

PANIC BAR PRIMER

by Marylee MacDonald

Commercial exit hardware requires careful ordering and precise installation. Good templates and instructions help simplify the work.

Although you may not realize it, the door opening hardware you engage with your hip as you leave McDonald's with your morning coffee can be a profitable sideline. In addition, it can offer a way to break into commercial work. Known as *exit devices* to manufacturers, specifiers, and building officials, they are required on nearly all commercial doors that offer egress.

More commonly called "panic bars," they are relatively easy to install given the instructions and templates that come packed with them. But because of the job they do and the amount of use they get, there is a good deal of liability involved. This requires some knowledge when ordering the hardware, and precision in putting it in.

Two general categories. Exit hardware falls into one of two classifications: *accident hazard (panic)* hardware and *fire exit* devices. Both do the same job — allow unrestricted normal and emergency egress — and are nearly identical to the untrained eye. However, you can use fire-rated hardware on any door, but you cannot use hazard hardware on doors that are designated as fire doors.

Although panic hardware meets all the tests for life safety, fire exit hardware must pass more stringent testing because it has the additional task of staying latched during a fire to prevent the spread of flames and smoke. It also has to be installed with machine screws in tapped holes or *sex bolts* (through-bolts with threaded receptors).

Another major difference is that fire-rated devices cannot have any type of mechanical *dogging* (fixing a door open so the latch is in a retracted position). Dogging is used with non-fire-rated doors to allow unrestricted access from the outside, and to save wear and tear on the latching mechanism. Fire exit hardware can only be dogged if the mechanism itself is controlled by an automatic, hardwired smoke and fire alarm system.

The basic requirements for fire doors and their hardware are set by the National Fire Protection Association (NFPA) in NFPA 80: Fire Doors and Windows, and NFPA 101: Life Safety Code. However, within these codes, final authority is given to the "local jurisdiction" — typically the Fire Marshall — although other building and health officials may have a say. Accessibility codes, ANSI standards, and regional model codes also play a part. As you might imagine, code interpretation varies greatly, and the only sure way of satisfying local officials is to consult them prior to

The Hardware

Exit devices were first developed in the early 1900s, fueled by a spectacular fire in Chicago's Iroquois Theater in which 596 people perished. Inventors were quick to respond with locking door hardware that would keep a building secure but allow large numbers to exit quickly. Installed on the "push side" of a door, the latch on today's exit hardware is retracted by as little as 15 pounds of pressure applied to the bar.

The touchbar rim device above, shown with a keyed cylinder, is installed horizontally and has a single latchpoint. The cylinder allows the hardware to be dogged, retracting the latch so the door can be opened freely from both sides — a feature not permitted on fire-rated devices. The surface-mounted vertical rod device (top) has two latchpoints, one in the head jamb and one in the floor, making it useful for double doors, or to provide extra security in a single door.

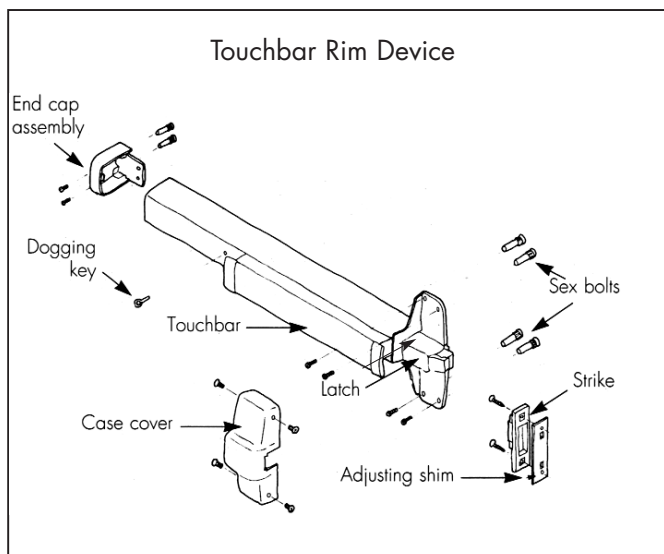


Figure 1. This touchbar rim device is composed of four basic parts: the bar itself (which includes the latching mechanism), the strike, the case cover, and the end cap.

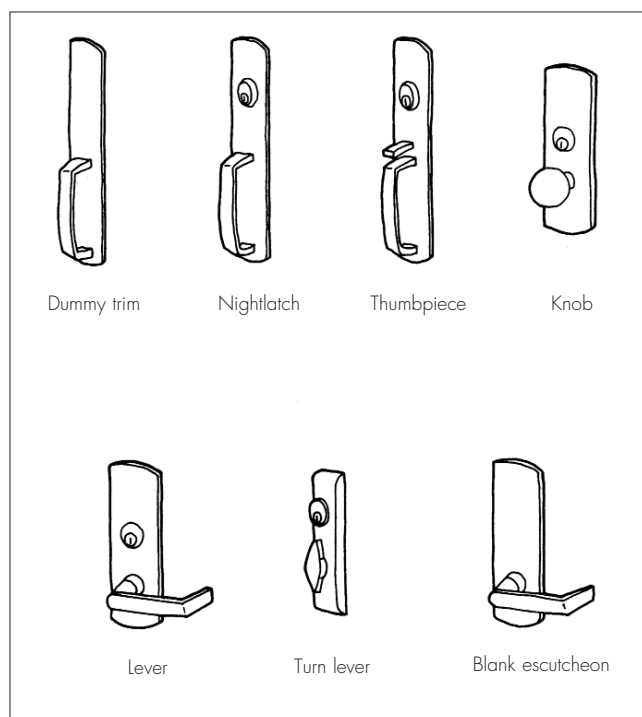


Figure 2. These exterior trim options don't affect the operation of the exit hardware from the interior, but allow various degrees of access and security from the exterior.

ordering and installing doors and hardware.

Fire doors are rated by effective duration: 20 minutes, 45 minutes, 1½ hours, or 3 hours. They are typically found on the interior of buildings in stairwells and at other openings in fire walls. On the exterior, fire doors are required where other buildings are closely adjacent, such as an alley. The hardware and door, in this case, are designed to keep the hazard out of the building.

Four basic types. Exit hardware of

tion in exit devices is style: *crossbar* or *touchbar* (*pushbar*). The traditional exit device is a crossbar style with two mechanism cases (active and inactive) on each side of the door and a tubular bar in between. But in 1971, the sleeker touchbar was introduced, and has overtaken the crossbar.

The touchbar type is generally easier to install, less expensive to purchase and maintain, more secure (a coat hanger can't be inserted under the door and used to pull down on the bar), doesn't project as far into the room, and looks more contemporary. Both classifications of exit hardware and most types can be purchased in either design.

Making Choices

If you're installing exit devices listed on a hardware schedule, your job is relatively easy: Install *exactly* what the specs call for. If the choice is yours — pretty common with retrofit or replacement devices — there are a lot of variables to deal with.

Compatibility. In addition to classification, type, and style, you'll have to make sure the hardware matches the door width, height, and the width of the stile. Most manufacturers make two lengths — one for doors 36 inches and under, and one for doors over 36 inches. Vertical rod devices are typically made for 80-inch and 96-inch doors. Glazed doors often have narrow stiles and require slimmer hardware.

You should also look for the appropriate *trim*, including the exterior escutcheon or rose with knob, lever, or thumbpiece. These should be compatible with the frame and sill construction, fit the hand of the door, match the aesthetics of the building in finish and style, and have the approval of all the code bodies with jurisdiction.

This can be just as complicated as it sounds, and requires the help of knowledgeable suppliers. Larger dealers sometimes have templates on file

that will help you make sure you are ordering hardware that will fit.

Exterior trim. There are lots of options for the building owner when it comes to the exterior side of the door (see Figure 2). *Exit only* refers to no trim at all, and *dummy trim* doesn't operate the latch but gives you a pull for opening the door from the exterior when the panic bar is dogged.

A *nightlatch* has an exterior, keyed cylinder (lock) for security, but like all exit devices, remains operable from the interior at all times. *Thumbpiece*, *knob*, and *lever* trim that also have exterior cylinders require different motions to release the latch. These same kinds of trim without a cylinder (essentially a latchset) are referred to as *blank escutcheons*. And *turn levers* are typically used with vertical rod devices (they retract the rods). On interior doors that don't require security, you can use passage trim that doesn't have a locking cylinder.

Some manufacturers also offer devices with interior cylinders that lock or unlock the exterior trim for greater security. In the case of some non-fire-rated doors, this cylinder is also a dogging device. (Dogging is accomplished with an Allen wrench on hazard hardware that doesn't use a keyed lock).

Cost. Exit devices are expensive — anywhere from \$150 to over \$1,000 a door, depending on the type, style, accessories, and trim. A good touchbar rim device will run around \$200 from a locksmith or builders' hardware supplier; double doors with vertical rods will run in the neighborhood of \$600 to \$1,700. While these prices may seem steep, exit devices are designed to take a tremendous amount of abuse and often outlast other door

hardware in the building.

Security considerations. Because building security is a big concern for owners, they'll frequently spend a few extra dollars for additional protection. A latch guard is a simple, inexpensive device that will cut down on forced entries. It's a steel plate, 8 to 10 inches long, that mounts on the door and covers the gap between the door and jamb.

Alarms are also popular. Many hardware companies make exit alarms that are hard-wired into the latch of the panic bar through a central control panel, but these systems are quite expensive. For a business with a smaller budget, there are self-contained systems that operate off 9-volt batteries (they'll last about a year). The alarm is contained within the touchbar hardware itself. If someone pushes on the bar, the alarm goes off. This system is also easier for customers to service — they just unlock the case with a key and change the batteries.

Installing a Rim Device

Although each brand and type of hardware is installed a little differently, here's an overview of the general procedures for installing a rim device and a surface-mounted vertical rod assembly.

Job-site prep. Go ahead and hang the door if it's not already in place. Shim the jamb so the door hangs perfectly square in the opening. Use a tape and check the reveal between the door and the jamb. The code is very specific about these reveals, and the hardware is also sensitive to doors that are out of square or out of plumb. You need 1/8-inch clearance at the top and lock jamb; 1/16-inch on the hinge jamb. The bottom clearance varies

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either category can also be classified by type: *rim*, *mortise*, *concealed vertical rod*, and *surface-mounted vertical rod*. A rim device is applied directly to the inside face of the door, and its strike screws into the frame stop. This makes rim hardware the least expensive and the easiest to install (see Figure 1). It's also a low-maintenance device that is very secure.

Mortise devices also have a single latch, but it is mortised into the edge of the door. Vertical rod assemblies, whether they are concealed in the door or surface-mounted, have at least two latch points — one each at the door's top and bottom. Vertical rod hardware is commonly used with double doors, sometimes in combination with rim devices.

Design choices. Still another dis-

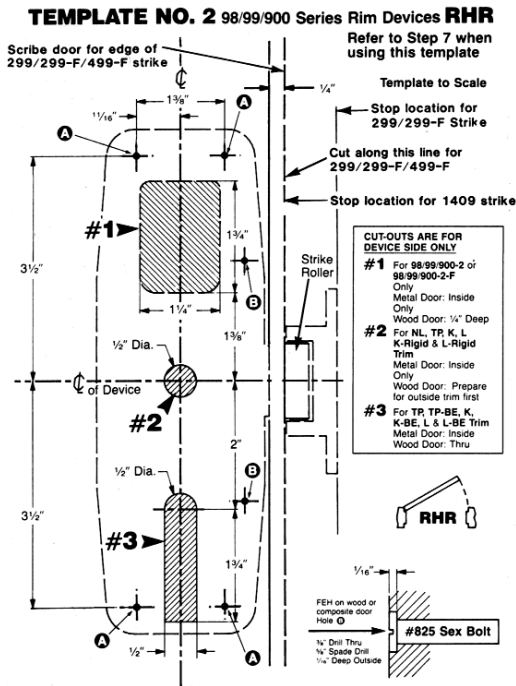


Figure 3. Installation templates, such as this one from Von Duprin, typically reference the centerline of the rim device. To avoid issues of liability installers must precisely follow the manufacturer's instructions.

with the floor treatment.

Most of the doors you'll be working on will be 1 3/4-inch, reverse bevel (right hand reverse or RHR, and left hand reverse or LHR). Before you begin installing the hardware, check to make sure the handing is correct. (If you're standing on the "push" or interior side, a RHR door will be hinged on the left; an LHR door on the right.) Although most exit devices can be used for either hand, that isn't always true of exterior trim. Also, check the door for a rating label to be sure it complies with the fire requirements of that opening. If you have been provided with a hardware schedule make sure you have what's listed.

Replacement or retrofit. Check the door itself for wear and internal damage, then make sure the opening is square. If the door is sagging — these doors can weigh 100 to 150 pounds — shim the existing hinges or replace them with a ball-bearing type, non-removable pin (NRP). These and other commercial hinges are typically 4 1/2 x 4 1/2 inches. You may also need hole covers for old mortises if the hardware you're using won't do the job.

If the door doesn't have a cutout to accommodate the panic bar mechanism, some mechanics will cut it themselves with a cordless jigsaw. They drill holes at the corners of the cutout, and then use the jigsaw to square up the rectangle. Dimensions are typically listed or drawn on the template that comes with the hardware. However, with a fire door this voids the warranty and shifts the liability from the door and hardware manufacturer/supplier directly to the mechanic. The proper procedure in

this case is to go back to your supplier for a door with a proper cutout, even though it means costly and irritating delays.

Following directions. A lot of carpenters are cavalier about following installation instructions. The hardware they deal with is fairly simple and the information sheet may seem more hindrance than help. But don't take that attitude with exit devices.

Manufacturers publish very complete directions and templates, and count on the installer to follow the instructions precisely (see Figure 3). Failing to do this will open you up to liability that has no end. Make sure to use the recommended size drill bits and taps, and the correct fastener in each hole (never substitute what you have in your toolbox even if something is missing). And pay careful attention to tolerances, including plumb and level.

However, you don't need a truck full of tools. A typical installation can be handled with a hammer, level, screw drivers, framing square, drill and bits, center punch, allen wrenches, tap-and-die set, jigsaw, and some masking tape.

Layout. Following the manufacturer's directions, cut the body of the touchbar to fit the width of the door. Then using masking tape, fasten the templates for the device and the strike on the door and jamb at the precise centerlines. You should also check final positions with a level. These full-size templates are included in the instructions, one for each handing.

The centerline height for the horizontal bar must conform to code. Door manufacturers typically use 39 13/16 inches from the top of the finished

floor to make their lock cut-outs. However, elementary schools and handicapped entries require hardware mounted lower than normal. Check the hardware schedule if you're working from plans.

Drilling and tapping holes. With the templates in place, punch and drill the holes for fasteners. Drill pilot holes first, then switch bits to the size indicated on the instruction sheet. You may need masonry bits for the strike on concrete and brick buildings.

Unless you are using sex bolts for the installation, you'll have to tap the holes you've drilled to receive machine bolts. Again, follow the directions explicitly on bit and tap sizes, and keep your fasteners separate so you're using each in the correct place.

Exterior trim. Once you've drilled holes for the exit device on the inside of the door, establish your template for exterior trim using the same centerline, and drill and tap the holes indicated.

This is also the time to make adjustments to the latching mechanism of the exit hardware for the trim that you're using with it. You should mount the interior cylinder now if that's included.

Attaching the strike and bar. On the hinge side of the door install the mounting bracket that will hold the panic bar in place. Depending on the size of your door, you may have to cut down the panic bar to fit. For this, you'll need to remove the mounting bracket at the end of the hardware, shorten the case with a jigsaw or hacksaw, and insert the mounting bracket back in the case.

Now you can position the device on the door, matching up the center of the case with the trim. Tighten the mounting screws, but leave them just loose enough so you can level the device.

Mark the bracket mounting holes, making sure the device is still level. Then slide the mounting bracket out of the way so you can drill. Use your center punch, drill your pilot hole and final holes, and tap them. Then install the end cap mounting bracket.

Next you can mount the strike on the jamb with the appropriate screws. Finally put a level on the bar to make sure you're still on the money, and snug up the fasteners on the control head side next to the jamb.

Final adjustments. Check the latch bolt and dead lock. If they don't work, adjust the device toward the strike. You may also have to adjust the strike, using shims supplied by the manufacturer. When everything functions, tighten the screws.

Install the mechanism end cap and case cover. Package up any leftover parts that were included in the box and save the instructions for future reference.

Surface Mounted With Vertical Rods

This installation is basically the same as a rim device except for the vertical rods and their strikes at the

Exit Device Manufacturers

Monarch Hardware and Manufacturing Co.
PO Box 548
Shepherdsville, KY 40165
800/826-5792

Corbin & Russwin
Architectural Hardware
A Black & Decker Company
225 Episcopal Rd.
Berlin, CT 06037
203/225-7411

Reed Exit Hardware
A Division of Yale Security Inc.
Box 25288
Charlotte, NC 28229-8010
800/438-1951

Apex Exit Hardware
Precision Hardware Inc.
38100 Jaykey Dr.
Romulus, MI 48174
313/326-7500

Arrow Exit Hardware
Essex Industries Inc.
103-00 Foster Ave.
Brooklyn, NY 11236
800/221-6529

Sargent Exit Hardware
Essex Industries Inc.
100 Sargent Dr.
New Haven, CT 06511
203/562-2151

Von Duprin Inc.
A Division of Ingersoll-Rand
2720 Tobey Dr.
Indianapolis, IN 46219
800/999-0408

top and bottom. These rods, strikes, and their templates are supplied with the hardware.

In this case, the strikes are installed after the bar. The top strike is typically installed first, but the bottom is usually the most difficult. If the threshold is wood, a square strike can easily be mortised into it to receive the latch. But if the installation is governed by handicapped access codes, the threshold is limited in height to 1/2 inch, and you may find yourself removing 1 1/2 inches of concrete to install the strike.

When installing the rods themselves you will need to size them — either cut them off or add extensions — depending on the height of the door. Make sure you put them in absolutely plumb and that both latching mechanisms work smoothly and easily. ■

Marylee MacDonald is the Midwest news editor of The Journal of Light Construction. Door mechanic Scott Boyes of Fremont, Calif., also contributed to this article.