SECTION 081113 - HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes hollow-metal including work for hollow metal door and frames.

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: For each type of product.

B. Shop Drawings: Include elevations, door edge details, frame profiles, metal thicknesses, preparations for hardware, and other details.

C. Samples for Initial Selection: For units with factory-applied color finishes.

D. Samples for Verification: For each type of exposed finish required.

E. Schedule: Prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings.

1.4 INFORMATIONAL SUBMITTALS

A. Product test reports.

1.5 QUALITY ASSURANCE

A. AWI Quality Standard: "Architectural Woodwork Quality Standards" of the Architectural Woodwork Institute for grade of door, core, construction, finish, and other requirements.

B. Fire-Rated Wood Doors: Specify wood doors that comply with NFPA 80; are identical in materials and construction to units tested in door and frame assemblies per ASTM E 152; and are labeled and listed by UL, Warnock Hersey, or another testing and inspection agency acceptable to authorities having jurisdiction.

C. Single-Source Responsibility: doors required from one source and by a single manufacturer including non-rated and rated doors.

D. Door Manufacturer's Warranty: Provide a written agreement submitted on door manufacturer's standard form with an agreement to repair or replace defective doors that have warped (bow, cup, or twist) more than 1/4 inch (6.35 mm) in a 42-by-84-inch (1067-by-2134-mm) section or that show telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inch (0.25 mm in a 75-mm) span, or do not conform to tolerance limitations of referenced quality standards. Warranty shall be in effect during the following period of time after date of Substantial Completion. Solid Core Interior Door warranty shall be for the life of the installation.

E. Provide all rated doors and frames labeled according to listing requirements of Underwriter's Laboratories (UL).

F. Provide one of the acceptable manufacturers standard core materials according to SDI standards:
1. Vertical steel stiffeners.
2. Honeycomb
3. Polystyrene

G. Clearances for hollow metal doors and frames:
1. Jamb and Head: 1/8 inch, except not more than 1/4 inch
2. Between non-fire-rated pairs of doors. Not more than 3/4 inch at bottom. For fire doors, specify clearances according to NFPA 80.

H. Exposed Fasteners: Provide countersunk flat or oval heads for exposed screws and bolts.

I. Thermal-Rated (Insulating) Assemblies: Provide doors fabricated as thermal insulating door and frame assemblies at all exterior locations and as required to meet the design intent. Doors shall be tested according to ASTM C 236 or ASTM C 976.

J. Hardware Preparation: Provide doors and frames prepared to receive hardware. Comply with applicable requirements of SDI 107 and ANSI A115 Series specifications for door and frame preparation for hardware.

K. All doors and frames shall be reinforced to receive surface-applied hardware.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. Curries Manufacturing.

2. The Ceco Corp.
3. Mesker Industries, Inc.
4. Pioneer Industries.
5. Republic Steel Corp.
6. Steelcraft Manufacturing Co.
7. Premier Steel Doors and Frames
8. Amweld Building Products, Inc.
9. Approved equal prior to bid.

2.2 REGULATORY 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 indicated, based on testing at positive pressure according to NFPA 252 or UL 10C.

2.3 INTERIOR DOORS AND FRAMES

A. Heavy-Duty Doors and Frames: SDI A250.8, Level 2.

1. Physical Performance: Level B according to SDI A250.4.
2. Doors:

    a. Type: As indicated in the Door and Frame Schedule.
    b. Thickness: 1-3/4 inches (44.5 mm).
    c. Face: Uncoated, cold-rolled steel sheet, minimum thickness of 0.042 inch (1.0 mm).
    d. Edge Construction: Model 1, Full Flush.
    e. Core: Manufacturer's standard.

3. Frames:

    a. Materials: Uncoated, steel sheet, minimum thickness of 0.053 inch (1.3 mm).
    b. Construction: Full profile welded.

4. Exposed Finish: Prime.

2.4 EXTERIOR HOLLOW-METAL DOORS AND FRAMES

A. Heavy-Duty Doors and Frames: SDI A250.8, Level 2. At all exterior door locations.

1. Physical Performance: Level B according to SDI A250.4.
2. Doors:

    a. Type: As indicated in the Door and Frame Schedule.
    b. Thickness: 1-3/4 inches (44.5 mm).
    c. Face: Metallic-coated steel sheet, minimum thickness of 0.042 inch (1.0 mm), with minimum A40 (ZF120) coating.

d. Edge Construction: Model 1, Full Flush.
e. Core: Manufacturer's standard insulation material.

3. Thermal-Rated Doors: Provide doors fabricated with thermal-resistance value (R-value) of not less than R= 1.4(U=0.70) when tested according to ASTM C 1363. Door to conform to requirements for Climate Zone 3 from the International Energy Conservation code.
4. Frames:

   a. Materials: Metallic-coated steel sheet, minimum thickness of 0.053 inch (1.3 mm), with minimum A40 (ZF120) coating.
   b. Construction: Full profile welded.

5. Exposed Finish: Prime.

2.5 FRAME ANCHORS

A. Jamb Anchors:

1. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, not less than 0.042 inch thick, with corrugated or perforated straps not less than 2 inches wide by 10 inches long; or wire anchors not less than 0.177 inch thick.
2. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch thick.
3. Compression Type for Drywall Slip-on Frames: Adjustable compression anchors.
4. Post-installed Expansion Type for In-Place Concrete or Masonry: Minimum 3/8-inch- diameter bolts with expansion shields or inserts. Provide pipe spacer from frame to wall, with throat reinforcement plate, welded to frame at each anchor location.

B. Floor Anchors: Formed from same material as frames, minimum thickness of 0.042 inch (1.0 mm), and as follows:

1. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.

2.6 MATERIALS

A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

B. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.

C. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B.

D. 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.

E. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M.

F. Power-Actuated Fasteners in Concrete: From corrosion-resistant materials.

G. Grout: ASTM C 476, except with a maximum slump of 4 inches, as measured according to ASTM C 143/C 143M.

H. Mineral-Fiber Insulation: ASTM C 665, Type I (blankets without membrane facing).

I. Glazing: Section 08 80 00 "Glazing."

J. Bituminous Coating: Cold-applied asphalt mastic, compounded for 15-mil dry film thickness per coat.

2.7 FABRICATION

A. Fabricate hollow-metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for metal thickness. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.

B. Hollow-Metal Doors:

1. Exterior Doors: Provide weep-hole openings in bottoms of exterior doors to permit moisture to escape. Seal joints in top edges of doors against water penetration.
2. Astragals: Provide overlapping astragal on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated.

C. Hollow-Metal Frames: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.

1. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
2. Grout Guards: Weld guards to frame at back of hardware mortises in frames to be grouted.
3. Floor Anchors: Weld anchors to bottoms of jambs with at least four spot welds per anchor; however, for slip-on drywall frames, provide anchor clips or countersunk holes at bottoms of jambs.
4. Jamb Anchors: Provide number and spacing of anchors as follows:

    a. Masonry Type: Locate anchors not more than 16 inches from top and bottom of frame. Space anchors not more than 32 inches o.c., to match coursing, and as follows:

1) Two anchors per jamb up to 60 inches high.
2) Three anchors per jamb from 60 to 90 inches high.
3) Four anchors per jamb from 90 to 120 inches high.
4) Four anchors per jamb plus one additional anchor per jamb for each 24 inches or fraction thereof above 120 inches high.

b. Stud-Wall Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:

1) Three anchors per jamb up to 60 inches high.
2) Four anchors per jamb from 60 to 90 inches high.
3) Five anchors per jamb from 90 to 96 inches high.
4) Five anchors per jamb plus one additional anchor per jamb for each 24 inches or fraction thereof above 96 inches high.

c. Compression Type: Not less than two anchors in each frame.
d. Postinstalled Expansion Type: Locate anchors not more than 6 inches from top and bottom of frame. Space anchors not more than 26 inches o.c.

5. Door Silencers: Except on weather-stripped frames, drill stops to receive door silencers.

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.

D. Hardware Preparation: Factory prepare hollow-metal work to receive templated mortised hardware; 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.
2. Comply with applicable requirements in SDI A250.6 and BHMA A156.115 for preparation of hollow-metal work for hardware.

E. Stops and Moldings: Provide stops and moldings around glazed lites and louvers where indicated. Form corners of stops and moldings with butted or mitered hairline joints.

1. Single Glazed Lites: Provide fixed stops and moldings welded on secure side of hollow-metal work.
2. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames.
3. Provide loose stops and moldings on inside of hollow-metal work.
4. Coordinate rabbet width between fixed and removable stops with glazing and installation types indicated.

2.8 STEEL FINISHES

A. Prime Finish: Clean, pretreat, and apply manufacturer's standard primer.

1. Shop Primer: SDI A250.10.

2.9 ACCESSORIES

A. Louvers: Provide sightproof louvers for interior doors, where indicated, which comply with SDI 111C, with blades or baffles formed of 0.020-inch thick, cold-rolled steel sheet set into 0.032-inch thick steel frame.

1. Fire-Rated Automatic Louvers: Movable blades closed by actuating fusible link, and listed and labeled for use in fire-rated door assemblies of type and fire-resistance rating indicated.

B. Grout Guards: Formed from same material as frames, not less than 0.016 inch (0.4 mm) thick.

2.10 FURTHER REQUIREMENTS (IN CASE OF A CONFLICT, THE FOLLOWING ARE TO TAKE PRECEDENCE)

A. HOLLOW METAL DOORS

1. Materials shall meet the following requirements.
   a. M A366A 366M or hot rolled, pickled and oiled steel conforming to ASTM A 569/A 569M. Steel shall be free of scale, pitting, coil breaks or other surface blemishes. Steel shall also be free of buckles, waves or any other defects caused by the use of improperly leveled sheets.
   b. Exterior Doors: Face sheets shall be 14 gauge minimum thickness and shall have a zinc coating applied by the hot-dip process conforming to ASTM A 653/A 653/M. All exterior doors shall be insulated.
   c. Interior Doors: Face sheets shall be 16 gauge minimum thickness. Where scheduled, face sheets of interior doors shall have a zinc coating conforming to ASTM A 653/A 653/M (A60).
   d. ASTM A167, Type 316 stainless steel.

2. Specify that construction of hollow metal doors shall be as follows:
   a. Door thickness shall be 1 3/4".
   b. Doors shall be neat in appearance and free from warpage and buckle. All edge bends shall be true and straight and of minimum radius for the material used.
   c. Door face sheets shall be joined at their vertical edges.
   d. Door edges shall be joined by internally applied tack welds no more than 6" on center extending the full height of the door. There shall be a visible seam at both edges of the door.
   e. Top and bottom edges of all doors shall be closed with continuous recessed steel channels no less than 16 gauge thickness, spot welded to both face sheets.
   f. Exterior doors shall have an additional flush closing channel at the top edge. Where required for specified hardware, the bottom edge of exterior doors shall have an additional flush closing channel. Opening shall be specified in the bottom closure channel of exterior doors to permit the escape of entrapped moisture.

g. Edge profiles shall be specified on both vertical edges of door as follows:
i. Single-acting doors – beveled 1/8" in 2"
ii. Double-acting doors – rounded on 2-1/8" radius
h. All hardware for single-acting doors shall be designed for beveled edges.
i. Hardware reinforcements:
i. Specify that doors shall be prepared in the factory to receive all hardware specified and approved by the County and to be in accordance with templates specified by the hardware supplier.
ii. Minimum thicknesses of hardware reinforcements shall be as follows:
a) Full mortise hinges & pivots: 10 gauge
b) Lock fronts, flush bolts, closers: 14 gauge
c) For all other Surface-mounted hardware: 16 gauge
j. Glass moldings and stops:
i. If doors contain glass panels, doors shall be specified with flush moldings to secure glazing by others, in accordance with glass sizes and thicknesses shown on approved drawings.
ii. Fixed molding shall be securely welded to the door on the security side.
iii. Removable glass stop shall be no less than 20 gauge channel, with butted corner joints, and secured with #6 cadmium or zinc-plated countersunk sheet metal screws spaced 10" o.c. maximum.
iv. Require that the metal surfaces to which glazing stops are secured and the inside of the glazing stops be chemically treated for maximum paint adhesion and painted with a rust inhibitive primer prior to installation in the door.
v. Snap on moldings and surface applied light kits are not permitted.
k. Louvers shall be factory installed flush type, and louver vanes shall be of the inverted vee type design. Louver vanes and louver channel shall be 18 gauge minimum thickness.
l. Insect screens and/or bird screens shall be specified on louvered doors in exterior locations.
m. At rated doors requiring louvers, specify a factory installed listed fire rated fusible link louver.

B. HOLLOW METAL FRAMES

1. Materials for hollow metal frames shall comply with the following standards:
a. Specify that frames be constructed of commercial quality, cold rolled steel conforming to ASTM A 366/A 366M or hot-rolled pickled and oiled steel conforming to ASTM A 569/A 569M.
b. Steel for exterior openings shall be 14 gauge, and shall have a zinc coating applied by the hot-dip process conforming to ASTM A 653/A 653M (A60).
c. Steel for interior openings shall be 16 gauge.
d. Steel for exterior openings subject to abuse shall be 14 gauge.
2. Construction:
a. All Hollow metal frames may be either knockdown for renovations and retrofits or welded type for new construction according to the design intent, with integral stops and trim.
b. All door frames in masonry construction shall be fully grouted.
c. Corner joints at welded corners shall have all contact edges closed tight, with faces mitered and continuously welded. Stops shall be butted.

d. Minimum height of stops shall be 5/8".
e. Hollow metal frames for multiple openings shall have mullion members.
f. Door Silencers: Except on weather stripped frames, all doors shall have 3 silencers on strike jambs of single-door frames and 2 silencers on heads of double-door frames.
g. Plaster Guards: Specify minimum 0.0179-inch- (0.45-mm-) thick steel plaster guards or mortar boxes at back of hardware cutouts where mortar or other materials might obstruct hardware operation and to close off interior of openings.
h. Hardware reinforcements:
  i. Specify that frames shall be prepared in the factory to receive all hardware specified and approved by the County and in accordance with templates specified by the hardware supplier.
    a) Frames prepared for anchor hinges shall be reinforced only. Drilling and tapping of mounting holes shall be done in the field by the hardware installer.
  ii. Minimum thickness of hardware reinforcing shall be as follows:
    a) Hinge: 7 gauge x 1 –1/2" x 10" in length
    b) Strike reinforcements: 12 gauge or 16 gauge extrusion
    c) Flush bolt reinforcements: 12 gauge
    d) Closer reinforcements: 12 gauge
    e) Surface applied hardware reinforcements: 12 gauge
k. Floor Anchors:
  i. Floor anchors shall be specified with two holes. Fasteners shall be secured welded inside each jamb for anchorage to floor.
  ii. Material thickness of floor anchors shall be 16 gauge.
  iii. Floor anchors are not required for existing wall conditions. An additional frame anchor shall be specified in lieu of a floor anchor.
l. Jamb Anchors:
  i. Frames for installation in masonry walls shall be specified with adjustable jamb anchors of the T-strap or strap and stirrup type no less than 16 gauge; or wire type no less than 0.156" in diameter. Straps shall be no less than 2' x 10" in size, either perforated or corrugated. The number of anchors specified on each jamb shall be as follows:
    a) Frames up to 60" height: 2 anchors
    b) Frames greater than 60" up to 90" : 3 anchors
    c) Frames greater than 90" up to 96": 4 anchors
    d) Frames greater than 96" shall have 4 anchors plus one for each 24" or fraction thereof over 96", spaces 24" maximum between anchors.
  ii. Welded frames for installation in stud partition shall be specified with 18 gauge steel anchors, secured inside each jamb as follows:
    a) Frames up to 60" height: 2 anchors
    b) Frames greater than 60" up to 90": 4 anchors
    c) Frames greater than 90" up to 96": 5 anchors
    d) Frames greater than 96" shall have 5 anchors plus one for each 24" or fraction thereof over 96", spaces 24" maximum between anchors.
  iii. Frames for installation in pre-finished concrete, masonry or steel

openings shall be specified with anchoring system of suitable design and quality. Fasteners for such anchors shall be specified as recommended by the manufacturer.

iv. Knock down frames shall be specified with a single adjustable tension anchor in each jamb and provision secure attachment of each jamb base to stud runners.

v. The Architect shall verify anchor requirements with all UL listed frames prior to final specification.

m. Mortar guard shall be 26 gauge steel and shall be welded in place at all hardware mortises on frames to be set in masonry or concrete openings.

i. Mortar guards are not be required at hardware preparations in frames for drywall partitions.

n. All welded frames shall be specified with a temporary steel spreader welded to the bottom of jambs to serve as bracing during shipping and handling.

o. Removable Glazing Stops:

i. Removable glass stops shall be no less than 20 gauge channel, with butted corner joints, and secured with #6 cadmium or zincplated countersunk sheet metal screw spaced 10" o.c. maximum.

ii. The frames 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.

3. Clearances for hollow metal doors and frames:

a. Jamb and Head: 1/8 inch, except not more than 1/4 inch

b. Between non-fire-rated pairs of doors. Not more than 3/4 inch at bottom. For fire doors, specify clearances according to NFPA 80.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Hollow-Metal Frames: Install hollow-metal frames of size and profile indicated. Comply with SDI A250.11 or NAAMM-HMMA 840 as required by standards specified.

1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.

a. At fire-rated openings, install frames according to NFPA 80.
b. Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
c. Install door silencers in frames before grouting.
d. Remove temporary braces necessary for installation only after frames have been properly set and secured.

e. Check plumb, square, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
f. Field apply bituminous coating to backs of frames that will be filled with grout containing antifreezing agents.

2. Floor Anchors: Provide 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 instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.

3. Metal-Stud Partitions: Solidly pack mineral-fiber insulation inside frames.
4. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout.
5. Concrete Walls: Solidly fill space between frames and concrete with mineral-fiber insulation.
6. In-Place Concrete or Masonry Construction: Secure frames in place with postinstalled expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
7. In-Place Metal or Wood-Stud Partitions: Secure slip-on drywall frames in place according to manufacturer's written instructions.
8. Installation Tolerances: Adjust hollow-metal door frames for squareness, alignment, twist, and plumb to the following tolerances:

   a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
   b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
   c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
   d. Plumbness: Plus or minus 1/16 inch, measured at jambs at floor.

B. Hollow-Metal Doors: Fit hollow-metal doors accurately in frames, within clearances specified below. Shim as necessary.

1. Non-Fire-Rated Steel Doors:

   a. Between Door and Frame Jambs and Head: 1/8 inch (3.2 mm) plus or minus 1/32 inch (0.8 mm).
   b. Between Edges of Pairs of Doors: 1/8 inch (3.2 mm) to 1/4 inch (6.3 mm) plus or minus 1/32 inch (0.8 mm).
   c. At Bottom of Door: [3/4 inch (19.1 mm)] [5/8 inch (15.8 mm)] plus or minus 1/32 inch (0.8 mm).
   d. Between Door Face and Stop: 1/16 inch (1.6 mm) to 1/8 inch (3.2 mm) plus or minus 1/32 inch (0.8 mm).

2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.

C. Glazing: Comply with installation requirements in Section 08 80 00 "Glazing" 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 (51 mm) o.c. from each corner.

3.2 ADJUSTING AND CLEANING

A. Final Adjustments: Check and readjust 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 otherwise unacceptable.

B. Remove grout and other bonding material from hollow-metal work immediately after installation.

C. 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.

D. Metallic-Coated Surface Touchup: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.

E. Touchup Painting: Cleaning and touchup painting of abraded areas of paint are specified in painting Sections.

END OF SECTION 081113