

“A ROAD MAP FOR YOUR CODE, SMOKE BARRIER & SMOKE PARTITION REQUIREMENTS”

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Smoke Barrier and Smoke Partition Requirements

IBC 2003

Smoke Barrier – Smoke barriers shall form an effective membrane continuous from outside wall to outside wall and from floor slab to floor or roof deck above, including continuity through concealed spaces, such as those found above suspended ceilings, and interstitial structural and mechanical spaces. The supporting construction shall be protected to afford the required fire-resistance rating of the wall or floor supported in buildings of other than Type IIB, IIIB or VB construction.

Smoke Partition – Smoke partitions shall extend from the floor to the underside of the floor or roof deck above or to the underside of the ceiling above where the ceiling membrane is constructed to limit the transfer of smoke.

709 SMOKE BARRIERS

709.5 Openings. Openings in a smoke barrier shall be protected in accordance with Section 715.

Exception: In Group I-2 (generally Healthcare & etc.), where such doors are installed across corridors, a pair of opposite-swinging doors without a center mullion shall be installed having vision panels with approved fire-resistance-rated glazing materials in approved fire-resistance-rated frames, the area of which shall not exceed that tested. The doors shall be close fitting within operational tolerances, and shall not have undercuts, louvers or grilles. The doors shall have head and jamb stops, astragals or rabbets at meeting edges and automatic-closing devices. Positive-latching devices are not required.

710.5 Openings. Windows shall be sealed to resist the free passage of smoke or be automatic-closing upon detection of smoke. Doors in smoke partitions shall comply with this section.

710.5.1 Louvers. Doors in smoke partitions shall not include louvers.

710.5.2 Smoke and draft-control doors. Where required elsewhere in the code, doors in smoke partitions shall be tested in accordance with UL1784 with an artificial bottom seal installed across the full width of the bottom of the door assembly. The air leakage rate of the door assembly shall not exceed 3.0 cubic feet per minute per square foot of door opening at 0.10 inch (24.9 Pa) of water for both the ambient temperature test and the elevated temperature exposure test.

710.5.3 Self-closing or automatic-closing doors. Where required elsewhere in the code, doors in smoke partitions shall be self-closing or automatic-closing in accordance with Section 715.3.7.3.

715 OPENING PROTECTIVES

715.3 Fire door and shutter assemblies. Approved fire door and fire shutter assemblies shall be constructed of any material or assembly of component materials that conforms to the test requirements of Section 715.3.1, 715.3.2 or 715.3.3 and the fire protection rating indicated in Table 715.3. Fire door assemblies and shutters shall be installed in accordance with the provisions of this section and NFPA 80.

715.3.1 Side-hinged or pivoted swinging doors. Side-hinged and pivoted swinging doors shall be tested in accordance with NFPA 252 or UL 10C. After 5 minutes into the NFPA 252 test, the neutral pressure level in the furnace shall be established at 40 inches (1016mm) or less above the sill.

715.3.2 Other types of doors. Other types of doors, including swinging elevator doors, shall be tested in accordance with NFPA 252 or UL 10B. The pressure in the furnace shall be maintained as nearly equal to the atmospheric pressure as possible. Once established, the pressure shall be maintained during the entire test period.

715.3.3 Door assemblies in corridors and smoke barriers. Fire door assemblies required to have minimum fire protection rating of 20 minutes where located in corridor walls or smoke barrier walls having a fire-resistance rating in accordance with Table 715.3 shall be tested in accordance with NFPA 252 or UL 10C without the hose stream test. If a 20 minute fire door assembly contains glazing material, the glazing material in the door itself shall have a minimum fire protection rating of 20 minutes and be exempt from the hose stream test. Glazing material in any other part of the door assembly, including transom lites and sidelites, shall be tested in accordance with NFPA 257, including the hose stream test, in accordance with Section 715.4. Fire door assemblies shall also meet the requirements for a smoke and draft control door assembly tested in accordance with UL 1784 with an artificial bottom seal.

installed across the full width of the bottom of the door assembly. The air leakage rate of the door assembly shall not exceed 3.0 cfm per square foot of door opening at 0.10 inch (24.9 Pa) of water for both the ambient temperature and elevated temperature tests. Louvers shall be prohibited.

715.3.4 Doors in vertical exit enclosures and exit passageways. Fire door assemblies in vertical exit enclosures and exit passageways shall have a maximum transmitted temperature end point of not more than 450°F (232°C) above ambient at the end of 30 minutes of standard fire test exposure.

Exception: The maximum transmitted temperature end point is not required in buildings equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1 or 903.3.1.2.

715.3.5 Labeled protective assemblies. Fire door assemblies shall be labeled by an approved agency. The labels shall comply with NFPA 80, and shall be permanently affixed to the door or frame.

715.3.5.1 Fire door labeling requirements. Fire doors shall be labeled showing the name of the manufacturer, the name of the third-party inspection agency, the fire protection rating and, where required for fire doors in exit enclosures by Section 715.3.4, the maximum transmitted temperature end point. Smoke and draft control doors complying with UL 1784 shall be labeled as such. Labels shall be approved and permanently affixed. The label shall be applied at the factory or location where fabrication and assembly are performed.

715.3.5.3 Smoke and draft control door labeling requirements. Smoke and draft control doors complying with UL 1784 shall be labeled in accordance with Section 715.3.5.1 and shall show the letter “S” on the fire rating label of the door. This marking shall indicate that the door and frame assembly are in compliance when listed or labeled Gasketing is also installed.

715.3.5.4 Fire door frame labeling requirements. Fire door frames shall be labeled showing the names of the manufacturer and the third-party inspection agency.

715.3.6 Glazing material. Fire-protection-rated glazing conforming to the opening protection requirements in Section 715.3 shall be permitted in fire door assemblies.

715.3.6.1 Size limitations. Wired glass used in fire doors shall comply with Table 715.4.3. Other fire-protection-rated glazing shall comply with the size limitations of NFPA 80.

Exceptions:

1. Fire-protection-rated glazing in fire doors located in fire walls shall be prohibited except that where serving as a horizontal exit, a self-closing swinging door shall be permitted to have a vision panel of not more than 100 square inches (0.065 m²) without a dimension exceeding 10 inches (254 mm).
2. Fire-protection-rated glazing shall not be installed in fire doors having a 1½-hour fire protection rating intended for installation in fire barriers, unless the glazing is not more than 100 square inches (0.065 m²) in area.

715.3.6.3 Labeling. Fire-protection-rated glazing shall bear a label or other identification showing the name of the manufacturer, the test standard and the fire protection rating. Such label or other identification shall be issued by an approved agency and shall be permanently affixed.

715.3.6.4 Safety glazing. Fire-protection-rated glazing installed in fire doors or fire window assemblies in areas subject to human impact in hazardous locations shall comply with Chapter 24.

IBC 2006

Smoke Barrier – Smoke barriers shall form an effective membrane continuous from outside wall to outside wall and from the top of the foundation or floor/ceiling assembly below to the underside of the floor or roof sheathing, deck or slab above, including continuity through concealed spaces, such as those found above suspended ceilings, and interstitial structural and mechanical spaces. The supporting construction shall be protected to afford the required fire-resistance rating of the wall or floor supported in buildings of other than Type IIB, IIIB or VB construction.

Smoke Partition – Smoke partitions shall extend from the top of the foundation or floor below to the underside of the floor or roof sheathing, deck or slab above or to the underside of the ceiling above where the ceiling membrane is constructed to limit the transfer of smoke.

709 SMOKE BARRIERS

709.5 Openings. Openings in a smoke barrier shall be protected in accordance with Section 715.

Exception: In Group I-2 (generally Healthcare & etc.), where doors are installed across corridors, a pair of opposite-swinging doors without a center mullion shall be installed having vision panels with fire-protection-rated glazing materials in fire-protection-rated frames, the area of which shall not exceed that tested. The doors shall be close fitting within operational tolerances, and shall not have undercuts, louvers or grilles. The doors shall have head and jamb stops, astragals or rabbets at meeting edges and shall be automatic closing by smoke detection in accordance with Section 715.4.7.3. Positive-latching devices are not required.

710.5 Openings. Windows shall be sealed to resist the free passage of smoke or be automatic-closing upon detection of smoke. Doors in smoke partitions shall comply with this section.

710.5.1 Louvers. Doors in smoke partitions shall not include louvers.

710.5.2 Smoke and draft-control doors. Where required elsewhere in the code, doors in smoke partitions shall be tested in accordance with UL 1784 with an artificial bottom seal installed across the full width of the bottom of the door assembly during the test. The air leakage rate of the door assembly shall not exceed 3.0 cubic feet per minute per square foot of door opening at 0.10 inch (24.9 Pa) of water for both the ambient temperature test and the elevated temperature exposure test.

710.5.3 Self-closing or automatic-closing doors. Where required elsewhere in the code, doors in smoke partitions shall be self-closing or automatic-closing in accordance with Section 715.4.7.3.

715 OPENING PROTECTIVES

715.4 Fire door and shutter assemblies. Approved fire door and fire shutter assemblies shall be constructed of any material or assembly of component materials that conforms to the test requirements of Section 715.4.1, 715.4.2 or 715.4.3 and the fire protection rating indicated in Table 715.4. Fire door assemblies and shutters shall be installed in accordance with the provisions of this section and NFPA 80.

715.4.1 Side-hinged or pivoted swinging doors. Side-hinged and pivoted swinging doors shall be tested in accordance with NFPA 252 or UL 10C. After 5 minutes into the NFPA 252 test, the neutral pressure level in the furnace shall be established at 40 inches (1016mm) or less above the sill.

715.4.2 Other types of doors. Other types of doors, including swinging elevator doors, shall be tested in accordance with NFPA 252 or UL 10B. The pressure in the furnace shall be maintained as nearly equal to the atmospheric pressure as possible. Once established, the pressure shall be maintained during the entire test period.

715.4.3 Door assemblies in corridors and smoke barriers. Fire door assemblies required to have minimum fire protection rating of 20 minutes where located in corridor walls or smoke barrier walls having a fire-resistance rating in accordance with Table 715.4 shall be tested in accordance with NFPA 252 or UL 10C without the hose stream test.

Exceptions:

1. Viewports that require a hole not larger than 1 inch (25 mm) in diameter through the door, have at least a 0.25-inch-thick (6.4 mm) glass disc and the holder is of metal that will not melt out where subject to temperatures of 1,700°F (927°C).
2. Corridor door assemblies in occupancies of Group I-2 shall be in accordance with Section 407.3.1.
3. Unprotected openings shall be permitted for corridors in multi-theater complexes where each motion picture auditorium has at least one-half of its required exit or exit access doorways opening directly to the exterior or into an exit passageway.

715.4.3.1 Smoke and draft control. Fire door assemblies shall also meet the requirements for a smoke and draft control door assembly tested in accordance with UL 1784. Louvers shall be prohibited. Installation of smoke doors shall be in accordance with NFPA 105.

715.4.3.2 Glazing in door assemblies. In a 20-minute fire door assembly, the glazing material in the door itself shall have a minimum fire-protection rating of 20 minutes and shall be exempt from the hose stream test. Glazing material in any other part of the door assembly, including transom lites and sidelites, shall be tested in accordance with NFPA 257, including the hose stream test, in accordance with Section 715.5.

715.4.4 Doors in exit enclosures and exit passageways. Fire door assemblies in exit enclosures and exit passageways shall have a maximum transmitted temperature end point of not more than 450°F (250°C) above ambient at the end of 30 minutes of standard fire test exposure.

Exception: The maximum transmitted temperature rise is not limited in buildings equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1 or 903.3.1.2.

715.4.4.1 Glazing in doors. Fire-protection-rated glazing in excess of 100 square inches (0.065 m²) shall be permitted in fire door assemblies when tested in accordance with NFPA 252 as components of the door assemblies and not as glass lights, and shall have a maximum transmitted temperature rise of 450°F (250°C) in accordance with Section 715.4.4.

Exception: The maximum transmitted temperature end point is not required in buildings equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1 or 903.3.1.2.

715.4.5 Labeled protective assemblies. Fire door assemblies shall be labeled by an approved agency. The labels shall comply with NFPA 80, and shall be permanently affixed to the door or frame.

715.4.5.1 Fire door labeling requirements. Fire doors shall be labeled showing the name of the manufacturer, the name of the third-party inspection agency, the fire protection rating and, where required for fire doors in exit enclosures and exit passageways by Section 715.4.4, the maximum transmitted temperature end point. Smoke and draft control doors complying with UL 1784 shall be labeled as such. Labels shall be approved and permanently affixed. The label shall be applied at the factory or location where fabrication and assembly are performed.

715.4.5.3 Smoke and draft control door labeling requirements. Smoke and draft control doors complying with UL 1784 shall be labeled in accordance with Section 715.4.5.1 and shall show the letter "S" on the fire rating label of the door. This marking shall indicate that the door and frame assembly are in compliance when listed or labeled Gasketing is also installed.

715.4.5.4 Fire door frame labeling requirements. Fire door frames shall be labeled showing the names of the manufacturer and the third-party inspection agency.

715.4.6 Glazing material. Fire-protection-rated glazing conforming to the opening protection requirements in Section 715.4 shall be permitted in fire door assemblies.

715.4.6.1 Size limitations. Wired glass used in fire doors shall comply with Table 715.5.3. Other fire-protection-rated glazing shall comply with the size limitations of NFPA 80.

Exceptions:

1. Fire-protection-rated glazing in fire doors located in fire walls shall be prohibited except that where serving as a horizontal exit, a self-closing swinging door shall be permitted to have a vision panel of not more than 100 square inches (0.065 m²) without a dimension exceeding 10 inches (254 mm).
2. Fire-protection-rated glazing shall not be installed in fire doors having a 1½-hour fire protection rating intended for installation in fire barriers, unless the glazing is not more than 100 square inches (0.065 m²) in area.

715.4.6.3 Labeling. Fire-protection-rated glazing shall bear a label or other identification showing the name of the manufacturer, the test standard and information required in Section 715.5.8.1 that shall be issued by an approved agency and shall be permanently affixed to the glazing.

715.4.6.3.1 Identification. For fire-protection-rated glazing, the label shall bear the following four-part identification: "D-H or NH-T or NT-XXX." "D" indicates that the glazing shall be used in fire door assemblies and that the glazing meets the fire resistance requirements of the test standard. "H" shall indicate that the glazing meets the hose stream requirements of the test standard. "NH" shall indicate that the glazing does not meet the hose stream requirements of the test. "T" shall indicate that the glazing meets the temperature requirements of Section 715.4.4.1. "NT" shall indicate that the glazing does not meet the temperature requirements of Section 715.4.4.1. The placeholder "XXX" shall specify the fire-protection-rating period, in minutes.

715.4.6.4 Safety glazing. Fire-protection-rated glazing installed in fire doors or fire window assemblies in areas subject to human impact in hazardous locations shall comply with Chapter 24.

NFPA 105

3.3 General Definitions

3.3.3 Smoke Door. The door component of a smoke door assembly

3.3.4 Smoke Door Assembly. Any combination of a door, frame, hardware, and any other accessories that together restrict smoke movement through door openings by limiting the amount of air that can pass through the assembly.

4.1 Testing and Installation

4.1.1 Fire door assemblies that are intended for use as smoke door assemblies shall also comply with NFPA 80.

4.2.2 For the air leakage test, fire door assemblies shall be installed in accordance with NFPA 80.

4.2.4 Specimens of door assemblies shall be tested as they are intended to be installed.

4.3 Air Leakage Test.

4.3.1 Smoke door assemblies shall have an air leakage rating not greater than 3 ft³/min/ft² (0.9 m³/min/m²) of door opening when tested in accordance with UL 1784.

4.3.2 Smoke door assemblies intended to be installed where pressurization is provided to control smoke movement shall not have an artificial bottom seal installed during the test.

4.4 Labeling. Smoke door assemblies shall bear an "S" label indicating a maximum air leakage rate of 3 ft³/min/ft² (0.9 m³/min/m²) and the tested pressure differential of 0.1, 0.2, or 0.3 in. of water (25, 50, Or 75 Pa).

4.5 Installation.

4.5.1 Smoke doors shall be self-closing or automatic closing in accordance with NFPA 80.

4.5.6 The opening between the bottom edge of the smoke door and the sill when the door is in the closed position shall not be required to be provided with a means to seal the opening.

4.5.6.1 Smoke door assemblies installed where pressurization is provided to restrict smoke movement shall be required to have a bottom seal.

5 Maintenance

5.1.1 Removal of Smoke Doors. Where a door or opening is no longer in use, the opening shall be filled with construction equivalent to that of the wall.

5.1.2 Operability. Doors shall be operable at all times.

5.1.2.1 The doors shall be kept closed or arranged for automatic closing.

5.1.2.2 Where required, the doors shall be latched.

5.2 Specific Requirements

5.2.1 Inspections.

5.2.1.1 Smoke door assemblies shall be inspected annually.

5.2.1.2 Door shall be operated to confirm full closure.

5.2.1.3 Hardware and gaskets shall be inspected annually, and any parts found to be damaged or inoperative shall be replaced.

5.2.1.5 A written record shall be maintained and shall be made available to the authority having jurisdiction.

5.2.1.6 Records shall be maintained for not less than 3 years.

Reference Publications

- NFPA 80** Standard for Fire Doors and Fire Windows
(2007 edition is Standard for Fire Doors and Other Opening Protectives)
- NFPA 92A** Recommended Practice for Smoke-Control Systems
- NFPA 92B** Guide for Smoke Management Systems in Malls, Atria, and Large Areas
- NFPA 101** Code for Safety to Life from Fire in Buildings and Structures
(2006 edition is Life Safety Code)
- NFPA 105** Recommended Practice for the Installation of Smoke-Control Door Assemblies
(2007 edition is Standard for the Installation of Smoke Door Assemblies and Other Opening Protectives)
Chapter 5 Section 5.2.1 requires annual inspections and written records
- NFPA 252** Standard Methods of Fire Tests of Door Assemblies
- NFPA 257** Standard on Fire Tests for Window and Glass Block Assemblies
- UL10B** Standard for Fire Tests of Door Assemblies
- UL10C** Standard for Positive Pressure Fire Tests of Door Assemblies
- UL1784** Standard for Air Leakage Tests of Door Assemblies

Publications Referenced

- IBC 2003** References [NFPA 80-99](#), NFPA 101-00, NFPA 252-99, NFPA 257-00, UL10B-97, UL10C-01, [UL1784-95](#)
- IBC 2006** References [NFPA 80-99](#), NFPA 101-03, [NFPA 105-03](#), NFPA 252-03, NFPA 257-00, UL10B-01, UL10C-01, [UL1784-95](#)

- NFPA 80** References [NFPA 101-97](#), [NFPA 105-99](#), [NFPA 252-95](#), [NFPA 257-96](#), [UL10B-93](#)
- NFPA 101-00** Mandatory References NFPA 80-99, NFPA 252-99, NFPA 257-00
- NFPA 101-03** References NFPA 80-99, NFPA 252-99, NFPA 257-00, UL1784-01
- NFPA 101-06** References NFPA 80-99, NFPA 105-03, NFPA 252-03, NFPA 257-00, UL10B-97, UL10C-98, UL1784-01
- NFPA 105-07** References NFPA 72-07, NFPA 80-07, NFPA 92A-06, NFPA 92B-05, UL 1784-01
- NFPA 252-99** References NFPA 80-99
- UL 1784-95** References NFPA 80, NFPA 105 (latest edition)