HAGER COMPANIES
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SEVEN STEPS TO SPECIFYING THE RIGHT HINGE

by John Cohrs, AHC/CDC, CCPR

The hinge is thought to be one of the greatest inventions of mankind, an equal contender to the wheel. Dating back to 1600 BC, the hinge has been found in cultures around the globe. In the United States, when colonists began moving west in the 1840s and 1850s, Charles Hager built his business by providing wagon wheel rims and hinges for the Conestoga wagons. Hager is credited with developing a compact version of the butt hinge in the early 1900s.

Today, there are thousands of different types of hinges, from mortise and half-surface to pivot and swing clear, strap, flag,concealed—all with various finishes and tips and additional options. It can be rather difficult to specify the right hinge. But by following these seven steps, the process can be made easier.

1. Determine the type of hinge. There are four types of hinges: full-mortise, half-mortise, fullsurface, and half-surface. To determine the type of hinge that is appropriate, it is important to know what the door material is (hollow metal, wood, stainless steel or fiberglass) and what the frame material is (hollow metal, wood, stainless steel or channel iron).

Full-mortise hinges have both leaves mortised into the door and frame (wood door or hollow metal door with wood or hollow metal frame). Half-mortise hinges have one leaf mortised into the door and the other leaf surface-applied to the frame (hollow metal door with a channel iron frame).

Full-surface hinges have both leaves surface-applied to the door and frame (metal core or hollow metal door and channel iron frame). Finally, half-surface hinges have one leaf surface-applied to the face of the door and the other leaf mortised into the frame (wood door with wood frame or metal core door with hollow metal frame).

When specifying half-mortise and half-surface hinges, remember that you are specifying the hinge on the door. Half-mortise has one leaf of the hinge mortised into the door, and half-surface has one leaf surfaced-applied to the door.

2. Select the proper weight and bearing structure. Two factors determine the weight and bearing structure of a hinge: the weight of the door and the frequency of use. Always include the weight of the hardware when calculating the door weight. Hinges are place into three groups:

- Standard weight – plain bearing: Use on low-frequency openings with a maximum door weight of 75 lbs. for a 4.5 inch-high hinge.
- Standard weight – ball bearing: Use on medium-frequency openings with a maximum door weight of 150 lbs. for a 4.5 inch-high hinge.
- Heavy weight – ball bearing: Use on high-frequency openings with a maximum door weight of 150 lbs. for a 4.5 inch-high hinge.

Hinges also have various bearing options, including ball bearing, oillite bearing and antifriction nylon bearing.

- Ball bearing – Engineered to throw the knuckle weight against hardened steel raceways, which ride on the bearing surfaces. Lateral wear is minimized because the pin is held against thrust by the hardened steel top and bottom raceways.
- Oillite bearing – Made of porous metal that has been press-formed and impregnated with oil. Pressure and heat generated when the door is operated cause the oil to come to the surface of the bearing, making the surface slick and smooth.
- Anti-friction nylon bearing – Made of resilient plastics that provide a self-lubricant bearing surface. The nylon acts as a cushion for the door and allows the door to flow smoothly on the surface of the nylon with a low wear factor.

3. Determine the size of the hinge. Full-mortise hinges have two dimensions (4½" x 4½"). The first dimension is the height of the hinge, and the second dimension is the width when the hinge is in the open position. The height is determined by the thickness and the width of the door.

The width of the hinge is determined by the maximum clearance required between the wall and the face of the door opened at 180 degrees. Three dimensions are needed to calculate the width of the hinge: door thickness, clearance required, and backset:

Width of Hinge =
[(Door Thickness – Backset) x 2] +
Clearance Required

4. Determine the number of hinges. On a 3070 hollow metal or wood door, three hinges are needed—one hinge for every 30 inches of door height or fraction thereof.

Door Height	Number of Hinges
Up to 60"	2 Hinges
Over 60" and not over 90"	3 Hinges
Over 90" and not over 120"	4 Hinges

For wider doors (doors over 37 inches to 48 inches), an additional hinge could be specified to support the weight and tension applied to the frame. There will be an additional cost for the door and frame for the preparation of the hinge.

5. Determine the type of hinge material. Hinge materials include stainless steel, steel and brass. Stainless steel is a rust-resistant material that is used on exterior openings or in corrosive areas. It is used on fire-rated and non-fire-rated openings. Steel is a corrosion-prone material that is used on interior openings in a controlled environment. It is used on fire-rated and non-fire-rated openings. Brass is a noncorrosive, rust-resistant material that is used on both interior and exterior openings. It is used only on non-fire-rated openings.

6. Determine the type of finish. Steel and brass base material hinges can be plated to match the finishes listed in the American National Standards Institute standard ANSI/ BHMA A156.18, Materials and Finishes.

Antimicrobial-treated coatings can be applied for durability and protection. Antimicrobial resistance on hinges is affected by moisture in the air. Silver ions interact with humidity and are released, creating a cleaner surface. Uses include healthcare facilities and schools.

7. Determine pin and tip styles. Non-removable pin (NRP) hinges have a small set screw in the barrel of the hinge. The set screw is positioned so it cannot be reached unless the door is opened. This application is used on exterior openings or out-swinging locked openings.

Hospital tips on hinges prevent hanging any objects on the tip of the hinge. They are commonly used in hospitals and prison facilities. The industry standard is the flat button tip. Decorative tips such as ball, acorn, steeple and urn are available and are used in decorative areas such as offices and residences.

There are a lot of things to consider when specifying the proper hinge, but by following the seven steps outlined in this article, that process can be made simpler, and you can ensure smooth operation of the opening and that it will last the life of the building.

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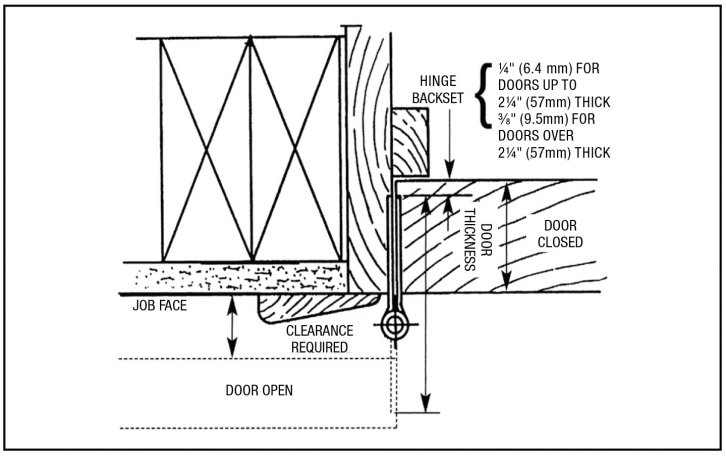
Full-Mortise Hinge Height	Frequency of Use	Max Door Weight	Maximum Door Width
4½" (114 mm)	Low	75	36" (914 mm)
4½" (114 mm)	Medium	150	36" (914 mm)
4½" (114 mm)	High	150	36" (914 mm)
5" (127 mm)	Low	100	36" (914 mm)
5" (127 mm)	Medium	175	36" (914 mm)
5" (127 mm)	High	175	36" (914 mm)
6" (152 mm)	Low	125	36" (914 mm)
6" (152 mm)	Medium	230	36" (914 mm)
6" (152 mm)	High	230	36" (914 mm)



Thickness of Door	Width of Door	Height of Hinge
1⅜" (35 mm) Door	To 32" (813 mm)	3½" (89 mm)
1⅜" (35 mm) Door	32" to 36" (813 to 914 mm)	4" (102 mm)
1¾" (45 mm) Door	To 36" (914 mm)	4½" (114 mm)
1¾" (45 mm) Door	36" to 48" (914 to 1219 mm)	5" (127 mm)
1¾" (45 mm) Door	Over 48" (1212 mm)	6" (152 mm)
2", 2¼", 2½" Door (51, 57 & 64 mm)	To 42" (1067 mm)	5" (127 mm) Heavy Weight
2", 2¼", 2½" Door (51, 57 & 64 mm)	Over 42" (1067 mm)	6" (152 mm) Heavy Weight

Door Thickness	Standard Backset	Max. Clearance Provided	Width of Hinge
1⅜" (35 mm)	¼" (6.4 mm)	1¼" (32 mm) 1¾" (45 mm)	3½" (89 mm) 4" (102 mm)
1¾" (45 mm)	¼" (6.4 mm)	1" (25 mm) 1½" (38 mm) 2" (51 mm) 3" (76 mm)	4" (102 mm) 4½" (114 mm) 5" (127 mm) 6" (152 mm)
2" (51 mm)	¼" (6.4 mm)	1" (25 mm) 1½" (38 mm) 2½" (64 mm)	4½" (114 mm) 5" (127 mm) 6" (152 mm)
2¼" (57 mm)	¼" (6.4 mm)	1" (25 mm) 2" (51 mm)	5" (127 mm) 6" (152 mm)
2½" (64 mm)	⅜" (9.5 mm)	¾" (19 mm) 1¾" (45 mm)	5" (127 mm) 6" (152 mm)