# SECTION 081100 – METAL DOORS AND FRAMES

## PART 1 - GENERAL

### 1.1 SUMMARY

A. This Section includes the following:
   1. Provide all material, labor, equipment and services necessary to fabricate and install all Custom Metal Doors and Custom Metal Frames materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.
      a. Fire-Rated and Smoke-Rated Assemblies.
   2. Provide all material, labor, equipment and services necessary to fabricate and install Temperature Rise Fire-Rated Assemblies.

B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
   1. ALL DIVISION 00 SPECIFICATION SECTIONS.
   2. ALL DIVISION 01 SPECIFICATION SECTIONS.
   3. 03 15 14 DRILLED ANCHORS
   4. 03 30 00 CAST-IN-PLACE CONCRETE
   5. 05 12 00 STEEL AND FABRICATIONS
   6. 06 10 00 ROUGH CARPENTRY
   7. 07 60 00 SHEET METAL
   8. 07 92 00 SEALANTS
   9. 08 33 00 COILING DOORS
   10. 08 70 00 HARDWARE
   11. 08 80 00 GLASS
   12. 09 24 00 CEMENT PLASTER
   13. 09 29 00 GYPSUM BOARD
   14. 09 30 00 TILE
   15. 09 67 23 RESINOUS FLOORING
   16. 09 72 00 WALL COVERINGS
   17. 09 91 00 PAINTING
   18. 10 05 00 MISCELLANEOUS SPECIALTIES
   19. 10 14 00 IDENTIFYING DEVICES
   20. DIVISION 13 SPECIAL CONSTRUCTION
   21. DIVISION 14 CONVEYING EQUIPMENT
   22. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICE SUBGROUP.

### 1.2 REFERENCES

A. Standards:
   1. In accordance with the following standards:
      a. ANSI American National Standards Institute
      b. ASTM American Society of Testing and Materials
      c. AWS American Welding Society
      d. HMMA Hollow Metal Manufacturers Association (Division of NAAMM)
      e. NAAMM National Association of Architectural Metal Manufacturers
      f. NFPA National Fire Protection Association
      g. NILECJ National Institute of Law Enforcement and Criminal Justice
      h. UL Underwriter's Laboratory, Inc.

i. USSG U.S. Standard Gages
j. WH Warnock Hersey International

1.3 DEFINITIONS

A. Minimum Thickness: Base metal thickness without coatings.

B. Custom Hollow Metal Work: Hollow metal work fabricated according to ANSI / NAAMM-HMMA.

C. Glazing Molding: Portion of the assembly retaining glazing materials or in-fill panels in a hollow metal door which contain the integral glazing stop, or to which a glazing stop is attached.

D. Glazing Stop: A formed metal section used to secure glazing in a door or frame.

E. Prepared Opening: Existing opening or wall constructed prior to installation of frames.

1.4 SYSTEM DESCRIPTION

A. Design Requirements:
1. Metal Doors and Metal Frames Assemblies.
a. All Doors shall be custom in accordance to NAAMM-HMMA Standards for Hollow Metal Doors.
b. All Frames shall be custom in accordance to NAAMM-HMMA Standards for Hollow Metal Frames.
2. Fire Rated Assemblies:
a. Doors and Frames Assemblies shall be custom in accordance to NAAMM-HMMA Standards for Fire-Rated Hollow Metal Doors and Frames and shall comply with all of the requirements for Doors and Frames.
b. Conform to the requirements of CBC, Chapter 7 "Fire and Smoke Protection Features".
1) Fire-Rated Door Assemblies shall comply with NFPA 252 "Standard Methods of Fire Tests of Door Assemblies" and UL 10C "Positive Pressure Fire Tests for Door Assemblies."
2) Fire-Rated Window Assemblies shall comply with NFPA 257 "Fire Testes for Fire Window Assemblies and Glass Block Assemblies," NFPA 80 "Standard for Fire Doors and Other Opening Protectives," and UL 9 "Fire Tests of Window Assemblies."
3) Fire-Rated Door Assemblies shall also meet the requirements for a Smoke and Draft Control Door Assembly, complying with UL 1784 "Air Leakage Tests for Door Assemblies."
4) Fire-Rated Doors, Panels, and Frames shall be labeled by an DSA/FLSapproved agency and shall comply with NFPA 80 "Standard for Fire Doors and Other Opening Protectives" and UL 1784 "Air Leakage Test for Door Assemblies."
c. All Fire-Rated Doors are to be positive latching and self or automatic closing in accordance with NFPA 80 "Standard for Fire Doors and Other Opening Protectives."
d. All Fire-Rated Assemblies shall be provided with approved gasketing material, so installed as to provide a seal where the door meets the stop on both sides and across the top.

1) Continuous Hinges, Seals, etc. shall not obscure ratings of doors or door frames.

## 1.5 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES.
   1. Contractor shall check all drawings and verify all dimensions (including wall thickness) in the field prior to fabrication.
   2. Contractor shall verify that shop drawings include all required materials and material clearances.

B. Product Data:
   1. Include construction details, material descriptions, core descriptions, label compliance, fire-resistance ratings, temperature-rise ratings, and finishes for each type of product indicated.
      a. Provide information indicating all the Structural Properties of the steel materials.

C. Shop Drawings:
   1. Include, but not limited to, the following information:
      a. Elevations of each door design and frame configuration.
      b. Details of doors, including vertical and horizontal edge details.
      c. Frame details for each frame type, including dimensioned profiles.
      d. Details and location of reinforcement and preparations for hardware.
      e. Details of each different wall opening condition.
      f. Details of anchorages, joints, field splices, and connection.
      g. Details of accessories.
      h. Details of moldings, removable stops, and glazing.
      i. Details of louvers, including sizes and location in doors, where required.
      j. Details of conduit and preparations for power, signal, and control systems.
   2. Provide a Schedule, prepared by or under the supervision of supplier for doors, panels, and frames using same reference numbers for details and openings as those on the Drawings.
      a. Coordinate with door hardware schedule.
   3. Provide setting drawings, templates, and directions for installing anchorage, including sleeves, concrete inserts, anchors, bolts, and items with integral anchors for installation coordination.
   4. Manufacturer's printed instructions for preparation, installation and care requirements for installers and inspecting authorities.

D. Samples:
   1. When factory applied color is indicated, provide manufacturer’s full range of factory applied color finishes for selection.
   2. Provide typical frame joint section and sample showing typical edge condition specified.
   3. When Stainless Steel is indicated, provide samples of 3 inches by 5 inches for each type of exposed finish required.
      a. Frames: Provide fabrication samples of profile and corner joints.
      b. Doors: Provide fabrication sample of corner showing vertical edges and top.

E. Quality Assurance/Control Submittals:
   1. Design Data:
   2. Test Reports:

a. Product Test Reports based on evaluation of comprehensive test performed by a qualified testing agency, for each type of fire-rated metal door, panel, and frame assembly.
b. Water Tightness Test Reports.

3. Certificates:
a. Oversized Construction Certification.
b. Installer Certification for Temperature Rise Fire Rated Framing System.

F. Closeout Submittals in accordance with the following:
1. General Construction Warranty.
2. Workmanship and Materials Warranty.

## 1.6 QUALITY ASSURANCE

A. Qualifications:
1. Material Qualifications:
a. Fire-Rated Doors, Panels, and Frames Assemblies shall be labeled by an DSA/FLS approved agency and shall comply with NFPA 80 "Standard for Fire Doors and Other Opening Protectives" and UL 1784 "Air Leakage Test for Door Assemblies."
b. Oversized Door Assemblies required to be fire rated and exceeds the limitations of labeled assemblies, a certificate of inspection shall be furnished by an approved testing agency in lieu of an Oversized Fire Door Label.

2. Installer Qualifications:
a. Installer shall be experienced and shall have successfully completed three (3) projects of similar scope and size to that indicated for this Project.
b. Installer(s) shall have participated in mock-up installation that was successfully tested for water tightness.

3. Manufacturer/Supplier Qualifications:
a. Manufacturer/Supplier shall have successfully produced/supplied products similar to that required for this Project, and shall have sufficient production/supply capacity to produce/supply required units without causing delay in the work.
b. Manufacturers must be members of the HMMA, who have been engaged for at least two years in the production for sale of swing steel doors and frames on a national basis.
1) All doors, panels and frames shall be manufactured and supplied by the same manufacturer.

B. Regulatory Requirements:
1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:
a. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the Project is located.

C. Mock Ups:
1. Provide Mock-Ups prior to application of the final layer of the finished exterior wall material and prior to installation of any exterior wall cavity and interior materials.
2. Metal Frame Assembly:
a. Mock-Ups shall be of each type of opening assembly in every type of exterior wall assembly in which an opening occurs, shall integrate all other related work assemblies and shall be representative of the intended end use configuration.

1) Provide a Mock-Up with a minimum opening size of *24 inches square* for window opening.

b. Mock Ups will be used for establishing construction sequence, and installation requirements of materials, and creating water tight assemblies.

c. Mock-Ups may become part of the completed Work upon successful testing for water tightness.

3. Installation:

a. The Project Inspector, the Architect, Contractor's Superintendent and Sub-contactor's Superintendent shall observe the installation of materials.

b. Installation crew for the Mock-Ups shall be the installers of the metal frame systems for this project and installers, as necessary, of other related work assemblies.

c. Mock Ups shall include the installation of integral flashing, glazing, louvers, sheet metal flashing, sealants, water barriers and penetration flashing of exterior material systems and other materials of related work that makes the openings watertight.

d. Failed Mock Ups shall be removed and the assembly reinstalled until the water tightness test is successful.

D. Meetings:

1. Pre-Installation: Scheduled by Contractor prior to the start of work.

a. Coordinate the work with all other related work.

b. Identify any potential problems that may impede planned progress and proper installation of work regarding quality of installation and warranty requirements.

2. Progress: Scheduled by the Contractor during the performance of the work.

a. Review for proper installation of work progress.

b. Identify any installation problems and acceptable corrective measures.

c. Identify any measures to maintain or regain project schedule if necessary.

3. Completion: Scheduled by the Contractor upon proper completion of the work.

a. Inspect and identify any problems that may impede issuance of warranties or guaranties.

b. Establish protection procedures to maintain installed work until the Notice of Substantial Completion has been executed.

## 1.7 DELIVERY, STORAGE, AND HANDLING

A. Packing, shipping, handling, and unloading:

1. Doors, Panels, and Frames shall be palletized, wrapped, or crated to provide protection during transit and Project-Site storage. Do not use non-vented plastic.

a. Provide additional protection to prevent dents, scratches and other damage.

B. Acceptance at Site:

1. Do not deliver doors, panels, and frames to project site until Installer is ready and the site conditions will accommodate the installation of frames.

2. Damaged products will not be accepted.

C. Storage and Protection:

1. Storage and protection shall be in accordance with NAAMM-HMMA 840 Standard, "Installation and Storage of Hollow Metal Doors and Frames."

2. Store Doors, Panels, and Frames under cover at Project Site. Stored on level platforms, minimum six (6) inches above ground, allowing air circulation under stacked units.

a. Doors, Panels, and Frames shall be placed in the up-right position, spaced by blocking to allow ventilation between units.

b. Cover materials with protective waterproof covering providing for adequate air circulation and ventilation.

## 1.8 PROJECT CONDITIONS

A. Existing Conditions:
1. Examine site and compare it with the drawings and specifications. Thoroughly investigate and verify conditions under which the work is to be performed. No allowance will be made for extra work resulting from negligence or failure to be acquainted with all available information concerning conditions necessary to estimate the difficulty or cost of the work.
2. Field Measurements: Verify openings by field measurements before fabrication and indicate measurements on Shop Drawings.
   a. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish opening dimensions for the fabrication of custom frames. Coordinate wall construction to ensure that actual opening dimensions correspond to established dimensions.

## 1.9 WARRANTY

A. Contractor's General Warranty:
1. In accordance with Specification Section - WARRANTIES.

B. Manufacturer's Warranty:
1. Doors and Frames in accordance with manufacturer's written standard warranty:
   a. Warranty Period One (1) Year.
2. Provide the Temperature Rise Rated Framing system warranty against defective workmanship and materials.
   a. Warranty Period Five (5) years upon project completion and acceptance.

C. Installer's Warranty:
1. Issue to the Owner a warranty against defective workmanship and materials.
   a. Warranty period Four (4) Years.
   b. In accordance with the terms of the Specification Section - WARRANTIES.
   c. Warranty shall include the responsibility for the repairs of any failure that is the result of defects in materials and workmanship.
   d. Warranty shall certify that the installation of all exterior Metal Doors and Frames were done in accordance with the method and procedures established with the successful Mock-Up for water tightness.
   e. The Warranty shall be co-endorsed by the General Contractor, the Metal Door and Frame Material Manufacturer, the Metal Door and Frame Installer and Glazing Installer.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
   1. Custom Metal Doors, and Frames:
      a. SECURITY METAL PRODUCTS CORPORATION.
      b. Acceptable alternative manufacturers:
         1) CURRIES COMPANY.
         2) METAL MANUFACTURING CO., INC.
         3) STILES CUSTOM METAL, INC.

B. Products from other manufacturers not listed must submit in accordance with Specification Section - SUBSTITUTION PROCEDURES.

2.2 MATERIALS

A. Cold-Rolled Steel Sheet: Commercial Steel (CS), Type B, conforming with ASTM A 1008/A 1008M "Standard Specification for Steel Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable." Steel shall be suitable for exposed to view applications.

B. Hot-Rolled Steel Sheet: Commercial Steel (CS), Type B, conforming with ASTM A 1011/A 1011M "Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength." The steel shall be pickled and oiled, free of scale, pitting, coil-breaks or other surface defects.

C. Metallic-Coated Steel Sheet: Commercial Steel (CS), Type B, complying with ASTM A 653/A 653M "Standard Specifications for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process." The steel shall have a minimum G60 (Z180) zinc (galvanized) or A60 (ZF 180) zinc-iron-alloy (galvannealed) coating designation.

D. Inserts, Bolts and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M "Standard Specification for Zinc Coating (Hot-dip) on Iron and Steel Hardware."

E. Grout:
   1. Concrete Walls: Comply with ASTM C476 "Standard Specification for Grout for Masonry," with a maximum slump of 4 inches, as measured according to ASTM C 143/C 143M "Standard Test Method for Slump of Hydraulic-Cement Concrete."
   2. Masonry Walls: Mortar comply with Specification Section - CONCRETE MASONRY UNITS.

F. Insulation:

1. Mineral-Fiber Insulation: ASTM C 665 "Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing," Type I (blankets without membrane facing): consisting of fibers manufactured from slag or rock wool with 6- to 12-lb/cu. ft. density: with maximum flame-spread and smoke-developed indexes of 25 and 50 respectively; passing ASTM E 136 "Test method for Behavior of Materials in a Vertical Tube Furnace at 750 degrees C," for combustion characteristics.
   a. Fire Rated Doors and Frames: Provide insulation that provides fire protection.
2. Expanded Foam Insulation suitable for injection into frame cavity.
   a. Spray Polyurethane Foam Insulation: ASTM C 1029, Type II, closed cell, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E 84.
3. Exterior Doors: Provide core with thermal polyisocyanurate insulation cores.
4. Exterior Door Frames: Solidly packed mineral insulation.
5. Insulation for Miscellaneous work:
   a. Glass-Fiber Insulation: ASTM C 764, Type II, loose fill; with maximum flame-spread and smoke-developed indexes of 5, per ASTM E 84.

G. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil dry film thickness per coat. Provide inert-type non-corrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

H. Sealants: Comply with Specification Section – SEALANTS.
1. Sealants shall be compatible with glazing and frames.

## 2.3 MANUFACTURED UNITS

A. General:
1. Exterior Doors, and Frames: In accordance with NAAMM-HMMA Standard 862, "Guide Specifications for Commercial Security Hollow Metal Doors and Frames," Class IV Door in accordance with NILECJ-STD-0306.00.
2. Interior Doors, and Frames: In accordance with NAAMM-HMMA 861 Standard, "Guide Specifications for Commercial Hollow Metal Doors and Frames," unless otherwise indicated in the Contract Documents.

B. Doors:
1. Design shall be custom seamless hollow construction in the flush type variations as indicated.
   a. Thickness1-3/4 inch.
2. Face Sheets:
   a. Exterior Doors shall be fabricated from Metallic-Coated Steel Sheets with zinc-iron-alloy (galvannealed) coating designation.
      1) Exterior Doors 14 gage minimum.
   b. Interior Doors shall be fabricated from Cold-Rolled Steel Sheets.
      1) Interior Doors 18 gage minimum.
3. Core:
   a. Steel Stiffened with continuous vertical formed steel sections fabricated from same materials as face sheets.
      1) Exterior Door 18 gage minimum.
      2) Interior Door 22 gage minimum.
   b. Spaces between stiffeners shall be insulated the full height of the door.
4. Top and Bottom Edges:
   a. Close with continuous recessed and flush filler channels fabricated from same material as face sheets.

1) Exterior Door 12 gage minimum.
2) Interior Door 16 gage minimum.

b. All doors shall have an additional flush filler channel at top and flush filler channel at bottom edges, unless recess channel at bottom is required for hardware.
c. All channels shall be fabricated from same material as face sheets.

5. Jamb Edges:
   a. Reinforce with continuous "U" channels fabricated from same material as face sheets.
      1) Exterior Door 12 gage minimum.
      2) Interior Door 16 gage minimum.
   b. All channels shall be galvanized at exterior doors.
   c. Astragals shall be fabricated from same material as face sheets. 14-gage minimum.
6. Hardware Reinforcements:
   a. Exterior Doors: Reinforcing Plates shall be fabricated from the same material as the face sheets in the minimum thickness as follows:
      1) Hinges and Pivots 1/4" plate.
      2) Continuous hinges 14-gage.
      3) Mortise Hardware 7-gage.
      4) Locks, Exit Devices, Flush Bolts, Concealed Holders, Concealed Hardware or Surface-Mounted Closures 12-gage.
      5) Pull Plates, Bars and all other Surface-Mounted Hardware 12-gage.
   b. Interior Doors: Reinforcing Plates shall be fabricated from the same material as the face sheets in the minimum thickness as follows:
      1) Hinges and Pivots 7-gage.
      2) Continuous Hinges 14-gage.
      3) Mortise Hardware 10-gage.
      4) Locks, Exit Devices, Flush Bolts, Concealed Holders, Concealed Hardware or Surface-Mounted Closures 12-gage.
      5) Pull Plates, Bars and all other Surface-Mounted Hardware 16-gage.
7. Glazing Moldings and Stops:
   a. Fabricate from the same material as the door face sheets.
      1) Exterior Doors 16-gage minimum.
      2) Interior Doors 20-gage minimum.

C. Frames:
1. Design shall be custom seamless hollow construction in the variety of configurations as indicated.
2. Exterior Frames shall be fabricated from Metallic-Coated Steel Sheets with zinc-iron-alloy (galvannealed) coating designation.
   a. All Opening sizes 12-gage minimum.
3. Interior Frames shall be fabricated from Cold-Rolled Steel Sheets.
   a. Openings 4'-0" or less 16-gage minimum.
   b. Openings greater than 4'-0" 14-gage minimum.
4. Glazing Stops shall be fabricate from the same material as Frames.
   a. Exterior Frames 16-gage minimum.
   b. Interior Frames 20-gage minimum.
5. Internal Frame Stiffeners shall be fabricated from the same material as Frames.
   a. Head of Frames 12-gage.
6. Internal Reinforcing Tabs shall be fabricate from the same material and gage thickness as Frame.
7. Hardware Reinforcements:

a. Exterior Frames: Reinforcing Plates shall be fabricated from the same material as the Frame in the minimum thickness as follows:
   1) Hinges and Pivots 1/4" plate full width of frame x 10".
   2) Continuous Hinges 14-gage full width of frame x entire frame length.
   3) Strike Hardware 7-gage.
   4) Flush Bolts 7-gage.
   5) Closers 7-gage.
   6) Surface-Mounted Hardware 7-gage.
   7) Hold-Open Arms 7-gage.
   8) Surface Panic Devices 7-gage.

b. Interior Frames: Reinforcing Plates shall be fabricated from the same material as the Frame in the minimum thickness as follows:
   1) Hinges and Pivots 7-gage full width of frame x 10".
   2) Continuous Hinges 14-gage full width of frame x entire frame length.
   3) Strike Hardware 12-gage.
   4) Flush Bolts 12-gage.
   5) Closers 12-gage.
   6) Surface-Mounted Hardware 12-gage.
   7) Hold-Open Arms 12-gage.
   8) Surface Panic Devices 12-gage.

8. Grout Guards: Grout Guards shall be fabricated from the same material as the Frame in minimum 22-gage thickness.

D. Frame Anchors:

1. Exterior Frames: Frame Anchors shall be fabricated from Metallic-Coated Steel Sheets, unless indicated otherwise.
   a. Masonry Wall not less that 2" wide x 10" long Anchors.
      1) Non Grouted Frames 14 gage T-Strap Anchors.
      2) Grouted Frames 14-gage perforated Adjustable Strap & Stirrup Anchors.
         a) Wire Loop Anchors of 0.156" diameter steel wire may be used at non-fire-rated frames that are fully grouted.
   b. Concrete Walls 14-gage Pour In Place Anchors.
   c. Stud Frame Walls 16-gage Combination Wood/Steel Stud Anchors.
      1) Anchor shall be not less than 2" wide x 10" long.
   d. Jamb Base 14-gage Fixed Floor Anchors.
   e. Floor Base 14-gage Existing Wall Anchors.
      1) Where indicated 14 gage continuous Rough Buck Anchors.
   f. Prepared Openings 14-gage Existing Wall Anchors.
      1) Where indicated 14 gage continuous Rough Buck Anchors.
2. Interior Frames: Frame Anchors shall be fabricated from Cold-Rolled Steel Sheets or Hot-Rolled Steel Sheets, unless indicated otherwise.
   a. Masonry Wall not less that 2" wide x 10" long Anchors.
      1) Non Grouted Frames 16 gage T-Strap Anchors.
      2) Grouted Frames 16 gage perforated Adjustable Strap & Stirrup Anchors.
         a) Wire Loop Anchors of 0.156" diameter steel wire may be used at non-fire-rated frames that are fully grouted.
   b. Concrete Walls 16 gage Pour In Place Anchors.
   c. Wood Stud Frame Walls 18 gage Wood Stud Anchors.
      1) Anchor shall be not less than 2" wide x 10" long.
   d. Metal Stud Frame Walls 18-gage Metal Channel Stud Anchors.
   e. Jamb Base 14-gage Fixed or Adjustable Floor Anchors.
   f. Floor Base 16 gage Existing Wall Anchors.
      1) Where indicated 16 gage Fixed Mullion Anchors.

g. Prepared Openings 16-gage Existing Wall Anchors.
   1) Where indicated 16 gage continuous Rough Buck Anchors.

E. Fasteners:
   1. Screws, bolts, washers, shields, spacers and other similar fastening devices:
      a. Provide stainless steel vandal resistant screws when outside exterior face glass stops are indicated.
      b. Furnish and install as required by frame installer.
      c. Provide Stainless Steel fasteners at Stainless Steel Frames.

## 2.4 FABRICATION

A. Shop Assembly:
   1. General:
      a. Fabricate in accordance NAAMM-HMMA Standard 810 "Hollow Metal Doors" and NAAMM-HMMA Standard 820 "Hollow Metal Frames," and NAAM-HMMA Standard 850 "Fire-Rated Hollow Metal Doors and Frames."
      b. Fabricate to the required size and profiles by accurately forming, welding edges straight, sharp and true. Corner bends shall be true and straight and of minimum radius for the gage of metal used.
      c. All finish work shall be strong, rigid and neat in appearance with corners, hairline joints and surfaces free from warp, wave, buckle, tool marks, surface imperfections or other defects.
      d. Welding to conform to applicable standards of AWS for high grade finished metal fabrication. All exposed welds shall be ground, filled and dressed smooth with no voids, tool marks, surface imperfections or ridges showing to make them invisible and provide a smooth flush surface.
      e. Assemblies shall be shop fabricated and permanently assembled before shipment.
         1) Where shipping limitations so dictate, frames for large openings shall be fabricated and prepared in section designated for assembly in the field and clearly identified.
   2. Metal Door Fabrication:
      a. General: All doors shall be of the types and sizes required and shall be fully welded seamless construction with smooth surfaces without visible joints of seams on exposed faces or edges.
         1) Glazed Lites shall be factory cut openings in doors.
         2) Provide weep-hole openings in the bottom of exterior doors to permit the escape of entrapped moisture.
      b. Face Sheets: Door faces shall be joined at their vertical edges by a continuous weld extending the full height of the door.
      c. Core: Stiffeners shall extending full-door height and spanning the full thickness of the interior space between door faces.
         1) Space Stiffeners no more than 6" apart and securely attached to both face sheets by spot welds spaced a maximum of 5" o.c..
         2) Solidly pack cavities the entire height of door with mineral-fiber insulation.
            a) Fire Door Cores: As required to provide fire-protection as indicated.
      d. Top and Bottom Edges: Closing Channels shall extend the full width of the door at top and bottom edges.
         1) All doors shall have recessed Closing Channels, spot welded to both faces. When left exposed, fill all gaps with epoxy sealer and filler, sand smooth with no tool marks or surface imperfections.

2) All doors shall have flush-filler Closing Channels in addition to recessed Closing Channels. Channels shall be continuously welded and ground smooth with no marks at all doors.
   a) Flush-filler Closing Channel shall be omitted at bottom edge when recess channel is required for hardware.

e. Jamb Edges: Reinforcing Channels shall extend the full height of the door.
   1) Edge profiles shall be provided on both vertical edges of doors as follows:
      a) Single-Acting Swing Doors beveled 1/8" in 2".
      b) Double-Acting Swing Doors rounded on 2-1/8" radius.
   2) Astragal: Flat x 1-1/2 inch, continuous welded to panel, ground smooth with no tool marks or surface imperfections. Extend minimum 3/4 inch beyond edge of door on which astragal is mounted.
      a) Provide overlapping astragal on one leaf of pairs of doors where required for fire-performance rating or where indicated.
      b) At exterior doors, provide overlapping astragal at strike. Cope astragal around strike plate.

f. Hardware Reinforcements: Doors shall be mortised, reinforced, drilled and tapped at the factory for fully templated hardware only, in accordance with the approved hardware schedule and templates provided by the hardware contractor.
   1) Where surface-mounted hardware is to be applied, doors shall have reinforcing plates only under the face of door.

g. Glazing Moldings and Stops: Provide glazing moldings and stops to secure glazing material and louvers. Moldings and stops shall be flush with face sheets of door. Use the same trim profile on all Fire-Rated and Non Fire-Rated Openings.
   1) Fixed Glazing Moldings shall be securely welded to both face sheets of door.
   2) Removable Glazing Stops shall be channel shaped and have mitered hairline corner joints. Drill and dimple stop for countersinking and concealment of fasteners spaces equally at 9" o.c. maximum and a maximum of 2" from ends. Snap-on attachments will not be permitted.
   3) Metal surfaces underneath the glazing stops and the inside of the glazing stops shall be treated for maximum paint adhesion and painted with a with a rust inhibitive primer prior to installation in the door.
   4) Coordinate depth and rabbet width between fixed and removable stops with type of glazing and type of installation indicated.

3. Metal Frame Fabrication:
   a. General: All frames shall be welded units of the sizes and profiles indicated and shall be of seamless hollow construction with smooth surfaces without visible joints of seams on exposed faces or edges.
      1) Metal Frame Spreaders shall be temporarily attached at bottom of all open frames for shipping and storage.
   b. Frame Sections: All frames are to be rolled and brake formed with integral nailing flanges, back bends, faces, rabbits, stops, and soffits, unless indicated otherwise.
      1) Provide 3 ½ inch wide integral Nailing Flanges at exterior frames. The flange shall be continuous all around the frame at head, jambs and wall sills without gaps at the corner joints. Coordinate flange length with height of concrete curb.
      2) Punch and Dimple frames at attachment points for countersinking and concealment of all through the frame anchorage fasteners.
   c. Frame Joints:

1) Perimeter Corners: Head, Jamb and Wall Sills Members shall be saw-mitered and fully (continuously) welded along entire joint from the throat or the unexposed side at Flanges, Returns, Faces, Rabbet, Stops, and Soffits.
2) Perimeter Butts: Entire joint shall be fully (continuously) welded along entire joint at Flanges, Returns, Faces, Rabbet, Stops, and Soffits from the throat or the unexposed side of the frame.
   a) Interior Frames: Continuously weld only the Faces. Rabbits, Stops and Soffits shall to be tightly fitted and appear as a hairline seams.
   b) Vertical Mullions members shall extend through Floor Sill Members to floor. Floor Sill Members Stops are to be notched.
3) Internal Flush and Indented Butts: Vertical Mullions Members shall be continuous, butt to Head and Sill Members and extend through Horizontal Rail Members. Vertical Mullion Stops are to be notched at Head and Sill Members and the Horizontal Rail Stops are to be notched to Vertical Member. Continuously weld only the Faces.
   a) Exterior Frames: Body Putty continuously along entire joint at returns, rabbets, stops, and soffits creating a water tight joint. Sand flush and smooth with no voids or ridges.
   b) Interior Frames: Rabbits, Stops and Soffits shall to be tightly fitted and appear as a hairline seams.

d. Alignment and Reinforcing Tabs: Provide internal alignment and reinforcing tabs at each joint of field splices with a minimum overlap of 2".
e. Internal Frame Stiffeners: Provide additional continuous steel "U" Channel extending the full width of frame and shall be factory welded into head of frame.
   1) Grouted Frames with openings greater than 4'-0" width.
   2) Frames with openings greater than 12'-0" in width.
f. Hardware Reinforcements: Frame shall be mortised, reinforced, drilled and tapped at the factory for fully templated hardware only, in accordance with the approved hardware schedule and templates provided by the hardware contractor.
   1) Where surface-mounted hardware is to be applied, frames shall have reinforcing plates only under face of frame.
g. Grout Guards: Provide at all hardware preparations, tapped mounting holes, glazing stop screws, silencers, and electrical box preparations on frames that are to be grouted.
   1) Weld guards to inside of frame at throat.
h. Glazing Stops: Provide channel shaped removable Glazing Stops to secure glazing material or panels. Glazing Stops shall be continuous and have butted hairline corner joints.
   1) Coordinate stop depth and rabbit width between fixed and removable stops with type of glazing and type of installation indicated.
      a) Stop Depth 5/8" depth minimum.
   2) Drill and Dimple stops for countersinking and concealment of fasteners uniformly spaced at 9 inches o.c. maximum and not more that 2 inches maximum from each corner.
   3) Metal surfaces underneath the glazing stops and the inside of the glazing stops shall be treated for maximum paint adhesion and painted with a with a rust inhibitive primer prior to installation in the door.

4. Frame Anchors:
   a. Coordinate the type of frame anchors with the type of frame insulation or grout being used so that the frame is fully packed with no voids.
   b. All Frame Anchors shall be securely welded to the throat at inside of frames.

c. Frame Anchor Spacing: All Frame Anchors at head, jamb and sill shall be placed a maximum of 8" from frame corners, and ends, with the remainder of the anchors to be equally spaced, not to exceed a maximum of 24" o.c. for all walls types unless indicated otherwise.

1) Masonry Walls: The spacing of anchors shall be equally spaced, not to exceed a maximum of 24" o.c.. Total number of anchors provided on each jamb shall be not less than the following:

a) Frames up to 7'-6" height 4 anchors.
b) Frames 7'-6" to 8'-0" height 5 anchors.
c) Frames over 8'-0" height provide five (5) anchors plus one (1) additional anchor for each 2' -0" or fraction thereof in height over 8'-0".

2) Stud Framed Walls: The spacing of anchors shall be equal spaced, not to exceed a maximum of 18" o.c.. Total number of anchors provided on each jamb shall be not less than the following:

a) Frames up to 4'-0" height 4 anchors.
b) Frames 4'-0" to 7'-6" high 5 anchors.
c) Frames 7'-6" to 8'-0" height 6 anchors.
d) Frames over 8'-0" height provide six (6) anchors plus one (1) additional anchor for each 2'-0" or fraction thereof in height over 8'-0".

3) Jamb Base: Provide floor anchors for each jamb and mullion that extends to floor.

a) When conditions do not permit the use of a floor anchor, an additional jamb anchor shall be substituted at a location not to exceed 8" from the base of the jamb.

4) Floor Base: When conditions do not permit the use of Existing Wall Anchors at floor sill members, provide continuous rough buck for frame anchorage.

5. Rubber Door Silencers: Except on weather/sound strip or fire gasket doors, drill stops to receive door silencers as follows. Keep holes clear during construction.

a. Single Swing Door Frames Provide and install three (3) at strike jamb.
b. Double Swing Door Frames Provide and install four (4) at head.

B. Fabrication Tolerances:

1. General: Clearances and Tolerances shall be in accordance with NAAMM-HMMA Standard 862 for Exterior Assemblies and NAAMM-HMMA Standard 861 for Interior Assemblies.

## 2.5 FINISHES

A. Shop Priming:

1. After fabrication, all tool marks and surface imperfections shall be dressed, filled and sanded as required to make all faces and vertical edges smooth, level and free of all irregularities.
2. Clean and chemically treat (phosphatize) the metal to insure maximum paint adhesion in preparation for primer paint.
3. Apply rust-inhibitive primer paint to all surfaces, minimum dry thickness of 0.7 mils. Manufacturer to provide primer for prolonged exposure that are compatible with substrate and field-applied coatings.

a. Coordinate primer used with field-applied paint finishes that are indicated and specified.

b. Shop Primer shall not be considered as a substitution for any primer required as part of the field-applied paint finishes.
c. Rust-inhibitive primer shall be fully cured before packaging and shipment.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

A. Site Verification of Conditions:
1. Prior to the installation of the work under this specification section, examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work under this specification section.
2. Examine roughing-in for embedded and built-in anchors to verify actual locations before frame installation.
3. Report conditions detrimental to performance of the work under this specification section. Proceed with installation only after unsatisfactory conditions have been corrected.
4. Installation of work under this specification section shall constitute acceptance of existing conditions.

### 3.2 PREPARATION

A. Protection:
1. Protect all adjacent surfaces from damage from work under this specification section.

B. Surface preparation:
1. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling and dressing, as required to repair area smooth, flush and invisible on exposed faces.
2. Prior to installation, All frames with temporary spreaders removed, shall be checked for size, and swing, and corrected to installation tolerance for squareness, alignment, twist and plumbness. Securely brace frames and maintain installation tolerances within the following limits.
a. Opening Width: Plus 1/16 inch, minus 1/32 inch, measured from rabbet to rabbet at top, middle and bottom of frame.
b. Opening Height: Plus 1/16 inch, minus 1/32 inch, measured measured vertically between the frame head rabbet and top of floor or bottom of frame minus jamb extension at each jamb and cross the head.
c. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
d. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
e. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines and perpendicular to plane of wall.
f. Plumbness: Plus or minus 1/16 inch, measured at jambs on a perpendicular line from head to floor.
3. Drill and tap doors and frames to receive non-templated, mortised, and surface-mounted door hardware.

## 3.3 INSTALLATION

A. General:
1. Install metal doors and frames plumb, rigid, properly aligned and securely fastened in place; comply with NAAMM-HMMA Standard 840, "Installation and Storage of Hollow Metal Doors and Frames."
2. Install in accordance with manufacturer's instructions and recommendations unless specifically noted otherwise.
3. Install Fire-Rated and Smoke-Control Assemblies in accordance with NFPA 80 "Standard for Fire Doors and Other Opening Protectives" and NFPA 105 "Standard for the Installation of Smoke Door Assemblies and Other Openings."

B. Frames:
1. Set frames accurately in position, plumbed, aligned, and temporarily braced secure, until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.
   a. Check plumbness, squareness, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
   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.
      1) At exterior frames, Body Putty smooth entire joint continuously along returns, rabbets, stops, and soffits creating a watertight joint. Sand flush with no voids or ridges.
2. Solidly insulate within the throat of all non-grouted exterior and interior frames for the full depth, width and length of frame.
   a. Provide fire-rated mineral fiber insulation as required to provide fire-protection and temperature-rise ratings as indicated at Fire Rated Assemblies.
   b. Inject expanding foam insulation as required.
3. Jamb Base: Secure in place frame anchors to floor with post-installed expansion anchors.
4. Floor Base: Secure frames in place with post-installed expansion anchors to floor. Countersink fasteners, fill with body putty, sand smooth and flush with no voids or ridges. Conceal installed fasteners as to be invisible at exposed faces.
5. Masonry and Concrete Walls: Coordinate installation of frames to allow the solidly fill the space between frames and masonry or concrete with grout. Take precautions, grout in lifts and brace frames, to ensure that frames are not deformed or damaged by grout forces.
   a. Field apply bituminous coating to backs of all frames that are filled with grout.
   b. Install door silencers in frames before grouting.
6. In-Place Concrete or Masonry Construction: Secure frames in place with post-installed expansion anchors. Countersink fasteners, fill with body putty, sand smooth and flush with no voids or ridges. Conceal installed fasteners as to be invisible at exposed faces.
7. Stud Frame Walls: Secure frames in place with screw fasteners at frame anchors to wall framing.
8. In-Place Stud Frame Walls: Secure frames in place with screw fasteners at frame anchors to wall framing. Countersink fasteners, fill with body putty, sand smooth and flush with no voids or ridges. Conceal installed fasteners as to be invisible at exposed faces.

9. Frame and Wall Joints: Provide joint sealants to maintain watertight and airtight continuous seals that aesthetically join dissimilar materials without causing staining or deterioration of joint substrates. Application of sealants shall be in strict compliance with manufacturer's instructions.
    a. Provide integral color sealants at exterior joints and paintable sealants at interior joints.
    b. Clean out joint between frames and masonry or concrete to a depth of 3/4 inch. Fill with rod and sealants.
10. Field-apply compatible and paintable sealant at all frame joints that are exposed to the exterior for the full depth of the frame at returns, rabbits, stops and soffits.

C. Doors: Fit doors accurately in frames, within clearances specified below. Shim as necessary.
1. Non-Fire-Rated Doors:
    a. Between door and frame at jambs and head 3/16 inch maximum.
    b. Between edges of pairs of doors 3/16 inch maximum.
    c. Door Sill Clearances: Coordinate with threshold conditions and floor materials.
        1) Between bottom of door and top of threshold 3/8 inch maximum.
        2) Between bottom of door and floor with no threshold 3/4 inch maximum.
2. Fire-Rated and Smoke-Control Doors: Install doors with clearances according to NFPA 80 "Standard for Fire Doors and Other Opening Protectives" and NFPA 105 "Standard for the Installation of Smoke Door Assemblies and Other Openings."
    a. Between bottom of door and floor covering surface 1/2 inch maximum.

D. Glazing Stops:
1. Coordinate and comply with installation requirements for all glazing indicated and specified.
2. Secure Glazing Stops to frames and doors with corrosion resistant countersunk flat or oval-head machine screws.
    a. All exterior screws (head, jamb and sills) shall be attached with a bed of sealant at the penetration point into the frame for a positive seal against water intrusion.
    b. Countersink fasteners, fill with body putty, sand smooth and flush with no voids or ridges. Conceal installed fasteners as to be invisible at exposed faces.
3. All exterior stops shall receive a full bed of sealant at back channel leg for the full length of opening, during final glazing installation for positive seal against water intrusion.
    a. Coordinate sealants with the requirements of the glazing specified.

## 3.4 FIELD QUALITY CONTROL

A. Site Tests:
1. As required by Regulatory Requirements.
2. Mock-Up Assemblies:
    a. Water Spray Test: Upon completion of the installation of the Mock-Up Assembly, conduct test for water penetration in according to AAMA 501.2 requirements.
        1) The Project Inspector, the Architect, Contractor's Superintendent and Sub-contractor's Superintendent shall visually inspect for water penetration.
        2) A Thermal Imagining process conducted by a Owner's Testing Laboratory Service, shall be used for additional inspection for water penetration.
        3) Cost of additional testing and inspection required due to failure for water tightness shall be borne by the Contractor.
    b. Reports:

1) Project Inspector and/or Owner's Testing Laboratory Services shall provide a written report noting the installation and water tightness of the Mock-Up Assemblies tested.

B. Inspection:
1. Notification: Schedule all inspections. Notify the Architect, Project Inspector and any regulatory agencies of the time at least 48 hours prior to the inspection.
2. Regulatory Requirements: No work shall be excepted without the required inspections being performed.

## 3.5 ADJUSTING

A. Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operation condition. Coordinate with hardware suppliers for function and use.

B. Remove and replace defective work, including work that is warped, bowed, or other wise unacceptable.

## 3.6 CLEANING

A. Clean in accordance with Specification Section - TEMPORARY FACILITIES AND CONTROLS.
1. Immediately clean all adjacent surfaces from all foreign materials.
2. Immediately remove grout, sealants and any foreign materials from bonding to metal doors and frames.
3. In accordance with manufacturer's instructions and recommendations.

B. Metal Doors, and Frames finishes shall be clean and ready of application of any additional finishes after installation.
1. Prime-Coat Surfaces: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.
2. Metallic-Coated Surfaces: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.
3. Stainless Steel Surfaces: Scratched and marred surfaces (including field welding) shall be cleaned and promptly be finished smooth. Refinish to match original finish.

## 3.7 PROTECTION

A. Protect and maintain conditions that ensures the work is without damage or deterioration until the time of Completion has been executed.
1. Maintain in a manner acceptable to manufacturer's and installer's warranty.

END OF SECTION