Fire Engineering

Construction Concerns: Door Holders for Fire Doors
Article and photos by Gregory Havel
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Fire-rated door and frame assemblies were developed to close openings in fire-rated walls. Some people, considering them an inconvenience, prefer to hold them open for easy access between different parts of the building.

To be effective, a fire-rated door must remain closed at all times, except when someone is passing through; and it must close behind the person in a controlled manner so that it can injure no one.

If the fire-rated door is held open for convenience, it must be arranged to respond to the products of combustion and close if there is a fire. Propping the door open with a bucket of sand, a concrete block, or a wedge between the floor and the bottom of the door are unacceptable methods to hold open a fire-rated door.

One of the earliest methods to release a held-open, fire-rated door was a heat release, built as part of the pivot joint on the arm of the door closer (photo 1). The door closer and arm were mounted to the fire-rated door and to the top of the fire-rated door frame, like any door closer. However, this type of door closer had a large adjustment nut on the bottom of the pivot arm that worked like a clutch. When the nut was properly adjusted, it allowed the door to be held fully open. When heat or flame melted the fusible link (at arrow in photo), it released the tension holding together the two arms of the clutch, and the door closer would swing the door shut. Many hardware manufacturers adopted this arrangement, and it was installed in thousands of schools and commercial buildings between the

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1940s and early 1980s. Although exposure to heat or flame would release a fire-rated door using this arrangement, the door would not close if only smoke were present.


Modern fire-rated doors that are held open use either
- a door closer with a smoke detector built into it, that holds the door open for convenience and closes it if smoke is present (photo 2, below left); or
- an ordinary door closer and an electromagnet powered by the building’s fire alarm and smoke detector system. Under normal conditions, the fire alarm control panel energizes the electromagnet and holds the door open. When smoke is detected anywhere in the building, the alarm panel deenergizes the electromagnets and all of the fire doors in the building swing closed. The electromagnet (photo 3, below right) is mounted in the box on the wall, and holds the door open using the plate mounted on a swivel on the fire door.

The requirements of NFPA 1, *Fire Code*, 2009 Edition:

14.5.4 Self-Closing Devices.

14.5.4.1. A door leaf normally required to be kept closed shall not be secured in the open position at any time and shall be self-closing or automatic-closing in accordance with 14.5.4.2 unless otherwise permitted by 14.5.4.3. [101:7.2.1.8.1]

14.5.4.2. In any building of low or ordinary hazard contents, as defined in 3.3.132.2 and 3.3.132.3, or where approved by the [authority having jurisdiction], doors shall be permitted to be automatic-closing, provided that the following criteria are met:
   1. Upon release of the hold-open mechanism, the leaf becomes self-closing.
   2. The release device is designed so that the leaf instantly releases manually and, upon release, becomes self-closing, or the leaf can be readily closed.

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3. The automatic releasing mechanism or medium is activated by the operation of approved smoke detectors installed in accordance with the requirements for smoke detectors for door leaf release service in NFPA 72.

4. Upon loss of power to the hold-open device, the hold-open mechanism is released and the door leaf becomes self-closing.

5. The release by means of smoke detection of one door leaf in a stair enclosure results in closing all door leaves serving that stair.

[101:7.2.1.8.2]


Even though the NFPA standards have required smoke-detector release of hold-open mechanisms for decades, some of these older units with fusible links are still in service. This is because codes and standards adoption varies from jurisdiction to jurisdiction; the AHJ permits old-style hardware to remain in service as long as it works and is maintained, unless the building is extensively remodeled; or code enforcement personnel do not have proper and complete training.

Owners and managers of buildings with fusible-link hold-open devices on fire-rated doors must be encouraged to replace these ancient devices with modern technology to protect building occupants from the effects of smoke if there is a fire. This must be done no matter how well-maintained the facility is, since parts for any mechanical device of that age will be difficult to obtain; and since maintenance may include repainting the door closing mechanism, its arm, and its fusible link, as was done in photo 1.

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