

Basic Fire Door, Fire Door Frame, Transom/Sidelight Frame, and Window Frame Requirements

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1 Introduction

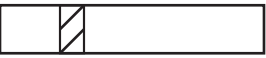
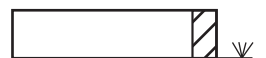
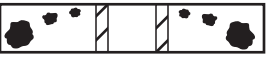
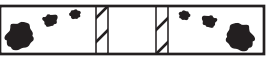
Fire testing of doors, door frames, transom/sidelight frames, window frames, glazing, and hardware and the resulting labeling programs granted by third-party testing agencies are complex subjects better understood when basic rules and guidelines are applied. The following information is based upon the requirements of the International Building Code.

Note: Values stated without parentheses are the requirement. Values in parentheses are explanatory or approximate information.

2 Doors

The fire-protection classification of the wall into which the door is installed dictates the required fire-protection rating of the door. The location of the wall in the building and prevailing building codes establish the fire-protection rating requirements for the wall. Fire door assemblies are often required to also act as smoke and draft control barriers by the building code in addition to the specified fire-protection rating. For openings in a smoke partition, no fire-protection rating is required for the door assembly but the door cannot exceed the code's maximum air

Table 1 – Fire door openings

Opening	Wall Rating	Door and Frame Rating	Description and Use
	4 Hour	3 Hour (180 minutes)	These openings are in walls that separate buildings or divide a single building into designated fire areas.
	2 Hour	1-½ Hour (90 minute)	Openings of this type are used in enclosures of vertical communication or egress through buildings. Examples of these types of openings include stairwells and elevator shafts.
	1 Hour	1 Hour (60 minute)	These door and frame assemblies divide occupancies in a building.
	1 Hour	¾ Hour (45 minute)	For use where there are openings in corridors or room partitions.
	2 Hour	1-½ Hour (90 minute)	This opening is in a wall where there is the potential for severe fire exposure from the exterior of the building.
	1 Hour	¾ Hour (45 minute)	This opening is in an exterior wall that has the potential to be exposed to moderate to light fire from the exterior of the building.
	½ Hour	⅓ Hour (20 minute)	These openings are in corridors where smoke and draft control is required.
	No Fire-protection rating	Smoke and draft control	These openings are in partitions required for smoke control in a building. No fire resistance rating is needed for the door assembly. The air leakage rate for the assembly cannot exceed 3.0 CFM/ft² at 0.10 inch (0.9 m³/min./m² at 25 Pa).

leakage rate. The associated door fire-protection ratings are shown in Table 1.

2.1 Hourly ratings

Steel fire doors are “rated” by the duration of time (in minutes or hours) that a door has successfully withstood exposure to fire test conditions. Hourly ratings include 1-½-hour (90 minute), 1-hour (60 minute), ¾-hour (45 minute), and ⅓-hour (20 minute), with the maximum rating required of any swinging type fire door being 3-hour (180 minute). All doors have been subjected to a hose stream test, unless otherwise noted on the label.

2.2 Three-hour (180-minute) doors

A door with a three-hour fire-protection rating is usually required in walls that separate buildings or that divide a large building into smaller fire areas. The wall rating is four hours.

2.3 1-½-hour (90-minute) doors

Doors rated for 1-½ hours are required in 2-hour rated walls. These doors are commonly located in stairwells, or other enclosures of vertical passage through a building. They also occur in boiler rooms and in exterior walls that have the potential for severe fire exposure from the outside of the building.

2.4 One-hour (60 minute) doors

One-hour rated doors are used in occupancy separation walls, which are also one-hour rated.

2.5 ¾-hour (45 minute) doors

Doors with ¾-hour fire-protection ratings are used in one-hour walls. A ¾-hour rated door is required in walls of corridors and room partitions. A door with this rating may also be located in the exterior wall of a building subject to moderate fire exposure from the outside of the building.

2.6 ⅓-hour (20 minute) doors

One-third-hour or 20 minute doors are used in one-hour walls. These doors are used for corridor applications and in other applications where smoke and draft control is a primary concern.

2.7 Doors tested without hose stream

Doors may be rated as 20 minutes without a hose stream. These doors have successfully passed a 20-minute fire test, with the omission of the hose stream test, and bear a label

that specifically states “Twenty-Minute-Rating Tested Without Hose Stream.” These doors may be provided with vision lights only limited in size by the door manufacturer’s fire labeling procedure.

Assemblies identified as “Twenty-Minute-Rating Tested Without Hose Stream” should not be confused with ⅓-hour fire-rated doors, which have been tested in accordance with the standard fire test procedure that includes the hose stream test.

2.8 Smoke and Draft Control Door

Doors marked as smoke and draft control door assemblies will be used in smoke partitions with no fire resistance rating. These doors are used to control the passage of smoke from room to room where the partition must only provide smoke and draft control. The door and frame assembly with all hardware and gasketing are required to have a maximum leakage rate not to exceed 3.0 CFM/ft² at 0.10 in. (0.9 m³/min./m² at 25 Pa) of water. These assemblies will be indicated by a leakage-rated door assembly label. These assemblies must be tested in accordance with UL 1784 and installed in accordance with NFPA 105. For double egress doors used as cross corridor smoke barriers, please refer to Section 15.

2.9 Summary

Doors are typically rated for three-fourths of the rating of the surrounding wall: A 3-hour door is used in a 4-hour rated wall; a 1-½-hour fire door is used in a 2-hour rated wall; and a ¾-hour door is used in a one-hour rated wall. The exceptions are the 1-hour and the ⅓-hour rated doors which are typically used with one-hour rated walls. However, a door with a higher fire-protection rating than the opening requires may also be specified. For example, a door rated for 3 hours may be used in a 1-½-hour opening. All requirements for the 3-hour rating, such as maximum glazing materials size, door size, and other restrictions for the higher rated door must be met.

3 Glazing Materials

A wide variety of glazing materials and glazing compounds are available for use in fire doors and frames. Wired glass that is ¼” (6.35 mm) thick was once the most common type of glazing in fire-rated assemblies but is