

SECTION 08 11 13

HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Interior hollow metal steel doors and frames.
2. Exterior hollow metal doors and frames.
3. Hollow metal opening framing.
4. Hollow metal panels.
5. Integration of electrified hardware, access control systems, and security systems into door and frame assemblies.

1.2 DEFINITIONS

- A. Minimum Thickness: Minimum thickness of base metal without coatings according to NAAMM-HMMA 803 or SDI A250.8.

1.3 ACTION SUBMITTALS

- A. Product Data: Technical data including construction detail, material descriptions, core descriptions, label compliance, sound and fire resistance ratings, temperature rise ratings and finishes for each type of door and frame specified.
- B. Provide technical data on all doors and frames to indicate thermal and other Performance Requirements compliance.
- C. Shop Drawings: Submit drawings using same designations in door and frame schedule on the Drawings. Manufacturers published details may NOT replace shop drawings for this project. Provide the following at minimum:
1. Opening size(s), handing of doors.
 2. Frame throat dimensions
 3. Details of each frame type.
 4. Elevations and profiles of door design types.
 5. Details of door and frame construction including vertical and horizontal edge details and metal thickness.
 6. Location and installation requirements of door hardware and reinforcements, hardware group numbers.
 7. Details of anchorage, joint, field splice, and connections, details of moldings, removable stops, and glazing.

8. Fire label requirements including fire rating time duration, maximum temperature rise requirements, and smoke label requirements.
 9. Indicate routing of electrical conduit and dimensions and locations of cutouts in doors and frames to accept electric hardware devices, signals, and control systems.
- D. Schedule: Provide schedule of steel doors and frames, prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with final door hardware schedule.

1.4 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: Submit test reports for each type of steel door and frame assembly for tests performed by a qualified testing agency.
- B. Certificate of Compliance for Fire Rated Doors: Provide copies of Certificate of Compliance for fire rated door assemblies, smoke and draft control door assemblies, and temperature rise rated door assemblies.
1. Oversize Construction Certification: For assemblies required to be fire rated and exceeding limitations of labeled assemblies.

1.5 QUALITY ASSURANCE

- A. Regulatory Requirements:
1. Steel Door and Frame Standard: Comply with applicable provisions of Hollow Metal Manufacturers Association (HMMA) Div. of National Association of Architectural Metal Manufacturers (NAAMM):
 - a. HMMA Hollow Metal Manual.
 - b. HMMA 861 Guide Specifications for Commercial Hollow Metal Doors and Frames.
- B. Manufacturer Qualifications: Firm having minimum 5 years documented experience in manufacturing steel doors and frames, with sufficient production capacity to produce required units.
- C. Source Limitations: Obtain steel doors and frames from single source from single manufacturer.
- D. Preinstallation Conference: Conduct conference at site.

1.6 COORDINATION

- A. Coordinate anchorage installation for hollow metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver to site in time for installation.
- B. Coordinate requirements for installation of door hardware, electrified door hardware, and access control and security systems.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver steel doors and frames palletized, packaged, or crated to provide protection during transit and site storage. Do not use nonvented plastic. Provide additional protection to prevent damage to factory finished units.
- B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.
- C. Store hollow metal work vertically under cover at site with head up. Place on minimum 4 inch (102 mm) high wood blocking. Provide minimum 1/4 inch (6 mm) space between each stacked door to permit air circulation.
- D. Inspect doors and frames, on delivery, for damage. Tool marks, rust, blemishes, and other damage on exposed surfaces is not acceptable. Remove and replace damaged items directed by Owner. Store doors and frames at building site in dry location and off ground to prevent deterioration.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire Rated Assemblies: Complying with NFPA 80 and listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction for fire protection ratings and temperature rise limits indicated, based on testing at positive pressure according to NFPA 252 or UL 10C. Provide metal labels permanently fastened on each door and frame assembly within size limitations established by the labeling authority having jurisdiction.
 - 1. Smoke and Draft Control Assemblies: Provide assemblies with gaskets listed and labeled for smoke and draft control by a qualified testing agency acceptable to authorities having jurisdiction, based on testing according to UL 1784 and installed in compliance with NFPA 105.
 - 2. Oversize Fire Rated Door Assemblies: For units exceeding sizes of tested assemblies, provide certification by a qualified testing agency that doors comply with standard construction requirements for tested and labeled fire-rated door assemblies except for size.
-
- B. Fire Rated, Borrowed Lite Assemblies: Complying with NFPA 80 and listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction, for fire protection ratings indicated, based on testing according to NFPA 257 or UL 9.
 - A. Thermally Rated Door Assemblies: Fabricate doors and frames for thermal insulating assemblies and tested in accordance with ASTM C 518.
 - 1. Provide door assemblies with U-factor of not more than 0.34 degrees Btu/F x h x sq. ft. when tested according to ASTM C 518.

- B. Sound Rated (Acoustical) Assemblies: Provide door and frame assemblies fabricated as sound reducing assemblies, tested in accordance with ASTM E 1408, and classified in accordance with ASTM E 413.
 - 1. Provide acoustical assemblies with sound ratings of STC 36 or better.
- C. Accessibility Requirements: Comply with applicable requirements.
 - 1. U.S. Architectural and Transportation Barriers Compliance Board Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities (ADAAG) 2010.
 - 2. ICC/ANSI A117.1 Accessible and Useable Building and Facilities..

2.2 MATERIALS

- A. Manufacturers: Subject to compliance with requirements, provide products complying with requirements of one of the following:
 - 1. Amweld International, LLC.
 - 2. Ceco Door Products; an Assa Abloy Group company.
 - 3. Curries Company; an Assa Abloy Group company.
 - 4. Mesker Door Inc.
 - 5. Republic Doors and Frames.
 - 6. Rocky Mountain Metals, Inc.
 - 7. Steelcraft; an Allegion company.
- B. Cold Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.
- C. Hot Rolled Steel Sheet: ASTM A 1011/A 1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.
- D. Metallic Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B.
- E. Inserts, Bolts, and Fasteners: Hot dip galvanized according to ASTM A 153/A 153M.
- F. Frame Anchors: ASTM A 879/A 879M, Commercial Steel (CS), 04Z (12G) coating designation; mill phosphatized.
 - 1. For anchors built into exterior walls, steel sheet complying with ASTM A 1008/A 1008M or ASTM A 1011/A 1011M, hot dip galvanized according to ASTM A 153/A 153M, Class B.
- G. Power Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hollow-metal frames of type indicated.
- H. Mineral Fiber Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers manufactured from slag or rock wool; with maximum flame spread and smoke developed indexes of 25 and 50, respectively; passing ASTM E 136 for combustion characteristics.

- I. Grout: ASTM C 476, except with a maximum slump of 4 inches (102 mm), as measured according to ASTM C 143/C 143M.
- J. Glazing: Comply with requirements in Section 08 80 00.
- K. Bituminous Coating: Cold applied asphalt mastic, compounded for 15 mil (0.4 mm) dry film thickness per coat. Provide inert type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

2.3 EXTERIOR STEEL DOORS AND FRAMES

- A. Construct hollow metal doors and frames to comply with standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.
- B. Maximum Duty Doors and Frames: SDI A250.8, Level 4; SDI A250.4, Level A..
 - 1. Doors:
 - a. Type: Indicated in the Door Schedule.
 - b. Thickness: 1-3/4 inches (44.5 mm).
 - c. Face: Metallic coated steel sheet, minimum thickness of 0.067 inch (1.7 mm), with minimum A60 (ZF180) coating.
 - d. Edge Construction: Model 2, Seamless.
 - e. Edge Bevel: Bevel lock edge 1/8 inch in 2 inches (3.2 mm in 51 mm).
 - f. Top Edge Closures: Close top edges of doors with flush closures of same material as face sheets. Seal joints against water penetration.
 - g. Bottom Edges: Close bottom edges of doors with end closures or channels of same material as face sheets. Provide weep hole openings in bottoms of exterior doors to permit moisture to escape.
 - h. Core: Polyisocyanurate insulation to meet U value indicated with Vertical steel stiffener.
 - i. Fire Rated Core: Vertical steel stiffener with insulation core for fire rated doors.
 - j. Achieve an operable U-Factor of 0.34 to meet all Performance Requirements.
 - k. Basis of Design: Provide Trio-E Energy Efficient Steel Stiffened Doors by Ceco Door.
 - 2. Frames:
 - a. Materials: Metallic coated steel sheet, minimum thickness of 0.067 inch (1.7 mm), with minimum A60 (ZF180) coating.
 - b. Construction: Full profile welded.
 - 3. Exposed Finish: Prime.

2.4 INTERIOR STANDARD STEEL DOORS AND FRAMES

- A. Construct hollow metal doors and frames to comply with standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.

- B. Extra Heavy Duty Doors and Frames: SDI A250.8, Level 3; SDI A250.4, Level A..
 - 1. Doors:
 - a. Type: Indicated in the Door Schedule.
 - b. Thickness: 1-3/4 inches (44.5 mm).
 - c. Face: Metallic coated steel sheet, minimum thickness of 0.053 inch (1.3 mm).
 - d. Edge Construction: Model 2, Seamless.
 - e. Edge Bevel: Bevel lock edge 1/8 inch in 2 inches (3.2 mm in 51 mm).
 - f. Core: Vertical steel stiffener.
 - g. Fire Rated Core: laminated mineral board core for fire rated and temperature rise rated doors.
 - 2. Frames:
 - a. Materials: Metallic coated steel sheet, minimum thickness of 0.053 inch (1.3 mm).
 - b. Sidelite and Transom Frames: Fabricated from same thickness material as adjacent door frame.
 - c. Construction: Full profile welded.
 - 3. Exposed Finish: Prime.

2.5 BORROWED LITES

- A. Fabricate of Metallic coated steel sheet, minimum thickness of 0.053 inch (1.3 mm).
- B. Construction: Full profile welded.
- C. Fabricate in one piece except where handling and shipping limitations require multiple sections. Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of metal of same or greater thickness as metal as frames.
- D. Provide countersunk, flat or oval head exposed screws and bolts for exposed fasteners unless otherwise indicated.

2.6 HOLLOW METAL PANELS

- A. Provide hollow metal panels of same materials, construction, and finish as adjacent door assemblies.

2.7 FRAME ANCHORS

- A. Jamb Anchors:
 - 1. Type: Provide anchors of minimum size and type required by applicable door and frame standard, and suitable for performance level indicated.
 - 2. Quantity: Minimum of three anchors per jamb, with one additional anchor for frames with no floor anchor. Provide one additional anchor for each 24 inches (610 mm) of frame height above 7 feet (2.1 m).

3. Postinstalled Expansion Anchor: Minimum 3/8 inch (9.5 mm) diameter bolts with expansion shields or inserts, with pipe spacer.
- B. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor.
- C. Floor Anchors for Concrete Slabs with Underlayment: Adjustable type anchors with extension clips, allowing not less than 2 inch (51 mm) height adjustment. Terminate bottom of frames at top of underlayment.

2.8 FABRICATION

- A. Fabricate steel doors and frames rigid and free from defects, warp, or buckle. Accurately form metal to required sized and profiles. Take field measurements as required for coordination with adjoining work. Where possible, fit and assemble units in manufacturer's plant. Clearly identify work which cannot be permanently factory assembled before shipment to assure proper assembly at site.
 1. Metallic Core Construction: Weld cores to both door face sheets.
 2. Nonmetallic Core Construction: Laminate core material to both door face sheets with waterproof adhesive.
- B. Remove tool marks and surface imperfections; dress smooth exposed faces of welded joints. Use of metallic filler to conceal manufacturing defects is not acceptable.
- C. Exposed Fasteners: Provide countersunk Phillips heads for exposed screws and bolts.
- D. Door Astragals: Provide overlapping astragal on one leaf of pairs of doors where required by NFPA 80 for fire performance rating or where indicated. Extend minimum 3/4 inch (19 mm) beyond edge of door on which astragal is mounted or as required to comply with published listing of qualified testing agency.
- E. Hollow Metal Frames: Fabricate frames in one piece in compliance with the reference standard and the following:
 1. Sidelite and Transom Bar Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by welding.
 2. Provide countersunk, flat or oval head exposed screws and bolts for exposed fasteners unless otherwise indicated.
 3. Grout Guards: Weld guards to frame at back of hardware mortises in grouted frames.
 4. Door Silencers: Except on weather stripped frames, drill stops to receive door silencers as follows. Keep holes clear during construction.
 - a. Single Door Frames: Drill stop in strike jamb to receive three door silencers.
 - b. Double Door Frames: Drill stop in head jamb to receive two door silencers.
- F. Jamb Anchors:
 1. Masonry Type: Locate anchors not more than 16 inches (400 mm) from top and bottom of frame. Space anchors not more than 32 inches (825 mm) o.c., to match coursing:

- a. Two anchors per jamb up to 60 inches (1530 mm) high.
 - b. Three anchors per jamb from 60 to 90 inches (1530 mm to 2290 mm) high.
 - c. Four anchors per jamb from 90 to 120 inches (2290 mm to 3060 mm) high.
 - d. Four anchors per jamb plus one additional anchor per jamb for each 24 inches (610 mm) or fraction thereof above 120 inches (3060 mm) high.
2. Stud Wall Type: Locate anchors not more than 18 inches (460 mm) from top and bottom of frame. Space anchors not more than 32 inches (815 mm) o.c.:
 - a. Three anchors per jamb up to 60 inches (1530 mm) high.
 - b. Four anchors per jamb from 60 to 90 inches (1530 mm to 2290 mm) high.
 - c. Five anchors per jamb from 90 to 96 inches (2290 mm to 2440 mm) high.
 - d. Five anchors per jamb plus one additional anchor per jamb for each 24 inches (610 mm) or fraction thereof above 96 inches (2440 mm) high.
 3. Compression Type: Not less than two anchors in each frame.
 4. Postinstalled Expansion Type: Locate anchors not more than 6 inches (150 mm) from top and bottom of frame. Space anchors not more than 26 inches (660 mm) o.c.
- G. Head Anchors: Two anchors per head for frames more than 42 inches (1065 mm) wide and mounted in metal stud partitions.
- H. Hardware Preparation: Factory prepare hollow metal doors and frames to receive templated mortised hardware, and electrical wiring; include cutouts, reinforcement, mortising, drilling, and tapping according to SDI A250.6, the Door Hardware Schedule, and templates.
1. Reinforce doors and frames to receive nontemplated, mortised, and surface mounted door hardware. Offset reinforcement so faces of mortised hardware items are flush with door surfaces. Secure reinforcement by spot welding.
 2. Comply with BHMA A156.115 and SDI 250.6 for preparing hollow metal doors and frames for hardware.
 - a. Hinges and Pivots: 0.167 inch (4.2 mm) thick by 1-1/2 inches (38 mm) wide by 9 inches (229 mm).
 - b. Lock Front, Strike, and Flushbolt Reinforcement: 0.093 inch (2.3 mm) thick by size as required by hardware manufacturer.
 - c. Lock Reinforcement Units: 0.067 inch (1.7 mm) thick by size as required by hardware manufacturer.
 - d. Closer Reinforcements: 0.093 inch (2.3 mm) thick one piece channel by size as required by hardware manufacturer.
 - 1) For concealed overhead door closers, provide space, cutouts, reinforcing, and provisions for fastening in top rail of doors or head of frames as applicable.
 - e. Other Hardware Reinforcements: Required for adequate strength and anchorage; in lieu of reinforcement specified, hardware manufacturers recommended reinforcing units may be used.
 - f. Exit Device Reinforcements: 0.250 inch (6.35 mm) thick by 10 inches (245 mm) high by 4 inches (101 mm) wide centered on exit device case body, unless otherwise recommended by exit device manufacturer.

- I. Glazed Lites: Provide stops and moldings around glazed lites and louvers where indicated. Form corners of stops and moldings with mitered hairline joints.
 - 1. Provide stops and moldings flush with face of door, and with square stops unless otherwise indicated.
 - 2. Multiple Glazed Lites: Provide fixed and removable stops and moldings so each glazed lite is capable of being removed independently.
 - 3. Weld fixed frame moldings on outside of exterior and on secure side of interior doors and frames.
 - 4. Provide loose stops and moldings on inside of hollow metal doors and frames.
 - 5. Coordinate rabbet width between fixed and removable stops with glazing and installation types indicated.
 - 6. Provide stops for installation with countersunk flat or oval head machine screws spaced uniformly not more than 9 inches (230 mm) o.c. and not more than 2 inches (51 mm) o.c. from each corner.
- J. Mullions and Transom Bars: Join to adjacent members by welding or rigid mechanical anchors.
- K. Plaster and Grout Guards and Removable Access Plates: Provide 0.016 inch (0.4mm) thick plaster guards or dust cover boxes of same material as frame, welded to frame at back of hardware cutouts to close off interior of openings and prevent mortar or other materials from obstructing hardware operation. Provide removable access plates in the heads of frames to receive overhead concealed door closers.
- L. Electrical Requirements: Coordinate provisions with installation of electrical items including electronic hardware, security system components, and similar items having electrical requirements; arrange so wiring can be readily removed and replaced.
 - 1. Provide cutouts and reinforcements required for steel doors and frames to accept security system components.
 - 2. Doors with Electric Hinges and Pivots: Provide with metal conduit or raceway to permit wiring from electric hinge or pivot to other electric door hardware.
 - a. Hinge Location: Center for doors less than 90 inches (2286 mm) tall or second hinge from door bottom for doors greater than 90 inches (2286 mm); top or bottom electric hinge locations shall not be permitted.

2.9 ACCESSORIES

- A. Rubber Door Silencers: Except on weatherstripped and smoke-gasketed doors, drill stop in strike jamb to receive three silencers on single-door frames and drill head jamb stop to receive four silencers on double-door frames. Install plastic plugs to keep holes clear during construction.
- B. Shim Space Insulation: loose or batt mineral fiber or foam-in-place type unless otherwise indicated on the Drawings.

2.10 STEEL FINISHES

- A. Surface Preparation: Clean, treat and prime surfaces of fabricated steel door and frame work, inside and out, whether exposed or concealed in the construction.
1. Clean surfaces with nonpetroleum solvent so surfaces are free of dirt, oil, grease, and contaminants that could impair paint bond.
 2. Remove mill scale and rust, if present, from uncoated steel, complying with SSPC-SP 3 *Power Tool Cleaning* or SSPC-SP 6/NACE No. 3 *Commercial Blast Cleaning*.
 3. After cleaning, apply conversion coating suited to organic coating applied over surface.
 4. Clean welds, mechanical connections, and abraded areas, and apply galvanizing repair paint complying with ASTM A 780.
 5. Galvanizing Repair Paint: High zinc dust content paint for regalvanizing welds in steel, complying with SSPC-Paint 20.
- B. Factory Priming for Field Painted Finish: Apply shop primer immediately after surface preparation and pretreatment. Apply fast curing, corrosion inhibiting, lead and chromate free, universal primer complying with ANSI A224.1; compatible with substrate and field applied finish paint system indicated; providing sound foundation for field applied topcoats despite prolonged exposure. Apply primer coat of a smooth, even consistency of provide uniform dry film thickness of not less than 0.7 mils (0.02 mm). Touch up surfaces having runs, smears, or bare spots.
1. Finish Coats: Spray finish coats complying with Sections governing interior and exterior painting as appropriate.
- C. Factory Finish: Clean, pretreat, and apply two coat, baked on finish consisting of prime coat and thermosetting topcoat, complying with SDI A250.3.
1. Color and Gloss: Selected by Architect.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions for compliance with requirements for installation tolerances and conditions affecting performance of the work. Examine roughing in for embedded and built-in anchors to verify actual locations before frame installation.
- B. Existing Steel Frames and Doors: Examine existing frames and doors for indications of hinge stress, improperly fitting and operating hardware, excessive wear, rust or corrosion, dents and patches, out of plumb, damaged core, fire rated opening clearances, delamination, forced entry and vandalism and similar wear indicators.
- C. Prepare written report listing conditions detrimental to performance of the work.
- D. Proceed with installation after correcting unsatisfactory conditions.

3.2 PREPARATION

- A. Remove welds in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces. Touch up factory applied finishes where spreaders are removed.
- B. Prior to installation and with installation spreaders in place, adjust and securely brace hollow metal door frames for squareness, alignment, twist, and plumb to the following tolerances:
 - 1. Squareness: Plus or minus 1/16 inch (1.6 mm), measured at door rabbet on a line 90 degrees from jamb, and perpendicular to frame head.
 - 2. Alignment: Plus or minus 1/16 inch (1.6 mm), measured at jambs on a horizontal line parallel to plane of wall.
 - 3. Twist: Plus or minus 1/16 inch (1.6 mm), measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
 - 4. Plumbness: Plus or minus 1/16 inch (1.6 mm), measured at jambs on a perpendicular line from head to floor.
- C. Drill and tap doors and frames to receive nontemplated, mortised, and surface mounted door hardware.

3.3 INSTALLATION

- A. Install hollow metal doors and frames plumb, rigid, properly aligned, and securely fastened in place. Comply with approved Shop Drawings and with manufacturer's written instructions.
- B. Hollow Metal Frames: Comply with SDI A250.11.
 - 1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces without damage to completed work.
 - a. Extend frame anchorages below fills and finishes. Coordinate the installation of built in anchors for wall and partition construction required with work.
 - b. Where frames are fabricated in sections, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces. Touch up finishes.
 - c. Install frames with removable stops located on secure side of opening.
 - d. Install door silencers in frames before grouting.
 - e. Field apply corrosion resistant coating to backs of frames in contact with grout or plaster containing antifreezing agents.
 - 2. Welded Frames: Set anchorage devices where required for securing frames to in place concrete or masonry construction. Set anchorage devices opposite each anchor location as specified and anchorage device manufacturer's written instructions. Leave drilled holes rough, not reamed, and free of dust and debris.
 - 3. Fire Rated Openings: Install frames according to NFPA 80.

4. Floor Anchors: Install floor anchors for each jamb and mullion that extends to floor, and secure with postinstalled expansion anchors.
 - a. Floor anchors may be set with power actuated fasteners in lieu of postinstalled expansion anchors if indicated and approved on Shop Drawings.
 5. Metal Stud Partition: Solidly pack mineral fiber insulation inside frames.
 6. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout or mortar.
 7. Concrete Walls: Solidly pack mineral fiber insulation inside frames; Coordinate installation of frames to allow for solidly filling space between frames and concrete with grout or mortar where indicated on the Drawings.
 8. In Place Concrete or Masonry Construction: Secure frames in place with postinstalled expansion anchors. Stainless Steel Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
 9. Installation Tolerances: Adjust hollow metal frames to specified tolerances:
 - a. Squareness: Plus or minus 1/16 inch (1.6 mm), measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
 - b. Alignment: Plus or minus 1/16 inch (1.6 mm), measured at jambs on a horizontal line parallel to plane of wall.
 - c. Twist: Plus or minus 1/16 inch (1.6 mm), measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
 - d. Plumbness: Plus or minus 1/16 inch (1.6 mm), measured at jambs at floor.
 10. Exterior Frames:
 - a. Coordinate installation with all other Work, including but not limited to sheet metal flashing and trim and sealant.
 - 1) Provide appropriate mineral fiber or foam-in-place shim space fill for sealant joint backing.
 - 2) Ensure sufficient frame fill is in place to permit proper installation of backer rod and sealant for all units to achieve a 2 point adhesion for all exterior frames.
 - b. Install exterior frames in accordance with manufacturer's requirements to achieve U value required by Performance Requirements.
 - c. Provide stainless steel drip edge flashing at all frame heads.
 - d. Clean all frames prior to installation of sealant to ensure 2 point adhesion of sealant assembly.
- C. Hollow Metal Doors: Fit and adjust hollow metal doors accurately in frames, within clearances specified.
1. Nonfire Rated Steel Doors: Comply with SDI A250.8.
 - a. Nonfire Rated Steel Doors:
 - 1) Between Door and Frame Jambs and Head: 1/8 inch (3 mm) plus or minus 1/32 inch (0.8 mm).
 - 2) Between Edges of Pairs of Doors: 1/8 inch to 1/4 inch (3 mm to 6 mm) plus or minus 1/32 inch (0.8 mm).
 - 3) At Bottom of Door:

- a) No Threshold or Carpet: 3/8 inch (9 mm) plus or minus 1/32 inch (0.8 mm).
 - b) Threshold or Carpet: 1/8 inch (3 mm) plus or minus 1/32 inch (0.8 mm).
 - 4) Between Door Face and Stop: 1/16 inch to 1/8 inch (1.6 mm to 3 mm) plus or minus 1/32 inch (0.8 mm).
2. Rated Assemblies: Place doors in frames with clearances specified in NFPA Standard No. 80:
 - a. Doors, Frames, and Meeting Edges, Pairs of Doors: 1/8 inch.
 - b. Bottom: Maximum 3/8 inch between door and raised noncombustible sill.
 - c. Bottom: Maximum 3/4 inch above finished floor between door and floor where there is no sill.
 - d. Bottom: Maximum 1/2 inch between door and nominal floor covering surface.
 - e. Astragals: Comply with NFPA 80.
 3. Smoke Control Doors: Install doors according to NFPA 105.
 4. Install exterior doors in accordance with manufacturer's requirements to achieve U value required by Performance Requirements.
- D. Glazing: Comply with installation requirements in Section 08 80 00 and with hollow metal manufacturer's written instructions.
1. Secure stops with countersunk flat or oval head machine screws spaced uniformly not more than 9 inches (230 mm) o.c. and not more than 2 inches (50 mm) o.c. from each corner.
- E. Hardware: Apply hardware in accordance with hardware manufacturer's instructions and Section 08 71 00. Drill and tap for machine screws as required. Do not use self tapping sheet metal screws. Adjust door installation to provide uniform clearance at head and jambs, and to contact stops uniformly. Adjust hardware items just prior to final inspection. Leave work in complete and proper operating condition.
- F. Repair of Existing Doors and Frames:
1. Hinge Damage: Remove the door and hinge. Drill welding holes in area where hinger reinforcement is located. Clam hinge reinforcement in its original position and plug weld. Grind smooth, prime, and finish paint. Rehang door ensuring it operates smoothly and no longer sags.
 2. Holes: Patch weld the hole. For fire rated doors, comply with NFPA requirements.
 3. Dents: If dent has not penetrated the for face, fill dent with recommended patching compound, sand smooth, and refinish the door.
- ### 3.4 ADJUSTING
- A. Final Adjustments: Test and adjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow metal work that is warped, bowed, or unacceptable.

3.5 CLEANING AND TOUCHUP

- A. Remove grout and other bonding material from hollow-metal work immediately after installation.
- B. Prime Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air drying, rust inhibitive primer.
- C. Metallic Coated Surface Touchup: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.
- D. Factory Finish Touchup: Clean abraded areas and repair with same material used for factory finish according to manufacturer's written instructions.
- E. Touchup Painting: Cleaning and touchup painting of abraded areas of paint are specified in painting Sections.
- F. Institute protective measures required throughout the remainder of the construction period to ensure that steel doors and frames will be without damage or deterioration, at time of substantial completion.

END OF SECTION