masonry chimney.

3102.3.8 Spark arrester. Where determined necessary by the building official due to local climatic conditions or where sparks escaping from the chimney would create a hazard, chimneys attached to any appliance or fireplace that burns solid fuel shall be equipped with an approved spark arrester. The net free area of the spark arrester shall not be less than four times the net free area of the outlet of the chimney. The spark arrester screen shall have heat and corrosion resistance equivalent to \( 0.109 \text{ inch} \) (2.77 mm) (No. 12 B.W. gage) wire, 0.042 inch (1.07 mm) (No. 19 B.W. gage) galvanized wire or 0.022 inch (0.56 mm) (No. 24 B.W. gage) stainless steel. Openings shall not permit the passage of spheres having a diameter larger than \( \frac{1}{2} \text{ inch} \) (12.7 mm) and shall not block the passage of spheres having a diameter of less than \( \frac{5}{8} \text{ inch} \) (9.5 mm).

Chimneys used with fireplaces or heating appliances in which solid or liquid fuel is used shall be provided with a spark arrester as required in the Fire Code.

EXCEPTION: Chimneys which are located more than 200 feet (60 960 mm) from any mountainous, brush-covered or forest-covered land or land covered with flammable material and are not attached to a structure having less than a Class C roof covering, as set forth in Chapter 15.

3102.4 Masonry Chimneys.

3102.4.1 Design. Masonry chimneys shall be designed and constructed to comply with Sections 3102.3.2 and 3102.4.2.

3102.4.2 Walls. Walls of masonry chimneys shall be constructed as set forth in Table 31-B.

3102.4.3 Reinforcing and seismic anchorage. Unless a specific design is provided, every masonry or concrete chimney in Seismic Zones 2, 3 and 4 shall be reinforced with not less than four
No. 4 steel reinforcing bars conforming to the provisions of Chapter 19 or 21 of this code. The bars shall extend the full height of the chimney and shall be spliced in accordance with the applicable requirements of Chapter 19 or 21. In masonry chimneys the vertical bars shall have a minimum cover of 1/2 inch (13 mm) of grout or mortar tempered to a pouring consistency. The bars shall be tied horizontally at 18-inch (457 mm) intervals with not less than 1/4-inch-diameter (6.4 mm) steel ties. The slope of the inclined portion of the offset in vertical bars shall not exceed 2 units vertical in 1 unit horizontal (200% slope). Two ties shall also be placed at each bend in vertical bars. Where the width of the chimney exceeds 40 inches (1016 mm), two additional No. 4 vertical bars shall be provided for each additional flue incorporated in the chimney or for each additional 40 inches (1016 mm) in width or fraction thereof.

In Seismic Zones 2, 3 and 4, all masonry and concrete chimneys shall be anchored at each floor or ceiling line more than 6 feet (1829 mm) above grade, except when constructed completely within the exterior walls of the building. Anchorage shall consist of two 3/16-inch by 1-inch (4.8 mm by 25 mm) steel straps cast at least 12 inches (305 mm) into the chimney with a 180-degree bend with a 6-inch (152 mm) extension around the vertical reinforcing bars in the outer face of the chimney. Each strap shall be fastened to the structural framework of the building with two 1/2-inch-diameter (12.7 mm) bolts per strap. Where the joists do not head into the chimney, the anchor strap shall be connected to 2-inch by 4-inch (51 mm by 102 mm) ties crossing a minimum of four joists. The ties shall be connected to each joist with two 16d nails. As an alternative to the 2-inch by 4-inch (51 mm by 102 mm) ties, each anchor strap shall be connected to the structural framework by two 1/2-inch-diameter (12.7 mm) bolts in an approved manner.

3102.4.4 Chimney offset. Masonry chimneys may be offset at a slope of not more than 4 inches in 24 inches (102 mm in 610 mm), but not more than one third of the dimension of the chimney, in the direction of the offset. The slope of the transition from the fireplace to the chimney shall not exceed 2 units vertical in 1 unit horizontal (200% slope).

3102.4.5 Change in size or shape. Changes in the size or shape of a masonry chimney, where the chimney passes through the roof, shall not be made within a distance of 6 inches (152 mm) above or below the roof joists or rafters.

3102.4.6 Separation of masonry chimney passageways. Two or more flues in a chimney shall be separated by masonry not less than 4 inches (102 mm) thick bonded into the masonry wall of the chimney.

3102.4.7 Inlets. Every inlet to any masonry chimney shall enter the side thereof and shall be of not less than 1/8-inch-thick (3.2 mm) metal or 1/8-inch-thick (16 mm) refractory material. Where there is no other opening below the inlet other than the cleanout, a masonry plug shall be constructed in the chimney not more than 16 inches (406 mm) below the inlet and the cleanout shall be located where it is accessible above the plug. If the plug is located less than 6 inches (152 mm) below the inlet, the inlet may serve as the cleanout.

3102.5 Factory-built Chimneys and Fireplaces.

3102.5.1 General. Factory-built chimneys and factory-built fireplaces shall be listed and shall be installed in accordance with the terms of their listings and the manufacturer's instructions as specified in the Mechanical Code.

3102.5.2 Hearth extensions. Hearth extensions of listed factory-built fireplaces shall conform to the conditions of listing and the manufacturer's installation instructions.

3102.5.3 Multiple venting in vertical shafts. Factory-built chimneys utilized with listed factory-built fireplaces may be used in a common vertical shaft having the required fire-resistance rating.

3102.6 Metal Chimneys. Metal chimneys shall be constructed and installed to meet the requirements of the Mechanical Code.
Metal chimneys shall be anchored at each floor and roof with two 1 1/2-inch by 1/8-inch (38 mm by 3.2 mm) metal straps looped around the outside of the chimney installation and nailed with not less than six 8d nails per strap at each joist.

3102.7 Masonry and Concrete Fireplaces and Barbecues.

3102.7.1 General. Masonry fireplaces, barbecues, smoke chambers and fireplace chimneys shall be of masonry or reinforced concrete and shall conform to the requirements of this section.

3102.7.2 Support. Masonry fireplaces shall be supported on foundations designed as specified in Chapters 16, 18 and 21.

When an approved design is not provided, foundations for masonry and concrete fireplaces shall not be less than 12 inches (305 mm) thick, extend not less than 6 inches (152 mm) outside the fireplace wall and project below the natural ground surface in accordance with the depth of foundations set forth in Table 18-I-D.

3102.7.3 Fireplace walls. Masonry walls of fireplaces shall not be less than 8 inches (203 mm) in thickness. Walls of fireboxes shall not be less than 10 inches (254 mm) in thickness, except that where a lining of firebrick is used, such walls shall not be less than a total of 8 inches (203 mm) in thickness. The firebox shall not be less than 20 inches (508 mm) in depth. Joints in firebrick shall not exceed 1/4 inch (6 mm).

**EXCEPTION:** For Rumford fireplaces, the depth may be reduced to 12 inches (305 mm) when:
1. The depth is at least one third the width of the fireplace opening.
2. The throat is at least 12 inches (305 mm) above the lintel and is at least 1/20 of the cross-sectional area of the fireplace opening.

3102.7.4 Hoods. Metal hoods used as part of a fireplace or barbecue shall not be less than 0.036 inch (0.92 mm) (No. 19 carbon sheet steel gage) copper, galvanized steel or other equivalent corrosion-resistant ferrous metal with all seams and connections of smokeproof unsoldered constructions. The hoods shall be sloped at an angle of 45 degrees or less from the vertical and shall extend horizontally at least 6 inches (152 mm) beyond the limits of the firebox. Metal hoods shall be kept a minimum of 18 inches (457 mm) from combustible materials unless approved for reduced clearances.

3102.7.5 Metal heat circulators. Approved metal heat circulators may be installed in fireplaces.

3102.7.6 Smoke chamber. Front and side walls shall not be less than 8 inches (203 mm) in thickness. Smoke chamber back walls shall not be less than 6 inches (152 mm) in thickness.

3102.7.7 Chimneys. Chimneys for fireplaces shall be constructed as specified in Sections 3102.3, 3102.4 and 3102.5 for residential-type appliances.

3102.7.8 Clearance to combustible material. Combustible materials shall not be placed within 2 inches (51 mm) of fireplace, smoke chamber or chimney walls. Combustible material shall not be placed within 6 inches (152 mm) of the fireplace opening. No such combustible material within 12 inches (305 mm) of the fireplace opening shall project more than 1/8 inch (3 mm) for each 1-inch (25 mm) clearance from such opening.

No part of metal hoods used as part of a fireplace or barbecue shall be less than 18 inches (457 mm) from combustible material. This clearance may be reduced to the minimum requirements specified in the Mechanical Code.

3102.7.9 Areas of flues, throats and dampers. The net cross-sectional area of the flue and of the throat between the firebox and the smoke chamber of a fireplace shall not be less than as set forth in Table 31-A. Metal dampers equivalent to not less than 0.097 inch (2.46 mm) (No. 12 carbon sheet metal gage) steel shall be installed. When fully opened, damper openings shall not be less than 90 percent of the required flue area.
3102.7.10 Lintel. Masonry over the fireplace opening shall be supported by a noncombustible lintel.

3102.7.11 Hearth. Masonry fireplaces shall be provided with a brick, concrete, stone or other approved noncombustible hearth slab. This slab shall not be less than 4 inches (102 mm) thick and shall be supported by noncombustible materials or reinforced to carry its own weight and all imposed loads. Combustible forms and centering shall be removed.

3102.7.12 Hearth extensions. Hearths shall extend at least 16 inches (406 mm) from the front of, and at least 8 inches (203 mm) beyond each side of, the fireplace opening. Where the fireplace opening is 6 square feet (0.56 m²) or larger, the hearth extension shall extend at least 20 inches (508 mm) in front of, and at least 12 inches (305 mm) beyond each side of, the fireplace opening.

Except for fireplaces which open to the exterior of the building, the hearth slab shall be readily distinguishable from the surrounding or adjacent floor.

3102.7.13 Fire blocking. Fire blocking between chimneys and combustible construction shall meet the requirements specified in Section 708.

SECTION 3103 — TEMPORARY BUILDINGS OR STRUCTURES

Temporary buildings or structures such as reviewing stands and other miscellaneous structures, sheds, canopies or fences used for the protection of the public around and in conjunction with construction work may be erected by special permit from the building official for a limited period of time. Such buildings or structures need not comply with the type of construction or fire-resistive time periods required by this code. Temporary buildings or structures shall be completely removed upon the expiration of the time limit stated in the permit.

TABLE 31-A—MINIMUM PASSAGEWAY AREAS FOR MASONRY CHIMNEYS

<table>
<thead>
<tr>
<th>Type of Masonry Chimney</th>
<th>Minimum Cross-Sectional Area (mm²)</th>
<th>Liner with Firebrick or Unlined</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>× 645 for mm²</td>
<td></td>
</tr>
<tr>
<td>Tile Lined</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Round</td>
<td>50 sq. in.</td>
<td>50 sq. in.</td>
</tr>
<tr>
<td>Square or Rectangle</td>
<td>50 sq. in.</td>
<td></td>
</tr>
<tr>
<td>1. Residential</td>
<td>85 sq. in.</td>
<td></td>
</tr>
<tr>
<td>2. Fireplace</td>
<td>1/12 of opening Minimum 50 sq. in.</td>
<td>1/10 of opening Minimum 64 sq. in.</td>
</tr>
<tr>
<td></td>
<td>1/10 of opening Minimum 64 sq. in.</td>
<td></td>
</tr>
<tr>
<td>3. Low heat</td>
<td>135 sq. in.</td>
<td></td>
</tr>
<tr>
<td>4. Incinerator</td>
<td>196 sq. in.</td>
<td>N/A</td>
</tr>
<tr>
<td>Apartment type</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 opening</td>
<td>324 sq. in.</td>
<td></td>
</tr>
<tr>
<td>2 to 6 openings</td>
<td>484 sq. in.</td>
<td></td>
</tr>
<tr>
<td>6 or more openings</td>
<td>484 sq. in. plus 10 sq. in.</td>
<td></td>
</tr>
</tbody>
</table>

1 Areas for medium- and high-heat chimneys shall be determined using accepted engineering methods and as approved by the building official.
2 Where fireplaces open on more than one side, the fireplace opening shall be measured along the greatest dimension.

NOTE: For altitudes over 2,000 feet (610 m) above sea level, the building official shall be consulted in determining the area of the passageway.
### TABLE 31-B—CONSTRUCTION, CLEARANCE AND TERMINATION REQUIREMENTS FOR MASONRY AND CONCRETE CHIMNEYS

<table>
<thead>
<tr>
<th>CHIMNEYS SERVING</th>
<th>THICKNESS (min. inches)</th>
<th>HEIGHT ABOVE ANY PART OF BUILDING WITHIN (feet)</th>
<th>CLEARANCE TO COMBUSTIBLE CONSTRUCTION (inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>× 25.4 for mm</td>
<td>× 304.8 for mm</td>
<td>10</td>
</tr>
<tr>
<td>Walls Lining</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. RESIDENTIAL-TYPE APPLIANCES&lt;sup&gt;1,2&lt;/sup&gt; (Low Btu input)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clay, shale or concrete brick</td>
<td>43</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Reinforced concrete</td>
<td>43</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Hollow masonry units</td>
<td>44</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Stone</td>
<td>12</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Unburned clay units</td>
<td>8</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>5/8 fire-clay tile or 2 firebrick</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. BUILDING HEATING AND INDUSTRIAL-TYPE LOW-HEAT APPLIANCES&lt;sup&gt;1,2&lt;/sup&gt; [1,000°F. (538°C.) operating temp.—1,400°F. (760°C.) maximum]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clay, shale or concrete brick</td>
<td>8</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Hollow masonry units</td>
<td>8</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Reinforced concrete</td>
<td>8</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Stone</td>
<td>12</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>5/8 fire-clay tile or 2 firebrick</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. MEDIUM-HEAT INDUSTRIAL-TYPE APPLIANCES&lt;sup&gt;1,6&lt;/sup&gt; [2,000°F. (1093°C.) maximum]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clay, shale or concrete brick</td>
<td>8</td>
<td></td>
<td>10</td>
</tr>
<tr>
<td>Hollow masonry units (Grouted solid)</td>
<td>8</td>
<td></td>
<td>10</td>
</tr>
<tr>
<td>Reinforced concrete</td>
<td>8</td>
<td></td>
<td>10</td>
</tr>
<tr>
<td>Stone</td>
<td>12</td>
<td></td>
<td>10</td>
</tr>
<tr>
<td>4 1/2 medium-duty firebrick</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. HIGH-HEAT INDUSTRIAL-TYPE APPLIANCES&lt;sup&gt;1,6&lt;/sup&gt; [Over 2,000°F. (1093°C.)]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clay, shale or concrete brick</td>
<td>167</td>
<td></td>
<td>20</td>
</tr>
<tr>
<td>Hollow masonry units (Grouted solid)</td>
<td>167</td>
<td></td>
<td>20</td>
</tr>
<tr>
<td>Reinforced concrete</td>
<td>167</td>
<td></td>
<td>20</td>
</tr>
<tr>
<td>4 1/2 high-duty firebrick</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. RESIDENTIAL-TYPE INCINERATORS</td>
<td>Same as for residential-type appliances as shown above.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(Continued)
<table>
<thead>
<tr>
<th></th>
<th>4½ medium-duty firebrick 7/8 fire-clay tile liner</th>
<th>3</th>
<th>2</th>
<th>2</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>6. CHUTE-FED AND FLUE-FED INCINERATORS WITH</strong></td>
<td><strong>TABLE 31-B—CONSTRUCTION, CLEARANCE AND TERMINATION REQUIREMENTS FOR MASONRY AND CONCRETE CHIMNEYS</strong> (Continued) <strong>COMBINED HEARTH AND GRATE AREA 7 SQ. FT.</strong> (0.65 m²) OR LESS</td>
<td>Clay, shale or concrete brick or hollow units</td>
<td>4</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td><strong>Portion extending to 10 ft. (3048 mm) above combustion chamber roof</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Portion more than 10 ft. (3048 mm) above combustion chamber roof</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Chimneys having walls 8 inches (203 mm) or more in thickness may be unlined.</strong></td>
<td><strong>Equivalent thickness including grouted cells when grouted solid. The equivalent thickness may also include the grout thickness between the liner and masonry unit.</strong></td>
<td><strong>Chimneys for residential-type appliances installed entirely on the exterior of the building. For fireplace and barbecue chimneys, see Section 3102.7.8.</strong></td>
<td><strong>Lining to extend from 24 inches (610 mm) below connector to 25 feet (7620 mm) above.</strong></td>
<td><strong>Two 8-inch (203 mm) walls with 2-inch (51 mm) airspace between walls. Outer and inner walls may be of solid masonry units or reinforced concrete or any combination thereof.</strong></td>
<td><strong>Clearance shall be approved by the building official and shall be such that the temperature of combustible materials will not exceed 160°F. (71°C.).</strong></td>
</tr>
<tr>
<td><strong>7. CHUTE-FED AND FLUE-FED INCINERATORS—COMBINED HEARTH AND GRATE AREAS LARGER THAN 7 SQ. FT.</strong> (0.65 m²)</td>
<td>Clay, shale or concrete brick or hollow units grouted solid or reinforced concrete</td>
<td>4</td>
<td>8</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td><strong>Portion extending to 40 ft. (12 192 mm) above combustion chamber roof</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Portion more than 40 ft. (12 192 mm) above combustion chamber roof</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Reinforced concrete</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>8. COMMERCIAL OR INDUSTRIAL-TYPE INCINERATORS</strong></td>
<td>Clay or shale solid brick</td>
<td>8</td>
<td>8</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td><strong>Reinforced concrete</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Chapter 32
CONSTRUCTION IN THE PUBLIC RIGHT OF WAY

SECTION 3201 — GENERAL
No part of any structure or any appendage thereto, except signs, shall project beyond the property line of the building site, except as specified in this chapter.

Structures or appendages regulated by this code shall be constructed of materials as specified in Section 705.

The projection of any structure or appendage shall be the distance measured horizontally from the property line to the outermost point of the projection.

Nothing in this code shall prohibit the construction and use of a structure between buildings and over or under a public way, provided the structure complies with all requirements of this code.

No provisions of this chapter shall be construed to permit the violation of other laws or ordinances regulating the use and occupancy of public property.

SECTION 3202 — PROJECTION INTO ALLEYS
No part of any structure or any appendage thereto shall project into any alley.

EXCEPTIONS: 1. A curb or buffer block may project not more than 9 inches (229 mm) and not exceed a height of 9 inches (229 mm) above grade.
2. Footings located at least 8 feet (2438 mm) below grade may project not more than 12 inches (305 mm).

SECTION 3203 — SPACE BELOW SIDEWALK
The space adjoining a building below a sidewalk on public property may be used and occupied in connection with the building for any purpose not inconsistent with this code or other laws or ordinances regulating the use and occupancy of such spaces on condition that the right to so use and occupy may be revoked by the city at any time and that the owner of the building will construct the necessary walls and footings to separate such space from the building and pay all costs and expenses attendant therewith.

Footings located at least 8 feet (2438 mm) below grade may project not more than 12 inches (305 mm).

SECTION 3204 — BALCONIES, SUN-CONTROL DEVICES AND APPENDAGES
Oriel windows, balconies, sun-control devices, unroofed porches, cornices, belt courses and appendages such as water tables, sills, capitals, bases and architectural projections may project over the public property of the building site a distance as determined by the clearance of the lowest point of the projection above the grade immediately below, as follows:

Clearance above grade less than 8 feet (2438 mm)—no projection is permitted.

Clearance above grade over 8 feet (2438 mm)—1 inch (25 mm) of projection is permitted for each additional inch of clearance, provided that no such projection shall exceed a distance of 4 feet (1219 mm).

SECTION 3205 — MARQUEES
3205.1 General. For the purpose of this section a marquee shall include any object or decoration attached to or a part of said marquee.
3205.2 **Projection and Clearance.** The horizontal clearance between a marquee and the curb line shall not be less than 2 feet (610 mm).

A marquee projecting more than two thirds of the distance from the property line to the curb line shall not be less than 12 feet (3658 mm) above the ground or pavement below.

A marquee projecting less than two thirds of the distance from the property line to the curb line shall not be less than 8 feet (2438 mm) above the ground or pavement below.

3205.3 **Length.** A marquee projecting more than two thirds of the distance from the property line to the curb line shall not exceed 25 feet (7620 mm) in length along the direction of the street.

3205.4 **Thickness.** The maximum height or thickness of a marquee measured vertically from its lowest to its highest point shall not exceed 3 feet (914 mm) when the marquee projects more than two thirds of the distance from the property line to the curb line and shall not exceed 9 feet (2743 mm) when the marquee is less than two thirds of the distance from the property line to the curb line.

3205.5 **Construction.** A marquee shall be supported entirely by the building and constructed of noncombustible material or, when supported by a building of Type V construction, may be of one-hour fire-resistive construction.

3205.6 **Roof Construction.** The roof or any part thereof may be a skylight, provided glass skylights are of laminated or wired glass complying with Section 2409. Plastic skylights shall comply with Section 2603.7.

Every roof and skylight of a marquee shall be sloped to downspouts which shall conduct any drainage from the marquee under the sidewalk to the curb.

3205.7 **Location Prohibited.** Every marquee shall be so located as not to interfere with the operation of any exterior standpipe or to obstruct the clear passage of stairways or exits from the building or the installation or maintenance of electroliers.

**SECTION 3206 — AWNINGS**

3206.1 **Definition.** For the purpose of this section:

**AWNING** is a shelter supported entirely from the exterior wall of a building.

3206.2 **Construction.** Awnings shall have noncombustible frames but may have combustible coverings. Awnings shall be either fixed, retractable, folding or collapsible. Awnings in any configuration shall not obstruct the use of a required exit.

3206.3 **Projection.** Awnings may extend over public property not more than 7 feet (2134 mm) from the face of a supporting building, but no portion shall extend nearer than 2 feet (610 mm) to the face of the nearest curb line measured horizontally. In no case shall the awning extend over public property greater than two thirds of the distance from the property line to the nearest curb in front of the building site.

3206.4 **Clearances.** All portions of any awning shall be at least 8 feet (2438 mm) above any public walkway.

**EXCEPTION:** Any valance attached to an awning shall not project above the roof of the awning at the point of attachment and shall not extend more than 12 inches (305 mm) below the roof of the awning at the point of attachment, but in no case shall any portion of a valance be less than 7 feet (2134 mm) in height above a public way.

**SECTION 3207 — DOORS**

Power-operated doors and their guide rails shall not project over public property. Other doors, either fully opened or when opening, shall not project more than 1 foot (305 mm) beyond the property line, except that in alleys no projection beyond the property line is permitted.
Chapter 33

SITE WORK, DEMOLITION AND CONSTRUCTION

SECTION 3301 — EXCAVATIONS AND FILLS

3301.1 General. Excavation or fills for buildings or structures shall be so constructed or protected that they do not endanger life or property.

Slopes for permanent fills shall not be steeper than 1 unit vertical in 2 units horizontal (50% slope). Cut slopes for permanent excavations shall not be steeper than 1 unit vertical in 2 units horizontal (50% slope) unless substantiating data justifying steeper cut slopes are submitted. Deviation from the foregoing limitations for cut slopes shall be permitted only upon the presentation of a soil investigation report acceptable to the building official.

No fill or other surcharge loads shall be placed adjacent to any building or structure unless such building or structure is capable of withstanding the additional loads caused by the fill or surcharge.

Existing footings or foundations which may be affected by any excavation shall be underpinned adequately or otherwise protected against settlement and shall be protected against lateral movement.

For footings on adjacent slopes see, Section 1806.4.

Fills to be used to support the foundations of any building or structure shall be placed in accordance with accepted engineering practice. A soil investigation report and a report of satisfactory placement of fill, both acceptable to the building official, shall be submitted.

Where applicable (see Section 101.3), see Appendix Chapter 33 for excavation and grading.

3301.2 Protection of Adjoining Property. The requirements for protection of adjoining property and depth to which protection is required shall be as defined by prevailing law. Where not defined by law, the following shall apply: Any person making or causing an excavation to be made to a depth of 12 feet (3658 mm) or less below the grade shall protect the excavation so that the soil of adjoining property will not cave in or settle, but shall not be liable for the expense of underpinning or extending the foundation of buildings on adjoining properties when the excavation is not in excess of 12 feet (3658 mm) in depth. Before commencing the excavation, the person making or causing the excavation to be made shall notify in writing the owners of adjoining buildings not less than 10 days before such excavation is to be made that the excavation is to be made and that the adjoining buildings should be protected.

The owners of the adjoining properties shall be given access to the excavation for the purpose of protecting such adjoining buildings.

Any person making or causing an excavation to be made exceeding 12 feet (3658 mm) in depth below the grade shall protect the excavation so that the adjoining soil will not cave in or settle and shall extend the foundation of any adjoining buildings below the depth of 12 feet (3658 mm) below grade at the expense of the person causing or making the excavation. The owner of the adjoining buildings shall extend the foundation of these buildings to a depth of 12 feet (3658 mm) below grade at such owner’s expense, as provided in the preceding paragraph.

SECTION 3302 — PREPARATION OF BUILDING SITE

All stumps and roots shall be removed from the soil to a depth of at least 12 inches (305 mm) below the surface of the ground in the area to be occupied by the building.

All wood forms which have been used in placing concrete, if within the ground or between foundation sills and the ground, shall be removed before a building is occupied or used for any purpose. Before completion, loose or casual wood shall be removed from direct contact with the ground under the building.
SECTION 3303 — PROTECTION OF PEDESTRIANS DURING CONSTRUCTION OR DEMOLITION

3303.1 General. No person shall use or occupy a street, alley or public sidewalk for the performance of work under a building permit except in accordance with the provisions of this chapter.

No person shall perform any work on any building or structure adjacent to a public way in general use by the public for pedestrian travel, unless the pedestrians are protected as specified in this chapter.

Any material or structure temporarily occupying public property, including fences and walkways, shall be adequately lighted between sunset and sunrise.

For additional requirements for temporary buildings or structures, see Section 3103.

3303.2 Temporary Use of Streets and Alleys. The use of public property shall meet the requirements of the public agency having jurisdiction. Whenever requested, plot plans and construction details shall be submitted for review by the agencies concerned.

3303.3 Storage on Public Property. Material and equipment necessary for work to be done under a permit shall not be placed or stored on public property so as to obstruct free and convenient approach to and use of any fire hydrant, fire or police alarm box, utility box, catch basin or manhole or so as to interfere with the free flow of water in any street or alley gutter.

3303.4 Mixing Mortar on Public Property. The mixing or handling of mortar, concrete or other material on public property shall be done in a manner that will not deface public property or create a nuisance.

3303.5 Protection of Utilities. A substantial protective frame and boarding shall be built around and over every street lamp, utility box, fire or police alarm box, fire hydrant, catch basin and manhole that may be damaged by any work being done under the permit. This protection shall be maintained while such work is being done and shall not obstruct the normal functioning of the device.

3303.6 Walkway. A walkway not less than 4 feet (1219 mm) wide shall be maintained on the sidewalk in front of the building site during construction, alteration or demolition unless the public agency having jurisdiction authorizes the sidewalk to be fenced and closed. Adequate signs and railings shall be provided to direct pedestrian traffic. Railings shall be provided when required by Section 3303.7.

The walkway shall be capable of supporting a uniform live load of 150 pounds per square foot (psf) (7.18 kN/m²). A durable wearing surface shall be provided.

3303.7 Pedestrian Protection.

3303.7.1 Protection required. Pedestrian traffic shall be protected by a railing on the street side when the walkway extends into the roadway, by a railing adjacent to excavations and by such other protection as set forth in Table 33-A. The construction of such protective devices shall be in accordance with the provisions of this chapter.

3303.7.2 Railings. Railings shall be substantially built and, when of wood, shall be constructed of new material having a nominal size of at least 2 inches by 4 inches (51 mm by 102 mm). Railings shall be at least 3 feet 6 inches (1067 mm) in height and when adjacent to excavations shall be provided with a midrail.

3303.7.3 Fences. Fences shall be solid and substantially built, be not less than 8 feet (2438 mm) in height above grade and be placed on the side of the walkway nearest to the building site. Fences shall extend the entire length of the building site and each end shall be returned to the building line.

Openings in such fences shall be protected by doors which normally are kept closed.

All fences shall be provided with 2-inch by 4-inch (51 mm by 102 mm) plate, top and bottom, and shall be well braced. The fence material shall be a minimum of ⅜-inch (19 mm) boards or ¼-inch (6.4 mm) plywood. Plywood fences shall conform to the following requirements:
1. Plywood panels shall be bonded with an adhesive identical to that for exterior plywood.

2. Plywood \( \frac{1}{4} \) inch (6.4 mm) or \( \frac{5}{16} \) inch (7.9 mm) in thickness shall have studs spaced not more than 2 feet (610 mm) on center.

3. Plywood \( \frac{3}{8} \) inch (9.5 mm) or \( \frac{1}{2} \) inch (12.7 mm) in thickness shall have studs spaced not more than 4 feet (1219 mm) on center, provided a 2-inch by 4-inch (51 mm by 102 mm) stiffener is placed horizontally at the midheight when the stud spacing exceeds 2 feet (610 mm) on center.

4. Plywood \( \frac{5}{8} \) inch (15.9 mm) or thicker shall not span over 8 feet (2438 mm).

3303.7.4 Canopies. The protective canopy shall have a clear height of 8 feet (2438 mm) above the walkway. The roof shall be tightly sheathed. The sheathing shall be 2-inch (51 mm) nominal wood planking or equal. Every canopy shall have a solid fence built along its entire length on the construction side.

If materials are stored or work is done on the roof of the canopy, the street sides and ends of the canopy roof shall be protected by a tight curb board not less than 1 foot (305 mm) high and a railing not less than 3 feet 6 inches (1067 mm) high.

The entire structure shall be designed to carry the loads to be imposed on it, provided the live load shall not be less than 150 psf (7.18 kN/m²). In lieu of such design a protection canopy supporting not more than 150 psf (7.18 kN/m²) may be constructed as follows:

1. Footings shall be continuous 2-inch by 6-inch (51 mm by 152 mm) members with scabbed joints.

2. Posts not less than 4 inches by 6 inches (102 mm by 152 mm) in size shall be provided on both sides of the canopy and spaced not more than 12 feet (3658 mm), center to center.

3. Stringers not less than 4 inches by 12 inches (102 mm by 305 mm) in size shall be placed on edge upon the posts.

4. Joists resting upon the stringers shall be at least 2 inches by 8 inches (51 mm by 305 mm) in size and shall be spaced not more than 2 feet (610 m), center to center.

5. The deck shall be of planks at least 2 inches (51 mm) thick nailed to the joists.

6. Each post shall be knee-braced to joists and stringers by members 4 feet (1219 mm) long, not less than 2 inches by 4 inches (51 mm by 102 mm) in size.

7. A curb not less than 2 inches by 12 inches (51 mm by 305 mm) in size shall be set on edge along the outside edge of the deck.

EXCEPTION: Protection canopies for new, light-frame construction not exceeding two stories in height may be designed for a live load of 75 psf (3.59 kN/m²) or the loads to be imposed on it whichever is the greater.

3303.8 Maintenance and Removal of Protective Devices.

3303.8.1 Maintenance. Pedestrian protection required by Section 3303.7 shall be maintained in place and kept in good order for the entire length of time pedestrians may be endangered.

3303.8.2 Removal. Every protection fence or canopy shall be removed within 30 days after such protection is no longer required by this chapter for protection of pedestrians.

3303.9 Demolition. The work of demolishing any building shall not be commenced until the required pedestrian protection structures are in place.

The building official may require the permittee to submit plans and a complete schedule for demolition. Where such are required, no work shall be done until such plans or schedule, or both, are approved by the building official.
### TABLE 33-A—TYPE OF PROTECTION REQUIRED FOR PEDESTRIANS

<table>
<thead>
<tr>
<th>HEIGHT OF CONSTRUCTION</th>
<th>DISTANCE FROM CONSTRUCTION</th>
<th>PROTECTION REQUIRED</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>× 304.8 for mm</td>
<td></td>
</tr>
<tr>
<td>8 feet or less</td>
<td>Less than 6 feet</td>
<td>Railing</td>
</tr>
<tr>
<td></td>
<td>6 feet or more</td>
<td>None</td>
</tr>
<tr>
<td>More than 8 feet</td>
<td>Less than 6 feet</td>
<td>Fence and canopy</td>
</tr>
<tr>
<td></td>
<td>6 feet or more, but not more than one fourth the height of construction</td>
<td>Fence and canopy</td>
</tr>
<tr>
<td></td>
<td>6 feet or more, but between one fourth to one half the height of construction</td>
<td>Fence</td>
</tr>
<tr>
<td></td>
<td>6 feet or more, but exceeding one half the construction height</td>
<td>None</td>
</tr>
</tbody>
</table>
Chapter 34
EXISTING STRUCTURES

SECTION 3401 — GENERAL
Buildings in existence at the time of the adoption of this code may have their existing use or occupancy continued, if such use or occupancy was legal at the time of the adoption of this code, provided such continued use is not dangerous to life.

Any change in the use or occupancy of any existing building or structure shall comply with the provisions of Sections 109 and 3405 of this code.

For existing buildings, see Appendix Chapter 34. See also Section 101.3.

For a comprehensive code and guidelines on the treatment of existing buildings, see Uniform Code for Building Conservation.

SECTION 3402 — MAINTENANCE
All buildings and structures, both existing and new, and all parts thereof, shall be maintained in a safe and sanitary condition. All devices or safeguards which are required by this code shall be maintained in conformance with the code edition under which installed. The owner or the owner’s designated agent shall be responsible for the maintenance of buildings and structures. To determine compliance with this subsection, the building official may cause a structure to be reinspected.

SECTION 3403 — ADDITIONS, ALTERATIONS OR REPAIRS
3403.1 General. Buildings and structures to which additions, alterations or repairs are made shall comply with all the requirements of this code for new facilities except as specifically provided in this section. See Section 310.9 for provisions requiring installation of smoke detectors in existing Group R, Division 3 Occupancies.

3403.2 When Allowed. Additions, alterations or repairs may be made to any building or structure without requiring the existing building or structure to comply with all the requirements of this code, provided the addition, alteration or repair conforms to that required for a new building or structure.

Additions or alterations shall not be made to an existing building or structure which will cause the existing building or structure to be in violation of any of the provisions of this code nor shall such additions or alterations cause the existing building or structure to become unsafe. An unsafe condition shall be deemed to have been created if an addition or alteration will cause the existing building or structure to become structurally unsafe or overloaded; will not provide adequate egress in compliance with the provisions of this code or will obstruct existing exits; will create a fire hazard; will reduce required fire resistance or will otherwise create conditions dangerous to human life. Any building so altered, which involves a change in use or occupancy, shall not exceed the height, number of stories and area permitted for new buildings. Any building plus new additions shall not exceed the height, number of stories and area specified for new buildings.

Additions or alterations shall not be made to an existing building or structure when such existing building or structure is not in full compliance with the provisions of this code except when such addition or alteration will result in the existing building or structure being no more hazardous based on life safety, fire safety and sanitation, than before such additions or alterations are undertaken. (See also Section 307.11.3 for Group H, Division 6 Occupancies.)

EXCEPTION: Alterations of existing structural elements, or additions of new structural elements, which are not required by Section 3401 and which are initiated for the purpose of increasing the lateral-force-resisting strength or stiffness of an existing structure need not be designed for forces conforming to these regulations provided that an engineering analysis is submitted to show that:
1. The capacity of existing structural elements required to resist forces is not reduced, and
2. The lateral loading to required existing structural elements is not increased beyond their capacity, and
3. New structural elements are detailed and connected to the existing structural elements as required by these regulations, and
4. New or relocated nonstructural elements are detailed and connected to existing or new structural elements as required by these regulations, and
5. An unsafe condition as defined above is not created.

3403.3 Nonstructural. Alterations or repairs to an existing building or structure which are non-structural and do not adversely affect any structural member or any part of the building or structure having required fire resistance may be made with the same materials of which the building or structure is constructed.

3403.4 Glass Replacement. The installation or replacement of glass shall be as required for new installations.

3403.5 Historic Buildings. Repairs, alterations and additions necessary for the preservation, restoration, rehabilitation or continued use of a building or structure may be made without conformance to all the requirements of this code when authorized by the building official, provided:

1. The building or structure has been designated by official action of the legally constituted authority of this jurisdiction as having special historical or architectural significance.
2. Any unsafe conditions as described in this code are corrected.
3. The restored building or structure will be no more hazardous based on life safety, firesafety and sanitation than the existing building.

SECTION 3404 — MOVED BUILDINGS

Buildings or structures moved into or within the jurisdiction shall comply with the provisions of this code for new buildings or structures.

SECTION 3405 — CHANGE IN USE

No change shall be made in the character of occupancies or use of any building which would place the building in a different division of the same group of occupancy or in a different group of occupancies, unless such building is made to comply with the requirements of this code for such division or group of occupancy.

EXCEPTION: The character of the occupancy of existing buildings may be changed subject to the approval of the building official, and the building may be occupied for purposes in other groups without conforming to all the requirements of this code for those groups, provided the new or proposed use is less hazardous, based on life and fire risk, than the existing use.

No change in the character of occupancy of a building shall be made without a certificate of occupancy, as required in Section 109 of this code. The building official may issue a certificate of occupancy pursuant to the intent of the above exception without certifying that the building complies with all provisions of this code.
Chapter 35

UNIFORM BUILDING CODE STANDARDS

NOTE: This chapter has been revised in its entirety.
Part I—General

SECTION 3501 — U.B.C. STANDARDS

The Uniform Building Code standards referred to in various parts of this code, which are also listed in Part II of this chapter, are hereby declared to be part of this code and are referred to in this code as a "U.B.C. standard."

SECTION 3502 — STANDARD OF DUTY

The standard of duty established for the recognized standards listed in Part III of this chapter is that the design, construction and quality of materials of buildings and structures be reasonably safe for life, limb, health, property and public welfare.

SECTION 3503 — RECOGNIZED STANDARDS

The standards listed in Part III of this chapter are recognized standards. Compliance with these recognized standards shall be prima facie evidence of compliance with the standard of duty set forth in Section 3502.

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Appendix Chapter 3

USE OR OCCUPANCY

Division I—DETENTION AND CORRECTIONAL FACILITIES

SECTION 313 — SCOPE

The provisions of this chapter apply to the design and construction of Group I, Division 3 Occupancies housing detention or correctional facilities (prisons, jails and reformatories).

SECTION 314 — APPLICATION

This appendix chapter may be used as alternative provisions to requirements found in Chapter 3 of this code. If this appendix chapter is used for design or construction purposes, all requirements in this appendix chapter shall be used. Chapter 3 provisions may be used if not specifically noted in this appendix chapter.

SECTION 315 — DEFINITIONS

For the purpose of this chapter, certain terms are defined as follows:

CELL is a housing unit in a detention or correctional facility for the confinement of not more than two inmates or prisoners.

CELL COMPLEX is a cluster or group of cells in a jail, prison or similar detention facility, together with rooms used for accessory purposes, all of which open into the cell complex, and are used for functions such as dining, counseling, exercise, classrooms, sick call, visiting, storage, staff offices, control rooms or similar functions, and interconnecting corridors all within the cell complex.

CELL, MULTIPLE-OCCUPANCY, is a housing area in a detention or correctional facility designed to house no less than three or no more than 16 inmates.

CELL TIER are cells located one level above the other, not exceeding two levels per floor.

DAY ROOM is a room which is adjacent to a cell, cell complex or cell tier, and which is used as a dining, exercise or other activity room for inmates.

SECTION 316 — CONSTRUCTION, REQUIREMENT EXCEPTIONS

316.1 General. Except as provided in this appendix chapter, buildings shall be constructed in accordance with the provisions of this code.

316.2 Exceptions to Table 6-A. Regardless of the provisions of Table 6-A, nonbearing cell walls within cell complexes may be of nonfire-rated, noncombustible construction, provided the cell complex is separated from all other areas of the building, including corridors which connect to the cell complex by construction and opening protection as required for exit corridors.

The open space in front of a cell tier not exceeding two tiers in height in detention or correctional facilities shall not be considered a vertical shaft whether extending from the floor to ceiling above or from floor to underside of roof.

SECTION 317 — COMPARTMENTATION

Every story having an occupant load of more than 50 inmates in a detention or correctional facility shall be divided into not less than two approximately equal compartments by a smoke-stop partition, constructed pursuant to the provisions of Section 308.2.
EXCEPTIONS: 1. Protection may be accomplished with horizontal exits. (See Section 1008.)
2. In restraint areas there are no restrictions on the total number area of glazed openings in a smoke barrier, provided vision panels are of glazing material as specified in Section 713.9.

SECTION 318 — OCCUPANCY SEPARATIONS

Regardless of the provisions of Table 3-B, a three-hour fire-resistive occupancy separation as set forth in Section 302.3, may be used between a Group I, Division 3 Occupancy and a Group S, Division 3 Occupancy used only for the parking of vehicles used to transport inmates or prisoners provided no repair work or fueling is performed.

EXCEPTION: Such occupancy separations need not be provided unless the Group S, Division 3 Occupancy area is enclosed with both surrounding walls and a solid roof.

SECTION 319 — GLAZING

In restraint areas of fully sprinklered detention and correctional facilities, the area of glazing in one-hour corridor walls is not restricted, provided:

1. All glazing is approved 1/4-inch-thick (6.4 mm) wired glass or other approved and fire-tested glazing material set in steel frames.
2. In lieu of the sizes set forth in Section 1005.8, the size and area of wired glass assemblies shall conform to Sections 713.7 and 713.8. Other glazing material shall not exceed the sizes and areas as specified in the fire test.

SECTION 320 — ELECTRICAL

Approved special electrical systems, exit illumination, power installations and alternate on-site electrical supplies shall be provided for every building or portion of a building housing 10 or more inmates in a detention or correctional facility.

SECTION 321 — AUTOMATIC SPRINKLER AND STANDPIPE SYSTEMS

321.1 General. Every building, or portion thereof, housing more than six inmates in a detention or correctional facility or similar occupancy, shall be protected by an automatic sprinkler system conforming to the provisions of U.B.C. Standard 9-1. The main sprinkler control valve or valves and all other control valves in the system shall be electrically supervised so that at least a local alarm will sound at a constantly attended location when valves are closed.

EXCEPTION: The sprinkler and piping serving single cells may be imbedded in the concrete construction. Protection for sprinklers and piping shall meet the provisions of U.B.C. Standard 9-1.

When a complete approved automatic sprinkler system conforming to this section is installed in a building or buildings of a detention or correctional facility, pressurized enclosures need not be provided. However all required stairways shall be pressurized to a minimum of 0.15 inch of water column (37.3 Pa) upon actuation of the smoke-detection system.

321.2 Wet Standpipes. Every building in a detention or correctional facility, housing 50 or more inmates, shall be provided with Class II standpipes with hoses, conforming to the provisions of Chapter 9. Wet standpipes shall be located in cell complexes and in other cell areas of the building. In addition, Class II standpipes shall be located so that it will not be necessary to extend hose lines through interlocking security doors or any exit doors in smoke-stop partitions or horizontal exit walls.

321.3 Dry Standpipes. Regardless of the height of the building or number of stories, every detention or correctional facility shall be provided with a Class I standpipe.
EXCEPTION: In lieu of dry standpipes, combined systems meeting the provisions of U.B.C. Standard 9-2 may be used.

When acceptable to the fire authority having jurisdiction, fire department connections may be located inside all security walls or fences on the property.

Standpipes shall be located in accordance with Chapter 9, and when located in cell complexes, may be placed in secured pipe chases.

SECTION 322 — FIRE ALARM SYSTEMS

Fire alarm systems shall be provided in accordance with the Fire Code.

SECTION 323 — SMOKE MANAGEMENT

323.1 Smoke Management System. A mechanically operated smoke management system or systems shall be provided in every detention or correctional facility.

323.2 Design and Installation. Every smoke management system shall be designed with zones which shall not exceed one smoke compartment per zone, except cell zones. Upon activation, the system shall operate at 100 percent exhaust from any zone of smoke generation and at 100 percent supply to all floors with returns closed in all zones adjacent to zone of smoke generation at not less than eight air changes per hour.

323.3 Automatic Initiation. Operation of the smoke-management system shall be initiated automatically upon the actuation of appropriately zoned automatic sprinkler flow indicators or smoke detectors or both. Smoke detectors shall be installed in accordance with Section 608 of the Mechanical Code and their listing.

323.4 Manual Controls. Zone operation status indicators and manual controls capable of overriding the automatic controls shall be provided in a location approved by the fire department.

323.5 Location of Intakes. Exhaust discharges and fresh air supply intakes shall be so located as to prevent the reintroduction of smoke into the building.

323.6 Plans. The location of required fire dampers or combination smoke-fire dampers shall be clearly indicated on plans.

323.7 Omission of Fire Dampers. Fire dampers required by other provisions of this code are not required if such dampers interfere with the operation of the smoke management system.

EXCEPTION: Those required to maintain the integrity of a floor-ceiling assembly.

323.8 Duct Materials. Duct materials shall be capable of safely conveying heat, smoke and toxic gases, to withstand both positive and negative pressures which may be imposed during the smoke-control mode, and to maintain their structural integrity under fire exposure conditions.

SECTION 324 — EXITS

324.1 Number of Exits. Multiple-occupancy rooms and day rooms in buildings or portions thereof in correctional or detention facilities constructed of not less than one-hour fire-resistive construction shall be provided with a minimum of two exits when the occupant load is more than 20.

The occupant load of any restraint area shall be determined by Table 10-A and classified as to the occupancy group it most nearly resembles and exits shall be provided as required by Section 1003.1.

A minimum of two exits shall be provided in all areas of restraint (cells, day rooms, cell tiers and cell complexes) within a detention or correctional facility when the occupant load is more than 20.
324.2 Exits through Adjoining or Accessory Areas. Exits from a room may open into an adjoining or intervening room or area, provided such adjoining room is accessory to the area served and provides a direct exit to an exit corridor, exit stairway, exterior exit, horizontal exit, exterior exit balcony or exit passageway.

EXCEPTIONS: 1. Exits are not to pass through kitchens, storerooms, restrooms, closets or spaces used for similar purposes.

2. The space in front of cells normally called a day room and used for access to an exitway in a detention or correctional facility shall not be considered an adjoining or accessory area if individual cells open directly into the space.

324.3 Cell Door Width. Cell doors shall not be less than 2 feet (610 mm) in width and 6 feet (1829 mm) in height.

324.4 Sliding Doors in Detention or Correctional Facilities. Electrically controlled and operated sliding doors may be used as exit doors regardless of occupant load served. Electrically controlled doors shall be designed to allow for manual operation by staff in the event of power failure.

324.5 Dead-end Balconies. Exit balconies serving cell tiers shall not extend more than 50 feet (15 240 mm) beyond an exit stairway.

NOTE: For number of exits, see Section 1003.1.

324.6 Electrically Operable Exit Doors. All exit doors (except those opening directly to the exterior of the building) and doors from cells and holding rooms in detention and correctional occupancies shall be electrically operable from the facility control center. Electric operation shall override any manual device.

SECTION 325 — FENCED ENCLOSURES

Exterior fenced enclosures into which an exit from a building or buildings terminate shall be provided with a safe dispersal area located not less than 50 feet (15 240 mm) from any building. Dispersal areas shall be based on an area of not less than 3 square feet (0.2787 m²) per occupant. A gate shall be provided from the safe dispersal area to allow for necessary relocation of occupants.

Exterior fenced enclosures used for exit termination and which do not provide a safe dispersal area shall have not less than two exits.

Fenced enclosures located on roofs of buildings one or more stories in height shall be provided with not less than two exits regardless of occupant load.

Fenced enclosures used for recreational or activity purposes only shall be provided with exits in accordance with Section 1003.
Division II—AGRICULTURAL BUILDINGS

SECTION 326 — SCOPE

The provisions of this appendix shall apply exclusively to agricultural buildings. Such buildings shall be classified as a Group U, Division 3 Occupancy and shall include the following uses:

1. Storage, livestock and poultry.
2. Milking barns.
3. Shade structures.
4. Horticultural structures (greenhouse and crop protection).

SECTION 327 — CONSTRUCTION, HEIGHT AND ALLOWABLE AREA

327.1 General. Buildings classed as a Group U, Division 3 Occupancy shall be of one of the types of construction specified in this code and shall not exceed the area or height limits specified in Sections 504, 505 and 506 and Table A-3-A.

327.2 Special Provisions. The area of a Group U, Division 3 Occupancy in a one-story building shall not be limited if the building is entirely surrounded and adjoined by public ways or yards not less than 60 feet (18 288 mm) in width, regardless of the type of construction.

The area of a two-story Group U, Division 3 Occupancy shall not be limited if the building is entirely surrounded and adjoined by public ways or yards not less than 60 feet (18 288 mm) in width and is provided with an approved automatic sprinkler system throughout, conforming to U.B.C. Standard 9-1.

Buildings using plastics shall comply with Type V-N construction. Plastics shall be approved plastics as defined in Chapter 2 and regulated by Chapter 26. For foam plastic, see Section 2602.

EXCEPTIONS: 1. When used as skylights or roofs, the areas of plastic skylights shall not be limited.
2. Except where designs must consider snow loads, plastics less than 20 mil (0.51 mm) thick may be used without regard to structural considerations. The structural frame of the building, however, shall comply.

SECTION 328 — OCCUPANCY SEPARATIONS

Occupancy separations shall be as specified in Section 302 and Table A-3-B.

SECTION 329 — EXTERIOR WALLS AND OPENINGS

Except where Table 6-A requires greater protection, exterior walls of agricultural buildings shall not be less than one-hour fire-resistive construction when less than 20 feet (6096 mm) from property line.

Openings in exterior walls of agricultural buildings which are less than 20 feet (6096 mm) from property lines shall be protected by fire assemblies having a fire-protection rating of not less than three-fourths hour.

SECTION 330 — EXIT FACILITIES

Exit facilities shall be as specified in Chapter 10.

EXCEPTIONS: 1. The maximum distance of travel from any point in the building to an exterior exit door, horizontal exit, exit passageway or an enclosed stairway shall not exceed 300 feet (91 440 mm).
2. One exit is required for each 15,000 square feet (1394 m²) of floor area and fraction thereof.
3. Exit openings shall not be less than 2 feet 6 inches by 6 feet 8 inches (763 mm by 2032 mm).
### TABLE A-3-A—BASIC ALLOWABLE AREA FOR A GROUP U, DIVISION 3 OCCUPANCY, ONE STORY IN HEIGHT AND MAXIMUM HEIGHT OF SUCH OCCUPANCY

<table>
<thead>
<tr>
<th>I</th>
<th>II</th>
<th>III and IV</th>
<th>V</th>
</tr>
</thead>
<tbody>
<tr>
<td>F.R.</td>
<td>One-hour</td>
<td>N</td>
<td>One-hour or Type IV</td>
</tr>
<tr>
<td>Unlimited</td>
<td>60,000</td>
<td>27,100</td>
<td>18,000</td>
</tr>
</tbody>
</table>

ALLOWABLE AREA\(^1\) \(\times 0.093\) for m\(^2\)

MAXIMUM HEIGHT IN STORIES\(^2\)

UNLIMITED 12 4 2 4 2 3 2

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\(^1\)See Section 327 for unlimited area under certain conditions.

\(^2\)For maximum height in feet, see Chapter 5, Table 5-B.

### TABLE A-3-B—REQUIRED SEPARATIONS BETWEEN GROUP U, DIVISION 3 AND OTHER OCCUPANCIES (In Hours)

<table>
<thead>
<tr>
<th>Occupancy</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>H (^1)</th>
<th>S-3</th>
<th>B</th>
<th>S-1, 2, 4 and 5</th>
<th>F and M</th>
<th>R-1</th>
<th>R-3</th>
<th>U</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rating</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>N</td>
</tr>
</tbody>
</table>

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\(^1\)See Chapter 3 for Group H, Division 1 Occupancies.
Division III—REQUIREMENTS FOR GROUP R, DIVISION 3 OCCUPANCIES

SECTION 331 — GENERAL

331.1 Purpose. The purpose of this division is to provide minimum standards for the protection of life, limb, health, property, environment and for the safety and welfare of the consumer, general public and the owners and occupants of Group R, Division 3 Occupancies regulated by this code.

331.2 Scope. The provisions of this division apply to the construction, prefabrication, alteration, repair, use, occupancy and maintenance of detached one- or two-family dwellings not more than three stories in height and their accessory structures.

SECTION 332 — ONE AND TWO FAMILY DWELLING CODE ADOPTED

Buildings regulated by this division shall be designed and constructed to comply with the requirements of the Council of American Building Officials One and Two Family Dwelling Code, 1992 edition (as it applies to detached one- and two-family dwellings), promulgated jointly by the International Conference of Building Officials, the Building Officials and Code Administrators International and the Southern Building Code Congress International.

Division IV—REQUIREMENTS FOR GROUP R, DIVISION 4 OCCUPANCIES

SECTION 333 — GENERAL

333.1 Purpose. The purpose of this division is to provide minimum standards of safety for group care facilities.

333.2 Scope.

333.2.1 General. The provisions of this division shall apply to buildings or portions thereof that are to be used for Group R, Division 4 Occupancies.

333.2.2 Applicability of other provisions. Except as specifically required by this division, Group R, Division 4 Occupancies shall meet all applicable provisions of this code. Group R, Division 4 Occupancies need not be accessible to persons with disabilities.

333.3 Definitions. For the purpose of this division, certain terms are defined as follows:

AMBULATORY PERSONS are those capable of achieving mobility sufficient to exit without the assistance of another person.

GROUP R, DIVISION 4 OCCUPANCIES shall be residential group care facilities for ambulatory, nonrestrained persons who may have a mental or physical impairment (each accommodating more than five and not more than 16 clients or residents, excluding staff).

SECTION 334 — CONSTRUCTION, HEIGHT AND ALLOWABLE AREA

334.1 General. Buildings or portions of buildings classified as Group R, Division 4 may be constructed of any materials allowed by this code, shall not exceed two stories in height or be located above the second story in any building, and shall not exceed 3,000 square feet (278.7 m²) in floor area per story except as provided in Sections 504, 505 and 506.

334.2 Special Provisions. Group R, Division 4 Occupancies having more than 3,000 square feet of floor area above the first story shall be of not less than one-hour fire-resistive construction throughout.

334.3 Mixed Occupancies. Group R, Division 4 Occupancies shall be separated from Group H Occupancies by a four-hour fire-resistive occupancy separation and shall be separated from all other occupancies by a one-hour fire-resistive occupancy separation.
EXCEPTIONS: 1. An occupancy separation need not be provided between a Group R, Division 4 Occupancy and a carport having no enclosed uses above, provided the carport is entirely open on two or more sides.

2. In the one-hour occupancy separation between a Group R, Division 4 and Group U, Division 1 Occupancy, the separation may be limited to the installation of materials approved for one-hour fire-resistant construction on the garage side and a self-closing, tight-fitting solid-wood door 1 3/4 inch (35 mm) in thickness will be permitted in lieu of a one-hour fire assembly. Fire dampers need not be installed in air ducts passing through the wall, floor or ceiling separating a Group R, Division 4 Occupancy from a Group U, Division 1 Occupancy, provided such ducts within the Group U Occupancy are constructed of steel having a thickness not less than 0.019 inch (0.48 mm) (No. 26 galvanized sheet gauge) and have no openings into the Group U Occupancy.

SECTION 335 — LOCATION ON PROPERTY

Exterior walls located less than 3 feet (914 mm) from property lines shall be of one-hour fire-resistant construction. Openings shall not be permitted in exterior walls located less than 3 feet (914 mm) from property lines. For other requirements, see Section 503 and Chapter 6.

SECTION 336 — EXITS AND EMERGENCY ESCAPES

336.1 General. Group R, Division 4 Occupancies shall be provided with exits as required by this section and Chapter 10 of this code.

336.2 Exits Required.

336.2.1 Number of exits. Every story, basement or portion thereof housing a Group R, Division 4 Occupancy shall have not less than two exits.

EXCEPTIONS: 1. Basements used exclusively for the service of the building may have one exit. For the purpose of this exception, storage rooms, laundry rooms, maintenance offices and similar uses shall not be considered as providing service to the building.

2. Storage rooms, laundry rooms and maintenance offices not exceeding 300 square feet (27.9 m²) in floor area may be provided with only one exit.

336.2.2 Distance to exits. The maximum travel distance specified in Chapter 10 shall be reduced by 50 percent.

336.3 Corridor Width. Corridors shall be not less than 36 inches (914 mm) in width.

336.4 Stairways. Stairways shall be constructed as required by Section 1006 of this code.

EXCEPTION: In buildings that are converted to a Group R, Division 4 Occupancy, existing stairways may have an 8-inch-maximum (203 mm) rise, 9-inch-minimum (229 mm) run and may be 30 inches (762 mm) in width.

336.5 Emergency Exit Illumination. In the event of power failure, exit illumination shall be automatically provided from an emergency system. Emergency systems shall be supplied from storage batteries or an on-site generator set and the system shall be installed in accordance with the requirements of the Electrical Code.

336.6 Emergency Escape. Every sleeping room shall be provided with emergency escape or rescue facilities as required by Section 310.4 of this code.

SECTION 337 — LIGHT, VENTILATION AND SANITATION

Light and ventilation shall be as specified in Section 1203.

Sanitation shall be as specified in Section 2902.6.

SECTION 338 — YARDS AND COURTS

Yards and courts shall be as specified in Section 1203.4.

1–406
SECTION 339 — ROOM DIMENSIONS
Room dimensions shall be as specified in Section 310.6.

SECTION 340 — SHAFT ENCLOSURES
Exits shall be enclosed as specified in Chapter 10.
   Elevator shafts, vent shafts, dumbwaiter shafts, clothes chutes and other vertical openings shall be enclosed and the enclosure shall be as specified in Section 711.

SECTION 341 — FIRE ALARM SYSTEMS
An approved automatic and manual fire alarm system shall be provided in Group R, Division 4 Occupancies.

SECTION 342 — HEATING
All habitable rooms shall be provided with heating facilities capable of maintaining a room temperature of 70°F (21°C) at a point 3 feet (914 mm) above the floor.

SECTION 343 — SPECIAL HAZARDS
343.1 Heating Equipment. All heating equipment shall be permanently installed. Chimneys and heating apparatus shall conform to the requirements of Chapter 31 of this code and the Mechanical Code.

343.2 Flammable Liquids. The storage and handling of gasoline, fuel oil or other flammable liquids shall be in accordance with the Fire Code.
Appendix Chapter 4
SPECIAL USE AND OCCUPANCY

Division I—BARRIERS FOR SWIMMING POOLS, SPAS AND HOT TUBS

NOTE: This division has been revised in its entirety.

SECTION 419 — GENERAL
The provisions of this section apply to the design and construction of barriers for swimming pools located on the premises of Group R, Division 3 Occupancies.

SECTION 420 — DEFINITIONS
For the purpose of this section, certain terms, words and phrases are defined as follows:

ABOVEGROUND/ON-GROUND POOL. See definition of "swimming pool."

BARRIER is a fence, wall, building wall, or a combination thereof, which completely surrounds the swimming pool and obstructs access to the swimming pool.

GRADE is the underlying surface such as earth or a walking surface.

HOT TUB. See definition of "swimming pool."

IN-GROUND POOL. See definition of "swimming pool."

SEPARATION FENCE is a barrier which separates all doors of a dwelling unit with direct access to a swimming pool from the swimming pool.

SPA. See definition of "swimming pool."

SWIMMING POOL is any structure intended for swimming or recreational bathing that contains water over 24 inches (610 mm) deep. This includes in-ground, aboveground and on-ground swimming pools; hot tubs; portable and nonportable spas; and fixed-in-place wading pools.

SWIMMING POOL, INDOOR, is a swimming pool which is totally contained within a residential structure and surrounded on all four sides by walls of said structure.

SWIMMING POOL, OUTDOOR, is any swimming pool which is not an indoor pool.

SECTION 421 — REQUIREMENTS

421.1 Outdoor Swimming Pool. An outdoor swimming pool shall be provided with a barrier that shall be installed, inspected and approved prior to plastering or filling with water. The barrier shall comply with the following:

1. The top of the barrier shall be at least 48 inches (1219 mm) above grade measured on the side of the barrier which faces away from the swimming pool. The maximum vertical clearance between grade and the bottom of the barrier shall be 2 inches (51 mm) measured on the side of the barrier which faces away from the swimming pool. The maximum vertical clearance at the bottom of the barrier may be increased to 4 inches (102 mm) when grade is a solid surface such as a concrete deck, or when the barrier is mounted on the top of the aboveground pool structure. When barriers have horizontal members spaced less than 45 inches (1143 mm) apart, the horizontal members shall be placed on the pool side of the barrier. Any decorative design work on the side away from the swimming pool, such as protrusions, indentations or cutouts, which render the barrier easily climbable, is prohibited.

2. Openings in the barrier shall not allow passage of a 13/4-inch-diameter (44 mm) sphere.
EXCEPTIONS:  1. When vertical spacing between such openings is 45 inches (1143 mm) or more, the opening size may be increased such that the passage of a 4-inch-diameter (102 mm) sphere is not allowed.

2. For fencing composed of vertical and horizontal members, the spacing between vertical members may be increased up to 4 inches (102 mm) when the distance between the tops of horizontal members is 45 inches (1143 mm) or more.

3. Chain link fences used as the barrier shall not be less than 11 gage.

4. Access gates shall comply with the requirements of Items 1 through 3. Pedestrian access gates shall be self-closing and have a self-latching device. Where the release mechanism of the self-latching device is located less than 54 inches (1372 mm) from the bottom of the gate, (1) the release mechanism shall be located on the pool side of the barrier at least 3 inches (76 mm) below the top of the gate, and (2) the gate and barrier shall have no opening greater than 1/2 inch (13 mm) within 18 inches (457 mm) of the release mechanism. Pedestrian gates shall swing away from the pool. Any gates other than pedestrian access gates shall be equipped with lockable hardware or padlocks and shall remain locked at all times when not in use.

5. Where a wall of a Group R, Division 3 Occupancy dwelling unit serves as part of the barrier and contains door openings between the dwelling unit and the outdoor swimming pool, which provide direct access to the pool, a separation fence meeting the requirements of Items 1, 2, 3 and 4 of Section 421.1 shall be provided.

EXCEPTION: When approved by the building official, one of the following may be used:

1. Self-closing and self-latching devices installed on all doors with direct access to the pool with the release mechanism located a minimum of 54 inches (1372 mm) above the floor.

2. An alarm installed on all doors with direct access to the pool. The alarm shall sound continuously for a minimum of 30 seconds immediately after the door and its screen, if present, are opened, and be capable of providing a sound pressure level of not less than 85 dBA when measured indoors at 10 feet (3048 mm). The alarm shall automatically reset under all conditions. The alarm system shall be equipped with a manual means, such as a touchpad or switch, to temporarily deactivate the alarm for a single opening. Such deactivation shall last no longer than 15 seconds. The deactivation switch shall be located at least 54 inches (1372 mm) above the threshold of the door.

3. Other means of protection may be acceptable so long as the degree of protection afforded is not less than that afforded by any of the devices described above.

6. Where an aboveground pool structure is used as a barrier or where the barrier is mounted on top of the pool structure, and the means of access is a ladder or steps, then (1) the ladder or steps shall be capable of being secured, locked or removed to prevent access or (2) the ladder or steps shall be surrounded by a barrier which meets the requirements of Items 1 through 5. When the ladder or steps are secured, locked or removed, any opening created shall be protected by a barrier complying with Items 1 through 5.

421.2 Indoor Swimming Pool. For an indoor swimming pool, protection shall comply with the requirements of Section 421.1, Item 5.
Division II—AVIATION CONTROL TOWERS

SECTION 422 — GENERAL
The provisions of this appendix apply exclusively to aviation control towers not exceeding 1,500 square feet (139.35 m²) per floor. Such buildings shall be classified as Group B, Division 2 Occupancies and shall be used only for the following uses:

1. Airport traffic control cab.
2. Electrical and mechanical equipment rooms.
3. Airport terminal radar and electronics rooms.
4. Office spaces incidental to the tower operation.
5. Lounges for employees, including sanitary facilities.

SECTION 423 — CONSTRUCTION, HEIGHT AND ALLOWABLE AREA
Buildings or portions of buildings constructed under the provisions of this chapter shall be either Type I-F.R., Type II-F.R., Type II One-hour, Type II-N or Type III One-hour construction. The height of the building or parts thereof shall not exceed the limitations specified in Table A-4-A and the area of such buildings shall not exceed 1,500 square feet (139.35 m²) on any floor.

SECTION 424 — EXIT FACILITIES
A single stairway may be used for exiting in towers of any height, provided the occupant load per floor does not exceed 15. Access to the stairway and the elevator shall be separated from each other a distance apart equal to no less than one half of the length of the maximum overall diagonal dimension of the area served measured in a straight line. The exit stairway and elevator hoistway may be located in a common shaft enclosure, provided they are separated from each other by a four-hour separation having no openings. Such stairway shall be constructed to comply with the requirements for pressurized enclosures as specified in Section 1009. Stairways, however, need not extend to the roof as specified in Section 1006.14. The provisions of Section 403 do not apply.

SECTION 425 — FIRE ALARMS
Smoke detectors shall be installed in all occupied levels. These devices shall be part of an approved fire alarm system having audible alarms mounted in all occupied levels.

SECTION 426 — ACCESSIBILITY
Aviation control towers need not be accessible to the handicapped as specified in the provisions of Chapter 11 and Section 2903.

SECTION 427 — STANDBY POWER AND EMERGENCY GENERATION SYSTEMS
A standby power-generation system conforming to the Electrical Code shall be installed in aviation control towers over 65 feet (19,812 mm) in height and shall provide power to the following equipment:

1. Pressurized enclosure, mechanical equipment and lighting.
2. Elevator operational power.
3. Smoke-detection systems.
TABLE A-4-A—MAXIMUM HEIGHT OF AVIATION CONTROL TOWERS (Feet)

<table>
<thead>
<tr>
<th>TYPES OF CONSTRUCTION</th>
<th>I-F.R.</th>
<th>II-F.R.</th>
<th>II One-hour</th>
<th>III One-hour</th>
<th>II-N</th>
</tr>
</thead>
<tbody>
<tr>
<td>× 0.3048 for m</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unlimited</td>
<td>240</td>
<td>100</td>
<td>65</td>
<td>85</td>
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</tbody>
</table>
Division III—REGULATIONS GOVERNING FALLOUT SHELTERS

SECTION 428 — PURPOSE
The purpose of this appendix is to establish minimum criteria which must be met before a building or building space can be constructed, occupied, used or designated a fallout shelter.

SECTION 429 — SCOPE
The scope of this appendix extends to building spaces designated for use as fallout shelters, including periods of drill and instruction for this purpose.

SECTION 430 — DEFINITIONS
DUAL-USE FALLOUT SHELTER is a fallout shelter having a normal, routine use and occupancy as well as an emergency use as a fallout shelter.

FALLOUT SHELTER is any room, structure or space designated as such and providing its occupants with protection at a minimum protection factor of 40 from gamma radiation from fallout from a nuclear explosion as determined by a qualified fallout shelter analyst certified by the Office of Civil Defense. Area used for storage of shelter supplies need not have a protection factor of 40.

PROTECTION FACTOR is a factor used to express the relation between the amount of fallout gamma radiation that would be received by an unprotected person and the amount that would be received by one in a shelter.

SINGLE-PURPOSE FALLOUT SHELTER is a fallout shelter having no use or occupancy except as a fallout shelter.

UNIT OF EGRESS WIDTH is 22 inches (559 mm).

SECTION 431 — OCCUPANCY REQUIREMENTS
431.1 General. Nothing in these regulations shall be construed as preventing the dual use or multiple use of normal occupancy space as fallout shelter space, providing the minimum requirements for each use are met.

431.2 Mixed Occupancy. The occupancy classification shall be determined by the normal use of the building. When a normal-use space is designed to have an emergency use as a fallout shelter in addition to the normal use, the most restrictive requirements for all such uses shall be met.

431.3 Occupancy Separation. No occupancy separation is required between that portion designated as a fallout shelter and the remainder of the building.

431.4 Space and Ventilation. A minimum of 10 square feet (0.929 m²) of net floor area shall be provided per shelter occupant. Partitions, columns and area for storage of federal shelter supplies also may be included in net area. A minimum of 65 cubic feet (1.84 m³) of volume shall be provided per shelter occupant. A minimum of 3 cubic feet (0.085 m³) of fresh air per minute per person shall be provided.

In addition, the shelter shall have a ventilating rate sufficient to maintain a daily average effective temperature of not more than 82°F (28°C.) for at least 90 percent of the days of the year.

431.5 Illumination. No special lighting levels are required.

431.6 Hazards. Hazardous utility lines such as steam, gas and oil shall not be located in or near the shelter unless provision is made to control such lines by valving or other approved means.

SECTION 432 — EXITS
There shall be no fewer than two widely spaced exits from a fallout shelter, leading directly to other spaces of the building or outdoors. Exits from the fallout shelter shall aggregate at least one unit of
egress width for every 200 shelter occupants. In no case shall a single exit be less than 24 inches (610 mm) wide.

SECTION 433 — FLAME-SPREAD INDEX OF INTERIOR SURFACES
Interior surfaces of single-purpose fallout shelters shall have a flame-spread index not exceeding 200.

SECTION 434 — MINIMUM DESIGN LOADS
434.1 Dual-use Fallout Shelters. In the case of dual-use fallout shelters, design live load required for the normal use shall govern, except that concentrated loads shall be considered.

434.2 Single-purpose Fallout Shelters. Minimum live loads for floor design in single-purpose fallout shelters shall be 40 pounds per square foot (1.92 kN/m²) except that concentrated loads shall be considered.

SECTION 435 — SANITATION
Toilets, either flush-type operating from the normal water supply system, or chemical or other types, shall be provided on the basis of one toilet per 50 fallout shelter occupants. Fifty percent of the toilets may be provided outside the fallout shelter area. Empty water containers may be considered as fulfilling this requirement.
Appendix Chapter 9
BASEMENT PIPE INLETS

SECTION 907 — BASEMENT PIPE INLETS

907.1 General. All basement pipe inlets shall be installed in accordance with requirements of this section.

907.2 Where Required. Basement pipe inlets shall be installed in the first floor of every store, warehouse or factory having basements.

EXCEPTIONS: 1. Where the basement is equipped with an automatic sprinkler system as specified in Section 904.2.
2. Where the basement is used for the storage of permanent archives or valuables such as safe deposit vaults or similar uses adversely affected by water.

907.3 Location. The location of basement pipe inlets shall be as required by the fire department.

907.4 Detailed Requirements. All basement pipe inlets shall be of cast iron, steel, brass or bronze with lids of cast brass or bronze.

The basement pipe inlet shall consist of a sleeve not less than 8 inches (203 mm) inside diameter extending through the floor and terminating flush with or through the basement ceiling and shall have a top flange recessed with an inside shoulder to receive the lid. The top flange shall be installed flush with finish floor surface. The lid shall be a solid casting and have a lift recessed in the top. This lid shall be provided with a cast-in sign reading: FIRE DEPARTMENT ONLY, DO NOT COVER. The lid shall be installed in such a manner to permit its easy removal from the flange shoulder.
Appendix Chapter 10
BUILDING SECURITY

SECTION 1023 — BUILDING SECURITY

Building security shall be in accordance with the *Uniform Building Security Code*. 
Appendix Chapter 11
ACCESSIBILITY

Division I—SITE ACCESSIBILITY

NOTE: This appendix chapter has been revised in its entirety.

SECTION 1106 — ACCESSIBLE EXTERIOR ROUTES

1106.1 General. Accessible exterior routes shall be provided from public transportation stops, accessible parking and accessible passenger loading zones and public sidewalks to the accessible building entrance they serve.

When more than one building or facility is located on a site, at least one accessible route shall connect accessible elements, facilities and buildings that are on the same site. The accessible route between accessible parking and accessible building entrances shall be the most practical direct route.


1106.3 Design and Construction. When accessibility is required by this section, it shall be designed and constructed in accordance with CABO/ANSI A117.1.

SECTION 1107 — PARKING FACILITIES

1107.1 Accessible Parking Required. When parking lots or garage facilities are provided, accessible parking spaces shall be provided in accordance with Table A-11-A except for the following occupancies:

1. For Group I, Divisions 1.1 and 2 medical care occupancies specializing in the treatment of persons with mobility impairments, 20 percent of the parking spaces provided shall be accessible.

2. For Group I, Divisions 1.1 and 1.2 and Group B Occupancies providing outpatient medical care facilities, 10 percent of the parking spaces provided shall be accessible.

3. For Group R, Division I apartment building containing accessible or adaptable dwelling units where parking is provided, 2 percent of the parking spaces shall be accessible. Where parking is provided within or beneath a building, accessible parking spaces shall also be provided within or beneath the building.

One van accessible parking space shall be provided for every eight accessible parking spaces, or fraction thereof.

Accessible parking spaces shall be located on the shortest possible accessible route from adjacent parking to an accessible building entrance. In facilities with multiple accessible building entrances with adjacent parking, accessible parking spaces shall be dispersed and located near the accessible entrances.

EXCEPTION: In multilevel parking structures, accessible van parking spaces may be located on one level.

Where a parking facility is not accessory to a particular building, accessible parking spaces shall be located on the shortest accessible route to an accessible pedestrian entrance to the parking facility.

1107.2 Design and Construction. When accessible and van accessible parking spaces are required by this section, they shall be designed and constructed in accordance with CABO/ANSI A117.1.
1107.3 Signs. Accessible parking space required by this section shall be identified by a sign complying with CABO/ANSI A117.1.

EXCEPTION: Accessible parking space signs need not be provided in parking garages or parking facilities that have five or less total parking spaces.

SECTION 1108 — PASSENGER LOADING ZONES

1108.1 Location. When provided, passenger loading zones shall be located on an accessible route.

1108.2 Design and Construction. Passenger loading zones shall be designed and constructed in accordance with CABO/ANSI A117.1.

TABLE A-11-A—NUMBER OF ACCESSIBLE PARKING SPACES

<table>
<thead>
<tr>
<th>TOTAL PARKING SPACES IN LOT OR GARAGE</th>
<th>MINIMUM REQUIRED NUMBER OF ACCESSIBLE SPACES</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-25</td>
<td>1</td>
</tr>
<tr>
<td>26-50</td>
<td>2</td>
</tr>
<tr>
<td>51-75</td>
<td>3</td>
</tr>
<tr>
<td>76-100</td>
<td>4</td>
</tr>
<tr>
<td>101-150</td>
<td>5</td>
</tr>
<tr>
<td>151-200</td>
<td>6</td>
</tr>
<tr>
<td>201-300</td>
<td>7</td>
</tr>
<tr>
<td>301-400</td>
<td>8</td>
</tr>
<tr>
<td>401-500</td>
<td>9</td>
</tr>
<tr>
<td>501-1,000</td>
<td>2% of total spaces</td>
</tr>
<tr>
<td>OVER 1,000</td>
<td>20 spaces plus 1 space for every 100 spaces, or fraction thereof, over 1,000</td>
</tr>
</tbody>
</table>
Division II—ACCESSIBILITY FOR EXISTING BUILDINGS

SECTION 1109 — SCOPE

The provisions of this division apply to renovations, alterations and additions to existing buildings, including those identified as historic buildings. This division includes minimum standards for removing architectural barriers, and providing and maintaining access to existing buildings and facilities for persons with disabilities.

SECTION 1110 — DEFINITIONS

For the purpose of this division, certain terms are designated as follows:

ALTERATION is any change, addition or modification in construction or occupancy.

TECHNICALLY INFEASIBLE is an alteration of a building or facility that has little likelihood of being accomplished because existing structural conditions would require removing or altering a load-bearing member which is an essential part of the structural frame, or because existing physical or site constraints prohibit modification or addition of elements, spaces or features which are in full and strict compliance with the minimum requirements for new construction and which are necessary to provide accessibility.

SECTION 1111 — ALTERATIONS

1111.1 General.

1111.1.1 Compliance. Alterations to existing buildings or facilities shall comply with this section. Alterations shall not reduce or have the effect of reducing accessibility or usability of a building, portion of a building, or facility. If compliance with this section is technically infeasible, the alteration shall provide access to the maximum extent technically feasible.

1111.1.2 Existing elements. If existing elements, spaces, essential features or common areas are altered, each such altered element, space, feature or area shall comply with the applicable provisions in Chapter 11 and CABO/ANSI A117.1.

EXCEPTION: Accessible means of egress required by Section 1104 need not be provided in alterations of existing buildings and facilities.

When an alteration is to an area of primary function, the accessible route to the altered area shall be made accessible. The accessible route to the primary function area shall include toilet facilities or drinking fountains serving the area of primary function.

EXCEPTIONS: 1. The costs of providing the accessible route need not exceed 20 percent of the costs of the alterations affecting the area of primary function.
2. Alterations to windows, hardware, operating controls, electrical outlets and signs.
3. Alterations to mechanical systems, electrical systems, installation or alteration of fire-protection systems, and abatement of hazardous materials.
4. Alterations undertaken for the primary purpose of increasing the accessibility of an existing building, facility or element.

1111.2 Modifications.

1111.2.1 General. Modifications set forth in this section may be used for compliance when the required standard is technically infeasible.

1111.2.2 Hotel guest rooms. When guest rooms of a hotel are being altered, at least one of every 25 guest rooms being altered shall be accessible, and at least one additional guest room for every 25 guest rooms being altered shall be provided with visible and audible alarm-indicating appliances for persons with hearing impairments. The total number of accessible guest rooms and guest rooms

1–418
accessible to persons with hearing impairments need not exceed the number required by Section 1103.1.9.3.

1111.2.3 Performance areas. When it is technically infeasible to alter performance areas to be on an accessible route, at least one of each type of performance area shall be made accessible.

1111.2.4 Platform lifts. Platform lifts may be used when installation of an elevator is technically infeasible.

1111.2.5 Toilet rooms. The addition of one accessible unisex toilet facility accessible to occupants on the floor may be provided in lieu of making existing toilet facilities accessible when it is technically infeasible to alter existing toilet and bathing facilities to be accessible. The unisex facility shall be located on the same floor and in the same area as the existing toilet facilities. Each unisex toilet facility shall contain one accessible water closet and lavatory, and the door shall be lockable from within the room.

When existing toilet facilities are being altered and are not made accessible, directional signs shall be provided indicating the location of the nearest accessible toilet or bathing facility within the building.

1111.2.6 Assembly areas. Seating shall adjoin an accessible route that also serves as a means of egress. When it is technically infeasible to disperse accessible seating throughout an altered assembly area, accessible seating areas may be clustered. Each accessible seating area shall have provisions for companion seating.

1111.2.7 Dressing rooms. When it is technically infeasible to provide accessible dressing rooms in each group of rooms, one dressing room for each sex, or a unisex dressing room, on each level shall be accessible.

SECTION 1112 — CHANGE OF OCCUPANCY

Requirements for new construction provided in Chapter 11 shall apply to existing buildings that undergo a change of occupancy group, unless technically infeasible.

SECTION 1113 — HISTORIC PRESERVATION

Accessibility provisions of this division shall be applied to historic buildings and facilities as defined in Section 3403.5 of this code.

The building official, after consulting with the appropriate historic preservation officer, shall determine whether provisions required by this division for accessible routes, ramps, entrances, toilets, parking or signage would threaten or destroy the historic significance of the building or facility.

If it is determined that any of the accessibility requirements listed above would threaten or destroy the historic significance of a building or facility, the modifications of Section 1111.2 for that feature may be utilized.
Appendix Chapter 12
INTERIOR ENVIRONMENT
Division I—VENTILATION
NOTE: This is a new appendix division.

SECTION 1206 — SCOPE
Buildings and structures enclosing spaces intended for human occupancy shall be provided with ventilation in accordance with this appendix chapter.

SECTION 1207 — VENTILATION

1207.1 General. Enclosed portions of buildings and structures in occupancies, other than the locations specified in Sections 1207.3 through 1207.7, shall be provided with natural ventilation by means of openable exterior openings with an area of not less than one twentieth of the total floor area of such portions, or shall be provided with a mechanically operated ventilating system. The mechanically operated ventilating system shall be capable of supplying ventilation air in accordance with Table A-12-A during such time as the building or space is occupied.

1207.2 Register Velocity. In assembly educational and institutional occupancies when the velocity of the air at the register exceeds 10 feet per second (3.048 m/s), the register shall be placed more than 8 feet (2438 mm) above the floor directly beneath.

1207.3 Toilet Rooms. Toilet rooms shall be provided with a fully openable exterior window at least 3 square feet (0.27 m²) in area; or a vertical duct not less than 100 square inches (0.645 516 m²) in area for the first toilet facility, with 50 additional square inches (0.032 516 m²) for each additional facility; or a mechanically operated exhaust system capable of exhausting 50 cubic feet of air per minute (23.6 L/min) for each water closet or urinal installed in the toilet room. Such systems shall be connected directly to the outside, and the point of discharge shall be at least 3 feet (914 mm) from any openable window.

1207.4 Ventilation in Hazardous Locations. Rooms, areas or spaces in which explosive, corrosive, combustible, flammable or highly toxic dusts, mists, fumes, vapors or gases are or may be emitted due to the processing, use, handling or storage of materials shall be mechanically ventilated as required by the Fire Code and the Mechanical Code.

Emissions generated at work stations shall be confined to the area in which they are generated as specified in the Fire Code and the Mechanical Code.

Supply and exhaust openings shall be in accordance with the Mechanical Code. Exhaust air contaminated by highly toxic material shall be treated in accordance with the Mechanical Code.

A manual shutoff control for ventilation equipment shall be provided outside the room adjacent to the principal access door to the room. The switch shall be of the break-glass type and shall be labeled “Ventilation System Emergency Shutoff.”

1207.5 Groups B, F, M and S Occupancies. In Groups B, F, M and S Occupancies, or portions thereof, where Class I, II or III-A liquids are used, mechanical exhaust shall be provided sufficient to produce six air changes per hour. Such mechanical exhaust shall be taken from a point at or near the floor level.

1207.6 Group S Parking Garages. In parking garages, other than open parking garages as defined in Section 405.2, used for storing or handling of automobiles operating under their own power and on loading platforms in bus terminals, ventilation shall be provided capable of exhausting a minimum of 1.5 cubic feet per minute (cfm) per square foot (0.708 L/s/m²) of gross floor area. The
building official may approve an alternate ventilation system designed to exhaust a minimum of 14,000 cfm (6608 L/s) for each operating vehicle. Such system shall be based on the anticipated instantaneous movement rate of vehicles, but not less than 2.5 percent (or one vehicle) of the garage capacity. Automatic carbon monoxide-sensing devices may be employed to modulate the ventilation system to maintain a maximum average concentration of carbon monoxide of 50 parts per million during any eight-hour period, with a maximum concentration not greater than 200 parts per million for a period not exceeding one hour.

EXCEPTION: In Group S, Division 3 repair garages and motor vehicle fuel-dispensing stations without lubrication pits; storage garages; and Group S, Division 5 aircraft hangars, such ventilating system may be omitted when, in the building official’s opinion, the building is supplied with unobstructed openings to the outer air which are sufficient to provide the necessary ventilation.

Connecting offices, waiting rooms, ticket booths, and similar uses shall be supplied with conditioned air under positive pressure.

1207.7 Group H, Division 4 Occupancies. In buildings used for the repair or handling of motor vehicles operating under their own power, mechanical ventilation shall be provided capable of exhausting a minimum of 1.5 cfm per square foot (7.62 L/s/m²) of floor area. Each engine repair stall shall be equipped with an exhaust pipe extension duct, extending to the outside of the building, which, if over 10 feet (3048 mm) in length, shall mechanically exhaust 300 cfm (141.6 L/s). Connecting offices and waiting rooms shall be supplied with conditioned air under positive pressure.

EXCEPTION: In repair garages and aircraft hangars, the building official may authorize the omission of such ventilating equipment when, in his or her opinion, the building is supplied with unobstructed openings to the outer air which are well distributed and sufficient in size to provide the necessary ventilation.
### TABLE A-12-A—OUTDOOR AIR REQUIREMENTS FOR VENTILATION

<table>
<thead>
<tr>
<th>OCCUPANCY 1</th>
<th>OUTDOOR VENTILATION AIR (cfm per square foot of area unless noted) 2 × 0.472 for L/s per m²</th>
</tr>
</thead>
</table>

#### Group A Occupancies

Applications similar to:

- **Food and Beverage Service**
  - Bars, cocktail lounges: 3.00
  - Cafeterias, fast food: 2.00
  - Dining rooms: 1.40
  - Kitchens (cooking): 0.30

- **Sports and Amusement**
  - Assembly rooms: 1.80
  - Ballrooms and discos: 2.50
  - Bowling alleys (seating areas): 1.75
  - Conference rooms: 1.00
  - Gambling casinos: 3.60
  - Game rooms: 1.75
  - Ice arenas: 0.50 (playing areas)
  - Playing floors (gymnasium): 0.60
  - Spectator areas: 2.25
  - Swimming pools (pool and deck area): 0.50

- **Theaters**
  - Auditorium: 2.25
  - Lobbies: 3.00
  - Stages, studios: 1.05
  - Ticket booths: 1.20

- **Transportation**
  - Platforms: 1.50
  - Waiting rooms: 1.50

#### Group B Occupancies

Applications similar to:

- **Offices**
  - Bank vaults: 0.08
  - Conference rooms: 1.00
  - Corridors and utilities: 0.05
  - Darkrooms: 0.50
  - Duplicating, printing areas: 0.50
  - Elevators: 1.00

- **Locker and dressing rooms**: 0.50

- **Meat-processing areas**: 0.15

- **Office spaces**: 0.14

- **Pharmacies**: 0.30

- **Photo studios**: 0.15

- **Public restrooms (per water closet or urinal)**: 50 cfm/water closet or urinal

- **Reception areas**: 0.90

- **Smoking lounges**: 4.20

- **Telecommunication centers and data entry spaces**: 1.20
<table>
<thead>
<tr>
<th>OCCUPANCY 1</th>
<th>OUTDOOR VENTILATION AIR (cfm per square foot of area unless noted) 2 × 0.472 for L/s per m²</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Group E Occupancies</strong></td>
<td></td>
</tr>
<tr>
<td>Applications similar to:</td>
<td></td>
</tr>
<tr>
<td>Education</td>
<td></td>
</tr>
<tr>
<td>Auditoriums</td>
<td>2.25</td>
</tr>
<tr>
<td>Classrooms</td>
<td>0.75</td>
</tr>
<tr>
<td>Corridors</td>
<td>0.00</td>
</tr>
<tr>
<td>Laboratories</td>
<td>0.60</td>
</tr>
<tr>
<td>Libraries</td>
<td>0.30</td>
</tr>
<tr>
<td>Locker rooms</td>
<td>0.50</td>
</tr>
<tr>
<td>Music rooms</td>
<td>0.75</td>
</tr>
<tr>
<td>Smoking lounges</td>
<td>4.20</td>
</tr>
<tr>
<td>Training shop</td>
<td>0.60</td>
</tr>
<tr>
<td><strong>Group F Occupancies</strong></td>
<td></td>
</tr>
<tr>
<td>Applications similar to:</td>
<td></td>
</tr>
<tr>
<td>Dry Cleaners, Laundries</td>
<td></td>
</tr>
<tr>
<td>Coin-operated dry cleaners</td>
<td>0.30</td>
</tr>
<tr>
<td>Coin-operated laundries</td>
<td>0.30</td>
</tr>
<tr>
<td>Commercial dry cleaners</td>
<td>0.90</td>
</tr>
<tr>
<td>Commercial laundries</td>
<td>0.25</td>
</tr>
<tr>
<td>Storage, pick-up areas</td>
<td>1.05</td>
</tr>
<tr>
<td><strong>Group I Occupancies</strong></td>
<td></td>
</tr>
<tr>
<td>Applications similar to:</td>
<td></td>
</tr>
<tr>
<td>Hospitals, Nursing and Convalescent Homes</td>
<td></td>
</tr>
<tr>
<td>Autopsy rooms</td>
<td>0.50</td>
</tr>
<tr>
<td>Medical procedure rooms</td>
<td>0.30</td>
</tr>
<tr>
<td>Operating rooms</td>
<td>0.60</td>
</tr>
<tr>
<td>Patient rooms</td>
<td>0.25</td>
</tr>
<tr>
<td>Physical therapy rooms</td>
<td>0.30</td>
</tr>
<tr>
<td>Recovery and ICU rooms</td>
<td>0.30</td>
</tr>
<tr>
<td>Correction facilities</td>
<td>0.00</td>
</tr>
<tr>
<td>Cells</td>
<td>0.40</td>
</tr>
<tr>
<td>Dining halls</td>
<td>1.50</td>
</tr>
<tr>
<td>Guard stations</td>
<td>0.60</td>
</tr>
<tr>
<td>Public restrooms</td>
<td>50 cfm/water closet or urinal</td>
</tr>
<tr>
<td><strong>Group M Occupancies</strong></td>
<td></td>
</tr>
<tr>
<td>Applications similar to:</td>
<td></td>
</tr>
<tr>
<td>Stores, Sales Floors and Showroom Floors</td>
<td></td>
</tr>
<tr>
<td>Basement and street levels</td>
<td>0.30</td>
</tr>
<tr>
<td>Upper levels</td>
<td>0.20</td>
</tr>
<tr>
<td>Dressing rooms</td>
<td>0.20</td>
</tr>
<tr>
<td>Malls and arcades</td>
<td>0.20</td>
</tr>
<tr>
<td>Shipping and receiving areas</td>
<td>0.15</td>
</tr>
<tr>
<td>Smoking lounges</td>
<td>4.20</td>
</tr>
</tbody>
</table>

*(continued)*
### TABLE A-12-A—OUTDOOR AIR REQUIREMENTS FOR VENTILATION—(Continued)

| OCCUPANCY 1 | OUTDOOR VENTILATION AIR (cfm per square foot of area unless noted) 2  
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Stores, Sales Floors and Showroom Floors (continued)</td>
<td>x 0.472 for L/s per m²</td>
</tr>
<tr>
<td>Storage rooms</td>
<td>0.15</td>
</tr>
<tr>
<td>Warehouse</td>
<td>0.05</td>
</tr>
<tr>
<td>Specialty Shops</td>
<td></td>
</tr>
<tr>
<td>Barber shops</td>
<td>0.38</td>
</tr>
<tr>
<td>Beauty shops</td>
<td>0.63</td>
</tr>
<tr>
<td>Clothiers</td>
<td>0.30</td>
</tr>
<tr>
<td>Drug stores</td>
<td>0.12</td>
</tr>
<tr>
<td>Fabric stores</td>
<td>0.12</td>
</tr>
<tr>
<td>Florists</td>
<td>0.12</td>
</tr>
<tr>
<td>Food stores</td>
<td>0.12</td>
</tr>
<tr>
<td>Furniture stores</td>
<td>0.30</td>
</tr>
<tr>
<td>Hardware stores</td>
<td>0.12</td>
</tr>
<tr>
<td>Pet shops</td>
<td>1.00</td>
</tr>
<tr>
<td>Reducing salons</td>
<td>0.30</td>
</tr>
<tr>
<td>Group R Occupancies</td>
<td></td>
</tr>
<tr>
<td>Division 1</td>
<td></td>
</tr>
<tr>
<td>Hotels, motels, resorts, dormitories</td>
<td></td>
</tr>
<tr>
<td>Assembly rooms</td>
<td>1.80</td>
</tr>
<tr>
<td>Bedrooms</td>
<td>30 cfm/room 5</td>
</tr>
<tr>
<td>Conference rooms</td>
<td>1.00</td>
</tr>
<tr>
<td>Dormitory sleeping rooms</td>
<td>0.30</td>
</tr>
<tr>
<td>Living rooms</td>
<td>30 cfm/room 5</td>
</tr>
<tr>
<td>Lobbies</td>
<td>0.45</td>
</tr>
<tr>
<td>Private bathrooms (intermittent exhaust)</td>
<td>35 cfm/room 5</td>
</tr>
<tr>
<td>Division 1 Apartment Houses and Division 3 Dwellings and Lodging Houses</td>
<td></td>
</tr>
<tr>
<td>Individual Dwelling Units, Lodging Houses</td>
<td></td>
</tr>
<tr>
<td>Bathrooms (intermittent exhaust) or (continuous exhaust)</td>
<td>50 cfm/room 4.5</td>
</tr>
<tr>
<td>Kitchens (intermittent exhaust) or (continuous exhaust)</td>
<td>100 cfm/room 4.5</td>
</tr>
<tr>
<td>Living areas</td>
<td>0.35 ACHP</td>
</tr>
<tr>
<td>Group S Occupancies</td>
<td></td>
</tr>
<tr>
<td>Applications similar to:</td>
<td></td>
</tr>
<tr>
<td>Division 3</td>
<td></td>
</tr>
<tr>
<td>Enclosed parking garages</td>
<td>1.50</td>
</tr>
</tbody>
</table>

1 Applications may not be unique to a single occupancy group. Where specific use is not listed, judgment as to similarity shall be by the building official.
2 Based on net occupiable space. The minimum amount of outdoor air supplied during occupancy shall be permitted to be based on the rate per square foot (m²) of floor area indicated in Table A-12-A or cubic feet per minute (L/s) per person in accordance with nationally recognized standards. See Chapter 35. Controls shall be permitted to adjust outdoor air ventilation rates to provide equivalent rates per person under different conditions of occupancy.
3 The sum of the outdoor and transfer air from adjacent spaces shall be sufficient to provide an exhaust rate of not less than 1.5 cubic feet per minute per square foot (0.708 L/s per m²).
4 Normally supplied by transfer air with local mechanical exhaust with no recirculation.
5 Independent of room size.
6 Air changes per hour, but not less than 15 cubic feet per minute (7.08 L/s) per person. Occupancy shall be based on the number of bedrooms; first bedroom, two persons; each additional bedroom, one person.
Division II—SOUND TRANSMISSION CONTROL

SECTION 1208 — SOUND TRANSMISSION CONTROL

1208.1 General. In Group R Occupancies, wall and floor-ceiling assemblies separating dwelling units or guest rooms from each other and from public space such as interior corridors and service areas shall provide airborne sound insulation for walls, and both airborne and impact sound insulation for floor-ceiling assemblies.

The standards listed below are recognized standards (see Sections 3502 and 3503).

1. ASTM E 90 and E 413, Laboratory Determination of Airborne Sound Transmission Class (STC)
2. ASTM E 492, Impact Sound Insulation
3. ASTM E 336, Airborne Sound Insulation Field Test

1208.2 Airborne Sound Insulation. All such separating walls and floor-ceiling assemblies shall provide an airborne sound insulation equal to that required to meet a sound transmission class (STC) of 50 (45 if field tested).

Penetrations or openings in construction assemblies for piping, electrical devices, recessed cabinets, bathtubs, soffits, or heating, ventilating or exhaust ducts shall be sealed, lined, insulated or otherwise treated to maintain the required ratings.

Entrance doors from interior corridors together with their perimeter seals shall have a laboratory-tested STC rating of not less than 26 and such perimeter seals shall be maintained in good operating condition.

1208.3 Impact Sound Insulation. All separating floor-ceiling assemblies between separate units or guest rooms shall provide impact sound insulation equal to that required to meet an impact insulation class (IIC) of 50 (45 if field tested). Floor coverings may be included in the assembly to obtain the required ratings and must be retained as a permanent part of the assembly and may be replaced only by other floor covering that provides the same sound insulation required above.

1208.4 Tested Assemblies. Field or laboratory tested wall or floor-ceiling designs having an STC or IIC of 50 or more may be used without additional field testing when, in the opinion of the building official, the tested design has not been compromised by flanking paths. Tests may be required by the building official when evidence of compromised separations is noted.

1208.5 Field Testing and Certification. Field testing, when required, shall be done under the supervision of a professional acoustician who shall be experienced in the field of acoustical testing and engineering and who shall forward certified test results to the building official that minimum sound insulation requirements stated above have been met.

1208.6 Airborne Sound Insulation Field Tests. When required, airborne sound insulation shall be determined according to the applicable Field Airborne Sound Transmission Loss Test procedures. All sound transmitted from the source room to the receiving room shall be considered to be transmitted through the test partition.

1208.7 Impact Sound Insulation Field Test. When required, impact sound insulation shall be determined.

SECTION 1209 — SOUND TRANSMISSION CONTROL SYSTEMS

Generic systems as listed in the Fire Resistance Design Manual, Thirteenth Edition, dated April 1992, as published by the Gypsum Association may be accepted where a laboratory test indicates that the requirements of Section 1208 are met by the system.
Appendix Chapter 13
ENERGY CONSERVATION IN NEW BUILDING CONSTRUCTION

SECTION 1302 — GENERAL
1302.1 Purpose. The purpose of this appendix is to regulate the design and construction of the exterior envelopes and selection of heating, ventilating and air-conditioning, service water heating, electrical distribution and illuminating systems and equipment required for the purpose of effective conservation of energy within a building or structure governed by this code.

1302.2 Model Energy Code Adopted. In order to comply with the purpose of this appendix, buildings shall be designed to comply with the requirements of the Model Energy Code promulgated jointly by the International Conference of Building Officials, the Southern Building Code Congress International, the Building Officials and Code Administrators International, and the National Conference of States on Building Codes and Standards, dated 1992.
Appendix Chapter 15

REROOFING

SECTION 1514 — GENERAL

All reroofing shall conform to the applicable provisions of Chapter 15 of this code.

Roofing materials and methods of application shall comply with the U.B.C. standards or shall follow manufacturer’s installation requirements when approved by the building official.

SECTION 1515 — INSPECTIONS

New roof coverings shall not be applied without first obtaining an inspection by the building official and written approval from the building official. A final inspection and approval shall be obtained from the building official when the reroofing is complete. The preroofing inspection shall pay particular attention to evidence of accumulation of water. Where extensive ponding of water is apparent, an analysis of the roof structure for compliance with Section 1506 shall be made and corrective measures, such as relocation of roof drains or scuppers, resloping of the roof or structural changes, shall be made.

An inspection report covering the above-listed topics prepared by a special inspector may be accepted in lieu of the preinspection by the building official.

SECTION 1516 — BUILT-UP ROOFS

1516.1 General. Built-up roof covering shall be completely removed before applying the new roof covering. New roofing conforming to Section 1503 shall be applied except that when the new roof is to be applied directly to a nailable deck which has residual bitumen adhering to it, a rosin-sized or other dry sheet shall be installed prior to the installation of the new roof system.

EXCEPTION: The building official may allow existing roof coverings to remain when inspection or other evidence reveals all of the following:

1. That the roof structure is sufficient to sustain the weight of the additional dead load of the roof covering.
2. There is not more than one existing roof covering on the structure.
3. The existing roof covering is securely attached to the deck.
4. The roof deck is structurally sound.
5. The existing insulation is not water soaked.

1516.2 Preparation of Roof and Application of New Covering.

1516.2.1 General. When reroofing without removal of existing roof coverings is permitted by the building official and when the conditions specified in the exceptions to Section 1516.1 above have been met, the reroofing shall be accomplished in accordance with this section.

1516.2.2 Over gravel-surfaced roof coverings. Over gravel-surfaced roof coverings, the roof shall be cleaned of all loose gravel and debris. All blisters, buckles and other irregularities shall be cut and made smooth and secure. Minimum 3/8-inch (9.5 mm) insulation board shall be nailed or securely cemented to the existing roofing with hot bitumen over which a new roof complying with Section 1503 shall be installed. When insulation board is to be attached with hot bitumen, the existing surface shall be primed.

Alternatively, on nailable decks only, all existing gravel shall be spudded off to provide a smooth surface. All blisters, buckles and other irregularities shall be cut and made smooth and secure. A rosin-sized or other dry sheet shall be installed and a base sheet as defined in the code shall be mechanically fastened in place. New roofing conforming to Section 1503 shall be applied.
1516.2.3 Over smooth or cap-sheet surface. Over smooth or cap-sheet surfaced roof coverings, all blisters, buckles and other irregularities shall be cut and made smooth and secure. In the case of nonnailable decks, a base sheet shall be spot cemented to the existing roofing. New roofing conforming to Section 1503 shall be applied.

In the case of nailable decks, a base sheet shall be nailed in place. In those cases where residual materials may cause the new base sheet to adhere to the old roof, a rosin-sized dry or other sheet shall be installed under the base sheet. New roofing conforming to Section 1503 shall be applied.

1516.3 Construction Details.

1516.3.1 Flashings and edgings. Vent flashings, metal edgings, drain outlets, metal counterflashing and collars shall be removed and cleaned. Rusted metal shall be replaced. Metal shall be primed with cutback primer prior to installation. Collars and flanges shall be flashed per the roofing manufacturer’s instructions.

1516.3.2 Intersecting walls. All concrete and masonry walls shall be completely cleaned and primed to receive new flashing. All vertical walls, other than concrete or masonry, shall have the surface finish material removed to a height of approximately 6 inches (153 mm) above the deck new roof surface to receive new roofing and flashing. All rotted wood shall be replaced with new materials. Surface finish material shall be replaced.

1516.3.3 Parapets. Parapets of area separation walls shall have noncombustible faces, including counterflashing and coping materials.

EXCEPTION: Combustible roofing may extend 7 inches (178 mm) above the roof surface.

1516.3.4 Cant strips. Where space permits, cant strips shall be installed at all angles. All angles shall be flashed with at least two more layers than in the new roof with an exposed finish layer of inorganic felt or mineral surfaced cap sheet.

SECTION 1517 — SHINGLES AND SHAKES

1517.1 General. Based on inspection of the existing roofing, the building official may permit the recovering of existing shingle or shake roofing in accordance with the provisions of this section.

1517.2 Asphalt Shingle Application. Not more than two overlays of asphalt shingles shall be applied over an existing asphalt shingle roof.

Not more than two overlays of asphalt shingle roofing shall be applied over wood shingles. Asphalt shingles applied over wood shingles shall have an overlay underlayment of not less than Type 30 nonperforated felt.

On structures with a slope of 2 units vertical in 12 units horizontal (16.7% slope) or greater and having no more than one existing built-up roof, one overlay of asphalt shingles may be applied, provided:

1. If the built-up roof has a gravel surface, the gravel must first be spudded off to provide a smooth surface. All blisters and irregularities shall be cut and made smooth and secure and an underlayment of not less than Type 30 nonperforated felt shall be installed.

2. If the built-up roof has a smooth or cap-sheet surface, all blisters and irregularities shall be cut and made smooth and secure and an underlayment of not less than Type 30 nonperforated felt shall be installed.

1517.3 Wood Shake Application. Not more than one overlay of wood shakes shall be applied over an existing asphalt shingle or wood shingle roof [with one layer of 18-inch (457 mm), Type 30 nonperforated felt interlaced between each layer of shakes].

1517.4 Wood Shingle Application. Not more than one overlay of wood shingles shall be applied over existing wood shingles.
1517.5 Application over Shakes. New roof covering shall not be applied over an existing shake roof.

1517.6 Flashing and Edgings. Rusted or damaged flashing, vent caps and metal edgings shall be replaced with new materials as necessary.

1517.7 Reroofing. When the application of a new roof covering over wood shingle or shake roofs creates a combustible concealed space, the combustible concealed space shall be filled with the materials listed in Section 708.2.2.

SECTION 1518 — TILE

Tile roofs may be applied over existing roof coverings when approved by the building official. Such installations shall be substantiated by structural data indicating that the existing or modified roof-framing system is adequate to support the additional tile roof covering.

Existing tile roofing shall be removed and cleaned. Damaged or rusted flashing and cracked or broken tile shall be replaced. Tile shall be applied in accordance with the requirements of Section 1507.7 (application of clay or concrete tile) and in conformance with the original manufacturer’s specifications.

EXCEPTION: When the original manufacturer’s specifications are no longer available, the tile may be reinstalled to match the prior installation except that clay and terra-cotta hips and ridge tile shall be reinstalled with portland cement mortar.

SECTION 1519 — METAL ROOFING

Reroofing with metal roofing shall be in accordance with the original manufacturer’s specifications or when the original manufacturer’s specifications are no longer available as required by Section 1507.8.

SECTION 1520 — SPRAY POLYURETHANE FOAM ROOFS

1520.1 General. Spray-applied polyurethane foam may be applied directly to an existing built-up roofing system when the completed assembly is a Class A, B or C roof covering that meets the criteria in Section 2602.5.3. When applied on a fire-resistive roof-ceiling assembly, the completed assembly shall comply with Section 710.1.

1520.2 Inspection of Existing Roof. The building official may allow existing roof coverings to remain when inspection or other evidence reveals all of the following:

1. That the roof structure is sufficient to sustain the weight of the additional dead load of the roof covering.
2. The existing roof covering is securely attached to the deck.
3. The roof deck is structurally sound.
4. The existing insulation is not water soaked.

1520.3 Preparation of Roof and Application of New Covering.

1520.3.1 General. When reroofing without removal of existing roof coverings is permitted by the building official and when the conditions specified in Section 1520.2 above have been met, the reroofing shall be accomplished in accordance with this section.

1520.3.2 Over gravel-surfaced roof coverings. Over gravel-surfaced roof coverings, the roof shall be cleaned of all loose gravel and debris. All blisters, buckles and other irregularities shall be cut and be made smooth and secure. The completed assembly must meet the conditions set forth in Section 2602.5.3, and Section 710.1, when applied on a fire-resistive roof-ceiling assembly.
1520.3.3 Over smooth or cap-sheet surfaces. Spray-applied polyurethane foam roofing may be applied directly to a properly prepared smooth or cap-sheet surface. The completed assembly must meet the conditions set forth in Section 2602.5.3, and Section 710.1, when applied on a fire-resistant roof-ceiling assembly.

1520.4 Construction Details.

1520.4.1 Flashings and edgings. Flashings and waterproof coverings for expansion joints shall be compatible with the polyurethane foam system.

1520.4.2 Miscellaneous materials. Miscellaneous materials such as adhesives, elastomeric caulking compounds, metal, vents and drains shall be a composite part of the roof system.

SECTION 1521 — OTHER ROOFINGS

Reroofing with systems not covered elsewhere in Chapter 15 or this appendix, such as, but not limited to, those that are fluid applied or applied as nonasphaltic sheets, shall be done with materials and procedures approved by the building official.
Appendix Chapter 29
MINIMUM PLUMBING FIXTURES
NOTE: This is a new appendix chapter.

SECTION 2905 — GENERAL

Each building shall be provided with sanitary facilities, including provisions for accessibility in accordance with Chapter 11. Plumbing fixtures shall be provided for the type of building occupancy with the minimum numbers as shown in Table A-29-A. The number of fixtures are the minimum required as shown in Table A-29-A and are assumed to be based on 50 percent male and 50 percent female. The occupant load factors shall be as shown in Table A-29-A.

EXCEPTION: Where circumstances dictate that a different ratio is needed, the adjustment shall be approved by the building official.
<table>
<thead>
<tr>
<th>TYPE OF BUILDING OR OCCUPANCY</th>
<th>WATER CLOSETS(^2) (fixtures per person)</th>
<th>LAVATORIES(^4) (fixtures per person)</th>
<th>BATHTUB OR SHOWER (fixtures per person)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>MALE</td>
<td>FEMALE</td>
<td>MALE</td>
</tr>
<tr>
<td>For the occupancies listed below, use 30 square feet (2.29 m(^2)) per occupant for the minimum number of plumbing fixtures.</td>
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<tr>
<td>Group A</td>
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<tr>
<td>Conference rooms, dining rooms, drinking establishments, exhibit rooms, gymnasiums, lounges, stages and similar uses including restaurants classified as Group B Occupancies</td>
<td>1:1-25</td>
<td>1:1-25</td>
<td>one for each water closet up to four; then one for each two additional water closets</td>
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<tr>
<td></td>
<td>2:26-75</td>
<td>2:26-75</td>
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<td></td>
<td>3:76-125</td>
<td>3:76-125</td>
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<td></td>
<td>4:126-200</td>
<td>4:126-200</td>
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<td></td>
<td>5:201-300</td>
<td>5:201-300</td>
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<td></td>
<td>6:301-400</td>
<td>6:301-400</td>
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<tr>
<td>Over 400, add one fixture for each additional 200 males or 150 females.</td>
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<tr>
<td>For the assembly occupancies listed below, use the number of fixed seating or, where no fixed seating is provided, use 15 square feet (1.39 m(^2)) per occupant for the minimum number of plumbing fixtures.</td>
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<td>Assembly places—</td>
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<tr>
<td></td>
<td>2:51-100</td>
<td>4:51-100</td>
<td>2:201-400</td>
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<tr>
<td></td>
<td>4:151-300</td>
<td>8:201-400</td>
<td>Over 750, add one fixture for each additional 500 persons.</td>
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<tr>
<td>Over 300 males, add one fixture for each additional 200, and over 400 females add one for each 125.</td>
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<tr>
<td>For the assembly occupancies listed below, use the number of fixed seating or, where no fixed seating is provided, use 30 square feet (2.29 m(^2)) per occupant for the minimum number of plumbing fixtures.</td>
<td></td>
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<tr>
<td>Worship places</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Principal assembly area</td>
<td>one per 150</td>
<td>one per 75</td>
<td>one per 2 water closets</td>
</tr>
<tr>
<td>Educational and activity unit</td>
<td>one per 125</td>
<td>one per 75</td>
<td>one per 2 water closets</td>
</tr>
<tr>
<td>For the occupancies listed below, use 200 square feet (18.58 m(^2)) per occupant for the minimum number of plumbing fixtures.</td>
<td></td>
<td></td>
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<tr>
<td>Group B</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Offices or public buildings</td>
<td>1:1-15</td>
<td>1:1-15</td>
<td>one per 2 water closets</td>
</tr>
<tr>
<td></td>
<td>2:16-35</td>
<td>2:16-35</td>
<td></td>
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<tr>
<td></td>
<td>3:36-55</td>
<td>3:36-55</td>
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<tr>
<td>Over 55, add one for each 50 persons.</td>
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</tbody>
</table>

(Continued)
<table>
<thead>
<tr>
<th>TYPE OF BUILDING OR OCCUPANCY</th>
<th>WATER CLOSETS¹</th>
<th>LAVATORIES²</th>
<th>BATHTUB OR SHOWER</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>MALE (fixtures per person)</td>
<td>MALE (fixtures per person)</td>
<td>(fixtures per person)</td>
</tr>
<tr>
<td>For the occupancies listed below, use 50 square feet (4.65 m²) per occupant for the minimum number of plumbing fixtures.</td>
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<tr>
<td><strong>Group E</strong></td>
<td></td>
<td></td>
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<tr>
<td>Schools—for staff use</td>
<td>1:1-15</td>
<td>1:1-15</td>
<td>one per 40</td>
</tr>
<tr>
<td>All schools</td>
<td>2:16-35</td>
<td>2:16-35</td>
<td>one per 40</td>
</tr>
<tr>
<td></td>
<td>3:36-55</td>
<td>3:36-55</td>
<td>one per 40</td>
</tr>
<tr>
<td>Over 55, add one fixture for each additional 40 persons.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Schools—for student use</td>
<td>1:1-20</td>
<td>1:1-20</td>
<td>one per 40</td>
</tr>
<tr>
<td>Day care</td>
<td>2:21-50</td>
<td>2:21-50</td>
<td>one per 40</td>
</tr>
<tr>
<td></td>
<td>Over 50, add one fixture for each additional 50 persons.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elementary</td>
<td>one per 30</td>
<td>one per 25</td>
<td>one per 35</td>
</tr>
<tr>
<td>Secondary</td>
<td>one per 40</td>
<td>one per 30</td>
<td>one per 40</td>
</tr>
<tr>
<td>For the occupancies listed below, use 50 square feet (4.65 m²) per occupant for the minimum number of plumbing fixtures.</td>
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<tr>
<td>Education Facilities other than Group E</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Others (colleges, universities, adult centers, etc.)</td>
<td>one per 40</td>
<td>one per 30</td>
<td>one per 40</td>
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<tr>
<td>one per 40</td>
<td>one per 30</td>
<td>one per 40</td>
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<tr>
<td>For the occupancies listed below, use 2,000 square feet (185.8 m²) per occupant for the minimum number of plumbing fixtures.</td>
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<tr>
<td><strong>Group F</strong></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Workshop, foundries and similar establishments, and Group H Occupancies</td>
<td>1:1-10</td>
<td>1:1-10</td>
<td>one for each two water closets</td>
</tr>
<tr>
<td></td>
<td>2:11-25</td>
<td>2:11-25</td>
<td>one for each two water closets</td>
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<td></td>
<td>3:26-50</td>
<td>3:26-50</td>
<td>one for each two water closets</td>
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<td></td>
<td>4:51-75</td>
<td>4:51-75</td>
<td>one for each two water closets</td>
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<td></td>
<td>5:76-100</td>
<td>5:76-100</td>
<td>one for each two water closets</td>
</tr>
<tr>
<td>Over 100, add one fixture for each additional 300 persons.</td>
<td></td>
<td></td>
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<tr>
<td>For the occupancies listed below, use the designated application and 200 square feet (18.58 m²) per occupant of the general use area for the minimum number of plumbing fixtures.</td>
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<tr>
<td><strong>Group I</strong></td>
<td></td>
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</tr>
<tr>
<td>Hospital waiting rooms</td>
<td>one per room (usable by either sex)</td>
<td>one per room</td>
<td>one per room</td>
</tr>
<tr>
<td>Hospital general use areas</td>
<td>1:1-15</td>
<td>1:1-15</td>
<td>one per each two water closets</td>
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<td></td>
<td>2:16-35</td>
<td>2:16-35</td>
<td>one per each two water closets</td>
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<td></td>
<td>3:36-55</td>
<td>3:36-55</td>
<td>one per each two water closets</td>
</tr>
<tr>
<td>Over 55, add one fixture for each additional 40 persons.</td>
<td></td>
<td></td>
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<tr>
<td>Hospitals</td>
<td>one per room</td>
<td>one per room</td>
<td>one per room</td>
</tr>
<tr>
<td>Patient room</td>
<td>one per eight patients</td>
<td>one per 10 patients</td>
<td>one per 20 patients</td>
</tr>
<tr>
<td>Ward room</td>
<td>one per eight patients</td>
<td>one per 10 patients</td>
<td>one per 20 patients</td>
</tr>
<tr>
<td>Jails and reformatories</td>
<td>Cell</td>
<td>one per cell one per exercise room</td>
<td>one per cell one per exercise room</td>
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<td>------------------------</td>
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</tr>
<tr>
<td>Exercise room</td>
<td>one per exercise room</td>
<td>one per exercise room</td>
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</table>

1. The figures shown are based on one fixture being the minimum required for the number of persons indicated or any fraction thereof.
2. Drinking fountains shall not be installed in toilet rooms.
3. When the design occupant load is less than 10 persons, a facility usable by either sex may be approved by the building official.
4. Any category not mentioned specifically or about which there are any questions shall be classified by the building official and included in the category which it most nearly resembles, based on the expected use of the plumbing facilities.
5. Where urinals are provided, one water closet less than the number specified may be provided for each urinal installed, except the number of water closets in such cases shall not be reduced to less than one half of the minimum specified.
6. Twenty-four inches (610 mm) of wash sink or 18 inches (457 mm) of a circular basin, when provided with water outlets for such space, shall be considered equivalent to one lavatory.

NOTE: Occupant loads over 30 shall have one drinking fountain for each 150 occupants.
APPENDIX CHAPTER 30

Appendix Chapter 30
ELEVATORS, DUMBWAITERS, ESCALATORS AND MOVING WALKS

SECTION 3008 — PURPOSE
The purpose of this appendix is to safeguard life, limb, property and public welfare by establishing minimum requirements regulating the design, construction, alteration, operation and maintenance of elevators, dumbwaiters, escalators and moving walks and by establishing procedures by which these requirements may be enforced.

SECTION 3009 — SCOPE
This appendix shall apply to new and existing installations of elevators, dumbwaiters, escalators and moving walks, requiring permits therefore and providing for the inspection and maintenance of such conveyances.

SECTION 3010 — DEFINITIONS
For purposes of this appendix, certain terms are defined as follows:


SECTION 3011 — PERMITS—CERTIFICATES OF INSPECTION

3011.1 Permits Required. It shall be unlawful to hereafter install any new elevator, moving walk, escalator or dumbwaiter, or to make major alterations to any existing elevator, dumbwaiter, escalator or moving walk as defined in Part XII of the ANSI code, without having first obtained a permit for such installation from the building official. Permits shall not be required for maintenance or minor alterations.

3011.2 Certificates of Inspection Required. It shall be unlawful to operate any elevator, dumbwaiter, escalator or moving walk without a current certificate of inspection issued by the building official. Such certificate shall be issued upon payment of prescribed fees and the presentation of a valid inspection report indicating that the conveyance is safe and that the inspector's and tests have been performed in accordance with Part X of the ANSI code. Certificates shall not be issued when the conveyance is posted as unsafe pursuant to Section 3015.

EXCEPTION: Certificates of inspection shall not be required for conveyances within a dwelling unit.

3011.3 Application for Permits. Application for a permit to install shall be made on forms provided by the building official, and the permit shall be issued to an owner upon payment of the permit fees specified in this section.

3011.4 Application for Certificates of Inspection. Application for a certificate of inspection shall be made by the owner of an elevator, dumbwaiter, escalator or moving walk. Applications shall be accompanied by an inspection report as described in Section 3014. Fees for certificates of inspection shall be as specified in this section.

3011.5 Fees. A fee for each permit or certificate of inspection shall be paid to the building official as follows:

New Installations:

Passenger or freight elevator, escalator, moving walk:

1–498
Up to and including $40,000 of valuation—$55.00
Over $40,000 of valuation—$55.00 plus $1.00 for each $1,000 or fraction thereof over $40,000
Dumbwaiter or Private Residence Elevator:
Up to and including $10,000 of valuation—$15.00
Over $10,000 of valuation—$15.00 plus $1.00 for each $1,000 or fraction thereof over $10,000

Major Alterations:
Fees for major alterations shall be as set forth in Table 1-A.
Installation fees include charges for the first year's annual inspection fee and charges for electrical
equipment on the conveyance side of the disconnect switch.
Annual certificates of inspection:
- For each elevator: $25.00
- For each escalator or moving walk: $15.00
- For each commercial dumbwaiter: $10.00

(Each escalator or moving walk unit powered by one motor shall be considered as a separate escalator or moving walk.)

SECTION 3012 — ANSI CODE ADOPTED


SECTION 3013 — DESIGN

For detailed design, construction and installation requirements, see Chapter 15 and the appropriate requirements of the ANSI code.

In Seismic Zones 3 and 4, elevators shall conform to Appendix F of the ANSI code.

SECTION 3014 — REQUIREMENTS FOR OPERATION AND MAINTENANCE

3014.1 General. The owner shall be responsible for the safe operation and maintenance of each elevator, dumbwaiter, escalator or moving walk installation and shall cause periodic inspections, tests and maintenance to be made on such conveyances as required in this section.

3014.2 Periodic Inspections and Tests. Routine and periodic inspections and tests shall be made as required by Part X of the ANSI code.

3014.3 Alterations, Repairs and Maintenance. Alterations, repairs and maintenance shall be made as required by Part XII of the ANSI code.

3014.4 Inspection Costs. All costs of such inspections and tests shall be paid by the owner.

3014.5 Inspection Reports. After each required inspection, a full and correct report of such inspection shall be filed with the building official.

SECTION 3015 — UNSAFE CONDITIONS

When an inspection reveals an unsafe condition, the inspector shall immediately file with the owner and the building official a full and true report of such inspection and such unsafe condition. If the
building official finds that the unsafe condition endangers human life, the building official shall cause to be placed on such elevator, escalator or moving walk, in a conspicuous place, a notice stating that such conveyance is unsafe. The owner shall see to it that such notice of unsafe condition is legibly maintained where placed by the building official. The building official shall also issue an order in writing to the owner requiring the repairs or alterations to be made to such conveyance which are necessary to render it safe and may order the operation thereof discontinued until the repairs or alterations are made or the unsafe conditions are removed. A posted notice of unsafe conditions shall be removed only by the building official when satisfied that the unsafe conditions have been corrected.
Appendix Chapter 31
SPECIAL CONSTRUCTION

Division I—FLOOD-RESISTANT CONSTRUCTION

SECTION 3104 — GENERAL

3104.1 Purpose. The provisions of this division are intended to promote public safety and welfare by reducing the risk of flood damage in areas prone to flooding.

3104.2 Scope. Buildings and structures erected in areas prone to flooding shall be constructed as required by the provisions of this division. The base flood elevation shown on the approved flood hazard map is the minimum elevation used to define areas prone to flooding, unless records indicate a higher elevation is to be used. The flood-prone areas are defined in the jurisdiction’s floodplain management ordinance.

3104.3 Definitions. For the purpose of this division, certain terms are defined as follows:

- **BASE FLOOD ELEVATION** is the depth or peak elevation of flooding, including wave height, having 1 percent chance of being equaled or exceeded in any given year.

- **FLOOD HAZARD MAP** is a map published by an approved agency, which defines the flood boundaries, elevations and insurance risk zones as determined by a detailed flood insurance study.

- **HAZARD ZONES** are areas which have been determined to be prone to flooding and are classified as either flood hazard zones, A zones, or coastal high-hazard zones, V zones, in accordance with Sections 3107.1 and 3108.1.

SECTION 3105 — MANUFACTURED STRUCTURES

New or replacement manufactured structures located in any flood hazard zone shall be located in accordance with the applicable elevation requirements of Sections 3107.2 and 3108.2, and the anchor and tie-down requirements of Section 3110.1.

SECTION 3106 — PROTECTION OF MECHANICAL AND ELECTRICAL SYSTEMS

New or replacement electrical equipment and heating, ventilating, air conditioning and other service facilities shall be either placed above the base flood elevation or protected to prevent water from entering or accumulating within the system components during floods up to the base flood elevation. Installation of electrical wiring and outlets, switches, junction boxes and panels below the base flood elevation shall conform to the provisions of the Electrical Code for such items in wet locations.

SECTION 3107 — FLOOD HAZARD ZONES—A ZONES

3107.1 General. Areas which have been determined as prone to flooding but not subject to wave heights of more than 3 feet (914 mm) are designated as flood hazard zones. Buildings or structures erected in flood hazard zones shall be designed and constructed in accordance with this section.

3107.2 Elevation. Buildings or structures erected within a flood hazard zone shall have the lowest floor, including basement floors, located at or above the base flood elevation.

**Exceptions:**
1. Except for Group R Occupancies, any occupancy may have floors below the base flood elevation in accordance with Section 3107.4.
2. Floors of buildings or structures which are used only for building access, exits, foyers, storage and parking garages may be below the base flood elevation in accordance with Section 3107.3.
3107.3 *Enclosures below Base Flood Elevation.* Enclosed spaces below the base flood elevation shall not be used with the exception of building access, exits, foyers, storage and parking garages. Enclosed spaces shall be provided with vents, valves or other openings which will automatically equalize the lateral pressure of waters acting on the exterior wall surfaces. The bottom of the openings shall not be higher than 12 inches (305 mm) above finish grade. A minimum of two openings per building, or one opening for each enclosure below the base flood elevation, whichever is greater, shall be provided. The total net area of such openings shall not be less than 4 square feet or 1 square inch for every square foot (0.37 m² or 0.007 m² for every 1 m²) of enclosed area, whichever is greater.

3107.4 *Flood-resistant Construction.* Buildings or structures of any occupancy other than Group R may, in lieu of meeting the elevation provisions of Section 3107.2, be erected with floors usable for human occupancy below the base flood elevation, provided the following conditions are met:

1. Space below the base flood elevation shall be constructed with exterior walls and floors that are impermeable to the passage of water.

2. Structural components subject to hydrostatic and hydrodynamic loads during the occurrence of flooding to the base flood elevation shall be capable of resisting such forces, including the effect of buoyancy.

3. Openings below the base flood elevation shall be provided with watertight closures and shall have adequate structural capacity to support flood loads acting upon closure surfaces.

4. Floor and wall penetrations for plumbing, mechanical and electrical systems shall be made watertight to prevent flood water seepage through spaces between penetration and wall construction materials. Sanitary sewer and storm drainage systems that have openings below the base flood elevation shall be provided with closure devices to prevent backwater flow during conditions of flooding.

3107.5 *Plan Requirements for Flood-resistant Construction.* When buildings or structures are to be constructed in accordance with Section 3107.4, an architect or engineer licensed by the state to practice as such shall prepare plans showing details of the floor wall and foundation support components. Calculations and approved technical data used to comply with the conditions of Section 3107.4 shall also be provided.

SECTION 3108 — COASTAL HIGH HAZARD ZONES—V ZONES

3108.1 *General.* Areas which have been determined to be subject to wave heights in excess of 3 feet (914 mm) or subject to high-velocity wave run-up or wave-induced erosion are designated as coastal high-hazard zones. Buildings or structures erected in coastal high-hazard zones shall be designed and constructed in accordance with this section.

3108.2 *Elevation.* Buildings or structures erected within a coastal high-hazard zone shall be elevated so that the lowest portion of horizontal structural members with the exception of footings, mat or raft foundations, piles, pile caps, columns, grade beams and bracing shall be located at or above the base flood elevation.

3108.3 *Enclosures below Base Flood Elevation.* Spaces below the base flood elevation in a coastal high-hazard zone shall be free of obstruction.

**EXCEPTIONS:**
1. Footings, mat or raft foundations, piles, pile caps, columns, grade beams and bracing that provide structural stability for the building.
2. Structural systems of entrances and required exits.
3. Storage of portable or mobile items that can be moved in the event of a storm.
4. Walls or partitions may be used to enclose all or part of the space, provided they are not part of the structural support of the building and are designed to break away under high tides or wave action without causing dam-

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3108.4 Foundations. Buildings or structures erected in coastal high-hazard zones shall be supported on piles or columns. When piles are used, they shall have soil penetration to resist the combined wave and wind loads to which they may be subject during a flood equal to the base flood elevation. Pile design shall include consideration of decreased resistance capacity caused by scour of the soil strata surrounding the piles. Pile system design and installation shall be made in accordance with the provisions of this code. When mat or raft foundations are used, they shall be located at a depth to provide protection from erosion or scour.

3108.5 Plan Requirements for Coastal High-hazard Construction. When buildings or structures are to be constructed in accordance with Section 3108, an architect or engineer licensed by the state to practice as such shall submit plans showing details of the foundation support and connection components to comply with the requirements of Section 3108.4. When solid walls or partitions are proposed below the base flood elevation, wall, framing and connection details of such walls in accordance with Section 3108.3 shall be provided.

SECTION 3109 — ELEVATION CERTIFICATION

A land surveyor, architect or engineer licensed by the state to practice as such shall certify that the actual elevation in relation to mean sea level of the lowest floor, if in a flood hazard zone, or the bottom of the lowest horizontal structural member, if in a coastal high-hazard zone, are at or above the minimum elevation when required by the provisions of Sections 3107.2 and 3108.2.

SECTION 3110 — DESIGN REQUIREMENTS

3110.1 Structural Systems. Structural systems of buildings or structures shall be constructed, connected and anchored to resist flotation, collapse or permanent lateral movement due to loads from flooding equal to the base flood elevation.

3110.2 Design Loads. The structural system shall be designed in accordance with well-established engineering principles and with consideration of hydrodynamic and hydrostatic loads. The required loading shall be established by site-specific criteria or approved national standards. Impact loads shall be considered in the analysis of the structural system.

3110.3 Load Combinations. Loading combinations shall be subject to approval by the building official. The structural system shall be designed to resist each combination of loading acting simultaneously. In lieu of site-specific loading requirements, load combinations from an approved national standard may be used.

3110.4 Stress Increases. Allowable stresses may be increased one third for flood loads in combination with dead load or dead and live load combinations. When strength design is used, flood loads may be considered as dead loads when considering dead and live load conditions. Flood loads may be considered as wind loads in other load combinations.

3110.5 Overturning. Buildings and structures and parts or elements shall be designed to resist sliding or overturning by at least 1.5 times the lateral force or overturning moment caused by wind and flood loads acting simultaneously. For the purpose of providing stability, only the dead load shall be considered effective in resisting overturning.

3110.6 Breakaway Walls. When walls or partitions located below the base flood elevation are required to break away in accordance with Section 3108.3, such walls shall be designed for not less than 10 pounds per square foot (psf) (0.48 kN/m²) or more than 20 psf (0.96 kN/m²) on the vertical projected area.
Appendix Chapter 31

1994 Uniform Building Code

Division II—Membrane Structures

Section 3111 — General

3111.1 Purpose. The purpose of this appendix is to establish minimum standards of safety for the construction and use of air-supported, air-inflated and membrane-covered cable or frame structures, collectively known as membrane structures.

3111.2 Scope. The provisions of this appendix shall apply to membrane structures erected for a period of 180 days or longer. Those erected for a shorter period of time shall comply with applicable provisions of the Fire Code.

   Exception: Water storage facilities, water clarifiers, water treatment plants, sewer plants, aquaculture pond covers, residential and agricultural greenhouses and similar facilities not used for human occupancy need meet only the requirements of Section 3112.2 and Section 3115.

3111.3 Definitions. For the purpose of this appendix, certain terms are defined as follows:

   Air-inflated Structure is a building where the shape of the structure is maintained by air pressurization of cells or tubes to form a barrel vault over the usable area. Occupants of such a structure do not occupy the pressurized area used to support the structure.

   Air-supported Structure is a building wherein the shape of the structure is attained by air pressure and occupants of the structure are within the elevated pressure area. Air-supported structures are of two basic types:

   1. Single skin—Where there is only the single outer skin and the air pressure is directly against that skin.

   2. Double skin—Similar to a single skin, but with an attached liner which is separated from the outer skin and provides an air space which serves for insulation, acoustic, aesthetic or similar purposes.

   A cable-restrained air-supported structure is one in which the uplift is resisted by cables or webbing which are anchored to either foundations or deadmen. Reinforcing cable or webbing may be attached by various methods to the membrane or may be an integral part of the membrane. This is not a cable-supported structure.

   Cable Structure is a nonpressurized structure in which a mast and cable system provide support and tension to the membrane weather barrier and the membrane imparts structural stability to the structure.

   Frame-Covered Structure is a nonpressurized building wherein the structure is composed of a rigid framework to support tensioned membrane which provides the weather barrier.

   Membrane is a thin, flexible, impervious material capable of being supported by an air pressure of 1.5 inches of water column (373 Pa).

   Noncombustible Membrane Structure is a membrane structure in which the membrane and all component parts of the structure are noncombustible as defined by Section 215.

   Tent is any structure, enclosure or shelter constructed of canvas or pliable material supported by any manner except by air or the contents it protects.

Section 3112 — Type of Construction and General Requirements

3112.1 General. Membrane structures shall be classified as Type V-N construction, except that noncombustible membrane structures may be classified as Type II-N construction.

   Exception: A noncombustible membrane structure used exclusively as a roof and located more than 25 feet (7620 mm) above any floor, balcony or gallery is deemed to comply with the roof construction requirements for Type I and Type II fire-resistant construction, provided that such a structure complies with the requirements of this section.
3112.2 Membrane Material. Membranes shall be either noncombustible as defined by Section 215, or flame retardant conforming to U.B.C. Standard 31-1, which is a part of this code (see Chapter 35).

EXCEPTION: Plastic less than 20-mil (0.51 mm) thickness used in greenhouses and for aquaculture pond covers need not be flame retardant.

3112.3 Applicability of Other Provisions. Except as specifically otherwise required by this section, membrane structures shall meet all applicable provisions of this code. Roof coverings shall be fire retardant.

EXCEPTION: Roof coverings for Group M, Division I Occupancies not exceeding 1,000 square feet (93 m²) in area need not be fire retardant.

3112.4 Allowable Floor Areas. The area of a membrane structure shall not exceed the limits set forth in Table 5-B, except as provided in Section 505.

3112.5 Maximum Height. Membrane structures shall not exceed one story nor shall they exceed the height limits in feet (mm) set forth in Table 5-B.

EXCEPTION: Noncombustible membrane structures serving as roof only.

SECTION 3113 — INFLATION SYSTEMS

3113.1 General. Air-supported and air-inflated structures shall be provided with primary and auxiliary inflation systems to meet the minimum requirements of this section.

3113.2 Equipment Requirements. The inflation system shall consist of one or more blowers and shall include provisions for automatic control to maintain the required inflation pressures. The system shall be so designed as to prevent overpressurization of the system.

In addition to the primary inflation system, in buildings exceeding 1,500 square feet (139.4 m²) in area, there shall be provided an auxiliary inflation system with sufficient capacity to maintain the inflation of the structure in case of primary system failure.

The auxiliary inflation system shall operate automatically if there is a loss of internal pressure or should the primary blower system become inoperative.

Blower equipment shall meet the following requirements:

1. Blowers shall be powered by continuous rated motors at the maximum power required for any flow condition as required by the structural design.

2. Blowers shall be provided with inlet screens, belt guards and other protective devices as may be required by the building official to provide protection from injury.

3. Blowers shall be housed within a weather-protecting structure.

4. Blowers shall be equipped with back draft check dampers to minimize air loss when inoperative.

5. Blower inlets shall be located to provide protection from air contamination. Location of inlets shall be approved by the building official.

3113.3 Emergency Power. Whenever an auxiliary inflation system is required, an approved standby power-generating system shall be provided. The system shall be equipped with a suitable means for automatically starting the generator set upon failure of the normal electrical service and for automatic transfer and operation of all the required electrical functions at full power within 60 seconds of such normal service failure. Standby power shall be capable of operating independently for a minimum of four hours.

SECTION 3114 — SECTION PROVISIONS

A system capable of supporting the membrane in the event of deflation shall be provided in all air-supported and air-inflated structures having an occupant load of more than 50 or when covering
a swimming pool regardless of occupant load. Such system shall maintain the membrane at least 7 feet (2134 mm) above the floor, seating area or surface of the water.

**EXCEPTION:** Membrane structures used as a roof for Type I or Type II fire-resistant construction must be maintained not less than 25 feet (7620 mm) above floor or seating areas.

**SECTION 3115 — ENGINEERING DESIGN**

All membrane structures shall be structurally designed in accordance with criteria approved by the building official and developed by an engineer or architect licensed by the state to practice as such.
Division III—PATIO COVERS

SECTION 3116 — PATIO COVERS DEFINED

Patio covers are one-story structures not exceeding 12 feet (3657 mm) in height. Enclosure walls may have any configuration, provided the open area of the longer wall and one additional wall is equal to at least 65 percent of the area below a minimum of 6 feet 8 inches (2032 mm) of each wall, measured from the floor. Openings may be enclosed with insect screening or plastic that is readily removable translucent or transparent plastic not more than 0.125 inch (3.2 mm) in thickness.

Patio covers may be detached or attached to other buildings as accessories to Group M; Group R, Division 3; or to single dwelling units in Group R, Division 1 Occupancies. Patio covers shall be used only for recreational, outdoor living purposes and not as carports, garages, storage rooms or habitable rooms.

SECTION 3117 — DESIGN LOADS

Patio covers shall be designed and constructed to sustain, within the stress limits of this code, all dead loads plus a minimum vertical live load of 10 pounds per square foot (0.48 kN/m²) except that snow loads shall be used where such snow loads exceed this minimum. Such covers shall be designed to resist the minimum horizontal wind loads set forth in this code, except that where less than 12 feet (3657 mm) high, the horizontal wind load shall be as indicated in Table A-31-A. In addition, they shall be designed to support a minimum wind uplift equal to the horizontal wind load acting vertical upward normal to the roof surface, except that for structures not more than 10 feet (3048 mm) above grade the uplift may be three fourths of the horizontal wind load. When enclosed with insect screening or plastic that is readily removable translucent or transparent plastic not more than 0.125 inch (3.2 mm) in thickness, wind loads shall be applied to the structure, assuming it is fully enclosed.

SECTION 3118 — LIGHT AND VENTILATION

Exterior openings required for light and ventilation may open into a patio structure conforming to Section 3116.

SECTION 3119 — FOOTINGS

A patio cover may be supported on a concrete slab on grade without footings, provided the slab is not less than 3 1/2 inches (89 mm) thick and further provided that the columns do not support live and dead loads in excess of 750 pounds (3.34 kN) per column.

### Table A-31-A—Design Wind Pressures for Patio Covers

<table>
<thead>
<tr>
<th>Height Zone in Feet</th>
<th>Wind Speed—Map Areas (miles per hour)</th>
<th>( \times 1.01 \text{ for km/h} )</th>
<th>( \times 0.048 \text{ for kN/m}^2 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \times 304.8 \text{ for mm} )</td>
<td>70</td>
<td>80</td>
<td>90</td>
</tr>
<tr>
<td>Less than 12</td>
<td>10</td>
<td>13</td>
<td>15</td>
</tr>
</tbody>
</table>

1See Figure 16-1 in Chapter 16 for basic wind speeds.
Appendix Chapter 33

EXCAVATION AND GRADING

SECTION 3304 — PURPOSE

The purpose of this appendix is to safeguard life, limb, property and the public welfare by regulating grading on private property.

SECTION 3305 — SCOPE

This appendix sets forth rules and regulations to control excavation, grading and earthwork construction, including fills and embankments; establishes the administrative procedure for issuance of permits; and provides for approval of plans and inspection of grading construction.

The standards listed below are recognized standards (see Sections 3502 and 3503).

1. Testing
   1.1 ASTM D 1557, Moisture-density Relations of Soils and Soil Aggregate Mixtures
   1.2 ASTM D 1556, In Place Density of Soils by the Sand-Cone Method
   1.3 ASTM D 2167, In Place Density of Soils by the Rubber-Balloon Method
   1.4 ASTM D 2937, In Place Density of Soils by the Drive-Cylinder Method
   1.5 ASTM D 2922 and D 3017, In Place Moisture Contact and Density of Soils by Nuclear Methods

SECTION 3306 — PERMITS REQUIRED

3306.1 Permits Required. Except as specified in Section 3306.2 of this section, no person shall do any grading without first having obtained a grading permit from the building official.

3306.2 Exempted Work. A grading permit is not required for the following:

1. When approved by the building official, grading in an isolated, self-contained area if there is no danger to private or public property.
2. An excavation below finished grade for basements and footings of a building, retaining wall or other structure authorized by a valid building permit. This shall not exempt any fill made with the material from such excavation or exempt any excavation having an unsupported height greater than 5 feet (1524 mm) after the completion of such structure.
3. Cemetery graves.
4. Refuse disposal sites controlled by other regulations.
5. Excavations for wells or tunnels or utilities.
6. Mining, quarrying, excavating, processing, stockpiling of rock, sand, gravel, aggregate or clay where established and provided for by law, provided such operations do not affect the lateral support or increase the stresses in or pressure upon any adjacent or contiguous property.
7. Exploratory excavations under the direction of soil engineers or engineering geologists.
8. An excavation which (1) is less than 2 feet (610 mm) in depth, or (2) which does not create a cut slope greater than 5 feet (1524 mm) in height and steeper than 1 unit vertical to 1 1/2 units horizontal (66.7% slope).
9. A fill less than 1 foot (305 mm) in depth and placed on natural terrain with a slope flatter than 1 unit vertical in 5 units horizontal (20% slope), or less than 3 feet (914 mm) in depth, not intended
to support structures, which does not exceed 50 cubic yards (38.3 m³) on any one lot and does not obstruct a drainage course.

Exemption from the permit requirements of this chapter shall not be deemed to grant authorization for any work to be done in any manner in violation of the provisions of this chapter or any other laws or ordinances of this jurisdiction.

SECTION 3307 — HAZARDS
Whenever the building official determines that any existing excavation or embankment or fill on private property has become a hazard to life and limb, or endangers property, or adversely affects the safety, use or stability of a public way or drainage channel, the owner of the property upon which the excavation or fill is located, or other person or agent in control of said property, upon receipt of notice in writing from the building official, shall within the period specified therein repair or eliminate such excavation or embankment so as to eliminate the hazard and be in conformance with the requirements of this code.

SECTION 3308 — DEFINITIONS
For the purposes of this appendix the definitions listed hereunder shall be construed as specified in this section.

APPROVAL shall mean the proposed work or completed work conforms to this chapter in the opinion of the building official.

AS-GRADED is the extent of surface conditions on completion of grading.

BEDROCK is in-place solid rock.

BENCH is a relatively level step excavated into earth material on which fill is to be placed.

BORROW is earth material acquired from an off-site location for use in grading on a site.

CIVIL ENGINEER is a professional engineer registered in the state to practice in the field of civil works.

CIVIL ENGINEERING is the application of the knowledge of the forces of nature, principles of mechanics and the properties of materials to the evaluation, design and construction of civil works.

COMPACTION is the densification of a fill by mechanical means.

EARTH MATERIAL is any rock, natural soil or fill or any combination thereof.

ENGINEERING GEOLOGIST is a geologist experienced and knowledgeable in engineering geology.

ENGINEERING GEOLOGY is the application of geologic knowledge and principles in the investigation and evaluation of naturally occurring rock and soil for use in the design of civil works.

EROSION is the wearing away of the ground surface as a result of the movement of wind, water or ice.

EXCAVATION is the mechanical removal of earth material.

FILL is a deposit of earth material placed by artificial means.

GEOTECHNICAL ENGINEER. See “soils engineer.”

GRADE is the vertical location of the ground surface.

Existing Grade is the grade prior to grading.

Finish Grade is the final grade of the site which conforms to the approved plan.
Rough Grade is the stage at which the grade approximately conforms to the approved plan.

GRADING is any excavating or filling or combination thereof.

KEY is a designed compacted fill placed in a trench excavated in earth material beneath the toe of a proposed fill slope.

PROFESSIONAL INSPECTION is the inspection required by this code to be performed by the civil engineer, soils engineer or engineering geologist. Such inspections include that performed by persons supervised by such engineers or geologists and shall be sufficient to form an opinion relating to the conduct of the work.

SITE is any lot or parcel of land or contiguous combination thereof, under the same ownership, where grading is performed or permitted.

SLOPE is an inclined ground surface the inclination of which is expressed as a ratio of horizontal distance to vertical distance.

SOIL is naturally occurring superficial deposits overlying bedrock.

SOILS ENGINEER (GEO TECHNICAL ENGINEER) is an engineer experienced and knowledgeable in the practice of soils engineering (geotechnical) engineering.

SOILS ENGINEERING (GEO TECHNICAL ENGINEERING) is the application of the principles of soils mechanics in the investigation, evaluation and design of civil works involving the use of earth materials and the inspection or testing of the construction thereof.

TERRACE is a relatively level step constructed in the face of a graded slope surface for drainage and maintenance purposes.

SECTION 3309 — GRADING PERMIT REQUIREMENTS

3309.1 Permits Required. Except as exempted in Section 3306 of this code, no person shall do any grading without first obtaining a grading permit from the building official. A separate permit shall be obtained for each site, and may cover both excavations and fills.

3309.2 Application. The provisions of Section 106.3.1 are applicable to grading and in addition the application shall state the estimated quantities of work involved.

3309.3 Grading Designation. Grading in excess of 5,000 cubic yards (3825 m³) shall be performed in accordance with the approved grading plan prepared by a civil engineer, and shall be designated as “engineered grading.” Grading involving less than 5,000 cubic yards (3825 m³) shall be designated “regular grading” unless the permittee chooses to have the grading performed as engineered grading, or the building official determines that special conditions or unusual hazards exist, in which case grading shall conform to the requirements for engineered grading.

3309.4 Engineered Grading Requirements. Application for a grading permit shall be accompanied by two sets of plans and specifications, and supporting data consisting of a soils engineering report and engineering geology report. The plans and specifications shall be prepared and signed by an individual licensed by the state to prepare such plans or specifications when required by the building official.

Specifications shall contain information covering construction and material requirements.

Plans shall be drawn to scale upon substantial paper or cloth and shall be of sufficient clarity to indicate the nature and extent of the work proposed and show in detail that they will conform to the provisions of this code and all relevant laws, ordinances, rules and regulations. The first sheet of each set of plans shall give location of the work, the name and address of the owner and the person by whom they were prepared.

The plans shall include the following information:
1. General vicinity of the proposed site.

2. Property limits and accurate contours of existing ground and details of te:-rain and area drainage.

3. Limiting dimensions, elevations or finish contours to be achieved by the grading, and proposed drainage channels and related construction.

4. Detailed plans of all surface and subsurface drainage devices, walls, cribbing, dams and other protective devices to be constructed with, or as a part of, the proposed work together with a map showing the drainage area and the estimated runoff of the area served by any drains.

5. Location of any buildings or structures on the property where the work is to be performed and the location of any buildings or structures on land of adjacent owners which are within 15 feet (4572 mm) of the property or which may be affected by the proposed grading operations.

6. Recommendations included in the soils engineering report and the engineering geology report shall be incorporated in the grading plans or specifications. When approved by the building official, specific recommendations contained in the soils engineering report and the engineering geology report, which are applicable to grading, may be included by reference.

7. The dates of the soils engineering and engineering geology reports together with the names, addresses and phone numbers of the firms or individuals who prepared the reports.

3309.5 Soils Engineering Report. The soils engineering report required by Section 3309.4 shall include data regarding the nature, distribution and strength of existing soils, conclusions and recommendations for grading procedures and design criteria for corrective measures, including buttress fills, when necessary, and opinion on adequacy for the intended use of sites to be developed by the proposed grading as affected by soils engineering factors, including the stability of slopes.

3309.6 Engineering Geology Report. The engineering geology report required by Section 3309.4 shall include an adequate description of the geology of the site, conclusions and recommendations regarding the effect of geologic conditions on the proposed development, and opinion on the adequacy for the intended use of sites to be developed by the proposed grading, as affected by geologic factors.

3309.7 Liquefaction Study. The building official may require a geotechnical investigation in accordance with Sections 1804.2 and 1804.5 when, during the course of an investigation, all of the following conditions are discovered, the report shall address the potential for liquefaction:

1. Shallow ground water, 50 feet (15 240 mm) or less.
2. Unconsolidated sandy alluvium.

3309.8 Regular Grading Requirements. Each application for a grading permit shall be accompanied by a plan in sufficient clarity to indicate the nature and extent of the work. The plans shall give the location of the work, the name of the owner and the name of the person who prepared the plan. The plan shall include the following information:

1. General vicinity of the proposed site.
2. Limiting dimensions and depth of cut and fill.
3. Location of any buildings or structures where work is to be performed, and the location of any buildings or structures within 15 feet (4572 mm) of the proposed grading.

3309.9 Issuance. The provisions of Section 106.4 are applicable to grading permits. The building official may require that grading operations and project designs be modified if delays occur which incur weather-generated problems not considered at the time the permit was issued.

The building official may require professional inspection and testing by the soils engineer. When the building official has cause to believe that geologic factors may be involved, the grading will be required to conform to engineered grading.
SECTION 3310 — GRADING FEES

3310.1 General. Fees shall be assessed in accordance with the provisions of this section or shall be as set forth in the fee schedule adopted by the jurisdiction.

3310.2 Plan Review Fees. When a plan or other data are required to be submitted, a plan review fee shall be paid at the time of submitting plans and specifications for review. Said plan review fee shall be as set forth in Table A-33-A. Separate plan review fees shall apply to retaining walls or major drainage structures as required elsewhere in this code. For excavation and fill on the same site, the fee shall be based on the volume of excavation or fill, whichever is greater.

3310.3 Grading Permit Fees. A fee for each grading permit shall be paid to the building official as set forth in Table A-33-B. Separate permits and fees shall apply to retaining walls or major drainage structures as required elsewhere in this code. There shall be no separate charge for standard terrace drains and similar facilities.

**TABLE A-33-A—GRADING PLAN REVIEW FEES**

<table>
<thead>
<tr>
<th>Cubic Yards Range</th>
<th>Fee</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 cubic yards (38.2 m³) or less</td>
<td>No fee</td>
</tr>
<tr>
<td>51 to 100 cubic yards (40 m³ to 76.5 m³)</td>
<td>$15.00</td>
</tr>
<tr>
<td>101 to 1,000 cubic yards (77.2 m³ to 764.6 m³)</td>
<td>$22.50</td>
</tr>
<tr>
<td>1,001 to 10,000 cubic yards (765.3 m³ to 7645.5 m³)</td>
<td>$30.00</td>
</tr>
<tr>
<td>10,001 to 100,000 cubic yards (7646.3 m³ to 76455 m³)</td>
<td>$30.00 for the first 10,000 cubic yards (7645.5 m³) plus $15.00 for each additional 10,000 cubic yards (7645.5 m³) or fraction thereof.</td>
</tr>
<tr>
<td>100,001 to 200,000 cubic yards (76456 m³ to 152911 m³)</td>
<td>$165.00 for the first 100,000 cubic yards (76455 m³), plus $9.00 for each additional 10,000 cubic yards (7645.5 m³) or fraction thereof.</td>
</tr>
<tr>
<td>200,001 cubic yards (152912 m³) or more</td>
<td>$255.00 for the first 200,000 cubic yards (152911 m³), plus $4.50 for each additional 10,000 cubic yards (7645.5 m³) or fraction thereof.</td>
</tr>
</tbody>
</table>

**Other Fees:**

Additional plan review required by changes, additions or revisions to approved plans ................................. $30.00 per hour* (minimum charge—one-half hour)

*Or the total hourly cost to the jurisdiction, whichever is the greatest. This cost shall include supervision, overhead, equipment, hourly wages and fringe benefits of the employees involved.

**TABLE A-33-B—GRADING PERMIT FEES**

<table>
<thead>
<tr>
<th>Cubic Yards Range</th>
<th>Fee</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 cubic yards (38.2 m³) or less</td>
<td>$15.00</td>
</tr>
<tr>
<td>51 to 100 cubic yards (40 m³ to 76.5 m³)</td>
<td>$22.50</td>
</tr>
<tr>
<td>101 to 1,000 cubic yards (77.2 m³ to 764.6 m³)</td>
<td>$22.50 for the first 100 cubic yards (76.5 m³) plus $10.50 for each additional 100 cubic yards (76.5 m³) or fraction thereof.</td>
</tr>
<tr>
<td>1,001 to 10,000 cubic yards (765.3 m³ to 7645.5 m³)</td>
<td>$117.00 for the first 1,000 cubic yards (764.6 m³), plus $9.00 for each additional 1,000 cubic yards (764.6 m³) or fraction thereof.</td>
</tr>
<tr>
<td>10,001 to 100,000 cubic yards (7646.3 m³ to 76455 m³)</td>
<td>$198.00 for the first 10,000 cubic yards (7645.5 m³), plus $40.50 for each additional 10,000 cubic yards (7645.5 m³) or fraction thereof.</td>
</tr>
<tr>
<td>100,001 cubic yards (76456 m³) or more</td>
<td>$562.50 for the first 100,000 cubic yards (76455 m³), plus $22.50 for each additional 10,000 cubic yards (7645.5 m³) or fraction thereof.</td>
</tr>
</tbody>
</table>

**Other Inspections and Fees:**

1. Inspections outside of normal business hours ................................. $30.00 per hour (minimum charge—two hours)

1-512
2. Reinspection fees assessed under provisions of Section 108.8
   $30.00 per hour

3. Inspections for which no fee is specifically indicated
   (minimum charge—one-half hour)
   $30.00 per hour

1The fee for a grading permit authorizing additional work to that under a valid permit shall be the difference between the fee paid for the original permit and the fee shown for the entire project.

2Or the total hourly cost to the jurisdiction, whichever is the greatest. This cost shall include supervision, overhead, equipment, hourly wages and fringe benefits of the employees involved.

SECTION 3311 — BONDS

The building official may require bonds in such form and amounts as may be deemed necessary to assure that the work, if not completed in accordance with the approved plans and specifications, will be corrected to eliminate hazardous conditions.

In lieu of a surety bond the applicant may file a cash bond or instrument of credit with the building official in an amount equal to that which would be required in the surety bond.

SECTION 3312 — CUTS

3312.1 General. Unless otherwise recommended in the approved soils engineering or engineering geology report, cuts shall conform to the provisions of this section.

In the absence of an approved soils engineering report, these provisions may be waived for minor cuts not intended to support structures.

3312.2 Slope. The slope of cut surfaces shall be no steeper than is safe for the intended use and shall be no steeper than 1 unit vertical in 2 units horizontal (50% slope) unless the permittee furnishes a soils engineering or an engineering geology report, or both, stating that the site has been investigated and giving an opinion that a cut at a steeper slope will be stable and not create a hazard to public or private property.

SECTION 3313 — FILLS

3313.1 General. Unless otherwise recommended in the approved soils engineering report, fills shall conform to the provisions of this section.

In the absence of an approved soils engineering report, these provisions may be waived for minor fills not intended to support structures.

3313.2 Preparation of Ground. Fill slopes shall not be constructed on natural slopes steeper than 1 unit vertical in 2 units horizontal (50% slope). The ground surface shall be prepared to receive fill by removing vegetation, noncomplying fill, topsoil and other unsuitable materials scarifying to provide a bond with the new fill and, where slopes are steeper than 1 unit vertical in 5 units horizontal (20% slope) and the height is greater than 5 feet (1524 mm), by benching into sound bedrock or other competent material as determined by the soils engineer. The bench under the toe of a fill on a slope steeper than 1 unit vertical in 5 units horizontal (20% slope) shall be at least 10 feet (3048 mm) wide. The area beyond the toe of fill shall be sloped for sheet overflow or a paved drain shall be provided. When fill is to be placed over a cut, the bench under the toe of fill shall be at least 10 feet (3048 mm) wide but the cut shall be made before placing the fill and acceptance by the soils engineer or engineering geologist or both as a suitable foundation for fill.

3313.3 Fill Material. Detrimental amounts of organic material shall not be permitted in fills. Except as permitted by the building official, no rock or similar irreducible material with a maximum dimension greater than 12 inches (305 mm) shall be buried or placed in fills.
EXCEPTION: The building official may permit placement of larger rock when the soils engineer properly devises a method of placement, and continuously inspects its placement and approves the fill stability. The following conditions shall also apply:

1. Prior to issuance of the grading permit, potential rock disposal areas shall be delineated on the grading plan.
2. Rock sizes greater than 12 inches (305 mm) in maximum dimension shall be 10 feet (3048 mm) or more below grade, measured vertically.
3. Rocks shall be placed so as to assure filling of all voids with well-graded soil.

3313.4 Compaction. All fills shall be compacted to a minimum of 90 percent of maximum density.

3313.5 Slope. The slope of fill surfaces shall be no steeper than is safe for the intended use. Fill slopes shall be no steeper than 1 unit vertical in 2 units horizontal (50% slope).

SECTION 3314 — SETBACKS

3314.1 General. Cut and fill slopes shall be set back from site boundaries in accordance with this section. Setback dimensions shall be horizontal distances measured perpendicular to the site boundary. Setback dimensions shall be as shown in Figure A-33-1.

3314.2 Top of Cut Slope. The top of cut slopes shall not be made nearer to a site boundary line than one fifth of the vertical height of cut with a minimum of 2 feet (610 mm) and a maximum of 10 feet (3048 mm). The setback may need to be increased for any required interceptor drains.

3314.3 Toe of Fill Slope. The toe of fill slope shall be made not nearer to the site boundary line than one half the height of the slope with a minimum of 2 feet (610 mm) and a maximum of 20 feet (6096 mm). Where a fill slope is to be located near the site boundary and the adjacent off-site property is developed, special precautions shall be incorporated in the work as the building official deems necessary to protect the adjoining property from damage as a result of such grading. These precautions may include but are not limited to:

1. Additional setbacks.
2. Provision for retaining or slough walls.
3. Mechanical or chemical treatment of the fill slope surface to minimize erosion.

3314.4 Modification of Slope Location. The building official may approve alternate setbacks. The building official may require an investigation and recommendation by a qualified engineer or engineering geologist to demonstrate that the intent of this section has been satisfied.

SECTION 3315 — DRAINAGE AND TERRACING

3315.1 General. Unless otherwise indicated on the approved grading plan, drainage facilities and terracing shall conform to the provisions of this section for cut or fill slopes steeper than 1 unit vertical in 3 units horizontal (33.3% slope).

3315.2 Terrace. Terraces at least 6 feet (1829 mm) in width shall be established at not more than 30-foot (9144 mm) vertical intervals on all cut or fill slopes to control surface drainage and debris except that where only one terrace is required, it shall be at midheight. For cut or fill slopes greater than 60 feet (18288 mm) and up to 120 feet (36576 mm) in vertical height, one terrace at approximately midheight shall be 12 feet (3658 mm) in width. Terrace widths and spacing for cut and fill slopes greater than 120 feet (36576 mm) in height shall be designed by the civil engineer and approved by the building official. Suitable access shall be provided to permit proper cleaning and maintenance.
Swales or ditches on terraces shall have a minimum gradient of 5 percent and must be paved with reinforced concrete not less than 3 inches (76 mm) in thickness or an approved equal paving. They shall have a minimum depth at the deepest point of 1 foot (305 mm) and a minimum paved width of 5 feet (1524 mm).

A single run of swale or ditch shall not collect runoff from a tributary area exceeding 13,500 square feet (1254.2 m²) (projected) without discharging into a down drain.

3315.3 Subsurface Drainage. Cut and fill slopes shall be provided with subsurface drainage as necessary for stability.

3315.4 Disposal. All drainage facilities shall be designed to carry waters to the nearest practicable drainage way approved by the building official or other appropriate jurisdiction as a safe place to deposit such waters. Erosion of ground in the area of discharge shall be prevented by installation of nonerosive downdrains or other devices.

Building pads shall have a drainage gradient of 2 percent toward approved drainage facilities, unless waived by the building official.

EXCEPTION: The gradient from the building pad may be 1 percent if all of the following conditions exist throughout the permit area:
1. No proposed fills are greater than 10 feet (3048 mm) in maximum depth.
2. No proposed finish cut or fill slope faces have a vertical height in excess of 10 feet (3048 mm).
3. No existing slope faces, which have a slope face steeper than 1 unit vertical in 10 units horizontal (10% slope), have a vertical height in excess of 10 feet (3048 mm).

3315.5 Interceptor Drains. Paved interceptor drains shall be installed along the top of all cut slopes where the tributary drainage area above slopes toward the cut and has a drainage path greater than 40 feet (12 192 mm) measured horizontally. Interceptor drains shall be paved with a minimum of 3 inches (76 mm) of concrete or gunite and reinforced. They shall have a minimum depth of 12 inches (305 mm) and a minimum paved width of 30 inches (762 mm) measured horizontally across the drain. The slope of drain shall be approved by the building official.

SECTION 3316 — EROSION CONTROL

3316.1 Slopes. The faces of cut and fill slopes shall be prepared and maintained to control against erosion. This control may consist of effective planting. The protection for the slopes shall be installed as soon as practicable and prior to calling for final approval. Where cut slopes are not subject to erosion due to the erosion-resistant character of the materials, such protection may be omitted.

3316.2 Other Devices. Where necessary, check dams, cribbing, riprap or other devices or methods shall be employed to control erosion and provide safety.

SECTION 3317 — GRADING INSPECTION

3317.1 General. Grading operations for which a permit is required shall be subject to inspection by the building official. Professional inspection of grading operations shall be provided by the civil engineer, soils engineer and the engineering geologist retained to provide such services in accordance with Section 3317.5 for engineered grading and as required by the building official for regular grading.

3317.2 Civil Engineer. The civil engineer shall provide professional inspection within such engineer's area of technical specialty, which shall consist of observation and review as to the establishment of line, grade and surface drainage of the development area. If revised plans are required during the course of the work they shall be prepared by the civil engineer.

3317.3 Soils Engineer. The soils engineer shall provide professional inspection within such engineer's area of technical specialty, which shall include observation during grading and testing for
required compaction. The soils engineer shall provide sufficient observation during the preparation of the natural ground and placement and compaction of the fill to verify that such work is being performed in accordance with the conditions of the approved plan and the appropriate requirements of this chapter. Revised recommendations relating to conditions differing from the approved soils engineering and engineering geology reports shall be submitted to the permittee, the building official and the civil engineer.

3317.4 Engineering Geologist. The engineering geologist shall provide professional inspection within such engineer's area of technical specialty, which shall include professional inspection of the bedrock excavation to determine if conditions encountered are in conformance with the approved report. Revised recommendations relating to conditions differing from the approved engineering geology report shall be submitted to the soils engineer.

3317.5 Permittee. The permittee shall be responsible for the work to be performed in accordance with the approved plans and specifications and in conformance with the provisions of this code, and the permittee shall engage consultants, if required, to provide professional inspections on a timely basis. The permittee shall act as a coordinator between the consultants, the contractor and the building official. In the event of changed conditions, the permittee shall be responsible for informing the building official of such change and shall provide revised plans for approval.

3317.6 Building Official. The building official shall inspect the project at the various stages of work requiring approval to determine that adequate control is being exercised by the professional consultants.

3317.7 Notification of Noncompliance. If, in the course of fulfilling their respective duties under this chapter, the civil engineer, the soils engineer or the engineering geologist finds that the work is not being done in conformance with this chapter or the approved grading plans, the discrepancies shall be reported immediately in writing to the permittee and to the building official.

3317.8 Transfer of Responsibility. If the civil engineer, the soils engineer, or the engineering geologist of record is changed during grading, the work shall be stopped until the replacement has agreed in writing to accept their responsibility within the area of technical competence for approval upon completion of the work. It shall be the duty of the permittee to notify the building official in writing of such change prior to the recommencement of such grading.

SECTION 3318 - COMPLETION OF WORK

3318.1 Final Reports. Upon completion of the rough grading work and at the final completion of the work, the following reports and drawings and supplements thereto are required for engineered grading or when professional inspection is performed for regular grading, as applicable.

1. An as-built grading plan prepared by the civil engineer retained to provide such services in accordance with Section 3317.5 showing original ground surface elevations, as-graded ground surface elevations, lot drainage patterns, and the locations and elevations of surface drainage facilities and of the outlets of subsurface drains. As-constructed locations, elevations and details of subsurface drains shall be shown as reported by the soils engineer.

Civil engineers shall state that to the best of their knowledge the work within their area of responsibility was done in accordance with the final approved grading plan.

2. A report prepared by the soils engineer retained to provide such services in accordance with Section 3317.3, including locations and elevations of field density tests, summaries of field and laboratory tests, other substantiating data, and comments on any changes made during grading and their effect on the recommendations made in the approved soils engineering investigation report. Soils engineers shall submit a statement that, to the best of their knowledge, the work within their area of responsibilities is in accordance with the approved soils engineering report and applicable provisions of this chapter.
3. A report prepared by the engineering geologist retained to provide such services in accordance with Section 3317.5, including a final description of the geology of the site and any new information disclosed during the grading and the effect of same on recommendations incorporated in the approved grading plan. Engineering geologists shall submit a statement that, to the best of their knowledge, the work within their area of responsibility is in accordance with the approved engineering geologist report and applicable provisions of this chapter.

4. The grading contractor shall submit in a form prescribed by the building official a statement of conformance to said as-built plan and the specifications.

3318.2 Notification of Completion. The permittee shall notify the building official when the grading operation is ready for final inspection. Final approval shall not be given until all work, including installation of all drainage facilities and their protective devices, and all erosion-control measures have been completed in accordance with the final approved grading plan, and the required reports have been submitted.

H/2 but 2' (610 mm) min. and 20' (6096 mm) max.  
H/5 but 2' (610 mm) min. and 10' (3048 mm) max.

FIGURE A-33-1
APPENDIX CHAPTER 34
1994 UNIFORM BUILDING CODE

Appendix Chapter 34
EXISTING STRUCTURES

Division I—LIFE-SAFETY REQUIREMENTS FOR EXISTING BUILDINGS OTHER THAN HIGH-RISE BUILDINGS

SECTION 3406 — GENERAL

3406.1 Purpose. The purpose of this division is to provide a reasonable degree of safety to persons occupying existing buildings by providing for alterations to such existing buildings which do not conform with the minimum requirements of this code.

EXCEPTION: Group U Occupancies regulated by Appendix Chapter 34, Division II, and Group R, Division 3 Occupancies, except that Group R, Division 3 Occupancies shall comply with Section 3411.

3406.2 Effective Date. Within 18 months after the effective date of this division, plans for compliance shall be submitted and approved, and within 18 months thereafter the work shall be completed or the building shall be vacated until made to conform.

SECTION 3407 — EXITS

3407.1 Number of Exits. Every floor above the first story used for human occupancy shall have access to at least two separate exits, one of which may be an exterior fire escape complying with Section 3407.4. Subject to the approval of the building official, an approved ladder device may be used in lieu of a fire escape when the construction feature or location of the building on the property makes the installation of a fire escape impracticable.

EXCEPTION: In all occupancies, second stories with an occupant load of 10 or less may have one exit.

An exit ladder device when used in lieu of a fire escape shall conform with U.B.C. Standard 10-3 which is a part of this code (see Chapter 35) and the following:

1. Serves an occupant load of 10 or less or a single dwelling unit or guest room.
2. The building does not exceed three stories in height.
3. The access is adjacent to an opening as specified for emergency egress or rescue or from a balcony.
4. Shall not pass in front of any building opening below the unit being served.
5. The availability of activating the device for the ladder is accessible only from the opening or balcony served.
6. So installed that it will not cause a person using it to be within 6 feet (1829 mm) of exposed electrical wiring.

3407.2 Stair Construction. All required stairs shall have a minimum run of 9 inches (229 mm) and a maximum rise of 8 inches (203 mm) and shall have a minimum width of 30 inches (762 mm) exclusive of handrails. Every stairway shall have at least one handrail. A landing having a minimum 30-inch (762 mm) run in the direction of travel shall be provided at each point of access to the stairway.

EXCEPTION: Fire escapes as provided for in this section.

Exterior stairs shall be of noncombustible construction.

EXCEPTION: On buildings of Types III, IV and V construction, provided the exterior stairs are constructed of wood not less than 2-inch (51 mm) nominal thickness.

3407.3 Corridors. Corridors of Groups A; B; E; F; H; I; M; R, Division 1; and S Occupancies serving as an exit for an occupant load of 30 or more shall have walls and ceilings of not less than
one-hour fire-resistive construction as required by this code. Existing walls surfaced with wood lath and plaster in good condition or 1/2-inch (12.7 mm) gypsum wallboard or openings with fixed wired glass set in steel frames are permitted for corridor walls and ceilings and occupancy separations when approved. Doors opening into such corridors shall be protected by 20-minute fire assemblies or solid wood doors not less than 1 3/4 inches (45 mm) thick. Where the existing frame will not accommodate the 1 3/4-inch-thick (45 mm) door, a 1 1/8-inch-thick (35 mm) solid bonded wood-core door or equivalent insulated steel door shall be permitted. Doors shall be self-closing or automatic closing by smoke detection. Transoms and openings other than doors from corridors to rooms shall comply with Section 1005.8 of this code or shall be covered with a minimum of 3/4-inch (19.1 mm) plywood or 1/2-inch (12.7 mm) gypsum wallboard or equivalent material on the room side.

**EXCEPTION:** Existing corridor walls, ceilings and opening protection not in compliance with the above may be continued when such buildings are protected with an approved automatic sprinkler system throughout. Such sprinkler system may be supplied from the domestic water system if it is of adequate volume and pressure.

3407.4 Fire Escapes.

1. Existing fire escapes which, in the opinion of the building official, comply with the intent of this section may be used as one of the required exits. The location and anchorage of fire escapes shall be of approved design and construction.

2. Fire escapes shall comply with the following:
   Access from a corridor shall not be through an intervening room.
   All openings within 10 feet (3048 mm) shall be protected by three-fourths-hour fire assemblies. When located within a recess or vestibule, adjacent enclosure walls shall be of not less than one-hour fire-resistive construction.
   Egress from the building shall be by a clear opening having a minimum dimension of not less than 29 inches (737 mm). Such openings shall be openable from the inside without the use of a key or special knowledge or effort. The sill of an opening giving access shall not be more than 30 inches (762 mm) above the floor of the building or balcony.

   Fire escape stairways and balconies shall support the dead load plus a live load of not less than 100 pounds per square foot (4.79 kN/m²) and shall be provided with a top and intermediate handrail on each side. The pitch of the stairway shall not exceed 60 degrees with a minimum width of 18 inches (457 mm). Treads shall not be less than 4 inches (102 mm) in width and the rise between treads shall not exceed 10 inches (254 mm). All stair and balcony railings shall support a horizontal force of not less than 50 pounds per lineal foot (729.5 N/m) of railing.

   Balconies shall not be less than 44 inches (1118 mm) in width with no floor opening other than the stairway opening greater than 5/8 inch (16 mm) in width. Stairway openings in such balconies shall not be less than 22 inches by 44 inches (599 mm by 1118 mm). The balustrade of each balcony shall not be less than 36 inches (914 mm) high with not more than 9 inches (229 mm) between balusters.

   Fire escapes shall extend to the roof or provide an approved gooseneck ladder between the top floor landing and the roof when serving buildings four or more stories in height having roofs with less than 4 units vertical in 12 units horizontal (33.3% slope). Fire escape ladders shall be designed and connected to the building to withstand a horizontal force of 100 pounds per lineal foot (1459 N/m); each rung shall support a concentrated load of 500 pounds (2224 N) placed anywhere on the rung. All ladders shall be at least 15 inches (381 mm) wide, located within 12 inches (305 mm) of the building and shall be placed flatwise relative to the face of the building. Ladder rungs shall be 3/4 inch (19 mm) in diameter and shall be located 12 inches (305 mm) on center. Openings for roof access ladders through cornices and similar projections shall have minimum dimensions of 30 inches by 33 inches (762 mm by 838 mm).

   The lowest balcony shall not be more than 18 feet (5486 mm) from the ground. Fire escapes shall extend to the ground or be provided with counterbalanced stairs reaching to the ground.
Fire escapes shall not take the place of stairways required by the codes under which the building was constructed.

Fire escapes shall be kept clear and unobstructed at all times and maintained in good working order.

3407.5 Exit and Fire Escape Signs. Exit signs shall be provided as required by this code.

**EXCEPTION:** The use of existing exit signs may be continued when approved by the building official.

All doors or windows providing access to a fire escape shall be provided with fire escape signs.

### SECTION 3408 — ENCLOSURE OF VERTICAL SHAFTS

Interior vertical shafts, including but not limited to stairways, elevator hoistways, service and utility shafts, shall be enclosed by a minimum of one-hour fire-resistive construction. All openings into such shafts shall be protected with one-hour fire assemblies which shall be maintained self-closing or be automatic closing by smoke detection. All other openings shall be fire protected in an approved manner. Existing fusible link-type automatic door-closing devices may be permitted if the fusible link rating does not exceed 135°F (57.2°C).

**EXCEPTIONS:**
1. In other than Group I Occupancies, an enclosure will not be required for openings serving only one adjacent floor.
2. Stairways need not be enclosed in a continuous vertical shaft if each story is separated from other stories by one-hour fire-resistive construction or approved wired glass set in steel frames. In addition, all exit corridors shall be sprinklered and the openings between the corridor and occupant space shall have at least one sprinkler head above the openings on the tenant side. The sprinkler system may be supplied from the domestic water supply if of adequate volume and pressure.
3. Vertical openings need not be protected if the building is protected by an approved automatic sprinkler system.

### SECTION 3409 — BASEMENT ACCESS OR SPRINKLER PROTECTION

An approved automatic sprinkler system shall be provided in basements or stories exceeding 1,500 square feet (139.3 m²) in area and not having a minimum of 20 square feet (1.86 m²) of opening entirely above the adjoining ground level in each 50 lineal feet (15,240 mm) or fraction thereof of exterior wall on at least one side of the building. Openings shall have a minimum clear dimension of 30 inches (762 mm).

If any portion of a basement is located more than 75 feet (22,860 mm) from required openings, the basement shall be provided with an approved automatic sprinkler system throughout.

### SECTION 3410 — STANDPIPES

Any buildings over four stories in height shall be provided with an approved Class I or Class III standpipe system.

### SECTION 3411 — SMOKE DETECTORS

3411.1 General. Dwelling units and hotel or lodging house guest rooms that are used for sleeping purposes shall be provided with smoke detectors. Detectors shall be installed in accordance with the approved manufacturer’s instructions.

3411.2 Power Source. Smoke detectors may be battery operated or may receive their primary power from the building wiring when such wiring is served from a commercial source. Wiring shall be permanent and without disconnecting switches other than those required for overcurrent protection.

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3411.3 Location within Dwelling Units. In dwelling units, detectors shall be mounted on the ceiling or wall at a point centrally located in the corridor or area giving access to each separate sleeping area. Where sleeping rooms are on an upper level, the detector shall be placed at the center of the ceiling directly above the stairway. Detectors shall also be installed in the basements of dwelling units having stairways which open from the basement into the dwelling. Detectors shall sound an alarm audible in all sleeping areas of the dwelling unit in which they are located.

3411.4 Location in Efficiency Dwelling Units and Hotels. In efficiency dwelling units, hotel suites and in hotel sleeping rooms, detectors shall be located on the ceiling or wall of the main room or hotel sleeping room. When sleeping rooms within an efficiency dwelling unit or hotel suite are on an upper level, the detector shall be placed at the center of the ceiling directly above the stairway. When actuated, the detector shall sound an alarm audible within the sleeping area of the dwelling unit, hotel suite or sleeping room in which it is located.

SECTION 3412 — SEPARATION OF OCCUPANCIES

Occupancy separations shall be provided as specified in Section 302 of this code. When approved by the building official, existing wood lath and plaster in good condition or 1/2-inch (12.7 mm) gypsum wallboard may be acceptable where one-hour occupancy separations are required.
Division II—LIFE-SAFETY REQUIREMENTS FOR EXISTING HIGH-RISE BUILDINGS

SECTION 3413 — SCOPE
These provisions apply to existing high-rise buildings constructed prior to the adoption of this division and which house Group B offices or Group R, Division 1 Occupancies, each having floors used for human occupancy located more than 75 feet (22 860 mm) above the lowest level of fire department vehicle access.

SECTION 3414 — GENERAL
Existing high-rise buildings as specified in Section 3413 shall be modified to conform with not less than the minimum provisions specified in Table A-34-A and as further enumerated within this division.

The provisions of this division shall not be construed to allow the elimination of fire-protection systems or a reduction in the level of firesafety provided in buildings constructed in conformance with previously adopted codes.

SECTION 3415 — COMPLIANCE DATA
After adoption of this division, the building official shall duly notify the owners whose buildings are subject to the provisions of this division. Upon receipt of such notice, the owner shall, subject to the following time limits, take necessary actions to comply with the provisions of this division.

Plans and specifications for the necessary alterations shall be filed with the building official within the time period established by the local jurisdiction after the date of owner notification. Work on the required alterations to the building shall commence within 30 months of the date of owner notification and such work shall be completed within five years from the date of owner notification.

The building official shall grant necessary extensions of time when it can be shown that the specified time periods are not physically practical or pose an undue hardship. The granting of an extension of time for compliance shall be based on the showing of good cause and subject to the filing of an acceptable systematic progressive plan of correction with the building official.

SECTION 3416 — AUTHORITY OF THE BUILDING OFFICIAL
For the purpose of applying the provisions of this division, the building official shall have the authority to consider alternative approaches and grant necessary deviations from this division as follows:

1. Allow alternate materials or methods of compliance if such alternate materials or methods of compliance will provide levels of fire and life safety equal to or greater than those specifically set forth in this division.

2. Waive specific individual requirements if it can be shown that such requirements are not physically possible or practical and that a practical alternative cannot be provided.

SECTION 3417 — APPEALS BOARD
Appeals of the determinations of the building official in applying the provisions of this code may be made by an appeal directed to the board of appeals as established by Section 105 of this code.

SECTION 3418 — SPECIFIC PROVISIONS AND ALTERNATES
3418.1 Specific Provisions. The following provisions shall apply when required by Table A-34-A.
3418.1.1 Type of construction. Buildings classified as Type II-N, III-N or V-N construction shall be equipped with an approved automatic sprinkler system installed in accordance with U.B.C. Standard 9-1 which is a part of this code (see Chapter 35).

EXCEPTION: Installation of meters or backflow preventers for the connection to the water works system need not be provided unless required by other regulations of the authority having jurisdiction.

3418.1.2 Automatic sprinklers. All required exit corridors, stairwells, elevator lobbies, public assembly areas occupied by 100 or more persons and commercial kitchens shall be protected by an approved automatic sprinkler system meeting the design criteria of U.B.C. Standard 9-1 which is a part of this code (see Chapter 35). A minimum of one sprinkler shall be provided on the room side of every corridor opening.

EXCEPTION: Sprinklers may be omitted in stairwells of noncombustible construction.

3418.1.3 Fire department communication system. When it is determined by test that the portable fire department communication equipment is ineffective, a communication system acceptable to the fire department shall be installed within the existing high-rise building to permit emergency communication between fire-suppression personnel.

3418.1.4 Single-station smoke detectors. Single-station smoke detectors shall be installed within all dwelling units or guest rooms in accordance with the manufacturer's installation instructions. In dwelling units, the detector shall be mounted on the ceiling or wall at a point centrally located in the corridor or area giving access to each separate sleeping area. When sleeping rooms are located on an upper level, the detector shall be installed at the center of the ceiling directly above the stairway within the unit. In efficiency dwelling units, hotel suites and in hotel guest rooms, detectors shall be located on the ceiling or wall of the main room or hotel sleeping room. When actuated, the detector shall provide an audible alarm in the sleeping area of the dwelling unit, hotel suite or guest room in which it is located.

Such detectors may be battery operated.

3418.1.5 Manual fire alarm system. An approved manual fire alarm system connected to a central, proprietary or remote station service, or an approved manual fire alarm system which will provide an audible signal at a constantly attended location, shall be provided.

3418.1.6 Occupant voice notification system. An approved occupant voice notification system shall be provided. Such system shall provide communication from a location acceptable to the fire department and shall permit voice notification to at least all normally occupied areas of the building.

The occupant voice notification system may be combined with a fire alarm system, provided the combined system has been approved and listed for such use. The sounding of a fire alarm signal in any given area or floor shall not prohibit voice communication to other areas or floors. Combination systems shall be designed to permit voice transmission to override the fire alarm signal, but the fire alarm shall not terminate in less than three minutes.

3418.1.7 Vertical shaft enclosures. Openings through two or more floors except mezzanine floors, which contain a stairway or elevator, shall be provided with vertical shaft enclosure protection as specified herein. Such floor openings, when not enclosed by existing shaft enclosure construction, shall be protected by one-hour fire-resistive-rated shaft enclosure construction. For floor openings which are enclosed by existing shaft enclosure construction, having fire-resistive capabilities similar to wood lath and plaster in good condition, 1/2-inch (12.7 mm) gypsum wallboard or approved 3/4-inch-thick (6.4 mm) wired glass is acceptable. Wired glass set in a steel frame may be installed in existing shaft enclosure walls but shall be rendered inoperative and be fixed in a closed position.

Openings through two or more floors for other than stairways or elevators, such as openings provided for piping, ducts, gas vents, dumbwaiters, and rubbish and linen chutes, shall be provided with vertical shaft enclosure protection as specified for stairways and elevators.
EXCEPTION: Openings for piping, ducts, gas vents, dumbwaiters and rubbish and linen chutes of copper or ferrous construction are permitted without a shaft enclosure, provided the floor openings are effectively fire-stopped at each floor level.

3418.1.8 Shaft enclosure opening protection. Openings other than those provided for elevator doors in new vertical shaft enclosures constructed of one-hour fire-resistive construction shall be equipped with approved fire assemblies having a fire-protection rating of not less than one hour. Openings other than those provided for elevator doors in existing vertical shaft enclosures shall be equipped with approved 20-minute-rated fire assemblies, 1 3/4-inch (44 mm) solid wood doors or the equivalent thereto. Doors shall be either self-closing or automatic closing and automatic latching.

All elevators on all floors shall open into elevator lobbies which are separated from the remainder of the building as is required for corridor construction in the Building Code, unless the building is protected throughout by a sprinkler system.

3418.1.9 Manual shutoff of heating, ventilating and air-conditioning (HVAC) systems. Heating, ventilating and air-conditioning systems shall be equipped with manual shutoff controls installed at an approved location when required by the fire department.

3418.1.10 Automatic elevator recall system. Elevators shall be equipped with an approved automatic recall system as required by Section 403.7, Item 2.

3418.1.11 Unlocked stairway doors. Exit doors into exit stairway enclosures shall be maintained unlocked from the stairway side on at least every fifth floor level. All unlocked doors shall bear a sign stating ACCESS ONTO FLOOR THIS LEVEL.

Stairway doors may be locked, subject to the following conditions:

1. Stairway doors which are to be locked from the stairway side shall have the capability of being unlocked simultaneously without unlatching upon a signal from an approved location.

2. A telephone or other two-way communications system connected to an approved emergency service which operates continuously shall be provided at not less than every fifth floor in each required stairway.

3418.1.12 Stair shaft ventilation. Stair shaft enclosures which extend to the roof shall be provided with an approved manually openable hatch to the exterior having an area not less than 16 square feet (1.486 m²) with a minimum dimension of 2 feet (610 mm).

EXCEPTIONS: 1. Stair shaft enclosures complying with the requirements for pressurized enclosures.
2. Stair shaft enclosures pressurized as required for mechanically operated pressurized enclosures to a minimum of 0.15-inch (3.8 mm) and a maximum of 0.50-inch (12.7 mm) water column.

3418.1.13 Elevator shaft ventilation. Elevator shaft enclosures which extend to the roof shall be vented to the outside with vents whose area shall not be less than 31/2 percent of the area of the elevator shaft, with a minimum of 3 square feet (0.278 m²) per elevator.

EXCEPTION: Where energy conservation or hoistway pressurization requires that the vents be normally closed, automatic venting by actuation of an elevator lobby detector or power failure may be accepted.

3418.1.14 Posting of elevators. A permanent sign shall be installed in each elevator cab adjacent to the floor status indicator and at each elevator call station on each floor reading IN FIRE EMERGENCY, DO NOT USE ELEVATOR—USE EXIT STAIRS, or similar verbiage approved by the building official.

EXCEPTION: Sign may be omitted at the main entrance floor-level call station.

3418.1.15 Exit stairways. All buildings shall have a minimum of two approved exit stairways.

3418.1.16 Exit corridor construction. Corridors serving as an exit for an occupant load of 30 or more shall have walls and ceilings of not less than one-hour fire-resistive construction as re-
quired by this code. Existing walls may be surfaced with wood lath and plaster in good condition or \( \frac{1}{2} \)-inch (12.7 mm) gypsum wallboard for corridor walls and ceilings and occupancy separations when approved.

3418.1.17 Exit corridor openings. Openings in corridor walls and ceilings shall be protected by not less than \( \frac{1}{2} \times \frac{3}{8} \)-inch (35 mm) solid-bonded wood-core doors, approved \( \frac{1}{4} \)-inch-thick (6.4 mm) wired glass, approved fire dampers conforming to U.B.C. Standard 7-7 which is a part of this code, or by equivalent protection in lieu of any of these items (see Chapter 35). Transoms shall be fixed closed and covered with \( \frac{1}{2} \)-inch (12.7 mm) Type X gypsum wallboard or equivalent material installed on both sides of the opening.

3418.1.18 Exit corridor door closers. Exit doors into corridors shall be equipped with self-closing devices or shall be automatic closing by actuation of a smoke detector. When spring hinges are used as the closing device, not less than two such hinges shall be installed on each door leaf.

3418.1.19 Exit corridor dead ends. The length of dead end corridors serving an occupant load of more than 30 shall not exceed 20 feet (6096 mm).

3418.1.20 Interior finish. The interior finish in exit corridors, exit stairways and extensions thereof shall conform to the provisions of Chapter 8 of this code.

3418.1.21 Exit stairway illumination. When the building is occupied, exit stairways shall be illuminated with lights having an intensity of not less than 1 footcandle (10.8 lux) at the floor level. Such lighting shall be equipped with an independent alternate source of power such as a battery pack or on-site generator.

3418.1.22 Exit corridor illumination. When the building is occupied, exit corridors shall be illuminated with lights having an intensity of not less than 1 footcandle (10.8 lux) at the floor level. Such lighting shall be equipped with an independent alternate source of power such as a battery pack or on-site generator.

3418.1.23 Exit stairway exit signs. The location of exit stairways shall be clearly indicated by illuminated exit signs. Such exit signs shall be equipped with an independent alternate source of power such as a battery pack or on-site generator or shall be of an approved self-illuminating type.

3418.1.24 Exitway exit signs. Illuminated exit signs shall be provided in all exitways and located in such a manner as to clearly indicate the direction of egress. Such exit signs shall be equipped with an independent alternate source of power such as a battery pack or on-site generator or shall be of an approved self-illuminating type.

3418.1.25 Emergency plan. The management for all buildings shall establish and maintain a written fire- and life-safety emergency plan which has been approved by the chief. The chief shall develop written criteria and guidelines on which all plans shall be based.

3418.1.26 Posting of emergency plan and exit plans. Copies of the emergency plan and exiting plans (including elevator and stairway placarding) shall be posted in locations approved by the chief.

3418.1.27 Fire drills. The management of all buildings shall conduct fire drills for their staff and employees at least every 120 days. The fire department must be advised of such drills at least 24 hours in advance. A written record of each drill shall be maintained in the building management office and made available to the fire department for review.

3418.2 Sprinkler Alternatives. The requirements of Table A-34-A may be modified as specified by the following for existing high-rise buildings of Type I, II-F.R., II One-hour, III One-hour, IV or V One-hour construction when an approved automatic sprinkler system is installed throughout the building in accordance with U.B.C. Standard 9-1:
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Item 5—Manual fire alarm system shall not be required.

Item 6—Occupant voice notification system shall not be required; however, if the building is equipped with a public address system, the public address system shall be available for use as an occupant voice notification system.

Item 7—Vertical shaft enclosures may be of nonrated construction for required exit stairway enclosures. Vertical shaft enclosures of openings in floors provided for elevators, escalators and supplemental stairways shall not be required, provided such openings are protected by an approved curtain board and water curtain sprinkler system.

Item 8—Protection of openings in vertical shaft enclosures may be nonrated but shall not be less than a 1 3/4-inch (44 mm) solid-wood door or the equivalent thereto. Closing and latching hardware shall be provided.

Item 10—An automatic elevator recall system shall not be required.

Item 12—Stair shaft ventilation shall not be required.

Item 16—Existing corridor construction need not be altered.

Item 17—Door openings into exit corridors may be protected by assemblies other than those specified in Section 3418.1, provided an effective smoke barrier is maintained. Closing and latching hardware shall be provided. Protection of duct penetrations is not required.

Item 19—The length of existing exit corridor dead ends shall not be limited.

Item 20—Interior finish in exitways may be reduced by one classification but shall not be less than Class III.

Installation of meters or backflow preventers for the connection to the water works system need not be provided unless required by other regulations of the authority having jurisdiction.
### TABLE A-34-A—OCCUPANCY CLASSIFICATION AND USE

#### GROUP R, DIVISION 1

<table>
<thead>
<tr>
<th>ITEMS REQUIRED</th>
<th>Apartment</th>
<th>Hotel</th>
<th>Height Zones²</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Automatic sprinklers in buildings of Type II-N, III-N or V-N construction. See Section 3418.1.1.</td>
<td>R R ___ R R ___ R R ___</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Automatic sprinklers in corridors, stairways, elevator lobbies, public assembly areas, kitchens and at doors opening to corridors. See Section 3418.1.2.</td>
<td>R R ___ R R R R ___</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Fire department communication system or radios. See Section 3418.1.3.</td>
<td>R R ___ R R ___ R R ___</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Single-station smoke detectors. See Section 3418.1.4.</td>
<td>R R ___ R R ___ R R ___</td>
<td>NR NR NR</td>
<td></td>
</tr>
<tr>
<td>5. Manual fire alarm system. See Section 3418.1.5.</td>
<td>R R ___ R R ___ R R ___</td>
<td>R R ___</td>
<td></td>
</tr>
<tr>
<td>6. Occupant voice notification system. See Section 3418.1.6.</td>
<td>NR ___ R R ___ NR ___ R R ___</td>
<td>NR NR NR</td>
<td></td>
</tr>
<tr>
<td>7. Vertical shaft enclosure walls of one-hour fire resistance. See Section 3418.1.7.</td>
<td>R R ___ R R ___ R R ___</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Protection of openings in vertical shaft enclosures by 20-minute-rated assemblies. See Section 3418.1.8.</td>
<td>R R ___ R R ___ R R ___</td>
<td>R R ___</td>
<td></td>
</tr>
<tr>
<td>9. Manual shutoff of HVAC systems. See Section 3418.1.9.</td>
<td>R R ___ R R ___ R R ___</td>
<td>R R ___</td>
<td></td>
</tr>
<tr>
<td>10. Automatic elevator recall system. See Section 3418.1.10.</td>
<td>R R ___ R R ___ R R ___</td>
<td>R R ___</td>
<td></td>
</tr>
<tr>
<td>11. Unlocked stairway doors every fifth floor. See Section 3418.1.11.</td>
<td>R R ___ R R ___ R R ___</td>
<td>NR ___ R</td>
<td></td>
</tr>
<tr>
<td>12. Stair shaft ventilation. See Section 3418.1.12.</td>
<td>R R ___ R R ___ R R ___</td>
<td>R R ___</td>
<td></td>
</tr>
<tr>
<td>13. Elevator shaft ventilation. See Section 3418.1.13.</td>
<td>R R ___ R R ___ R R ___</td>
<td>R R ___</td>
<td></td>
</tr>
<tr>
<td>15. Minimum of two exit stairways. See Section 3418.1.15.</td>
<td>R R ___ R R ___ R R ___</td>
<td>R R ___</td>
<td></td>
</tr>
<tr>
<td>16. Exit corridor wall construction. See Section 3418.1.16.</td>
<td>R R ___ R R ___ R R ___</td>
<td>R R ___</td>
<td></td>
</tr>
<tr>
<td>17. Protected exit corridor openings with 20-minute-rated assemblies or 1 1/4-inch (44 mm) solid-wood door. See Section 3418.1.17.</td>
<td>R R ___ R R ___ R R ___</td>
<td>NR ___ NR</td>
<td></td>
</tr>
<tr>
<td>18. Exit corridor doors equipped with self-closing devices. See Section 3418.1.18.</td>
<td>R R ___ R R ___ R R ___</td>
<td>NR ___ NR</td>
<td></td>
</tr>
</tbody>
</table>

#### GROUP B

<table>
<thead>
<tr>
<th>ITEMS REQUIRED</th>
<th>Office</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Automatic sprinklers in buildings of Type II-N, III-N or V-N construction. See Section 3418.1.1.</td>
<td></td>
</tr>
<tr>
<td>2. Automatic sprinklers in corridors, stairways, elevator lobbies, public assembly areas, kitchens and at doors opening to corridors. See Section 3418.1.2.</td>
<td></td>
</tr>
<tr>
<td>3. Fire department communication system or radios. See Section 3418.1.3.</td>
<td></td>
</tr>
<tr>
<td>5. Manual fire alarm system. See Section 3418.1.5.</td>
<td></td>
</tr>
<tr>
<td>6. Occupant voice notification system. See Section 3418.1.6.</td>
<td></td>
</tr>
<tr>
<td>7. Vertical shaft enclosure walls of one-hour fire resistance. See Section 3418.1.7.</td>
<td></td>
</tr>
<tr>
<td>8. Protection of openings in vertical shaft enclosures by 20-minute-rated assemblies. See Section 3418.1.8.</td>
<td></td>
</tr>
<tr>
<td>10. Automatic elevator recall system. See Section 3418.1.10.</td>
<td></td>
</tr>
<tr>
<td>11. Unlocked stairway doors every fifth floor. See Section 3418.1.11.</td>
<td></td>
</tr>
<tr>
<td>12. Stair shaft ventilation. See Section 3418.1.12.</td>
<td></td>
</tr>
<tr>
<td>15. Minimum of two exit stairways. See Section 3418.1.15.</td>
<td></td>
</tr>
<tr>
<td>16. Exit corridor wall construction. See Section 3418.1.16.</td>
<td></td>
</tr>
<tr>
<td>17. Protected exit corridor openings with 20-minute-rated assemblies or 1 1/4-inch (44 mm) solid-wood door. See Section 3418.1.17.</td>
<td></td>
</tr>
<tr>
<td>18. Exit corridor doors equipped with self-closing devices. See Section 3418.1.18.</td>
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(Continued)
### TABLE A-34-A—OCCUPANCY CLASSIFICATION AND USE1—(Continued)

<table>
<thead>
<tr>
<th>ITEMS REQUIRED</th>
<th>GROUP R, DIVISION 1</th>
<th>GROUP B</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Apartment</td>
<td>Hotel</td>
</tr>
<tr>
<td></td>
<td>Height Zones2</td>
<td>1</td>
</tr>
<tr>
<td>19. Exit corridor dead ends limited to 20 feet (6096 mm) maximum. See Section 3418.1.19.</td>
<td>R</td>
<td>R</td>
</tr>
<tr>
<td>20. Interior finish controlled in exit corridors, exit stairways and extensions thereof. See Section 3418.1.20.</td>
<td>R</td>
<td>R</td>
</tr>
<tr>
<td>21. Exit stairway illumination. See Section 3418.1.21.</td>
<td>R</td>
<td>R</td>
</tr>
<tr>
<td>22. Exit corridor illumination. See Section 3418.1.22.</td>
<td>R</td>
<td>R</td>
</tr>
<tr>
<td>23. Exit stairway exit signs. See Section 3418.1.23.</td>
<td>R</td>
<td>R</td>
</tr>
<tr>
<td>24. Exitway exit signs. See Section 3418.1.24.</td>
<td>R</td>
<td>R</td>
</tr>
<tr>
<td>25. Emergency planning. See Section 3418.1.25.</td>
<td>R</td>
<td>R</td>
</tr>
<tr>
<td>26. Posting of emergency instructions. See Section 3418.1.26.</td>
<td>R</td>
<td>R</td>
</tr>
<tr>
<td>27. Fire drills. See Section 3418.1.27.</td>
<td>NR</td>
<td>NR</td>
</tr>
</tbody>
</table>

1R—Provisions are required.
NR—Provisions are not required.

2Height zones are established based on a building having a floor as measured to the top of the floor surface used for human occupancy located within the ranges of heights above the lowest level of a fire department vehicle access in accordance with the following:
- Height Zone 1: More than 75 feet (22 860 mm), but not in excess of 149 feet (45 415 mm).
- Height Zone 2: More than 149 feet (45 415 mm), but not in excess of 399 feet (121.6 m).
- Height Zone 3: More than 399 feet (121.6 m).
## UNIT CONVERSION TABLES

### SI SYMBOLS AND PREFIXES

<table>
<thead>
<tr>
<th>Quantity</th>
<th>Unit</th>
<th>Symbol</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length</td>
<td>Meter</td>
<td>m</td>
</tr>
<tr>
<td>Mass</td>
<td>Kilogram</td>
<td>kg</td>
</tr>
<tr>
<td>Time</td>
<td>Second</td>
<td>s</td>
</tr>
<tr>
<td>Electric current</td>
<td>Ampere</td>
<td>A</td>
</tr>
<tr>
<td>Thermodynamic temperature</td>
<td>Kelvin</td>
<td>K</td>
</tr>
<tr>
<td>Amount of substance</td>
<td>Mole</td>
<td>mol</td>
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<tr>
<td>Luminous intensity</td>
<td>Candela</td>
<td>cd</td>
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</table>

### SI SUPPLEMENTARY UNITS

<table>
<thead>
<tr>
<th>Quantity</th>
<th>Unit</th>
<th>Symbol</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plane angle</td>
<td>Radian</td>
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</tr>
<tr>
<td>Solid angle</td>
<td>Steradian</td>
<td>sr</td>
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### SI PREFIXES

<table>
<thead>
<tr>
<th>Multiplication Factor</th>
<th>Prefix</th>
<th>Symbol</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 000 000 000 000 000 = $10^{18}$</td>
<td>exa</td>
<td>E</td>
</tr>
<tr>
<td>1 000 000 000 000 000 = $10^{15}$</td>
<td>peta</td>
<td>P</td>
</tr>
<tr>
<td>1 000 000 000 000 000 = $10^{12}$</td>
<td>tera</td>
<td>T</td>
</tr>
<tr>
<td>1 000 000 000 000 000 = $10^{9}$</td>
<td>giga</td>
<td>G</td>
</tr>
<tr>
<td>1 000 000 000 000 000 = $10^{6}$</td>
<td>mega</td>
<td>M</td>
</tr>
<tr>
<td>1 000 000 000 000 000 = $10^{3}$</td>
<td>kilo</td>
<td>k</td>
</tr>
<tr>
<td>100 = $10^{2}$</td>
<td>hecto</td>
<td>h</td>
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<tr>
<td>10 = $10^{1}$</td>
<td>deka</td>
<td>da</td>
</tr>
<tr>
<td>0.1 = $10^{-1}$</td>
<td>deci</td>
<td>d</td>
</tr>
<tr>
<td>0.01 = $10^{-2}$</td>
<td>centi</td>
<td>c</td>
</tr>
<tr>
<td>0.001 = $10^{-3}$</td>
<td>milli</td>
<td>m</td>
</tr>
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<td>0.000 001 = $10^{-6}$</td>
<td>micro</td>
<td>μ</td>
</tr>
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<td>0.000 000 001 = $10^{-9}$</td>
<td>nano</td>
<td>n</td>
</tr>
<tr>
<td>0.000 000 000 001 = $10^{-12}$</td>
<td>pico</td>
<td>p</td>
</tr>
<tr>
<td>0.000 000 000 000 001 = $10^{-15}$</td>
<td>femto</td>
<td>f</td>
</tr>
<tr>
<td>0.000 000 000 000 000 001 = $10^{-18}$</td>
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(Continued)
### SI SYMBOLS AND PREFIXES—(Continued)

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<tr>
<th>Quantity</th>
<th>Unit</th>
<th>Symbol</th>
<th>Formula</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency (of a periodic phenomenon)</td>
<td>hertz</td>
<td>Hz</td>
<td>(1/\text{s})</td>
</tr>
<tr>
<td>Force</td>
<td>newton</td>
<td>N</td>
<td>(\text{kg}\cdot\text{m}/\text{s}^2)</td>
</tr>
<tr>
<td>Pressure, stress</td>
<td>pascal</td>
<td>Pa</td>
<td>(\text{N}/\text{m}^2)</td>
</tr>
<tr>
<td>Energy, work, quantity of heat</td>
<td>joule</td>
<td>J</td>
<td>(\text{N}\cdot\text{m})</td>
</tr>
<tr>
<td>Power, radiant flux</td>
<td>watt</td>
<td>W</td>
<td>(\text{J}/\text{s})</td>
</tr>
<tr>
<td>Quantity of electricity, electric charge</td>
<td>coulomb</td>
<td>C</td>
<td>(\text{A}\cdot\text{s})</td>
</tr>
<tr>
<td>Electric potential, potential difference, electromotive force</td>
<td>volt</td>
<td>V</td>
<td>(\text{W}/\text{A})</td>
</tr>
<tr>
<td>Capacitance</td>
<td>farad</td>
<td>F</td>
<td>(\text{C}/\text{V})</td>
</tr>
<tr>
<td>Electric resistance</td>
<td>ohm</td>
<td>(\Omega)</td>
<td>(\text{V}/\text{A})</td>
</tr>
<tr>
<td>Conductance</td>
<td>siemens</td>
<td>S</td>
<td>(\text{A}/\text{V})</td>
</tr>
<tr>
<td>Magnetic flux</td>
<td>weber</td>
<td>Wb</td>
<td>(\text{V}\cdot\text{s})</td>
</tr>
<tr>
<td>Magnetic flux density</td>
<td>tesla</td>
<td>T</td>
<td>(\text{Wb}/\text{m}^2)</td>
</tr>
<tr>
<td>Inductance</td>
<td>henry</td>
<td>H</td>
<td>(\text{Wb}/\text{A})</td>
</tr>
<tr>
<td>Luminous flux</td>
<td>lumen</td>
<td>lm</td>
<td>(\text{cd}\cdot\text{sr})</td>
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<tr>
<td>Illuminance</td>
<td>lux</td>
<td>lx</td>
<td>(\text{lm}/\text{m}^2)</td>
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<tr>
<td>Activity (of radionuclides)</td>
<td>becquerel</td>
<td>Bq</td>
<td>(\text{l}/\text{s})</td>
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<tr>
<td>Absorbed dose</td>
<td>gray</td>
<td>Gy</td>
<td>(\text{J}/\text{kg})</td>
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### CONVERSION FACTORS

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<th>to</th>
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<td>LENGTH</td>
<td></td>
<td></td>
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<tr>
<td>1 mile (U.S. statute)</td>
<td>km</td>
<td>1.609 344</td>
</tr>
<tr>
<td>1 yd</td>
<td>m</td>
<td>0.9144</td>
</tr>
<tr>
<td>1 ft</td>
<td>m</td>
<td>0.3048</td>
</tr>
<tr>
<td>1 in</td>
<td>mm</td>
<td>25.4</td>
</tr>
<tr>
<td>AREA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 mile² (U.S. statute)</td>
<td>km²</td>
<td>2.589 998</td>
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<td>1 acre (U.S. survey)</td>
<td>ha</td>
<td>0.404 6873</td>
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<tr>
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<td>m²</td>
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<tr>
<td>1 yd²</td>
<td>m²</td>
<td>0.836 1274</td>
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<tr>
<td>1 ft²</td>
<td>m²</td>
<td>0.092 903 04</td>
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<tr>
<td>1 in²</td>
<td>mm²</td>
<td>645.16</td>
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<td>VOLUME, MODULUS OF SECTION</td>
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<td></td>
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<tr>
<td>1 acre ft</td>
<td>m³</td>
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</tr>
<tr>
<td>1 yd³</td>
<td>m³</td>
<td>0.764 5549</td>
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<tr>
<td>100 board ft</td>
<td>m³</td>
<td>0.235 9737</td>
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<tr>
<td>1 ft³</td>
<td>m³</td>
<td>0.028 316 85</td>
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<td></td>
<td>L(dm³)</td>
<td>28.3168</td>
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<tr>
<td>1 in³</td>
<td>mm³</td>
<td>16 387.06</td>
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<tr>
<td></td>
<td>mL (cm³)</td>
<td>16.3871</td>
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<tr>
<td>1 barrel (42 U.S. gallons)</td>
<td>m³</td>
<td>0.158 9873</td>
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(Continued)
### CONVERSION FACTORS—(Continued)

#### (FLUID) CAPACITY

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<td><strong>L</strong> <strong>mL</strong> <strong>mL</strong> <strong>mL</strong> <strong>mL</strong> <strong>mL</strong></td>
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<tr>
<td>1 gal (U.S. liquid) *</td>
</tr>
<tr>
<td>1 qt (U.S. liquid)</td>
</tr>
<tr>
<td>1 pt (U.S. liquid)</td>
</tr>
<tr>
<td>1 ft oz (U.S.)</td>
</tr>
<tr>
<td>1 gal (U.S. liquid)</td>
</tr>
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</table>

*1 gallon (UK) approx. 1.2 gal (U.S.).

**1 liter approx. 0.001 cubic meter.

#### SECOND MOMENT OF AREA

<table>
<thead>
<tr>
<th>1 in <strong>4</strong></th>
<th>mm <strong>4</strong></th>
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<tbody>
<tr>
<td>m <strong>4</strong></td>
<td>416 231.4</td>
</tr>
<tr>
<td>m <strong>4</strong></td>
<td>0.16 231 4 × 10 <strong>-7</strong></td>
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#### PLANE ANGLE

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<th>1° (degree)</th>
<th>rad</th>
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<td>mrad</td>
<td>0.017 453 29</td>
</tr>
<tr>
<td>urad</td>
<td>17.453 29</td>
</tr>
<tr>
<td>1' (minute)</td>
<td>urad</td>
</tr>
<tr>
<td>urad</td>
<td>290.88</td>
</tr>
<tr>
<td>1&quot; (second)</td>
<td>urad</td>
</tr>
<tr>
<td>urad</td>
<td>4.848</td>
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#### VELOCITY, SPEED

<table>
<thead>
<tr>
<th>1 ft/s</th>
<th>m/s</th>
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<tbody>
<tr>
<td>1 mile/h</td>
<td>km/h</td>
</tr>
<tr>
<td>m/s</td>
<td>0.3048</td>
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<tr>
<td>m/s</td>
<td>1.609 344</td>
</tr>
<tr>
<td>m/s</td>
<td>0.447 04</td>
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#### VOLUME RATE OF FLOW

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<th>m <strong>3</strong>/s</th>
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<tr>
<td>1 ft <strong>3</strong>/min</td>
<td>L/s</td>
</tr>
<tr>
<td>1 gal/min</td>
<td>L/s</td>
</tr>
<tr>
<td>1 gal/min</td>
<td>m <strong>3</strong>/min</td>
</tr>
<tr>
<td>1 gal/h</td>
<td>mL/s</td>
</tr>
<tr>
<td>1 million gal/d</td>
<td>L/s</td>
</tr>
<tr>
<td>1 acre ft/s</td>
<td>m <strong>3</strong>/s</td>
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#### TEMPERATURE INTERVAL

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<th>1°F</th>
<th>°C or K</th>
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<tr>
<td>5°F</td>
<td>0.555 556</td>
</tr>
<tr>
<td>5°F°C = 5°FK</td>
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#### EQUIVALENT TEMPERATURE (°C = T°C – 273.15)

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<th>t°F</th>
<th>T°C</th>
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<tr>
<td>t°F</td>
<td>°C = 9/5 t°F + 32</td>
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#### MASS

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<thead>
<tr>
<th>1 ton (short ***</th>
<th>metric ton</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 lb</td>
<td>kg</td>
</tr>
<tr>
<td>1 oz</td>
<td>g</td>
</tr>
<tr>
<td>1 long ton (2,240 lb)</td>
<td>kg</td>
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</tbody>
</table>

#### MASS PER UNIT AREA

<table>
<thead>
<tr>
<th>1 lb/ft <strong>2</strong></th>
<th>kg/m <strong>2</strong></th>
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</thead>
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<tr>
<td>1 oz/yr <strong>2</strong></td>
<td>g/m <strong>2</strong></td>
</tr>
<tr>
<td>1 oz/ft <strong>2</strong></td>
<td>g/m <strong>2</strong></td>
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(Continued)
# Conversion Tables

## Uniform Building Code

### Conversion Factors—(Continued)

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<tr>
<th>From</th>
<th>To</th>
<th>Conversion Factor</th>
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<tr>
<td><strong>Density (mass per unit volume)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 lb/ft³</td>
<td>kg/m³</td>
<td>16.01846</td>
</tr>
<tr>
<td>1 lb/yd³</td>
<td>kg/m³</td>
<td>0.5932764</td>
</tr>
<tr>
<td>1 ton/yd³</td>
<td>t/m³</td>
<td>1.186553</td>
</tr>
<tr>
<td><strong>Force</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 tonf (ton-force)</td>
<td>kN</td>
<td>8.89644</td>
</tr>
<tr>
<td>1 kip (1,000 lbf)</td>
<td>kN</td>
<td>4.44822</td>
</tr>
<tr>
<td>1 lbf (pound-force)</td>
<td>N</td>
<td>4.44822</td>
</tr>
<tr>
<td><strong>Moment of Force, Torque</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 lbf·ft</td>
<td>N·m</td>
<td>1.355818</td>
</tr>
<tr>
<td>1 lbf·in</td>
<td>N·m</td>
<td>0.1129848</td>
</tr>
<tr>
<td>1 ton·ft</td>
<td>kN·m</td>
<td>2.71164</td>
</tr>
<tr>
<td>1 kip·ft</td>
<td>kN·m</td>
<td>1.35582</td>
</tr>
<tr>
<td><strong>Force per Unit Length</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 lbf/ft</td>
<td>N/m</td>
<td>14.5939</td>
</tr>
<tr>
<td>1 lbf/in</td>
<td>N/m</td>
<td>175.1268</td>
</tr>
<tr>
<td>1 ton/ft</td>
<td>kN/m</td>
<td>29.1878</td>
</tr>
<tr>
<td><strong>Pressure, Stress, Modulus of Elasticity (force per unit area)</strong> <em>(1 Pa = 1 N/m²)</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 tonf/in²</td>
<td>MPa</td>
<td>13.7895</td>
</tr>
<tr>
<td>1 tonf/ft²</td>
<td>kPa</td>
<td>95.7605</td>
</tr>
<tr>
<td>1 kip/in²</td>
<td>MPa</td>
<td>6.894757</td>
</tr>
<tr>
<td>1 kip/ft²</td>
<td>kPa</td>
<td>6.894757</td>
</tr>
<tr>
<td>1 lbf/in²</td>
<td>Pa</td>
<td>47.8803</td>
</tr>
<tr>
<td>1 lbf/ft²</td>
<td>Pa</td>
<td>2.98898</td>
</tr>
<tr>
<td>1 atmosphere</td>
<td>kPa</td>
<td>101.3250</td>
</tr>
<tr>
<td>1 inch mercury</td>
<td>kPa</td>
<td>3.37685</td>
</tr>
<tr>
<td>1 foot (water column at 32°F)</td>
<td>kPa</td>
<td>2.98898</td>
</tr>
<tr>
<td><strong>Work, Energy, Heat</strong> <em>(1 J = 1 N·m = 1 W·s)</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 kWh (550 ft·lbf/s)</td>
<td>MJ</td>
<td>3.6</td>
</tr>
<tr>
<td>1 Btu (Int. Table)</td>
<td>kJ</td>
<td>1.055056</td>
</tr>
<tr>
<td>1 ft·lbf</td>
<td>J</td>
<td>1055.056</td>
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<tr>
<td><strong>Coefficient of Heat Transfer</strong></td>
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<td></td>
</tr>
<tr>
<td>1 Btu/(ft²·h·°F)</td>
<td>W/(m²·K)</td>
<td>5.678263</td>
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<tr>
<td><strong>Thermal Conductivity</strong></td>
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<td></td>
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<tr>
<td>1 Btu/(ft·h·°F)</td>
<td>W/(m·K)</td>
<td>1.730735</td>
</tr>
<tr>
<td><strong>Illuminance</strong></td>
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<td></td>
</tr>
<tr>
<td>1 lm/ft² (footcandle)</td>
<td>lx (lux)</td>
<td>10.76391</td>
</tr>
<tr>
<td><strong>Luminance</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 cd/ft²</td>
<td>cd/m²</td>
<td>10.7639</td>
</tr>
<tr>
<td>1 foot lambert</td>
<td>cd/m²</td>
<td>3.426259</td>
</tr>
<tr>
<td>1 lambert</td>
<td>kcd/m²</td>
<td>3.183099</td>
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A

A—OCCUPANCIES 303

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<th>Topic</th>
<th>Sections</th>
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<tbody>
<tr>
<td>Access to buildings</td>
<td>1001.7, 1004.9, 1005.6</td>
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<tr>
<td>Adaptability</td>
<td>1102</td>
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<td>Area of refuge</td>
<td>1102, 1104.2</td>
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<td>Corridors</td>
<td>1005.1</td>
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<tr>
<td>Definition</td>
<td>1102</td>
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<td>Doors</td>
<td>1004</td>
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<td>Egress</td>
<td>1104.1</td>
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<td>Elevators</td>
<td>1031.8, 1104.1.3, 1105.3</td>
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<td>Facilities (toilets, lavatories, bathing, fixtures, water fountains and other building facilities)</td>
<td>1106</td>
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<tr>
<td>Landings at doors</td>
<td>1004.10</td>
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<td>Persons with disability, definition</td>
<td>1102</td>
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<td>Ramps</td>
<td>1007</td>
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<td>Signs</td>
<td>1103.2.4</td>
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<td>Site facilities</td>
<td>Appendix 1106</td>
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<td>To residential occupancies</td>
<td>1103.1.9</td>
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<td>Where required</td>
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ADHESIVES (see WOOD, Glued-laminated timber)

ADJOINING BUILDINGS (see also LOCATION ON PROPERTY)

<table>
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<td>Protection of adjoining property</td>
<td>3301.2</td>
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<td>Wall protection of buildings on same property</td>
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ADMIXTURE, mortar and grout, aggregate 1902, 1903.3, 2103

ADOBE CONSTRUCTION (see MASONRY, unburned clay)

AEROSOL 304.8

<table>
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<td>Buildings storing</td>
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<td>Occupancy classification</td>
<td>307.1.1</td>
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AGGREGATES

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<td>1903.3</td>
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<td>1902</td>
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<tr>
<td>Fire-resistive construction</td>
<td>702</td>
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<td>202</td>
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<td>Occupancy classification and requirements</td>
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AIRCRAFT

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<td>Floors</td>
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<th>Topic</th>
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<td>Occupancy classification for Group F, Division 1 Occupancies (production)</td>
<td>306.1</td>
</tr>
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<td>Occupancy classification for Group H, Division 5 Occupancies (hangars)</td>
<td>307.1</td>
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<td>311.1</td>
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<td>Special provisions for Group H, Division 5 repair garages</td>
<td>307.2.11</td>
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<td></td>
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<tr>
<td>ALLOWABLE FLOOR AREAS</td>
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<td>General</td>
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<td>To historic buildings</td>
<td>3403.5</td>
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<td>ALTERNATE MATERIALS AND METHODS OF CONSTRUCTION</td>
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</tr>
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