

11.12.2.2.3.3.2 Ventilation Options. Ventilation options between array sections shall be one of the following:

- (1) A pathway 8 ft (2438 mm) or greater in width
- (2) A pathway 4 ft (1219 mm) or greater in width and bordering on existing roof skylights or ventilation hatches
- (3) A pathway 4 ft (1219 mm) or greater in width and bordering 4 ft (1219 mm) × 8 ft (2438 mm) venting cutouts options every 20 ft (6096 mm) on alternating sides of the pathway

11.12.2.2.4 Location of Direct Current (DC) Conductors.

11.12.2.2.4.1 Exterior-mounted dc conduits, wiring systems, and raceways for photovoltaic circuits shall be located as close as possible to the ridge, hip, or valley and from the hip or valley as directly as possible to an outside wall to reduce trip hazards and maximize ventilation opportunities.

11.12.2.2.4.2 Conduit runs between subarrays and to dc combiner boxes shall be designed to take the shortest path from the array to the dc combiner box.

11.12.2.2.4.3 DC combiner boxes shall be located so that conduit runs are minimized in the pathways between arrays.

11.12.2.2.4.4 DC wiring shall be run in metallic conduit or raceways where located within enclosed spaces in a building.

11.12.2.2.4.4.1 Where dc wiring is run perpendicular or parallel to load-bearing members, a minimum 10 in. (254 mm) space below roof decking or sheathing shall be maintained.

11.12.3 Ground-Mounted Photovoltaic System Installations. Ground-mounted photovoltaic systems shall be installed in accordance with 11.12.3.1 through 11.12.3.3.

11.12.3.1* Clearances. A clear area of 10 ft (3048 mm) around ground-mounted photovoltaic installations shall be provided.

11.12.3.2* Noncombustible Base. A gravel base or other noncombustible base acceptable to the AHJ shall be installed and maintained under and around the installation.

11.12.3.3* Security Barriers. Fencing, skirting, or other suitable security barriers shall be installed when required by the AHJ.

Chapter 12 Features of Fire Protection

12.1 General. This chapter shall apply to new, existing, permanent, or temporary buildings.

12.2* Construction.

12.2.1* Where required by this *Code*, a type of building construction shall comply with NFPA 220, *Standard on Types of Building Construction*.

12.2.2 Fire safety construction features for new and existing occupancies shall comply with this *Code* and the referenced edition of NFPA 101.

12.3 Fire-Resistive Materials and Construction.

12.3.1 The design and construction of fire walls and fire barrier walls that are required to separate buildings or subdivide a building to prevent the spread of fire shall comply with Section 12.3 and NFPA 221, *Standard for High Challenge Fire Walls, Fire Walls, and Fire Barrier Walls*.

12.3.2* Quality Assurance for Penetrations and Joints. In new buildings three stories or greater in height, a quality assurance program for the installation of devices and systems installed to protect penetration and joints shall be prepared and monitored by the RDP responsible for design. Inspections of firestop systems and fire-resistive joint systems shall be in accordance with 12.3.2.1 and 12.3.2.2.

12.3.2.1 Inspection of firestop systems of the types tested in accordance with ASTM E 814, *Standard Test Method for Fire Tests of Through-Penetration Fire Stops*, or ANSI/UL 1479, *Standard for Fire Tests of Through-Penetration Firestops*, shall be conducted in accordance with ASTM E 2174, *Standard Practice for On-Site Inspection of Installed Fire Stops*. [5000:40.9.1]

12.3.2.2 Inspection of fire-resistive joint systems of the types tested in accordance with ASTM E 1966, *Standard Test Method for Fire-Resistive Joint Systems*, or ANSI/UL 2079, *Standard for Tests for Fire Resistance of Buildings Joint Systems*, shall be conducted in accordance with ASTM E 2393, *Standard Practice for On-Site Inspection of Installed Fire Resistive Joint Systems and Perimeter Fire Barriers*. [5000:40.9.2]

12.3.3* Maintenance of Fire-Resistive Construction.

12.3.3.1 Required fire-resistive construction, including fire barriers, fire walls, exterior walls due to location on property, fire-resistive requirements based on type of construction, draft-stop partitions, and roof coverings, shall be maintained and shall be properly repaired, restored, or replaced where damaged, altered, breached, penetrated, removed, or improperly installed.

12.3.3.2 Where required, fire-rated gypsum wallboard walls or ceilings that are damaged to the extent that through openings exist, the damaged gypsum wallboard shall be replaced or returned to the required level of fire resistance using a listed repair system or using materials and methods equivalent to the original construction.

12.3.3.3 Where readily accessible, required fire-resistance-rated assemblies in high-rise buildings shall be visually inspected for integrity at least once every 5 years.

12.3.3.3.1 The person responsible for conducting the visual inspection shall demonstrate appropriate technical knowledge and experience in fire-resistance-rated design and construction acceptable to the AHJ.

12.3.3.3.2 A written report prepared by the person responsible for conducting the visual inspection shall be submitted to the AHJ documenting the results of the visual inspection.

12.4 Fire Doors and Other Operating Protectives.

12.4.1* The installation and maintenance of assemblies and devices used to protect openings in walls, floors, and ceilings against the spread of fire and smoke within, into, or out of buildings shall comply with Section 12.4 and NFPA 80, *Standard for Fire Doors and Other Opening Protectives*. [80:1.1]

12.4.2* With the exception of fabric fire safety curtain assemblies, Section 12.4 addresses assemblies that have been subjected to standardized fire tests. (See Chapter 20 of NFPA 80, *Standard for Fire Doors and Other Opening Protectives*.) [80:1.1.1]

12.4.3* Incinerator doors, record room doors, and vault doors are not covered in Section 12.4. [80:1.1.2]

12.4.4* Requirements for horizontally sliding, vertically sliding, and swinging doors as used in this *Code* do not apply to hoistway doors for elevators and dumbwaiters. [80:1.1.3]

12.4.5* Section 12.4 shall not cover fire resistance glazing materials and horizontally sliding accordion or folding assemblies fabricated for use as walls and tested as wall assemblies in accordance with NFPA 251. [80:1.1.4]

12.4.6 Care and Maintenance of Fire Doors and Other Opening Protectives.

12.4.6.1 Subsection 12.4.6 shall cover the care and maintenance of fire doors and other opening protectives.

12.4.6.2 Removal of Door or Window. Where a door or window opening is no longer in use, the opening shall be filled with construction equivalent to that of the wall. [80:5.1.2]

12.4.6.3 Operability.

12.4.6.3.1 Doors, shutters, and windows shall be operable at all times. [80:5.1.3.1]

12.4.6.3.2 Doors, shutters, and windows shall be kept closed and latched or arranged for automatic closing. [80:5.1.3.2]

12.4.6.4 Replacement. Where it is necessary to replace fire doors, shutters, windows or their frames, glazing materials, hardware, and closing mechanisms, replacements shall meet the requirements for fire protection and shall be installed as required by this section for new installations. [80:5.1.4]

12.4.6.5 Repairs and Field Modifications.

12.4.6.5.1 Repairs shall be made, and defects that could interfere with operation shall be corrected without delay. [80:5.1.5.1]

12.4.6.5.2 Field Modifications.

12.4.6.5.2.1 In cases where a field modification to a fire door or a fire door assembly is desired, the laboratory with which the product or component being modified is listed shall be contacted and a description of the modifications shall be presented to the laboratory. [80:5.1.5.2.1]

12.4.6.5.2.2 If the laboratory finds that the modifications will not compromise the integrity and fire resistance capabilities of the assembly, the modifications shall be permitted to be authorized by the laboratory without a field visit from the laboratory. [80:5.1.5.2.2]

12.4.6.6* Inspections.

12.4.6.6.1* Fire door assemblies shall be inspected and tested not less than annually, and a written record of the inspection shall be signed and kept for inspection by the AHJ. [80:5.2.1]

12.4.6.7 Performance-Based Option.

12.4.6.7.1 As an alternate means of compliance with 12.4.6.6.1, subject to the AHJ, fire door assemblies shall be permitted to be inspected, tested, and maintained under a written performance-based program. [80:5.2.2.1]

12.4.6.7.2 Goals established under a performance-based program shall provide assurance that the fire door assembly will perform its intended function when exposed to fire conditions. [80:5.2.2.2]

12.4.6.7.3 Technical justification for inspection, testing, and maintenance intervals shall be documented. [80:5.2.2.3]

12.4.6.7.4 The performance-based option shall include historical data acceptable to the AHJ. [80:5.2.2.4]

12.4.6.8 Functional Testing.

12.4.6.8.1 Functional testing of fire door and window assemblies shall be performed by individuals with knowledge and understanding of the operating components of the type of door being subject to testing. [80:5.2.3.1]

12.4.6.8.2 Before testing, a visual inspection shall be performed to identify any damaged or missing parts that can create a hazard during testing or affect operation or resetting. [80:5.2.3.2]

12.4.6.9 Swinging Doors with Builders Hardware or Fire Door Hardware.

12.4.6.9.1 Fire door assemblies shall be visually inspected from both sides to assess the overall condition of door assembly. [80:5.2.4.1]

12.4.6.9.2 As a minimum, the following items shall be verified:

- (1) No open holes or breaks exist in surfaces of either the door or frame.
- (2) Glazing, vision light frames, and glazing beads are intact and securely fastened in place, if so equipped.
- (3) The door, frame, hinges, hardware, and noncombustible threshold are secured, aligned, and in working order with no visible signs of damage.
- (4) No parts are missing or broken.
- (5) Door clearances do not exceed clearances listed in 4.8.4 and 6.3.1.7 of NFPA 80.
- (6) The self-closing device is operational; that is, the active door completely closes when operated from the full open position.
- (7) If a coordinator is installed, the inactive leaf closes before the active leaf.
- (8) Latching hardware operates and secures the door when it is in the closed position.
- (9) Auxiliary hardware items that interfere or prohibit operation are not installed on the door or frame.
- (10) No field modifications to the door assembly have been performed that void the label.
- (11) Gasketing and edge seals, where required, are inspected to verify their presence and integrity. [80:5.2.4.2]

12.4.6.10 Horizontally Sliding, Vertically Sliding, and Rolling Doors.

12.4.6.10.1 Fire door assemblies shall be visually inspected from both sides to assess the overall condition of door assembly. [80:5.2.5.1]

12.4.6.10.2 The following items shall be verified:

- (1) No open holes or breaks exist in surfaces of either the door or frame.
- (2) Slats, endlocks, bottom bar, guide assembly, curtain entry hood, and flame baffle are correctly installed and intact.
- (3) Glazing, vision light frames, and glazing beads are intact and securely fastened in place, if so equipped.
- (4) Curtain, barrel, and guides are aligned, level, plumb, and true.
- (5) Expansion clearance is maintained in accordance with manufacturer's listing.
- (6) Drop release arms and weights are not blocked or wedged.
- (7) Mounting and assembly bolts are intact and secured.
- (8) Attachment to jambs are with bolts, expansion anchors, or as otherwise required by the listing.
- (9) Smoke detectors, if equipped, are installed and operational.

- (10) No parts are missing or broken.
- (11) Fusible links, if equipped, are in the location; chain/cable, s-hooks, eyes, and so forth, are in good condition (i.e., no kinked or pinched cable, no twisted or inflexible chain); and links are not painted or coated with dust or grease.
- (12) Auxiliary hardware items that interfere or prohibit operation are not installed on the door or frame.
- (13) No field modifications to the door assembly have been performed that void the label. [80:5.2.5.2]

12.4.6.11 Inspection shall include an operational test for automatic-closing doors and windows to verify that the assembly will close under fire conditions. [80:5.2.6]

12.4.6.12 Assembly shall be reset after a successful test. [80:5.2.7]

12.4.6.13 Resetting of the release mechanism shall be done in accordance with manufacturer's instructions. [80:5.2.8]

12.4.6.14 Hardware shall be examined, and inoperative hardware, parts, or other defects shall be replaced without delay. [80:5.2.9]

12.4.6.15 Tin-clad and kalamein doors shall be inspected for dry rot of the wood core. [80:5.2.10]

12.4.6.16 Chains or cables employed shall be inspected for excessive wear and stretching. [80:5.2.11]

12.4.6.17 Lubrication and Adjustments.

12.4.6.17.1 Guides and bearings shall be kept well lubricated to facilitate operation. [80:5.2.12.1]

12.4.6.17.2 Chains or cables on biparting, counterbalanced doors shall be checked, and adjustments shall be made, to ensure latching and to keep the doors in proper relation to the opening. [80:5.2.12.2]

12.4.6.18 Prevention of Door Blockage.

12.4.6.18.1 Door openings and the surrounding areas shall be kept clear of anything that could obstruct or interfere with the free operation of the door. [80:5.2.13.1]

12.4.6.18.2 Where necessary, a barrier shall be built to prevent the piling of material against sliding doors. [80:5.2.13.2]

12.4.6.18.3 Blocking or wedging of doors in the open position shall be prohibited. [80:5.2.13.3]

12.4.6.19 Maintenance of Closing Mechanisms.

12.4.6.19.1 Self-closing devices shall be kept in working condition at all times. [80:5.2.14.1]

12.4.6.19.2 Swinging doors normally held in the open position and equipped with automatic-closing devices shall be operated at frequent intervals to ensure operation. [80:5.2.14.2]

12.4.6.19.3 All horizontal or vertical sliding and rolling fire doors shall be inspected and tested annually to check for proper operation and full closure. [80:5.2.14.3]

12.4.6.19.3.1 Resetting of the automatic-closing device shall be done in accordance with the manufacturer's instructions. [80:5.2.14.3.1]

12.4.6.19.3.2 A written record shall be maintained and shall be made available to the AHJ. [80:5.2.14.3.2]

12.4.6.19.3.3 When the annual test for proper operation and full closure is conducted, rolling steel fire doors shall be drop-tested twice. [80:5.2.14.3.3]

12.4.6.19.3.4 The first test shall be to check for proper operation and full closure. [80:5.2.14.3.4]

12.4.6.19.3.5 A second test shall be done to verify that the automatic-closing device has been reset correctly. [80:5.2.14.3.5]

12.4.6.19.4 Fusible links or other heat-actuated devices and release devices shall not be painted. [80:5.2.14.4]

12.4.6.19.5* Paint shall be prevented from accumulating on any movable part. [80:5.2.14.5]

12.4.6.20 Repair of Fire Doors and Windows.

12.4.6.20.1 Damaged glazing material shall be replaced with labeled glazing. [80:5.2.15.1]

12.4.6.20.1.1 Replacement glazing materials shall be installed in accordance with their individual listing. [80:5.2.15.1.1]

12.4.6.20.2 Any breaks in the face covering of doors shall be repaired immediately. [80:5.2.15.2]

12.4.6.20.3 Where a fire door, frame, or any part of its appurtenances is damaged to the extent that it could impair the door's proper emergency function, the following actions shall be performed:

- (1) The fire door, frame, door assembly, or any part of its appurtenances shall be repaired with labeled parts or parts obtained from the original manufacturer.
- (2) The door shall be tested to ensure emergency operation and closing upon completion of the repairs. [80:5.2.15.3]

12.4.6.20.3.1 If repairs cannot be made with labeled components or parts obtained from the original manufacturer or retrofitted in accordance with 12.4.6.21, the fire door frame, fire door assembly, or appurtenances shall be replaced. [80:5.2.15.3.1]

12.4.6.20.4 When holes are left in a door or frame due to changes or removal of hardware or plant-ons, the holes shall be repaired by the following methods:

- (1) Install steel fasteners that completely fill the holes
- (2) Fill the screw or bolt holes with the same material as the door or frame [80:5.2.15.4]

12.4.6.21 Retrofit Operators.

12.4.6.21.1 The operator, governor, and automatic-closing device on rolling steel fire doors shall be permitted to be retrofitted with a labeled retrofit operator under the conditions specified in 12.4.6.21.2 through 12.4.6.21.5. [80:5.3.1]

12.4.6.21.2 The retrofit operator shall be labeled as such. [80:5.3.2]

12.4.6.21.3 The retrofit operator shall be installed in accordance with its installation instructions and listing. [80:5.3.3]

12.4.6.21.4 The installation shall be acceptable to the AHJ. [80:5.3.4]

12.4.6.21.5 The retrofit operator shall be permitted to be provided by a manufacturer other than the original manufacturer of the rolling steel fire door on which it is retrofitted, provided its listing allows it to be retrofitted on that manufacturer's doors. [80:5.3.5]

12.5* Interior Finish.

12.5.1 Interior finish in buildings and structures shall meet the requirements of NFPA 101 and this Code.

12.5.2* General.

12.5.2.1 Classification of interior finish materials shall be in accordance with tests made under conditions simulating actual installations, provided that the AHJ shall be permitted to establish the classification of any material on which a rating by standard test is not available, unless otherwise provided in 12.5.2.2. [101:10.2.1.1]

12.5.2.2 Materials applied directly to the surface of walls and ceilings in a total thickness of less than $\frac{1}{28}$ in. (0.9 mm) shall not be considered interior finish and shall be exempt from tests simulating actual installation if they meet the requirements of Class A interior wall or ceiling finish when tested in accordance with 12.5.4 using fiber cement board as the substrate material. [101:10.2.1.2]

12.5.2.3 Approved existing installations of materials applied directly to the surface of walls and ceilings in a total thickness of less than $\frac{1}{28}$ in. (0.9 mm) shall be permitted to remain in use, and the provisions of 10.2.2 through 10.2.3.7.2 of NFPA 101 shall not apply. [101:10.2.1.3]

12.5.2.4* Fixed or movable walls and partitions, paneling, wall pads, and crash pads applied structurally or for decoration, acoustical correction, surface insulation, or other purposes shall be considered interior finish and shall not be considered decorations or furnishings. [101:10.2.1.4]

12.5.2.5 Lockers constructed of combustible materials shall be considered interior finish. [101:10.2.1.5]

12.5.3* Use of Interior Finishes.

12.5.3.1 Requirements for interior wall and ceiling finish shall apply as follows:

- (1) Where specified elsewhere in this Code for specific occupancies in Chapter 20 and NFPA 101 (see Chapter 7 and Chapter 11 through Chapter 43 of NFPA 101)
- (2) As specified in 12.5.5. [101:10.2.2.1]

12.5.3.2* Requirements for interior floor finish shall apply under any of the following conditions:

- (1) Where floor finish requirements are specified elsewhere in the Code
- (2)* Where carpet or carpet-like material not meeting the requirements of ASTM D 2859, *Standard Test Method for Ignition Characteristics of Finished Textile Floor Covering Materials*, is used
- (3) Where the fire performance of the floor finish cannot be demonstrated to be equivalent to floor finishes with a critical radiant flux of at least 0.1 W/cm²
- (4) Where the fire performance of the floor finish is unknown [101:10.2.2.2]

12.5.4* Interior Wall or Ceiling Finish Testing and Classification. Interior wall or ceiling finish that is required elsewhere in this Code to be Class A, Class B, or Class C shall be classified based on test results from ASTM E 84, *Standard Test Method for Surface Burning Characteristics of Building Materials*, or ANSI/UL 723, *Standard for Test of Surface Burning Characteristics of Building Materials*, except as indicated in 12.5.4.1 or 12.5.4.2. [101:10.2.3]

12.5.4.1 Exposed portions of structural members complying with the requirements for Type IV (2HH) construction in accordance with NFPA 220, *Standard on Types of Building Construction*, or with the building code shall be exempt from testing and classification in accordance with ASTM E 84, or ANSI/UL 723. [101:10.2.3.1]

12.5.4.2 Interior wall and ceiling finish tested in accordance with NFPA 286, *Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth*, and meeting the conditions of 12.5.4.7.2 shall be permitted to be used where interior wall and ceiling finish is required to be Class A in accordance with ASTM E 84 or ANSI/UL 723. [101:10.2.3.2]

12.5.4.3 For fire-retardant coatings, see 12.5.7. [101:10.2.3.3]

12.5.4.4* Products required to be tested in accordance with ASTM E 84 or ANSI/UL 723 shall be classified as follows in accordance with their flame spread and smoke development, except as indicated in 12.5.4.4(4):

- (1) Class A interior wall and ceiling finish shall be characterized by the following:
 - (a) Flame spread index, 0–25
 - (b) Smoke developed index, 0–450
- (2) Class B interior wall and ceiling finish shall be characterized by the following:
 - (a) Flame spread index, 26–75
 - (b) Smoke developed index, 0–450
- (3) Class C interior wall and ceiling finish shall be characterized by the following:
 - (a) Flame spread index, 76–200
 - (b) Smoke developed index, 0–450
- (4) Existing interior finish shall be exempt from the smoke development criteria of 12.5.4.4(1)(b), 12.5.4.4(2)(b), and 12.5.4.4(3)(b). [101:10.2.3.4]

12.5.4.5 The classification of interior finish specified in 12.5.4.4 shall be that of the basic material used by itself or in combination with other materials. [101:10.2.3.5]

12.5.4.6 Wherever the use of Class C interior wall and ceiling finish is required, Class A or Class B shall be permitted. Where Class B interior wall and ceiling finish is required, Class A shall be permitted. [101:10.2.3.6]

12.5.4.7* Products tested in accordance with NFPA 265, *Standard Methods of Fire Tests for Evaluating Room Fire Growth Contribution of Textile or Expanded Vinyl Wall Coverings on Full Height Panels and Walls*, shall comply with the criteria of 12.5.4.7.1. Products tested in accordance with NFPA 286, *Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth*, shall comply with the criteria of 12.5.4.7.2. [101:10.2.3.7]

12.5.4.7.1 The interior finish shall comply with all of the following when tested using method B of the test protocol of NFPA 265, *Standard Methods of Fire Tests for Evaluating Room Fire Growth Contribution of Textile or Expanded Vinyl Wall Coverings on Full Height Panels and Walls*:

- (1) During the 40 kW exposure, flames shall not spread to the ceiling.
- (2) The flame shall not spread to the outer extremities of the samples on the 8 ft × 12 ft (2440 mm × 3660 mm) walls.
- (3) Flashover, as described in NFPA 265, shall not occur.
- (4) For new installations, the total smoke released throughout the test shall not exceed 1000 m².

[101:10.2.3.7.1]

12.5.4.7.2 The interior finish shall comply with all of the following when tested using the test protocol of NFPA 286, *Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth*:

- (1) During the 40 kW exposure, flames shall not spread to the ceiling.
- (2) The flame shall not spread to the outer extremity of the sample on any wall or ceiling.
- (3) Flashover, as described in NFPA 286, shall not occur.
- (4) The peak heat release rate throughout the test shall not exceed 800 kW.
- (5) For new installations, the total smoke released throughout the test shall not exceed 1000 m².

[101:10.2.3.7.2]

12.5.5* Specific Materials.

12.5.5.1* Textile Wall and Textile Ceiling Materials. The use of textile materials on walls or ceilings shall comply with one of the following conditions:

- (1) Textile materials meeting the requirements of Class A when tested in accordance with ASTM E 84, *Standard Test Method for Surface Burning Characteristics of Building Materials*, or ANSI/UL 723, *Standard for Test for Surface Burning Characteristics of Building Materials*, using the specimen preparation and mounting method of ASTM E 2404, *Standard Practice for Specimen Preparation and Mounting of Textile, Paper or Vinyl Wall or Ceiling Coverings to Assess Surface Burning Characteristics* (see 10.2.3.4 of NFPA 101), shall be permitted on the walls or ceilings of rooms or areas protected by an approved automatic sprinkler system.
- (2) Textile materials meeting the requirements of Class A when tested in accordance with ASTM E 84 or ANSI/UL 723, using the specimen preparation and mounting method of ASTM E 2404 (see 10.2.3.4 of NFPA 101), shall be permitted on partitions that do not exceed three-quarters of the floor-to-ceiling height or do not exceed 8 ft (2440 mm) in height, whichever is less.
- (3) Textile materials meeting the requirements of Class A when tested in accordance with ASTM E 84 or ANSI/UL 723, using the specimen preparation and mounting method of ASTM E 2404 (see 10.2.3.4 of NFPA 101), shall be permitted to extend not more than 48 in. (1220 mm) above the finished floor on ceiling-height walls and ceiling-height partitions.
- (4) Previously approved existing installations of textile material meeting the requirements of Class A when tested in accordance with ASTM E 84 or ANSI/UL 723 (see 10.2.3.4 of NFPA 101) shall be permitted to be continued to be used.
- (5) Textile materials shall be permitted on walls and partitions where tested in accordance with NFPA 265, *Standard Methods of Fire Tests for Evaluating Room Fire Growth Contribution of Textile or Expanded Vinyl Wall Coverings on Full Height Panels and Walls*. (See 12.5.4.7.)
- (6) Textile materials shall be permitted on walls, partitions, and ceilings where tested in accordance with NFPA 286, *Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth*. (See 12.5.4.7.)

[101:10.2.4.1]

12.5.5.2* Expanded Vinyl Wall and Expanded Vinyl Ceiling Materials. The use of expanded vinyl wall or expanded vinyl ceiling materials shall comply with one of the following conditions:

- (1) Materials meeting the requirements of Class A when tested in accordance with ASTM E 84, *Standard Test Method for Surface Burning Characteristics of Building Materials*, or ANSI/UL 723, *Standard for Test for Surface Burning Characteristics of Building Materials*, using the specimen preparation and mounting method of ASTM E 2404, *Standard Practice for Specimen Preparation and Mounting of Textile, Paper or Vinyl Wall or Ceiling Coverings to Assess Surface Burning Characteristics* (see 10.2.3.4 of NFPA 101), shall be permitted on the walls or ceilings of rooms or areas protected by an approved automatic sprinkler system.
- (2) Materials meeting the requirements of Class A when tested in accordance with ASTM E 84 or ANSI/UL 723, using the specimen preparation and mounting method of ASTM E 2404 (see 10.2.3.4 of NFPA 101), shall be permitted on partitions that do not exceed three-quarters of the floor-to-ceiling height or do not exceed 8 ft (2440 mm) in height, whichever is less.
- (3) Materials meeting the requirements of Class A when tested in accordance with ASTM E 84 or ANSI/UL 723, using the specimen preparation and mounting method of ASTM E 2404 (see 10.2.3.4 of NFPA 101), shall be permitted to extend not more than 48 in. (1220 mm) above the finished floor on ceiling-height walls and ceiling-height partitions.
- (4) Previously approved existing installations of materials meeting the requirements for the occupancy involved, when tested in accordance with ASTM E 84 or ANSI/UL 723 (see 10.2.3.4 of NFPA 101), shall be permitted to be continued to be used.
- (5) Materials shall be permitted on walls and partitions where tested in accordance with NFPA 265, *Standard Methods of Fire Tests for Evaluating Room Fire Growth Contribution of Textile or Expanded Vinyl Wall Coverings on Full Height Panels and Walls*. (See 12.5.4.7.)
- (6) Textile materials shall be permitted on walls, partitions, and ceilings where tested in accordance with NFPA 286, *Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth*. (See 12.5.4.7.) [101:10.2.4.2]

12.5.5.3 Cellular or Foamed Plastic. Cellular or foamed plastic materials shall not be used as interior wall and ceiling finish unless specifically permitted by 12.5.5.3.1 or 12.5.5.3.2. The requirements of 12.5.5.3 through 12.5.5.3.2 shall apply both to exposed foamed plastics and to foamed plastics used in conjunction with a textile or vinyl facing or cover. [101:10.2.4.3]

12.5.5.3.1* Cellular or foamed plastic materials shall be permitted where subjected to large-scale fire tests that substantiate their combustibility and smoke release characteristics for the use intended under actual fire conditions. The tests shall be performed on a finished foamed plastic assembly related to the actual end-use configuration, including any cover or facing, and at the maximum thickness intended for use. Suitable large-scale fire tests shall include those shown in 12.5.5.3.1.1. [101:10.2.4.3.1]

12.5.5.3.1.1 One of the following fire tests shall be used for assessing the combustibility of cellular or foamed plastic materials as interior finish:

- (1) NFPA 286, *Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth*, with the acceptance criteria of 10.2.3.7.2 of NFPA 101.

- (2) ANSI/UL 1715, *Standard for Fire Test of Interior Finish Material* (including smoke measurements, with total smoke release not to exceed 1000 m²)
- (3) ANSI/UL 1040, *Standard for Fire Test of Insulated Wall Construction*
- (4) ANSI/FM 4880, *Approval Standard for Class 1 Insulated Wall or Wall and Roof/Ceiling Panels; Plastic Interior Finish Materials; Plastic Exterior Building Panels; Wall/Ceiling Coating Systems; Interior or Exterior Finish Systems*

[101:10.2.4.3.1.1]

12.5.5.3.1.2* New installations of cellular or foamed plastic materials tested in accordance with ANSI/UL 1040, *Standard for Fire Test of Insulated Wall Construction*, or ANSI/FM 4880, *Approval Standard for Class 1 Insulated Wall or Wall and Roof/Ceiling Panels; Plastic Interior Finish Materials; Plastic Exterior Building Panels; Wall/Ceiling Coating Systems; Interior or Exterior Finish Systems*, shall also be tested for smoke release using NFPA 286, *Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth*, with the acceptance criterion of 10.2.3.7.2(4) of NFPA 101. [101:10.2.4.3.1.2]

12.5.5.3.2 Cellular or foamed plastic shall be permitted for trim not in excess of 10 percent of the wall or ceiling area, provided that it is not less than 20 lb/ft³ (320 kg/m³) in density, is limited to ½ in. (13 mm) in thickness and 4 in. (100 mm) in width, and complies with the requirements for Class A or Class B interior wall and ceiling finish as described in 12.5.4.4; however, the smoke developed index shall not be limited. [101:10.2.4.3.2]

12.5.5.4* **Light-Transmitting Plastics.** Light-transmitting plastics shall be permitted to be used as interior wall and ceiling finish if approved by the AHJ. [101:10.2.4.4]

12.5.5.5 Decorations and Furnishings. Decorations and furnishings that do not meet the definition of interior finish, as defined in 3.3.113.2, shall be regulated by the provisions of Section 12.6. [101:10.2.4.5]

12.5.5.6 Metal Ceiling and Wall Panels. Listed factory finished Class A metal ceiling and wall panels shall be permitted to be finished with one additional application of paint. Such painted panels shall be permitted for use in areas where Class A interior finishes are required. The total paint thickness shall not exceed ½₂₈ in. (0.9 mm). [101:10.2.4.6]

12.5.5.7 Polypropylene (PP) and High-Density Polyethylene (HDPE). Polypropylene and high-density polyethylene materials shall not be permitted as interior wall or ceiling finish unless the material complies with the requirements of 10.2.3.7.2 of NFPA 101. The tests shall be performed on a finished assembly and on the maximum thickness intended for use. [101:10.2.4.7]

12.5.5.8 Site-Fabricated Stretch Systems. For new installations, site-fabricated stretch systems containing all three components described in the definition in Chapter 3 of NFPA 101 shall be tested in the manner intended for use and shall comply with the requirements of 10.2.3 or 10.2.3.2 of NFPA 101. If the materials are tested in accordance with ASTM E 84, *Standard Test Method for Surface Burning Characteristics of Building Materials*, or ANSI/UL 723, *Standard for Test for Surface Burning Characteristics of Building Materials*, specimen preparation and mounting shall be in accordance with ASTM E 2573, *Standard Practice for Specimen Preparation and Mounting of Site-Fabricated Stretch Systems to Assess Surface Burning Characteristics*. [101:10.2.4.8]

12.5.5.9 Reflective Insulation Materials. Reflective insulation materials shall be tested in the manner intended for use and shall comply with the requirements of 10.2.3 of NFPA 101. If the materials are tested in accordance with ASTM E 84, *Standard Test Method for Surface Burning Characteristics of Building Materials*, or ANSI/UL 723, *Standard for Test for Surface Burning Characteristics of Building Materials*, specimen preparation and mounting shall be in accordance with ASTM E 2599, *Standard Practice for Specimen Preparation and Mounting of Reflective Insulation Materials and Radiant Barrier Materials for Building Applications to Assess Surface Burning Characteristics*. [101:10.2.4.9]

12.5.6 Trim and Incidental Finish.

12.5.6.1 General. Interior wall and ceiling trim and incidental finish, other than wall base in accordance with 12.5.6.2 and bulletin boards, posters, and paper in accordance with 12.5.6.3, not in excess of 10 percent of the aggregate wall and ceiling areas of any room or space shall be permitted to be Class C materials in occupancies where interior wall and ceiling finish of Class A or Class B is required. [101:10.2.5.1]

12.5.6.2 Wall Base. Interior floor trim material used at the junction of the wall and the floor to provide a functional or decorative border, and not exceeding 6 in. (150 mm) in height, shall meet the requirements for interior wall finish for its location or the requirements for Class II interior floor finish as described in 12.5.8.4 using the test described in 12.5.8.3. If a Class I floor finish is required, the interior floor trim shall be Class I. [101:10.2.5.2]

12.5.6.3 Bulletin Boards, Posters, and Paper.

12.5.6.3.1 Bulletin boards, posters, and paper attached directly to the wall shall not exceed 20 percent of the aggregate wall area to which they are applied. [101:10.2.5.3.1]

12.5.6.3.2 The provision of 12.5.6.3.1 shall not apply to artwork and teaching materials in sprinklered educational or day-care occupancies in accordance with 20.2.4.4.3 and 20.3.4.2.3.5.3. [101:10.2.5.3.2]

12.5.7* Fire-Retardant Coatings.

12.5.7.1* The required flame spread or smoke development classification of existing surfaces of walls, partitions, columns, and ceilings shall be permitted to be secured by applying approved fire-retardant coatings to surfaces having higher flame spread ratings than permitted. Such treatments shall be tested, or shall be listed and labeled for application to the material to which they are applied, and shall comply with the requirements of NFPA 703, *Standard for Fire Retardant-Treated Wood and Fire-Retardant Coatings for Building Materials*. [101:10.2.6.1]

12.5.7.2 In new construction, surfaces of walls, partitions, columns, and ceilings shall be permitted to be finished with factory-applied fire-retardant coated assemblies that have been listed and labeled to demonstrate compliance with the following: (a) a flame spread index of 25 or less, when tested in accordance with ASTM E 84, *Standard Test Method for Surface Burning Characteristics of Building Materials*, or ANSI/UL 723, *Standard for Test for Surface Burning Characteristics of Building Materials*, (b) show no evidence of significant progressive combustion when the test is continued for an additional 20-minute period, and (c) result in a flame front that does not progress more than 10 ft 6 in. (3.2 m) beyond the centerline of the burners at any time during the test. [101:10.2.6.2]

12.5.7.3 Fire-retardant coatings or factory-applied fire-retardant coated assemblies shall possess the desired degree of permanency and shall be maintained so as to retain the effectiveness of the treatment under the service conditions encountered in actual use. [101:10.2.6.3]

12.5.8 Interior Floor Finish Testing and Classification.

12.5.8.1 Carpet and carpet-like interior floor finishes shall comply with ASTM D 2859, *Standard Test Method for Ignition Characteristics of Finished Textile Floor Covering Materials*. [101:10.2.7.1]

12.5.8.2* Floor coverings, other than carpet for which 12.5.3.2 establishes requirements for fire performance, shall have a minimum critical radiant flux of 0.1 W/cm². [101:10.2.7.2]

12.5.8.3* Interior floor finishes shall be classified in accordance with 12.5.8.4, based on test results from NFPA 253, *Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source*, or ASTM E 648, *Standard Test Method for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source*. [101:10.2.7.3]

12.5.8.4 Interior floor finishes shall be classified as follows in accordance with the critical radiant flux ratings:

- (1) Class I interior floor finish shall be characterized by a critical radiant flux not less than 0.45 W/cm², as determined by the test described in 12.5.8.3.
- (2) Class II interior floor finish shall be characterized by a critical radiant flux not less than 0.22 W/cm² but less than 0.45 W/cm², as determined by the test described in 12.5.8.3. [101:10.2.7.4]

12.5.8.5 Wherever the use of Class II interior floor finish is required, Class I interior floor finish shall be permitted. [101:10.2.7.5]

12.5.9 Automatic Sprinklers.

12.5.9.1 Unless specifically prohibited elsewhere in this *Code*, where an approved automatic sprinkler system is installed in accordance with Section 13.3, Class C interior wall and ceiling finish materials shall be permitted in any location where Class B is required, and Class B interior wall and ceiling finish materials shall be permitted in any location where Class A is required. [101:10.2.8.1]

12.5.9.2 Unless specifically prohibited elsewhere in this *Code*, where an approved automatic sprinkler system is installed in accordance with Section 13.3, Class II interior floor finish shall be permitted in any location where Class I interior floor finish is required, and where Class II is required, no critical radiant flux rating shall be required. [101:10.2.8.2]

12.6 Contents and Furnishings.

12.6.1 Furnishings, contents, decorations, and treated finishes in buildings and structures shall meet the requirements of NFPA 101 and this *Code*.

12.6.2* Where required by the applicable provisions of this *Code*, draperies, curtains, and other similar loosely hanging furnishings and decorations shall meet the flame propagation performance criteria contained in NFPA 701, *Standard Methods of Fire Tests for Flame Propagation of Textiles and Films*. [101:10.3.1]

12.6.3 Smoldering Ignition of Upholstered Furniture and Mattresses.

12.6.3.1* **Upholstered Furniture.** Newly introduced upholstered furniture, except as otherwise permitted by Chapter 20, shall be resistant to a cigarette ignition (i.e., smoldering) in accordance with one of the following:

- (1) The components of the upholstered furniture shall meet the requirements for Class I when tested in accordance with NFPA 260, *Standard Methods of Tests and Classification System for Cigarette Ignition Resistance of Components of Upholstered Furniture*, or with ASTM E 1353, *Standard Test Methods for Cigarette Ignition Resistance of Components of Upholstered Furniture*.
- (2) Mocked-up composites of the upholstered furniture shall have a char length not exceeding 1½ in. (38 mm) when tested in accordance with NFPA 261, *Standard Method of Test for Determining Resistance of Mock-Up Upholstered Furniture Material Assemblies to Ignition by Smoldering Cigarettes*, or with ASTM E 1352, *Standard Test Method for Cigarette Ignition Resistance of Mock-Up Upholstered Furniture Assemblies*. [101:10.3.2.1]

12.6.3.2* **Mattresses.** Newly introduced mattresses, except as otherwise permitted by Chapter 20, shall have a char length not exceeding 2 in. (51 mm) when tested in accordance with 16 CFR 1632, "Standard for the Flammability of Mattresses and Mattress Pads" (FF 4-72). [101:10.3.2.2]

12.6.3.2.1* Where required by the applicable provisions of this *Code*, upholstered furniture, unless the furniture is located in a building protected throughout by an approved automatic sprinkler system, shall have limited rates of heat release when tested in accordance with ASTM E 1537, *Standard Test Method for Fire Testing of Upholstered Furniture*, as follows:

- (1) The peak rate of heat release for the single upholstered furniture item shall not exceed 80 kW.
- (2) The total heat released by the single upholstered furniture item during the first 10 minutes of the test shall not exceed 25 MJ. [101:10.3.3]

12.6.3.2.2* Where required by the applicable provisions of this *Code*, mattresses, unless the mattress is located in a building protected throughout by an approved automatic sprinkler system, shall have limited rates of heat release when tested in accordance with ASTM E 1590, *Standard Test Method for Fire Testing of Mattresses*, as follows:

- (1) The peak rate of heat release for the mattress shall not exceed 100 kW.
- (2) The total heat released by the mattress during the first 10 minutes of the test shall not exceed 25 MJ. [101:10.3.4]

12.6.4* Furnishings or decorations of an explosive or highly flammable character shall not be used. [101:10.3.5]

12.6.5 Fire-retardant coatings shall be maintained to retain the effectiveness of the treatment under service conditions encountered in actual use. [101:10.3.6]

12.6.6* Where required by the applicable provisions of this *Code*, furnishings and contents made with foamed plastic materials that are unprotected from ignition shall have a heat release rate not exceeding 100 kW when tested in accordance with UL 1975, *Standard for Fire Tests for Foamed Plastics Used for Decorative Purposes*. [101:10.3.7]

12.6.7 Lockers. [101:10.3.8]

12.6.7.1 Combustible Lockers. Where lockers constructed of combustible materials other than wood are used, the lockers shall be considered interior finish and shall comply with Section 12.5, except as permitted by 12.6.7.2. [101:10.3.8.1]

12.6.7.2 Wood Lockers. Lockers constructed entirely of wood and of noncombustible materials shall be permitted to be used in any location where interior finish materials are required to meet a Class C classification in accordance with 10.2.3 of NFPA 101. [101:10.3.8.2]

12.7 Fire Barriers.

12.7.1 General. Fire barriers used to provide enclosure, subdivision, or protection under NFPA 101 and this Code shall be classified in accordance with one of the following fire resistance ratings:

- (1) 3-hour fire resistance rating
- (2) 2-hour fire resistance rating
- (3) 1-hour fire resistance rating
- (4)* ½-hour fire resistance rating [101:8.3.1.1]

12.7.2 Walls.

12.7.2.1 The fire-resistive materials, assemblies, and systems used shall be limited to those permitted in this Code and this subsection. [101:8.3.2.1]

12.7.2.1.1* Fire resistance-rated glazing tested in accordance with ASTM E 119, *Standard Test Methods for Fire Tests of Building Construction and Materials*, or ANSI/UL 263, *Standard for Fire Tests of Building Construction and Materials*, shall be permitted. [101:8.3.2.1.1]

12.7.2.1.2 New fire resistance-rated glazing shall bear the identifier "W-XXX" where "XXX" is the fire resistance rating in minutes. Such identification shall be permanently affixed. [101:8.3.2.1.2]

12.7.2.2 The construction materials and details for fire-resistive assemblies and systems for walls described shall comply with all other provisions of this Code, except as modified herein. [101:8.3.2.2]

12.7.2.3 Interior walls and partitions of nonsymmetrical construction shall be evaluated from both directions and assigned a fire resistance rating based on the shorter duration obtained in accordance with ASTM E 119, *Standard Test Methods for Fire Tests of Building Construction and Materials* or ANSI/UL 263, *Standard for Fire Tests of Building Construction and Materials*. When the wall is tested with the least fire-resistive side exposed to the furnace, the wall shall not be required to be subjected to tests from the opposite side. [101:8.3.2.3]

12.7.3 Fire Doors and Windows.

12.7.3.1 Openings required to have a fire protection rating by Table 12.7.4.2 shall be protected by approved, listed, labeled fire door assemblies and fire window assemblies and their accompanying hardware, including all frames, closing devices, anchorage, and sills in accordance with the requirements of Section 12.4, except as otherwise specified in this Code. [101:8.3.3.1]

12.7.3.1.1 Fire resistance-rated glazing tested in accordance with ASTM E 119, *Standard Test Methods for Fire Tests of Building Construction and Materials*, or ANSI/UL 263, *Standard for Fire Tests of Building Construction and Materials*, shall be permitted in fire door assemblies and fire window assemblies where tested and installed in accordance with their listings. [101:8.3.3.1.1]

12.7.3.1.2 New fire resistance-rated glazing shall be marked in accordance with Table 12.7.3.12 and Table 12.7.4.2. Such marking shall be permanently affixed. [101:8.3.3.1.2]

12.7.3.2* Fire protection ratings for products required to comply with 12.7.3 shall be as determined and reported by a nationally recognized testing agency in accordance with NFPA 252; ANSI/UL 10B, *Standard for Fire Tests of Door Assemblies*; or ANSI/UL 10C, *Standard for Positive Pressure Fire Tests of Door Assemblies*; NFPA 257; or ANSI/UL 9, *Standard for Fire Tests of Window Assemblies*. [101:8.3.3.2]

12.7.3.2.1 Fire protection-rated glazing shall be evaluated under positive pressure in accordance with NFPA 257. [101:8.3.3.2.1]

12.7.3.2.2 All products required to comply with 12.7.3.2 shall bear an approved label. [101:8.3.3.2.2]

12.7.3.2.3* Labels on fire door assemblies shall be maintained in a legible condition. [101:8.3.3.2.3]

12.7.3.3 Unless otherwise specified, fire doors shall be self-closing or automatic-closing in accordance with 14.5.4. [101:8.3.3.3]

12.7.3.4 Floor fire door assemblies, shall be tested in accordance with NFPA 288, *Standard Methods of Fire Tests of Floor Fire Door Assemblies Installed Horizontally in Fire Resistance-Rated Floor Systems*, and shall achieve a fire resistance rating not less than the assembly being penetrated. Floor fire doors assemblies shall be listed and labeled. [101:8.3.3.4]

12.7.3.5 Fire protection-rated glazing shall be permitted in fire barriers having a required fire resistance rating of 1 hour or less and shall be of an approved type with the appropriate fire protection rating for the location in which the barriers are installed. [101:8.3.3.5]

12.7.3.6* Glazing in fire window assemblies, other than in existing fire window installations of wired glass and other fire-rated glazing material, shall be of a design that has been tested to meet the conditions of acceptance of NFPA 257; or ANSI/UL 9, *Standard for Fire Tests of Window Assemblies*. Fire protection-rated glazing in fire door assemblies, other than in existing fire-rated door assemblies, shall be of a design that has been tested to meet the conditions of acceptance of NFPA 252; ANSI/UL 10B, *Standard for Fire Tests of Door Assemblies*; or ANSI/UL 10C, *Standard for Positive Pressure Fire Tests of Door Assemblies*. [101:8.3.3.6]

12.7.3.7 Fire resistance-rated glazing complying with 12.7.2.1.1 shall be permitted in fire doors and fire window assemblies in accordance with their listings. [101:8.3.3.7]

12.7.3.8 Glazing materials that have been tested, listed, and labeled to indicate the type of opening to be protected for fire protection purposes shall be permitted to be used in approved opening protectives in accordance with Table 8.3.4.2 of NFPA 101 and in sizes in accordance with NFPA 80, *Standard for Fire Doors and Other Opening Protectives*. [101:8.3.3.8]

12.7.3.9 Existing installations of wired glass of ¼ in. (6.3 mm) thickness and labeled for fire protection purposes shall be permitted to be used in approved opening protectives, provided that the maximum size specified by the listing is not exceeded. [101:8.3.3.9]

12.7.3.10 Nonsymmetrical fire protection-rated glazing systems shall be tested with each face exposed to the furnace, and the assigned fire protection rating shall be that of the shortest duration obtained from the two tests conducted in compliance with NFPA 257; or ANSI/UL 9, *Standard for Fire Tests of Window Assemblies*. [101:8.3.3.10]

12.7.3.11 The total combined area of glazing in fire-rated window assemblies and fire-rated door assemblies used in fire barriers shall not exceed 25 percent of the area of the fire barrier that is common with any room, unless the installation meets one of the following criteria:

- (1) The installation is an existing fire window installation of wired glass and other fire-rated glazing materials in approved frames.
- (2) The fire protection-rated glazing material is installed in approved existing frames. [101:8.3.3.11]

12.7.3.12 New fire protection-rated glazing shall be marked in accordance with Table 12.7.3.12 and Table 12.7.4.2, and such marking shall be permanently affixed. [101:8.3.3.12]

12.7.4 Opening Protectives.

12.7.4.1 Every opening in a fire barrier shall be protected to limit the spread of fire and restrict the movement of smoke from one side of the fire barrier to the other. [101:8.3.4.1]

12.7.4.2* The fire protection rating for opening protectives in fire barriers, fire-rated smoke barriers, and fire-rated smoke partitions shall be in accordance with Table 12.7.4.2. [101:8.3.4.2]

Table 12.7.4.2 was revised by a tentative interim amendment (TIA). See page 1.

Table 12.7.3.12 Marking Fire-Rated Glazing Assemblies

Fire Test Standard	Marking	Definition of Marking
ASTM E119, or ANSI/UL 263 ^a	W	Meets wall assembly criteria
NFPA 257	OH	Meets fire window assembly criteria, including the hose stream test
NFPA 252	D	Meets fire door assembly criteria
	H	Meets fire door assembly hose stream test
	T	Meets 450° F (232°C) temperature rise criteria for 30 minutes
	XXX	The time, in minutes, of fire resistance or fire protection rating of the glazing assembly

^aASTM E 119, *Standard Test Methods for Fire Tests of Building Construction and Materials* and ANSI/UL 263, *Standard for Fire Tests of Building Construction and Materials*. [101: Table 8.3.3.12]

Table 12.7.4.2 Minimum Fire Protection Ratings for Opening Protectives in Fire Resistance-Rated Assemblies and Fire-Rated Glazing Markings

Component	Walls and Partitions (hr)	Fire Door Assemblies (hr)	Door Vision Panel Maximum Size (in ²) ^a	Fire-Rated Glazing Marking Door Vision Panel	Minimum Side Light/Transom Assembly Rating (hr)		Fire-Rated Glazing Marking Side Light/Transom Panel		Fire Window Assemblies ^{b, c}	
					Fire Protection	Fire Resistance	Fire Protection	Fire Resistance	(hr)	Fire-Rated Glazing Marking Window
Elevator hoistways	2	1½	155 in. ^{2d}	D-H-90 or D-H-W-90	NP	2	NP	D-H-W-120	NP	W-120
	1	1	155 in. ^{2d}	D-H-60 or D-H-W-60	NP	1	NP	D-H-W-60	NP	W-60
	½	½	85 in. ^{2e}	D-20 or D-W-20	½	½	D-H-20	D-W-20	NP	W-30
Elevator lobby (per 7.2.13.4)	1	1	100 in. ^{2b}	≤100 in ² , D-H-T-60 or D-H-W-60 ^a >100 in ² , D-H-W-60 ^a	NP	1	NP	D-H-W-60	NP	W-60
Vertical shafts, including stairways, exits, and refuse chutes	2	1½	Maximum size tested	D-H-90 or D-H-W-90	NP	2	NP	D-H-W-120	NP	W-120
	1	1	Maximum size tested	D-H-60 or D-H-W-60	NP	1	NP	D-H-W-60	NP	W-60
Replacement panels in existing vertical shafts	½	1/3	Maximum size tested	D-20 or D-W-20	½	½	D-H-20	D-W-20	NP	W-30

Table 12.7.4.2 Continued

Component	Walls and Partitions (hr)	Fire Door Assemblies (hr)	Door Vision Panel Maximum Size (in ²) ^a	Fire-Rated Glazing Marking Door Vision Panel	Minimum Side Light/Transom Assembly Rating (hr)		Fire-Rated Glazing Marking Side Light/Transom Panel		Fire Windows Assemblies ^{b,c}	
					Fire Protection	Fire Resistance	Fire Protection	Fire Resistance	(hr)	Fire-Rated Glazing Marking Window
Fire barriers	3	3	100 in. ² b	≤100 in. ² , D-H-180 or D-H-W-180 ^h	NP	3	NP	D-H-W-180	NP	W-180
				>100 in. ² , D-H-W-180 ^h						
	2	1½	Maximum size tested	D-H-90 or D-H-W-90	NP	2	NP	D-H-W-120	NP	W-120
	1	¾	Maximum size tested ^f	D-H-45 or D-H-W-45	¾ ^f	¾ ^f	D-H-45	D-H-W-45	¾	OH-45 or W-60
	½	¾	Maximum size tested	D-20 or D-W-20	½	½	D-H-20	D-W-20	½	OH-20 or W-30
Horizontal exits	2	1½	Maximum size tested	D-H-90 or D-H-W-90	NP	2	NP	D-H-W-120	NP	W-120
Horizontal exits served by bridges between buildings	2	¾	Maximum size tested ^f	D-H-45 or D-H-W-45	¾ ^f	¾ ^f	D-H-45	D-H-W-45	¾	OH-45 or W-120
Exit access corridors ^g	1	¾	Maximum size tested	D-20 or D-W-20	¾	¾	D-H-45	D-H-W-20	¾	OH-45 or W-60
	½	¾	Maximum size tested	D-20 or D-W-20	½	½	D-H-20	D-H-W-20	½	OH-20 or W-30
Smoke barriers ^a	1	¾	Maximum size tested	D-20 or D-W-20	¾	¾	D-H-45	D-H-W-20	¾	OH-45 or W-60
Smoke partitions ^{g, h}	½	¾	Maximum size tested	D-20 or D-W-20	½	½	D-H-20	D-H-W-20	½	OH-20 or W-30

NP: Not permitted.

^aNote: 1 inch² = .00064516 m².

^bFire resistance-rated glazing tested to ASTM E 119, *Standard Test Methods for Fire Tests of Building Construction and Materials*, or ANSI/UL 263, *Standard for Fire Tests of Building Construction and Materials*, shall be permitted in the maximum size tested. (See 12.7.3.7.)

^cFire-rated glazing in exterior windows shall be marked in accordance with Table 12.7.3.11.

^dSee ASME A17.1, *Safety Code for Elevators and Escalators*, for additional information.

^eSee ASTM A17.3, *Safety Code for Existing Elevators and Escalators*, for additional information.

^fMaximum area of individual exposed lights shall be 1296 in.² (0.84 m²) with no dimension exceeding 54 in. (1.37 m) unless otherwise tested. [80: Table 4.4.5, Note b, and 80:4.4.5.1]

^gFire doors are not required to have a hose stream test per NFPA 252, *Standard Methods of Fire Tests of Door Assemblies*; ASTM E 2074, *Standard Test Method for Fire Tests of Door Assemblies, Including Positive Pressure Testing of Side-Hinged and Pivoted Swinging Door Assemblies*; ANSI/UL 10B, *Standard for Fire Tests of Door Assemblies*; or ANSI/UL 10C, *Standard for Positive Pressure Fire Tests of Door Assemblies*.

^hFor residential board and care, see 32.2.3.1 and 33.2.3.1 of NFPA 101.

12.7.4.2.1 Fire-rated glazing assemblies marked as complying with hose stream requirements (H) shall be permitted in applications that do not require compliance with hose stream requirements. Fire-rated glazing assemblies marked as complying with temperature rise requirements (T) shall be permitted in applications that do not require compliance with temperature rise requirements. Fire-rated glazing assemblies marked with ratings that exceed the ratings required by this Code (XXX) shall be permitted. [101:8.3.4.2.1]

12.7.4.3 Existing fire door assemblies having a minimum ¾-hour fire protection rating shall be permitted to continue to be used in vertical openings and in exit enclosures in lieu of the minimum 1-hour fire protection rating required by Table 12.7.4.2. [101:8.3.4.3]

12.7.4.4 Where a 20-minute fire protection-rated door is required in existing buildings, an existing 1¾ in. (44 mm) solid-bonded wood-core door, an existing steel-clad (tin-clad) wood door, or an existing solid-core steel door with positive latch and closer shall be permitted, unless otherwise specified by Chapters 11 through 43 of NFPA 101. [101:8.3.4.4]

12.7.5 Penetrations. The provisions of 12.7.5 shall govern the materials and methods of construction used to protect through-penetrations and membrane penetrations in fire walls, fire barrier walls, and fire resistance-rated horizontal assemblies. The provisions of 12.7.5 shall not apply to approved existing materials and methods of construction used to protect existing through-penetrations and existing membrane penetrations in fire walls, fire barrier walls, or fire resistance-rated horizontal assemblies, unless otherwise required by Chapter 11 through 43 of NFPA 101. [101:8.3.5]

12.7.5.1* Firestop Systems and Devices Required. Penetrations for cables, cable trays, conduits, pipes, tubes, combustion vents and exhaust vents, wires, and similar items to accommodate electrical, mechanical, plumbing, and communications systems that pass through a wall, floor, or floor/ceiling assembly constructed as a fire barrier shall be protected by a firestop system or device. The firestop system or device shall be tested in accordance with ASTM E 814, *Standard Test Method for Fire Tests of Through Penetration Fire Stops*, or ANSI/UL 1479, *Standard for Fire Tests of Through-Penetration Firestops*, at a minimum positive pressure differential of 0.01 in. water column (2.5 N/m²) between the exposed and the unexposed surface of the test assembly. [101:8.3.5.1]

12.7.5.1.1 The requirements of 12.7.5.1 shall not apply where otherwise permitted by any one of the following:

- (1) Where penetrations are tested and installed as part of an assembly tested and rated in accordance with ASTM E 119, *Standard Test Methods for Fire Tests of Building Construction and Materials* or ANSI/UL 263, *Standard for Fire Tests of Building Construction and Materials*
- (2) Where penetrations through floors are enclosed in a shaft enclosure designed as a fire barrier
- (3) Where concrete, grout, or mortar has been used to fill the annular spaces around cast-iron, copper, or steel piping that penetrates one or more concrete or masonry fire resistance-rated assemblies and both of the following criteria are also met:
 - (a) The nominal diameter of each penetrating item shall not exceed 6 in. (150 mm), and the opening size shall not exceed 1 ft² (0.09 m²).
 - (b) The thickness of the concrete, grout, or mortar shall be the full thickness of the assembly.

- (4) Where firestopping materials are used with the following penetrating items, the penetration is limited to one floor, and the firestopping material is capable of preventing the passage of flame and hot gases sufficient to ignite cotton waste when subjected to the time-temperature fire conditions of NFPA 251 under a minimum positive pressure differential of 0.01 in. water column (2.5 Pa) at the location of the penetration for the time period equivalent to the required fire resistance rating of the assembly penetrated:
 - (a) Steel, ferrous, or copper cables
 - (b) Cable or wire with steel jackets
 - (c) Cast-iron, steel, or copper pipes
 - (d) Steel conduit or tubing

[101:8.3.5.1.1]

12.7.5.1.2 The maximum nominal diameter of the penetrating item, as indicated in 12.7.5.1.1(4)(a) through (d), shall not be greater than 4 in. (100 mm) and shall not exceed an aggregate 100 in.² (64,520 mm²) opening in any 100 ft² (9.3 m²) of floor or wall area. [101:8.3.5.1.2]

12.7.5.1.3 Firestop systems and devices shall have a minimum 1-hour F rating, but not less than the required fire resistance rating of the fire barrier penetrated. [101:8.3.5.1.3]

12.7.5.1.4 Penetrations in fire-rated horizontal assemblies shall have a minimum 1-hour T rating, but not less than the fire resistance rating of the horizontal assembly. Rated penetrations shall not be required for the following:

- (1) Floor penetrations contained within the cavity of a wall assembly
- (2) Penetrations through floors or floor assemblies where the penetration is not in direct contact with combustible material [101:8.3.5.1.4]

12.7.5.2 Sleeves. Where the penetrating item uses a sleeve to penetrate the wall or floor, the sleeve shall be securely set in the wall or floor, and the space between the item and the sleeve shall be filled with a material that complies with 12.7.5.1. [101:8.3.5.2]

12.7.5.3 Insulation and Coverings. Insulation and coverings for penetrating items shall not pass through the wall or floor unless the insulation or covering has been tested as part of the firestop system or device. [101:8.3.5.3]

12.7.5.4 Transmission of Vibrations. Where designs take transmission of vibrations into consideration, any vibration isolation shall meet one of the following conditions:

- (1) It shall be provided on either side of the wall or floor.
- (2) It shall be designed for the specific purpose. [101:8.3.5.4]

12.7.5.5 Transitions.

12.7.5.5.1 Where piping penetrates a fire resistance-rated wall or floor assembly, combustible piping shall not connect to noncombustible piping within 36 in. (915 mm) of the firestop system or device without demonstration that the transition will not reduce the fire resistance rating, except in the case of previously approved installations. [101:8.3.5.5.1]

12.7.5.5.2 Unshielded couplings shall not be used to connect noncombustible piping to combustible piping unless it can be demonstrated that the transition complies with the fire-resistive requirements of 12.7.5.1. [101:8.3.5.5.2]

12.7.5.6 Membrane Penetrations.

12.7.5.6.1 Membrane penetrations for cables, cable trays, conduits, pipes, tubes, combustion vents and exhaust vents, wires,

and similar items to accommodate electrical, mechanical, plumbing, and communications systems that pass through a membrane of a wall, floor, or floor/ceiling assembly constructed as a fire barrier shall be protected by a firestop system or device and shall comply with 12.7.5.1 through 12.7.5.5.2. [101:8.3.5.6.1]

12.7.5.6.2 The firestop system or device shall be tested in accordance with ASTM E 814, *Standard Test Method for Fire Tests of Through Penetration Fire Stops*, or ANSI/UL 1479, *Standard for Fire Tests of Through-Penetration Firestops*, at a minimum positive pressure differential of 0.01 in. water column (2.5 N/m²) between the exposed and the unexposed surface of the test assembly, unless one of the following applies:

- (1) Membrane penetrations of ceilings that are not an integral part of a fire resistance-rated floor/ceiling or roof/ceiling assembly shall be permitted.
- (2) Membrane penetrations of steel, ferrous, or copper conduits, pipes, tubes, or combustion vents or exhaust vents shall be permitted where the annular space is protected with an approved material, and the aggregate area of the openings does not exceed 0.7 ft² (0.06 m²) in any 100 ft² (9.3 m²) of ceiling area.
- (3) Electrical outlet boxes and fittings shall be permitted, provided that such devices are listed for use in fire resistance-rated assemblies and are installed in accordance with their listing.
- (4) The annular space created by the membrane penetration of a fire sprinkler shall be permitted, provided that the space is covered by a metal escutcheon plate. [101:8.3.5.6.2]

12.7.5.6.3 Where walls or partitions are required to have a minimum 1-hour fire resistance rating, recessed fixtures shall be installed in the wall or partition in such a manner that the required fire resistance is not reduced, unless one of the following is met:

- (1) Any steel electrical box not exceeding 0.1 ft² (0.01 m²) shall be permitted where the aggregate area of the openings provided for the boxes does not exceed 0.7 ft² (0.06 m²) in any 100 ft² (9.3 m²) of wall area, and, where outlet boxes are installed on opposite sides of the wall, the boxes shall be separated by one of the following:
 - (a) Horizontal distance of not less than 24 in. (610 mm)
 - (b) Horizontal distance of not less than the depth of the wall cavity, where the wall cavity is filled with cellulose loose-fill, rock wool, or slag wool insulation
 - (c)* Solid fireblocking
 - (d) Other listed materials and methods
- (2) Membrane penetrations for any listed electrical outlet box made of any material shall be permitted, provided that such boxes have been tested for use in fire resistance-rated assemblies and are installed in accordance with the instructions included in the listing.
- (3) The annular space created by the membrane penetration of a fire sprinkler shall be permitted, provided that the space is covered by a metal escutcheon plate. [101:8.3.5.6.3]

12.7.5.7 Openings for Air-Handling Ductwork. Openings in fire barriers for air-handling ductwork or air movement shall be protected in accordance with 11.2.1. [101:8.3.5.7]

12.7.5.8 Joints.

12.7.5.8.1 The provisions of 12.7.5.8 shall govern the materials and methods of construction used to protect joints in between and at the perimeter of fire barriers or, where fire barriers meet

other fire barriers, the floor or roof deck above, or the outside walls. The provisions of 12.7.5.8 shall not apply to approved existing materials and methods of construction used to protect existing joints in fire barriers, unless otherwise required by Chapters 11 through 43 of NFPA 101. [101:8.3.6.1]

12.7.5.8.2 Joints made within or at the perimeter of fire barriers shall be protected with a joint system that is capable of limiting the transfer of smoke. [101:8.3.6.2]

12.7.5.8.3 Joints made within or between fire barriers shall be protected with a smoke-tight joint system that is capable of limiting the transfer of smoke. [101:8.3.6.3]

12.7.5.8.4 Testing of the joint system in a fire barrier shall be representative of the actual installation suitable for the required engineering demand without compromising the fire resistance rating of the assembly or the structural integrity of the assembly. [101:8.3.6.4]

12.7.5.8.5 Joints made within or between fire resistance-rated assemblies shall be protected with a joint system that is designed and tested to prevent the spread of fire for a time period equal to that of the assembly in which the joint is located. Such materials, systems, or devices shall be tested as part of the assembly in accordance with the requirements of ASTM E 1966, *Standard Test Method for Fire-Resistive Joint Systems*, or ANSI/UL 2079, *Standard for Tests for Fire Resistance of Building Joint Systems*. [101:8.3.6.5]

12.7.5.8.6 All joint systems shall be tested at their maximum joint width in accordance with the requirements of ASTM E 1966 or ANSI/UL 2079, under a minimum positive pressure differential of 0.01 in. water column (2.5 N/m²) for a time period equal to that of the assembly. All test specimens shall comply with the minimum height or length required by the standard. Wall assemblies shall be subjected to a hose stream test in accordance with ASTM E 119 or ANSI/UL 263. [101:8.3.6.6]

12.7.5.8.7 Exterior Curtain Walls and Perimeter Joints.

12.7.5.8.7.1 Voids created between the fire resistance-rated floor assembly and the exterior curtain wall shall be protected with a perimeter joint system that is designed and tested in accordance with ASTM E 2307, *Standard Test Method for Fire Resistance of Perimeter Fire Barriers Using Intermediate-Scale, Multi-story Apparatus*. [101:8.3.6.7.1]

12.7.5.8.7.2 The perimeter joint system shall have an F rating equal to the fire resistance rating of the floor assembly. [101:8.3.6.7.2]

12.8 Smoke Partitions.

12.8.1* General. Where required elsewhere in this *Code*, smoke partitions shall be provided to limit the transfer of smoke. [101:8.4.1]

12.8.2 Continuity. The following shall apply to smoke partitions:

- (1) They shall extend from the floor to the underside of the floor or roof deck above, through any concealed spaces, such as those above suspended ceilings, and through interstitial structural and mechanical spaces.
- (2)* They shall be permitted to extend from the floor to the underside of a monolithic or suspended ceiling system where the following conditions are met:
 - (a) The ceiling system forms a continuous membrane.
 - (b) A smoke-tight joint is provided between the top of the smoke partition and the bottom of the suspended ceiling.
 - (c) The space above the ceiling is not used as a plenum.

- (3) Smoke partitions enclosing hazardous areas shall be permitted to terminate at the underside of a monolithic or suspended ceiling system where the following conditions are met:
- The ceiling system forms a continuous membrane.
 - A smoke-tight joint is provided between the top of the smoke partition and the bottom of the suspended ceiling.
 - Where the space above the ceiling is used as a plenum, return grilles from the hazardous area into the plenums are not permitted. [101:8.4.2]

12.8.3 Opening Protectives.

12.8.3.1 Doors in smoke partitions shall comply with 12.8.3.2 through 12.8.3.5. [101:8.4.3.1]

12.8.3.2 Doors shall comply with the provisions of 7.2.1 of NFPA 101. [101:8.4.3.2]

12.8.3.3 Doors shall not include louvers. [101:8.4.3.3]

12.8.3.4* Door clearances shall be in accordance with NFPA 80. [101:8.4.3.4]

12.8.3.5 Doors shall be self-closing or automatic-closing in accordance with 14.5.4. [101:8.4.3.5]

12.8.4 Penetrations. The provisions of 12.8.4 shall govern the materials and methods of construction used to protect through-penetrations and membrane penetrations of smoke partitions. [101:8.4.4]

12.8.4.1 Penetrations for cables, cable trays, conduits, pipes, tubes, vents, wires, and similar items to accommodate electrical, mechanical, plumbing, and communications systems that pass through a smoke partition shall be protected by a system or material that is capable of limiting the transfer of smoke. [101:8.4.4.1]

12.8.4.2 Where designs take transmission of vibrations into consideration, any vibration isolation shall meet one of the following conditions:

- It shall be provided on either side of the smoke partition.
- It shall be designed for the specific purpose. [101:8.4.4.2]

12.8.5 Joints.

12.8.5.1 The provisions of 12.8.5 shall govern the materials and methods of construction used to protect joints in between and at the perimeter of smoke partitions or, where smoke partitions meet other smoke partitions, the floor or roof deck above, or the outside walls. The provisions of 12.8.5 shall not apply to approved existing materials and methods of construction used to protect existing joints in smoke partitions, unless otherwise required by Chapters 11 through 43 of NFPA 101. [101:8.4.5.1]

12.8.5.2 Joints made within or at the perimeter of smoke partitions shall be protected with a joint system that is capable of limiting the transfer of smoke. [101:8.4.5.2]

12.8.6 Air-Transfer Openings.

12.8.6.1 General. The provisions of 12.8.6 shall govern the materials and methods of construction used to protect air-transfer openings in smoke partitions. [101:8.4.6.1]

12.8.6.2* Smoke Dampers. Air-transfer openings in smoke partitions shall be provided with approved smoke dampers designed and tested in accordance with the requirements of ANSI/UL 555S, *Standard for Smoke Dampers*, to limit the transfer of smoke. [101:8.4.6.2]

12.8.6.3 Smoke Damper Ratings. Smoke damper leakage ratings shall be not less than Class II. Elevated temperature ratings shall be not less than 250°F (140°C). [101:8.4.6.3]

12.8.6.4 Smoke Detectors. Dampers in air-transfer openings shall close upon detection of smoke by approved smoke detectors installed in accordance with NFPA 72, *National Fire Alarm and Signaling Code* and Section 13.7. [101:8.4.6.4]

12.9 Smoke Barriers.

12.9.1* General. Where required by Chapters 11 through 43 of NFPA 101, smoke barriers shall be provided to subdivide building spaces for the purpose of restricting the movement of smoke. [101:8.5.1]

12.9.2* Continuity.

12.9.2.1 Smoke barriers required by this Code shall be continuous from an outside wall to an outside wall, from a floor to a floor, or from a smoke barrier to a smoke barrier, or by use of a combination thereof. [101:8.5.2.1]

12.9.2.2 Smoke barriers shall be continuous through all concealed spaces, such as those found above a ceiling, including interstitial spaces. [101:8.5.2.2]

12.9.2.3 A smoke barrier required for an occupied space below an interstitial space shall not be required to extend through the interstitial space, provided that the construction assembly forming the bottom of the interstitial space provides resistance to the passage of smoke equal to that provided by the smoke barrier. [101:8.5.2.3]

12.9.3 Fire Barrier Used as Smoke Barrier. A fire barrier shall be permitted to be used as a smoke barrier, provided that it meets the requirements of Section 12.9. [101:8.5.3]

12.9.4 Opening Protectives.

12.9.4.1* Doors in smoke barriers shall close the opening, leaving only the minimum clearance necessary for proper operation, and shall be without louvers or grilles. The clearance under the bottom of a new door shall be a maximum of ¾ in. (19 mm). [101:8.5.4.1]

12.9.4.2 Where required by Chapters 11 through 43 of NFPA 101, doors in smoke barriers that are required to be smoke leakage-rated shall comply with the requirements of 8.2.2.5 of NFPA 101. [101:8.5.4.2]

12.9.4.3 Latching hardware shall not be required on doors in smoke barriers unless specifically exempted by Chapters 11 through 43 of NFPA 101. [101:8.5.4.3]

12.9.4.4* Doors in smoke barriers shall be self-closing or automatic-closing in accordance with 14.5.4 and shall comply with the provisions of 7.2.1 of NFPA 101. [101:8.5.4.4]

12.9.4.5 Fire window assemblies shall comply with 12.7.3. [101:8.5.4.5]

12.9.5 Ducts and Air-Transfer Openings.

12.9.5.1 General. The provisions of 12.9.5 shall govern the materials and methods of construction used to protect ducts and air-transfer openings in smoke barriers. [101:8.5.5.1]

12.9.5.2 Smoke Dampers. Where a smoke barrier is penetrated by a duct or air-transfer opening, a smoke damper designed and tested in accordance with the requirements of ANSI/UL 555S shall be installed. Where a smoke barrier is also constructed as a fire barrier, a combination fire/smoke damper designed and tested in accordance with the requirements of ANSI/UL 555 and ANSI/UL 555S shall be installed. [101:8.5.5.2]

12.9.5.3 Smoke Damper Exemptions. Smoke dampers shall not be required under any of the following conditions:

- (1) Where specifically exempted by provisions in Chapters 11 through 43 of NFPA 101
- (2) Where ducts or air-transfer openings are part of an engineered smoke control system
- (3) Where the air in ducts continues to move and the air-handling system installed is arranged to prevent recirculation of exhaust or return air under fire emergency conditions
- (4) Where the air inlet or outlet openings in ducts are limited to a single smoke compartment
- (5) Where ducts penetrate floors that serve as smoke barriers
- (6) Where ducts penetrate smoke barriers forming a communicating space separation in accordance with 8.6.6(4)(a) of NFPA 101 [101:8.5.5.3]

12.9.5.4 Installation, Testing, and Maintenance.

12.9.5.4.1 Air-conditioning, heating, ventilating ductwork, and related equipment, including smoke dampers and combination fire and smoke dampers, shall be installed in accordance with NFPA 90A, *Standard for the Installation of Air-Conditioning and Ventilating Systems*, and NFPA 105, *Standard for Smoke Door Assemblies and Other Opening Protectives*. [101:8.5.5.4.1]

12.9.5.4.2 Smoke dampers and combination fire and smoke dampers required by this code shall be inspected, tested, and maintained in accordance with NFPA 105. [101:8.5.5.4.2]

12.9.5.4.3 The equipment specified in 12.9.5.4.1 shall be installed in accordance with the requirements of 12.9.5, the manufacturer's installation instructions, and the equipment listing. [101:8.5.5.4.3]

12.9.5.5 Access and Identification. Access to the dampers shall be provided for inspection, testing, and maintenance. The access openings shall not reduce the fire resistance rating of the fire barrier assembly. [101:8.5.5.5]

12.9.5.6 Smoke Damper Ratings. Smoke damper leakage ratings shall be not less than Class II. Elevated temperature ratings shall be not less than 250°F (140°C). [101:8.5.5.6]

12.9.5.7 Smoke Detectors.

12.9.5.7.1 Required smoke dampers in ducts penetrating smoke barriers shall close upon detection of smoke by approved smoke detectors in accordance with NFPA 72, unless one of the following conditions exists:

- (1) The ducts penetrate smoke barriers above the smoke barrier doors, and the door release detector actuates the damper.
- (2) Approved smoke detector installations are located within the ducts in existing installations. [101:8.5.5.7.1]

12.9.5.7.2 Where a duct is provided on one side of the smoke barrier, the smoke detectors on the duct side shall be in accordance with 12.9.5.7.1. [101:8.5.5.7.2]

12.9.5.7.3 Required smoke dampers in air-transfer openings shall close upon detection of smoke by approved smoke detectors in accordance with NFPA 72. [101:8.5.5.7.3]

12.9.6 Penetrations.

12.9.6.1 The provisions of 12.9.6 shall govern the materials and methods of construction used to protect through-penetrations and membrane penetrations of smoke barriers. [101:8.5.6.1]

12.9.6.2 Penetrations for cables, cable trays, conduits, pipes, tubes, vents, wires, and similar items to accommodate electrical, mechanical, plumbing, and communications systems that pass through a wall, floor, or floor/ceiling assembly constructed as a smoke barrier, or through the ceiling membrane of the roof/ceiling of a smoke barrier assembly, shall be protected by a system or material capable of restricting the transfer of smoke. [101:8.5.6.2]

12.9.6.3 Where a smoke barrier is also constructed as a fire barrier, the penetrations shall be protected in accordance with the requirements of 12.7.5 to limit the spread of fire for a time period equal to the fire resistance rating of the assembly and 12.9.6 to restrict the transfer of smoke, unless the requirements of 12.9.6.4 are met. [101:8.5.6.3]

12.9.6.4 Where sprinklers penetrate a single membrane of a fire resistance-rated assembly in buildings equipped throughout with an approved automatic fire sprinkler system, noncombustible escutcheon plates shall be permitted, provided that the space around each sprinkler penetration does not exceed ½ in. (13 mm), measured between the edge of the membrane and the sprinkler. [101:8.5.6.4]

12.9.6.5 Where the penetrating item uses a sleeve to penetrate the smoke barrier, the sleeve shall be securely set in the smoke barrier, and the space between the item and the sleeve shall be filled with a material capable of restricting the transfer of smoke. [101:8.5.6.5]

12.9.6.6 Where designs take transmission of vibrations into consideration, any vibration isolation shall meet one of the following conditions:

- (1) It shall be provided on either side of the smoke barrier.
- (2) It shall be designed for the specific purpose. [101:8.5.6.6]

12.9.7 Joints.

12.9.7.1 The provisions of 12.9.7 shall govern the materials and methods of construction used to protect joints in between and at the perimeter of smoke barriers or, where smoke barriers meet other smoke barriers, the floor or roof deck above, or the outside walls. The provisions of 12.9.7 shall not apply to approved existing materials and methods of construction used to protect existing joints in smoke barriers, unless otherwise required by Chapters 11 through 43 of NFPA 101. [101:8.5.7.1]

12.9.7.2 Joints made within or at the perimeter of smoke barriers shall be protected with a joint system that is capable of limiting the transfer of smoke. [101:8.5.7.2]

12.9.7.3 Joints made within or between smoke barriers shall be protected with a smoke-tight joint system that is capable of limiting the transfer of smoke. [101:8.5.7.3]

12.9.7.4 Smoke barriers that are also constructed as fire barriers shall be protected with a joint system that is designed and tested to resist the spread of fire for a time period equal to the required fire resistance rating of the assembly and restrict the transfer of smoke. [101:8.5.7.4]

12.9.7.5 Testing of the joint system in a smoke barrier that also serves as fire barrier shall be representative of the actual installation suitable for the required engineering demand without compromising the fire resistance rating of the assembly or the structural integrity of the assembly. [101:8.5.7.5]

Chapter 13 Fire Protection Systems

13.1 General.

13.1.1 The AHJ shall have the authority to require that construction documents for all fire protection systems be submitted for review and approval and a permit be issued prior to the installation, rehabilitation, or modification. (For additional information concerning construction documents, see Section 1.14.) Further, the AHJ shall have the authority to require that full acceptance tests of the systems be performed in the AHJ's presence prior to final system certification.

13.1.1.1 Permits. Permits, where required, shall comply with Section 1.12.

13.1.2 The property owner shall be responsible for the proper testing and maintenance of the equipment and systems.

13.1.3 Obstructions shall not be placed or kept near fire hydrants, fire department inlet connections, or fire protection system control valves in a manner that would prevent such equipment or fire hydrants from being immediately visible and accessible.

13.1.4 A minimum 36 in. (91 mm) of clear space shall be maintained to permit access to and operation of fire protection equipment, fire department inlet connections, or fire protection system control valves. The fire department shall not be deterred or hindered from gaining immediate access to fire protection equipment.

13.1.4.1 An approved clear and unobstructed path shall be provided and maintained for access to the fire department inlet connections.

13.1.5 Detailed records documenting all systems and equipment testing and maintenance shall be kept by the property owner and shall be made available upon request for review by the AHJ.

13.1.6 Existing systems shall be in accordance with 1.3.6.2 and 10.3.2.

13.1.7 All fire protection systems and devices shall be maintained in a reliable operating condition and shall be replaced or repaired where defective or recalled.

13.1.8 The AHJ shall be notified when any fire protection system is out of service and on restoration of service.

13.1.9 When a fire protection system is out of service for more than 4 hours in a 24-hour period, the AHJ shall be permitted to require the building to be evacuated or an approved fire watch to be provided for all portions left unprotected by the fire protection system shutdown until the fire protection system has been returned to service.

13.1.10 In the event of a failure of a fire protection system or an excessive number of accidental activations, the AHJ shall be permitted to require an approved fire watch until the system is repaired.

13.1.11* For occupancies of an especially hazardous nature or where special hazards exist in addition to the normal hazard of the occupancy, or where access for fire apparatus is unduly difficult, or where the size or configuration of the building or contents limits normal fire suppression efforts, the AHJ shall have the authority to require additional safeguards consisting of additional fire safety equipment, more than one type of fire safety equipment, or special systems suitable for the protection of the hazard involved.

13.1.12 The AHJ shall have the authority to require locking fire department connection (FDC) plugs or caps on all water-based fire protection systems.

13.2 Standpipe Systems.

13.2.1 General. The design and installation of standpipe systems shall be in accordance with Section 13.2 and NFPA 14, *Standard for the Installation of Standpipe and Hose Systems*.

13.2.2 Where Required.

13.2.2.1 Where required by this Code or the referenced codes and standards listed in Chapter 2, standpipe systems shall be installed in accordance with 13.2.1.

13.2.2.2 New buildings shall be equipped with a Class I standpipe system installed in accordance with the provisions of Section 13.2 where any of the following conditions exist:

- (1) More than three stories above grade where the building is protected by an approved automatic sprinkler system
- (2) More than two stories above grade where the building is not protected by an approved automatic sprinkler system
- (3) More than 50 ft (15 m) above grade and containing intermediate stories or balconies
- (4) More than one story below grade
- (5) More than 20 ft (6.1 m) below grade

13.2.2.3 High-rise buildings shall be protected throughout by a Class I standpipe system in accordance with 13.2.2. [101:11.8.3.2]

13.2.2.4* In new assembly occupancies, regular stages over 1000 ft² (93 m²) in area and all legitimate stages shall be equipped with 1½ in. (38 mm) hose lines for first aid fire fighting at each side of the stage. [101:12.4.5.12.1]

13.2.2.4.1 In existing assembly occupancies, stages over 1000 ft² (93 m²) in area shall be equipped with 1½ in. (38 mm) hose lines for first aid fire fighting at each side of the stage. [101:13.4.5.12.1]

13.2.2.4.2 Hose connections shall be in accordance with NFPA 13, *Standard for the Installation of Sprinkler Systems*, unless Class II or Class III standpipes in accordance with NFPA 14 are used. [101:12.4.5.12.2; 101:13.4.5.12.2]

13.2.2.5 New and Existing Detention and Correctional Facilities. Standpipe and hose systems shall be provided in accordance with 9.7.4.2 of NFPA 101 as follows, unless otherwise permitted by 13.2.2.5.1:

- (1) Class I standpipe systems shall be provided for any building three or more stories in height.
- (2) Class III standpipe and hose systems shall be provided for all nonsprinklered buildings three or more stories in height. [101:22.3.5.5; 101:23.3.5.5]

13.2.2.5.1 The requirements of 13.2.2.5 shall not apply where otherwise permitted by the following:

- (1) Formed hose, 1 in. (25 mm) in diameter, on hose reels shall be permitted to provide Class II service.
- (2) Separate Class I and Class II systems shall be permitted in lieu of a Class III system. [101:22.3.5.6; 101:23.3.5.6]

13.2.2.6 The AHJ shall be authorized to permit the removal of existing occupant-use hose lines where all of the following are met:

- (1) This Code does not require their installation.
- (2) The current building code does not require their installation.
- (3) The AHJ determines that the occupant-use hose line will not be utilized by trained personnel or the fire department.

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