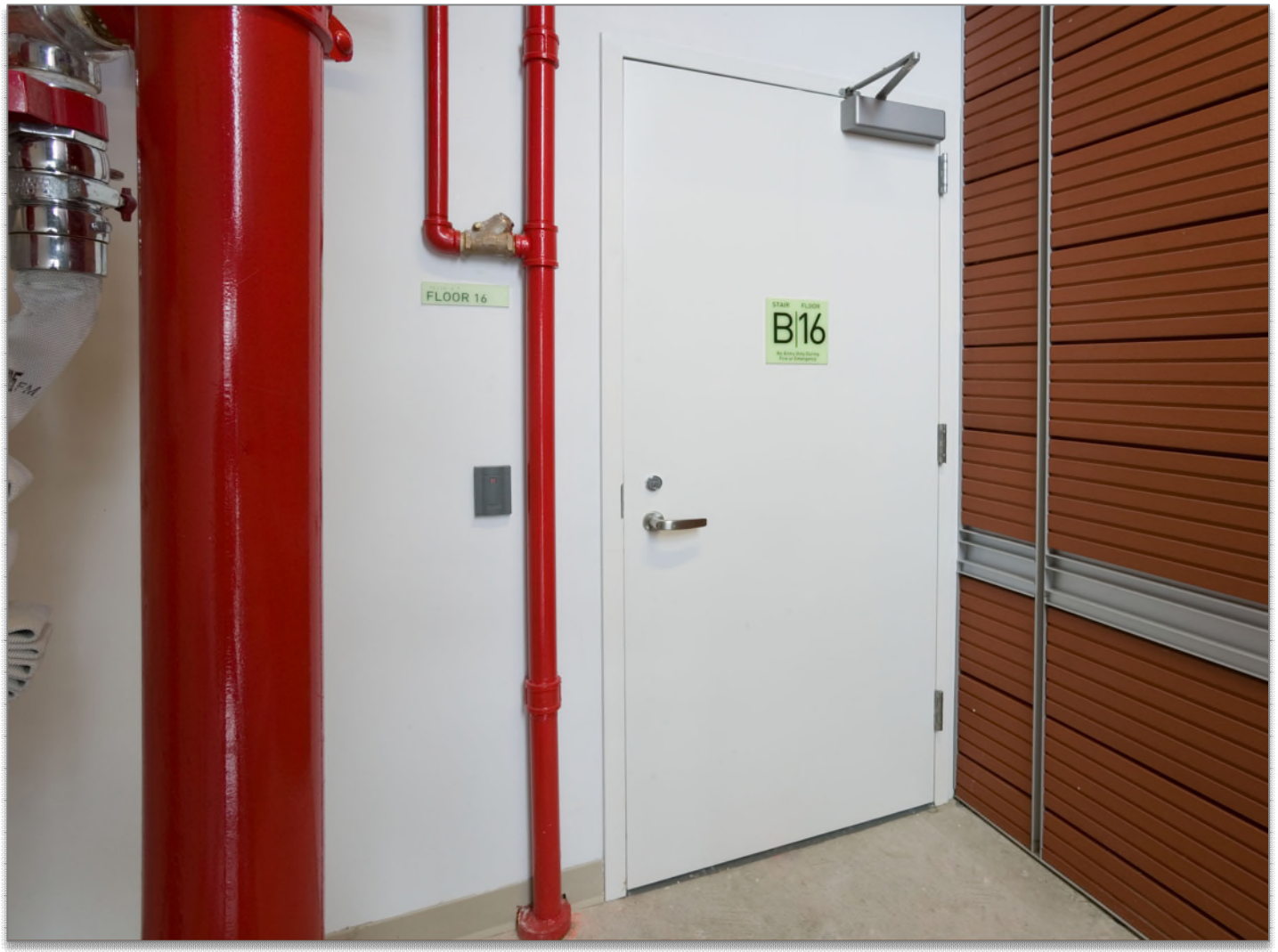
Fire-Rated Steel Doors & Frames Overview



Fire-Rated Steel Doors & Frames

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Overview

- Fire-rated doors and frames play a vital role in keeping people safe and minimizing property damage during a fire
- Many components of a door assembly can be rated to withstand fire for a specified period of time including:
  - ✓ Doors
  - ✓ Door frames
  - ✓ Window frames
  - ✓ Hardware
  - ✓ Transoms
  - ✓ Sidelights
  - ✓ Glazing

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Nomenclature

Rated

- Product that has been approved to withstand fire for a specified period of time

Listed or **Approved**

- Having been fire tested and approved through proper listing agencies

Labeled

- Product that is physically bearing a fire-rating label from an approved agency

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Requirements

- Fire ratings are granted by third-party testing agencies and are labeled on the products
- The doors must meet the requirements of the International Building and International Fire Codes, as well as NFPA 80
- Building codes dictate the fire-rating requirements for the wall based on the location of the wall, building use, and more
- The fire-rating of the wall dictates the required fire rating of the door
- Fire doors are required to be self closing and positive latching

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Ratings

Fire door assemblies have 5 ratings:

1. 20 minute
2. 45 minute
3. 1 hour
4. 1-1/2 hour
5. 3 hour

The rating of a fire door assembly is based on the lowest rated component

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Frames

- There are not hourly ratings for basic fire door frames unless the label specifically states the frame is rated less than 3 hours
- Some state and local building codes require hourly ratings up to and including 3 hours for a door frame
- If a frame bears a recognized label qualifying it as a fire door frame, it may support doors rated 3 hours or less

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Frames

- Frames used in masonry walls may be used with a maximum 3-hour fire door, while frames used in drywall stud walls are intended to be used with a maximum 1-1/2-hour fire door
- Consult with individual fire door frame manufacturers listings for fire door frames that can be used in drywall stud walls with a maximum 3-hour rating
- Grout is not required for fire rated frames installed in either drywall or masonry walls at any hourly rating

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Frames – Sidelights & Transoms

- Sidelights are treated differently than transom frames
- Sidelights are available only up to 1 1/2 hours
- Transom frames can carry up to a 3-hour label, just like 3-sided frames

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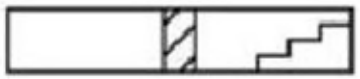
SDI 118

Table 1 in SDI 118 shows the proper door ratings for various types of walls

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.

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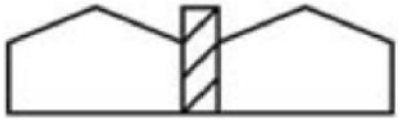
How to Use SDI 118

Situation: A door is installed in a 4-hour fire wall and used as a separation between two adjoining buildings, and you need to verify what fire door rating is required

Solution: Table 1 of SDI 118 shows the door and frame must bear a 3-hour fire label

Opening Wall Rating	Door and Frame	Rating
	4 Hour	3 Hour (180 Minutes)

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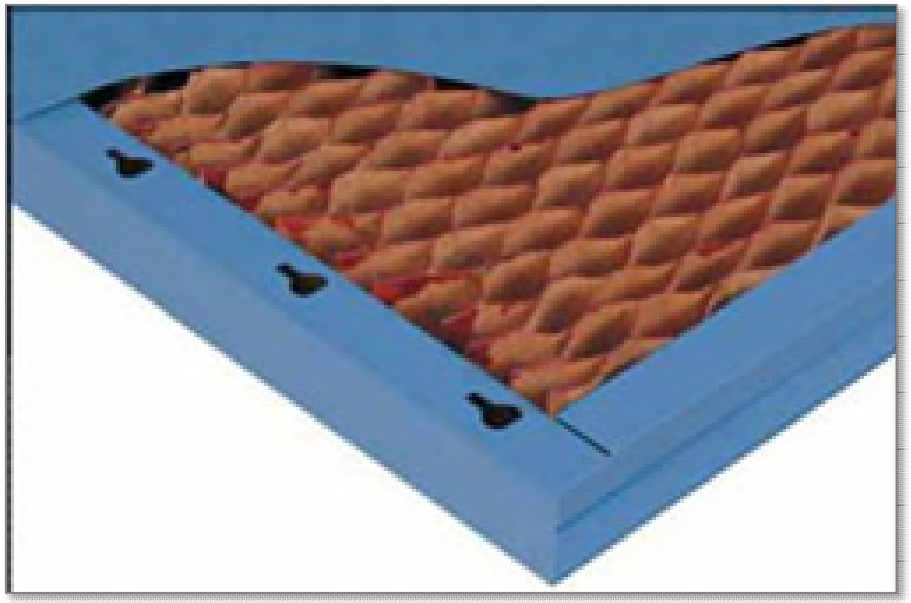
Types of Fire-Rated Doors

SDI manufacturers offer stock and custom fire-rated doors which are available with a variety of cores, such as:

- Honeycomb
- Polystyrene
- Steel stiffened
- Temperature rise



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Temperature Rise Doors

- Temperature rise doors minimize the transfer of heat to the cooler side of the door
- These doors are commonly found in stairwells of high-rise buildings because they allow people to safely pass below the floors with fire
- Temperature rise doors prevent the unexposed side of the door from reaching:
  - ✓ 250°F (least heat transfer)
  - ✓ 450°F
  - ✓ 650°F

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Louvers

- The maximum rating for louvers is 90 minutes
- Regardless of the rating, louvers are generally not allowed in corridor openings
- Only approved louvers can be used in fire-rated doors
- Louvers must:
  - ✓ be a maximum of 24” x 24”
  - ✓ have a fusible link
  - ✓ only be on the lower portion of the door

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Hardware

- The door assembly's hardware must also carry the appropriate fire label
- Hardware has the same fire rating durations as doors and frames
- Types of fire rated hardware include:
  - ✓ Hinges
  - ✓ Pivots
  - ✓ Locks
  - ✓ Closers

- Gasketing materials must be listed to show that their installation does not adversely affect the fire-resistance performance of the assembly

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Hardware

- Limitations on Use of Hardware:
  - ✓ Size of Armor Plates
  - ✓ Door Viewers
  - ✓ Door Vision Lites
- A properly sized closing device is the last of the “basic” fire door hardware requirements
- A fire door must be in a closed and latched position to serve as a protective barrier in the event of a fire, and for this reason, either listed spring hinges or a listed door closer are required to ensure that the door will close properly
- Conditions of Test Acceptance
  - ✓ Assembled hardware must keep the door closed during and after the fire

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Hardware

- Proper hardware selections can be verified by consulting the “Fire Resistance Directory” published by Underwriters Laboratories Inc. and “Listed Product Directories” published by Intertek Testing (Warnock Hersey)
- Links are located in section 3 of **SDI 118**
- The directories identify hardware and other products that may be used in fire-rated assemblies

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Fire Tests

- Fire tests must be performed by an independent, internationally recognized laboratory
- There are 2 two portions of the test
- The first is the fire test where an operable door assembly is installed in front of a furnace and exposed to fire for a specified time
- As the test progresses, the temperature is steadily increased to simulate the conditions of a real fire and the temperature and pressure of the door are monitored

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Fire Tests

- The second fire test is called the hose stream test
- Once the fire test is complete, the door is sprayed with cold water
- The opening must stay secure to pass inspection

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Specialty Doors

Most specialty doors come with a fire-rated option. A few of them include:

Acoustic

Blast & Bullet Resistant

Windstorm Resistant

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Resources

- Hollow metal doors are excellent at limiting the danger and damage of fires - they are the only material widely available with a 3-hour rating
- For more detailed information on fire-rated doors and frames, reference **SDI 118** (Basic Fire Door, Fire Door Frame, Transom/Sidelight Frame, and Window Frame Requirements)
- **SDI member manufacturers** are also an excellent resource for questions regarding fire-rated products

SDI Member Companies

SDI CERTIFIED