

Fusible Links & Smoke-Actuated Hold-Opens



From the well-known blog idighardware.com, Lori Greene brings some much-needed clarity to codes.

BY LORI GREENE, AHC/CDC, CCPR, FDHI

IN THE DAYS BEFORE HOLD-OPEN DEVICES ON FIRE DOORS AND SMOKE DOORS were actuated by smoke detectors, fusible-link closer arms were often used to hold open doors that were required to close if a fire occurred. Fusible-link closer arms incorporate a link made from pieces of metal held together by solder that is designed to melt when it reaches a certain temperature, releasing the hold-open and allowing the door closer to close the door. The problem with using a fusible link for this purpose is that smoke and gases will pass through the door opening before the fusible link becomes hot enough to release the door. This defeats the purpose of the fire door or smoke door, which is meant to protect the means of egress to provide an escape route for building occupants.

I'm asked quite often if fusible-link arms are still allowed to be used on fire doors. The logical place to start is NFPA 80, *Standard for Fire Doors and Other Opening Protectives*. Fusible links are addressed by NFPA 80, especially with regard to sliding fire doors, and the standard does not limit their use for swinging doors. Door operation is divided into three categories: self-closing, automatic-closing, and power-operated doors. Here is the section from the 2007 edition of NFPA 80:

6.1.4.2 Self-Closing Doors.

6.1.4.2.1 *Self-closing doors shall swing easily and freely and shall be equipped with a closing device to cause the door to close and latch each time it is opened.*

6.1.4.2.2 *The closing mechanism shall not have a hold-open feature.*

6.1.4.3 Automatic-Closing Doors. *Automatic-closing doors shall be permitted to close automatically by means of the installation of a closing device and one of the following:*

(1) A separate, labeled, fail-safe door holder/release device or a hold-open mechanism that shall be permitted to be an integral part of the basic closing device

(2) An integral closing device that allows the door to swing freely and that automatically closes the door during an alarm condition, provided the hold-open mechanisms are released by one or a combination of automatic fire detectors acceptable to the AHJ

6.1.4.4 Power-Operated Fire Doors. *Power-operated fire doors shall be equipped with a releasing device that shall automatically disconnect the power operator at the time of fire, allowing a self-closing or automatic device to close the door regardless of power failure or manual operation.*

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Electronic Hold-Open



Fusible-Link Arm

Note: The 2010 edition of NFPA 80 is the same except that a requirement for the door to latch was added to Automatic-Closing Doors and Power-Operated Fire Doors. The 2013 edition of NFPA 80 did not make further changes but moved the section from 6.1.4 to 6.1.3.

A fire door with a hold-open mechanism would be an automatic-closing door, and in this section, NFPA 80 isn't very specific. Would a fusible-link arm be acceptable? Let's check Chapter 3, Definitions:

3.3.6 Automatic-Closing Device. *A device that causes the door or window to close when activated by a fusible link or detector.*

3.3.7 Automatic-Closing Door. *A door that normally is open but that closes when the automatic-closing device is activated.*

Because an automatic-closing door is defined as a door with an automatic closing device, and the definition of an automatic closing device includes a fusible link as an option, my interpretation is that NFPA 80 would permit a fusible-link closer arm. But before you stock up on fusible-link closers or specify them for your next project, we need to consider the International Building Code (IBC) and NFPA 101, *The Life Safety Code*.

The International Building Code (2012: 716.5.9.3; 2009: 715.4.8.3) requires fire doors and smoke doors in certain locations to be smoke-activated—automatic-closing by the actuation of smoke detectors or loss of power to the detector or hold-open. The code also requires smoke-activated doors to begin closing within 10 seconds after the smoke detector is actuated. This applies to automatic-closing fire doors and smoke doors in the following locations:

- Doors installed across a corridor
- Doors that protect openings in exits or corridors required to be of fire-resistance-rated construction or in walls that are capable of resisting the passage of smoke
- Doors in smoke barriers, fire partitions, fire walls, and shaft enclosures
- Doors in refuse and laundry chutes and access and termination rooms
- Certain doors in underground buildings, including walls for compartmentation and elevator lobby walls
- Doors in smoke partitions

NFPA 101, *The Life Safety Code*, permits automatic-closing doors in buildings of low or ordinary hazard contents or where approved by the Authority Having Jurisdiction (AHJ). The NFPA 101 requirements for automatic-closing doors are:

- The door becomes self-closing upon release of the hold-open mechanism.
- The device can be manually released and will then become self-closing.
- The automatic releasing mechanism is activated by smoke detectors in accordance with NFPA 72, *National Fire Alarm and Signaling Code*.
- The hold-open mechanism is released upon loss of power to the device.
- When one stair door is released by smoke detection, all of the door leaves serving that stair will close.

More information about detectors, including the locations where they must be installed, can be found in NFPA 72, as well as NFPA 80. One of the common

questions with regard to NFPA 72 is whether smoke detectors used for door release must be monitored, as some hold-open devices include an integral smoke detector that is not typically monitored by the building's smoke detection system. I had to get some assistance from the NFPA on this question, but I was assured that these smoke detectors are not required to be monitored by the system. This is spelled out clearly in paragraph 21.8.2 of the 2010 edition of NFPA 72:

21.8.2 All detection devices used for door hold-open release service shall be monitored for integrity in accordance with Section 10.17.


Exception: Smoke detectors used only for door release and not for open area protection.

NFPA 72 Handbook: Monitoring for integrity is not required for detectors integral to the door assembly, or stand-alone detectors not connected to the fire alarm system.

If you've read NFPA 72, you may have noticed the next paragraph, which seems to contradict the exception above, but because Class D circuits are used, the referenced Section 21.2 does not require the detectors to be monitored, as explained in the NFPA 72 Handbook:

21.8.3 All door hold-open release and integral door release and closure devices used for release service shall be monitored for integrity in accordance with Section 21.2.

Handbook: Generally, magnetic door release appliances are installed so that they release on loss of power. Where Class D circuits or pathways are used in accordance with 21.2.6, fail-safe operation is provided, and monitoring for integrity is not required.

The codes in your jurisdiction may vary, so check the local requirements, but there are very few locations where fusible-link closer arms are acceptable for use on fire doors or smoke doors. This is to protect the means of egress from becoming compromised by smoke prior to the release of the fusible link. In locations where a hard-wired electronic hold-open unit is not feasible, a battery-operated unit with an integral smoke detector may be a good solution. 

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