**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.

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

Upcodes Diagrams

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.

Upcodes Diagrams

12.3.2\* Quality Assurance for Penetrations and Joints

A quality assurance program for the installation of devices and systems installed to protect penetrations 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. [5000:40.9]

12.3.2.1

Inspection of firestop systems of the types tested in accordance with ASTM E814, Standard Test Method for Fire Tests of Penetration Firestop Systems, or UL 1479, Fire Tests of Penetration Firestops, shall be conducted in accordance with ASTM E2174, Standard Practice for On-Site Inspection of Installed Firestops. [5000:40.9.1]

12.3.2.2

Inspection of fire-resistive joint systems of the types tested in accordance with ASTM E1966, Standard Test Method for Fire-Resistive Joint Systems, or UL 2079, Tests for Fire Resistance of Building Joint Systems, shall be conducted in accordance with ASTM E2393, 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, Draft-Stop Partitions, and Roof Coverings

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 3 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 Opening 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. [80:1.1]

12.4.1.1\*

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.) [80:1.1.1]

12.4.1.2\*

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

12.4.1.3\*

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]

12.4.1.4\*

Section 12.4 does 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 ASTM E119, Standard Test Methods for Fire Tests of Building Construction and Materials, or UL 263, Fire Tests of Building Construction and Materials. [80:1.1.4]

12.4.2 Care and Maintenance of Fire Doors and Other Opening Protectives

12.4.2.1\*

Subsection 12.4.2 shall cover the inspection, testing, and maintenance of fire doors, fire shutters, fire windows, and opening protectives other than fire dampers, fabric fire safety curtains, and fire protective curtain assemblies. [80:5.1.1.1]

12.4.2.2

The requirements of Section 12.4 shall apply to new and existing installations. [80:5.1.1.2]

12.4.2.3 Operability

12.4.2.3.1\*

Doors, shutters, and windows shall be operable at all times. [80:5.1.2.1]

12.4.2.3.2

Doors, shutters, and windows shall be kept closed and latched or arranged for automatic closing. [80:5.1.2.2]

12.4.2.3.3 Prevention of Door Blockage

12.4.2.3.3.1

Door openings and their surrounding areas shall be kept clear of anything that could obstruct or interfere with the free operation of the door. [80:5.1.2.3.1]

12.4.2.3.3.2

Where necessary, a barrier shall be built to prevent the piling of material against sliding doors. [80:5.1.2.3.2]

12.4.2.3.3.3

Blocking or wedging of doors in the open position shall be prohibited. [80:5.1.2.3.3]

12.4.2.4 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 and tested as required by this section for new installations. [80:5.1.3]

12.4.2.5 Field Labeling

12.4.2.5.1

Field labeling shall be performed by the listing agency that maintains periodic inspections of production of the labeled equipment or materials under review, and by whose labeling the manufacturer indicates compliance with appropriate standards or performance in a specified manner. [80:5.1.4.1]

12.4.2.5.2

Individuals performing the service shall provide proof of qualifications to the AHJ prior to performing work, as described in 12.4.2.5.1. [80:5.1.4.2]

12.4.2.5.3

At a minimum, field labels shall contain the following information:

The words "field inspected" or "field labeled"

The words "fire door" or "fire door frame"

The marking of a third-party certification agency

The fire protection rating

A unique serial number (if provided by the listing agency)

The fire test standard designation to which the assembly was tested

[80:5.1.4.3]

12.4.2.5.4

Field modifications shall not be permitted to be made to a non-fire-rated door assembly to achieve a fire rating unless the field modification is completed under label service. [80:5.1.4.4]

12.4.2.5.5

Doors in which a field modification in accordance with 12.4.2.5.4 has been completed shall be labeled. [80:5.1.4.5]

12.4.2.5.6

When an opening with a non-fire-rated door requires a fire door, the door assembly shall be replaced. [80:5.1.4.6]

12.4.2.6 Field Modifications

12.4.2.6.1\*

In cases where a field modification to a fire door or a fire door assembly is desired, and is not permitted by 4.1.3.2 through 4.1.3.2.5 of NFPA 80, the laboratory with which the product or component being modified is listed shall be contacted through the manufacturer and a written or graphic description of the modifications shall be presented to that laboratory. [80:5.1.5.1]

12.4.2.6.2

Field modifications shall be permitted without a field visit from the laboratory upon written authorization from that laboratory. [80:5.1.5.2]

12.4.2.6.3

When the manufacturer is no longer available, the laboratory shall be permitted to provide an engineering evaluation supporting the field modification. [80:5.1.5.3]

12.4.2.7 Removal of Door or Window

Where a fire door or fire window opening no longer functions as an opening, or the door or window is removed and not replaced, the opening shall be filled to maintain the required rating of the wall assembly. [80:5.1.6]

12.4.2.8\* Inspection and Testing

12.4.2.8.1\*

Upon completion of the installation, door, shutters, and window assemblies shall be inspected and tested in accordance with 12.4.2.8.4. [80:5.2.1]

12.4.2.8.2\*

A record of all inspections and testing shall be signed by the inspector and kept for inspection by the AHJ. [80:5.2.2]

12.4.2.8.2.1

Records of acceptance tests shall be retained for the life of the assembly. [80:5.2.2.1]

12.4.2.8.2.2\*

Unless a longer period is required by 12.4.2.10, records shall be retained for a period of at least 3 years. [80:5.2.2.2]

12.4.2.8.2.3\*

The records shall be on a medium that will survive the retention period. Paper or electronic media shall be permitted. [72:14.6.2.3]

12.4.2.8.2.4

A record of all inspections and testing shall be provided that includes, but is not limited to, the following information:

Date of inspection

Name of facility

Address of facility

Name of person (s) performing inspections and testing

Company name and address of inspecting company

Signature of inspector of record

Individual record of each inspected and tested fire door assembly

\* Opening identifier and location of each inspected and tested fire door assembly

\* Type and description of each inspected and tested fire door assembly

\* Verification of visual inspection and functional operation

Listing of deficiencies in accordance with 12.4.2.8.3, 12.4.2.9, and 12.4.2.10

[80:5.2.2.4]

12.4.2.8.3 Acceptance Testing

12.4.2.8.3.1\*

Acceptance testing of fire door and window assemblies shall be performed by a qualified person with knowledge and understanding of the operating components of the type of assembly being subject to testing. [80:5.2.3.1]

12.4.2.8.3.2\*

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]

12.4.2.8.3.3

Acceptance testing shall include the closing of the door by all means of activation. [80:5.2.3.3]

12.4.2.8.3.4

A record of these inspections and testing shall be made in accordance with 12.4.2.8.2. [80:5.2.3.4]

12.4.2.8.3.5 Swinging Doors With Builders Hardware or Fire Door Hardware

12.4.2.8.3.5.1

Fire door assemblies shall be visually inspected from both sides to assess the overall condition of door assembly. [80:5.2.3.5.1]

12.4.2.8.3.5.2

As a minimum, the following items shall be verified:

Labels are clearly visible and legible.

No open holes or breaks exist in surfaces of either the door or frame.

Glazing, vision light frames, and glazing beads are intact and securely fastened in place, if so equipped

The door, frame, hinges, hardware, and noncombustible threshold are secured, aligned, and in working order with no visible signs of damage.

No parts are missing or broken.

Door clearances do not exceed clearances listed in 4.8.4 and 6.3.1.7 of NFPA 80.

The self-closing device is operational; that is, the active door completely closes when operated from the full open position.

If a coordinator is installed, the inactive leaf closes before the active leaf.

Latching hardware operates and secures the door when it is in the closed position.

Auxiliary hardware items that interfere or prohibit operation are not installed on the door or frame.

\* No field modifications to the door assembly have been performed that void the label.

Meeting edge protection, gasketing and edge seals, where required, are inspected to verify their presence and integrity.

Signage affixed to a door meets the requirements listed in 4.1.4 of NFPA 80.

[80:5.2.3.5.2]

12.4.2.8.3.5.3\* Inspection Mark

Upon completion of inspection, an inspection mark shall be permitted to be applied to the assembly. [80:5.2.3.5.3]

12.4.2.8.3.6 Horizontally Sliding, Vertically Sliding, and Rolling Doors

12.4.2.8.3.6.1

Fire door assemblies shall be visually inspected from both sides to assess the overall condition of door assembly. [80:5.2.3.6.1]

12.4.2.8.3.6.2

At a minimum, the following items shall be verified:

Labels are clearly visible and legible.

No open holes or breaks exist in surfaces of either the door or the frame.

Slats, endlocks, bottom bar, guide assembly, curtain entry, hood, and flame baffle are correctly installed and intact for rolling steel fire doors.

Glazing, vision light frames, and glazing beads are intact and securely fastened in place, if so equipped.

Curtain, barrel, and guides are aligned, level, plumb, and true for rolling steel fire doors.

Expansion clearance is maintained in accordance with the manufacturer's listing.

Drop release arms and weights are not blocked or wedged.

Mounting and assembly bolts are intact and secured.

Attachments to jambs are with bolts, expansion anchors, or as otherwise required by the listing.

Smoke detectors, if equipped, are installed and operational.

No parts are missing or broken

\* Fusible links, if equipped, are in the correct location; chain/cable, s-hooks, eyes, and so forth, are in good condition; the cable or chain is not kinked, pinched, twisted, or inflexible; and links are not painted or coated with dust or grease.

Auxiliary hardware items that interfere or prohibit operation are not installed on the door or frame.

No field modifications to the door assembly have been performed that void the label.

Doors have an average closing speed of not less than 6 in./sec (152 mm/sec) or more than 24 in./sec (610 mm/sec).

[80:5.2.3.6.2]

12.4.2.8.3.7 Closing Devices

12.4.2.8.3.7.1

All fire doors, fire shutters, and fire window assemblies shall be inspected and tested to check for proper operation and full closure. [80:5.2.3.7.1]

12.4.2.8.3.7.2

Resetting of the automatic-closing device shall be done in accordance with the manufacturer's instructions. [80:5.2.3.7.2]

12.4.2.8.3.7.3 Rolling Steel Fire Doors

12.4.2.8.3.7.3.1

Rolling steel fire doors shall be drop-tested twice. [80:5.2.3.7.3.1]

12.4.2.8.3.7.3.2

The first test shall be to check for proper operation and full closure. [80:5.2.3.7.3.2]

12.4.2.8.3.7.3.3

A second test shall be done to verify that the automatic-closing device has been reset correctly. [80:5.2.3.7.3.3]

12.4.2.8.3.8\*

Fusible links, release devices, and any other moveable parts shall not be painted or coated with other materials that could interfere with the operation of the assembly. [80:5.2.3.8]

12.4.2.8.4 Periodic Inspection and Testing

12.4.2.8.4.1\*

Periodic inspections and testing shall be performed not less than annually. [80:5.2.4.1]

12.4.2.8.4.2

As a minimum, the provisions of 12.4.2.8.3 shall be included in the periodic inspection and testing procedure. [80:5.2.4.2]

12.4.2.8.4.3

Inspection shall include an operational test for automatic-closing doors and windows to verify that the assembly will close under fire conditions. [80:5.2.4.3]

12.4.2.8.4.4

The assembly shall be reset after a successful test. [80:5.2.4.4]

12.4.2.8.4.5

Resetting of the release mechanism shall be done in accordance with the manufacturer's instructions. [80:5.2.4.5]

12.4.2.8.4.6\*

Hardware shall be examined, and inoperative hardware, parts, or other defective items shall be replaced without delay. [80:5.2.4.6]

12.4.2.8.4.7

Tin-clad and kalamein doors shall be inspected for dry rot of the wood core. [80:5.2.4.7]

12.4.2.8.4.8

Chains, cables or ropes employed shall be inspected for excessive wear, stretching, degradation, and binding. [80:5.2.4.8]

12.4.2.9 Retrofit Operators

12.4.2.9.1

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 12.4.2.9.2 through 12.4.2.9.5. [80:5.3.1]

12.4.2.9.2

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

12.4.2.9.3

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

12.4.2.9.4

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

12.4.2.9.5

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]

12.4.2.10\* Performance-Based Option

12.4.2.10.1

As an alternate means of compliance with 12.4.2.8.4, subject to the AHJ, fire door assemblies shall be permitted to be inspected, tested, and maintained under a written performance-based program. [80:5.4.1]

12.4.2.10.2

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. [80:5.4.2]

12.4.2.10.3

Technical justification for inspection, testing, and maintenance intervals shall be documented in writing. [80:5.4.3]

12.4.2.10.4

The performance-based option shall include historical data acceptable to the AHJ. [80:5.4.4]

12.4.2.11 Maintenance

12.4.2.11.1\*

Repairs shall be made, and defects that could interfere with operation shall be corrected without delay. [80:5.5.1]

12.4.2.11.2

Damaged glazing material shall be replaced with labeled glazing. [80:5.5.2]

12.4.2.11.3

Replacement glazing materials shall be installed in accordance with their individual listing. [80:5.5.3]

12.4.2.11.4\*

Any breaks in the face covering of doors shall be repaired without delay. [80:5.5.4]

12.4.2.11.5

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:

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.

The door shall be tested to ensure emergency operation and closing upon completion of the repairs.

[80:5.5.5]

12.4.2.11.6

If repairs cannot be made with labeled components or parts obtained from the original manufacturer or retrofitted in accordance with 12.4.2.9, the fire door frame, fire door assembly, or appurtenances shall be replaced. [80:5.5.6]

12.4.2.11.7

When fastener 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:

Install steel fasteners that completely fill the holes.

Fill the screw or bolt holes with the same material as the door or frame.

Fill holes with material listed for this use and installed in accordance with the manufacturer's procedures.

[80:5.5.7]

12.4.2.11.8

Holes, other than those as described by 12.4.2.11.7, shall be treated as a field modification in accordance with 12.4.2.6. [80:5.5.8]

12.4.2.11.9\*

Upon completion of maintenance work, fire door assemblies shall be inspected and tested in accordance with 12.4.2.8.3. [80:5.5.9]

12.4.2.11.9.1

A record of inspections and testing, as required by 12.4.2.11.9, shall be made in accordance with 12.4.2.8.2. [80:5.5.9.1]

12.4.2.11.9.2

A record of maintenance performed on existing fire door assemblies shall include the following information:

Date of maintenance

Name of facility

Address of facility

Name of person (s) performing maintenance

Company name and address of maintenance personnel

Signature of maintenance personnel performing the work

Individual listings of each inspected and tested fire door assembly

\* Opening identifier and location of each repaired fire door assembly

\* Type and description of each repaired fire door assembly

\* Description or listing of the work performed on each fire door assembly

[80:5.5.9.2]

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 is permitted to establish the classification of any material for which classification by a standard test is not available. [101:10.2.1.1]

12.5.2.2

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. [101:10.2.1.2]

12.5.2.3

Lockers shall be considered interior finish. [101:10.2.1.3]

12.5.2.4

Washroom water closet partitions shall be considered interior finish. [101:10.2.1.4]

12.5.2.5

Fire-retardant coatings shall be in accordance with 12.5.7. [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:

Where specified elsewhere in this Code for specific occupancies (see Chapter 7 and Chapters 11 through 43 of NFPA 101)

As specified in 12.5.4 through 12.5.7

[101:10.2.2.1]

12.5.3.2\*

Interior floor finish shall comply with 12.5.8 under any of the following conditions:

Where floor finish requirements are specified elsewhere in this Code

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

[101:10.2.2.2]

12.5.4\* Interior Wall or Ceiling Finish Testing and Classification

Where interior wall or ceiling finish is required elsewhere in this Code to be classified for fire performance and smoke development, it shall be classified in accordance with 12.5.4.1 or 12.5.4.2, except as indicated in 12.5.5. [101:10.2.3]

12.5.4.1 Interior Wall and Ceiling Finish Materials Tested in Accordance With NFPA 286

12.5.4.1.1

Interior wall and ceiling finish materials shall be classified in accordance with NFPA 286 and comply with 12.5.4.2. [101:10.2.3.1.1]

12.5.4.1.2\*

Materials tested in accordance with 12.5.4.1.1 and complying with 12.5.4.2 shall be considered also to comply with the requirements of a Class A in accordance with 12.5.4.3. [101:10.2.3.1.2]

12.5.4.2 Acceptance Criteria for NFPA 286

The interior finish shall comply with the following:

During the 40 kW exposure, flames shall not spread to the ceiling.

The flame shall not spread to the outer extremity of the sample on any wall or ceiling.

Flashover, as described in NFPA 286, shall not occur.

The peak heat release rate throughout the test shall not exceed 800 kW.

For new installations, the total smoke released throughout the test shall not exceed 1000 m2.

[101:10.2.3.2]

12.5.4.3\* Interior Wall and Ceiling Finish Materials Tested in Accordance With ASTM E84 or UL 723

Interior wall and ceiling finish materials shall be classified in accordance with ASTM E84, Standard Test Method for Surface Burning Characteristics of Building Materials, or UL 723, Test for Surface Burning Characteristics of Building Materials, except as indicated in 12.5.4.4 and 12.5.4.5, and shall be grouped in the following classes in accordance with their flame spread and smoke developed indexes:

Class A: Flame spread index 0—25; smoke developed index 0—450.

Class B: Flame spread index 26—75; smoke developed index 0—450.

Class C: Flame spread index 76—200; smoke developed index 0—450.

[101:10.2.3.3]

12.5.4.3.1

Existing interior finish shall be exempt from the smoke developed index criteria of 12.5.4.3. [101:10.2.3.3.1]

12.5.4.3.2

The classification of interior finish specified in 12.5.4.3 shall be that of the basic material used by itself or in combination with other materials. [101:10.2.3.3.2]

12.5.4.3.3

Wherever the use of Class C interior wall and ceiling finish is required, Class A or Class B shall be permitted, and where Class B interior wall and ceiling finish is required, Class A shall be permitted. [101:10.2.3.3.3]

12.5.4.4

Materials complying with the requirements of 12.5.4.1 shall not be required to be tested in accordance with 12.5.4.3. [101:10.2.3.4]

12.5.4.5

Materials described in 12.5.5 shall be tested as described in the corresponding sections. [101:10.2.3.5]

12.5.5\* Interior Wall and Ceiling Finish Materials With Special Requirements

The materials indicated in 12.5.5.1 through 12.5.5.16 shall be tested as indicated in the corresponding sections. [101:10.2.4]

12.5.5.1 Thickness Exemption

The provisions of 12.5.4 shall not apply to materials having a total thickness of less than 1/28 in. (0.9 mm) that are applied directly to the surface of walls and ceilings where all of the following conditions are met:

The wall or ceiling surface is a noncombustible or limited combustible material.

The material applied meets the requirements of Class A interior wall or ceiling finish when tested in accordance with 12.5.4.3, using fiber cement board as the substrate material.

The material applied is not one of the following:

A textile wall or ceiling covering

An expanded vinyl wall or ceiling covering

[101:10.2.4.1]

12.5.5.1.1

If a material having a total thickness of less than 1/28 in. (0.9 mm) is applied to a surface that is not noncombustible or not limited-combustible, the provisions of 12.5.4 shall apply. [101:10.2.4.1.1]

12.5.5.1.2

Approved existing installations of materials applied directly to the surface of walls and ceilings in a total thickness of less than 1/28 in. (0.9 mm) shall be permitted to remain in use, and the provisions of 12.5.4 shall not apply. [101:10.2.4.1.2]

12.5.5.2\* Exposed Portions of Structural Members

In other than new interior exit stairways, new interior exit ramps, and new exit passageways, exposed portions of structural members complying with the requirements for Type IV (2HH) construction in accordance with NFPA 220 or with the building code shall be exempt from testing and classification in accordance with 12.5.4. [101:10.2.4.2]

12.5.5.3 Cellular or Foamed Plastic

12.5.5.3.1

Cellular or foamed plastic materials shall not be used as interior wall and ceiling finish unless specifically permitted by 12.5.5.3.2 or 12.5.5.3.3.1. [101:10.2.4.3.1]

12.5.5.3.2

The requirements of 12.5.5.3 shall apply both to exposed foamed plastics and to foamed plastics used in conjunction with a textile or vinyl facing or cover. [101:10.2.4.3.2]

12.5.5.3.3\*

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. [101:10.2.4.3.3]

12.5.5.3.3.1

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

NFPA 286 with the acceptance criteria of 12.5.4.2

UL 1715, Fire Test of Interior Finish Material (including smoke measurements, with total smoke release not to exceed 1000 m2)

UL 1040, Fire Test of Insulated Wall Construction

ANSI/FM 4880, American National Standard for Evaluating the Fire Performance of Insulated Building Panel Assemblies and Interior Finish Materials

[101:10.2.4.3.3.1]

12.5.5.3.3.2\*

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. [101:10.2.4.3.3.2]

12.5.5.3.3.3

Cellular or foamed plastic materials tested in accordance with UL 1040, Fire Test of Insulated Wall Construction, or ANSI/FM 4880, American National Standard for Evaluating the Fire Performance of Insulated Building Panel Assemblies and Interior Finish Materials, shall also be tested for smoke release using NFPA 286 with the acceptance criteria of 12.5.4.2. [101:10.2.4.3.3.3]

12.5.5.3.4

Cellular or foamed plastic shall be permitted for trim not in excess of 10 percent of the specific wall or ceiling area to which it is applied, provided that it is not less than 20 lb/ft3 (320 kg/m3) in density, is limited to 1/2 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 12.5.4.3; however, the smoke developed index shall not be limited. [101:10.2.4.3.4]

12.5.5.4\* Textile Wall Coverings

Where used as interior wall finish materials, textile materials shall be tested in the manner intended for use, using the product mounting system, including adhesive, and shall comply with the requirements of 12.5.4.1, 12.5.5.4.1, or 12.5.5.4.3. [101:10.2.4.4]

12.5.5.4.1\*

Products tested in accordance with NFPA 265 shall comply with the criteria of 12.5.5.4.2. [101:10.2.4.4.1]

12.5.5.4.2\*

The interior finish shall comply with all of the following when tested using method B of the test protocol of NFPA 265:

During the 40 kW exposure, flames shall not spread to the ceiling.

The flame shall not spread to the outer extremities of the samples on the 8 ft x 12 ft (2440 mm x 3660 mm) walls.

Flashover, as described in NFPA 265, shall not occur.

For new installations, the total smoke released throughout the test shall not exceed 1000 m2.

[101:10.2.4.4.2]

12.5.5.4.3

Textile materials meeting the requirements of Class A when tested in accordance with ASTM E84, Standard Test Method for Surface Burning Characteristics of Building Materials, or UL 723, Test for Surface Burning Characteristics of Building Materials, using the specimen preparation and mounting method of ASTM E2404, Standard Practice for Specimen Preparation and Mounting of Textile, Paper or Polymeric (Including Vinyl) and Wood Wall or Ceiling Coverings, Facings and Veneers, to Assess Surface Burning Characteristics, shall be permitted as follows:

On the walls of rooms or areas protected by an approved automatic sprinkler system.

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.

On the lower 48 in. (1220 mm) above the finished floor on ceiling-height walls and ceiling-height partitions.

Previously approved existing installations of textile material meeting the requirements of Class A when tested in accordance with ASTM E84, Standard Test Method for Surface Burning Characteristics of Building Materials or UL 723, Test for Surface Burning Characteristics of Building Materials, shall be permitted to be continued to be used.

[101:10.2.4.4.3]

12.5.5.5\* Expanded Vinyl Wall Coverings

Where used as interior wall finish materials, expanded vinyl wall coverings shall be tested in the manner intended for use, using the product mounting system, including adhesive, and shall comply with the requirements of 12.5.4.1, 12.5.5.4.1, or 12.5.5.4.3. [101:10.2.4.5]

12.5.5.6 Textile Ceiling Coverings

Where used as interior ceiling finish materials, textile materials shall be tested in the manner intended for use, using the product mounting system, including adhesive, and shall meet one of the following:

Comply with the requirements of 12.5.4.1

Meet the requirements of Class A when tested in accordance with ASTM E84, Standard Test Method for Surface Burning Characteristics of Building Materials or UL 723, Test for Surface Burning Characteristics of Building Materials using the specimen preparation and mounting method of ASTM E2404, Standard Practice for Specimen Preparation and Mounting of Textile, Paper or Polymeric (Including Vinyl) and Wood Wall or Ceiling Coverings, Facings and Veneers, to Assess Surface Burning Characteristics, and used on the ceilings of rooms or areas protected by an approved automatic sprinkler system

[101:10.2.4.6]

12.5.5.7 Expanded Vinyl Ceiling Coverings

Where used as interior ceiling finish materials, expanded vinyl materials shall be tested in the manner intended for use, using the product mounting system, including adhesive, and shall meet one of the following:

Comply with the requirements of 12.5.4.1

Meet the requirements of Class A when tested in accordance with ASTM E84, Standard Test Method for Surface Burning Characteristics of Building Materials or UL 723, Test for Surface Burning Characteristics of Building Materials, using the specimen preparation and mounting method of ASTM E2404, Standard Practice for Specimen Preparation and Mounting of Textile, Paper or Polymeric (Including Vinyl) and Wood Wall or Ceiling Coverings, Facings and Veneers, to Assess Surface Burning Characteristics, and used on the ceilings of rooms or areas protected by an approved automatic sprinkler system

[101:10.2.4.7]

12.5.5.8 Lockers

12.5.5.8.1 Combustible Lockers

Where lockers constructed of combustible materials other than wood are used, the lockers shall be considered interior finish and shall comply with 12.5.4, except as permitted by 12.5.5.8.2. [101:10.2.4.8.1]

12.5.5.8.2 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 12.5.4. [101:10.2.4.8.2]

12.5.5.9 Solid Thermoplastics

12.5.5.9.1

Solid thermoplastics including, but not limited to, polypropylene, high-density polyethylene (HDPE), solid polycarbonate, solid polystyrene, and solid acrylic materials that melt and drip when exposed to flame shall not be permitted as interior wall or ceiling finish unless the material complies with the requirements of 12.5.4.1. [101:10.2.4.9.1]

12.5.5.9.2

The tests shall be performed on a finished assembly and on the maximum thickness intended for use. [101:10.2.4.9.2]

12.5.5.10 Site-Fabricated Stretch Systems

12.5.5.10.1

For new installations, site-fabricated stretch systems containing all three components described in the definition in Chapter 3 shall be tested in the manner intended for use and shall comply with the requirements of 12.5.4.1 or 12.6.7. [101:10.2.4.10.1]

12.5.5.10.2

If the materials are tested in accordance with ASTM E84, Standard Test Method for Surface Burning Characteristics of Building Materials, or UL 723, Test for Surface Burning Characteristics of Building Materials, specimen preparation and mounting shall be in accordance with ASTM E2573, Standard Practice for Specimen Preparation and Mounting of Site-Fabricated Stretch Systems to Assess Surface Burning Characteristics. [101:10.2.4.10.2]

12.5.5.11 Reflective Insulation Materials

12.5.5.11.1

Reflective insulation materials shall be tested in the manner intended for use and shall comply with the requirements of 12.5.4 or 12.5.4.3. [101:10.2.4.11.1]

12.5.5.11.2

If the materials are tested in accordance with ASTM E84, Standard Test Method for Surface Burning Characteristics of Building Materials, or UL 723, Test for Surface Burning Characteristics of Building Materials, specimen preparation and mounting shall be in accordance with ASTM E2599, Standard Practice for Specimen Preparation and Mounting of Reflective Insulation, Radiant Barrier, and Vinyl Stretch Ceiling Materials for Building Applications to Assess Surface Burning Characteristics. [101:10.2.4.11.2]

12.5.5.12 Metal Ceiling and Wall Panels

12.5.5.12.1

Listed factory finished metal ceiling and wall panels meeting the requirements of Class A, in accordance with 12.5.4, shall be permitted to be finished with one additional application of paint. [101:10.2.4.12.1]

12.5.5.12.2

Such painted panels shall be permitted for use in areas where Class A interior finishes are required. The total paint thickness shall not exceed 1/28 in. (0.9 mm). [101:10.2.4.12.2]

12.5.5.13 Laminated Products Factory Produced With a Wood Substrate

12.5.5.13.1

Laminated products factory produced with a wood substrate shall be tested in the manner intended for use and shall comply with the requirements of 12.5.4.1 or 12.5.4.3. [101:10.2.4.13.1]

12.5.5.13.2

If the materials are tested in accordance with ASTM E84, Standard Test Method for Surface Burning Characteristics of Building Materials, or UL 723, Test for Surface Burning Characteristics of Building Materials, specimen preparation and mounting shall be in accordance with ASTM E2579, Standard Practice for Specimen Preparation and Mounting of Wood Products to Assess Surface Burning Characteristics, using the product-mounting system, including adhesive, of actual use. [101:10.2.4.13.2]

12.5.5.14 Facings or Wood Veneers Intended to Be Applied on Site Over a Wood Substrate

12.5.5.14.1

Facings or veneers intended to be applied on site over a wood substrate shall be tested in the manner intended for use and shall comply with the requirements of 12.5.4.1 or 12.5.4.3. [101:10.2.4.14.1]

12.5.5.14.2

If the materials are tested in accordance with NFPA 286 they shall use the product-mounting system, including adhesive, described in 5.8.9 of NFPA 286. [101:10.2.4.14.2]

12.5.5.14.3

If the materials are tested in accordance with ASTM E84, Standard Test Method for Surface Burning Characteristics of Building Materials, or UL 723, Test for Surface Burning Characteristics of Building Materials, specimen preparation and mounting shall be in accordance with ASTM E2404, Standard Practice for Specimen Preparation and Mounting of Textile, Paper or Polymeric (Including Vinyl) and Wood Wall or Ceiling Coverings, Facings and Veneers, to Assess Surface Burning Characteristics. [101:10.2.4.14.3]

12.5.5.15\* Light-Transmitting Plastics

12.5.5.15.1

Light-transmitting plastics used as interior wall and ceiling finish shall be permitted based on large-scale fire tests per 12.5.5.3.3.1, which substantiate the combustibility characteristics of the plastics for the use intended under actual fire conditions. [101:10.2.4.15.1]

12.5.5.15.2

The tests shall be performed on a light-transmitting plastic assembly related to the actual end-use configuration and on the maximum thickness intended for use. [101:10.2.4.15.2]

12.5.5.16 Decorations and Furnishings

Decorations and furnishings that do not meet the definition of interior finish, as defined in 3.3.121.2, shall be regulated by the provisions of Section 12.6. [101:10.2.4.16]

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 specific wall and ceiling areas of any room or space to which it is applied 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. [101:10.2.5.2]

12.5.6.2.1

If a Class I floor finish is required, the interior floor trim shall be Class I. [101:10.2.5.2.1]

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(3), 20.2.4.4.3(4), 20.3.4.2.3.5.3(3), and 20.3.4.2.3.5.3(4). [101:10.2.5.3.2]

12.5.7\* Fire-Retardant Coatings

12.5.7.1\*

The required flame spread index or smoke developed index 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 index values than permitted. [101:10.2.6.1]

12.5.7.1.1

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. [101:10.2.6.1.1]

12.5.7.2\*

Surfaces of walls, partitions, columns, and ceilings shall be permitted to be finished with factory-applied fire-retardant-coated products that have been listed and labeled to demonstrate compliance with the requirements of ASTM E2768, Standard Test Method for Extended Duration Surface Burning Characteristics of Building Materials, on the coated surface. [101:10.2.6.2]

12.5.7.3

Fire-retardant coatings or factory-applied fireretardant-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 D2859, 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 or ASTM E648, 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 grouped in the classes specified in 12.5.8.4.1 and 12.5.8.4.2 in accordance with the critical radiant flux requirements. [101:10.2.7.4]

12.5.8.4.1 Class I Interior Floor Finish

Class I interior floor finish shall have a critical radiant flux of not less than 0.45 W/cm2, as determined by the test described in 12.5.8.3. [101:10.2.7.4.1]

12.5.8.4.2 Class II Interior Floor Finish

Class II interior floor finish shall have a critical radiant flux of 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. [101:10.2.7.4.2]

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

Other than as required in 12.5.5, 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

Where an approved automatic sprinkler system is installed in accordance with Section 13.3, throughout the fire compartment or smoke compartment containing the interior floor finish, 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, the provisions of 12.5.8.2 shall apply. [101:10.2.8.2]

12.6 Contents and Furnishings

12.6.1\* Draperies, Curtains, and Other Hanging or Suspended Furnishings and Decorations

Where required by the applicable provisions of this Code, draperies, curtains, and other hanging or suspended furnishings and decorations shall meet the flame propagation performance criteria contained in Test Method 1 or Test Method 2, as appropriate, of NFPA 701. [101:10.3.1]

12.6.2 Upholstered Furniture

12.6.2.1\* Smoldering Ignition of Upholstered Furniture

Newly introduced upholstered furniture, except as otherwise permitted by Chapters 11 through 43 of NFPA 101, shall be resistant to a cigarette ignition (i.e., smoldering) in accordance with one of the following:

The components of the upholstered furniture shall meet the requirements for Class I when tested in accordance with NFPA 260.

Mocked-up composites of the upholstered furniture shall have a char length not exceeding 11/2 in. (38 mm) when tested in accordance with NFPA 261.

[101:10.3.2.1]

12.6.2.2\* Rate of Heat Release Testing of Upholstered Furniture

12.6.2.2.1

Where required by the applicable provisions of this Code, upholstered furniture and other seating 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 E1537, Standard Test Method for Fire Testing of Upholstered Furniture, as follows:

The peak rate of heat release for the single furniture item shall not exceed 80 kW.

The total heat released by the single furniture item during the first 10 minutes of the test shall not exceed 25 MJ.

[101:10.3.2.2.1]

12.6.2.2.2

When tests are conducted in accordance with 12.6.2.2, the formation of flaming droplets during the test shall be reported. [101:10.3.2.2.2]

12.6.3 Mattresses

12.6.3.1\* Smoldering Ignition of Mattresses

Newly introduced mattresses, except as otherwise permitted by Chapters 11 through 43 of NFPA 101, 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" (FF4-72). [101:10.3.3.1]

12.6.3.2\* Rate of Heat Release and Mass Loss Testing of Mattresses

Where required by the applicable provisions of this Code, mattresses shall comply with 12.6.3.2.1 or 12.6.3.2.2, unless the mattress is located in a building protected throughout by an approved automatic sprinkler system. [101:10.3.3.2]

12.6.3.2.1

The mattress shall have limited rates of heat release when tested in accordance with ASTM E1590, Standard Test Method for Fire Testing of Mattresses, as follows:

The peak rate of heat release for the single mattress shall not exceed 100 kW.

The total heat released by the mattress during the first 10 minutes of the test shall not exceed 25 MJ.

[101:10.3.3.2.1]

12.6.3.2.2

The mattress shall have a mass loss not exceeding 15 percent when tested in accordance with the fire test in Appendix A3 of ASTM F1085, Standard Specification for Mattress and Box Springs for Use in Berths in Marine Vessels. [101:10.3.3.2.2]

12.6.3.2.3

When tests are conducted in accordance with 12.6.3.2, the formation of flaming droplets during the test shall be reported. [101:10.3.3.2.3]

12.6.4\* Explosive or Highly Flammable Furnishings or Decorations

Furnishings or decorations of an explosive or highly flammable character shall not be used. [101:10.3.4]

12.6.5 Fire-Retardant Coatings

Fire-retardant coatings shall be maintained to retain the effectiveness of the treatment under service conditions encountered in actual use. [101:10.3.5]

12.6.6\* Foamed Plastics

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, Fire Tests for Foamed Plastics Used for Decorative Purposes, or when tested in accordance with NFPA 289 using the 20 kW ignition source. [101:10.3.6]

12.6.7 Lockers

Lockers shall be considered interior finish and shall comply with the requirements of 12.5.5.8. [101:10.3.7]

12.6.8 Containers for Waste or Linen

12.6.8.1

Where required by Chapters 11 through 43 of NFPA 101, newly introduced containers for waste or linen, with a capacity of 20 gal (75.7 L) or more, shall meet both of the following:

Such containers shall be provided with lids.

Such containers and their lids shall be constructed of noncombustible materials or of materials that meet a peak rate of heat release not exceeding 300 kW/m2 when tested at an incident heat flux of 50 kW/m2 in the horizontal orientation and at a thickness as used in the container but not less than 1/4 in. (6.3 mm), in accordance with ASTM E1354, Standard Test Method for Heat and Visible Smoke Release Rates for Materials and Products Using an Oxygen Consumption Calorimeter.

[101:10.3.8.1]

12.6.8.2

Where required by Chapters 11 through 43 of NFPA 101, newly introduced metal wastebaskets and other metal waste, or linen containers with a capacity of 20 gal (75.7 L) or more shall be listed in accordance with UL 1315, Metal Waste Paper Containers, and shall be provided with a noncombustible lid. [101:10.3.8.2]

12.6.9 Combustible Vegetation

12.6.9.1

Combustible vegetation, including natural cut Christmas trees, shall be in accordance with Section 12.6.9.

12.6.9.1.1

Christmas tree placement within buildings shall comply with Table 12.6.9.1.1.

Table 12.6.9.1.1 Provisions for Christmas Trees by Occupancy

Occupancy

No Trees Permitted

Cut Tree Permitted With Automatic Sprinkler Systems

Cut Tree Permitted Without Automatic Sprinkler Systems

Balled Tree Permitted

Ambulatory

health care

X

Apartment

buildings

Within unit

Within unit

X

Assembly

X

Board and care

X

Business

X

X

Day-care

X

X

Detention and correctional

X

Dormitories

X

Educational

X

Health care

X

Hotels

X

Industrial

X

X

X

Lodging and

rooming

X

Mercantile

X

X

One and two

family

X

X

X

Storage

X

X

X

12.6.9.2

In any occupancy, limited quantities of combustible vegetation shall be permitted where the AHJ determines that adequate safeguards are provided based on the quantity and nature of the combustible vegetation.

12.6.9.3

Vegetation and Christmas trees shall not obstruct corridors, exit ways, or other means of egress.

12.6.9.4

Combustible vegetation and natural cut Christmas trees shall not be located near heating vents or other fixed or portable heating devices that could cause it to dry out prematurely or to be ignited.

12.6.9.5 Flammability of Combustible Artificial Vegetation

12.6.9.5.1

Combustible artificial decorative vegetation and artificial Christmas trees shall meet one of the following:

The flame propagation performance criteria of Test Method 1 or Test Method 2, as appropriate, of NFPA 701

A maximum heat release rate of 100 kW when tested to NFPA 289, using the 20 kW ignition source

[101:10.3.9.1]

12.6.9.5.2

Each individual artificial decorative vegetation item shall be labeled to demonstrate compliance with 12.6.9.5.1 in an approved manner.

12.6.9.6 Provisions for Natural Cut Trees

12.6.9.6.1

Where a natural cut tree is permitted, the bottom end of the trunk shall be cut off with a straight fresh cut at least 1/2 in. (13 mm) above the end prior to placing the tree in a stand to allow the tree to absorb water.

12.6.9.6.2

The tree shall be placed in a suitable stand with water.

12.6.9.6.3

The water level shall be maintained above the fresh cut and checked at least once daily.

12.6.9.6.4\*

The tree shall be removed from the building immediately upon evidence of dryness.

12.6.9.6.5 Fire-Retardant Treatments for Natural Cut Christmas Trees

Where fire-retardant treatments are applied to natural cut Christmas trees, the fire-retardant treatment shall comply with both Test Method 1 and Test Method 2 of ASTM E3082, Standard Test Methods for Determining the Effectiveness of Fire Retardant Treatments for Natural Christmas Trees. [101:10.3.9.2]

12.6.9.7 Electrical Equipment

12.6.9.7.1

Electrical wiring and listed luminaires used on combustible artificial decorative vegetation, shall be listed for that application. [101:10.3.9.3.1]

12.6.9.7.2

Electrical wiring and luminaires used on natural vegetation shall be listed for that application.

12.6.9.7.3

Electrical lights shall be prohibited on metal artificial trees.

12.6.9.8 Open Flames

12.6.9.8.1

Candles and open flames shall not be used on or near combustible artificial decorative vegetation. [101:10.3.9.4]

12.6.9.8.2

Candles and open flames shall not be used on or near natural vegetation.

12.7 Fire Barriers

Diagram

UpCodes Diagrams

P

Fire Rated Wall Assemblies

Fire Barriers

Fire and Smoke Compartments (NFPA)

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:

3-hour fire resistance rating

2-hour fire resistance rating

1-hour fire resistance rating

1/2-hour fire resistance rating

[101:8.3.1.1]

12.7.2\*

Fire barriers shall comply with one of the following:

The fire barriers are continuous from outside wall to outside wall or from one fire barrier to another, or a combination thereof, including continuity through all concealed spaces, such as those found above a ceiling, including interstitial spaces.

The fire barriers are continuous from outside wall to outside wall or from one fire barrier to another, and from the floor to the bottom of the interstitial space, provided that the construction assembly forming the bottom of the interstitial space has a fire resistance rating not less than that of the fire barrier.

[101:8.3.1.2]

12.7.3

Walls used as fire barriers shall comply with the requirements of NFPA 221 applicable to fire barrier walls. [101:8.3.1.3]

12.7.4 Smoke Barrier Used as a Fire Barrier

A smoke barrier shall be permitted to be used as a fire barrier, provided that it meets the requirements of Section 8.3 of NFPA 101. [101:8.3.1.4]

12.7.5 Walls

12.7.5.1

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]

12.7.5.1.1\*

Fire resistance glazing tested in accordance with ASTM E119, Standard Test Methods for Fire Tests of Building Construction and Materials, or UL 263, Fire Tests of Building Construction and Materials, shall be permitted. [101:8.3.2.1.1]

12.7.5.2

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]

12.7.5.3

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 E119, Standard Test Methods for Fire Tests of Building Construction and Materials, or UL 263, 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]

12.7.6 Opening Protectives

12.7.6.1 General

Every opening in a fire barrier shall be protected to limit the spread of fire from one side of the fire barrier to the other. [101:8.3.3.1]

12.7.6.2 Minimum Fire Protection Rating

12.7.6.2.1

Fire protection ratings for products required to comply with 12.7.6 shall be as determined and reported by a nationally recognized testing agency in accordance with NFPA 252; NFPA 257; UL 10B, Fire Tests of Door Assemblies; UL 10C, Positive Pressure Fire Tests of Door Assemblies; or UL 9, Fire Tests of Window Assemblies. [101:8.3.3.2.1]

12.7.6.2.2\*

The minimum fire rating for opening protectives in fire barriers, fire-rated smoke barriers, and fire-rated smoke partitions shall be in accordance with Table 12.7.6.2.2, except as otherwise permitted in 12.7.6.2.3 or 12.7.6.2.4. [101:8.3.3.2.2]

Table 12.7.6.2.2 Minimum Fire Ratings for Opening Protectives in Fire-Resistance-Rated Assemblies and Fire-Rated Glazing Markings

Door Vision Panel Maximum Size (in.2)

Fire-Rated Glazing Marking Door Vision Panel

Minimum Side Light/ Transom Assembly Rating (hr)

Fire-Rated Glazing Marking Side Light/ Transom Panel

Minimum Fire-Rated Windows Ratinga,b (hr)

Fire Window Marking

Component

Walls and Partitions (hr)

Fire Door Assemblies (hr)

Fire Protection

Fire Resistance

Fire Protection

Fire Resistance

Fire Protection

Fire Resistance

Fire Protection

Fire Resistance

Elevator hoistways

2

11/2

155 in.2ce

D-H-90 or D-H-W-90

NP

2

NP

D-H-W-120

NP

2

NP

W-120

1

1

155 in.2ce

D-H-60 or D-H-W-60

NP

1

NP

D-H-W-60

NP

1

NP

W-60

1/2

1/3

85 in.2d

D-20 or D-W-20

1/3

1/3

D-H-20

D-W-20

1/3

1/3

OH -20

W-30

Elevator lobby (per 7.2.13.4 of NFPA 101)

1

1

100 in.2a ≤100 in.2, D-H-T-60 or D-H-W-60a

>100 in.2, D-H-W-60

NP

1

NP

D-H-W-60

NP

W-60

Vertical shafts, (including stairways, exits, and refuse chutes)

2

11/2

Maximum size tested

D-H-90 or D-H-W-90

NP

2

NP

D-H-W-120

NP

2

NP

W-120

1

1

Maximum size tested

D-H-60 or D-H-W-60

NP

1

NP

D-H-W-60

NP

1

NP

W-60

Replacement panels in existing vertical shafts

1/2

1/3

Maximum size tested

D-20 or D-W-20

1/3

1/3

D-H-20

D-W-20

1/3

1/3

OH-20

W-30

Fire barriers

3

3

100 in.2a ≤100 in.2,

D-H-180 or D-H-W-180 >100 in.2, D-H-W-180

NP

3

NP

D-H-W-180

NP

3

NP

W-180

2

11/2

Maximum size tested

D-H-90 or D-H-W-90

NP

2

NP

D-H-W-120

NP

2

NP

W-120

1

3/4

Maximum size testede

D-H-45 or D-H-W-45

3/4e

3/4e

D-H-45

D-H-W-45

3/4

3/4

OH-45

W-60

1/2

1/3

Maximum size tested

D-20 or D-W-20

1/3

1/3

D-H-20

D-W-20

1/3

1/3

OH-20

W-30

Horizontal exits

2

11/2

Maximum size tested

D-H-90 or D-H-W-90

NP

2

NP

D-H-W-120

NP

2

NP

W-120

Horizontal exits served by bridges between buildings

2

3/4

Maximum size testede

D-H-45 or D-H-W-45

3/4e

3/4e

D-H-45

D-H-W-45

3/4

3/4

OH-45

W-120

Exit access corridorsf

1

1/3

Maximum size tested

D-20 or D-W-20

3/4

3/4

D-H-45

D-H-W-20

3/4

3/4

OH-45

W-60

1/2

1/3

Maximum size tested

D-20 or D-W-20

1/3

1/3

D-H-20

D-H-W-20

1/3

1/3

OH-20

W-30

Smoke barriersf

1

1/3

Maximum size tested

D-20 or D-W-20

3/4

3/4

D-H-45

D-H-W-20

3/4

3/4

OH-45

W-60

Smoke partitionsf,g

1/2

1/3

Maximum size tested

D-20 or D-W-20

1/3

1/3

D-H-20

D-H-W-20

1/3

1/3

OH-20

W-30

For SI units, 1 in.2= 0.00064516 m2.

NP: Not permitted.

a Fire resistance glazing tested to ASTM E119, Standard Test Methods for Fire Tests of Building Construction and Materials, or UL 263, Fire Tests of Building

Construction and Materials, shall be permitted in the maximum size tested. (See 12.7.6.6.8.)

b Fire-rated glazing in exterior windows shall be marked in accordance with Table 12.7.6.6.3.

c See ASME A17.1/CSA B44, Safety Code for Elevators and Escalators, for additional information.

d See ASME A17.3, Safety Code for Existing Elevators and Escalators, for additional information.

e Maximum 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]

f Fire doors are not required to have a hose stream test per UL 10B, Fire Tests of Door Assemblies, or UL 10C, Positive Pressure Fire Tests of Door Assemblies.

g For residential board and care, see 32.2.3.1 and 33.2.3.1 of NFPA 101.

[101: Table 8.3.3.2.2]

12.7.6.2.3

Existing fire door assemblies having a minimum 3/4-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 12.7.6.2.2. [101:8.3.3.2.3]

12.7.6.2.4

Where a 20-minute fire-protection-rated door is required in existing buildings, an existing 13/4 in. (44 mm) solid-bonded wood-core door, an existing steel-clad (tin-clad) wood door, or an existing solid-core steel door shall be permitted, unless otherwise specified by Chapters 11 through 43 of NFPA 101. [101:8.3.3.2.4]

12.7.6.2.5

Existing doors permitted by 12.7.6.2.4 shall have a positive latch and a closer. [101:8.3.3.2.5]

12.7.6.2.6

Openings required to have a fire protection rating by Table 12.7.6.2.2 shall be protected by approved, listed and 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 NFPA 80, except as otherwise specified in NFPA 101. [101:8.3.3.2.6]

12.7.6.3\* Fire Doors

12.7.6.3.1\*

Required fire door assemblies shall be installed, inspected, tested, and maintained in accordance with NFPA 80. [101:8.3.3.3.1]

12.7.6.3.2

All fire door assemblies shall be labeled. [101:8.3.3.3.2]

12.7.6.3.3

Labels on fire door assemblies shall be maintained in a legible condition. [101:8.3.3.3.3]

Table 12.7.6.6.3 Marking Fire-Rated Glazing Assemblies

Fire Test Standard

Marking

Definition of Marking

ASTM E119 or UL 263

W

Meets wall assembly criteria

NFPA 257 or UL 9

OH

Meets fire window assembly criteria, including the hose stream test

NFPA 252, UL 10B, or UL 10C

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

12.7.6.3.4

In existing installations, steel door frames without a label shall be permitted where approved by the AHJ. [101:8.3.3.3.4]

12.7.6.3.5

Unless otherwise specified, fire doors shall be self-closing or automatic-closing. [101:8.3.3.3.6]

12.7.6.4 Floor Fire Door Assemblies

12.7.6.4.1

Floor fire door assemblies used to protect openings in fire-resistance-rated floors shall be tested in accordance with NFPA 288 and shall achieve a fire resistance rating not less than the assembly being penetrated. [101:8.3.3.4.1]

12.7.6.4.2

Floor fire doors assemblies shall be listed and labeled. [101:8.3.3.4.2]

12.7.6.5 Fire Windows

12.7.6.5.1

Fire window assemblies shall be installed, inspected, tested, and maintained in accordance with NFPA 80. [101:8.3.3.5.1]

12.7.6.5.2

All fire window assemblies shall be labeled. [101:8.3.3.5.2]

12.7.6.5.3\*

Fire window assemblies 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 they are installed. [101:8.3.3.5.3]

12.7.6.6 Glazing

Upcodes Diagrams

12.7.6.6.1

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 12.7.6.2.2 and NFPA 80. [101:8.3.3.6.1]

12.7.6.6.2

Fire-rated glazing assemblies shall be permitted as follows:

Those marked as complying with hose stream requirements (H) shall be permitted in applications that do not require compliance with hose stream requirements.

Those marked as complying with temperature rise requirements (T) shall be permitted in applications that do not require compliance with temperature rise requirements.

Those marked with ratings that exceed the ratings required by NFPA 101 shall be permitted.

[101:8.3.3.6.2]

12.7.6.6.3

New fire protection glazing shall be marked in accordance with Table 12.7.6.6.3 and Table 12.7.6.2.2, and such marking shall be permanently affixed. [101:8.3.3.6.3]

12.7.6.6.4

New fire resistance glazing shall be marked in accordance with Table 12.7.6.6.3 and Table 12.7.6.2.2, and such marking shall be permanently affixed. [101:8.3.3.6.4]

12.7.6.6.5

Fire protection 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. [101:8.3.3.6.5]

12.7.6.6.6\*

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 UL 9, Fire Tests of Window Assemblies. [101:8.3.3.6.6]

12.7.6.6.7

Fire protection 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, UL 10B, Fire Tests of Door Assemblies, or UL 10C, Positive Pressure Fire Tests of Door Assemblies. [101:8.3.3.6.7]

12.7.6.6.8

Fire resistance glazing tested in accordance with ASTM E119, Standard Test Methods for Fire Tests of Building Construction and Materials, or UL 263, Fire Tests of Building Construction and Materials, shall be permitted in fire doors and fire window assemblies in accordance with their listings. [101:8.3.3.6.8]

12.7.6.6.9

Nonsymmetrical fire protection glazing systems shall be tested with each face exposed to the furnace, and the assigned fire protection rating shall be the shortest duration obtained from the two tests conducted in compliance with NFPA 257 or UL 9, Fire Tests of Window Assemblies. [101:8.3.3.6.9]

12.7.6.6.10

The total combined area of fire protection glazing in fire window assemblies and fire 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 is an existing fire window of wired glass or other fire protection glazing materials in approved frames.[101:8.3.3.10]

12.7.6.6.11

Existing installations of wired glass of 1/4 in. (6.3 mm) thickness previously approved for fire protection purposes shall be permitted to remain in use. [101:8.3.3.6.11]

12.7.6.7 Sidelights and Transoms

Glazing used in sidelights and transoms adjacent to 20-minute doors in 1-hour corridor fire barriers shall be tested in accordance with 12.7.6.2, including hose stream, and shall attain a minimum 45-minute fire protection rating. [101:8.3.3.7]

12.7.7 Opening Protectives

12.7.7.1

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]

12.7.8 Penetrations

12.7.8.1 General

12.7.8.1.1

The provisions of 12.7.8 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. [101:8.3.4.1.1]

12.7.8.1.2

The provisions of 12.7.8 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 Chapters 11 through 43 of NFPA 101. [101:8.3.4.1.2]

12.7.8.1.3

Penetrations shall be protected in accordance with a tested system, and installed and maintained in accordance with the manufacturer's instructions. [101:8.3.4.1.3]

12.7.8.2\* Firestop Systems and Devices Required

12.7.8.2.1

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. [101:8.3.4.2.1]

12.7.8.2.2 Testing

The firestop system or device shall be tested in accordance with ASTM E814, Standard Test Method for Fire Tests of Penetration Firestop System, or UL 1479, Fire Tests of Penetration Firestops, at a minimum positive pressure differential of 0.01 in. water column (2.5 Pa) between the exposed and the unexposed surface of the test assembly. [101:8.3.4.2.2]

12.7.8.2.3 F Ratings

Firestop systems and devices shall have a minimum 1-hour F rating, and not less than the required fire resistance rating of the fire barrier penetrated. [101:8.3.4.2.3]

12.7.8.2.4 T Ratings

12.7.8.2.4.1

Penetrations in fire-resistance-rated horizontal assemblies shall have a T rating of not less than 1 hour, and not less than the fire resistance rating of the horizontal assembly. [101:8.3.4.2.4.1]

12.7.8.2.4.2

A T rating shall not be required for either of the following:

Floor penetrations contained within the cavity of a wall assembly

Penetrations through floors or floor assemblies where the penetration is not in direct contact with combustible material [101:8.3.4.2.4.2]

12.7.8.2.5 Alternative Firestop Requirements

12.7.8.2.5.1

The requirements of 12.7.8.2 shall not apply where otherwise permitted by any one of the following:

Where penetrations are tested and installed as part of an assembly tested and rated in accordance with ASTM E119, Standard Test Methods for Fire Tests of Building Construction and Materials or UL 263, Fire Tests of Building Construction and Materials

Where penetrations through floors are enclosed in a shaft enclosure designed as a fire barrier

Where concrete, grout, or mortar has been used to fill the annular spaces around cast-iron, copper, or steel piping, conduit, or tubing that penetrates one or more concrete or masonry fire-resistance-rated assemblies and all of the following applies:

The nominal diameter of each penetrating item does not exceed 6 in. (150 mm),

The opening size does not exceed 1 ft2 (0.09 m2).

The thickness of the concrete, grout, or mortar is the full thickness of the assembly.

Where penetration is limited to one floor, 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 ASTM E119, Standard Test Methods for Fire Tests of Building Construction and Materials, or UL 263, Fire Tests of Building Materials 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, and the firestopping materials are used with the following penetrating items:

Steel, ferrous, or copper cables

Cable or wire with steel jackets

Cast-iron, steel, or copper pipes

Steel conduit or tubing

[101:8.3.4.2.5.1]

12.7.8.2.5.2

The maximum nominal diameter of the penetrating item, as indicated in 12.7.8.2.5.1(4) (a) through 12.7.8.2.5.1 (4)(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. [101:8.3.4.2.5.2]

12.7.8.3 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 12.7.8.2. [101:8.3.4.3]

12.7.8.4 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. [101:8.3.4.4]

12.7.8.5 Vibration Isolation Equipment or Systems

Where vibration isolation of equipment or systems is employed, the vibration restraint(s) shall be located outside of the partition, wall, or floor assembly for which the equipment or systems pass through. [101:8.3.4.5]

12.7.8.6 Transitions

12.7.8.6.1

Where piping penetrates a fire-resistance-rated wall or floor assembly, combustible piping shall not connect to noncombustible piping unless it can be demonstrated that the transition will not reduce the fire resistance rating, except in the case of previously approved installations. [101:8.3.4.6.1]

12.7.8.6.2

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 12.7.8.2. [101:8.3.4.6.2]

12.7.8.7 Membrane Penetrations

12.7.8.7.1

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 12.7.8.2 through 12.7.8.6.2. [101:8.3.4.7.1]

12.7.8.7.2

The firestop system or device shall be tested in accordance with ASTM E814, Standard Test Method for Fire Tests of Penetration Firestop Systems, or UL 1479, Fire Tests of Penetration Firestops, at a minimum positive pressure differential of 0.01 in. water column (2.5 Pa) between the exposed and the unexposed surface of the test assembly, unless one of the following conditions applies:

Membrane penetrations of ceilings that are not an integral part of a fire-resistance-rated floor/ceiling or roof/ ceiling assembly.

Membrane penetrations of steel, ferrous, or copper conduits, piping, or tubing, and steel electrical outlet boxes and wires, or combustion vents or exhaust vents where the annular space is protected with an approved material, and the aggregate area of the openings does not exceed 100 in.2 (64,520 mm2) in any 100 ft2 (9.3 m2) of ceiling area.

Electrical outlet boxes and fittings, provided that such devices are listed for use in fire-resistance-rated assemblies and are installed in accordance with their listing.

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.

[101:8.3.4.7.2]

12.7.8.7.3

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 criteria is met:

Any steel electrical box not exceeding 16 in.2 (10,300 mm2) in area shall be permitted where the aggregate area of the openings provided for the boxes does not exceed 100 in.2 (64,520 mm2) 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 means:

Horizontal distance of not less than 24 in. (610 mm)

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

\* Solid fireblocking

Other listed materials and methods

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.

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.

Membrane penetrations by electrical boxes of any size or type, which have been listed as part of a wall opening protective material system for use in fire-resistance-rated assemblies and are installed in accordance with the instructions included in the listing shall be permitted.

[101:8.3.4.7.3]

12.7.8.8 Ducts and Air-Transfer Openings

Openings for air-handling ductwork or air movement shall be protected in accordance with 11.2.1. [101:8.3.4.8]

12.7.9 Joints

12.7.9.1 General

12.7.9.1.1

The provisions of 12.7.9 shall govern the materials and methods of construction used to protect joints in fire barriers, in between fire barriers, and at the perimeter of fire barriers where fire barriers meet other fire barriers, the floor or roof deck above, or the outside walls. [101:8.3.5.1.1]

12.7.9.1.2

The provisions of 12.7.9 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. [101:8.5.1.2]

12.7.9.2 Joint System Requirements

12.7.9.2.1\*

Joints made within or at the perimeter of fire barriers, between fire-resistance-rated assemblies, or where fire barriers meet other fire barriers, the floor or roof deck above, or the outside walls 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. [101:8.3.5.2.1]

12.7.9.2.2

Joints made within or at the perimeter of fire barriers used as smoke barriers shall be capable of restricting the transfer of smoke in accordance with 8.5.7.4 of NFPA 101. [101:8.3.5.2.2]

12.7.9.2.3

Joints shall be installed in accordance with a tested system, and installed and maintained in accordance with the manufacturer's instructions. [101:8.3.5.2.3]

12.7.9.2.4

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. [101:8.3.5.2.4]

12.7.9.2.5

Such materials, systems, or devices shall be tested as part of the assembly in accordance with the requirements of ASTM E1966, Standard Test Method for Fire-Resistive Joint Systems, or UL 2079, Tests for Fire Resistance of Building Joint Systems. [101:8.3.5.2.5]

12.7.9.2.6

All joint systems shall be tested at their maximum joint width in accordance with the requirements of ASTM E1966, Standard Test Method for Fire-Resistive Joint Systems, or UL 2079, Tests for Fire Resistance of Building Joint Systems, 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. [101:8.3.5.2.6]

12.7.9.2.7

All test specimens shall comply with the minimum height or length required by the standard. [101:8.3.5.2.7]

12.7.9.2.8

Wall assemblies shall be subjected to a hose stream test in accordance with ASTM E119, Standard Test Methods for Fire Tests of Building Construction and Materials, or UL 263, Fire Tests of Building Construction and Materials. [101:8.3.5.2.8]

12.7.9.3

Joints made between a fire barrier and a non-fire-resistance-rated floor or roof sheathing, slab, or deck above shall be protected by an approved continuity head of wall joint system installed and tested in accordance with ASTM E2837, Standard Test Method for Determining the Fire Resistance of Continuity Head-of-Wall Joint Systems Installed Between Rated Wall Assemblies and Nonrated Horizontal Assemblies, and the system shall have an F rating and T rating of not less than the required fire resistance rating of the fire barrier. [101:8.3.5.3]

12.7.9.4\* Exterior Curtain Walls and Perimeter Joints

12.7.9.4.1

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 E2307, Standard Test Method for Determining Fire Resistance of Perimeter Fire Barriers Using Intermediate-Scale, Multi-story Apparatus. [101:8.3.5.4.1]

12.7.9.4.2

The perimeter joint system shall have an F rating equal to the fire resistance rating of the floor assembly. [101:8.3.5.4.2]

12.8 Smoke Partitions

Upcodes Diagrams

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

Smoke partitions shall comply with the following:

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.

\* They shall be permitted to extend from the floor to the underside of a monolithic or suspended ceiling system where all of 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.

The space above the ceiling is not used as a plenum.

Smoke partitions enclosing hazardous areas shall be permitted to terminate at the underside of a monolithic or suspended ceiling system where all of 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 12.8.3.6. [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]

12.8.3.6

Shutters that protect openings shall be automatic-closing upon operation of approved smoke detectors installed in accordance with the provisions of NFPA 72. [101:8.4.3.6]

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 Vibration Isolation Equipment or Systems

Where vibration isolation of equipment or systems is employed, the vibration restraint(s) shall be located outside of the partition, wall or floor assembly through which the equipment or systems pass. [101:8.4.4.2]

12.8.5 Joints

Diagram

Upcodes Diagrams

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 UL 555S, 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. [101:8.4.6.4]

12.9 Smoke Barriers

Upcodes Diagrams

12.9.1\* General

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

12.9.2\* Continuity

12.9.2.1

Smoke barriers required by NFPA 101 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 required by NFPA 101 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. For other than previously approved existing doors, the clearance under the bottom of the doors shall be a maximum of 3/4 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 8.2.2.4 of NFPA 101. [101:8.5.4.2]

12.9.4.3

Latching hardware shall 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 12.7.6. [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

12.9.5.2.1

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 UL 555S, Smoke Dampers, shall be installed. [101:8.5.5.2.1]

12.9.5.2.2

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 UL 555, Fire Dampers, and UL 555S, Smoke Dampers, shall be installed. [101:8.5.5.2.2]

12.9.5.3 Smoke Damper Exemptions

Smoke dampers shall not be required under any of the following conditions:

Where specifically exempted by provisions in Chapters 11 through 43 of NFPA 101

Where ducts or air-transfer openings are part of an engineered smoke control system and the smoke damper will interfere with the operation of a smoke control system

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

Where the air inlet or outlet openings in ducts are limited to a single smoke compartment

Where ducts penetrate floors that serve as smoke barriers

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, NFPA 90B, NFPA 105, or NFPA 80, as applicable. [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

12.9.5.5.1

Access to the dampers shall be provided for inspection, testing, and maintenance. [101:8.5.5.5.1]

12.9.5.5.2

Smoke and combination fire and smoke dampers in new construction shall be provided with an approved means of access, as follows:

The means of access shall be large enough to allow inspection and maintenance of the damper and its operating parts.

The access shall not affect the integrity of fire-resistance-rated assemblies or smoke barrier continuity.

The access openings shall not reduce the fire resistance rating of the assembly.

Access doors in ducts shall be tight-fitting and suitable for the required duct construction.

Access and maintenance shall comply with the requirements of the mechanical code.

[101:8.5.5.5.2]

12.9.5.5.3 Identification

Access points to fire and smoke dampers in new construction shall be permanently identified by one of the following:

A label having letters not less than 1/2 in. (13 mm) in height and reading as one of the following:

FIRE/SMOKE DAMPER

SMOKE DAMPER

FIRE DAMPER

Symbols as approved by the AHJ

[101:8.5.5.5.3]

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:

The ducts penetrate smoke barriers above the smoke barrier doors, and the door release detector actuates the damper.

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 12.7.8 to limit the spread of fire for a time period equal to the fire resistance rating of the assembly and the requirements of 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 1/2 in. (13 mm), measured between the edge of the membrane and the sprinkler. [101:8.5.6.4]

12.9.6.5

In new construction, through-penetrations shall be protected by an approved through-penetration firestop system installed and tested in accordance with the requirements of UL 1479, Fire Tests of Penetration Firestops, for air leakage and shall comply with one of the following:

A maximum 5 ft3/m in per ft2 (0.025 m3/s per m2) of penetration opening for each through-penetration firestop system

A maximum total cumulative leakage of 50 ft3/min (0.024 m3/s) for any 100 ft2 (9.3 m2) of wall area or floor area

[101:8.5.6.5]

12.9.6.6 Vibration Isolation Equipment or Systems

Where vibration isolation of equipment or systems is employed, the vibration restraint(s) shall be located outside of the partition, wall or floor assembly for which the equipment or systems pass through. [101:8.5.6.7]

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, between, or at the perimeter of smoke barriers shall be protected with a joint system that is tested in accordance with the requirements of UL 2079, Tests for Fire Resistance of Building Joint Systems, for air leakage, and the L rating of the joint system shall not exceed 5 ft3/min per ft (0.00775 m3/s per m ) of the joint. [101:8.5.7.2]

12.9.7.3

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 in compliance with 12.9.7.2. [101:8.5.7.3]

12.9.7.4

Testing of the joint system in a smoke barrier that also serves as fire barrier shall be representative of the actual installation. [101:8.5.7.4]





