



[FDAI](#)
[INSPECTION CRITERIA](#)
[FAQS](#)
[INSPECTORS](#)
[NFPA 80](#)
[SPECS](#)
[NEWS](#)
[ABOUT](#)

## INSPECTION CRITERIA

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- (1) No holes or breaks in door or frame.
- (2) Glazing and glass kit/glass beads are intact and securely fastened.
- (3) Door, frame, and hardware are in proper working order.
- (4) No missing or broken parts.
- (5) Door clearances are within allowable limits.
- (6) Door closer/spring hinges are operational and door is self-closing.
- (7) Coordinator ensures that door leaves close in proper sequence (pairs only).
- (8) Door is self-latching in the closed position.
- (9) Opening is not equipped with auxiliary hardware items which interfere with operation.
- (10) No field modifications have been performed that void the label.
- (11) Gasketing and edge seals, where required, are present, continuous, and of the proper type for a fire door.

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## (1) No holes or breaks in door or frame.

Holes in fire doors and frames are often left by the removal of hardware, or because a replacement component requires a different screw-hole pattern from the original. These holes must be repaired by installing steel fasteners which completely fill the holes, or by filling the holes with the same material as the door or frame.

Common repair techniques include filling the holes with steel screws and thru-bolts, or welding a steel plate over the holes. Body filler (Bondo) is not an acceptable means of filling holes in a fire door assembly unless it has been tested and approved for this purpose. At this time I'm not aware of a filler-type product which has been tested for use in repairing fire doors or frames.

**Source: NFPA 80 2007, 2010 – 5.2.15.4**



## (2) Glazing and glass kit/glass beads are intact and securely fastened.

Glazing used in fire door assemblies must meet the door or frame manufacturer's requirements for fire resistance, and may also need to be impact-resistant depending on the building code in use. Glazing must be installed in labeled glass light kits or glass beads that are acceptable per the manufacturer's listings, and must be installed in accordance with the manufacturer's installation instructions.

Doors which are labeled for 3 hours are typically limited to 100 square inches of glazing. Other fire doors may have the maximum glazing allowed by the manufacturer's listings.

Each glazing unit must have a label that is visible after installation, which includes the location where the glass is used (Door, Opening, or Wall), whether the glass has met the hose stream test (H-required for 45 minute label or greater or NH-allowed for 20-minute label only), whether the glass meets the temperature rise criteria (T or NT), and the fire protection rating period (20, 45, 60, 90, or 180 minutes). The label may include additional information about the product and manufacturer. Viewers (peepholes) used in fire doors must also be labeled.

**Source: NFPA 80 2007, 2010 – 4.4**



### (3) Door, frame, and hardware are in proper working order.

The assembly components must be securely fastened, operational, and the door must swing freely. If a noncombustible threshold is required, it must be installed securely. Although labels aren't specifically mentioned, this is one item that code officials seem to consistently look for so I will cover them here.

Most components of a fire door assembly are required to be listed or labeled. The physical label or the inclusion of the product in a published list indicates that the product has been manufactured in compliance with the appropriate standards for use in a fire door assembly.

Labels may be made of metal, paper, or plastics, or may be stamped or diecast into the item. If labels are missing or illegible, the code official may require evaluation and re-labeling by an authorized agent. Fire door and frame labels will include information about the manufacturer, the fire rating, a unique number that can be used to learn more about the opening, and perhaps additional information such as the latch throw, or a reference to fire exit hardware.

Generic items such as hinges, which do not require individual labels, must meet the requirements of NFPA 80. For example, NFPA 80 specifies the quantity of hinges (2 hinges for doors up to 60 inches high + 1 hinge for each additional 30" of door height), and the quantity of spring hinges (at least 2) where applicable. It also states that hinges must be ball bearing type or may employ other antifriction bearing surfaces in accordance with ANSI/BHMA A156.1 – Standard for Butts and Hinges. NFPA 80 Table 6.4.3.1 mandates the minimum hinge size and thickness, and the maximum door size for various types of hinges.

**Source: NFPA 80 2007, 2010 – 4.2 (labels) and 6.4.3.1 (hinges)**



### (4) No missing or broken parts.

As fire door assemblies become damaged due to age or abuse, they are often repaired with inappropriate methods or neglected. Products which are not intended for use on fire rated doors are sometimes used to replace the original listed/labeled components. In some cases, fire door hardware is purposely disabled because it is inconvenient when the door operates as designed.

NFPA 80 states that if any components of a fire door assembly become damaged to the extent that the emergency function could be impaired, the opening must be repaired with parts from the original manufacturer or replaced. The opening must then be tested. If any components are omitted (disabled or removed), the assembly rating is void. The repair of any deficiencies must be completed "without delay."

**Source:**

**NFPA 80 2007 – 5.2.15 (repair), 5.2.9 (without delay), A3.3.52 (rating void)**

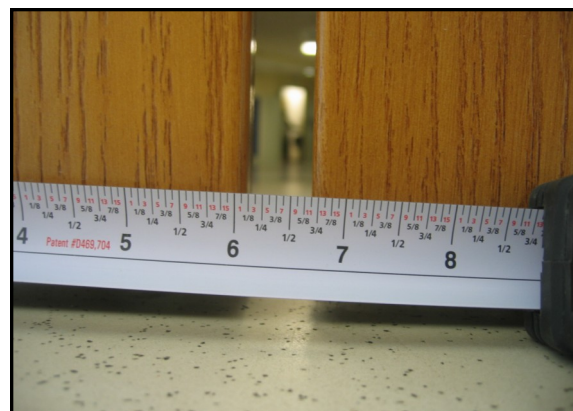
**NFPA 80 2010 – 5.2.15 (repair), 5.2.9 (without delay), A3.3.49 (rating void)**



### (5) Door clearances are within allowable limits.

The maximum clearance between the bottom of a fire door and the top of the finished floor or threshold is 3/4". When the bottom of the door is more than 38" above the finished floor (ex: a counter shutter or a dutch door), the maximum clearance at the bottom is 3/8" or as specified by the manufacturer's label service procedure.

Clearances at the perimeter and between the meeting stiles of pairs are measured on the pull side face of the door. For wood doors, the clearance must not exceed 1/8". For hollow metal doors, the clearance must be between 1/16" and 3/16". This is very difficult to accomplish unless the frames are installed perfectly.



One solution for improper clearances at the jambs or meeting stiles is shimming the hinges with steel shims. Another option for reducing an oversized gap at the meeting stiles is a listed edge guard specifically approved for this purpose. I'm not aware of a listed/labeled solution for extending the length of a door. If the door undercut is greater than 3/4", a threshold may be added to reduce the gap, but keep in mind that the maximum threshold height for accessible doors is 1/2".

**Source: NFPA 80 2007, 2010 – 4.8.4 and 6.3.1.7**

## **(6) Door closer/spring hinges are operational and door is self-closing.**

Of all the potential issues with a fire door, problems with the closing device seem to be the most common. Although there are many code-compliant ways to hold open a fire door using electrified products, fire doors are often improperly held open with wood wedges or more creative means. When a fire door is held open improperly, it can't perform its intended function during a fire by closing and compartmentalizing the building.

In NFPA 80, door operation is divided into 3 categories:

- 1) Self-Closing Doors – Doors equipped with a closing device to cause the door to close and latch each time it is opened.
- 2) Automatic-Closing Doors – Doors equipped with a labeled fail-safe hold-open mechanism which holds the door open or allows the door to swing freely but will close and latch the door upon actuation of the fire alarm system.
- 3) Power-Operated Fire Doors – Doors equipped with automatic operators. The automatic operator must be disconnected upon fire alarm, allowing the door to close and latch.

The spring size of a closer indicates the amount of closing force exerted by the spring inside of the closer. Most of today's closers have adjustable spring power. NFPA 80 recommends a size 3 closer for a 3' wide interior door. Note that fire doors are not required to meet the opening force requirements of the accessibility standards.

I have to take a moment here to mention spring hinges. Although NFPA 80 does allow spring hinges to be used as a closing device on a fire door, Annex A states that spring hinges should be adjusted to achieve positive latching from an open position of 30 degrees. In 20+ years in the hardware industry, I don't think I've seen a door with spring hinges that would reliably close and latch from 30 degrees. Spring hinges do not control a door the way a door closer does, they simply try to get enough momentum to overcome the friction of the latch. Given the smoke seal that is installed on many fire doors today, and the increased use of pressurization for smoke control, doors with spring hinges have become even less reliable. The low cost of spring hinges and the benefit of not having a visible door closer are offset by the difficulty in getting the door closed and keeping the spring hinges properly adjusted, not to mention the negative impact on life safety and security.

**Source: NFPA 80 2007, 2010 – 6.1.4 (closers), A6.4.1.4 (closing force and spring hinges)**



## **(7) Coordinator ensures that door leaves close in proper sequence (pairs only).**

Most fire-rated pairs of doors are equipped with either fire exit hardware (panic devices) or a lockset on the active leaf and automatic flush bolts on the inactive leaf. The exception to this would be doors leading to unoccupied spaces such as electrical, mechanical, or boiler rooms.

Automatic flush bolts are projected when the active door closes and engages the triggers, and when the active door opens the auto flush bolts retract. This means that in order for the doors to close and latch, the inactive leaf with the automatic flush bolts has to close before the active leaf. The same situation occurs when a pair of fire doors is equipped with an overlapping astragal – the proper leaf has to close first.

The function of a coordinator is to ensure that the leaves of a pair close in the proper sequence. Two common types of coordinators are gravity coordinators which are mounted on the frame face (top right), and bar-type coordinators which are mounted on the underside of the frame head (bottom right). If both leaves of the pair are opened and the active leaf begins to close first, the coordinator holds the active leaf open a few degrees to allow the inactive leaf to close first. When the inactive leaf is in the closed position, it engages the release mechanism on the coordinator which then allows the active leaf to close.

Sound complicated? It is! Coordinators and automatic flush bolts can be a problematic application, so fire exit hardware is definitely preferred where possible. If fire exit hardware can't be used, holding the doors open with approved hold-open devices that release upon fire alarm can help by reducing the frequency of use.

**Source: NFPA 80 2007, 2010 – 6.4.1.2**



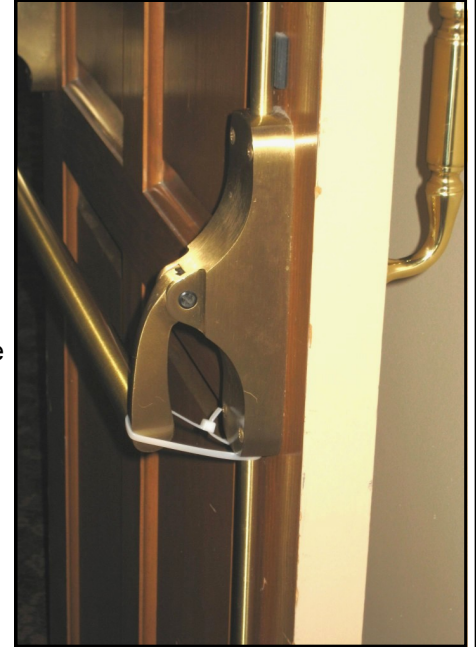
**(8) Door is self-latching in the closed position.**

When a fire door is closed, it must also be latched to prevent the door from being forced open by the pressure from a fire. Because some building occupants are inconvenienced by a door that is constantly closing, latching, and sometimes locking, people sometimes employ creative ways of holding the latch retracted in order to keep the door unlocked.

The only code-compliant way to hold the latch retracted on a fire door is with a fail-safe device that becomes positively latched upon fire alarm. This is typically electric latch retraction fire exit hardware (panic hardware). A fail secure electric strike could be used in a similar manner, allowing the latchbolt to be pulled through the keeper under normal operation, but securing the latchbolt upon fire alarm.

Some other lock-related requirements of NFPA 80 include:

- Locksets/latchsets and fire exit hardware must be labeled.
- When fire exit hardware is used, it must be labeled for both fire and panic, and it can only be installed on a door with a label stating that the door is equipped with fire exit hardware.
- Deadbolts may be used in addition to an active latch bolt on doors other than those used in the means of egress or where acceptable to the code official (take note of accessibility or egress codes which may require one motion to unlatch the door).
- Doors within a means of egress may be equipped with interconnected locks which release the deadbolt and latchbolt when the lever is turned.
- Where permitted by the code official, pairs of doors without an astragal may have fire exit hardware and an open back strike.
- When the inactive leaf is not required for egress width, automatic flush bolts may be used (with a coordinator).
- Manual flush bolts may be used on pairs of doors to rooms not normally occupied by humans if acceptable to the code official.
- Minimum latch throw is determined by the door manufacturer's listings.



**Source: NFPA 80 2007, 2010 – 6.4.4**

**(9) Opening is not equipped with auxiliary hardware items which interfere with operation.**



**(10) No field modifications have been performed that void the label.**

Job site preparation for hardware is limited by NFPA 80 to the following modifications:

- surface-applied hardware – maximum hole diameter of 1"
- function holes for mortise locks – maximum hole diameter of 1" with the exception of cylinder holes which may be any diameter
- holes for labeled viewers (peepholes)
- maximum 3/4" wood and composite door undercutting
- preparation for protection plates

Field modifications such as preparing for electric strikes, adding glass lites, or mortising for a cylindrical lock or mortise lock pocket are not permitted by NFPA 80. These preparations must be performed in accordance with the manufacturer's inspection service procedure and under label service, not in the field. The code official may require the assembly to be re-labeled if unacceptable modifications are found.

**Source: NFPA 80 2007, 2010 – 4.1.3**



**(11) Gasketing and edge seals, where required, are present, continuous, and of the proper type for a fire door.**

Gasketing is not required for all fire doors, but where a code or standard requires a door to be tested to UL 1784 with air transmission of 3.0 cubic feet per minute per square foot of door opening at 0.10 inch of water, gasketing is typically required. In that case, the assembly must include gasketing which is continuous, and has been tested by the manufacturer for use on a smoke and draft control assembly. This will typically be indicated by a symbol in the gasketing catalog.

**Source: NFPA 80 2007, 2010 – 6.4.8**

