How to Fix EDGE CLEARANCES on STEEL DOORS

By David Taylor

"This door doesn't fit!"

Many factors affect the proper installation and operation of doors. The most critical of these are edge clearances. Edge clearances are the distances between the door and frame at the head, the jambs, and between the leaves of a pair of doors. When edge clearances are correct, doors and hardware function as designed.

Edge clearances are not only essential for the form, fit and function of every door opening system, they are essential for life safety. The National Fire Protection Agency (NFPA) specification 80-2007[1] requires that edge clearances be ⅛" plus or minus 1/16" for steel doors. These are the same edge clearances specified by the Hollow Metal Manufacturers Association (HMMA) for all openings, as documented in *Tolerances and Clearances for Commercial Hollow Metal Doors and Frames* (ANSI/HMMA 841-07).

Door and frame manufacturers design and build their products to meet these stringent tolerances. These same tight tolerances must carry over to installation. When installers follow the proper industry-accepted practices, they can achieve these critical edge clearances. The first and most important thing a qualified installer can do is to follow proper installation practices.

Luckily, there is an easy way to learn the proper methods of installation for steel door frames. These are detailed in the HMMA document *Guide Specification for Installation and Storage of Hollow Metal Doors and Frames* (NAAMM HMMA 840-07). This is a fabulous resource for instructions and information regarding acceptable tolerances and installation techniques, and it is available online.

"OOPS! The clearances are not right!"

When a door binds or even touches at the head, a jamb or another door leaf, it has an edge clearance problem. Less severe, but also important, is when the clearances are not uniform around the door, creating an aesthetic problem and reflecting poorly on the workmanship of the whole job. In either case, the installer must correct the installation errors to achieve correct edge clearances.

The first thing to check is that the frame is square, true and plumb. This can be done with a series of measurements at the top, middle and bottom of the frame and by using a framing square or other tools specifically designed to check door openings. These troubleshooting techniques were the subject of our article "Troubleshooting Door and Frame Issues from Your Desk" in the November 2011 issue of *Doors & Hardware* magazine.

If you can adjust the frame to fix the problem, then great! But what do you do if the frame is installed improperly and not easily fixed? Before tearing out a frame, think about using shims. You may be able to use shims under the hinge leaves to correct the clearance issues.

Shims are permitted by NFPA 80 as long as they are made of steel. Shims are typically ¼" x 4" and come in varied metal thicknesses to suit the condition. Installers can cut their own shims, or they can use purchased shims. Either way, the shims should be made from corrosion-resistant zinc-coated steel so they can be used on both exterior and interior openings.

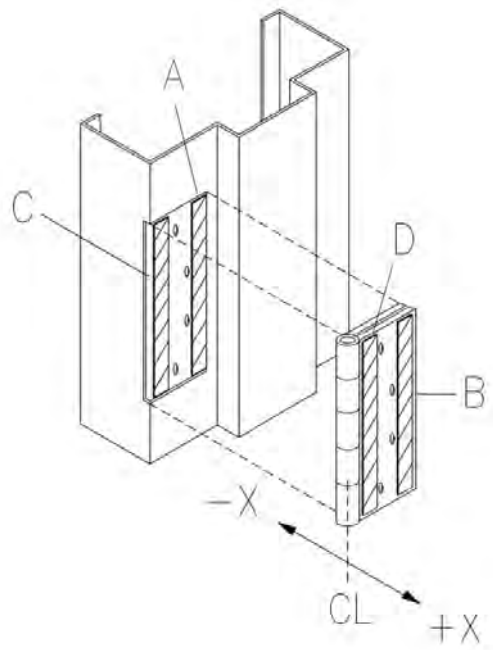


Figure 1 shows a hinge and a hinge reinforcement in a metal door frame, as well as the possible locations that shims can be placed to adjust clearances.

- Using shim A only will move both the door and centerline of the hinge barrel in the -X direction.
- Using shim B only will move the door in the -X direction.
- Using both shims A and B will move the door in the -X direction by a greater amount than using them individually.
- Using shim C only will move both the door and centerline of the hinge barrel in the +X direction.
- Using shim D only will move the door in the +X direction.
- Using both shims C and D will move the door in the +X direction by a greater amount than using them individually.

The idea behind using shims is to change the position of the hinge relative to both the door and the frame. By being clever, you can change the axis and position of the door swing relative to the hinge jamb of the frame. See Figure 1 and its accompanying description to get a feel for how this works. Once you use these techniques a few times, you will develop the experience necessary for placing the shim, selecting shim thickness, and deciding how many shims to use.

Fix These Common Conditions

You can use the adjustments described in Figure 1 to remedy the following four specific field conditions. Be aware that shims must be of equal size and correct thickness. If the shims are too thick, the door might suffer a condition known as "hinge bind." Hinge bind is when the door does not close quite far enough for the latch to engage. This is especially evident when weatherstripping is applied to the hinge rabbet and you need to slam the door or press it closed with extra force to latch it.

Illustrations Courtesy of HMF Express, LLC

Refer back to the positions A, B, C and D that are referenced in Figure 1 as you read through the following conditions.

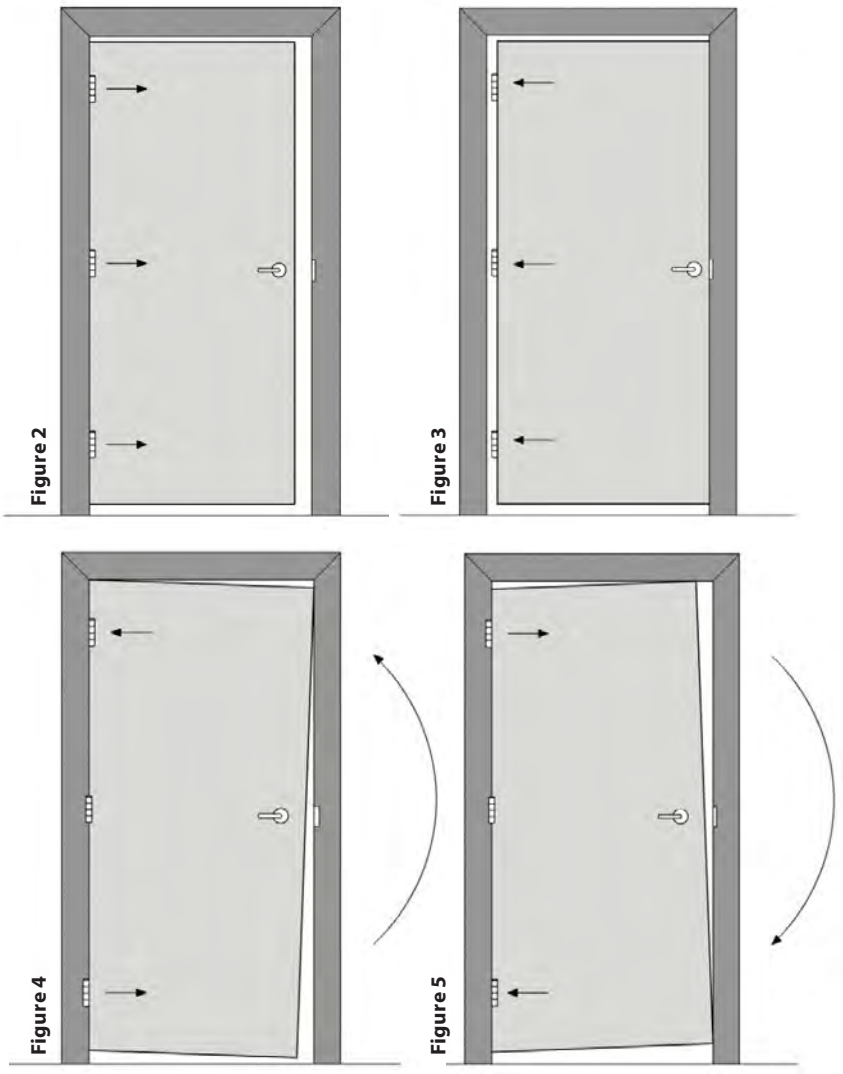
As you become familiar with these techniques for using shims, you will be able to help contractors solve many of their installation problems. By procuring high-quality material and providing knowledgeable service, you can make sure that the doors and frames you supply meet the necessary requirements for a safe and functional opening.

Your efforts to learn about and communicate proper installation techniques will improve the satisfaction of your customers, the end users, the installer and everyone else involved in the project.

About the Author: *David Taylor is the Sales and Product Development Manager with HMF Express, LLC, a custom and quick-ship hollow metal manufacturer with production facilities in Wilmington, NC, and Atlanta, GA. David also serves as the chairman of the Hollow Metal Manufacturers Association Technical Committee. To learn more about field troubleshooting, installation and product application, you can see David's material at www.hmfexpress.com, call 866/452-1845, or email Dtaylor@hmfexpress.com. To share your tips and product knowledge with the community, Tweet to @HMFExpress or post to Facebook: HMF-Express.*

Endnote

1. See NFPA 80 – 2007, Para. 6.3.1.7 for further information.



Condition: Gap too wide
(Figure 2) at lock edge

- Place equal-sized shims in position C between each jamb hinge reinforcement and the hinge leaf.
- Make further adjustments by placing equal-sized shims in position D behind each door hinge leaf.

Condition: Gap too narrow
(Figure 3) at lock edge

- Place equal-sized shims in position A between each jamb hinge reinforcement and the hinge leaf.
- Make further adjustments by placing equal-sized shims in position B behind each door hinge leaf.

Condition: Out-of-square hinge or
(Figure 4) strike jamb toed out

- This condition can be improved by placing shims in positions C and/or D behind the jamb hinge leaf and/or the door hinge leaf at the bottom hinge. Start with the jamb hinge leaf, and continue to the door hinge leaf if needed.
- Make further adjustments by placing a shim in position A behind the top hinge. The effect of this will be to rotate the door at about the middle hinge.
- If the strike jamb is toed out, you may try placing shims in positions C and D at the middle hinge as well.

Condition: Out-of-square hinge or
(Figure 5) strike jamb toed in

- This condition can be improved by placing a shim in position A behind the bottom hinge leaf and possibly the middle hinge leaf as well.
- Make additional fine adjustments by placing thin shims in positions C and D at the top hinge.