

**SPECIAL SPECIFICATION**

**SECTION 08110S**

**STEEL DOORS AND FRAMES**

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## **SPECIAL SPECIFICATION**

### **SECTION 08110S**

#### **STEEL DOORS AND FRAMES**

#### PART 1 - GENERAL

##### .01 DESCRIPTION OF WORK

- A. Section Includes: The following, as scheduled and detailed in the Contract documents, and as specified herein.
1. Steel doors.
  2. Steel door frames.
  3. Steel sidelight, borrowed lite and transom frames.
  4. Louvers installed in steel doors.
- B. Related Sections: Refer to the following sections for related work:
1. Division 8, Section "Finish Hardware" for hardware installed in doors and frames.
  2. Division 8, Section "Wood Doors" for solid-core wood doors installed in steel frames.
  3. Division 9, Section "Painting" for field-painting of doors and frames.

##### .02 ENVIRONMENTAL OBJECTIVES

- A. As described in section 01805 "Environmental Objectives", the owner has determined that this project must be rated by LEED™ Version 2.0 green building rating system, which was issued in March 2000 by the U.S. Green Building Council, 1015 18<sup>th</sup> Street, NW, Suite 805, Washington, DC 20036. Phone: 202/ 82-USGBC (828-7422) Fax: 202/ 828-5110.
- B. While these goals and implementation strategies are incorporated within the Contract Documents, suggestions and input from the contractor for implementing these goals are encouraged. A team approach is encouraged.
- C. Manufacturer/ Fabricator to supply documentation of level of compliance or non-compliance with the following requirements before consideration as an "Acceptable Manufacturer".
1. The Design Team has determined that the following be mandatory requirements:
- D. The product(s) supplied is manufactured/fabricated within a radius of 500 miles from the project site and/or the manufactured/fabricated product(s) are extracted, harvested, or recovered within 500 miles of the project site.

Steel Doors and Frames

- E. The product(s) supplied is to have a minimum weighted average of 20% post consumer recycled content material, OR, a minimum weighted average of 40% post-industrial recycled content material.
- F. Comply with the requirements of section 01505S “Construction Waste Management”
- G. Paints and coatings (interior only) must meet or exceed the VOC and chemical component limits of Green Seal requirements.
- H. Products that conform to the Environmental Objectives yet do not fully meet other requirements of this section may still be considered at the sole discretion of the Owner and Architect.

.03 REFERENCES

- A. American National Standards Institute (ANSI)
  - A115 Series of Door and Frame Preparation Standards
  - A224.1 Standard Test Procedure and Acceptance Criteria for Prime-Painted Steel Services for Steel Doors and Frames
- B. American National Standards Institute/Steel Door Institute (ANSI/SDI)
  - ANSI/SDI 100 Recommended Specification for Standard Steel Doors and Frames
- C. American Society of Testing and Materials (ASTM)
  - A153 Specification for Zinc Coating (Hop-Dip) on Iron and Steel Hardware
  - A366 Specification for Steel, Sheet, Carbon, Cold-Rolled, Commercial Quality
  - A569 Specification for Steel, Carbon (0.15 Maximum, Percent), Hot-Rolled, Sheet and Strip Commercial Quality
  - A620 Specification for Steel, Sheet, Carbon, Drawing Quality, Special Killed, Cold-Rolled
  - A653 Specification for Steel Sheet, Zinc-Coated or Zinc-Iron Alloy-Coated by the Hot-Dip Process
  - A780 Practice for Repair of Damaged Hot-Dip Galvanized Coatings
  - C236 Test Method for Steady-State Thermal Performance of Building Assemblies by Means of a Guarded Hot Box
  - C578 Specification for Rigid, Cellular Polystyrene Thermal Insulation
  - C591 Specification for Unfaced Preformed Rigid Cellular Polyurethane Thermal Insulation
  - C976 Test Method for Thermal Performance of Building Assemblies by Means of a Calibrated Hot Box

- E152    Methods for Fire Tests of Door Assemblies
- E413    Classification for Rating Sound Insulation
- E1408    Method for Laboratory Measurement of the Sound Transmission Loss of Door Panels and Door Systems
- D.    Door and Hardware Institute (DHI)
  - Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames
- E.    Federal Specifications (FS)
  - TT-P-641        Primer Coating, Zinc Dust-Zinc Oxide (for Galvanized Surfaces)
- F.    Military Standardization Documents (MIL)
  - P-21035 Paint, High Zinc Dust Content, Galvanizing Repair
- G.    National Association of Architectural Metal Manufacturers (NAAMM)
  - Metal Finishes Manual for Architectural and Metal Products
- H.    National Fire Protection Association (NFPA)
  - 80        Standard for Fire Doors and Windows
  - 105        Installation of Smoke-Control Door Assemblies
- I.    Steel Door Institute (SDI)
  - 105        Recommended Erection Instructions for Steel Frames
  - 107        Hardware on Steel Doors (Reinforcement-Application)
  - 111        Recommended Details, Steel Doors and Frames
  - 112        Galvanized Standard Steel Doors and Frames
  - 117        Manufacturing Tolerances Standard Steel Doors and Frames
- J.    Steel Structures Painting Council SSPC
  - PA 1        Paint Application Specification No. 1
  - Paint 20    Paint Specification No. 20 Zinc-Rich Primers (Type I, “Inorganic,” and Type II, “Organic”)
  - SP 1        Surface Preparation Specification No. 1: Solvent Cleaning
  - SP 5        Surface Preparation Specification No. 5: White Metal Blast Cleaning

SP 8 Surface Preparation Specification No. 8: Pickling

.04 SUBMITTALS

- A. Environmental Objectives Documentation: signed by the manufactures/ fabricators stating level of compliance for the requirements and objectives in Environmental Objectives in section.
- B. General: Submit the following in accordance with conditions of Contract and Division 1, Section "Descriptive Submittals."
- C. Product Data: Submit detailed technical information for each type of door and frame specified, including details of construction, materials, dimensions, hardware preparation, core, label compliance, sound ratings, profiles, and finishes.
- D. Shop Drawings: Submit shop drawings showing fabrication and installation of steel doors and frames. Include details of each frame type, elevations of door design types, conditions at openings, details of construction, location and installation requirements of door and frame hardware and reinforcements, and details of joints and connections. Show anchorage and accessory items.
- E. Door Schedule: Submit schedule of doors and frames using same reference numbers for details and openings as those on the Contract documents.
- F. Indicate coordination of glazing frames and stops with glass and glazing requirements.
- G. Oversize Construction Certification: For door assemblies required to be fire rated and exceeding limitations of labeled assemblies, submit certification of a testing agency acceptable to Sandia National Laboratories (SNL) Site Fire Marshal that each door and frame assembly has been constructed to conform to design, materials, and construction equivalent to requirements for labeled construction.

.05 QUALITY ASSURANCE

- A. Provide doors and frames complying with ANSI/SDI-100 "Recommended Specifications for Standard Steel Doors and Frames" and as specified.
- B. Fire-Rated Door Assemblies: Units that comply with NFPA 80, are identical to door and frame assemblies tested for fire-test-response characteristics per ASTM E152, and are labeled and listed by UL, Warnock Hersey, Factory Mutual (FM) or another nationally recognized testing laboratory.
  - 1. Oversize Fire-Rated Door Assemblies: For units exceeding sizes of tested assemblies, provide certification by a testing agency acceptable to SNL Site Fire Marshal that doors conform to standard construction requirements of tested and labeled fire-rated door assemblies except for size.
  - 2. Temperature-Rise Rating: Where indicated, provide doors that have a temperature-rise rating of 450 degrees F (250 degrees C) maximum in 30 minutes of fire exposure.

.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver doors and frames cardboard-wrapped or crated to provide protection during transit and job storage.
- B. Inspect doors and frames for damage upon delivery. Minor damages may be repaired provided refinished items are equal in all respects to new work and acceptable to the SDR; otherwise, remove and replace damaged items as directed.
- C. Store doors and frames at building site under cover. Place units on minimum 4-inch- (101.6-mm-) high wood blocking. Avoid use of nonvented plastic or canvas shelters that could create a humidity chamber. If cardboard wrappers on doors become wet, remove cartons immediately. Provide 1/4-inch- (6.4-mm-) spaces between stacked doors to promote air circulation.

PART 2 - PRODUCTS

.01 MANUFACTURERS

Subject to compliance with requirements, provide doors by one of the following:

- Ceco Door Products
- Curries Co.
- Republic Builders Products
- Steelcraft

.02 MATERIALS

- A. Hot-Rolled Steel Sheets and Strip: Commercial-quality carbon steel, pickled and oiled, complying with ASTM A569. **Use a min. 30% post-consumer recycled steel.**
- B. Cold-Rolled Steel Sheets: Carbon steel complying with ASTM A366, commercial quality, or ASTM A620, drawing quality, special killed. **Use a min 30% post-consumer recycle steel.**
- C. Galvanized Steel Sheets: Zinc-coated carbon steel commercial quality, complying with ASTM A653 (replaced A525 and A526), with A60 or G60 coating designation, mill phosphatized.
- D. Supports and Anchors: Fabricated from not less than 0.0478-inch- (1.2-mm-) thick steel sheet; 0.0516-inch- (1.3-mm-) thick galvanized steel where used with galvanized steel frames.
- E. Inserts, Bolts, and Fasteners: Manufacturer's standard units. Where items are to be built into exterior walls, hot-dip galvanize complying with ASTM A153, Class C or D as applicable.
- F. Shop-Applied Paint: Rust-inhibitive primer, either air-drying or baking, suitable as base for specified finish paints on steel surfaces.

.03 DOORS

- A. Steel Doors: Provide 1-3/4-inch- (44.5-mm-) thick doors of materials and ANSI/SDI 100 grades and models specified below, or as indicated on Contract documents.
  - 1. Interior Doors: Grade II, heavy-duty, Model 1 (Level B), full flush design, minimum 18 gage (0.0478-inch-) (1.2-mm-) thick cold-rolled steel sheet faces.
  - 2. Exterior Doors: Grade III, extra heavy-duty, Model 1 (Level A), full flush design, minimum 16 gage (0.0635-inch-) (1.6-mm-) thick galvanized steel sheet faces.
- B. New Doors in Existing Frames: Coordinate door hinge/strike locations with existing frames.
- C. Door Numbers: Permanently stamp each door on the hinge side with the same reference numbers as those on the Contract documents.
- D. Door Louvers: Provide louvers according to SDI 111C for interior doors where indicated, with blades or baffles formed of 24 gage (0.0239-inch-) (0.6-mm-) thick cold-rolled steel sheet set into minimum 20 gage (0.0359-inch-) (0.9-mm-) thick steel frame.
  - 1. Sight-Proof Louvers: Stationary louvers constructed with inverted V-shaped or Y-shaped blades.
  - 2. Lightproof Louvers: Stationary louvers constructed with baffles to prevent light from passing from one side to the other, any angle.

.04 FRAMES

- A. Provide metal frames for doors, transoms, sidelights, borrowed lights, and other openings, according to ANSI/SDI 100, and of types and styles as shown on Contract documents. Conceal fastenings, unless otherwise indicated.
- B. Fabricate frames of full-welded unit construction with mitered corners, reinforced, continuously welded full depth and width of frame.
  - 1. Interior: Fabricate frames of minimum 16 gage (0.0635-inch-) (1.6-mm-) thick cold-rolled or hot-rolled sheet.
  - 2. Exterior: Fabricate frames of minimum 16 gage (0.0635-inch-) (1.6-mm-) thick cold-rolled or hot-rolled sheet.

For openings over 48 inches (1.2 m) wide, fabricate frames from 14 gage (0.0747-inch-) (1.9-mm-) thick steel sheet.
- C. Existing Doors in New Frames: Coordinate frame hinge and strike locations with existing doors.

.05 STOPS AND MOLDINGS

- A. Provide stops and moldings around solid, glazed, and louvered panels where indicated.
- B. Form fixed stops and moldings integral with frame, unless otherwise indicated.

- C. Provide removable stops and moldings where indicated or required, formed of not less than 20 gage (0.0358-inch-) (0.90-mm-) steel sheets matching steel of frames. Secure with countersunk flat or oval head machine screws spaced uniformly not more than 12 inches (304.8-mm-) o.c. Form corners with butted hairline joints.
- D. Coordinate width of rabbet between fixed and removable stops with type of glass or panel and type of installation indicated.

.06 FABRICATION, GENERAL

- A. Fabricate steel door and frame units to be rigid, neat in appearance, and free from defects, warp, or buckle. Wherever practical, fit and assemble units in manufacturer's plant. Clearly identify work that cannot be permanently factory-assembled before shipment, to assure proper assembly at Project site. Comply with ANSI/SDI 100 requirements.
  - 1. Internal Construction: One of the following standard core materials according to SDI Standards:
    - a. Resin-impregnated paper honeycomb.
    - b. Rigid polyurethane, ASTM C591.
    - c. Rigid polystyrene, ASTM C578.
    - d. Unitized steel grid.
    - e. Vertical steel stiffeners.
    - f. Rigid mineral fiber with internal sound deadener on inside of face sheets.
  - 2. Clearances: Not more than 1/8 inch (3.2 mm) at jambs and heads, except not more than 1/4 inch (6.4 mm) between non-fire rated pairs of doors. Not more than 3/4 inch (19.1 mm) at bottom.  
  
Fire Doors: Provide clearances according to NFPA 80.
- B. Tolerances: Comply with SDI 117 "Manufacturing Tolerances Standard Steel Doors and Frames."
- C. Fabricate concealed stiffeners, reinforcement, edge channels, louvers, and moldings from either cold- or hot-rolled steel sheet.
- D. Exposed Fasteners: Unless otherwise indicated, provide countersunk flat or oval heads for exposed screws and bolts.
- E. Galvanized Steel Doors, Panels, and Frames: For exterior locations and where indicated, fabricate doors, panels, and frames from galvanized steel sheet according to SDI 112.
  - 1. Close top and bottom edges of doors flush as an integral part of door construction, or by addition of minimum 16 gage (0.0635-inch-) (1.6-mm-) thick galvanized steel channels, with channel webs placed even with top and bottom edges.

2. Seal joints in top edges of doors against water penetration.

- F. Thermal-Rated (Insulating) Assemblies: Where shown or scheduled, provide doors fabricated as thermal-insulating assemblies and tested in accordance with ASTM C236 or C976 on fully operable door assemblies.

Unless otherwise indicated, provide thermal-rated assemblies U-value rating of 0.41 Btu/square foot x h x degree F (2.33 W/sq. m x K) or better.

- G. Sound-Rated (Acoustical) Assemblies: Where shown or scheduled, provide door and frame assemblies fabricated as sound-reducing type, tested in accordance with ASTM E1408, and classified in accordance with ASTM E413.

Unless otherwise indicated, provide acoustical assemblies with STC sound ratings of 33 or better.

- H. Hardware Preparation: Prepare doors and frames to receive mortised and concealed hardware according to final door hardware schedule and templates provided by hardware supplier. Comply with applicable requirements of SDI 107 and ANSI A115 Series specifications for door and frame preparation for hardware.

For concealed overhead door closers, provide space, cutouts, reinforcing, and provisions for fastening in top rail of doors or head of frames, as applicable.

- I. Reinforce doors and frames to receive surface-applied hardware. Drilling and tapping for surface-applied hardware may be done at Project site.

- J. Locate hardware as indicated on shop drawings or, if not indicated, according to the Door and Hardware Institute's (DHI) "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."

- K. Glazing Stops: Minimum 0.0359-inch- (0.90-mm-) thick steel or 0.040-inch- (1.0-mm-) thick aluminum.

1. Provide nonremovable stops on outside of exterior doors and on secure side of interior doors for glass, louvers, and other panels in doors.
2. Provide screw-applied, removable, glazing beads on inside of glass, louvers, and other panels in doors.

.07 FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual" for recommendations relative to applying and designating finishes.
- B. Comply with SSPC-PA 1, "Paint Application Specification No. 1," for steel sheet finishes.
- C. Apply primers and organic finishes to doors and frames after fabrication.

.08 GALVANIZED STEEL SHEET FINISHES

- A. Surface Preparation: Clean surfaces with nonpetroleum solvent so that surfaces are free of oil or other contaminants. After cleaning, apply conversion coating of the type suited to the organic coating applied over it. Clean welds, mechanical connections, and abraded areas, and apply galvanizing repair paint specified below to comply with ASTM A780.

Galvanized Repair Paint: Comply with requirements of MIL P-21035B, Type I or SSPC - Paint 20.

- B. Factory Priming for Field-Painted Finish: Where field painting after installation is indicated, apply air-dried primer specified below immediately after cleaning and pretreatment.

Shop Primer: Zinc-dust, zinc-oxide primer paint complying with performance requirements of FS TT-P-641, Type II.

.09 STEEL SHEET FINISHES

- A. Surface Preparation: Solvent-clean surfaces to comply with SSPC-SP 1 to remove dirt, oil, grease, and other contaminants that could impair paint bond. Remove mill scale and rust, if present, from uncoated steel to comply with SSPC-SP 5 (White Metal Blast Cleaning) or SSPC-SP 8 (Pickling).

- B. Pretreatment: Immediately after surface preparation, apply conversion coating of type suited to organic coating applied over it.

- C. Factory Priming for Field-Painted Finish: Apply shop primer that complies with ANSI A224.1 acceptance criteria, is compatible with finish paint systems indicated, and has capability to provide a sound foundation for field-applied topcoats. Apply primer immediately after surface preparation and pretreatment.

PART 3 -

EXECUTION

.01 EXAMINATION

Examine substrate and conditions under which steel doors and frames are to be installed. Do not proceed with installation until unsatisfactory conditions have been corrected.

.02 INSTALLATION

A. General: Install steel doors, frames, and accessories according to shop drawings, manufacturer's data, and as specified.

B. Placing Frames: Comply with provisions of SDI 105, unless otherwise indicated. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is completed, remove temporary braces and spreaders, leaving surfaces smooth and undamaged.

1. Except for frames located in existing concrete, masonry, or gypsum board assembly construction, place frames before constructing enclosing walls and ceilings.

2. In masonry construction, install at least three (3) wall anchors per jamb adjacent to hinge location on hinge jamb and at corresponding heights on strike jamb. Acceptable anchors include masonry wire anchors and masonry T-shaped anchors.

3. At existing concrete or masonry construction, install at least three (3) completed opening anchors per jamb adjacent to hinge location on hinge jamb and at corresponding heights on strike jamb. Set frames and secure to adjacent construction with bolts and masonry anchorage devices.

4. In metal-stud partitions, install at least three (3) wall anchors per jamb at hinge and strike levels. In steel-stud partitions, attach wall anchors to studs with screws.

5. Floor Anchors: Provide frames with minimum 18 gage anchors for attachment to floor. For wall conditions that do not allow the use of a floor anchor, provide additional jamb anchors.

6. Install fire-rated frames according to NFPA 80.

C. Door Installation: Fit hollow-metal doors accurately in frames, with the specified clearances to comply with SDI 100.

1. Jambs and Heads: 1/8 inch (3.2 mm).

2. Meeting Edges, Pair of Doors: 1/8 inch (3.2 mm).

3. Bottom: 3/4 inch (19.1 mm).

4. Door Face and Stop: 1/16 inch (1.6 mm).

5. Fire-Rated Doors: Install with clearances specified in NFPA 80.

6. Smoke-Control Doors: Comply with NFPA 105.

.03 ADJUST AND CLEAN

- A. Final Adjustments: Check and readjust operating hardware items just prior to final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including doors or frames that are warped or bowed.
- B. Prime Coat Touch-Up: Immediately after erection, sand smooth any rusted or damaged areas of prime coat, and apply touch-up of compatible air-drying primer.

END OF SECTION