

## METAL DOORS AND FRAMES

### GENERAL INFORMATION

- 1.1 Hollow Metal Door and Frame assemblies for fire-rated and non-rated openings.
- 1.2 Hollow Metal Doors and Frames shall comply with Steel Door Institute “Recommended Specifications: Standard Steel Doors and Frames” (SDI-100), and as described herein.
- 1.3 Wherever a fire resistance classification is scheduled for Hollow Metal Doors and Frames, fire rated units shall be provided that have been tested as fire door assemblies and comply with National Fire Protection Association (NFPA) Standard No. 80, are tested per fire-test response characteristics per ASTM E 152 and otherwise comply with and these Specifications.
- 1.4 Each fire-rated door and frame shall be identified with metal UL, or Warnock Hersey Inc. label indicating applicable fire class of the unit. Rivet or weld labels on the hinge edge of door and jamb rabbet of frame.
- 1.5 Whenever fire rated assemblies are larger than size limitations established by NFPA, provide manufacturer's certification that they have been constructed with materials and methods equivalent to requirements for labeled construction.

### DESIGN REQUIREMENTS

- 2.1 Materials:
  - a. Uncoated Steel Sheet shall be commercial quality cold-rolled steel per ASTM A366, stretcher leveled for door face sheets, stretcher or roller leveled for other work. For office, classroom, and other interior assemblies not exposed to high humidity or wetness.
  - b. Coated Steel Sheet shall be hot-dip galvanized/galvannealed commercial quality steel per ASTM A526 x G60/A60 coating class, stretcher leveled for door face sheets, stretcher or roller leveled for other work. For assemblies exposed to the exterior and to interior toilets, lockers, showers, and other areas of high humidity.

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- c. Oval Head Screws: Steel with electrodeposited cadmium or zinc coating per ASTM B766 x NS or ASTM B633 x GS.
- d. Universal Metal Primer: Alkyd-phenolic, rust-inhibitive metal primer that is compatible with both chemically-cured and air-dried coatings; Tnemec S37 Chem-Prime or Sherwin-Williams B50 N 6.
- e. Insulation: Incombustible, vermin-proof, rot-proof, non-setting mineral rockwool batts.
- f. Hinge Junction Boxes for Doors with Card Access/Provisions for Card Access: With knockouts for standard conduit fittings; Stanley JB-2 Junction Box and Mortar Shield, or approved equal.
- g. Conduit for Doors with Card Access/Provisions for Card Access: 3/4" flexible conduits and conduit clamps.

### 2.2 Gage Requirements:

- a. Office, classroom and other interior doors and frames, including janitors and electric closets: Doors with minimum 20 gage face sheets, minimum 16 gage frames.
- b. Basement and penthouse mechanical areas: Doors with minimum 18 gage face sheets, minimum 14 gage frames
- c. Loading dock and other delivery entrances and service areas with cart or truck traffic: Doors with 16 gage face sheets, minimum 12 gage frames.

### 2.3 Fabrication of all work shall be strong, rigid, accurate, neat, and free of warp, wave, buckle, and other defects that harmfully affect strength, function, or appearance. Shearing and punching shall be clean, without burrs or deformation. Forming and bending shall be true and straight, with uniform profiles. Corner bend shall be formed to minimum radii without cracking or necking.

### 2.4 Welding shall use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals, and obtains complete fusion without discontinuity or undercut. Weld spatter, oxides, and flux shall be removed upon completion. Exposed welds shall be ground smooth

### 2.5 Glazed openings shall be constructed with no more than 1/8" difference in diagonal measurements. Glazing channels shall be formed with constant profiles and no more than 1/32" corner offset and 1/16" bow per 48" length. Glazing channels shall be kept free from welds, fastener heads, and other obstructions.

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- 2.6 After fabrication, tool marks and other imperfections shall be removed by grinding, filling, and sanding. External surfaces shall be made smooth and free of irregularities.
- 2.7 Accessible surfaces shall be thoroughly cleaned and phosphate-coated per FS. TT-C-490 requirements for at least Type II coating.
- 2.8 All accessible surfaces shall be shop primed to 1.0 DMT (min.). Primer shall be thoroughly cured before shipment, to develop maximum hardness and abrasion resistance. Blockages from vent holes shall be cleared.
- 2.9 Fire Rated Construction: Construct assemblies as tested and rated in accordance with ASTM E152. Limit construction variances to those authorized by the labeling agency.
- 2.10 Door Construction:
- a. Style: Seamless hollow steel construction with continuously welded edge seams.
  - b. Face Stiffeners: Continuous, formed steel trusses/hat shapes that run vertically and span interior space between faces; 22 gage (min.) section on 6" centers, arc welded together at top and bottom, and spot welded 4" o.c. to both face sheets. In addition, reinforce cutout perimeters with 16 gage (min.) steel channels, spot welded 4" o.c. (max.) to both faces.
  - c. Edge Stiffeners: 12 gage (min.) steel, completely closing door ends, spot welded to both faces. Locate welds where they are not disturbed by trimming 1/4" from door tops and bottoms. Drill vent holes in bottom channels.
  - d. Vertical Edges: Stiffen edges continuously between hardware reinforcements with welded-in, 18 gage (min.) edge strips.
- 2.11 Insulation: Insulate internal door spaces. Compress insulation to prevent settling.
- 2.12 Flush Closures: Provide flush top closures in exterior doors and flush top and/or bottom closures in all doors where required for weatherstripping or seals installation. Closures shall be 16 gage (min.) steel filler channels or flush mounted end (stiffener) channels. Weatherseal top closures. Vent bottom closures.
- 2.13 Special Closures: Provide 16 gage (min.) steel closures in special shapes where required to accommodate mortised weatherstripping or seals and/or to member with rabbeted construction. Weld securely in place.
- 2.14 Edge Profiles: Bevel stiles 1/8" in 2". Vee bevel meeting stiles of single acting double swing doors.

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- 2.15 Clearances: Provide 1/8" clearance at heads, jambs, and meeting stiles. Undercut doors per schedule. Where not otherwise scheduled, provide bottom clearances of 1/4" at thresholds and 3/4" elsewhere.
- 2.16 Astragals: 1/8" x 1-1/2" flat steel bars. Surface mount to lap opposite leaf 5/8".
- 2.17 Louvers: Make all louvers the same width. Vary height to obtain required net free area. Louvers shall be 20 gage (min.) steel, welded, flush face assemblies without projecting or surface trim. Blades shall be full depth, sight-proof inverted wye. Install louver assemblies between face sheets and spot weld them securely to both faces.
- 2.18 Glazing Provisions: Size and space stops for required glass bite and clearances. Fixed glass stops shall be 20 gage (min.) edge molding with full welded corners and no projecting or surface trim. Form molding with integral rectangular stop for recessed glazing. Install moldings between face sheets and spot weld them securely to both faces 4" (max.) o.c. and 2" (max.) from ends. Removable glass stop shall be formed 20 gage (min.), one-piece-for-length, rectangular, stops with miter-jointed corners and no projecting or surface trim; secure them to edge moldings with evenly-spaced, countersunk oval head machine screws, 2" (max.) from ends and 6" (max.) o.c.
- 2.19 Welded Frame Construction: industry standard frames shall be used unless otherwise approved in writing by facilities.
- a. Single opening frames shall be set-up and welded pressed steel frames with integral trim and backbends.
  - b. Multi-opening frames shall be set-up and welded pressed steel frames with integral trim and backbends; closed, tubular-shape intermediate members, butted to other members with tight contact edges. Secure fixed intermediate members by continuous face welds. Secure removable intermediate members with countersunk flathead machine screws, driven through rabbets into concealed 12 gage steel channels.
- 2.20 Field Joints: Limit field joints to large, multi-opening frames, to meet shipping and field conditions. Make field joints in concealed and/or inconspicuous locations. Weld-in splice plates to match profiles of joined pieces. Make joints clean and flush, with required edge clearances at relief joints and tight contact edges elsewhere. Secure rigid joints with countersunk flathead machine screws, driven through rabbets.
- 2.21 Corners: Miter trim, butt stops, and fit sections together with tight contact edges. Secure interlocked tabs by welding. Weld jamb and head stops along their depth on insides of frames.

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Continuously weld miters on insides of frames; dress and finish faces to produce invisible seams. Weld backbends together.

- 2.22 Head Stiffening: Stiffen headers over 48" long with 14 gage (min.) cold formed steel channels or equivalent. For fire rated frames, ship stiffeners loose for field installation. For other frames, weld stiffeners in headers to develop full combined strength of headers and stiffeners.
- 2.23 Stops:
- a. Door Stops: Form integral stops 5/8" deep where not otherwise shown. Punch/drill stops for silencers: three in strike stops for single swing doors, two in head stops for double swing doors.
  - b. Glass Stops: Size and space stops for required glass bite and clearances. Form integral, rectangular fixed stops for recessed glazing. Fabricate one-piece-for-length, rectangular, removable stops with miter-jointed corners; secure them to frames with evenly-spaced, countersunk oval head machine screws, 2" (max.) from ends and 6" (max.) o.c.
- 2.24 Wall Anchors:
- a. Adjustable Masonry Anchors: Provide stirrup and strap type anchors for preset fire rated frames per ANSI/UL 63.
  - b. Wire Masonry Anchors: 0.156" (min.) diameter steel wire. Furnish for preset non-fire rated frames: three pairs for frames up to 90" high and four pairs for frames between 90" and 96" high. Furnish an additional pair for each 24" or fraction of frame height over 96".
  - c. Steel-Stud Anchors: Provide for preset fire rated and non-fire rated frames in drywall construction per ANSI/UL 63. Provide at least four pairs of anchors for frames up to 90" high and five pairs for frames between 90" and 96" high. Provide an additional pair for each 24" or fraction of frame height over 96".
- 2.25 Base Anchors: Provide fixed base anchors for preset fire rated and non-fire rated frames per ANSI/UL 63.
- 2.26 Ceiling Struts: Provide ceiling struts for fire rated frames where required by ANSI/UL 63. Provide ceiling struts for all frames in drywall construction.

## **CONSTRUCTION REQUIREMENTS**

- 3.1 Installation of fire rated doors and frames shall comply with NFPA 80. Secure head stiffeners in frame heads.
- 3.2 Welded Frames:
  - a. Position frames in proper relation to adjoining work. Plumb, square, and align frames. Hold them in exact position with support jacks or 2 x 4 wood braces. Install accurately cut, frame depth x 1" nominal thick wood spreaders at open ends and mid-height. Leave supports and spreaders in place until all anchorage is completed.
  - b. Frames: Check and correct frame position before anchoring. Secure clip anchors and ceiling struts to building structure with at least two bolts each. Install the proper number of loose anchors in each jamb.
- 3.3 Doors: Hang doors carefully and accurately. Obtain proper perimeter clearances. Eliminate hinge bid. Adjust work so that doors operate smoothly and hardware functions properly.
- 3.4 Correct noncomplying and damaged work. Replace work that cannot be satisfactorily repaired.
- 3.5 Spot Priming: Sand smooth, thoroughly clean and touch up damaged shop coatings and field connections with compatible rust-inhibiting primer.
- 3.6 Thoroughly clean work and leave it ready for finish painting.
- 3.7 Protection: Protect work from damage and abuse.

## **REFERENCE**

- 4.1 The applicable CSI Specification Section is 08 11 00.