

Back to Basics: Door Closers

The function of a door closer is not just to close the door; a good door closer will also control the door in both the opening and closing cycles to prevent damage and injury caused by abuse, wind or other factors.

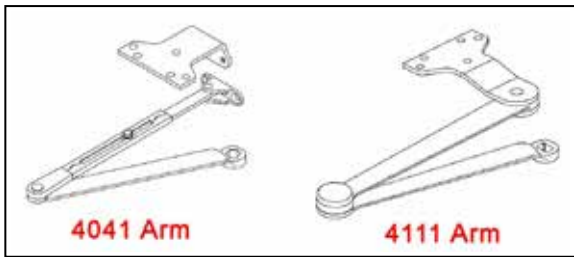
With all of the available types and options, it can be difficult to know which closer to specify. Considerations include frequency of use, life-cycle cost, aesthetics and the necessary features and functions. In addition, there are code requirements that must be taken into account.

During the opening cycle of a door, the closer's function is to allow the door to open easily, except at the end of the cycle when backcheck is applied. The backcheck feature cushions the opening swing to prevent the door from hitting the stop with excessive force. An auxiliary stop should be provided as the backcheck feature does not replace the stop. For very abusive applications, the advanced variable backcheck option provides the cushioning effect earlier in the opening cycle. During the closing cycle, the closer should maintain a uniform closing speed until within a few degrees from the latch. In this position, the latch speed will ensure the door closes firmly and latches without slamming.

Considerations

- **Size/durability:** Door closers range from slimline to heavy-duty, with other levels in between. Heavy-duty closers are recommended for high frequency doors, exterior doors, and in schools or public buildings where heavy use or abuse is expected. For doors used less frequently, a smaller closer may be acceptable and will typically cost less than a heavy duty closer.
- **Grade:** The recognized standard for door closers is ANSI/BHMA A156.4, which details the testing requirements for grades 1, 2 and 3. Most commercial and institutional closers, however, meet the testing requirements for Grade 1 (from slimline closers to heavy duty), so specifying only the grade will not define the level of closer desired.
- **Material:** Door closers are made of cast iron or aluminum. While aluminum closers can be a lower-cost option for some facilities, cast iron closers are preferred by many institutions because of the material's compatibility with the high-grade steel components within the closer. Where closers are subject to millions of opening and closing cycles, this durability is extremely important.
- **Type:** There are two basic types of surface-mounted closers: application-specific and universal. Application-specific closers are designed for installation in a specific mounting style and are "handed" either left or right. A universal closer is more of a "one-size-fits-all" solution and can typically be mounted three different ways, and on a door of either hand. While this may sound like the best product to specify, there are concessions. For example, the application-specific parallel arm closer is a solid arm, where the universal closer's parallel arm consists of pieces that are screwed together in the field. On a universal closer, the pinion penetrates the top and bottom of the closer, creating a second potential leak point; the mounting location is in the hands of the installer since the closer can be mounted on the push or pull side of the door. For institutional facilities, application-specific closers are recommended.

- Arm/function:** The force of the closer is transferred to the door through the arm; therefore, the construction of the arm is very important for the durability of the closer. Forged steel arms offer the maximum strength, where stamped arms are more commonly used when cost is the primary concern. Some closer arms can incorporate a hold-open feature, an integral stop (CUSH), a spring-loaded stop (Spring-CUSH) or a combination of hold-open and stop. For unusual applications, a special template may be needed. This template may illustrate a change to the mounting location or a physical change to the closer. (LCN has more than 3,000 special templates available!)



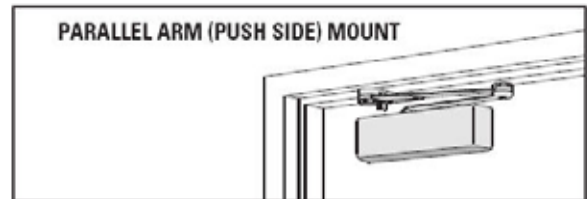
- Spring size:** Most closers are adjustable in “size,” meaning the spring power can be increased or reduced to control the closing force. (This also affects the opening force.) Closers that are not adjustable must be ordered in the correct size for the door opening, depending on the door size, whether the door is interior or exterior, or whether the location is particularly drafty. It is sometimes difficult to properly coordinate the functional requirements of a “sized” closer with the opening force limits for accessibility.
- Fluid:** In addition to lubricating internal components, the fluid inside a closer controls the closing speed as the adjustment valves increase or decrease the flow of fluid. Specifying a closer with all-weather fluid will eliminate the need for seasonal adjustments. Without all-weather fluid, a closer may creep closed slowly when it is cold, or slam shut when it is hot, because of the change in viscosity of the fluid with the change in temperature.

- Fasteners:** Proper fasteners should be specified and supplied depending on the door and frame material. Closers must be installed with manufacturer’s fasteners and per the manufacturer’s installation instructions and templates in order to function properly long-term. For mineral core wood doors, through-bolts should be used unless special blocking is provided in the top of the door.
- Finish:** The powder coat finish available on many closers today is very durable and the result of an environmentally-friendly process, particularly compared with other types of finishes. Powder coating can protect components for up to 100 hours of salt-spray testing—four times what is required by the test standard—and is available in standard and custom colors. For corrosive environments and exterior installations, a special rust inhibitor coating is also available. It may be tempting to specify closers plated with architectural plated finishes, but generally these finishes provide only a fraction of the durability offered by powder coating. In addition, the plating process for them is very expensive.

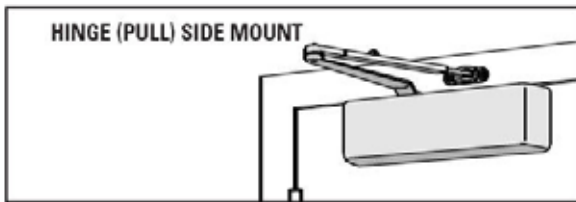
Mounting styles

When selecting an application-specific closer, the mounting style must be considered. Surface-mounted closers are typically mounted where they are least visible to the public, such as inside a room, instead of on the corridor side of the door. The most common mounting styles are:

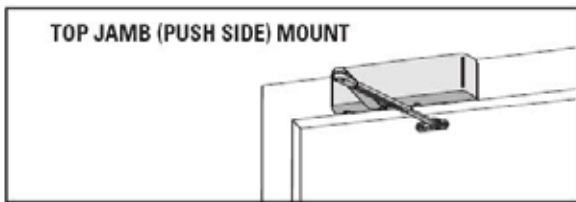
- Parallel arm:** Closer is mounted on the push side of the door, with the parallel arm shoe attached to the underside of the frame head



- **Regular arm (AKA hinge side mount):** Mounted on the pull side of the door, with the arm attached to the frame face above



- **Top jamb:** Mounted on the push side of the frame, with the arm attached to the face of the door



- **Track closers:** Various types available for push or pull side mounting, with track mounted on door or frame and a single lever arm, instead of a double-lever arm and shoe
- **Concealed:** Closer body-mounted either in frame head or top of door and often used where aesthetics dictate,

In addition to surface-mounted closers, there is a variety of other types of closers for specific purposes and applications. Floor closers may be desired when an overhead closer can't be used. High-security closers are designed for use where they may be subject to excessive abuse or vandalism. Closers with an electronic hold-open feature may be used to hold open fire doors, if they are integrated with the fire detection system so the doors close automatically upon fire alarm. Automatic operators are common for doors that need to provide greater accessibility than what can be provided by standard door closers.

Code requirements

Many codes and standards contain requirements for door closers. Accessibility, fire and life-safety requirements all have an effect on door closers, but if the product is selected and installed properly, these requirements may not be difficult to meet.

- **Accessibility:** According to the national accessibility standards, door closers must be adjusted so that it takes [at least five seconds](#) for the door to move from an open position of 90 degrees to 12 degrees from the latch. The delayed action feature, which holds the door open for a minute or two before beginning the closing cycle, is not required by the national standards, but may be helpful for certain types of rooms, such as a storage room or tub room. Interior doors that are not fire doors must be able to be opened [with a maximum of five pounds of force](#). This limitation applies to the force required to open the door, not the force required to release the latch. Fire doors are limited to the minimum opening force allowed by the Authority Having Jurisdiction (AHJ). For interior doors, the NFPA 80 typically recommends a size 3 closer. Exterior doors are not addressed by the national accessibility standards, but may be addressed by state or local accessibility requirements. The International Building Code (IBC) limits the opening force for accessible, non-fire-rated, swinging doors to five pounds, and other egress doors to 15 pounds to release the latch, 30 pounds to set the door in motion, and 15 pounds to open the door to the fully-open position.
- **Fire doors:** One of the cardinal rules of fire-rated doors is that they must be closed at the time of a fire, but there are [many ways to hold open a fire door](#). A wall- or floor-mounted magnetic holder and a separate mechanical closer may be used if the holder releases upon fire alarm/smoke detection. A closer with an integral electronic holder may either release upon fire alarm or may contain an integral smoke detector. For retrofit applications, a battery-operated holder with an integral smoke detector may be used in conjunction with a separate mechanical closer. According to NFPA 80 – Standard for Fire Doors and Other Opening Protectives, a closing device must be installed on every fire door. Exceptions to this requirement are communicating doors between hotel rooms and the inactive leaf of pairs leading to rooms not normally occupied by humans, like a mechanical room (where acceptable to the AHJ). Closers must be securely attached with steel screws or through-bolts, and the closer must be adjusted so the door latches each time it closes.



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- **Life-safety:** The IBC and NFPA 101 – Life Safety Code contain similar requirements for holding open fire doors, although they are more specific with regard to locations where automatic-closing doors are allowed and how they are released. Automatic-closing doors must have the capability of manual release and must be automatically released by smoke detectors meeting the requirements of NFPA 72 – National Fire Alarm Code. When automatic-closing doors are used on stairs, they must be wired so all doors close when one door closes to protect the exit enclosure.

Conclusion

For questions about door closers, assistance with special applications, or a complete specification, Allegion has more than 100 specification writers and architectural consultants available to help. We are also an AIA/CES-approved provider, and conduct a wide range of courses offering AIA continuing education units. For help with code compliance and product application, explore www.idighardware.com, where you can ask a specific question using the Help button.

By Lori Greene, AHC/CDC, CCPR, FDAI, Manager, Codes and Resources, Allegion

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