SECTION 08110

STEEL DOORS AND FRAMES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Insulated Hollow Metal Doors.

B. Hollow Metal Frames:

C. Adjustable Metal Frames.

D. Retro-fit Metal Frames.

1.2 RELATED SECTIONS

A. Section 06200 - Finish Carpentry.

B. Section 08210 - Wood Doors.

C. Section 08710 - Door Hardware.

D. Section 09900 - Paints and Coatings.

1.3 REFERENCES

A. ANSI A224.1 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames.

B. ANSI A250.3 - Test Procedure and Acceptance Criteria for Factory-Applied Finish Painted Steel Surfaces for Steel Doors and Frames.

C. ANSI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors and Hardware Reinforcings.

D. ANSI/ISDI-104 - Water Penetration Performance Standard for Insulated Steel Door Systems.

E. ANSI/ISDSI-103 - Acoustical Performance Standard for Insulated Steel Door Systems.

F. ANSI/ISDSI-105 - Mechanical Performance Standard for Insulated Steel Door Systems.

G. ANSI/SDI 100 - Recommended Specifications for Standard Steel Doors & Frames; Steel Door Institute.

H. ASTM A 653/A 653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

I. ASTM B 117 - Standard Method of Salt Spray (Fog) Testing.

J. ASTM C 236 - Standard Test Method for Steady-State Thermal Performance of Building Assemblies by Means of a Guarded Hot Box.

K. ASTM D 1735 - Standard Practice for Testing Water Resistance of Coating Using Water Fog Apparatus.

L. ASTM E 90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions.

M. ASTM E 152 - Standard Methods of Fire Tests of Door Assemblies.

N. ASTM E 283 - Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.

O. ASTM E 331 - Standard Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure.

P. NFPA 80 - Standard for Fire Doors and Windows.

Q. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies.

R. SDI 105 - Recommended Erection Instructions for Steel Frames.

S. SDI 111 - Recommended Standard Details - Steel Doors and Frames.

T. SDI 113 - Test Procedure and Acceptance Criteria for Apparent Thermal Performance for Steel Door and Frame Assemblies.

U. SDI 114 - Test Procedure and Acceptance Criteria for Acoustical Performance for Steel Door and Frame Assemblies.

V. SDI 116 - Test Procedure and Acceptance Criteria for Rate of Air Flow Through Closed Steel Door and Frame Assemblies.

W. Warnock Hersey International Inc. (WHI) - Certification Listings.

X. Uniform Building Code (UBC).

Y. UL 10B - Standard for Fire Tests of Door Assemblies.

1.4 SYSTEM DESCRIPTION

A. Performance Requirements:
   1. Doors:
      a. Standard 3 feet by 7 feet door to meet requirements of ANSI A250.4 procedure for level C doors for 250,000 cycles.
      b. Thermal resistance of door without lite or louver, when tested in accordance with _____: R-factor of 14.5, U-factor of 0.07, K-factor of 0.122.
      c. Thermal transmittance of door without lite or louver, when tested in accordance with ASTM C 236 and SDI 113: 0.23 BTU per hour per square foot per degree F.
      d. Sound transmission class (STC) of door without lite or louver, when tested in accordance with ANSI/ISDSI-103, ASTM E 90, and SDI 114: STC 25.
   2. Door and frame assemblies:
      a. Water penetration, when tested in accordance with ASTM E 331 and ANSI/ISDI-104: No water penetration at 25 miles per hour wind velocity.
      b. Air infiltration, when tested in accordance with ASTM E 283, ANSI/ISDSI-101, and SDI 116: 0.04 cubic feet per minute at 25 miles per hour wind velocity.
   3. Fire-rated door and frame assemblies: Tested in accordance with UL 10B, ASTM E 152, NFPA 252, UBC 43-2, and type tested by WHI for 1-1/2 hour resistance rating.

1.5 SUBMITTALS

A. Submit under provisions of Section 01300.

B. Product Data: Manufacturer's descriptive literature demonstrating compliance with referenced standards.

C. Shop Drawings: Indicate the following:
   1. Door and frame schedule in accordance with SDI 111D.
   2. Locations and sizes of lites and louvers.
   3. Frame sizes, profiles, and throat depths.
   4. Hardware preparation.

D. Selection Samples: Two sets of color chips representing manufacturer's full range of available factory finishes.

E. Verification Samples: Two 6 inch square samples of each factory finish specified.

F. Quality Control Submittals: Manufacturer's printed installation instructions for each specified product.

1.6 QUALITY ASSURANCE

A. Qualifications:
   1. Manufacturer: Member of Steel Door Institute (SDI).
   2. Installer: Minimum three (3) years documented experience installing products specified in this section.

B. Field Samples:
   1. Furnish field samples as follows: Full-size door, hung in frame, representing correct type and fit of door and frame.
   2. Locate field samples as directed by Architect.
   3. Obtain Architect's acceptance of field samples before beginning construction activities of this section; accepted field samples will be standard by which installed products of this section are judged.
   4. Return field samples to manufacturer when so directed by Architect, or at project closeout.
   5. Accepted field samples may be incorporated into Work as last units of type.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Protect products from moisture, construction traffic, and damage; store under cover.
   1. Place units upright on 4 inch high wood sills to prevent rust or damage.

2. Provide 1/4 inch space between doors to promote air circulation.

B. Do not use non-vented plastic or canvas shelters; should wrappers become wet, remove immediately.

1.8 SEQUENCING

A. Ensure that jamb anchors are available to installers of other sections in time for building-in.

1.9 WARRANTY

A. Manufacturer's Warranty: Manufacturer's standard warranty, effective on date of purchase, against defects in product workmanship and materials; minimum 18 months for doors and frames, including 12 month warranty against rust.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer: Benchmark Commercial Division of General Products Company, Inc.; P.O. Box 7387, Fredericksburg, VA 22404; Tel: (540) 898-5700, Fax: (540) 898-5894.

B. Requests for substitutions will be considered in accordance with provisions of Section 01600.

C. Substitutions: Not permitted.

D. Unless otherwise specified for an individual product or material, supply all products specified in this section from the same manufacturer.

2.2 MANUFACTURED UNITS

A. Insulated Hollow Metal Doors:
1. Acceptable product: Benchmark Insulated Hollow Metal Door.
2. Type: Flush door faces.
3. Type: Six-panel embossed door faces.
4. Type: Eight-panel embossed door faces.
5. Types: Indicated on drawings.
6. Sizes: Indicated on drawings.

7. Construction: 1-3/4 inches nominal thickness, and as follows:
    a. Face sheets: Galvanized steel conforming to ASTM A 653, commercial quality, with A40 coating, and as follows:
        1) Doors for interior use: Minimum __ gage thickness.
        2) Doors for exterior use: Minimum __ gage thickness.
        3) Visible seams on face sheets not permitted.
    b. Core: Expanded polyurethane, foamed in place, without voids, and bonded to inside surfaces of both face sheets.
    c. Vertical edges: Continuous flush interlocking seams joining face sheets.
    d. Top and bottom edges: Flush closures, integral with door construction.
    e. Hardware preparation: Doors prepared for hardware, reinforced with same material as door face sheet, and as follows:
        1) Hinges: Non-handed cut-outs and minimum 10 gage reinforcement provided for full-mortise 4-1/2 inches by 4-1/2 inches standard weight template hinges, located in accordance with ANSI/SDI 100; one hinge handing plate supplied for each hinge cut-out.
        2) Lockset: Minimum 18 gage.
        3) Surface-mounted hardware: Concealed reinforcement of minimum 16 gage provided for other door hardware specified in Section 08710.
    f. Lites:
        1) Fire-rated doors: Wire glass, minimum 1/4 inch thick, maximum size 100 square inches, with stop assembly type-tested by WHI for 1-1/2 hour fire resistance rating; stop assembly finish matching door finish.
        2) Flush doors: Tempered glass, 1/4 inch thick, with manufacturer's standard cold-rolled steel stop insert finished to match door finish.
        3) Embossed-panel doors: Insulating glass units, 1/2 inch total thickness, with manufacturer's standard polyvinyl chloride (PVC) surround.
        4) Sizes: Indicated on drawings.
    g. Louvers:

1) Fire-rated doors: Fusible-link louver, cold-rolled steel construction, gray primer finish; louver and stop assembly type-tested by WHI for 1-1/2 hour fire resistance rating.
2) All other doors: Inverted vee design, cold-rolled steel construction, with manufacturer's standard cold-rolled steel stop insert.
3) Sizes: Indicated on drawings.

8. Door finish: Factory-applied primer.
9. Door finish: Factory-applied baked enamel, color to be selected from full range of manufacturer's available colors.
10. Door finish: Factory-applied baked enamel, _____ color.

B. Hollow Metal Frames:
1. Acceptable product: Benchmark Universal Commercial Steel Frame.
2. Construction: Three-piece frames constructed of galvanized steel conforming to ASTM A 653, commercial quality, with A40 coating, 16 gage minimum metal thickness, and as follows:
a. Profile: Double-rabbeted for 1-3/4 inch door thickness, with 2 inches wide trim face, double return to wall, and 5/8 inch high stop; throat dimensions indicated.
b. Corners: Mitered for hairline joint at intersections of head and jambs, with concealed corner reinforcement and factory-installed alignment tabs for tight fit.
c. Hardware preparation: Frames prepared for hardware, reinforced with same material as door face sheet welded-in at factory, and as follows:
1) Hinges: Cut-outs and minimum 10 gage reinforcement provided for full-mortise 4-1/2 inches by 4-1/2 inches standard weight template hinges, located in accordance with ANSI/SDI-100.
2) Strike: Reinforcement for 4-7/8 inches ASA strike integral with frame, located in accordance with ANSI/SDI-100.
3) Surface-mounted hardware: Concealed reinforcement of minimum 16 gage provided for other door hardware specified in Section 08710.
4) Silencers: Prepare frames for interior openings to receive silencer buttons; two on

strike side of single opening, two at head of double opening, located 1 inch each side of centerline of opening.

3. Anchoring devices: Manufacturer's standard anchoring devices for indicated opening types, minimum 6 supplied per frame, with anchoring device accessories specified in manufacturer's installation instructions.
4. Frame finish: Factory-applied primer.
5. Frame finish: Factory-applied baked enamel, color to be selected from full range of manufacturer's available colors.
6. Frame finish: Factory-applied baked enamel, _____ color.

C. Adjustable Metal Frames:
   1. Acceptable product: Benchmark Adjusta-Trim Steel Frame.
   2. Construction: Two-piece frames constructed of galvanized steel conforming to ASTM A 653, commercial quality, with A40 coating, and as follows:
      a. Base frame component: 16 gage.
      b. Closure frame component: 20 gage.
      c. Profiles: Interlocking base and closure profiles for 1/2 inch throat dimension adjustment; manufacturer's standard throat dimensions to accommodate wall thicknesses 4-1/8 inches to 10 inches:
         1) Double rabbet; rabbet for 1-3/4 inch door thickness one side of stop, 1-1/8 inch rabbet other side of stop.
         2) 5/8 inch high stop with kerf for weatherstrip.
         3) 2 inches wide trim face, 1/2 inch return legs.
      d. Corners: Butted for hairline joint at intersections of head and jambs.
      e. Hardware preparation: Frames prepared for hardware, reinforced with same material as door face sheet, and as follows:
         1) Hinges: Cut-outs and minimum 10 gage reinforcement provided for full-mortise 4-1/2 inches by 4-1/2 inches standard weight template hinges, located in accordance with ANSI/SDI-100.
         2) Strike: Reinforcement integral with frame, located in accordance with ANSI/SDI-100.

3) Surface-mounted hardware: Concealed reinforcement of minimum 16 gage provided for other door hardware specified in Section 08710.

3. Weatherstrip: Manufacturer's standard vinyl-covered combination magnetic/compression weatherstrip, installed in kerf of frame.
4. Threshold: Manufacturer's standard two-piece type of extruded aluminum, mill finish with safety ribs, with interlocking extruded vinyl sill component, adjustable for wall thickness variation; ribbed extruded vinyl sweep across door bottom.
5. Threshold: Barrier-free ADA-compliant type of extruded aluminum, mill finish with safety ribs, 4 inches wide by 1/2 inch height; ribbed extruded vinyl sweep across door bottom.
6. Frame finish: Factory-applied dry-powder prime coating.
7. Frame finish: Factory-applied baked enamel, color to be selected from full range of manufacturer's available colors.
8. Frame finish: Factory-applied baked enamel, _____ color.

D. Adjustable Metal Frames:
1. Acceptable product: Benchmark Adjusta-Fit Steel Frame.
2. Construction: Two-piece frames constructed of galvanized steel conforming to ASTM A 653, commercial quality, with A40 coating, and as follows:
a. Base frame component: 16 gage.
b. Closure frame component: 22 gage.
c. Profiles: Interlocking base and closure profiles for 1/2 inch throat dimension adjustment; manufacturer's standard throat dimensions to accommodate wall thicknesses 4-1/8 inches to 7 inches:
1) Single rabbet for 1-3/4 inch door thickness.
2) 5/8 inch high stop with kerf for weatherstrip.
3) Flat faces punched with elongated fastener holes.
d. Corners: Butted for hairline joint at intersections of head and jambs.
e. Hardware preparation: Frames prepared for hardware, reinforced with same material as door face sheet, and as follows:

1) Hinges: Cut-outs and minimum 10 gage reinforcement provided for full-mortise 4-1/2 inches by 4-1/2 inches standard weight template hinges, located in accordance with ANSI/SDI-100.
2) Strike: Reinforcement for 4-7/8 inches ASA strike integral with frame, located in accordance with ANSI/SDI-100.
3) Surface-mounted hardware: Concealed reinforcement of minimum 16 gage provided for other door hardware specified in Section 08710.

3. Weatherstrip: Manufacturer's standard vinyl-covered combination magnetic/compression weatherstrip, installed in kerf of frame.
4. Threshold: Manufacturer's standard two-piece type of extruded aluminum, mill finish with safety ribs, with interlocking extruded vinyl sill component, adjustable for wall thickness variation; ribbed extruded vinyl sweep across door bottom.
5. Threshold: Barrier-free ADA-compliant type of extruded aluminum, mill finish with safety ribs, 4 inches wide by 1/2 inch height; ribbed extruded vinyl sweep across door bottom.
6. Frame finish: Factory-applied dry-powder prime coating.
7. Frame finish: Factory-applied baked enamel, color to be selected from full range of manufacturer's available colors.
8. Frame finish: Factory-applied baked enamel, _____ color.
9. Trim: Manufacturer's standard snap-on steel trim, finished to match frame finish, with clips for field installation.
10. Wood casings: Specified in Section 06200.

E. Retro-fit Metal Frames:
1. Acceptable product: Benchmark Secura-Fit Steel Frame.
2. Construction: 16 gage galvanized steel conforming to ASTM A 653, commercial quality, A40 coating, and as follows:
a. Profile: L-shape profile for 1-3/4 inch door thickness; flat face punched with elongated fastener holes, primed wood stops kerfed for weatherstrip.

b. Corners: Butted for hairline joint at intersections of head and jambs.
c. Hardware preparation: Frames prepared for hardware, reinforced with same material as door face sheet, and as follows:
1) Hinges: Cut-outs and minimum 10 gage reinforcement provided for full-mortise 4-1/2 inches by 4-1/2 inches standard weight template hinges, located in accordance with ANSI/SDI-100.
2) Strike: Reinforcement for 2-3/4 tee strike, integral with frame, located in accordance with ANSI/SDI-100.
3) Surface-mounted hardware: Concealed reinforcement of minimum 16 gage provided for other door hardware specified in Section 08710.

3. Weatherstrip: Manufacturer's standard vinyl-covered combination magnetic/compression weatherstrip, installed in kerf of wood stops.
4. Threshold: Manufacturer's standard two-piece type of extruded aluminum, mill finish with safety ribs, with interlocking extruded vinyl sill component, adjustable for wall thickness variation; ribbed extruded vinyl sweep across door bottom.
5. Threshold: Barrier-free ADA-compliant type of extruded aluminum, mill finish with safety ribs, 4 inches wide by 1/2 inch height; ribbed extruded vinyl sweep across door bottom.
6. Frame finish: Factory-applied dry-powder prime coating.
7. Frame finish: Factory-applied baked enamel, color to be selected from full range of manufacturer's available colors.
8. Frame finish: Factory-applied baked enamel, _____ color.

F. Hinges for Pre-Hung Units:
1. Type: Full mortise 4-1/2 inches by 4-1/2 inches template; ball-bearing type for fire-rated openings.
2. Pin: Removable for in-swinging door operation; non-removable (NRP) for out-swinging door operation.
3. Spring hinges: Supply spring-type hinges for top and bottom hinge of indicated doors.
4. Finish: _____ _____, US___.

2.3 FABRICATION

A. Fabricate doors and frames to meet requirements of ANSI/SDI 100.
B. Shop Assembly: Assemble frames, face-weld joints, grind welds smooth, then re-apply primer; ship frames with spreader bar.
C. Shop Assembly: Ship frames knocked down, with components for each opening packaged together in manufacturer's standard protective packaging.

D. Shop Assembly: Install one hinge at each hinge reinforcement location; ship doors and frames together as pre-hung units, with shipping clips and spreader bars to prevent warping or racking, in manufacturer's standard protective packaging.

2.4 FINISHES

A. Chemical Treatment: Treat steel surfaces to promote paint adhesion.
B. Factory-Applied Primer: Water-dispersed acrylic primer meeting requirements of ANSI A224.1.

C. Factory-Applied Dry Powder Prime Coat: Baked-on dry powder prime coating meeting requirements of ANSI A224.1.
D. Factory-Applied Baked Enamel: Electrostatically applied, forced-air oven dried acrylic enamel meeting requirements of ANSI A250.3, and the following:
1. 120-hour salt spray test in accordance with ASTM B 117.
2. 240-hour humidity test in accordance with ASTM D 1735.

2.5 SOURCE QUALITY CONTROL

A. Verification of Performance:
1. Attach fire rating seal of certifying agency to fire-rated doors and frames.
2. Provide metal seals.
3. Provide mylar seals.

PART 3 EXECUTION

3.1 EXAMINATION

A. Have installer verify that project conditions are acceptable before beginning installation of frames;

verify that completed openings to receive frames are of correct size and thickness.

B. Correct unacceptable conditions before preceding with installation.

3.2 PREPARATION

A. Remove spreader bars provided for shipping before installing units; using spreader bars to assist installation and alignment is not permitted.

3.3 INSTALLATION

A. Install frames in accordance with manufacturer's instructions, approved shop drawings, and requirements of SDI 105; in addition, install frames for fire-rated openings in accordance with requirements of NFPA 80.
B. Installation of wood casings is specified in Section 06200.

C. Installation of door hardware is specified in Section 08710.
D. Field finishing of factory-primed doors and frames is specified in Section 09900.

END OF SECTION