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Guide specifications are intended to be used as the basis for developing project specifications and must be edited to suit specific job requirements. Inapplicable provisions should be deleted, appropriate selections should be made, and provisions applicable to the project should be added where necessary. Notes and instructions to specifiers are given in italics directly following or at the start of the sections to which they apply. For details, additional information, and the latest specification editions and updates available in Microsoft Word format, go to http://www.jrmetalframes.com. Complete HMMA standards are available at http://www.naamm.org/hmma/hmma_technical_literature.aspx.

SECTION 08 11 13 – HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Hollow metal doors and frames.
   2. Borrowed lights.
   3. [Smoke seals and weatherstripping gaskets.]

B. Related Requirements:
   1. Section 08 14 16 - Flush Wood Doors: For wood doors installed in hollow metal frames.
   2. Section 08 71 00 - Door Hardware: For door hardware for hollow metal doors.
   3. Section 08 80 00 - Glazing: For glass and glazing in hollow metal doors and frames.
   4. Section 09 90 00 - Painting: For field painting of hollow metal doors and frames.
   5. Section [____] -

1.2 DEFINITIONS

A. Minimum Thickness: Minimum uncoated base metal steel sheet thickness complying with NAAMM HMMA 803-08 Steel Tables.

1.3 COORDINATION

A. Section 01 30 00 - Administrative Requirements specifies requirements for coordination.

B. Coordinate Work of this Section with wall construction types for proper anchorage of hollow metal frames.

1.4 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures specifies requirements for submittals.

B. Product Data: Submit manufacturer's product data for specified products and fabrications.

C. Shop Drawings and Schedules: Provide door and frame schedule and detailed drawings of fabrication and assembly, including the following information:
   1. Identification of each opening, cross-referenced to the construction documents using the same opening designations and numbering indicated.

2. Dimensioned door and frame product elevations, sections and profiles. Provide dimensions for proper edge clearances of wood and metal doors, including meeting stiles for pairs of doors going into metal frames.
3. Stile and rail edge details.
4. Door undercut requirements to clear scheduled floor finish thicknesses.

The contract documents should be very specific regarding door undercut, with detailed drawings showing conditions for specialized floors such as ceramic tile, terrazzo or gypsum cement underlayment. See HMMA-810 TN01-03 for additional information on defining undercuts.

5. Material thicknesses, anchors and fastening.
6. Locations of welded and interlocking joints and connections, including field splices.
7. Show construction, hardware preparation, reinforcement, moldings, stops, trims and accessories. Coordinate with the final approved door hardware schedule.
8. Explanation of abbreviations, symbols, and nomenclature contained in submittal.
9. Details and locations of smoke seals and weather stripping of frames.
10. Preparation for wiring and electrified hardware.

1.5 SUSTAINABLE DESIGN SUBMITTALS

A. Section 01 81 13 - Sustainable Design Requirements specifies requirements for sustainable design submittals.

B. Manufacturer's Certificate: Certify the following products meet or exceed specified sustainable design requirements.
1. Recycled Content - LEED Credit ___: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content.
2. Regional Material - LEED Credit ___: For building materials or products that have been manufactured, within 500 miles of the project, documentation indicating percentages based on cost of total materials value.
3. [_____].

Edit lists above and below as applicable to products specified and Project sustainable design requirements.

C. Product Cost Data: Submit cost of products to verify compliance with Project sustainable design requirements. Exclude cost of labor and equipment to install products.
1. Provide cost data for the following products:
   a. Products with recycled material content.
   b. Regional products.
   c. [_____].

1.6 QUALITY ASSURANCE

A. Door Frame Inspection: Contractor with Installer shall inspect each door frame, checking frame for squareness, alignment, twist, plumbness and anchor attachment before installation of wallboard [and masonry] to assure proper fit of doors with correct clearances and operation

without modification to the door. Frames that are out of tolerance shall be reinstalled to requirements.

1.7 QUALIFICATIONS

A. Manufacturer: Member of National Association of Architectural Metal Manufacturers (NAAMM), that manufacturers in accordance with standards set by the Hollow Metal Manufacturers Association (HMMA) for fabrication methods and product quality.

B. Company specializing in manufacturing products specified in this Section with minimum five years' experience.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 - Product Requirements specifies requirements for transporting, handling, storing, and protecting products.

B. Package or crate materials to provide protection during transit and delivery.

C. Remove wraps or covers upon delivery at the building site and ensure that scratches or disfigurement caused by shipping or handling are promptly cleaned and touched up with a rust inhibitive primer.

D. Inspect hollow metal work on delivery for damage; notify shipper and supplier if damage is found. Minor damages may be repaired provided refinished items match new work and are acceptable to Architect. Remove and replace damaged items that cannot be repaired as directed.

E. Comply with HMMA 840. Properly store on planks or dunnage in a dry location. Doors and frame product shall be stored in a vertical position, spaced by blocking. Materials shall be covered to protect them from damage but in such a manner as to permit air circulation.

Include article below for as applicable for existing conditions affecting doors and frames.

1.9 EXISTING CONDITIONS

A. Field Measurements: Verify field measurements prior to fabrication. Indicate field measurements on Shop Drawings.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. Acceptable Manufacturer: J/R Metal Frames Manufacturing, Inc., 287 Oakland Road, Belgrade, Maine 04917; Phone: 207.465.9066; http://www.jrmetalframes.com/index.html

2.2 REGULATORY REQUIREMENTS

A. Labeled Fire-Rated and Smoke and Draft Control Doors and Frames:

1. Doors, frames, transom frames and sidelight assemblies provided for openings requiring fire protection, temperature rise, and/or smoke and draft control shall be listed and/or classified and bear the label of a testing agency having a factory inspection service and acceptable to authorities having jurisdiction.
    a. Tested in accordance with ANSI/UL-10C or NFPA 252 and constructed as listed or classified for fire labeling.

Include paragraph above and delete paragraph below for positive pressure testing to accommodate the requirements of some jurisdictions and codes. Where positive pressure is not required, delete paragraph above.

    b. Tested in accordance with ANSI/UL-10B or NFPA 252 and constructed as listed or classified for fire labeling.
    c. Tested in accordance with UL 1784 and installed in compliance with ANSI/NFPA 105 and for smoke and draft control with gaskets listed and labeled for smoke control.
    d. Welded doors and frames shall be listed and labeled by Underwriters' Laboratories (UL).
    e. Knock down frames shall be listed and labeled by FM Global.

B. Labeled Fire-Rated Borrowed-Lights:
    a. Frames provided for openings requiring fire protection ratings shall be listed and bear the label of a testing agency having a factory inspection service and acceptable to authorities having jurisdiction.
    b. Assemblies complying with NFPA 80 tested in accordance with ANSI/UL 9 or ANSI/NFPA 257 and constructed as listed for labeling.

C. If any door or frame product specified by the Architect to be fire-rated cannot qualify for labeling because of design, hardware or any other reason, the Architect shall be so advised in the submittal documents. If hardware, glazing, or other options affect the fire-rating and are unknown at the time of submittal document preparation, the architect shall be advised.

2.3 PERFORMANCE REQUIREMENTS

A. Physical Endurance for Steel Doors and Hardware Reinforcings: Doors and frames shall meet the following performance requirements.
    1. The test specimen shall be a 3 feet 0 inches by 7 feet 0 inches, 1-3/4 inches thick nominal size door, representative of the construction and material to be provided.
    2. The specimen shall be tested in accordance with the ANSI A250.4, Cycle and Twist Test procedure.
        a. Steel Stiffened Doors
            1) Cycle Test Acceptance Criteria:
                a) Doors specified with 0.053 inch and thicker face sheets shall be tested to 4,000,000 cycles.
                b) Doors specified with 0.042 inch to 0.053 inch thick face sheets shall be tested to Level A (1,000,000 cycles).
            2) Twist Test Acceptance Criteria: Maximum deflection under 300 pound load.
                a) 4,000,000 cycle-tested doors shall not exceed 0.625 inch deflection and maximum permanent deflection shall not exceed 0.062 inch.

b) 1,000,000 cycle-tested doors shall not exceed 1.25 inch deflection and maximum permanent deflection shall not exceed 0.125 inch.

b. Laminated Core Doors
1) Cycle Test Acceptance Criteria:
a) Doors specified with 0.042 inch and thicker face sheets shall be tested to Level A (1,000,000 cycles).
2) Twist Test Acceptance Criteria: Maximum deflection under 300 pound load.
a) 1,000,000 cycle-tested doors shall not exceed 1.25 inches and maximum permanent deflection shall not exceed 0.125 inch.

2.4 HOLLOW METAL DOORS

A. Exterior Hollow Metal Doors
1. Design: [Flush panel] [with applied moldings] [As indicated] [Insert Design].
2. Face Sheets: Face sheets fabricated from metallic-coated steel sheet.
a. Zinc-Coating: A40 galvannealed [A60 galvannealed] [G90 galvanized].

A40 galvannealed is standard product offer. For additional protection select A60 galvannealed or G90 galvanized.

b. Minimum Thickness: 0.053 [0.042] [0.067] inch.

Standard exterior door face sheet thickness is 0.042 inch. For low frequency use at non-abusive locations, 0.042 inch door face sheet thickness may be considered. For high frequency and more abusive locations, 0.053 and 0.067 inch door face sheet thickness may be considered.

3. Door Stile Edge Construction: [Interlocking seam, tack welded at top and bottom of edge] [Interlocking seam, welded and filled (seamless)].
4. Rail Edge Construction: Closed flush at top edge and filled.
5. Core: Thermally rated.
6. Exposed Finish: Primer.

B. Interior Hollow Metal Doors
1. Design: [Flush panel] [with applied moldings] [As indicated] [Insert Design].
2. Face Sheets: Face sheets fabricated from A40 galvannealed metallic-coated steel sheet.

A40 galvannealed with factory applied primer is standard for J/R manufactured interior doors and frames. Galvannealed metallic coated steel sheet provides additional protection of doors and frames during construction, and virtually eliminates the chance of flash rust and burn through during the application of interior water based paints in the presence of high humidity caused by weather and from internal construction moisture sources.

a. Minimum Thickness: 0.053 [0.042] [0.067] inch.

3. Typical door face sheet thickness is 0.053 inch. For low frequency use at non-abusive locations, 0.042 inch door face sheet thickness may be considered. For high frequency and abuse locations, 0.067 inch door face sheet thickness may be considered. TBD???
4. Door Edge Construction: [Interlocking seam, tack welded at top and bottom of edge] [Interlocking seam, welded and filled (seamless)].
5. Core: [Manufacturer's standard] [Kraft-paper honeycomb] [Polystyrene] [Mineral fiber board] [Vertical steel-stiffener core with internal sound deadener].
a. Fire Rated: Mineral fiber board.
1) [Temperature Rise Rating: [450] [650] degree temperature rating.]

6. Exposed Finish: Primer.

2.5 HOLLOW METAL PANELS

A. Hollow Metal Panels: Made of the same materials, construction and finish as specified for exterior and interior hollow metal doors.

2.6 HOLLOW METAL FRAMES

A. Exterior Hollow Metal Frames.
1. Fabricated from A40 galvannealed [A60 galvannealed] [G90 galvanized] metallic-coated steel sheet.

A40 galvannealed is standard product offer. For additional protection select A60 galvannealed or G90 galvanized.

2. Steel Sheet Thickness:
a. Doors
1) 0.053 inch [for _____doors].
2) 0.067 inch [for _____doors].
3) 0.093 inch [for _____doors]
b. Borrowed Lights: 0.053 inch.
3. Fabricate frames with mitered or coped corners and seamless face joints.
4. Fabricate frames as [face welded] [full profile welded] unless otherwise indicated.

Face welded is standard. For additional protection from passage of air and water, full profile welded is available.

5. Exposed Finish: Primer.

B. Interior Hollow Metal Frames
1. Face sheets fabricated from metallic-coated steel sheet.
a. Zinc-Coating: A40 galvannealed.

A40 galvannealed with factory applied primer is standard for J/R manufactured interior doors and frames. Galvannealed metallic coated steel sheet provides additional protection of frames during construction, and virtually eliminates the chance of flash rust and burn through during the application of interior water based paints in the presence of high humidity caused by weather and from internal construction moisture sources.

2. Steel Sheet Thickness:
a. Doors
1) 0.053 inch [for _____doors].
2) 0.067 inch [for _____doors].
3) 0.093 inch [for _____doors].
b. Borrowed Lights: 0.053 inch.

0.053 inch thickness typical thickness for wood doors and hollow metal doors with face sheets up to 0.053 inch thickness. For heavier weight doors, large openings, and abusive locations such as school entrances, vestibules, stairways and high use pairs of doors, consider the use of 0.067 inch thickness.

3. Fabricate frames with mitered or coped corners and seamless face joints.
4. Fabricate frames as [knocked down][face welded] [full profile welded] unless otherwise indicated.

Select and modify subparagraphs above and below for various differing frame fabrication requirements than what is listed above.

a. Fabricate frames as [face welded] [full profile welded] for pairs of doors.
b. Fabricate frames as [knocked down][face welded] [full profile welded] for [_____].
c. [Fabricate frames at drywall partitions as knocked down slip-on pressure fit frames.]

5. Exposed Finish: Primer.

2.7 MATERIALS

A. Metallic-Coated Steel Sheet: Zinc-coated steel sheet conforming to ASTM A 653 CS Type B, Coating Designation A40.
1. [Provide coating designation [A60] [G90] where indicated.]

B. Frame Anchors, Internal Door Components and Reinforcements: Zinc-coated steel sheet conforming to ASTM A 653 CS Type B, Coating Designation A40.

C. Inserts, Bolts, and Fasteners: ASTM A 153 hot-dip galvanized.

D. Thermal Insulation: One pound per cubic foot density expanded polystyrene (EPS) core providing R- 4.17 per inch at 40 degrees F.

E. Sound Deadening and Fire Resistant Core Material: ASTM C 665, Type I, minimum 10 pcf mineral-fiber insulation; ASTM E 136, rated non-combustible per NFPA Standard 220; ASTM E 84, flame spread rating of 0, smoke developed rating of 0.

F. Power-Actuated Fasteners: Corrosion resistant fasteners of size and configuration for applicable attachment configurations and substrates.

Include subparagraph below for field applied protective coating for frames to be filled with mortar when installed in masonry.

G. [Bituminous Barrier Coating: Asphaltic non-fiber emulsion, complying with ASTM D1187 and LEED low-emitting VOC requirements for interior applications.
1. Products:
a. BASF Building Systems, Hydrocide 600.
b. W.R. Meadows, Sealmastic Emulsion Type I or Type II.]

H. [Gasketing: Flexible kerf insert gasketing, fire and smoke rated.]

2.8 FABRICATION

A. General: Comply with NAAMM's HMMA 800 through 850 Series documents, unless more stringent requirements are specified. Fabricate hollow metal work to be neat and uniform in appearance and free from warpage or buckle. Edge bends shall be true and straight and of minimum radius for the thickness of metal used. Assemble units at the manufacturer's facility to the maximum extent possible.
1. Before shipment, mark each door and frame with an identification number as shown on approved submittal drawings and door schedule.

2. Tolerances and Clearances: Comply with HMMA 840.

B. Hollow Metal Doors
1. Provide doors of design indicated, not less than thickness indicated; fabricated with smooth surfaces, without visible joints or seams on exposed faces unless otherwise indicated.
a. Construction:
1) Minimum nominal door thickness shall be 1-3/4 inches.
2) Rail Edge Construction: Close top and bottom edges with a continuous steel channel, not less than 0.042 inch thickness, welded to both face sheets.
a) Where required for attachment for weather-stripping, a flush steel closure channel shall be provided at the bottom edge. Openings shall be provided in the bottom closure channel of exterior doors to permit the escape of entrapped moisture.
3) Edge profiles beveled 1/8 inch in 2 inches provided on both vertical edges of doors.
4) Door Stile Edge Construction:
a) 0.042 to 0.053 inch Face Sheet Thickness: [Interlocking seam, tack welded at top and bottom of edge] [Interlocking seam, welded and filled (seamless)].
b) 0.067 inch Face Sheet Thickness: Seamless, welded and filled.
5) Hardware Reinforcements and Preparations:
a) Doors shall be mortised, reinforced, drilled and tapped at the factory for templated hardware only, in accordance with the approved hardware schedule and templates provided by the hardware supplier. Where surface mounted non-templated hardware apply, doors shall be reinforced, with drilling and tapping done by others in the field.
b) Minimum steel thickness for hardware reinforcements shall be as follows:
(1) Full Mortise Hinges and Pivots: 0.184 inch.
(2) Continuous Hinges: 0.067 inch.
(3) Lock Fronts: 0.067 inch.
(4) Lock Boxes: 0.053 inch for cylindrical locks; 0.067 for mortise locks.
(5) Concealed Holders, Surface Mounted Closers and Overhead Stops: 0.093 inch.
(6) Internal Reinforcements For Other Surface Applied Hardware: 0.067 inch.
c) Hardware Location: Locate hardware reinforcement and indicated or, if not indicated, according to HMMA 831.
(1) [Hardware for doors mounted in existing frames shall be coordinated with locations of existing frame hardware preparations.]
6) Where electrically or electronically operated hardware is required, provide conduit, hardware enclosures and junction boxes within the door shall be provided. Access plates shall be the same material and thickness as the door face sheets and shall be fastened with not less than four #8-32 machine screws or #6 sheet metal screws at a spacing not to exceed 12 inches on center. Access plate screws shall be corrosion resistant.

7) Core Construction:
   a) Manufacturer's standard kraft-paper honeycomb, polystyrene, mineral fiber board, or vertical steel-stiffener core with internal sound deadener as indicated.
   b) Vertical Steel-Stiffener Core: Same material as face sheets, 0.042 [0.053] inch minimum thickness continuous vertically formed steel sections full height of door, spanning the full thickness of the interior space between door faces. Space vertical interior webs are no more than 6 inches apart. Securely fasten stiffeners to both face sheets by spot welds spaced a maximum of 6 inches on center vertically. Fill spaces between stiffeners with mineral wool material.

0.042 inch thick stiffeners is standard for heavy duty construction. Select 0.053 inch thick for stiffeners if extra heavy duty construction is warranted. Painting steel stiffened doors with a high gloss paint is not recommended due to telegraphing of rib welds on face sheets. Delete paragraph is steel stiffened doors are not used.

   c) Fire Door Core: As required to provide fire-protection[and temperature-rise] ratings indicated.
   d) Thermal-Rated (Insulated) Doors: 1-1/2 inch thick, expanded polystyrene core providing R-6.26 at 40 degrees F.

C. Hollow Metal Frames
1. Construction:
   a. Frame product shall have integral stops of sizes and types shown on approved shop drawings.
   b. Jamb, header, mullion and sill profiles shall be in accordance with the frame schedule and as shown on the approved submittal drawings.
   c. Corner joints shall have all contact edges closed tight with faces mitered and stops butted.
   d. Minimum height of stops shall be 5/8-inch.
   e. [Thermally Broken Frames: Interior and exterior frame sections separated by continuous thermal break. Provide frame with integral weatherstripping.]
   f. Frames shall be prepared for single stud, resilient door silencers, three per strike jamb for single door openings, two per head for pairs, except on gasketed or weather stripped frame product. Silencers shall be supplied and installed by others.
   g. [Gasketed Frames: Provide frames with integral kerf to receive head and jamb gaskets.]

IBC building codes require smoke seal for smoke and fire rated doors to be inspected annually, and any damage repaired immediately upon discovery. Integral gaskets are concealed when doors are in the closed position, and less apparent in the open position. Gaskets located in the corner of the stop/rabbet that are held in place by a frame kerf are less susceptible to damage and vandalism than screw attached or adhered surface gaskets for smoke seals and weatherstripping. Kerfs with gaskets should reduce code violations and annual maintenance. Kerf gaskets also improve sound ratings when used in conjunction with sound seals.

   h. [Terminated Stops: Cap cut-off stops with a 45 degree angle, at heights as shown on the approved shop drawings, and weld and finish smooth so that there are no visible seams jamb joints below cut-off stops.]

It is recommended that cut-off stops (hospital frames) not be used at exterior, double egress or gasketed openings. Include requirements for terminated stops in the construction document schedules.

i. Welding:
   1) Perimeter face joints (flush or indented) shall be continuously welded internally or externally. Flush face joints shall be finished smooth with seamless faces. Rabbets and soffits shall be continuously welded internally.
   2) Internal flush face joints shall be continuously welded and finished smooth with seamless faces.
   3) Members at internal indented intersections shall be securely welded to concealed reinforcements, and have hairline face seams.
   4) All other intersection elements shall have hairline seams.
   5) Provide welded frames with temporary steel spreader bar welded to the feet of the jambs or mullions to serve as bracing during shipping and handling only. Spreader bars to be removed before installation.

j. Knocked-Down Frames: Flush corner joints with steel reinforcing gussets with integral concealed tabs and slots which securely interlock upon assembly. Assembled corner joint shall provide tight mitered joints with flush faces.

J/R manufacturers knocked down frames with concealed tabs that locks the head of the frame into the jambs to prevent lifting, providing increased stabilization for closers, resist displacement from being pushed on, and eliminates sharp edges of exposed tabs.

k. [Thermally Broken Frames: Interior and exterior frame sections separated by continuous thermal break. Provide frame with integral weatherstripping.]

l. Hardware Reinforcements and Preparations:
   1) Frames shall be mortised, reinforced, drilled and tapped at the factory for templated hardware only, in accordance with the approved hardware schedule and templates provided by the hardware supplier. Where surface mounted non-templated hardware apply, frames shall be reinforced, with drilling and tapping done by others in the field.
   2) Minimum steel thickness for hardware reinforcements shall be as follows:
      a) Full Mortise Hinges and Pivots: 0.184 inch.
      b) Continuous Hinges: 0.067 inch.
      c) Strikes, Pivots, Concealed Holders, or Surface Mounted Closers: 0.093 inch.
      d) Overhead Stops: 0.093 inch.
      e) Plaster Guards: Formed from same material as frames, not less than 0.016-inch thick steel sheet to close off interior of openings; place at back of hardware cutouts where mortar or other materials might obstruct hardware installation and operation.

2. Floor Anchors: Provide floor anchors for frames, unless indicated otherwise. Floor anchors are in addition to jamb anchors.
   a. Formed from same material and thickness as frames, but not less than 0.053 inch thick.
   b. Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor. Provide two holes for fastening to substrate.
   c. [Topping Slabs: Where specified or scheduled, provide adjustable floor anchors, providing not less than 2 inch height adjustment.]

3. Jamb Anchors: Frames shall be provided with anchorage appropriate to frame and wall construction. Anchor requirements below are in addition to floor anchors.
   a. Masonry Anchors: Adjustable jamb anchors of the strap and stirrup or T-strap type not less than 0.053 inch thickness. Straps shall be not less than 2 inches by 10 inches in size, corrugated or perforated. Jamb anchors shall be placed at a maximum of 18 inches from top and bottom of openings. The minimum number of anchors spaced at maximum 32 inches on center, provided on each jamb, based on the over-all frame height, shall be as follows:
      1) Up to 60 inches: 3 jamb anchors and one floor anchor.
      2) Greater than 60 inches, up to 90 inches: 3 jamb anchors and one floor anchor.
      3) Greater than 90 inches, up to 96 inches: 4 jamb anchors and one floor anchor.
      4) Greater than 96 inches: 5 jamb anchors plus one for each 24 inches or fraction thereof, spaced at 32 inches maximum between anchors and one floor anchor.
   b. Stud Wall Anchors: Combination anchor, not less than 0.053 inch thickness. Jamb anchors shall be placed at a maximum of 18 inches from top and bottom of openings. The minimum number of anchors spaced at maximum 32 inches on center, provided on each jamb, based on the over-all frame height, shall be as follows:
      1) Up to 86 inches: 3 jamb anchors and one floor anchor.
      2) Greater than 86 inches, up to 96 inches: 4 jamb anchors and one floor anchor.
      3) Greater than 96 inches: 5 jamb anchors plus one for each 24 inches or fraction thereof, spaced at 32 inches maximum between anchors and one floor anchor.
   c. Compression Anchors: Provide slip-on drywall frames for installation in stud partitions with an adjustable compression anchor in each jamb and provide for secure attachment of each jamb base to stud runners. Provide anchor straps on both sides of bottom of frame jambs to receive screw fasteners.

Compression anchors hold the frame in place near the top of the frame by turning a concealed screw that presses a plate against the rough opening framing. The bottom of the frame is held in place by metal strap anchors attached with screws into the support framing on both sides of the frame jambs. Light gage metal framing at the rough opening should be of heavy gage thickness and/or reinforced with wood blocking or similar stiffener to provide suitable resistance to the force of the compression anchor and loads imposed by the door operation to prevent displacement. Compression anchors are not recommended for door openings 48 inches or greater in width. Do not use compression anchors at high traffic or abusive locations, or at locations subject to impact loads. For commercial and institutional use, floor and jamb anchors are recommended.

   d. Existing Wall Anchors: Provide countersunk holes to receive 0.375 inch diameter screw fasteners, with a spacer within the jamb profile. Place anchors a maximum of 6 inches from the top and bottom of the frame, with intermediate spacing at a maximum of 24 inches on center. Provide anchors for installation by others.

D. Glazing Moldings and Stops:

1. Provide with steel moldings to secure glazing materials, in accordance with glazing sizes and thickness shown in the contract documents.
2. Removable glass stops shall be channel shaped, not less than 0.032 inch thickness, with tight fitting butt or mitered corners, and secured with #6 minimum, corrosion resistant countersunk sheet metal screws.
3. Metal surfaces to which glazing stops are applied, and the inside of the glazing stops shall be treated for maximum paint adhesion and painted with a rust inhibitive primer prior to installation of the stop.
4. Glazing stops to have same zinc-coating and primer finish as the door face sheets.
5. Fire rated doors and frames shall be prepared for listed glazing as required in accordance with the door manufacturer's fire rating procedure.
6. Fasteners: Zinc coated phillips head self-tapping screws. Fasteners located on secure side of opening.

2.9 FINISH

A. Preparation: After fabrication, fill and sand all tool marks and surface imperfections as required to make surfaces free from irregularities and dressed smooth.
1. Galvanannealed surfaces shall be wiped clean, removing dirt, oils and metal filings.
2. Galvanized surfaces shall be cleaned and etched in accordance with primer manufacturer requirements.
3. At exterior hollow metal work, repair galvanized surfaces with zinc-rich primer.

B. Primer: Rust inhibitive alkyd primer that permits latex and alkyd architectural coatings and two-component epoxies, aliphatic urethanes and oleo resinous industrial coating systems.

C. Prime coat external surfaces including faces, and vertical, top and bottom edges. Prime coat concealed glazed opening surfaces and glazing stops.

D. Fully cure primer before shipment.

PART 3 - EXECUTION

A. EXAMINATION

B. Section 01 70 00 - Execution and Closeout Requirements specifies requirements for installation examination.

C. Verify that substrate conditions, whether existing or installed under other Sections, are as detailed in the construction drawings, and are acceptable for product installation in accordance with the manufacturer's instructions.

D. Check the area of floor on which the frame is to be installed, and within the path of door swing, for flatness and levelness.

E. Check slabs for location and depth of conduits and piping to ensure clearance from power-actuated fasteners and post installation fasteners.

F. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Section 01 70 00 - Execution and Closeout Requirements specifies requirements for installation preparation.

B. Check doors and frame for correct size, swing, fire-rating, and opening number. Verify adequate floor clearance above finish flooring scheduled for the door location, providing not less than 1/4 inch floor clearance from finish floor.

C. Remove temporary steel spreader bars before installation. Dress smooth area of removal by grinding and filling, removing tool marks and surface imperfections. At exterior hollow metal work, repair galvanized surfaces with zinc-rich primer.

D. [Coat concealed frame surfaces to come in contact with mortar grout with a field applied monolithic bituminous barrier coating.]

3.3 INSTALLATION

A. General Installation: Install hollow metal work plumb, level, rigid and in true alignment. Comply with According to HMMA 840, manufacturer's instructions and the following. Install labeled fire doors and frames according to NFPA 80.

B. Hollow Metal Frames:
   1. Set frames in proper location, temporarily braced, shimmed and held in position until permanently anchored.
      a. Properly space frame using wood template not less than 1 inch thick, that is nearly full depth of frame and of proper spacing width during setting and anchoring of frames to maintain proper width, with frame plumb and square without twists. Provide additional spreader at mid height to correct or prevent bowing of frames and secure to maintain proper opening and clearance tolerances. Remove temporary braces necessary for installation after frames have been properly set and secured.
      b. Where frames are fabricated and shipped in sections, field splice at approved locations by welding face joint continuously or mechanical splice with recessed screws and filled. Dress smooth by grinding and filling, removing tool marks and surface imperfections. At exterior hollow metal work, repair galvanized surfaces with zinc-rich primer.
      c. Floor Anchors: Provide for each jamb and mullion, and secure to substrate with not less than two power-actuated fasteners or post installation screw fasteners per anchor.
      d. Masonry Walls: Masonry anchors, set into mortar joints and grouted as masonry installation progresses. Provide floor anchor at each jamb, in addition to wall anchors.
         1) Coordinate installation of silencers in frames before mortar grout placement.
      e. Stud Partitions: Screw attach stud wall anchors to studs. Provide floor anchor at each jamb, in addition to wall anchors. Use galvanized fasteners at exterior wall locations.
      f. In-Place Stud Partitions: Adjust compression anchors to secure frames in proper position. Screw attach jamb bottoms to framing on both sides of each jamb.

g. In-Place Masonry or Concrete: Existing wall anchors, secured to substrate with post installation screw anchors. Countersink fastener heads, fill and finish flush and not visible after finish painting.

h. Installation Tolerances: During the setting and securing of frames check and correct as necessary for opening width, opening height, squareness, alignment, twist and plumbness. Installation tolerances shall be maintained within the following limits.

1) Opening Width: Measured from rabbet to rabbet at top, middle and bottom of frame; plus 1/16 inch, minus 1/32 inch.

2) Opening Height: Measured vertically between the frame head rabbet and top of floor or bottom of frame minus jamb extensions at each jamb and across the head; plus 1/16 inch, minus 1/32 inch.

3) Squareness: Measured at rabbet on a line from jamb, perpendicular to frame head; not to exceed 1/16 inch.

4) Alignment: Measured at jambs on a horizontal line parallel to the plane of the face; not to exceed 1/16 inch.

5) Twist: Measured at opposite face corners of jambs on parallel lines perpendicular to the plane of the door rabbet; not to exceed 1/16 inch.

6) Plumbness: Measured at the jambs on a perpendicular line from the head to the floor; not to exceed 1/16 inch.

C. Hollow Metal Doors

1. Hang doors in proper location, shimmed and fit into openings. Installation tolerances shall be maintained within the following limits.

a. Non-Fire Rated Openings:

1) Between Doors and Frame at Head and Jambs: 1/8 inch plus or minus 1/16 inch.

2) Between Edges of Pairs of Doors: 1/8 inch plus or minus 1/16 inch.

3) Between Bottom of Door and Top of Threshold: Maximum 3/8 inch.

4) Between Bottom of Door and Top of Finish Floor: Maximum 3/4 inch.

b. Fire Rated Openings: Per NFPA 80.

1) Between Edges of Pairs of Doors: Maximum 1/8 inch.

2) Between Bottom of Door and Top of Finish Floor: Maximum 1/2 inch.

D. Glazing Moldings and Stops

1. Coordinate installation with Division 08 Section - Glazing and with hollow metal manufacturer's instructions. Screw attach with stops with uniformly spaced countersunk flathead or oval head fasteners to hold stops in position tight to opening without gaps or displacement.

3.4 ADJUSTING AND CLEANING

A. Adjustments: Adjust doors for proper clearances and operation.

B. Clean surfaces made dirty by field work.

C. Metallic-Coated Steel Surfaces: At hollow metal work exposed to the exterior, repair galvanized surfaces with zinc-rich primer.

D. Primer Touchup: Surfaces damaged from storage, handling and installation operations shall be sanded smooth and touch up with compatible rust inhibitive primer.

END OF SECTION