



GUIDE SPECIFICATIONS
FOR SWINGING
SOUND CONTROL
HOLLOW METAL
DOORS AND FRAMES



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FOREWORD

These specifications have been prepared in accordance with the CSI recommended format with Part 1-General, Part 2-Product and Part 3-Execution. Guide specifications are intended to be used as the basis for developing job specifications and must be edited to fit specific job requirements. Inapplicable provisions should be deleted, appropriate selections should be made where there are choices, and provisions applicable to the job should be added where necessary. Options are shown in brackets. Notes, recommendations and instructions to specifiers are given in *Italics* directly following or at the start of the sections to which they apply. Notes that contain permissive language are not considered part of this standard. Dates given with ASTM and other standards were current at the time this specification was published. When a more recent standard is available, the specifier should verify its applicability to this Guide prior to its inclusion. Note: While the CSI Section Format locates Delivery, Storage and Handling in Part 1, NAAMM standards include them under Part 3 – Execution.

These specifications are comprehensive in regard to steel swinging sound control doors, door frames, sidelight, transom, and fixed window assemblies only. They do not cover sliding sound control doors or other related components. Due to the complexity of the field of acoustics, it is advisable to retain an acoustical consultant or acoustician.

Materials and fabrication methods are specified in detail in Part 2. Specific internal door constructions are not covered since they are proprietary to each manufacturer. Doors and frames made in accordance with these specifications have successfully met the testing and performance requirements of Section 1.05. However, the materials and fabrication methods called for in these specifications, while providing an excellent guide, are not meant to restrict the use of other materials and methods where it can be demonstrated through the specific testing procedures in Section 1.05 that the construction can equal or exceed the performance levels specified in this section. In order to ensure that a manufacturer's product meets the desired performance levels, the construction specifications must always include the testing and performance requirements of Section 1.05 and the Quality Assurance requirements of Section 1.06. Note: the effectiveness of a door and frame unit is dependent on the sum of all parts of the unit functioning effectively in order to meet the specified STC rating. This would mean that all portions of the unit including the door, doorframe, perimeter gaskets and glazing are tested as a unit. All components must be supplied from a single source, with the exception of glazing which may be factory installed or field installed by the manufacturer's authorized representative.

Hardware Considerations

The selection of the hardware is a very important part of a successful sound control assembly. Sound doors are heavier than conventional hollow metal doors. Their weight can vary, from 7 to 20 ± lbs. per square foot (34 to 98 ± kg/m²), depending on the STC rating and thickness of the door; therefore, it is important to specify proper heavy-duty hardware capable of handling the door weight over the life of the installation. A minimum of three extra heavy hinges, or two cam-lift hinges, is required for all units. The doorframe shall be made of thicker materials than that which is used for conventional hollow metal doors weighing only 7 to 8 lbs. per square foot (34 to 39kg/m²).

Sound control doors are built with specially designed proprietary cores. Any interference with this sound septum may cause a reduction in performance. Concealed vertical-rod exit devices or concealed closers are examples of hardware that may interfere with the performance of the assembly.

Another important part of the assembly is the gasketing around the door. Hardware that may interfere with this seal should be avoided.

As is the case with any product that is certified based on performance done under controlled laboratory conditions, sound control doors installed under less well-controlled job site conditions can be expected to have a 3 to 5 point reduction in STC performance. Appropriate allowances for this shall be given consideration.

Other Key Considerations

Although many acoustic door/frame assemblies closely resemble standard hollow metal products a number of additional factors must be taken into account.

- Overall tolerances are much more exacting, particularly where STC ratings exceed 48.
- The squareness of the frame installation is essential
- The flatness of the floor beneath the door is critical

A company with experience manufacturing sound control door assemblies can give advice on the proper hardware to use.

For other applications of hollow metal doors and frames, consideration may be given to ANSI/NAAMM HMMA 861, Guide Specification for Commercial Hollow Metal Doors and Frames. For less rigorous applications, NAAMM HMMA 860, Guide Specifications for Hollow Metal Doors and Frames. If security is a factor, there are two hollow metal standards available - NAAMM HMMA 862, Guide Specifications for Commercial Security Hollow Metal Doors and Frames and ANSI/NAAMM HMMA 863, Guide Specifications for Detention Security Hollow Metal Doors and Frames. For Stainless Steel applications, ANSI/NAAMM HMMA 866, Guide Specifications for Stainless Steel Hollow Metal Doors and Frames will be helpful.

CSI SECTION 08348

SOUND CONTROL HOLLOW METAL DOORS AND FRAMES

Part 1 - GENERAL

1.01 SUMMARY

This Section includes swinging sound control doors, doorframes, sidelight, transom, and fixed window assemblies where shown in the contract documents.

1.02 PRODUCTS PROVIDED UNDER THIS SECTION

- A. Provide assemblies complete with door, frame, [cam lift hinges], anchors, sound seals, retainers and covers, [automatic door bottom][fixed door bottom][threshold], properly mortised cutouts for hinges, and cutouts and reinforcements for other hardware items as listed or required
 - 1. Hollow Metal-Swinging Sound Control Doors _____ STC rating [Flush], [Vision lights with provisions for tested acoustic glazing], [with Fire Rating] [with Temperature Rise Rating]. For fire-rated doors, indicate the rating required - 3 hour, 1-1/2 hour, 3/4 hour, and 1/3 hour. For temperature rise rated doors, indicate the temperature rise rating required - 650°F (361°C), 450°F (232°C), 250°F (139°C).
 - 2. Where indicated on the contract documents provide a [factory installed] [field installed by the manufacturer's authorized representative] glazed vision light assembly meeting the specified STC rating and fire protection rating.
- B. Gasketing Systems with [Retainers], [Retainer Covers], [Gaskets], [Automatic Door Bottoms], [Fixed Door Bottoms], [Thresholds] and [Fasteners].
- C. Hollow metal window frames, including non-operable sidelight frames and borrowed light frames, _____ STC rating [with Fire Rating].
- D. Camlift hinges when required by manufacturer to meet the STC rating specified.

1.03 RELATED SECTIONS

- A. Section 08700 - Builders Hardware
- B. Section 08800 - Glass and Glazing
- C. Section 09900 - Painting

1.04 REFERENCES

Note: The publications listed in this section form a part of this specification to the extent referenced. The publications are referenced in the text by basic designation only. When a more recent standard is available, the specifier should verify its applicability to this guide prior to its inclusion.

- A. ANSI/NAAMM HMMA 801-98, Glossary of Terms for Hollow Metal Doors and Frames
- B. ANSI/NFPA 80-1999, Standard for Fire Doors and Fire Windows
- C. ANSI/NFPA 252-1999, Standard Methods of Fire Tests of Door Assemblies
- D. ANSI/NFPA 257-2000, Standard Fire Test for Windows and Glass Block Assemblies
- E. ANSI/UL 9-2000, Fire Test of Window Assemblies, 7th Edition
- F. ANSI/UL 10B-2001, Fire Test of Door Assemblies, 9th Edition
- G. ANSI/UL 10C-2001, Standard for Positive Pressure Fire Tests of Door Assemblies, 1st Edition
- H. ASTM A 653/A 653M-02, Specification for Steel Sheet, Zinc-Coated, (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process, (Commercial Steel).
- I. ASTM A 1008/A 1008M-02, Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability

- J. ASTM A 1011/A 1011M-02, Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability
- K. ASTM B117-02, Method of Practice for Operating Salt Spray (Fog) Apparatus
- L. ASTM C 143/C 143M-00, Test Method for Slump of Hydraulic Cement Concrete
- M. ASTM D610-01, Test Method for Evaluating Degree of Rusting on Painted Steel Surfaces
- N. ASTM D714-02, Test Method for Evaluating Degree of Blistering of Paints
- O. ASTM D1735-02, Practice for Testing Water Resistance of Coating Using Water Fog Apparatus
- P. ASTM E90-02, Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements
- Q. ASTM E336-97, Test Method for Measurement of Airborne Sound Insulation in Buildings
- R. ASTM E413-87 (1999), Classification for Rating of Sound Insulation
- S. ASTM E1408-91 (2000), Test Method for Laboratory Measurement of the Sound Transmission Loss of Door Panels and Door Systems
- T. CAN4-S104-M85, Fire Test of Door Assemblies
- U. CAN4-S106-M80, Fire Test of Window Assemblies
- V. ICBO UBC 7-2 (1997), Fire Tests of Door Assemblies
- W. ICBO UBC 7-4 (1997), Fire Tests of Window Assemblies
- X. NAAMM HMMA 802-92, Manufacturing of Hollow Metal Doors and Frames
- Y. NAAMM HMMA 803 Steel Tables
- Z. NAAMM HMMA 820-87 Hollow Metal Frames
- AA. NAAMM HMMA 830-02 Hardware Selection for Hollow Metal Doors and Frames
- BB. NAAMM HMMA 831-97 Recommended Hardware Locations for Hollow Metal Doors and Frames
- CC. NAAMM HMMA 840-99 Installation and Storage of Hollow Metal Doors and Frames
- DD. NAAMM HMMA 850-00 Fire-Rated Hollow Metal Doors and Frames

ANSI American National Standards Institute, Inc.
 25 West 43rd Street
 New York, New York 10036
 (212) 642-4900 www.ansi.org

ASTM American Society for Testing and Materials
 100 Barr Harbor Drive
 West Conshohocken, Pennsylvania 19428-2959
 (610) 832-9585 www.astm.org

ICBO International Conference of Building Officials
 Now known as International Code Council - Los Angeles Office
 Uniform Building Code
 5360 Workman Mill Road
 Whittier, California 90601-2298
 (592) 692-4226 www.icbo.org

NAAMM National Association of Architectural Metal Manufacturers
 8 S. Michigan Avenue
 Chicago, Illinois 60603
 (312) 332-0405 www.naamm.org

NFPA	National Fire Protection Association 1 Batterymarch Park P.O. Box 9101 Quincy, Massachusetts 02269 (617) 770-3000	www.nfpa.org
UL	Underwriters Laboratories, Inc 333 Pfingsten Road Northbrook, Illinois 60062 (708) 272-8800	www.ul.com

1.05 TESTING AND PERFORMANCE

- A. Sound Control performance testing shall be in accordance with ASTM E90 and ASTM E413 by independent testing laboratory. For specific installations, as designated in the contract documents, door assemblies shall be tested in accordance with ASTM E1408. The laboratory referenced in the test report and/or certification shall be qualified under the National Voluntary Laboratory Accreditation Program (NVLAP) of the National Institute for Science and Technology (NIST). Units shall be tested as operable door/frame units in accordance with these test standards.

B. Labeled Fire-Rated Doors and Frames

- Doors and frame assemblies shall be provided for those openings requiring fire protection ratings as determined and scheduled by the Architect. Such doors and frames shall be constructed as tested in accordance with [ANSI/NFPA 252, ANSI/UL-10B, CAN4-S104-85] [ANSI/UL-10C, UBC 7-2] and listed and/or classified for labeling by a recognized testing agency having a factory inspection service.

Note: UBC 7-2 and UL 10C provide for positive pressure testing to accommodate the requirements of some jurisdictions and should be included only for such jurisdictions. Reference to CAN 4 applies only to Canadian projects.

- Window frames shall be provided for those openings requiring fire protection ratings as determined and scheduled by the Architect. Such frames shall be constructed as tested in accordance with [ANSI/NFPA 257 or ANSI/UL 9 or CAN4-S106-M80] [UBC 7-4] and listed and/or classified for labeling by a recognized testing agency having a factory inspection service.

Note: UBC 7-4 provides for positive pressure testing to accommodate the requirements of some jurisdictions and should be included only for such jurisdictions. Reference to CAN 4 applies only to Canadian projects.

- If doors or frames specified by the Architect to be fire-rated cannot qualify for required labeling because of design, hardware or other reasons, the Architect shall be so advised in the submittal documents.

1.06 QUALITY ASSURANCE

A. Manufacturer's Qualifications

- Manufacturer shall provide evidence of having personnel and plant equipment capable of fabricating sound control hollow metal door, frame and window assemblies of the types specified.
- Manufacturer shall provide evidence of having a quality control system in place.

B. Quality Criteria

- All door, frame and window assemblies shall meet the requirements of Section 1.05 of these specifications. Fabricate assemblies in strict accordance with the approved submittal drawings.

2. Fabrication methods and product quality shall meet the standards set by the Hollow Metal Manufacturers Association, HMMA a Division of the National Association of Architectural Metal Manufacturers, NAAMM, as set forth in these specifications.

1.07 SUBMITTALS

- A. Show dimensioned door and frame elevations and frame sections.
- B. Show listing of opening descriptions including locations, thicknesses, and anchors.
- C. Show location and details of openings.
- D. Provide laboratory's test report and manufacturer's certification that the assembly utilized has been tested in accordance with Section 1.05.A of this specification.
- E. Manufacturer's recommended installation procedures will become the basis for accepting or rejecting actual installation.
- F. Manufacturer shall not proceed with fabrication without receipt of approved submittal drawings and approved hardware schedule.

Note: The approved submittal drawings and the approved hardware schedule are the versions that have been provided to the hollow metal manufacturer at the time of release for fabrication. These drawings and the schedule are considered part of the project contract documents.

Insist upon receiving detailed procedures along with approved submittal drawings to assure good coordination between Contractor and installers.

1.08 WARRANTY

- A. Door and frame assemblies shall be warranted from defects in workmanship and quality for a period of one (1) year from date of shipment when stored, installed and painted in accordance with NAAMM HMMA 840-99 and manufacturer's installation instructions.

Part 2 - PRODUCTS

2.01 SOUND CONTROL HOLLOW METAL DOORS

- A. Where indicated in the contract documents provide a [factory installed] [field installed by the manufacturer's authorized representative] glazed vision light assembly meeting the specified STC rating and fire endurance.
- B. Facilitate the work of this Section in strict accordance with the approved submittal drawings.
- C. Materials
 1. Interior doors shall be constructed of 0.042 in. (1.0 mm) minimum thickness commercial quality steel sheet conforming to ASTM A1008 for cold-rolled steel or ASTM A1011 for hot-rolled pickled and oiled, free of scale, pitting or surface defects.
 2. Exterior door face sheets shall be 0.043 in. (1.1 mm) minimum thickness and shall have a zinc coating applied by the hot-dip process conforming to ASTM A653/A653M, designation G60 (Z180) or A60 (ZF180).
- D. Construction shall be manufacturer's standard for the rating specified. Products shall be specified by performance criteria only with the following minimum construction standards.
 1. All doors shall be of the types and sizes shown on approved submittal drawings, with no visible seams or joints on faces. Minimum nominal door thickness 1¾ in. (44 mm).
 2. All doors shall be strong, rigid and neat in appearance. Corner bends shall be true and straight and of minimum radius for the thickness of metal used.
 3. Top and bottom edges of all doors shall have a continuous steel channel not less than 0.053 in. (1.33 mm) extending the full width of the door and welded to both face sheets. The bottom channel of exterior doors shall be vented to permit the escape of entrapped moisture.

4. Hardware supplier shall coordinate hardware compatibility with the door manufacturer.

Note: Sound attenuation performance is partly dependent upon the type of hardware and sound seals used. Coordination of this Section and the Door Hardware Section is required to avoid duplication of products and assure proper performance. Sound control doors are built with specially designed proprietary cores. Any interference with this sound septum may cause a reduction in performance. Concealed vertical rod exit devices or concealed closers are examples of hardware that may interfere with the performance of the assembly.

Another important part of the assembly is the gasketing around the perimeter of the door. Any hardware that may interfere with this seal should be avoided. An experienced sound control door manufacturer can give advice on the best hardware to use.

5. Hardware reinforcements:

- a. Doors shall be mortised, reinforced, drilled, and tapped at the factory for templated mortised hardware only, in accordance with the approved hardware schedule and templates provided by the hardware supplier. Where surface-mounted hardware, anchor hinges, thrust pivots, or non-templated mortised hardware apply, doors shall be reinforced with all drilling and tapping done by others in the field.
- b. Minimum thickness for hardware reinforcements shall be as follows:
 - i. Full mortise hinges 0.167 in. (4.2 mm)
 - ii. Reinforcements for lock fronts, concealed holders, or surface mounted closer. 0.093 in. (2.3 mm)
 - iii. Internal reinforcements for all other surface applied hardware. . . . 0.067 in.(1.7 mm)
- c. In cases where electrically operated hardware is required, and indicated on the approved hardware schedule, conduit, hardware enclosures, and/or junction boxes within the door shall be provided. Access plates, where required, shall be the same thickness as the door face sheet and shall be fastened with four (4) #8-32 machine screws or #6 metal screws minimum at a spacing not to exceed 12 in. (305 mm) o/c.

6. Glazing Assemblies (if applicable).

Note: Glass is relatively permeable to sound; therefore, the manufacturer's test results regarding allowable glazing material and sizes shall be followed to retain sound retarding characteristics of the assembly.

- a. Where specified or scheduled, doors shall be provided with a glazing assembly consisting of molding [and glazing furnished and factory installed][and glazing furnished by others and installed in the field by the manufacturer's authorized representative] as tested by the manufacturer for the model and rating specified.
- b. When dual glazed systems are provided, each piece of glazing shall be capable of being removed independently. When single glazed systems are provided, fixed molding shall be welded to the door on the secure side.
- c. Removable stops shall be manufacturer's standard but not less than 0.032 in. (0.8 mm) steel, with butt or mitered corner joints, secured to the frame opening by cadmium- or zinc-coated screws.

2.02 SOUND CONTROL HOLLOW METAL PANELS

- A. Sound control panels shall be made of the same materials, and construction as specified in Section 2.01.
- B. Sound control panels shall be finished as specified in Section 2.06

2.03 SOUND CONTROL HOLLOW METAL DOOR FRAMES

Note: Provisions of this Section are applicable to door frames, transoms, sidelights and window assemblies.

A. Materials:

Note: A sound control door is typically heavier than a normal steel door, and may require a heavier than normal material thickness in frame and anchoring devices. It is important to consider this extra weight when designing and constructing the wall.

1. Interior frames shall be constructed of 0.067 in. (1.7 mm) minimum thickness commercial quality sheet conforming to either ASTM A1008 for cold-rolled steel or ASTM A1011 for hot-rolled, pickled and oiled steel, free of scale, pitting or surface defects.
2. Exterior frames shall be 0.067 in. (1.7 mm) minimum thickness and shall have a zinc coating applied by the hot-dip process conforming to ASTM A653/A653M, commercial quality with a coating designation G60 (Z180) or A60 (ZF180).

B. Construction:

1. Frames shall be welded units of the sizes and types shown on the approved submittal drawings.
2. Knocked-down frames shall not be accepted. All finished work shall be neat in appearance, square, and free of defects, warps or buckles. Pressed steel members shall be straight and of uniform profile through their lengths.
3. Jamb, header, mullion and sill profiles shall be in accordance with the frame schedule and as shown on the approved submittal drawings.
4. Corner joints shall have all contact edges closed tight with trim faces mitered and stops either butted or mitered. Faces, rabbets, and soffits shall be continuously welded (see Figure 1) and the faces finished smooth in accordance with Section 2.06, Finish. All other face joints shall be continuously welded and finished smooth. The use of gussets or plates as a substitute for welding is not acceptable.

Note: See NAAMM HMMA 820 "Hollow Metal Frames" pages 5 and 6 for further details on frame welding.

5. All mullions shall be solidly packed with 6 to 12 lb/ft³ (96 kg/m³ to 192 kg/m³) density mineral wool insulation.
6. When shipping limitations so dictate, frames for large openings shall be fabricated in sections designated for assembly in the field by others. Alignment plates or angles shall be installed at each joint. Such components shall be the same thickness as the frame. Field joints shall be made in accordance with approved submittal drawings and shall be welded in the field by others.
7. Hardware supplier shall coordinate hardware compatibility with the door manufacturer.

Note: See Note under 2.01.D.4.

8. Hardware reinforcements

- a. Frames shall be mortised, reinforced, drilled and tapped for all templated mortised hardware only, in accordance with the final approved hardware schedule and templates provided by the hardware supplier. Where surface mounted hardware, anchor hinges, thrust pivots, or non-templated mortised hardware apply, frames shall be reinforced, with all drilling and tapping done by others in the field.

Note: See NAAMM HMMA 830 "Hardware Selection for Hollow Metal Doors and Frames" for additional information.

- b. Minimum thickness of hardware reinforcing plates shall be as follows:
- i. Hinge 0.167 in. x 1.25 in. x 10 in. length (4.2 mm x 31.7 mm x 254 mm)
 - ii. Strike reinforcements 0.093 in (2.3 mm)
 - iii. Flush bolt reinforcements 0.093 in (2.3 mm)
 - iv. Closer reinforcements 0.093 in (2.3 mm)
 - v. Reinforcements for surface-mounted hardware 0.093 in (2.3 mm)
 - vi. Reinforcements for hold-open arms. 0.093 in (2.3 mm)
 - vii. Reinforcements for surface panic devices 0.093 in (2.3 mm)

9. Floor anchors

- a. Where applicable, floor anchors shall be provided with two holes for fasteners and be attached inside jambs with at least four (4) spot welds per anchor.
- b. Where scheduled, adjustable floor anchors, providing no less than 2 in. (50.8 mm) height adjustment, shall be fastened in place with at least four (4) spot welds per anchor.
- c. Thickness of floor anchors shall be a minimum of 0.067 in. (1.7 mm).

10. Jamb anchors

- a. Provide frames with anchors and attachments as required to transfer door loads to surrounding wall construction.
- b. Masonry Type: Frames for installation in masonry walls shall be provided with adjustable jamb anchors of the strap and stirrup or T-strap type no less than 0.053 in. (1.3 mm) thickness, or wire type no less than 0.156 in. (4 mm) in diameter. Straps shall be no less than 2 in. x 10 in. (50 mm x 254 mm) in size, corrugated and/or perforated. The number of anchors provided on each jamb based on frame opening height shall be as follows:
 - i. Frames up to 60 in. (1524 mm) 3 anchors
 - ii. Frames greater than 60 in. (1524 mm) up to 90 in. (2286 mm). 4 anchors
 - iii. Frames greater than 90 in. (2286 mm) up to 96 in. (2438 mm). 5 anchors
 - iv. Frames greater than 96 in. (2438 mm) 5 anchors plus 1 for each 18 in. (457 mm) or fraction thereof over 96 in. (2438 mm) spaced at 18 in. (457 mm) maximum between anchors.
- c. Dry Wall Type: Frames for installation in stud partitions shall be provided with steel anchors of suitable design, no less than 0.042 in. (1.0 mm) thickness, securely welded inside each jamb anchor provided on each jamb based on frame opening height as follows:
 - i. Frames up to 60 in. (1524 mm) 4 anchors
 - ii. Frames greater than 60 in. (1524 mm) up to 90 in. (2286 mm). 5 anchors
 - iii. Frames greater than 90 in. (2286 mm) up to 96 in. (2438 mm). 6 anchors
 - iv. Frames greater than 96 in. (2438 mm) 6 anchors plus 1 for each 14 in. (356 mm) or fraction thereof over 96 in. (2438 mm), spaced at 14 in. (356 mm) maximum between anchors.
- d. Expansion Bolt Type: Frames for installation in existing masonry or concrete walls shall be prepared for expansion bolt type anchors. The preparation shall consist of a countersunk hole for a 3/8 in. (9.5 mm) diameter bolt and a spacer from the unexposed surface of the frame to the wall. The spacer shall be welded to the frame and spaced a maximum of 6 in. (152 mm) from the top and bottom of the door opening, with intermediate spacing at a maximum of 26 in. (660 mm) o/c. Fasteners for such anchors shall be provided by others.

- e. Frames to be installed in pre-finished concrete, masonry or steel openings, shall be constructed and provided with anchoring systems of suitable design as shown on the approved submittal drawings. Grout frame solid and seal frame to wall. Others shall provide fasteners for such anchors.
- 11. Frames for installation in masonry wall openings more than 4'-0" (1219 mm) in width shall have an angle or channel stiffener factory welded into the head when the head is to be grouted. Such stiffeners shall be no less than 0.093 in. (2.3 mm) in thickness and no longer than the opening width, and shall not be used as lintels or load bearing members.
- 12. Plaster guards made from no less than 0.016 in (0.4 mm) thick steel shall be attached at all hardware mortises on frames to be set in masonry or plaster partitions.
- 13. All frames shall be provided with a temporary steel spreader welded to the feet of both the jambs to serve as bracing during shipping and handling. The temporary steel spreader shall not be used for installation.
- 14. Removable glazing stops
 - a. Where specified, frames shall be provided with removable glazing stops to secure glazing furnished and installed in the field by others, in accordance with glass size and thickness shown on the contract documents.
 - b. Removable glass channel stops shall be cold-rolled steel, no less than 0.032 in. (0.8 mm), butted at corner joints and secured to the frame using cadmium—or zinc—plated #6 (minimum) countersunk sheet metal screws.
 - c. The frame underneath the glazing stops and the inside of the glazing stop shall be treated for maximum paint adhesion and painted with a rust inhibitive primer prior to installation in the frame.

2.04 MANUFACTURING TOLERANCES

Note: The manufacturer of the doors and frames is responsible only for the manufacturing tolerances listed in Section 2.04.A. The final clearances and relationship between door and frame depend on the setting of the frame and the hanging and adjustment of the door hardware (see Section 3.02).

- A. Manufacturing tolerance shall be maintained within the following limits
 - 1. Frames for single door or pair of doors.
 - a. Width, measured between rabbets at the head:
 - i. Nominal opening width + 1/16 in. (1.6 mm), - 1/32 in. (0.8 mm)
 - b. Height (total length of jamb rabbet).
 - i. Nominal opening height +/- 3/64 in. (1.2 mm)
 - 2. Cross sectional profile dimensions: (see Figure 2)
 - a. Face ± 1/32 in. (0.8 mm)
 - b. Stop ± 1/32 in. (0.8 mm)
 - c. Rabbet ± 1/32 in. (0.8 mm)
 - d. Depth ± 1/32 in. (0.8 mm)
 - e. Throat ± 1/16 in. (1.6 mm)

Note: Frames overlapping walls to have throat dimension 1/8 in. (3.2 mm) greater than dimensioned wall thickness to accommodate irregularities in wall construction.

3. Doors.
 - a. Width $\pm 3/64$ in. (1.2 mm)
 - b. Height $\pm 3/64$ in. (1.2 mm)
 - c. Thickness $\pm 1/16$ in. (1.6 mm)
4. Hardware.
 - a. Cutout dimensions template dimensions + 0.015 in. (0.38 mm), -0
 - b. Location $\pm 1/32$ in. (0.8 mm)
 - c. Between hinge centerlines +/- 1/64 in. (0.4 mm)

2.05 HARDWARE

A. Locations: The location of hardware on doors and frames shall be as follows:

1. Hinges:
 - a. Top 5 in. (127 mm) from head of frame to top of hinge.
 - b. Bottom 10 in. (254 mm) from finished floor to bottom of hinge.
 - c. Intermediate Centered between top and bottom hinges.
2. Locks and latches 38 in. (965 mm) to centerline of knob or lever shaft
3. Deadlocks 46 in. (1168 mm) to centerline of cylinder
4. Exit hardware . . . 38 in. (965 mm) to centerline of cross bar or as shown on hardware template

Note: The hardware locations listed in this specification reflect HMMA's standards. However, specific hardware and/or individual door / frame manufacturers' designs may require different locations.

B. Sill Condition:

1. The floor area under a sound control door shall be flat, level and smooth.
2. Where indicated on the contract documents, [furnish by hardware supplier] [furnish by sound control door manufacturer] a smooth, flush [stainless steel] [aluminum] threshold for the door bottom to seal against when the door is in the closed position. The minimum width of the threshold shall be door thickness plus 3 in. (76.2 mm) to allow the threshold to extend a minimum of 1 1/2 in. (38.1 mm) beyond the face of the door on both sides of opening. For openings where carpet butts one or both sides of the threshold, the threshold heights shall be 1/16 in. (1.6 mm) greater in height than the carpet thickness. For openings with different floor finish on each side, the threshold shall be beveled as required to accommodate the difference in elevations and provide a smooth transition to eliminate a raised obstruction.

Note: Thresholds, when used, under acoustical doors shall have a smooth, non-fluted surface for the door bottom to ride across and seal against. The use of a threshold with fluted or abrasive surfaces will cause excessive wear and will cause the seal to pull out of the retainer and bind up under the door.

2.06 FINISH

- A. After fabrication, all tool marks and surface imperfections shall be filled and sanded as required to make face sheets, vertical edges and weld joints free from irregularities. After appropriate metal preparation, all exposed surfaces of doors and frames shall receive a rust inhibitive primer which meets or exceeds ASTM B 117 Salt Spray for 150 hours with a rust grade of not less than 6 as defined in ASTM D 610, and ASTM D 1735 Water Fog Test for organic coatings for 200 hours with any quantity of #8 blisters but no more than "few" #6 blisters as illustrated in ASTM D 714.

Note: All finish paint must be formulated for Direct to Metal (DTM) application.

Part 3 - EXECUTION

3.01 SITE STORAGE AND PROTECTION OF MATERIALS

Note: Correct site storage and protection is essential to the proper performance of doors and frames. The requirements for proper storage are given in the following sections. However, it is important to recognize that proper storage is not the responsibility of the hollow metal manufacturer. For this reason the requirements for installation of hollow metal sound control doors and frames shall be in that section of the specifications where installation of work is specified.

- A. The contractor responsible for installation shall remove wraps or covers from doors and frames upon delivery at the building site. 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.
- B. The contractor responsible for installation shall ensure that materials are properly stored on planks or dunnage in a dry location. Doors and frames shall be stored in a vertical position and spaced by blocking. Doors shall be stored on the top edge, eliminating the potential of damage to the bottom seal. Figure 3 illustrates recommended storage positioning. Materials shall be covered to protect them from damage but in such a manner as to permit air circulation.

3.02 INSTALLATION AND CLEARANCES

Note: Correct installation is essential to the proper performance of sound control doors and frames. The requirements for proper installation are given in the following sections. However, it is important to recognize that installation is not normally the responsibility of the sound control door and frame manufacturer. It shall be the responsibility of the general contractor using experienced personnel to perform the following. For additional information regarding installation see NAAMM HMMA 840 "Guide Specification for Installation and Storage of Hollow Metal Doors and Frames".

- A. Installation
 - 1. Prior to installation remove temporary spreaders. All frames shall be checked for size and swing. During setting of the frame, check and correct as necessary for squareness, alignment, twist, and plumbness. Permissible frame installation tolerances shall not exceed 1/16 in. (1.5 mm):
 - a. Squareness measured at rabbet on a line from jamb perpendicular to frame head.
 - b. Alignment measured on jambs on a horizontal line parallel to the plane of the face.
 - c. Twist measured at opposite face corners of jambs on parallel lines, perpendicular to the plane of the door rabbet.
 - d. Plumbness measured at jambs on a perpendicular line from the head to the floor.

Note: The above tolerances 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 would result in sufficient misalignment to prevent the door from functioning properly. Care shall be taken to keep each of these tolerances as close to zero as possible. The details in Figure 4 illustrate methods of measuring the above-specified tolerances:

2. Solidly pack throat of frames which are installed in metal-stud and gypsum-board, and existing masonry partitions with 6 to 12 lb/ft³ (96 kg/m³ to 192 kg/m³) density mineral wool insulation.
3. Solidly grout-fill frames which are installed in masonry or poured in place, eliminating all voids.
4. Plaster guards and junction boxes are intended to protect hardware mortises and factory tapped mounting holes from masonry grout of 4 in. (101 mm) maximum slump consistency that is hand troweled in place. If a lighter consistency grout (greater than 4 in. (101 mm) slump when tested in accordance with ASTM C 143/C 143M) is to be used, special precautions must be taken in the field by the installation contractor to protect the aforementioned.
5. Proper door clearances shall be maintained in accordance with Section 2.04 of these specifications, except for special conditions otherwise noted. Where necessary, metal hinge shims, furnished by the General Contractor, are acceptable to maintaining clearances. Manufacturers recommended installation instructions shall be closely followed for compliance with Section 3.02.A.1.
6. Hardware shall be applied in accordance with hardware manufacturer's templates and instructions.
7. Gasket retainers, retainer covers, and gaskets shall be installed and adjusted in accordance with manufacturer's instructions.
8. Care shall be taken to not damage the gaskets and door bottom during the installation of the door and hardware.

B. Clearances

1. Doors shall be hung, hardware installed and adjusted to provide the following clearances. Clearances for swinging doors shall not exceed the following:
 - a. Between doors and frames at head and jams 3/16 in. (4.7 mm)
 - b. Between edges of pairs of doors 3/16 in. (4.7 mm)
 - c. At door sills Manufacturer's standard

Note: The architect must define the distance from the top of floor / finished floor to top of floor covering so appropriate undercuts can be provided, Floor / Finished floor is defined as the top of the concrete or structural slab. When floor coverings such as resilient tile or hardwood are used, undercuts may be required to be increased to accommodate these floor coverings thicknesses.

3.03 FIELD VERIFICATION (Optional)

- A. Engage and pay for a qualified manufacturer's representative to:
 1. Inspect completed installation of a representative sample of door and frame assemblies.
 2. Test all components through a minimum of ten complete cycles of operation.
 3. Verify each component is correctly installed.
 4. Direct installer in adjusting components for correct operation.
 5. Issue certified statement of compliance of installed door and frame assemblies to Architect as per approved contract documents.
- B. Per the request and at the expense of the Owner, an independent testing agency shall:
 1. Test door and frame assemblies selected by Owner or Architect in accordance with ASTM E 336.
 2. Issue certified report documenting compliance of installed door and frame assemblies to specified acoustical performance requirements.
 3. Notify Architect a minimum of four (4) calendar days prior to scheduled testing dates.

3.04 MAINTENANCE

- A. Instruct the Owner's Maintenance Personnel regarding the operation and maintenance of these doors.

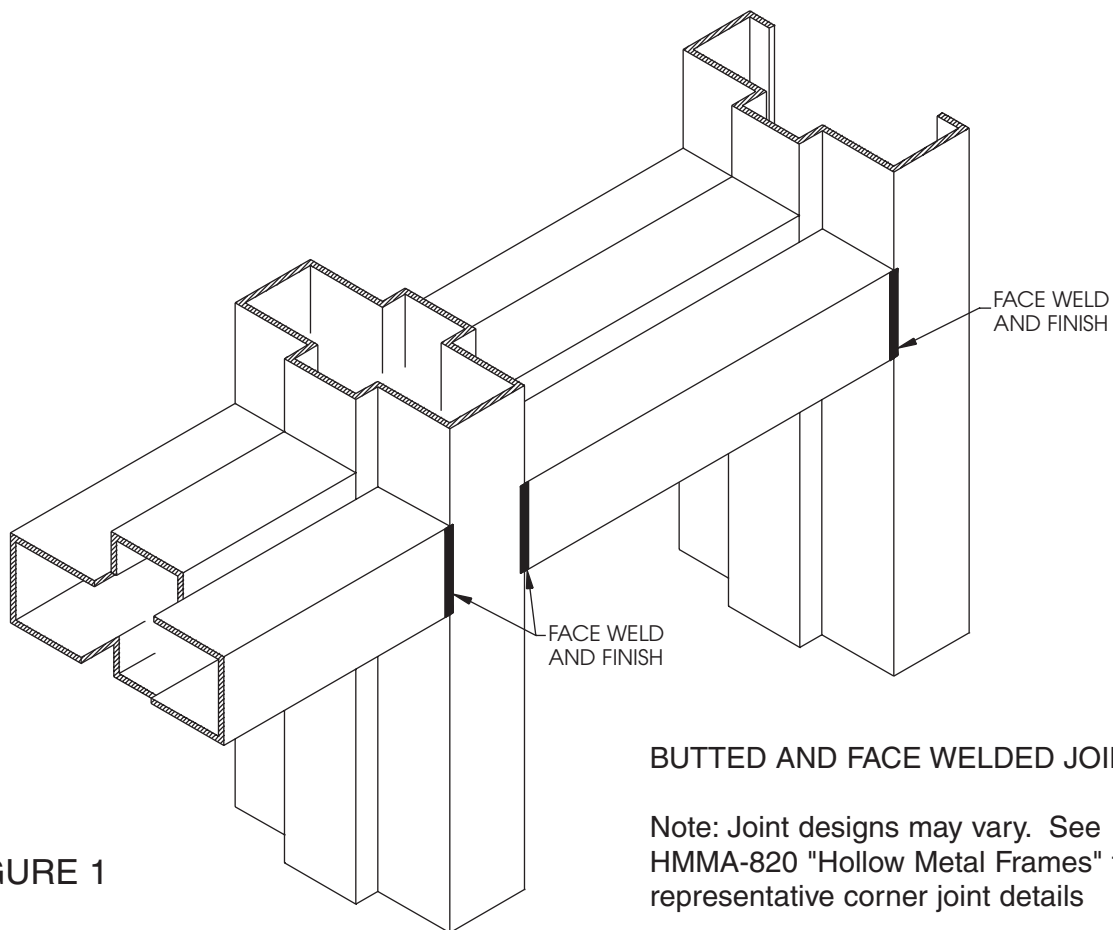
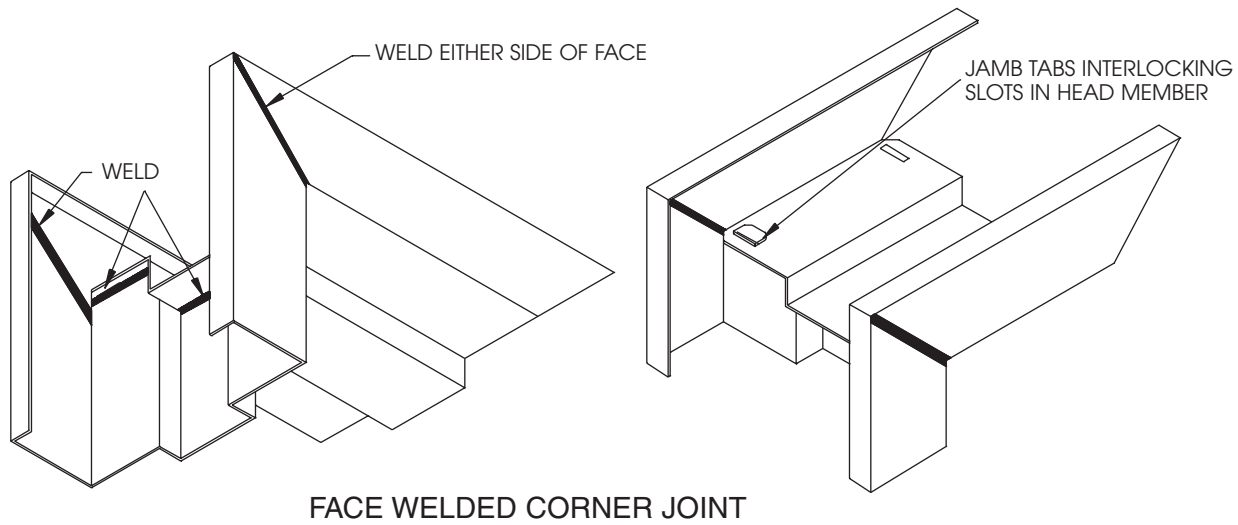


FIGURE 1

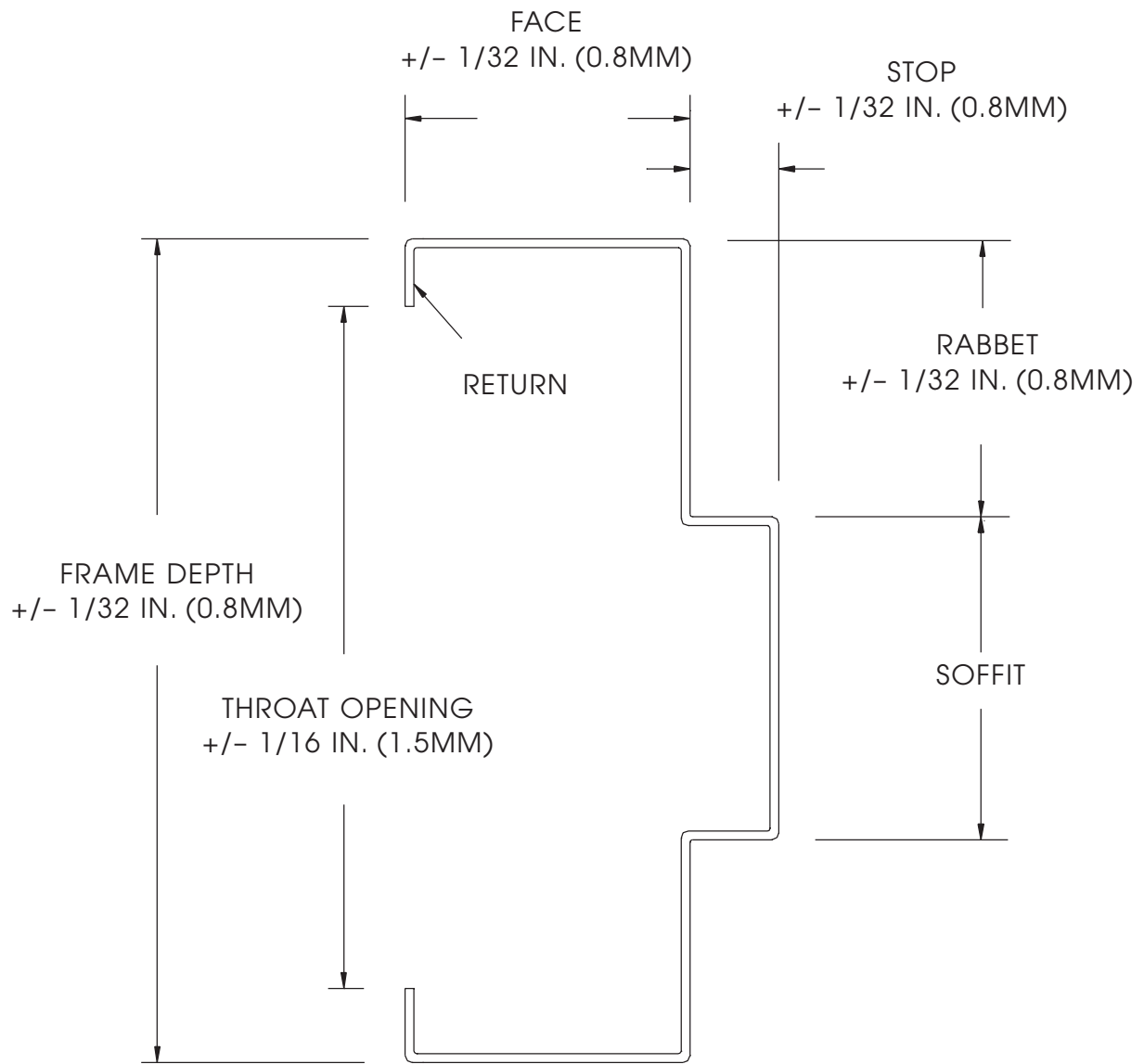
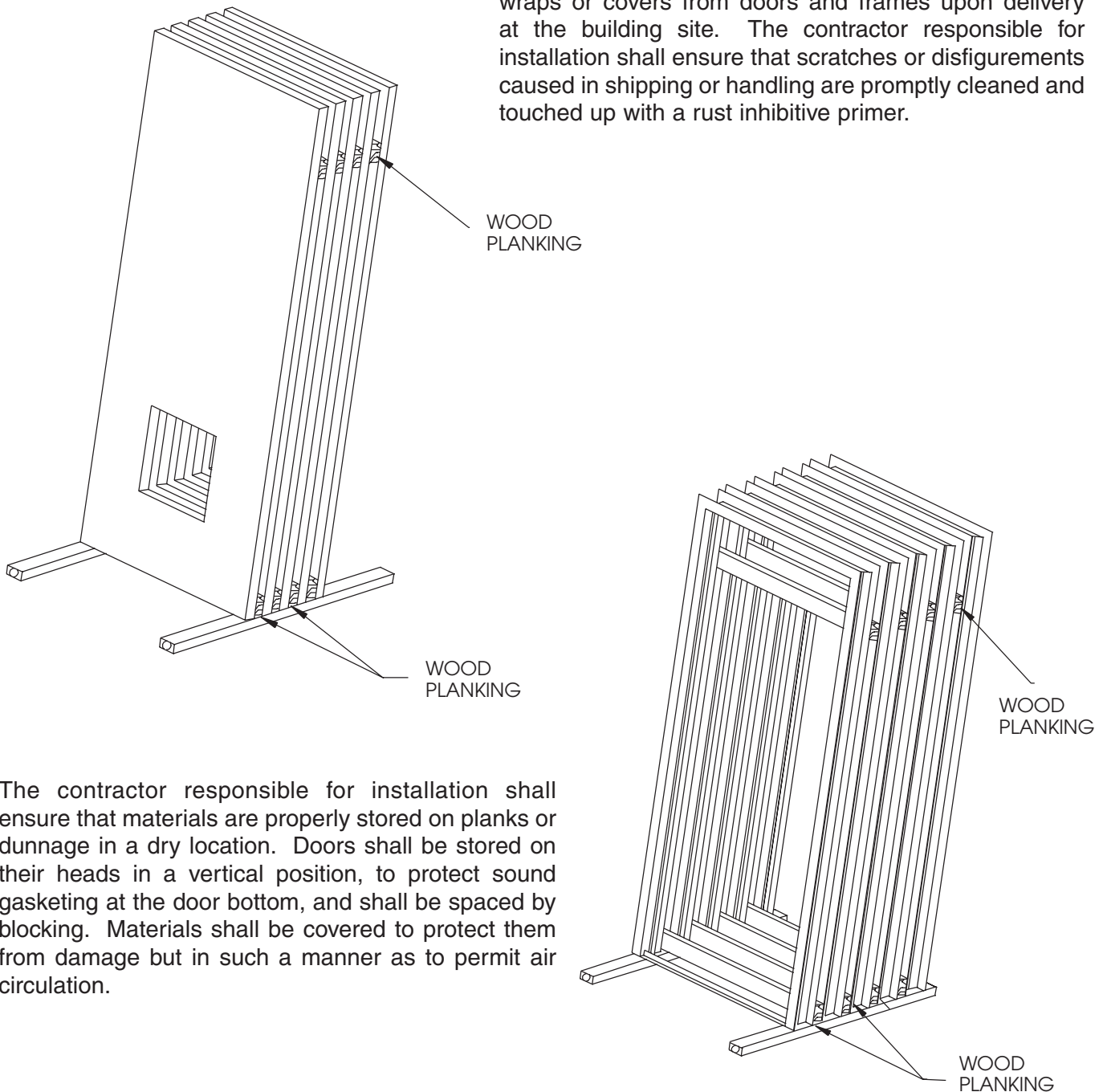


FIGURE 2
SECTIONAL PROFILE TOLERANCES

The contractor responsible for installation shall remove wraps or covers from doors and frames upon delivery at the building site. The contractor responsible for installation shall ensure that scratches or disfigurements caused in shipping or handling are promptly cleaned and touched up with a rust inhibitive primer.



The contractor responsible for installation shall ensure that materials are properly stored on planks or dunnage in a dry location. Doors shall be stored on their heads in a vertical position, to protect sound gasketing at the door bottom, and shall be spaced by blocking. Materials shall be covered to protect them from damage but in such a manner as to permit air circulation.

FIGURE 3
RECOMMENDED STORAGE

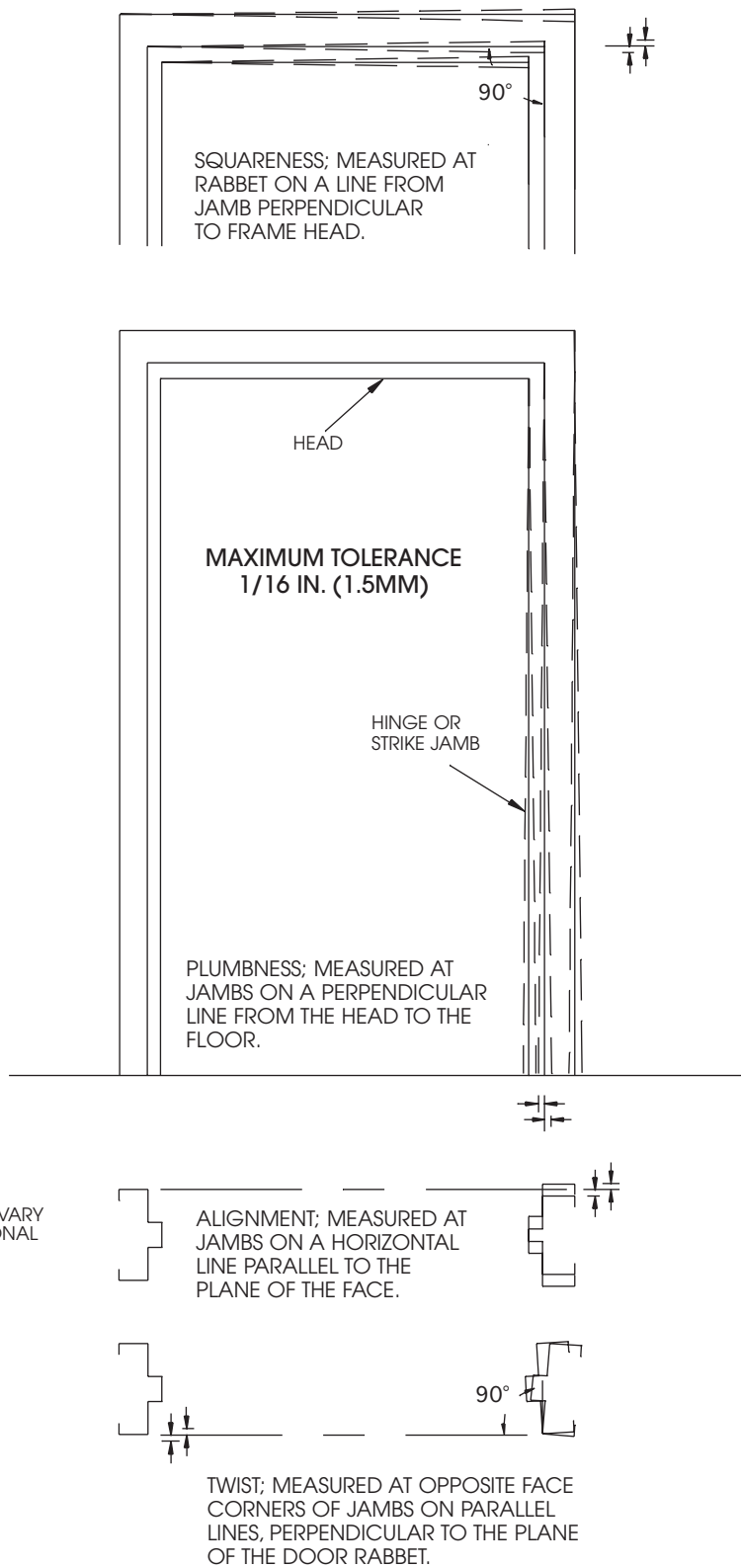


FIGURE 4
INSTALLATION TOLERANCES

APPENDIX

(Not part of the Standard)

NAAMM HMMA 803 STEEL TABLES

Prior to 1970, sheet steel was referred to by gage. ASTM and ANSI currently do not list gage numbers in their standards. Like many generic terms, gage (or gauge) is ingrained in many vocabularies and is misunderstood as a term for thickness. NAAMM is publishing this minimum thickness table to be used instead of discontinued gage numbers.

The values shown were taken from the Underwriters Laboratories, Inc. publication for gage number and equivalent thickness.

MINIMUM THICKNESS		
Uncoated Steel Sheet		
Gage	Decimal	mm
4	0.214	5.4
5	0.199	5.0
6	0.184	4.6
7	0.167	4.2
8	0.152	3.8
10	0.123	3.1
12	0.093	2.3
14	0.067	1.7
16	0.053	1.3
18	0.042	1.0
20	0.032	0.8
22	0.026	0.6
24	0.020	0.5
26	0.016	0.4
28	0.013	0.3

CONVERSION		
Fraction	Decimal	mm
	1.000	25.4
15/16	0.937	23.8
7/8	0.875	22.2
13/16	0.812	20.6
3/4	0.750	19.0
11/16	0.687	17.4
5/8	0.625	15.8
9/16	0.562	14.2
1/2	0.500	12.7
7/16	0.437	11.1
3/8	0.375	9.5
5/16	0.312	7.9
1/4	0.250	6.3
3/16	0.187	4.7
1/8	0.125	3.1
1/16	0.062	1.5

DISCLAIMER

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HMMA Hollow Metal Manufacturers Division of the
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RECOMMENDED USAGE GUIDE FOR HMMA HOLLOW METAL DOORS AND FRAMES

HMMA 860 — Hollow Metal Door and Frames

Apartment Buildings; Dormitories; Military Barracks; and Motels

ANSI/NAAMM

HMMA 861 — Commercial Hollow Metal Doors and Frames

Schools; Hospitals; Industrial Buildings; Office Buildings; Hotels;
Nursing Homes; Airports; and Convention Centers

HMMA 862 — Commercial Security Hollow Metal Doors and Frames

Exterior Doors to Schools; Warehouses; Industrial Buildings; or Strip Stores

ANSI/NAAMM

HMMA 863 — Detention Security Hollow Metal Doors and Frames

Jails; Prisons; Detention Centers and Secured Areas in Hospitals;
or Courthouses

ANSI/NAAMM

HMMA 865 — Swinging Sound Control Hollow Metal Doors and Frames

TV; Radio, Recording and Sound Studios; Theaters; and Music Rooms

ANSI/NAAMM

HMMA 866 — Stainless Steel Hollow Metal Doors and Frames

Type 304 or 316 Stainless Steel for highly corrosive, moderately corrosive
or aesthetic applications