

GUIDE SPECIFICATION FOR INSTALLATION AND STORAGE OF HOLLOW METAL DOORS AND FRAMES

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STEEL DOOR
MANUFACTURERS
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STORAGE AND INSTALLATION OF HOLLOW METAL DOORS AND FRAMES

PART I - INTRODUCTION

This guide specification is intended to stress the necessary precautions and requirements for receipt, storage, handling and installation of hollow metal products, and the skills essential in the hanging of doors.

The proper performance of most products depends not only on how they are manufactured, but how they are installed. This is especially true of hollow metal doors and frames. The installation of doors and frames is an operation demanding care and skill, if the doors are to operate properly. Care in manufacturing does not, in itself, guarantee satisfactory performance. Even the best designed and most carefully constructed frames and doors, if incorrectly installed, will not function properly.

Hollow metal work is fabricated in accordance with the shop drawings, approved by the architect or engineer. Preparation for hardware or other items supplied by others is provided in accordance with the information furnished to the hollow metal manufacturer.

The hollow metal manufacturer is a material supplier, not a subcontractor. The manufacturer does not include the installation of their product in the building, but only shipment in good condition from the factory.

Should the General Contractor discover any error in the hollow metal delivered to the job site, it is imperative that the hollow metal manufacturer be notified in writing and allowed sufficient time before initiating any corrective measure in the field, so that the manufacturer can participate in solving the problem. Failure to do so could result in the cancellation of the warranty and/or fire label and non-acceptance of any cost associated with repair.

Most member companies of the Hollow Metal Manufacturer's Association Division of CSDMA have their own field representatives who are qualified not only to do expert repair work but to determine whether the fault lies with the manufacturer or with some other party.

It is essential that material is properly stored prior to installation and skills are exercised in the setting of frames and hanging of doors.

PART 2 - RECEIVING AND STORAGE OF MATERIAL

A. RECEIVING

Upon delivery, the contractor responsible for receiving hollow metal products shall thoroughly inspect for damage. Cardboard and other wrappings shall be removed for inspection and to promote air circulation. Any scratches or disfigurements caused in shipping or handling shall be promptly cleaned and touched up with a direct to metal rust inhibitive primer.

Should damaged material be found, the General Contractor has the option of refusing delivery or to accept the material as damaged. For coordination purposes, CSDMA suggests that delivery should not be refused, but rather accepted as damaged. Any damaged items should be noted on the freight bill. Claims will not be honored by the freight carrier, unless the damaged items are noted on the freight bill at the time of delivery. The contractor shall notify the hollow metal manufacturer in writing immediately of any item signed for as damaged.

B. ON SITE STORAGE

Proper storage of hollow metal work at the construction site will help prevent damage to the primer coat of paint. Prime coated steel must be protected when exposed to the elements such as high humidity, salt air, rain, snow, and/or damp wrappings etc.... Particular attention must, therefore, be given to steel products having a coat of factory applied primer. Primer is porous to properly receive and hold top coats. Water or moisture, in contact with primer coated steel will seep through to the steel. An electrolytic action then follows, resulting in corrosion and causing the paint film to lose adhesion. The presence of oxygen at the water-air interface behind the loosened paint film accelerates corrosive action and the prime coat further deteriorates.

Even when zinc coated steel is used to provide corrosion resistance, manufacturers of hollow metal door and frame products have found that one week of product exposure to water, due to improper storage, can be equivalent to at least a year of outdoor exposure to the elements.

NOTE: Paint manufacturers advise that the primer typically used by hollow metal manufacturers should receive a finish coat of paint within 30 days of delivery. It is the responsibility of the General Contractor to sand, touch up and clean prime painted surfaces prior to finish painting in accordance with the finish paint manufacturer's instructions.

The following procedures shall always be observed in storing hollow metal doors and frames at the job site:

1. Store all materials in a dry area, under cover. All products shall be stored where they will not be exposed to, or come in contact with the elements.
2. Do not use non-vented plastic or canvas. These materials create a humidity chamber, which promotes blistering and corrosion.
3. Store doors and frames in an upright position with heads uppermost, Figures 1 and 2.
4. Place no more than 5 doors or welded frames in a group. Small groups not only minimize the likelihood of damage due to excess handling, but also facilitate selection from the group for installation. In the case of multi-opening frames, no more than three units should be stored in a group, to avoid serious damage to the bottom most frame.
5. Place all material on planking or blocking at least 4 in. (100 mm) off the ground, 2 in. (50 mm) off a paved area or the floor slab.
6. Provide at least 1/4 in. (6.4 mm) space between all units to permit air circulation.

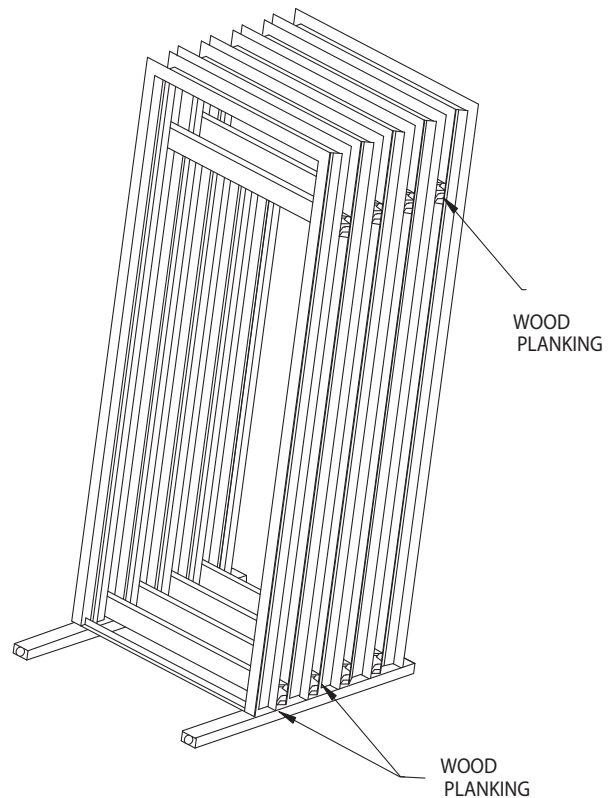


FIGURE 1
FRAME STORAGE

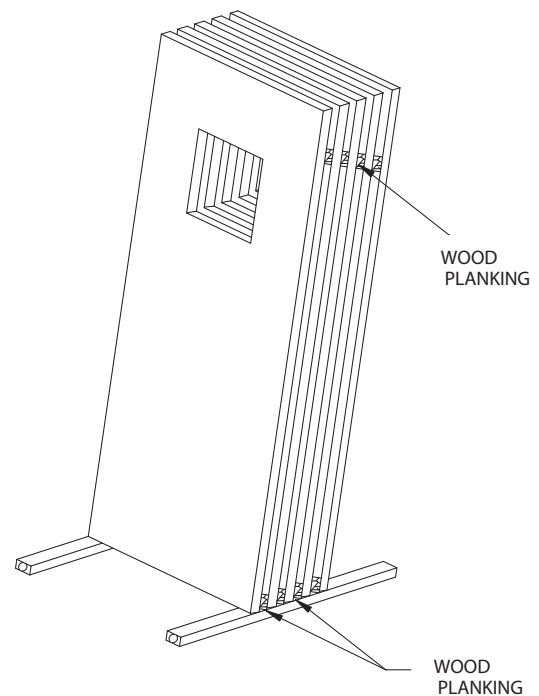


FIGURE 2
DOOR STORAGE

PART 3 - INSTALLATION OF FRAMES

A. GENERAL

Welded door frames are checked at the factory to ensure that they are square and that no jamb twists have occurred during fabrication. Temporary steel spreaders are then attached to the jamb base to minimize misalignment or other damage during handling and shipment. The frames are loaded on the carrier by personnel experienced in frame packing. The spreaders are for shipping and handling purposes only and must be removed before installing the frame.

At no time shall the spreaders be used during installation.

In spite of precautions, frames can and sometimes do arrive at the job site with minor alignment deviations. Minor deviations from true form and alignment can be corrected by the contractor responsible for installation.

When knock-down frames are used the manufacturer's recommended assembly procedures must be followed before installation of the frame can begin. A knock-down frame is easier to pack for shipment and requires less shipping space than a welded frame. Such frames, however, place greater responsibility on the installer, who must assemble them and make sure that, in spite of job conditions, they are square and in true alignment. Frames of this type normally use bendable tabs, screw or bolt fasteners in their assembly, and these may be lost in shipment or at the job site. In general, knockdown frames are not recommended for doors wider than 3 ft. 6 in. (1067 mm) or weighing more than 100 pounds (45 kg).

B. PRIOR TO INSTALLATION

The installer shall perform the following prior to installation:

The area of floor on which the frame is to be installed and the path of the door swing shall be checked for flatness and levelness. Permissible tolerance is +/- 1/16 in. (1.5mm). If the floor exceeds this, it is the general contractor's responsibility to correct the area that is out of tolerance before the frame is installed.

Frame shall be checked for correct size, swing, fire rating and opening number. Remove temporary steel spreaders. Spreader can typically be removed with cold chisel and hammer. With frame standing on concrete, position cold chisel at weld joint of spreader and jamb and strike chisel with hammer.

C. INSTALLATION TOLERANCES

During the setting of the frame, check and correct as necessary for opening width, opening height, squareness, alignment, twist and plumbness. Permissible frame product installation tolerances shall be maintained within the following limits: See Figure 3.

Opening width – Measured horizontally from rabbet to rabbet at top, middle and bottom of frame; +/- 1/32 in. (1mm).

Opening height – Measured vertically between the frame head rabbet and top of floor or bottom of frame minus jamb extension at each jamb and across the head; +/- 1/16 in. (1.5mm).

Squareness – Measured at rabbet on a line from jamb, perpendicular to frame head; not to exceed 1/16 in. (1.5mm).

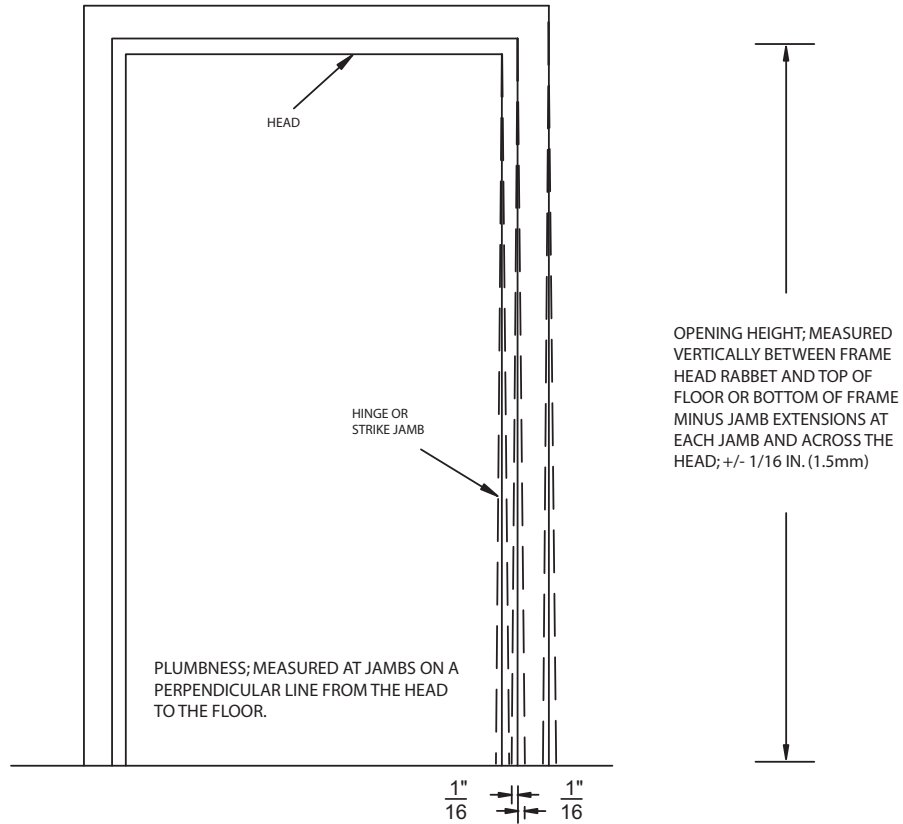
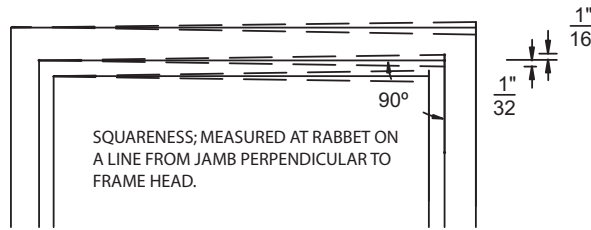
Alignment – Measured at jambs on a horizontal line parallel to the plane of the face; not to exceed 1/16 in. (1.5mm).

Twist – Measured at opposite face. Corners of jamb on parallel lines, perpendicular to the plane of the door rabbet.

Plumbness – Measured at jambs on a perpendicular line from the head to the floor; not to exceed 1/16 in. (1.5mm).

The tolerances shown provide a reasonable guideline for proper installation of hollow metal frame products. However, it should be noted that the cumulative effect of the installation tolerances at or near their maximum levels could result in sufficient misalignment to prevent the door from functioning properly. Installers should be careful not to create a tolerance buildup. Tolerance buildup occurs when several tolerances are at or near their maximums. Care should be taken to keep each of these tolerances as close to zero as possible.

OPENING WIDTH; MEASURED HORIZONTALLY FROM RABBET TO RABBET AT TOP, MIDDLE AND BOTTOM OF FRAME; +/- 1/32 IN. (1mm)



PROFILE MAY VARY AS A FUNCTIONAL DESIGN

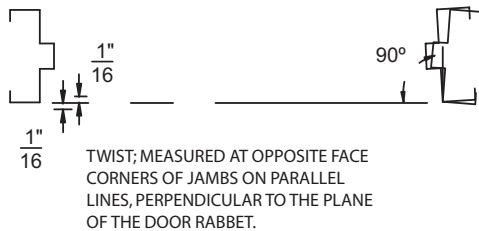
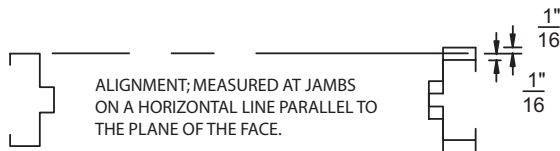
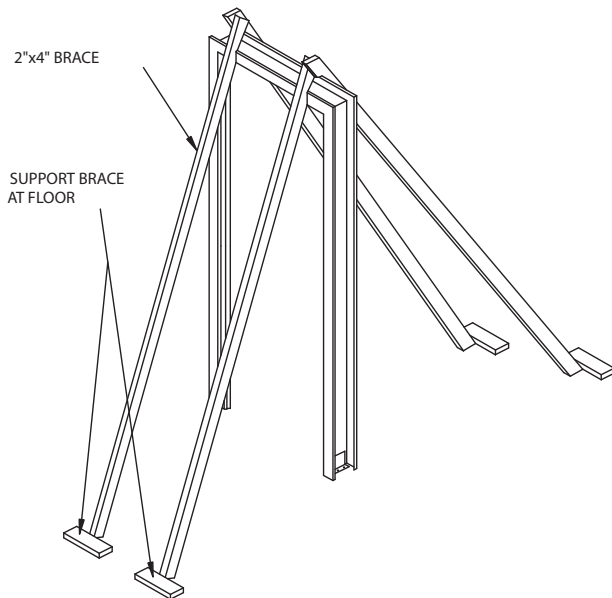


FIGURE 3
FRAME INSTALLATION TOLERANCES

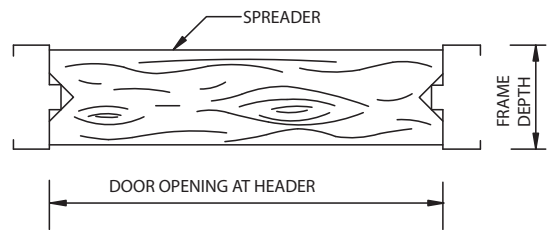
D. TYPICAL INSTALLATION PROCEDURES

Position frame in the correct location. Brace the frame as shown, Figure 4. Do not brace in the direction of intended wall.

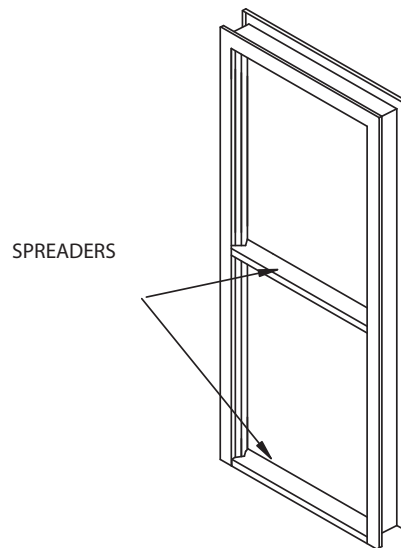


**FIGURE 4
FRAME BRACING**

With frame in position, install the temporary wood spreaders. The wood spreader, Figure 5, must be square and no less than 1 in. (25 mm) thick. Correct length is the door opening width between the jambs at the header. Cut clearance notches for frame stops. Spreader must be nearly as wide as frame depth for proper installation. Install a spreader at the bottom of the frame and a second wood spreader at the mid or strike point to maintain a proper door opening and to prevent bowing of the jambs, Figure 6. Clamp or wire spreaders to frame to hold spreaders in place until the frames are set permanently in the wall.



**FIGURE 5
WOOD SPREADER**



**FIGURE 6
SPREADER LOCATION**

At frames with jamb opening heights greater than 8 ft. (2438mm) or frame face dimensions less than 1-1/2 in. (38mm), install an additional wood spreader. Space wood spreaders at a maximum of 36 in. (914mm) intervals between header and bottom of frame, Figure 7.

At frames with sidelights where the sidelight sill intersects the door jamb near the strike, it is imperative that a wood spreader is located at this location, Figure 8.

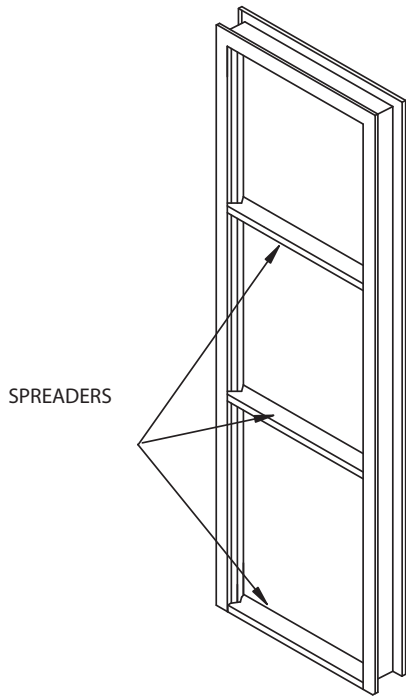


FIGURE 7
SPREADER LOCATION AT
LARGE JAMB OPENING HEIGHTS

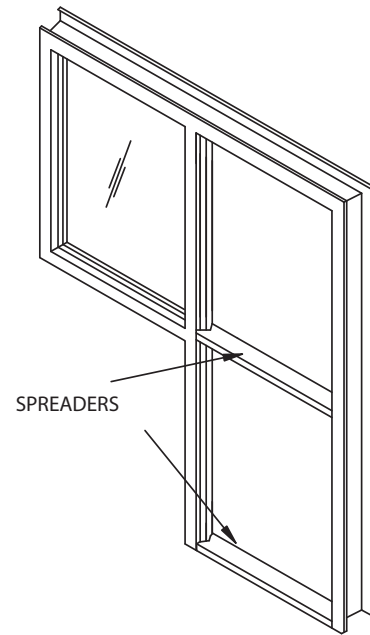
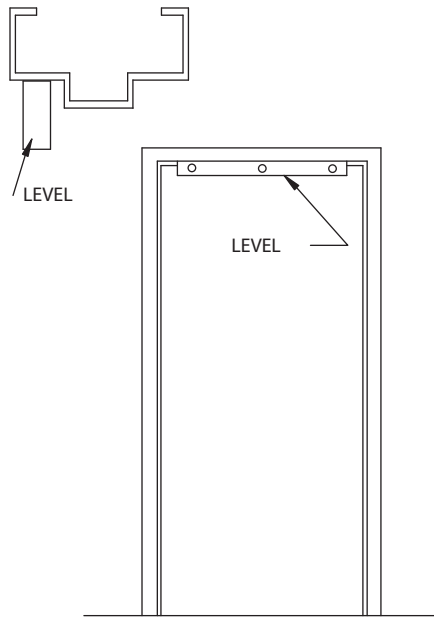


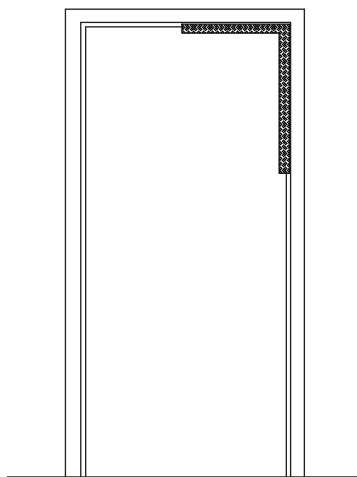
FIGURE 8
SPREADER LOCATION AT SIDELIGHTS

The installation contractor shall have a carpenter level and builder's square. Level the head by positioning the level to the head door rabbet, Figure 9. If necessary, adjust for high spots in floor by shimming under the jamb floor anchor, Figure 13a. Equalize them through an adjustable floor anchor, if specified, Figure 13b. Note, for labeled openings the maximum floor clearance is 3/4 in. (19mm).



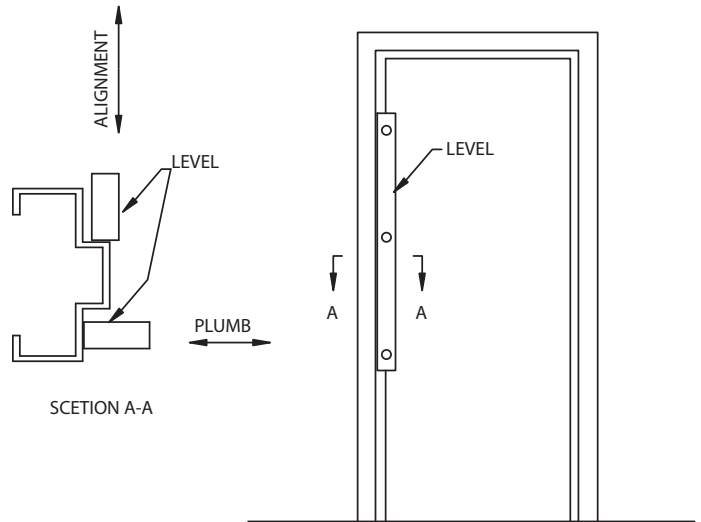
**FIGURE 9
LEVELING THE HEAD**

With builder's square, check frame for squareness. Position square against jamb and head at door rabbet, adjust as required, Figure 10.



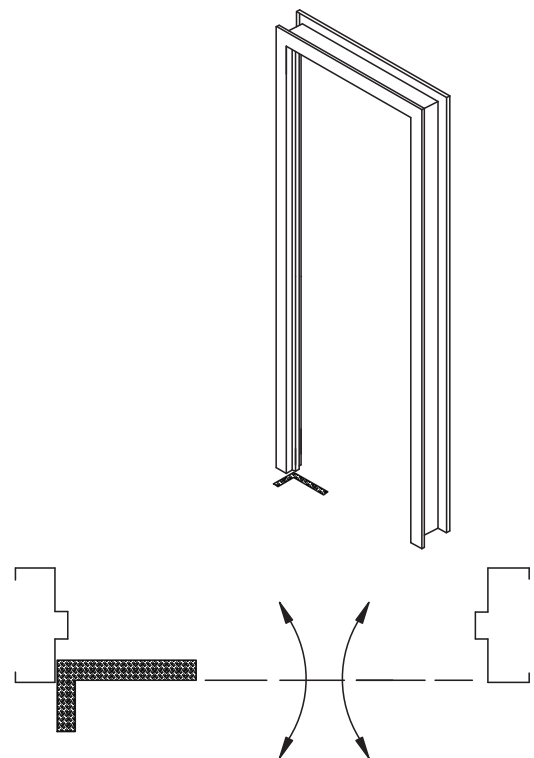
**FIGURE 10
SQUARENESS**

With carpenter level check the frame for plumbness and alignment: For plumbness, position level against both hinge and strike jambs in the rabbet. For alignment; Position level against both hinge and strike jambs on the stop, adjust as required, Figure 11.



**FIGURE 11
PLUMBING AND ALIGNMENT**

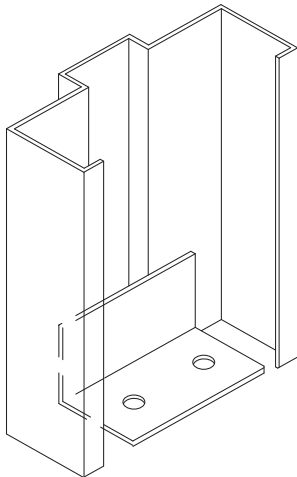
With builder's square, check jambs for twist. Position square against door rabbet and project line perpendicular to the plane of the door rabbet, adjust as required, Figure 12.



Once the installer has ensured that the frame is in the correct position, anchor the jamb to the floor.

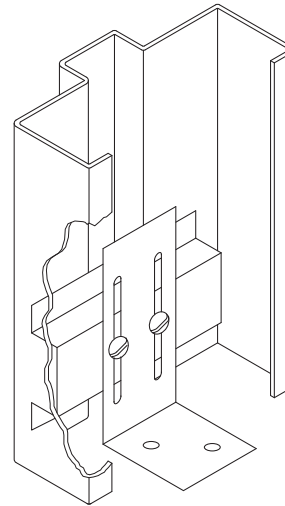
Floor Anchors: The fixed floor anchor is welded to the base of the jamb, typically secured to the floor by mechanical fasteners, providing solid anchorage for the base of each jamb, Figure 13a. Shimming must be used if the floor is not level. This type of anchor is not used in existing masonry, preframed stud walls or slip-on dry-wall frames, but may be provided.

At prepared openings (existing masonry or concrete) an additional expansion anchor reinforcement is provided. With pre-framed stud walls or completed drywall openings an additional base anchor is included. In both instances these anchors are located as close to the bottom of the jamb as is practical.



**FIGURE 13A
FIXED FLOOR ANCHOR**

The adjustable floor anchor is designed for use where there are significant irregularities from level, an intended slope in the floor, or where toppings such as terrazzo are used, Figure 13b. Like the standard anchor, it cannot be used in prepared openings or slip-on knock-down dry-wall frames.



**FIGURE 13B
ADJUSTABLE FLOOR ANCHOR**

E. WALL CONSTRUCTIONS AND APPROPRIATE ANCHORS

Proper frame anchoring is vitally important to the proper performance of the door opening. A variety of jamb wall anchors are available to suit the various types of wall construction. Anchors shown on the following pages are but a few of the variety of anchoring methods available.

ANCHOR SPACING

Anchor Spacing: CSDMA specifications require that the number of wall anchors used on each jamb, in all cases, be as follows:

- A. Openings in Masonry Walls. Frames with expansion bolt anchors; Anchors spaced a maximum of 6 in. (152 mm) from the top and bottom, with intermediate spacing at a maximum of 26 in. (660 mm) o/c. See Table 1.
- B. Openings in stud partitions with steel or wood stud anchors: Near hinges and directly opposite on strike jamb. See Table 1.
- C. Anchor quantity for slip-on drywall frames shall be as per manufacturer's standards and label requirements.
- D. Wall anchors locations and quantity are in addition to floor anchors, when required.

Table 1

Frame Anchor Spacing

Frame Height	Masonry Walls	Stud Partitions
> 0 in. < 60 in. (1524 mm)	2	3
> 60 in. < 90 in. (2286 mm)	3	4
> 90 in. < 96 in. (2438 mm)	4	5
> 96 in.	4 + 1 per 24 in. (610 mm)	5 + 1 per 24 in.

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