Steel Door Institute

Fire Rated Doors and Frames
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Fire Rated Doors and Frames

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. A few of the components include:

- Doors
- Door frames
- Window frames
- Hardware
- Transoms
- Sidelights
- Glazing
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
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. This is 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.
Fire Ratings

Fire door assemblies have 5 ratings:

- 20 minute
- 45 minute
- 1 hour
- 1-1/2 hour
- 3 hour

The rating of a fire door assembly is based on the lowest rated component.
Fire Door 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.
Fire Door 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.
Sidelights and Transoms Frames

- Sidelights are treated differently than transom frames.
- Sidelights are available only up to 1 ½ hours.
- Transom frames can carry up to a 3 hour label, just like 3-sided frames.
Fire Rated Walls and Doors

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

<table>
<thead>
<tr>
<th>Opening</th>
<th>Wall Rating</th>
<th>Door and Frame Rating</th>
<th>Description and Use</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>4 Hour</td>
<td>3 Hour (180 minutes)</td>
<td>These openings are in walls that separate buildings or divide a single building into designated fire areas.</td>
</tr>
<tr>
<td></td>
<td>2 Hour</td>
<td>1-½ Hour (90 minute)</td>
<td>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.</td>
</tr>
<tr>
<td></td>
<td>1 Hour</td>
<td>1 Hour (60 minute)</td>
<td>These door and frame assemblies divide occupancies in a building.</td>
</tr>
<tr>
<td></td>
<td>1 Hour</td>
<td>¾ Hour (45 minute)</td>
<td>For use where there are openings in corridors or room partitions.</td>
</tr>
<tr>
<td></td>
<td>2 Hour</td>
<td>1-½ Hour (90 minute)</td>
<td>This opening is in a wall where there is the potential for severe fire exposure from the exterior of the building.</td>
</tr>
</tbody>
</table>
How to Use SDI 118

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**Situation:** A door is installed in a 4 hour fire wall and used as a separation between two adjoining buildings. 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.
Types of Fire Rated Doors

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

- Honeycomb
- Polystyrene
- Steel stiffened
- Temperature rise
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° (least heat transfer)
  - 450°
  - 650°
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
Fire Rated Hardware

The door assembly’s hardware must also carry the appropriate fire label.
Fire Rated Hardware

- 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.
Fire Rated 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. 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
Fire Rated 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.
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. 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. The temperature and pressure of the door are monitored.
Fire Tests

The second is the **hose stream test**. Once the fire test is complete, the door is sprayed with cold water. The opening must stay secure.
Fire Rated Specialty Products

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

• Acoustic
Fire Rated Specialty Products

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

- Acoustic
- **Blast and Pressure Resistant**
Fire Rated Specialty Products

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

- Acoustic
- Blast and Pressure Resistant
- **Bullet Resistant**
Fire Rated Specialty Products

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

- Acoustic
- Blast and Pressure Resistant
- Bullet Resistant
- **Windstorm Resistant**
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