



Exit Devices

Fire Exit Hardware

An exit device is a piece of hardware mounted on the push side of a door. It is designed to release a latching mechanism in the event of panic. Hence the term "panic hardware" is synonymous. Exit devices are intended to operate without prior knowledge or training when pressure is applied to a horizontal bar or push pad mounted to the door. Such devices allow normal daily access through an opening while meeting numerous security and fire safety requirements.

Accident and Fire Devices

Exit devices can be divided into two classifications: Accident Hazard and Fire Exit Hardware. Both are designed to provide unrestricted exit with a free path of egress. However, Fire Exit Hardware has additional design features intended to keep a fire door latched to prevent the spread of smoke and fire, thus maintaining the integrity of the fire assembly.

Most model building codes outline specific requirements for both Accident Hazard devices and Fire Exit Hardware. These requirements cover specific tests by broad criteria requiring testing by an approved testing agency. Underwriters Laboratories Inc. (ULI) and Warnock-Hersey International (WHI) are two that typically are referenced. The requirement for using "exit devices" or fire exit hardware usually is based on the occupancy classification of the building or area and the occupant load (quantity of persons using the facility).

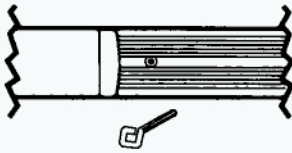
To be listed as acceptable for these uses, a sample device must pass a series of tests. The two most important are that the device operates for a specific number of cycles, and that the opening pressure (force required to release the device) must not exceed certain levels. Both Accident Hazard and Fire Exit devices must

pass this portion of the test. The maximum force to unlatch the device is specified in most model building codes.

Before a device can be listed as Fire Exit Hardware it must pass further testing. Complete assemblies of doors, frames and hardware are put together in a wall to form an assembly on which a laboratory fire test will be performed. Depending on the length of the fire test, the devices will be listed as 3 hour (A Label); 1 ½ hour (B-Label) or possibly a shorter time.

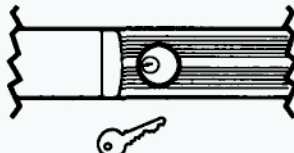
Note: Doors which are constructed to accept fire exit hardware will bear a label noting this fact. The label of the device also will indicate it is a Fire Exit Hardware device.

In order to assure that Fire Exit Hardware will always latch, they are not permitted to have a mechanical "dogging" feature which normally is available with exit devices listed as Accident Hazard. "Dogging" refers to a feature which allows the latch to be held retracted so the door operates as push/pull. To activate this mechanical dogging a hex key, cylinder key or special tool is used (Figures 1 and 2). Although mechanical dogging is not allowed on fire exit hardware, there are several manufacturers who have listed electrical dogging devices. These units may hold the latch retracted only if they are connected into the building fire/smoke alarm system. When the alarm is activated, the latch is released and immediately provides the positive latching needed for a fire assembly.



Standard Dogging
(Hex key or special tool)

Figure 1



Cylinder Dogging

Figure 2

Types

There are four basic types of exit devices:

Rim—Surface applied to the door. Single latchbolt (Figure 3)

Mortise — Lock case installed (mortised) into the edge of the door. Single latchbolt. (Figure 4)

Surface Vertical Rod — Surface applied to the door. Top and bottom latching. (Figure 5)

Concealed Vertical Rod — All components are concealed within the door or installed (mortised) in the edge. Top and bottom latching. (Figure 6)

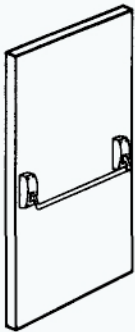


Figure 3

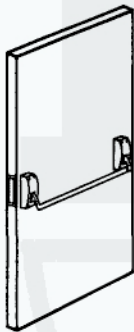


Figure 4

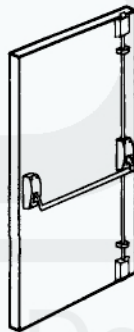


Figure 5

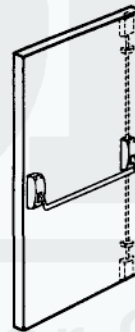


Figure 6

Type to Use. Depending on the door manufacturer, following are what is accepted as standard practice:

Single Door: Rim; Mortise; Surface Vertical Rod; or Concealed Vertical Rod.

Pair of Doors: Rim X Rim with Removable Mullion (* most secure). (Figure 7a)

Rim X Surface Vertical Rod (special overlapping strike.
** Requires coordinator X carry open bar.) (Figure 8)

Mortise X Surface Vertical Rod (or Concealed Vertical Rod.

** Requires coordinator X carry open bar unless open back strike is used.) (Figure 9)

Surface Vertical Rod both leaves. (Figure 10)

Concealed Vertical Rod both leaves. (Figure 10)

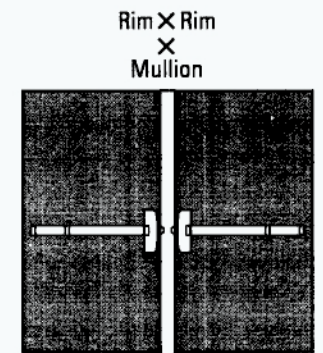
**Be aware of exit width requirements to satisfy building codes.*

*** Coordinator is necessary to assure that the inactive leaf closes first. The carry open bar sets the doors into position for the coordinator to operate when inactive leaf is opened first*

Double Egress:

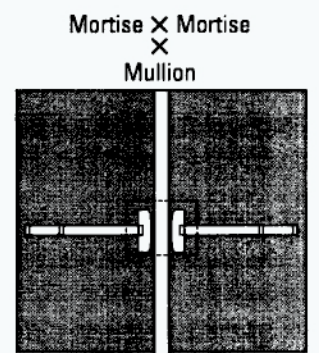
Surface Vertical Rod both leaves. (Figure 11)

Concealed Vertical Rod both leaves. (Figure 11)



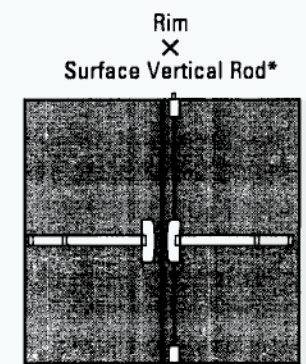
Mullion is a Hardware Component

Figure 7a



Mullion is a Frame Component

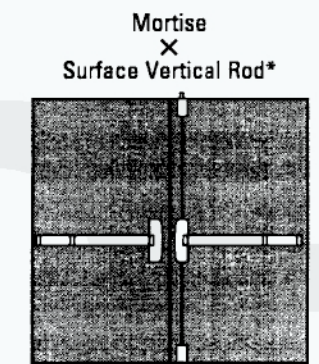
Figure 7b



*Concealed Vertical Rod Optional

Overlapping Strike

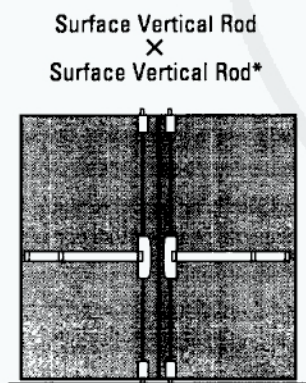
Figure 8



*Concealed Vertical Rod Optional

Open Back Strike

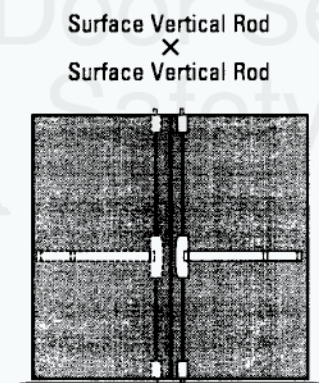
Figure 9



*Concealed Vertical Rod Optional

NO Overlapping Astragal

Figure 10



Double Egress (Both leaves are same hand)

Figure 11

Functions

There are many operating functions available. The most frequently used are:

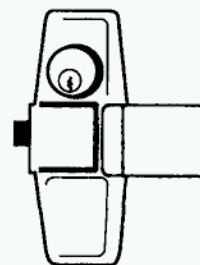
Function Number	Description
01	EXIT ONLY (EO) No outside trim.
02	DUMMY TRIM (DT) Trim is not functional acting only as dummy trim. Used to pull door open when device is dogged. May also be a rigid knob or lever. Often used on the inactive leaf of a pair of doors to match the operating trim on the active leaf. (Figure 12)
03	NIGHT LATCH (NL) Outside always locked except when key is used to retract the latchbolt Similar to a storeroom function. Available with outside knob, lever or dummy handle. (Figure 13)
05	THUMB PIECE (TP) The outside operating trim (thumb piece) may be locked or unlocked by use of a key. Similar to classroom function. (Figure 14)
08	KNOB/LEVER Same as above except operating trim is a knob (K) or lever (L). (Figures 15a and 15b)
11	TURN LEVER (TL) Turn lever may be locked or unlocked by use of a key. Usually found on a vertical rod device and when unlocked the turn lever will retract the vertical rods. (Figure 16)
N/A	BLANK ESCUTCHEON (BE) No cylinder control the outside operating trim of thumb piece, knob or lever is operable at all times. Similar to a latchset. (Figure 17)

*Function Numbers taken from ANSI/BHMA Standard A 156.3.

Inside Cylinder

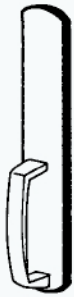
When a device is provided with an inside cylinder, it usually controls the locking or unlocking of outside trim. With some manufacturers it may also be used to allow quick dogging of the device. Check each situation carefully. (Figure 18)

Note: Each manufacturer will have its own letter or numbering system to describe available function. However the functions and



Inside Cylinder
Figure 18

operations will most often parallel those described above.



02

Figure 12



03

Figure 13



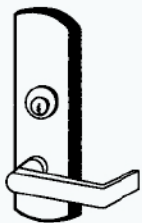
05

Figure 14



08

Figure 15a



08

Figure 15b



11

Figure 16

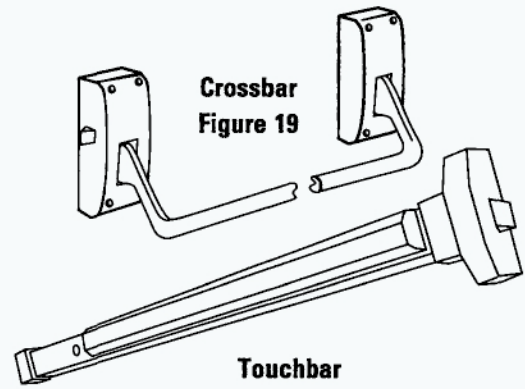


N/A

Figure 17

Design

Exit devices are available in two design styles: the traditional cross bar type (Figure 19) and the contemporary touch bar (touchpad) type (Figure 20). The crossbar type has two cases, a lock stile case and a hinge stile case. A conventional round cross bar connects horizontally across the door to both of them. Pressing the crossbar toward the door retracts the latch. The touch bar type usually is a one piece assembly consisting of a rectangular body extending from the lock stile to the hinge stile. A portion of the body protrudes away from the unit, acting as a touch bar (touchpad/contact from the unit, acting as a touch bar (touchpad/contact surface). Pressure against this touch bar will retract the latch or vertical rods at the end of the assembly.



Crossbar
Figure 19

Touchbar
Figure 20

Selection

Selection of exit devices depends on many factors. The following lists a few of those factors which influence the selection.

Door Design. The width of some door stiles may prevent the application of some devices. This would apply when the device case is too large to fit the stile width or if the mounting fasteners extend into the glazing on the glazing stop.

Door Size. Touch bar devices sometimes are limited as to the door width sizes on which they will operate. Also, vertical rod devices will be listed in your catalog as to the maximum, or recommended height of the door on which they may be applied and operate properly.

Door Glazing. Some glass stops in doors project past the face and will affect the installation of touch (Modern) type devices. Changing glass lite size, glass stop size or providing shims may be required.

Building Code and Owner Requirements. The building codes and the owner's requirements of operation should be investigated. Appearance (aesthetics) and design requirements of the architect or building designer affect your selection.

Overlapping Astragals. Caution must be taken when a pair of doors requires the use of overlapping astragals. For example, on a pair with two vertical rod devices the astragal would not allow one leaf to open independently from the other leaf.

Check List For Ordering

WIDTH and HEIGHT-Is the device shown for use on a door of your size? Does it meet maximum and minimum

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listed requirements for use on fire doors of this size?

STILE WIDTH-is the door stile size adequate for installation of the device cases, appropriate strike, trim and fastening screws? Use manufacturer's catalog and/or templates for verification.

DOOR THICKNESS-Operating trim and fastening hardware often are sized according to the door thickness. Anything other than 1 3/4" must be noted and listed.

DOOR MATERIAL-Fastening hardware may vary depending on the material of the door and frame. For example, fire exit hardware listing requirements may dictate that certain types of fasteners be utilized on certain types of doors.

DOOR DESIGN-Glass glazing stop thickness.

OTHER HARDWARE-Attention must be addressed to other items of hardware because they could interfere with the operation of the exit devices. For example, overhead stops, concealed closers or stop mounted coordinators might conflict with the top strike of a vertical rod device. In most cases, the problem can be overcome by special preparation or modification.

Kickplates such as plastic, Herculite, tempered glass, etc. will affect vertical rod devices because of their thickness. Consideration should be given to open back strikes, electric strikes, weatherstripping, astragals, thresholds and mullions.

Sometimes push or pull trim may have to be moved, altered or eliminated to avoid conflict with your device.

FRAME/SILL-Check construction and configuration of these items to assure what strikes are appropriate.

DOOR PREP-Because many "stock" doors are available and in use, it is wise to verify that your device will cover, conceal and conform to the door's standard preparation. Also, when using fire exit hardware, remember that codes require that the fire door bear a label stating the door is "For Fire Exit Hardware".

HANDING-Exit devices always are referred to as either Right Hand Reverse (RHR-RHRB) or Left Hand Reverse (LHR-LHRB). Although many devices are reversible or non-handed, the trim, strike or some other part may be handed. Therefore it is always wise to indicate the handing required.

TEMPLATES/CATALOG-Examination of the current manufacturer's templates and catalog may alert you to

restrictions of operation, minimum and maximum clearances at jambs and sills, special shipping package should special fasteners or other items be required that may have been overlooked.

All the above are necessary items to be recognized, checked and addressed. Failure to do so may very likely produce job-site problems which will encompass extensive time delays and costly replacements. Some of these problems may be unpredictable and unavoidable. However, with tenacious attention to the preceding details, you can be assured such problems will be at an absolute minimum.

Security Considerations

Along with providing an unobstructed path to safety, both accident and fire exit devices also must provide security.

From the standpoint of preventing manipulation of the latch-bolt or crossbar from the outside, rim devices provide the greatest security with the simplest installation. The device mounts to the surface of the door and in most cases, the strike can be surface applied to the frame stop. The latchbolt and crossbar are protected from outside attack by the frame stop. The use of a mullion on pairs of doors converts each leaf of the pair into a single door, therefore maintaining the same level of security as a single door while providing the most versatile application for a pair of doors. Mullion stabilizers should be included.

Combinations of a vertical rod and rim or mortise device may be used on pairs of doors when a mullion is not feasible, such as a pair with an overlapping astragal. In applications where other types of devices are used, the fit of the door to the frame and the stability of the door and frame become more critical. Security sometimes may be traded for aesthetics in these cases.

Electric Functions

Electrifying the operation of certain features on exit devices provides a variety of options to the architect, owner and consultant. None of these features are designed to deter from the intended function of the exit.

Many manufacturers now offer electric locking or unlocking of the outside trim. This feature resembles the action of a key without issuing of a key. The trim may be unlocked by a card-reader, timeclock, push button or some other access device including activation by the fire alarm.

There are also exit devices which may be electrically dogged. Previously the statement was made that fire exit hardware cannot be mechanically dogged. However, many manufacturers do have provisions for the use of

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listed fire exit hardware with electrified dogging. In addition, they further require that these be connected into the fire, smoke or emergency alarm system to assure that they will be latched properly when necessary.

Exit devices may also be coordinated for use with electric strikes which may be activated by many different sources.

Integrated with magnetic locks, exit devices offer a means to provide time delay exiting meeting special locking arrangements. Verify code criteria when selecting.

Security requirements have also generated a demand for monitor switches incorporated into some exit devices. You should be aware that the monitoring of latchbolt engagement, trim locking status, use of touch bar or crossbar and other combinations of these are available from some manufacturers.

Summary

The proper selection of the correct exit device is possible with careful investigation of facts. Satisfying the owner's needs for security exiting, and appearance is your goal.

Trouble Shooting

When an exit device is not functioning properly, the problem usually can be traced to one of the following factors:

Poor fitting or alignment of door and frame

Wrong lock or case

Strike not mounted correctly

Door prepared incorrectly

Frame and/or door reinforcement incorrect

Improper cylinder or installation

Not mounted level

Latch case not aligned

Vertical rods not aligned

Fasteners of wrong length

Fasteners too loose or tight

Operating trim not installed properly or binding

Proper attention to templating, ordering and installation instructions usually can help avoid these situations.

The owner also must be alerted to the importance of maintenance with these devices. There are devices that have been in service for many years and continue to function efficiently and effectively, but only because periodic adjustments, proper lubrication and maintenance have been provided. Not only do these provisions enhance the service life of the device, they also assure the continuous attention to the need of life safety requirements.

There are many publications available for examination when selecting exit devices. NFPA-80 (Fire Doors and Windows); NFPA-101 (Life Safety Code); ANSI/BHMA Standard A156.3; ASTM E152; Hardware for Labeled Fire Doors (DHI); "Fire Code Standards Summary" by the Architectural Woodwork Institute and others will be of assistance.

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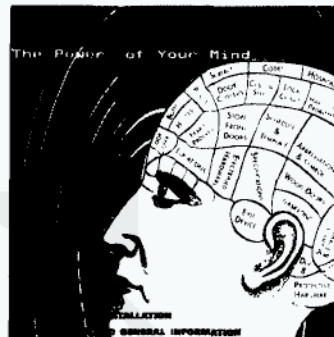
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