



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



Hollow Metal Manufacturers Association

Division of the National Association of Architectural Metal Manufacturers

This manual was developed by representative members of the Hollow Metal Manufacturers Association Division (HMMA) of the National Association of Architectural Metal Manufacturers (NAAMM) to provide information and guidance on the selection of hardware for hollow metal doors and frames. This manual contains advisory information only and is published as a public service by NAAMM and its HMMA Division.

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HARDWARE SELECTION FOR HOLLOW METAL DOORS AND FRAMES

PART I - INTRODUCTION

A. GENERAL

The proper performance of most products depends not only on how they are manufactured, but how they are installed. This is particularly 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 made 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 to be supplied by offers is provided in accordance with the intonation 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. However, the hollow metal manufacturer is concerned that products are properly handled and protected after delivery, and that the necessary care and skills are exercised in the setting of frames and hanging of doors. The architect too is concerned that this critical phase of the work is properly executed. Frames and doors out of true alignment and not operating properly are deficiencies that cannot be tolerated. It is important to all concerned, therefore, that attention be given to the essential requirements of good practice in field installation work.

B. DELIVERY AND RECEIVING OF MATERIAL

Upon delivery, all material shall be thoroughly inspected for damage. Cardboard and other wrappings shall be removed for inspection and to promote air circulation. Should damaged material be found, the General Contractor has the option of refusing delivery or to accept the material 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 General

Contractor must telephone or write the local office of the freight carrier and request an inspection of the damage. The contractor shall notify the hollow metal manufacturer in writing immediately of any item signed for as damage. This procedure will help to expedite the repair or replacement of the damaged items and the processing of the damage claim with the freight carrier.

Should the General Contractor discover any damage or error in the hollow metal delivered to the job site, it is imperative that the hollow metal manufacturer be notified in writing 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.

If claim is to be made for any error or deficiency in the hollow metal work itself, it is imperative that the manufacturer be so notified in writing before initiating any corrective work in the field. Most member companies of the Hollow Metal Manufacturer's Association Division of NAAMM 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.

THE CONTRACTOR RESPONSIBLE FOR INSTALLATION SHALL SEE THAT ANY SCRATCHES OR DISFIGUREMENT CAUSED IN SHIPPING OR HANDLING ARE PROMPTLY CLEANED AND TOUCHED UP WITH A RUST INHIBITIVE PRIMER.

C. ON SITE STORAGE

Proper storage of hollow metal work at the construction site will help to prevent damage to the primer coat of paint. Prime coated steel must be protected when exposed to the elements, including high humidity, salt, air, and/or damp wrappings. Particular attention must, therefore, be given to steel products having a shop coat of prime paint. Because the protective shop coat must be porous to properly receive and hold top coats, water or moisture in contact with primer coated steel will seep through to the steel by capillary action. 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 hot-dip galvanizing is used to provide a corrosion resistant base coat on steel, manufacturers of hollow metal doors have found that one week of product exposure to water, because of 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.

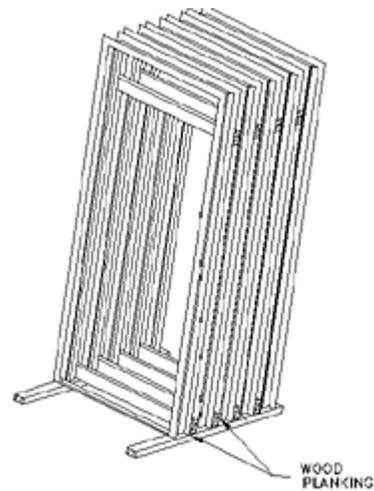


Figure 1 - FRAME STORAGE

The following procedures should 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 ferrous metal products should be stored where they will not be exposed to, or come in contact with water. This is particularly true of products such as doors, which have large flat surfaces on which water may collect if they are stacked horizontally.
2. Do not use non-vented plastic or canvas. These materials create a humidity chamber, which promotes blistering and corrosion.
3. Store doors and welded 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 a least 1/4 in. (6.4 mm) space (wood trip) between all units to permit air circulation.

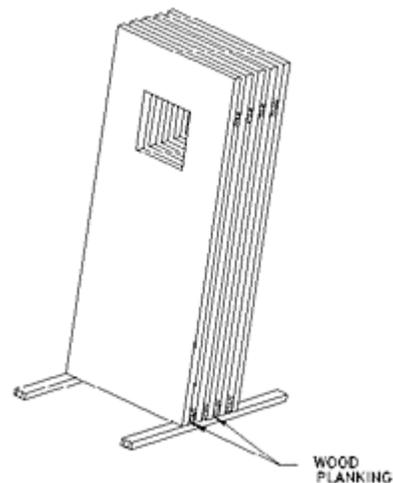


Figure 2 - DOOR STORAGE

PART 2 - INSTALLATION OF FRAMES

A. GENERAL

Welded door frames are checked at the factory to insure that they are square and that no jamb twists have occurred during fabrication. Temporary spreader bars are then attached to the jamb base to minimize misalignment or other damage during shipment. The frames are loaded on the carrier by personnel experienced in frame packing. It should be noted that the steel spreader bar is for shipping purposes only and should be removed before installing the frame. Removal of the spreader bar and primer surface touchup are performed by the contractor responsible for installation. At no time should the spreader be used to square a frame 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 reassembled frame. Such frames, however, place much 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, knock-down frames are not recommended for doors wider than 3 ft. 6 in. (1067 mm) or weighing more than 100 pounds (45 kg).

B. JAMB 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. Because loose anchors may be lost, improper quantity used, or spaced in the frame incorrectly, HMMA specifications recommend that ALL anchors be welded into the frame.

1. Masonry Anchors: Figure 3. The adjustable strap-and-stirrup type is normally used on hollow metal frames and is approved for use on fire rated frames. The stirrup or "yoke" is welded to the back of the jamb soffit. It is critically important, as stated above, that one anchor be placed near the top of each jamb, another near the bottom. This type of anchor can be used in either masonry or poured concrete construction and provides sufficient adjustment for masonry coursing as well as access for full grouting of jambs.

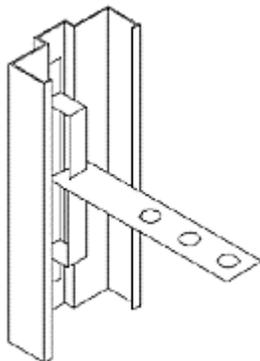


Figure 3
STRAP & STIRRUP (MASONRY) ANCHOR
(PERFORATED OR CORRUGATED)

2. The T-strap and Wire Loop anchors (Figures 4a and 4b) are shipped loose and are approved for use in fire rated frames.

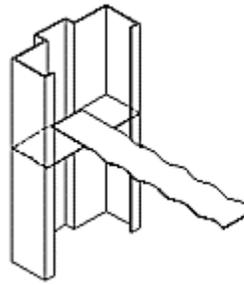


Figure 4A
T-STRAP ANCHOR
(MASONRY)

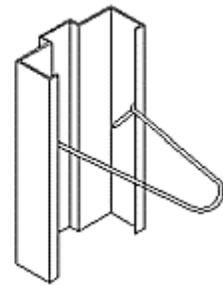


Figure 4B
WIRE LOOP ANCHOR
(MASONRY)

3. Steel Stud Anchors: (Figure 5) The steel stud anchor welded to the back of the jamb is used on custom frames and meets fire rating requirements.

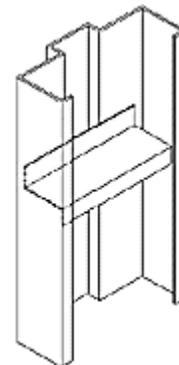


Figure 5
STEEL STUD

4. Wood Stud Anchors: (Figures 6a and 6b) Both types of wood stud anchors shown are welded to the back of the jamb. They meet fire label requirements. Loose twist in anchors are not recommended.

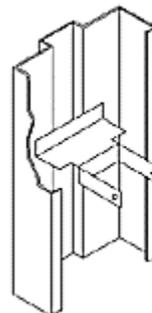


Figure 6A
WOOD-STUD
ZEE ANCHOR

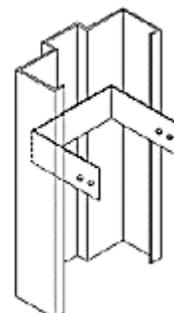


Figure 6B
WOOD-STUD ANCHOR

5. Floor Anchors: (Figure 7a) The standard floor anchor is welded to the foot of frame and, if firmly secured to the floor by expansion shield fasteners, provides solid anchorage for the base of each jamb. However, as it cannot be adjusted, shimming must be used if the floor is not level. This type of anchor cannot be used in existing masonry, preframed wood stud walls or on slip-on dry-wall frames. At prepared openings (existing masonry or concrete) an additional expansion anchor reinforcement is provided. With preframed wood stud walls an additional wood stud anchor is included. In both instances these anchors are located as close to the bottom of the jamb as is practical.

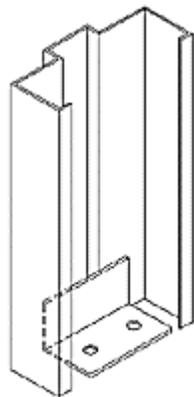


Figure 7a
FLOOR ANCHOR

6. The Adjustable Floor Anchor: (Figure 7b) 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. Like the standard anchor, it cannot be used in prepared openings or slip-on knock-down dry-wall frames.

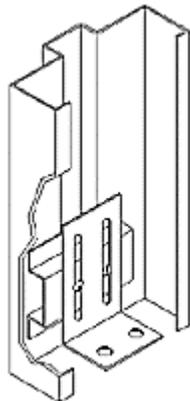


Figure 7b
ADJUSTABLE FLOOR ANCHOR

7. Slip-on Dry Wall Base Anchor: (Figure 7c) A strap of metal welded at each side of the jamb at the bottom with holes punched for nails or screws. Frames incorporating this anchor can be fire rated.

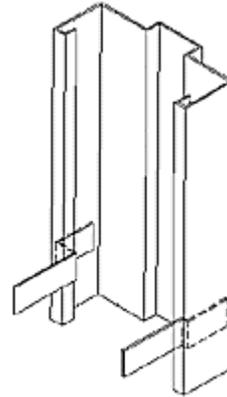
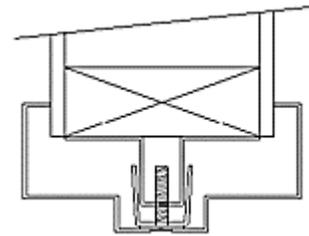
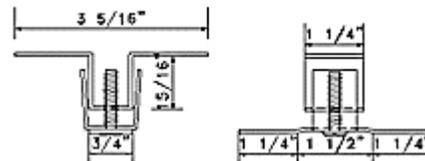


Figure 7c
SLIP-ON DRY WALL BASE ANCHOR

8. Compression Anchor: (Figure 8) An adjustable compression device located near the top of each jamb. This anchor, used on slip-on dry wall frames and in conjunction with slip-on dry wall base anchors, can be fire rated.



WOOD STUD COMPRESSION ANCHORS



METAL STUD COMPRESSION ANCHORS

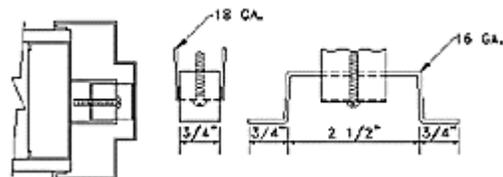


Figure 8
COMPRESSION ANCHORS

9. Expansion Bolt Anchor: (Figure 9) A hole punched and dimpled through the frame soffit to receive a 3/8 in. (9.5 mm) flat head machine bolt, expansion shield, with a crush proof tube and strap anchor welded to the back. This anchor may be used on fire rated frames only when installed in existing masonry and concrete openings.

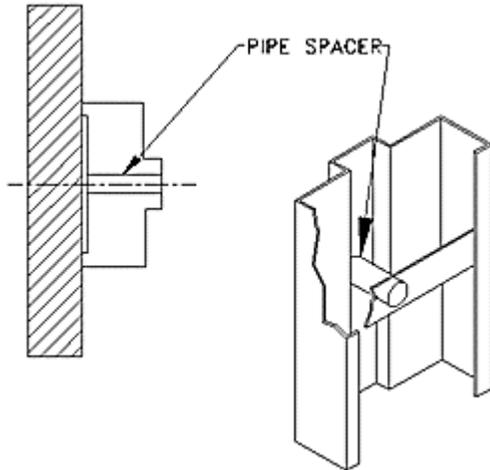


Figure 9
EXPANSION BOLT ANCHOR

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

- a. Openings in Masonry Walls: See Table 1. 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.
- b. Openings in stud partitions with steel or wood stud anchors: Near hinges and directly opposite on strike jamb. See Table 1

Table 1
Frame Anchor Spacing

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

10. Rough Buck: (Figure 10) A pre-assembled, split Frame, punched for machine bolts and expansion shields.

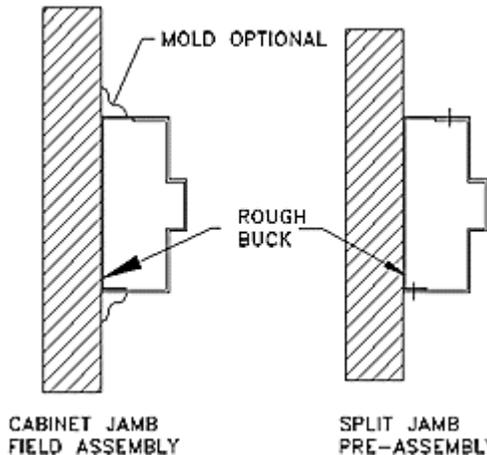


Figure 10
FRAMES WITH ROUGH BUCKS

C. MASONRY WALLS

1. Bracing the Frame: Brace the frame as shown in Figure 11. Do not brace in the direction of intended wall. (Figure 11)

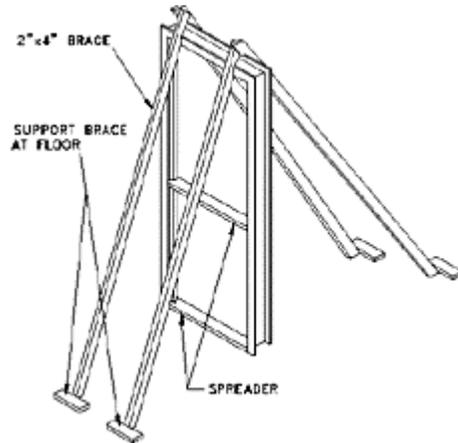


Figure 11
FRAME BRACING

2. Plumbing the Frame: The contractor should have a carpenter level, square and spreader. Set the frame in the desired location and level the header. If necessary, shim under jamb floor anchor. Figures 7a and 7b, or equalize them through an adjustable floor anchor. With frame on line, set the spreader and fasten jambs to the floor through floor anchors. (Figure 12)

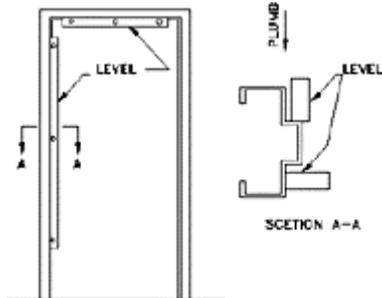


Figure 12
PLUMBING THE FRAME

3. Spreader: The typical wood spreader must be square and fabricated from lumber no less than 1 in. (25.4 mm) thick. Correct length is the door opening width between the jambs at the header (i.e. single door 3 ft. 0 in. - 3 ft. 6 in. [914mm - 1067 mm]). Cut clearance notches for frame stops. Spreader must be nearly as wide as frame depth for proper installation. Do not remove spreaders until the frames are set permanently in the wall. (Figure 13)

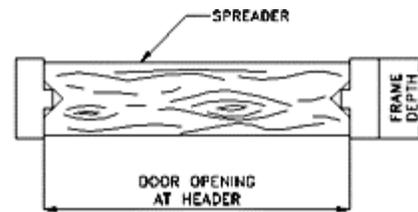


Figure 13
WOOD SPREADER

A second wood spreader at the mid or strike point on the frame must be used in addition to the one at the base of the frame to maintain a proper door opening and to prevent bowing of the jambs. (Figure 14)

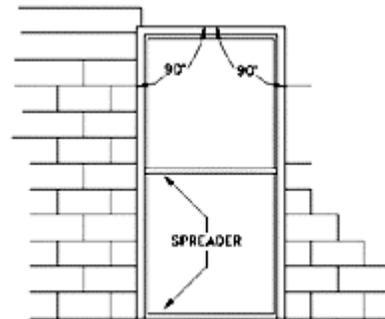


Figure 14
SPREADER LOCATIONS
(MASONRY WALLS)

The temporary spreaders, often welded to the base of the jambs of frames with welded corners, are not intended to be used during the installation of the frame into the wall. These temporary spreaders are used to prevent shipping damage only.

4. Anchoring: As wall is laid up, locate the anchors at the hinges in the hinge jamb and at a corresponding position in the strike jamb. Grout frame fully as the wall is laid up around the frame. Continually check plumb and square and twist in the jamb as wall progresses. (Figure 15)

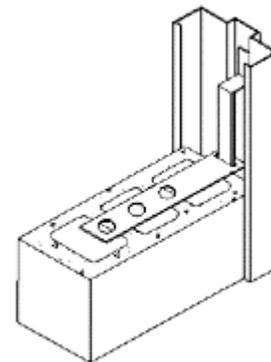


Figure 15
SPREADER LOCATIONS

D. CHANNEL-TYPE STEEL-STUD WALLS

1. Bracing, Plumbing and Using the spreader: The methods noted under Masonry Walls also apply to this wall condition. See Figures 16 and 17, also see Figures 12, 13 and 14. (Figure 16)

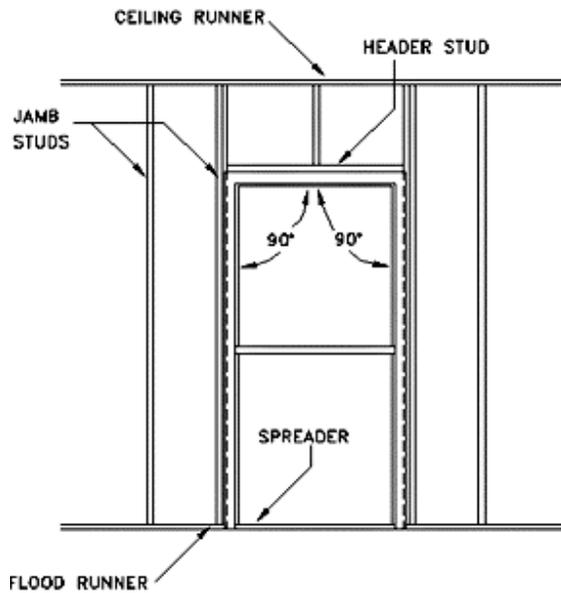
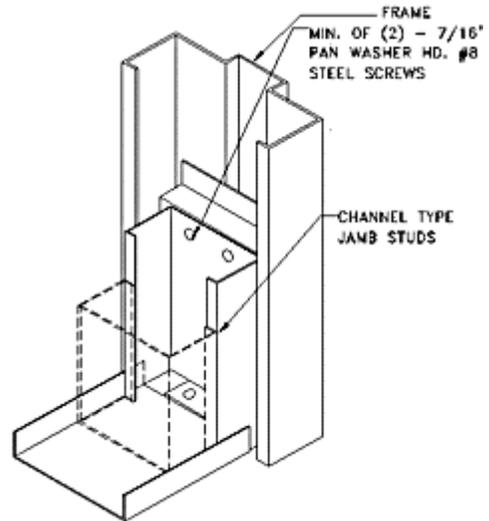


Figure 16
SPREADER LOCATIONS
(STEEL STUD WALLS)

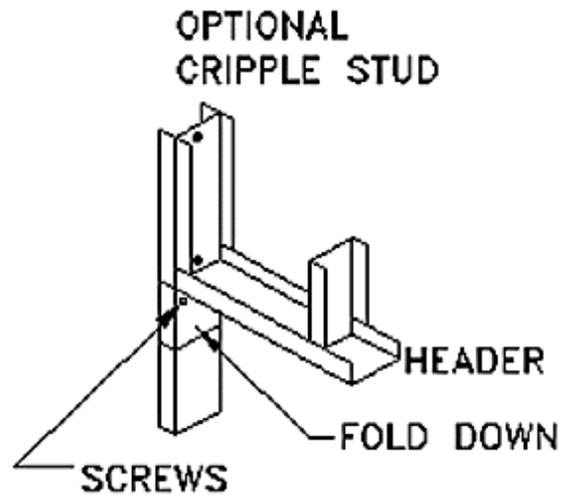
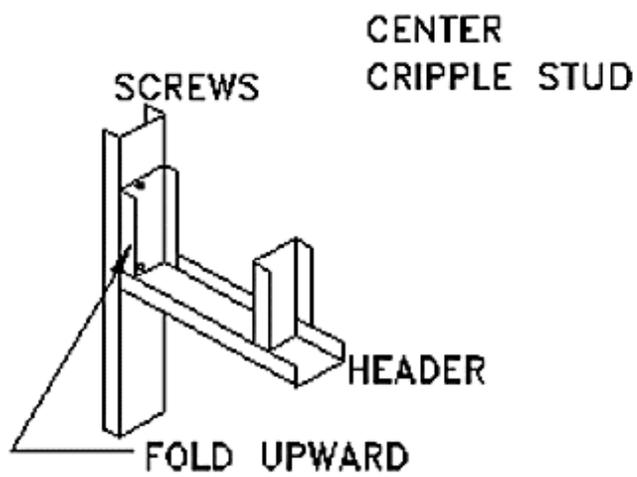
2. Anchoring: Figure 5. Anchors should be located at the hinges in the hinge jamb and at a corresponding position in the strike jamb. See anchor spacing information in Part 2.B.10.b.

Attach jambs to floor through the floor anchor, Figures 7a and 7b. Center the studs in the frame throat. Attach the steel studs to floor and ceiling runners. Attach steel studs to anchors with screws or by welding (Figure 17)



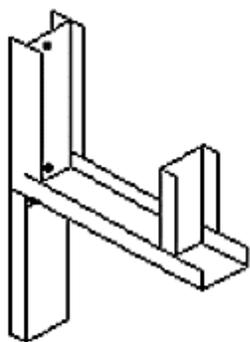
Continually check the plumb and square of the frame and check jambs for twist as the wall progresses.

3. Wall Construction: It is very important that the steel stud manufacturer's recommendation on thickness and general construction technique be followed to ensure that a solid and stable opening is achieved. For example, double studding of proper thickness at the opening is necessary.
4. See Figure 18 for examples of header construction (Figure 18)

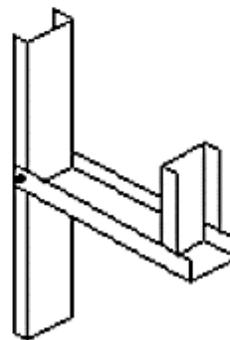


RECOMMENDED

ACCEPTABLE



ACCEPTABLE



NOT RECOMMENDED

Figure 18
STEEL STUD HEADERS

E. WOOD-STUD WALLS

1. Rough Stud Opening: The width of the opening shall be the overall frame width + 1/2 in. (12.7 mm).

The heights of the opening shall be the overall frame height + 1/4 in. (6.4 mm).

2. Anchoring: Install a minimum of four anchors per jamb on frames over 60 in. (2286 mm) high. Locate the anchors immediately above or below each hinge and as close to the bottom as feasible and in a corresponding position in the strike jamb. See anchor spacing information in Part 2.B.11.b.

Place the frame in the rough stud opening.

Bend the anchor tabs around the stud, leaving the desired clearance between the frame return and stud, for inserting the finished wall material.

Set the spreader and level and plumb the frame. Check for twist in jambs. Shim jambs if necessary.

Square the frame at the corner and nail the top anchors to the studs on ONE JAMB ONLY. Recheck the plumb, twist and square of the frame at the other corner and continue to nail the balance of the anchors to the studs. Repeat the same process for the opposite jamb.

Note: See Figures 19 and 20 for typical installation for wood studs and Figures 6a and 6b for examples of wood stud anchors. (Figure 19) (Figure 20)

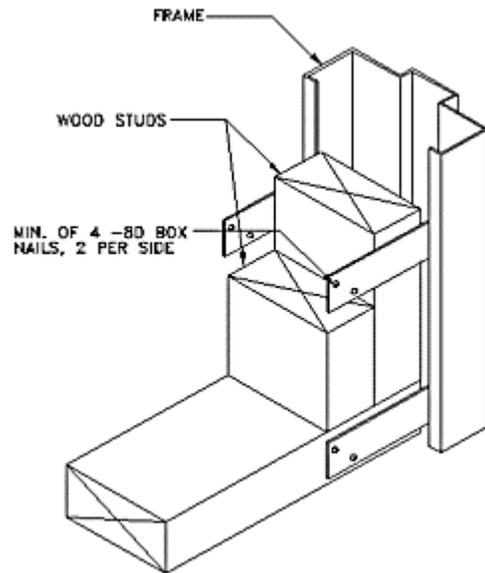


Figure 19
TYPICAL WOOD STUD INSTALLATION

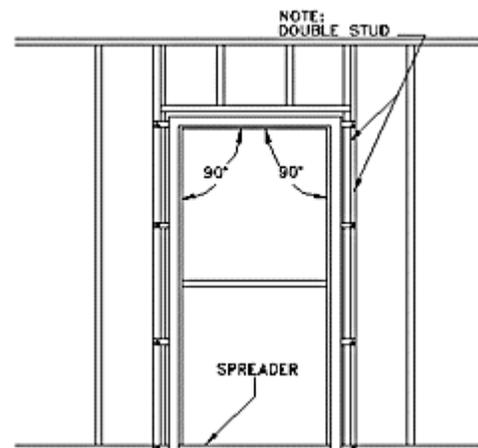


Figure 20
SPREADER LOCATIONS
(WOOD STUDS)

F. COMPLETED DRY WALL

1. Wall Construction: It is very important that the stud manufacturers recommendation on thickness and general construction technique be followed to ensure that a solid and stable opening is achieved. For example, double studding at the opening is necessary; the header stud must be the same width as the jamb stud. It is particularly important that the overlapping of vertical and horizontal steel studs be avoided since this produces oversize walls.

This, in turn, could create significant installation problems when drywall frames are used

2. Rough Stud Openings: It is important that the frame supplier be identified and his recommendation on the opening size be followed. A variety of anchoring techniques preclude the establishment of a definite rough opening standard.

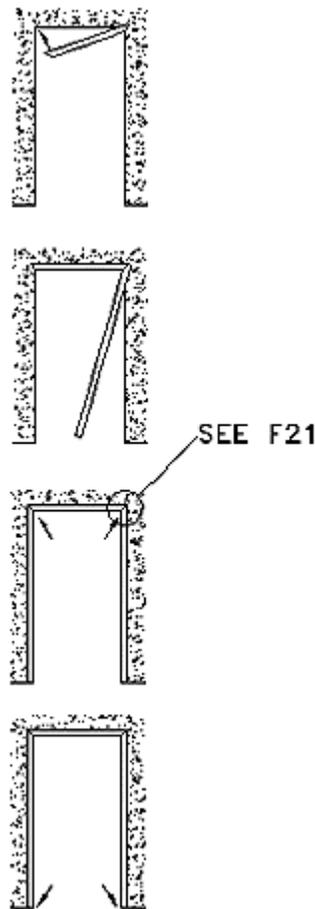


Figure 21
INSTALLATION SEQUENCE

3. Installation Sequence: Installation varies from manufacturer to manufacturer. Consult the supplying manufacturer's literature for exact instructions. A typical installation cycle may be as follows: (Figure 21)

Slide the header in place over the wall approximately in the center of the opening.

Install one jamb by sliding it over the wall at the top. Push the bottom of the member until it is approximately vertical.

Install the other jamb in a similar manner. The frame should be installed with all excessive rough opening clearances thrown to the hinge side. The weight of the door will tend to cause movement, within the opening, toward the strike jamb.

Join the horizontal header to the jambs. (Figure 22) . This is normally done by inserting tabs into the slots, tightening the screws or a combination of both. Consult the supplying manufacturer's literature to exact instructions in this area.

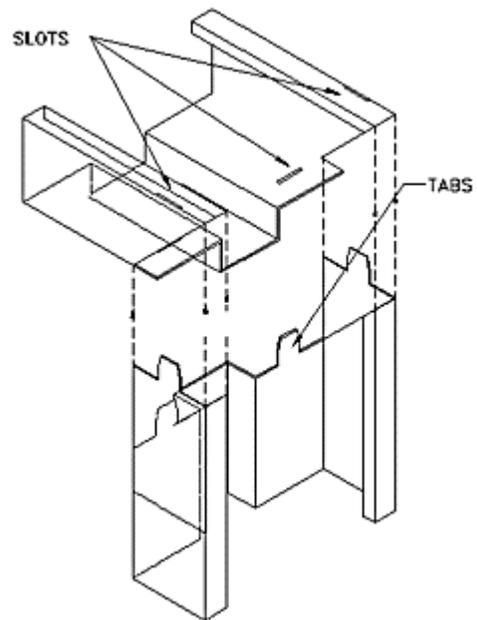


Figure 22
TYPICAL KNOCKDOWN FRAME CORNER CONNECTION

Plumb and square the opening and check the jambs for twist. A carpenter's square and level are normally employed for this purpose although some installers prefer to hang the door at this point, permitting the door to perform this function.

Attach the base anchor to the stud or floor channel at the base of the wall.

CAUTION: When doors and frames are installed in openings where security is an objective, the wall sections adjacent to the middle hinge and strike locations in the frame must be reinforced. This may be accomplished with horizontal blocking between three adjacent studs on each side of the frame and vertical blocking in the voids between the frame and the immediate adjacent studs. (Figure 23) (Figure 24)

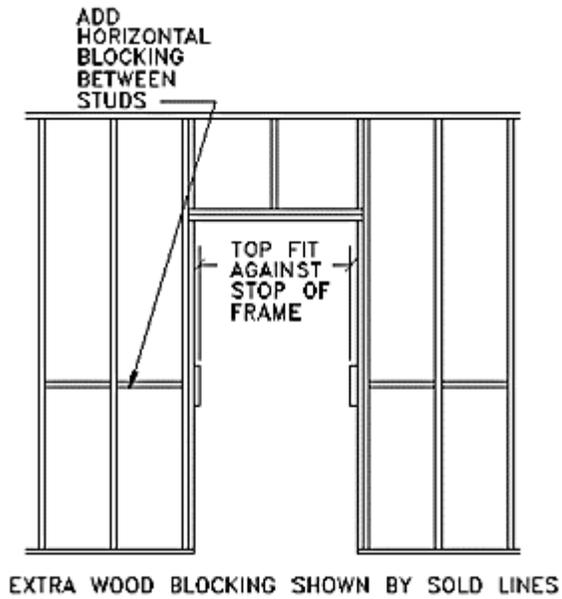


Figure 23
WOOD STUD FRAMING AND BLOCKING FOR KNOCKDOWN FRAME

The range of wall thickness variance in which drywall frames will work properly is critical. If the wall is too thick, the frame section will have to be forced over the wall, thus bowing the frame section, throwing the hinge pin centerline toward the strike jamb and thereby eliminating the normal door-frame clearance. Furnish drywall frames only for the wall for which they are designed.

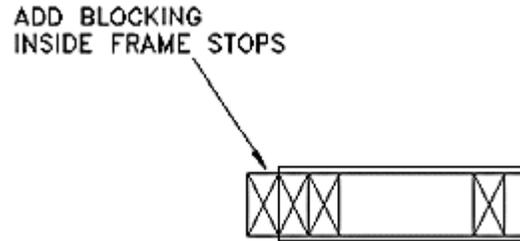


Figure 24
SECTION A-A

G. EXISTING MASONRY WALL OPENINGS

1. Anchoring: Install minimum four anchors per jamb. Locate the anchors as close to the bottom as feasible, in the hinge jamb and in a corresponding position in the strike jamb. Use five anchors on frames over 7 ft. 6 in. (2286 mm) high. See anchor spacing information in Part 2.B.11.a.
2. Wall Preparation: Place the frame in the completed wall opening. (Figure 25) Check for squareness. Mark the wall through the holes in the jamb provided at the anchor points. Drill appropriate holes at the marks. Install the sleeve anchors.

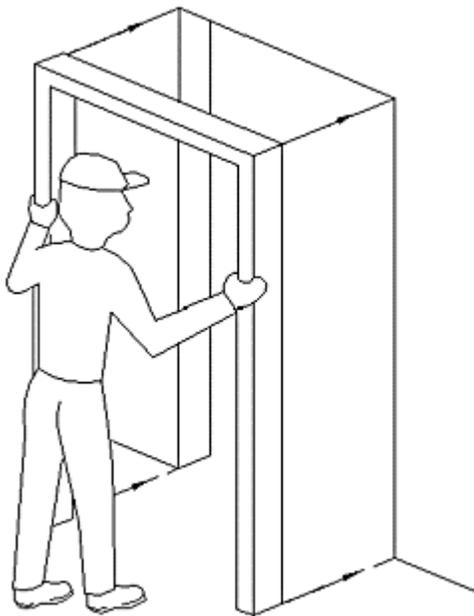


Figure 25
EXISTING MASONRY WALL FRAME
INSTALLATION

3. Install frame: Insert bolts (3/8 in. flat-headed sleeve anchors must be used on fire rated frames) through the frame soffit into the expansion shields. (Figure 26) Shim behind anchors above bolts to ensure a plumb frame. The methods of plumbing the frame, and the use of the spreader noted under Masonry Wall, also apply to this wall condition. Tighten the screws. Continually check plumb, square, and twist in the jamb as tightening progresses.

Caulk or grout clearance between frame and wall.

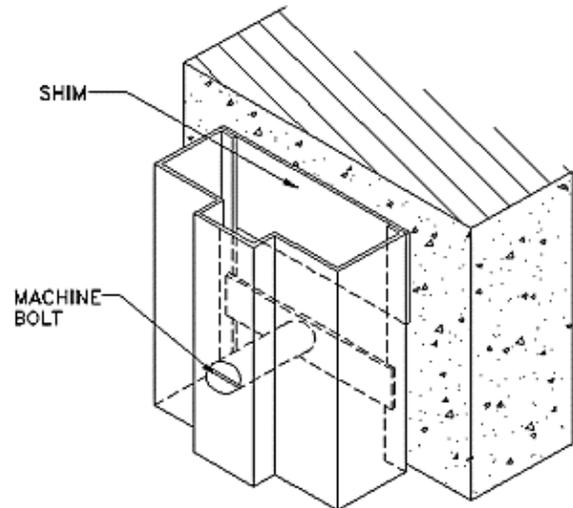


Figure 26
EXPANSION BOLT INSTALLATION

4. Rough Buck Frame: Employ similar steps as described above when a Rough Buck is used. (Figure 27)

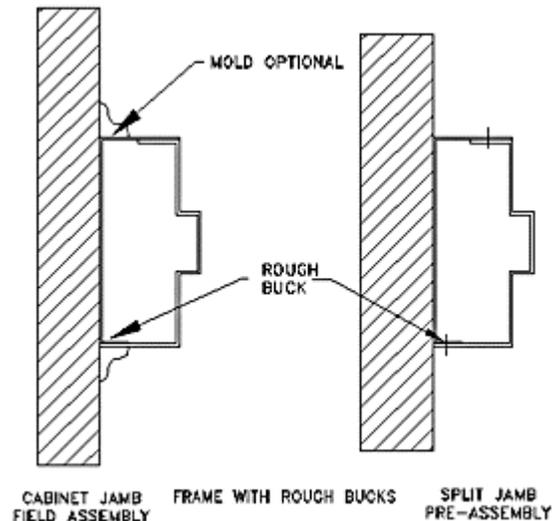


Figure 27
ROUGH BUCK

H. GROUTING OF FRAMES

Plaster guards and junction boxes are intended to protect hardware preparations and tapped mounting holes from masonry grout of 4 in. (100 mm) max. slump consistency which is hand troweled in place. If a lighter consistency of grout (greater than 4 in. (127 mm) slump when tested in accordance with ASTM C143) is to be used, special precautions must be taken in the field by the installation contractor to protect the hardware preparations. Any grout or other bonding material shall be promptly cleaned off of frames or doors following installation. Hollow metal surfaces shall be kept free of grout, tar or other bonding materials or sealers. Grouting materials which require air to dry (cure) are not recommended for such use in any closed section, such as a mullion.

1. Back-painting of Grouted Frames: When temperature conditions necessitate the use of anti-freezing agents in plaster or mortar, the inside of the frames must be coated with a bituminous water resistant paint (by the contractor responsible for installation).

I. RUBBER SILENCERS

To ensure that rubber silencers are clean and undamaged when installation is complete, they are usually installed after the field painting is done, either by adhesion or by insertion into holes provided in the frame.

When frames are built into masonry construction, the rubber silencer must be installed prior to grouting. This avoids grout filling the silencer hole.

1. Rubber Silencer Installation: (Figure 28) Use the installation tool or a #6d nail with the point cut off. Insert nail into the hole in the silencer to elongate it. Moisten the end of the silencer and insert it into pre-punched hole in the frame stop, then remove nail.

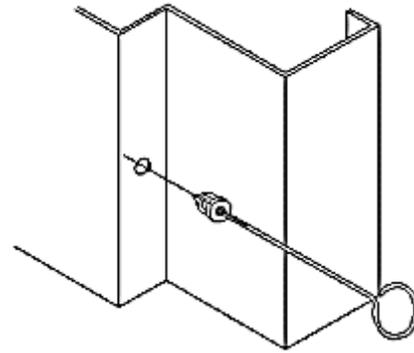


Figure 28
RUBBER SILENCER INSTALLTION

J. FIELD SPLICING

When shipping limitations so dictate, frames for large openings shall be fabricated in sections designed for splicing and welding in the field by others. (Figure 29)

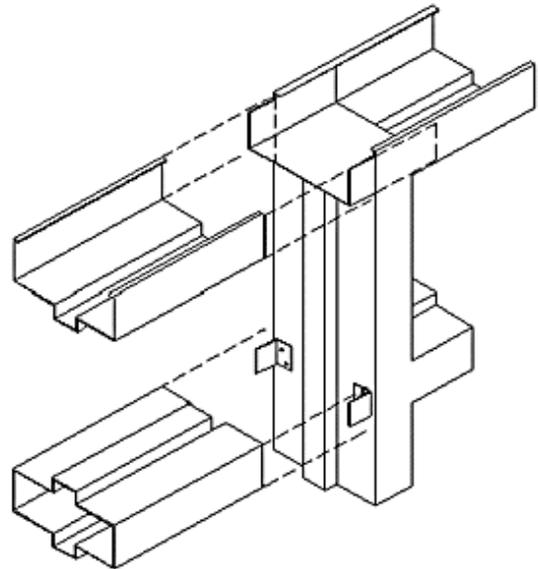


Figure 29
FIELD SPLICES

K. INSTALLATION TOLERANCES

The tolerances permitted with respect to squareness, plumbness, alignment and twist of the installed frame are shown in Figure 30. (Figure 30) The tolerances shown provide a reasonable guideline for proper installation of hollow metal frames. However, it should be noted that the cumulative effect of the tolerances at their maximum levels will result in sufficient misalignment to prevent the door from functioning properly. Installer should be careful not to create a tolerance buildup. Tolerance buildup occurs when more than one dimension is at or near its maximum tolerance.

Squareness + 1/16 in. (1.6 mm) Measured at rabbet on a line 90 degrees from jamb perpendicular to frame head.

Alignment + 1/16 in. (1.6 mm) Measured at jambs on a horizontal line parallel to the plane of the face.

Twist + 1/16 in. (1.6 mm) Measured at opposite face corners of jambs on parallel lines, perpendicular to the plane of the door rabbet.

Plumbness + 1/16 in. (1.6 mm) Measured at jambs on a perpendicular line from the head to the floor.

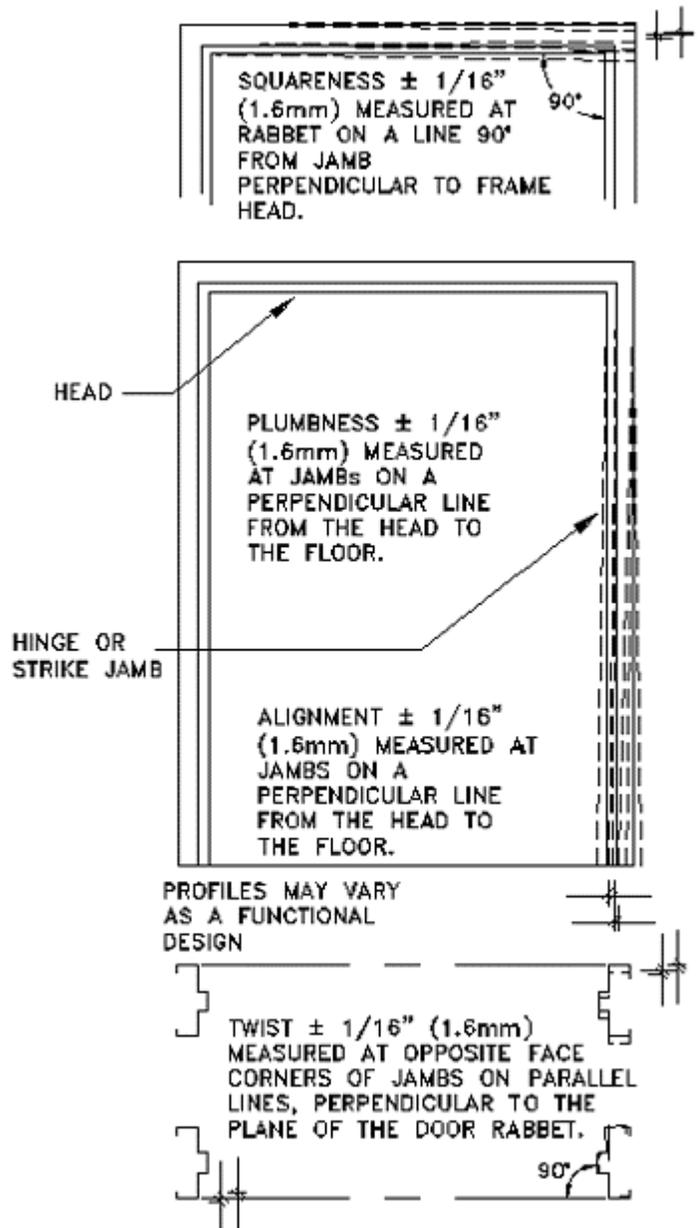


Figure 30
FRAME INSTALLATION TOLERANCES

PART 3 - HANGING OF DOORS

A. GENERAL

It is the responsibility of the installer to hang all doors and install all hardware prior to finish painting. Doors shall be reinforced, drilled and tapped at the factory for completely templated mortise hardware only, in accordance with the final approved hardware schedule and templates provided by the hardware supplier. Where surface mounted hardware anchor, pivot reinforced, or thrust pivot hinges, and/or non-templated mortise hardware is to be applied, doors shall be reinforced, with all drilling and tapping done in the field.

Experienced craftsmanship and care are essential in the hanging of metal doors. The use of metal hinge shims are normally required to provide uniform clearance around the door and alleviate "hinge bind". (Figure 31) (Figure 32)

The door-to-frame clearance adjustment toward the strike jamb (in the direction of arrow S) in Figure 31. can be accomplished by placing a metal shim or shims under the hinge leaf or leaves along the barrel edge of the hinge. Adjusting toward the hinge jamb (in the direction of arrow H) in Figure 32. can be done by placing a metal shim or shims under the outer edge of the hinge leaf or leaves.

B. EDGE CLEARANCES

The following edge clearances are recommended by the Hollow Metal Manufacturers Association Division of NAAMM and are in accordance with NFPA-80.

1. Between door and frame at head and jamb 1/8 in. (3.2 mm) \pm 1/16 in. (1.6 mm).
2. Between edges of pairs of doors 1/8 in. (3.2 mm) \pm 1/16 in. (1.6 mm).
3. Where a threshold is used 3/8 in. (9.5 mm) max. from bottom of door to top of threshold.
4. Where no threshold is used 3/4 in. (19.1 mm) max. from bottom of door to the finish floor.
5. For fire rated openings the clearance under the bottom of the door shall be as follows.

The clearance between the bottom of the door and a raised noncombustible sill shall not exceed 3/8 in. (159 mm).

Where there is no sill, the clearance between the bottom of the door and the floor shall not exceed 3/4 in. (19.1 mm).

The clearance between the bottom of the door and the rigid floor tile shall not exceed 5/8" in. (15.9 mm)

The clearance between the bottom of the door and the nominal surface of floor coverings shall not exceed 1/2 in. (12.7 mm).

Finished floor is defined as the top surface of the floor, except when resilient tile or carpet is used, when it is the top of the concrete slab.

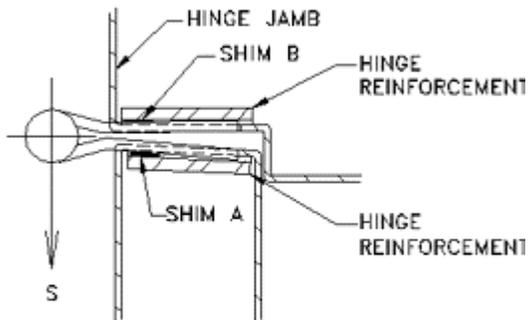
C. CARE AFTER INSTALLTION

Doors installed prior to completion of construction may be subjected to damage from other trades because of improper protection or carelessness on the part of construction workers.

Primed or painted surfaces which have been scratched or otherwise marred during installation (including field welding) and/or cleaning, shall promptly be finished smooth, cleaned, treated for maximum paint adhesion and touched up with a rust inhibited primer.

Acid washing of masonry construction adjacent to door and frame installations will damage the primer coat on the steel surfaces. If not cleaned immediately, rusting of the surfaces will occur. For this reason steel doors and frames must be protected. If exposed to an acid wash, all primed or painted steel surfaces must be thoroughly cleaned with particular attention being given to hidden areas such as those areas under glazing stops.

USE OF HINGE SHIMS TO
ADJUST DOOR CLEARANCE



USING SHIM A ONLY, DOOR WILL BE RELOCATED IN DIRECTION OF ARROW S.

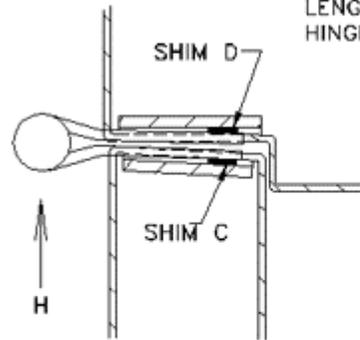
USING SHIM B ONLY, BOTH DOOR AND CENTERLINE OF HINGE BARREL WILL MOVE IN DIRECTION OF ARROW S.

USING BOTH SHIMS A AND B WILL MOVE THE DOOR FURTHER IN DIRECTION OF ARROW S THAN BY USING EITHER A OR B ALONE, AND HINGE BARREL WILL BE RELOCATED JUST AS USING B ALONE.

Figure 31

SHIMMING TO INCREASE CLEARANCE AT HINGE EDGE

SHIMS ARE 1/4" (6.4 mm) WIDE BY LENGTH EQUAL TO HINGE HEIGHT



USING SHIM C ONLY, DOOR WILL BE RELOCATED IN DIRECTION OF ARROW H.

USING SHIM D ONLY, BOTH DOOR AND CENTERLINE OF HINGE BARREL WILL MOVE IN DIRECTION OF ARROW H.

USING BOTH SHIMS C AND D WILL MOVE THE DOOR FURTHER IN DIRECTION OF ARROW H THAN BY USING EITHER C OR D ALONE, AND HINGE BARREL WILL BE RELOCATED JUST AS BY USING D ALONE.

Figure 32

SHIMMING TO DECREASE CLEARANCE AT HINGE EDGE