

# ***TRUSSBILT***

## **GUIDE SPECIFICATIONS FOR DETENTION SECURITY HOLLOW METAL DOORS AND FRAMES**

*(Complies With ANSI/NAAMM HMMA 863, ASTM F 1450, and ASTM F 1592)*

**Last Revision 3/05**

**Member  
Hollow Metal Manufacturers Association  
Division of the  
National Association of Architectural Metal Manufacturers**

**TRUSSBILT ISO 9001:2000 CERTIFIED**

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CSI SECTION 11190  
DETENTION SECURITY HOLLOW METAL DOORS AND FRAMES

**PART 1 - GENERAL**

**1.01 SUMMARY**

This Section includes detention security hollow metal [bullet resistant] products as scheduled in the contract drawings and as specified herein.

**1.02 PRODUCTS PROVIDED UNDER THIS SECTION**

- A. Detention security hollow metal doors with specified fire rating and/or bullet resistance rating as indicated in the door schedule. Doors shall be swinging type or sliding type and shall be provided in the types and sizes scheduled in the contract drawings and as specified herein.
- B. Detention security hollow metal frames with specified fire rating and/or bullet resistance rating as indicated in the door schedule. Frames shall be provided in the types and sizes scheduled in the contract drawings and as specified herein.
- C. Detention security hollow metal panels with specified security grade, fire rating and/or bullet resistance rating as indicated in the door schedule. Panels shall be provided in the types and sizes scheduled in the contract drawings and as specified herein.

*Indicate bullet resistant doors, frames and panels only if applicable to the job. If these are to be fire-rated doors, frames and panels, indicate the required rating. Also indicate the type of door operation required (swinging or sliding).*

### 1.03 RELATED SECTIONS

- A. Detention Hardware 11190 (or 08780)
- B. Security Glass and Glazing Materials 08800 (or 11190)
- C. Gaskets and Weather-strip 08720 (or 11190)
- D. Section [      ] - - - Installation of Detention Security Hollow Metal Doors & Frames
- E. Section 03300 - - - - Cast in Place Concrete: Item(s)
- F. Section 03350 - - - - Concrete Floor Finishing: Item(s)
- G. Section 03400 - - - - Pre-cast Concrete: Item(s)
- H. Section 04200 - - - - Masonry System: Item(s)
- I. Section 05120 - - - - Structural Steel: Item(s)
- J. Section 08110 - - - - Commercial Hollow Metal Doors and Frames
- K. Section 08113 - - - - Commercial Security Hollow Metal Doors and Frames
- L. Section 08130 - - - - Stainless Steel Hollow Metal Doors and Frames
- M. Section 08348 - - - - Swinging Sound Control Hollow Metal Doors and Frames
- N. Section 08580 - - - - Operable Windows
- O. Section 08740 - - - - Detention Locking Control Systems: Item(s)
- P. Section 09900 - - - - Painting: Item(s)

### 1.04 REFERENCES

- A. ASTM A 1008 / A 1008M-03, Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability
- B. ASTM A 1011 / A 1011M-03, Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability
- C. ASTM A 653/A 653M-02, Specification for Steel Sheet, Zinc-coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot Dipped Process, (Commercial Steel)
- D. ASTM A 666-00, Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate and Flat Bar
- E. ASTM C 143 / C 143M-00, Standard Test Method for Slump of Hydraulic Cement Concrete
- F. ANSI A 250.10 – 1998, Standard Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames
- G. ASTM F 1450-97 (2004), Standard Test Methods for Hollow Metal Swinging Door Assemblies for Detention and Correctional Facilities.

- H. ASTM F 1592-01, Standard Test Methods for Detention Hollow Metal Vision Systems
- I. ANSI / NAAMM HMMA 801-98, Glossary of Terms for Hollow Metal Doors and Frames
- J. NAAMM HMMA 803-98, Steel Tables
- K. NAAMM HMMA 820-87, Hollow Metal Frames
- L. HMMA-820 TN01-03, Grouting Hollow Metal Frames
- M. NAAMM HMMA 840-99, Installation and Storage of Hollow Metal Doors and Frames
- N. NAAMM HMMA 850-00, Fire-Rated Hollow Metal Doors and Frames, Second Edition
- O. ANSI / NAAMM HMMA 866-01, Guide Specifications for Stainless Steel Hollow Metal Doors and Frames
- P. ANSI / NFPA 80-1999, Fire Doors and Windows
- Q. ANSI / NFPA 105-1999, Recommended Practice for the Installation of Smoke Control Door Assemblies
- R. ANSI / NFPA 252-1999, Standard Methods of Fire Tests of Door Assemblies
- S. ANSI / NFPA 257-2000, Methods for Fire Test of Window Assemblies
- T. ANSI / UL 9-2000, Fire Test of Window Assemblies, 7<sup>th</sup> Edition
- U. ANSI / UL 10B-2001, Fire Test of Door Assemblies, 9<sup>th</sup> Edition
- V. ANSI / UL 10C-2001, Standard for Positive Pressure Fire Tests of Door Assemblies, 1st Edition
- W. UL 1784-01, Air Leakage Tests of Door Assemblies, 3<sup>rd</sup> Edition.
- X. ICBO UBC 7-2 (1997), Fire Tests of Door Assemblies
- Y. ICBO UBC 7-4 (1997), Fire Tests of Window Assemblies
- Z. UL 752-00, 10<sup>th</sup> Edition, Bullet Resisting Equipment

ANSI	American National Standards Institute, Inc. 25 W. 43rd Street New York, NY 10036 Telephone: 212-642-4900 <a href="http://www.ansi.org">www.ansi.org</a>
ASTM	American Society for Testing and Materials <i>Also known as ASTM International</i> 100 Barr Harbor Drive West Conshohocken, PA 19428-2959 Telephone: 610-832-9585 <a href="http://www.astm.org">www.astm.org</a>
ICBO	International Code Council – Los Angeles Office <i>Formerly known as International Conference of Building Officials</i> Uniform Building Code 5360 Workman Mill Road Whittier, California 90601-2298 Telephone: 592-692-4226 <a href="http://www.icbo.org">www.icbo.org</a>
NAAMM	National Association of Architectural Metal Manufacturers 8 South Michigan Avenue Suite 1000 Chicago, IL 60603 Telephone: 312-332-0405 <a href="http://www.naamm.org">www.naamm.org</a>
NFPA	National Fire Protection Association 1 Batterymarch Park P.O. Box 9101 Quincy, MA 02269 Telephone: 617-770-3000 <a href="http://www.nfpa.org">www.nfpa.org</a>
UL	Underwriters Laboratories, Inc. 333 Pfingsten Road Northbrook, Illinois 60062 Telephone: 708-272-8800 <a href="http://www.ul.com">www.ul.com</a>

*Note: The following standards are used only for “traditional” negative pressure fire test methods and should be deleted from the project specifications when positive pressure testing is required by the governing building code: NFPA-252 (1.04.R), NFPA-257 (1.04.S), UL-10B (1.04.U), CAN4-S104 (1.04X) and CAN4-S106 (1.04.Y).*

*Conversely, the following standards are used for positive pressure fire tests, and should be deleted from project specifications requiring negative pressure fire tests: UL-9 (1.04.N), UL-10C (1.04.Y), UBC 7-2 (1.04.Z) and UBC 7-4 (1.04.AA).*

## 1.05 TESTING AND PERFORMANCE

Performance grades for each opening shall be as indicated on the contract documents. Performance test requirements for each opening shall be as indicated for individual grade number designations shown in the tables in ASTM F 1450 and ASTM F 1592. Test procedures shall be performed on door and frame designs as described in Sections A, B, C, D and E.

### A. Door Assembly Impact Test

Two 3 ft. x 7 ft. (914 mm x 2134 mm) doors shall be constructed in accordance with Section 2.01, each with 100 square inch (645.2 cm<sup>2</sup>) vision panel, 4 in. x 25 in. (102 mm x 635 mm) clear opening positioned generally as shown in ASTM F 1450, Figure 1. Doors shall have a maximum weight for Grades 1 and 2 of 230 lbs and for grades 3 and 4 of 190 lbs. Two accompanying frames shall be constructed in accordance with Section 2.03. One door and frame assembly shall be equipped with hardware in accordance with ASTM F 1450, Paragraph 6.1.1.3. The other assembly shall be equipped with hardware in accordance with ASTM F 1450, Paragraph 6.1.1.4. Test doors and frames shall be installed and tested in accordance with ASTM F 1450, Section 6, "Specimen Preparation" and Section 7.2 "Door Assembly Impact Test." The test assemblies shall meet the acceptance criteria in Section 7.2 in order to qualify under Section 1.05 of this specification.

### B. Detention Hollow Metal Vision System Impact Test In Accordance With ASTM F 1592

1. A four (4) equal light multi-light security hollow metal assembly, overall dimensions of 50 in. width x 50 in. height (1270 x 1270 mm), shall be constructed in accordance with this specification, Section 2.03, and shall be impact tested in accordance with ASTM F 1592, Sections 5, 6 and 7.2. The test assembly shall meet the acceptance criteria in Section 7.2 in order to qualify under Section 1.05 of this specification.
2. A single sidelight security hollow metal assembly, door dimensions 3 ft. x 7 ft. (914 mm x 2134 mm) and sidelight dimensions with clear opening size of 28 in. wide x 33 in. high +/- 1 in. (711 mm x 838 mm +/- 25 mm), shall be constructed in accordance with Sections 2.01 and 2.03, and shall be impact tested in accordance with ASTM F 1592, Sections 5, 6 and 7.2. The test assembly shall meet the acceptance criteria in Section 7.2 in order to qualify under Section 1.05 of this specification.

### C. Door Static Load Test

Two (2) doors constructed identically to each of the test doors required for Section 1.05.A "Door Assembly Impact Test," 3 ft. x 7 ft. (914 x 2134 mm), with 4 in. x 25 in. (102 mm x 635 mm) vision panel, and with hardware preparations, shall be tested in accordance with ASTM F 1450, Section 7.3, "Door Static Load Test." The test doors shall meet the acceptance criteria in Section 7.3 in order to qualify under Section 1.05 of this specification.

#### D. Door Rack Test

Two (2) doors constructed identically to each of the test doors required in Section 1.05.A, "Door Assembly Impact Test," 3 ft. x 7 ft. (914 mm x 2134 mm), with 4 in. x 25 in. (102 mm x 635 mm) vision panel, and with hardware preparations shall be tested in accordance with ASTM F 1450, Section 7.4, "Door Rack Test." The test doors shall meet the acceptance criteria in Section 7.4 in order to qualify under Section 1.05 of this specification.

#### E. Door Edge Crush Test

One (1) door constructed identically to either of the test doors required in Section 1.05.A, "Door Assembly Impact Test," 3 ft. x 7 ft. (914 x 2134 mm), with 4 in. x 25 in. (102 x 635 mm) vision panel, and with hardware preparations, shall be tested in accordance with ASTM F 1450, Section 7.7 "Door Edge Crush Test."

#### F. Bullet Resistance Test

1. Where specified for individual openings, bullet resistance shall be certified by the application of a laboratory bullet resistance rating label on the door covering the assembly opening indicating compliance with the testing procedure described in UL Standard 752, and consistent with ASTM F 1450, Section 6, "Specimen Preparation" and Section 7.1, "Bullet Penetration." The bullet resistance rating shall be Level 3.

*The .44 Magnum Revolver is used in this specification because it is the most powerful commonly available handgun. According to prison officials, high powered rifles, if any are kept on the premises, would be securely locked in an armory. Handguns, however, could be obtained in a riot situation or can be concealed and smuggled into public or secure areas. For this reason it is recommended that all doors which are indicated on the door schedule to be bullet resistant be certified for the .44 Magnum Revolver.*

OR

2. A sample door, frame, and hardware assembly shall be constructed, tested, and certified by a qualified independent testing laboratory in accordance with the test procedure outlined in ASTM F 1450, Section 6 "Specimen Preparation" and Section 7.1 "Bullet Penetration." In this case test reports shall include complete descriptions of the test procedure and results. Firearms and ammunition used shall be certified as being correct with respect to bullet caliber, weight, muzzle velocity, and muzzle energy.

#### G. Test Reports

The manufacturer shall provide test reports and documentation by an independent testing laboratory in accordance with the reporting requirements of ASTM F 1450 and ASTM F 1592 certifying compliance with ANSI/NAAMM/HMMA 863, Section 1.05.

## H. Labeled Fire Rated Doors and Frames

1. Fire labeled doors, frames, transom frames and side light assemblies shall be provided for those openings requiring fire protection, temperature rise, or smoke and draft control ratings as determined and scheduled by the Architect. Such products shall be tested in accordance with [ANSI/NFPA-252 or ANSI/UL-10B] [ANSI/UL-10C or UBC 7-2; Part 1] [UL 1784 or UBC 7-2; Part 2 or ANSI/NFPA 105] and constructed as listed and/or classified by a recognized testing agency having a factory inspection service.
2. Window frames shall be provided for those openings requiring fire protection ratings as determined and scheduled by the Architect. Such frames shall be tested in accordance with [ANSI/NFPA 257 or ANSI/UL 9] [UBC 7-4] and constructed as listed for labeling by a recognized testing laboratory having a factory follow up inspection service.

*Note: UBC 7-2 and UL 10C provide for positive pressure testing to accommodate the requirements of some jurisdictions and should be included only for such jurisdictions.*

*UL 1784, UBC 7-2; Part 2 and ANSI/NFPA 105 provide for smoke and draft control assembly testing to accommodate these specific requirements, and should be included only when required.*

3. If any door or frame specified by the Architect to be fire-rated cannot qualify for appropriate labeling because of its design, hardware, or any other reason, the Architect shall be so advised in the submittal documents or prior to manufacture of the product if hardware, glazing or other options affecting the fire rating are unknown at the time of submittal document preparation.

*Note: Refer to NAAMM/HMMA 850, "Fire-Rated Hollow Metal Doors and Frames," for additional information.*

## 1.06 QUALITY ASSURANCE

### A. Manufacturer's Qualification

1. Manufacturer shall provide evidence of having personnel and plant equipment capable of fabricating hollow metal door and frame assemblies of the type specified herein. Manufacturer shall provide current documentation of the number of employees, a listing of their production equipment, and a description of their manufacturing facility.



2. Manufacturers shall be ISO 9001:2000 certified and shall be required to present their Certificate of Registration upon request. The manufacturer's registrar shall be nationally recognized and shall provide the manufacturer with periodic factory follow up audits reaffirming the manufacturer's continuing compliance with their written quality program.
3. Manufacturer's production welders shall be qualified under AWS D1.3 and upon request shall provide copies of Welders Certifications in accordance with AWS D1.3.
4. Manufacturers shall have a minimum of ten (10) years experience successfully producing detention hollow metal of the types and sizes required in the contract documents. Upon request the manufacturer shall provide a list of successfully completed projects and the dates they were completed.
5. Manufacturers shall have written test reports of their having passed the testing requirements of section 1.05 and using their current materials and production processes.

#### B. Quality Criteria

1. All door and frame construction shall be in accordance with construction of assemblies, which meet the testing requirements of Section 1.05.
2. Fire labeled doors and frames shall be provided for those openings indicated in the schedule as requiring fire protection ratings. Such doors and frames shall be constructed as tested in accordance with ASTM E 152, UL-10B or NFPA-252 and labeled by a recognized testing agency having a factory inspection service.
3. If any door or frame specified by the Architect to be fire-rated cannot qualify for appropriate labeling because of its design, hardware or any other reason, the Architect shall be so advised before fabricating work on that item is started.
4. Fabrication methods and product quality shall meet standards set by the Hollow Metal Manufacturers Association, HMMA, a Division of the National Association of Architectural Metal Manufacturers, NAAMM, as set forth in these specifications.
5. Job Site Door Check  
At the owner's option, a door at the job site shall be selected at random and sawed in half or otherwise taken apart as deemed necessary for verification that construction is in accordance with these specifications. The manufacturer shall include the cost of the replacement door in his quotation. If the door construction does not conform to these specifications the non-conforming doors shall be repaired or replaced at the manufacturer's expense.

## **1.07 SUBMITTALS**

### **A. Submittal Drawings**

1. Show door and frame elevations and sections.
2. Show listing of opening descriptions including locations, material thicknesses, and anchors.
3. Show location and details of all openings.
4. Indicate performance grade levels on the submittal as they are shown on the contract drawings and in the door schedule.

### **B. Samples (if required)**

1. Door: 1'-0" x 1'-0" (305 mm x 305 mm) corner section with hinge mortise and reinforcement showing internal construction.
2. Frame: 1'-0" x 1'-0" (305 mm x 305 mm) corner section showing welding of head to jamb. Include hinge mortise, reinforcement and plaster guard in one rabbet, and glazing stop applied as specified in the opposite rabbet. Glazing stop shall be applied in both head and jamb section to show corner joint.
3. All samples submitted shall be of the production type and shall represent in all respects the minimum quality of work to be furnished by the manufacturer. No work represented by the samples shall be fabricated until the samples are approved, and any downgrading of quality demonstrated by the samples can be cause for rejection of the work.

### **C. Test Report**

1. Manufacturer shall submit to the architect, ten (10) days prior to bid date, an independent testing laboratory report certifying that door and frame assemblies meet the performance requirements of Paragraph 1.05 and are constructed in accordance with Paragraphs 2.01 and 2.03 of these specifications.

### **D. Qualifications**

1. Manufacturer shall submit to the architect, ten (10) days prior to bid date, its qualifications as required by Paragraph 1.06.

## **1.09 WARRANTY**

All hollow metal work shall be warranted from defects in workmanship and quality for a period of one (1) year from shipment.

*Note: Extended warranties for up to ten (10) years can be obtained by the owner upon request.*

## PART 2 - PRODUCTS

### 2.01 DETENTION SECURITY HOLLOW METAL DOORS

#### A. Materials

1. Doors shall be manufactured of commercial quality, level, cold-rolled steel conforming to ASTM A 1008 / A1008M CS type B or hot-rolled, pickled and oiled steel conforming to ASTM A 1011 / A 1011M CS type B. The steel shall be free of scale, pitting, coil breaks, buckles, waves or other surface blemishes or defects.
2. Interior doors: Face sheets shall be [for Grades 3 and 4: 0.067 in. (1.7 mm)] [for Grades 1 and 2: 0.093 in. (2.3 mm)] minimum thickness.

*Note: For interior doors subject to corrosive conditions it is recommended that zinc coated steel face sheets, as specified in 2.01.A.3, be used.*

3. Exterior Doors: Face sheets shall be [for Grades 3 and 4: 0.067 in. (1.7 mm)] [for Grades 1 and 2: 0.093 in. (2.3 mm)] minimum thickness and shall have a zinc coating applied by the hot-dip process conforming to ASTM A 653/A 653M Commercial Steel (CS type B), coating designation A60 (ZF180).
4. For severely corrosive conditions and where specified for individual openings, either interior or exterior: Face sheets shall be [0.067 in. (1.7 mm)] [0.093 in. (2.3 mm)] minimum thickness. Face sheets and components shall be stainless steel conforming to ASTM A 666, Type [304] [316]. Steel stiffened construction methods and finishes for stainless steel doors shall comply with ANSI/NAAMM/HMMA 866.

*Note: If the Architect determines that zinc coated components for zinc coated face sheets and stainless steel components for stainless steel face sheets are needed in addition to galvanized or stainless steel face sheets, 2.01.A.3 and 2.01.A.4 are the appropriate locations to specify that requirement.*

#### B. Construction:

1. All doors shall be of the types and sizes shown on the approved submittal drawings, shall be constructed in accordance with the specifications and shall meet the performance requirements of Paragraph 1.05 where applicable. Alternate materials and methods of construction, which meet the aforementioned performance criteria, shall be permitted.

2. Door face sheets shall be joined at their vertical edges by a continuous tungsten inert gas (TIG) weld extending the full height of the door. This edge seam weld shall be sanded smooth and be neat in appearance. The door vertical edges shall not be covered with auto body putty or metallic fillers. The weld shall be visible to ensure a continuous weld.
3. Door thickness shall be 2 in. (50 mm) nominal to accommodate detention hardware. Doors shall be neat in appearance and free from warpage or buckle. Edge bends shall be true and straight and of minimum radius for the thickness of material used.
4. The door shall be stiffened by one of the following systems:
  - a. Continuous steel truss design core material, .015 in. (.4 mm) minimum, having truncated triangular roll formed sections extending continuously from one door face to the other, spot welded to each face sheet 2 ¾ in. (69.9 mm) oc horizontally and 3 in. (76.2 mm) oc vertically. Core material shall extend full height and width of door.
  - b. Rolled or formed 1/8 in. (3.2 mm) steel channels extending from top to bottom of door and continuous from one face to the other, spaced not more than 4 in. (101.6 mm) oc and spot welded to door faces not more than 3 in. (76.2 mm) oc vertically.
  - c. Continuous vertical hat sections, one such hat section welded to each face of the door, .053 in. (1.3 mm), with vertical webs no more than 4 in. (101.6 mm) apart. Hat sections shall be welded to each other at least 6 in. (152.4 mm) oc both sides in order to prevent separation.

Spaces between stiffeners shall be filled with fiberglass or mineral rockwool batt-type material.

5. The vertical edges shall be reinforced by a continuous steel channel extending the full height of the door and welded to both face sheets. The channels' thickness shall be not less than the thickness of the door face sheet. The top and bottom edges shall be closed with a continuous channel, the same thickness as the vertical edge channels and shall be spot-welded to the face sheet a maximum of 3 in. (76 mm) o.c. The closing end channel shall be continuously welded to the vertical reinforcing channel at all four corners producing a fully welded perimeter reinforcing channel.
6. The top and bottom end channel shall be fitted with an additional flush closing channel of the same material thickness. The flush closing channel shall be welded in place at the corners and at the center. Tops of exterior doors shall be made weather tight where specified.

7. Edge profiles shall be provided on both vertical edges of doors as follows:

Single acting doors - beveled 1/8 in. (3 mm) in 2 in. (50 mm) profile  
Sliding doors or equivalent - square profile

8. Hardware reinforcements:

a. Doors shall be mortised, reinforced, drilled and tapped at the factory for completely templated mortised hardware only, in accordance with the final approved hardware schedule and templates provided by the hardware supplier. Where surface mounted hardware - or non-templated mortised hardware - is to be applied, doors shall be reinforced, and all drilling and tapping shall be done by others in the field.

b. Minimum thicknesses for hardware reinforcements shall be as follows:

- Full mortise hinges and pivots 0.167 in. (4.2 mm)
- Surface applied maximum security hinges 0.214 in. (5.4 mm)
- Strikes 0.167 in. (4.2 mm)
- Slide device hanger attachment - per device manufacturer's recommendations
- Lock fronts, concealed holders, or surface mounted closer 0.093 in. (2.3 mm)
- All other surface applied hardware 0.093 in. (2.3 mm)

c. In cases where electrically operated hardware is required, and where shown on approved submittal drawings, hardware enclosures and junction boxes shall be provided and shall be interconnected using UL approved 0.5 in. (12 mm) minimum diameter conduit and connectors. Also, where shown on submittal drawings, junction boxes with access plates shall be provided to facilitate the proper installation of wiring. Access plates shall be the same thickness as the face sheet and fastened with a minimum of four (4) #8-32 tamper resistant machine screws, not to exceed 6 in. (152 mm) o.c.

9. Glass moldings and stops:

a. Where specified, doors shall be provided with steel moldings to secure glazing by others in accordance with glass sizes and thicknesses shown on approved submittal drawings.

b. Fixed glass molding shall be not less than 0.093 in. (2.3 mm), and shall be spot-welded to both face sheets 3.0 in. (76 mm) o.c. maximum.

- c. In glass openings where security glazing is specified and where shown on the approved submittal drawings, pressed steel angle glazing stops, no less than 0.093 in. (2.3 mm) thickness, shall be provided. Angle stops shall be mitered or notched and tight fitting at the corner joints, and secured in place using 1/4 - 20 or 1/4 - 28 button head tamper resistant machine screws with spacing necessary to satisfy the performance criteria outlined in Section 1.05.

*Note: It is recommended that view window stop heights be specified to provide 1 in. (25.4 mm) glass engagement.*

- d. Metal surfaces to which glazing stops are secured, and the inside of the glazing stops shall be treated for maximum paint adhesion and painted with a rust inhibitive primer prior to installation in the door, or shall be fabricated from A60 (ZF180) zinc coated steel per 2.01.A.3.
10. Louvers shall be of the welded inverted “Y” type construction providing free air delivery as specified. The louver opening shall be a flush opening fabricated using interior channels 0.093 in. (2.3 mm) minimum thickness, securely welded to the inside of both face sheets. A rectangular louver shall not exceed 18 in. (457 mm) in width without being reinforced at its midpoint by a vertical rectangular steel bar at least 0.25 in. x 1.50 in. (6.4 mm x 38 mm) or a vertical round steel bar at least 0.75 in. (19 mm) diameter. The vanes shall be not less than 0.093 in. (2.3 mm) thickness and shall be spaced so that no rigid flat instrument can be passed through them. Insect screens and flattened expanded metal not less than 0.093 in. (2.3 mm) thickness shall be provided on louvered doors in exterior locations where shown on approved submittal drawings. Louvers of other designs, which meet the security requirements, can be qualified for this application.
  11. Speaking devices shall consist of a rectangular pattern of round holes, no more than 0.25 in. (6.4 mm) dia., in both face sheets directly across from each other. The minimum size of the rectangular hole pattern shall be 1 in. (25 mm) high x 4 in. (102 mm) wide with holes spaced no more than 1 in. (25 mm) o.c. vertically and horizontally. The interior of the door between the rectangular hole patterns shall be baffled using pressed steel sections, not less than 0.042 in. (1.0 mm), so that no objects can be passed through.
  12. Food pass/cuff port openings:
    - a. The food pass opening shall be a flush opening fabricated using interior Zee shaped formed sections 0.093 in. (2.3 mm) minimum thickness, securely welded to the inside of both face sheets. The four corner seams shall be continuously arc welded and dressed smooth. The finished opening shall be of such construction that it cannot be dismantled or otherwise affected by tampering or scraping.
    - b. The food pass shutter door shall be constructed from 0.067 in. (3.1 mm) thickness steel, press formed, hollow metal flush assembly with a 0.167 (4.2mm) backup plate on the inmate side.

- c. The shutters shall be treated for maximum paint adhesion and given a shop coat of rust inhibitive primer. Shutters and food pass hardware shall be factory installed.

13. Product Identification: Doors shall have the Architect's mark number permanently stamped on the center hinge reinforcement for swing doors and on the horizontal Z of the window for sliding door types.

## **2.02 HOLLOW METAL PANELS**

- A. Hollow metal panels shall be made of the same materials and construction and finished in the same way as specified in Section 2.01 of this specification.

## **2.03 HOLLOW METAL FRAMES**

### **A. Materials**

1. Frames shall be constructed of commercial quality, cold rolled steel conforming to ASTM A 366 or hot rolled, pickled [dry or oiled] steel conforming to ASTM A 569. The steel shall be free of scale, pitting, coil breaks or other surface defects.
2. Interior openings: Steel shall be [for Grades 3 and 4, 0.067 in. (1.7 mm)] [for Grades 1 and 2, 0.093 in. (2.3 mm)] minimum thickness.

*Note: For interior areas subject to corrosive conditions it is recommended that zinc coated frames as specified in 2.03 A.3 be used.*

3. Exterior openings: Steel shall be [for Grades 3 and 4, 0.067 in. (1.7 mm)] [for Grades 1 and 2, 0.093 in. (2.3 mm)] minimum thickness and shall have a zinc coating applied by the hot-dip process conforming to ASTM A 653/A 653M Commercial Steel (CS), coating designation A60 (Z180).

### **B. Construction:**

1. All frames, with the exception of cased openings such as for sliding doors, shall have integral stops and be welded units of the sizes and types shown on approved submittal drawings. Frames shall be constructed in accordance with these specifications and meet performance criteria specified in Sections 1.06C through 1.06D where applicable. Alternate materials and methods of construction, which meet the aforementioned performance criteria, shall be permitted.
2. All finished work shall be neat in appearance, square, and free of defects, warps and buckles. Pressed steel members shall be straight and of uniform profile throughout their lengths.
3. Jamb, header and sill profiles shall be in accordance with the frame schedule and as shown on the approved submittal drawings.

4. Corner joints shall have all contact edges closed tight with faces mitered and stops either butted or mitered. Corner joints shall be continuously welded and the use of gussets or splice plates shall be unacceptable.
5. Minimum height of stops in door openings shall be 0.625 in. (16 mm). Height of stops on security glass or panel openings shall be as shown on approved submittal drawings. Cut-off stops, where shown, shall be capped at 45 degrees or 90 degrees at heights as shown on approved submittal drawings, and jamb joints below cut-off stops shall be tight fitting and welded, then finished as necessary to present a neat, flush appearance.
6. When shipping limitations so dictate, frames for large openings shall be fabricated in sections designated for splicing in the field by others. Where splicing is necessary, angle splices shall be installed at the corners of the profile, and shall extend at least 4 in. (102 mm) on either side of the joint. Splicing angles shall be the same gage thickness as the frame. Field splices shall be made in accordance with approved submittal drawings.
7. Frames for multiple openings shall have mullion members which, after fabrication, are closed tubular shapes conforming to profiles shown on approved submittal drawings. All joints between faces of abutted members shall be continuously welded and finished smooth. All joints between stops of abutted members shall be welded along the soffit and shall be left neat and uniform in appearance. The contractor responsible for installation shall provide for welding and finishing all field joints between faces of abutted members.
8. Hardware Reinforcements and Preparation:
  - a. Frames shall be mortised, reinforced, drilled and tapped for all templated mortised hardware only, in accordance with the final approved hardware schedule and templates provided by the hardware supplier. Where surface mounted hardware - anchor hinges, thrust pivots, pivot reinforced hinges, or non-templated mortised hardware - is to be applied, frames shall be reinforced, and all drilling and tapping shall be done by others in the field.
  - b. Minimum thickness of hardware reinforcing plates shall be as follows:
 

Hinges and pivots	0.167 in. x 1.5 in. x 10 in. length (4.2 mm x 38 mm x 254 mm)
Strikes	0.167 in. (4.2 mm)
Closers	0.167 in. (4.2 mm)
Flush bolts	0.167 in. (4.2 mm)
All other surface applied hardware - 0.093 in. (2.3 mm)	



- c. In cases where electrically operated hardware is required, and where shown on approved submittal drawings, hardware enclosures and junction boxes shall be provided, and shall be interconnected using UL approved 0.5 in. (12 mm) diameter minimum conduit and connectors. Also, where shown on submittal drawings, junction boxes with access plates shall be provided to facilitate the proper installation of wiring. Access plates shall be the same thickness as the frame and fastened with a minimum of four (4) #8-32 tamper resistant machine screws, not to exceed 6 in. (152 mm) o.c.

9. Floor Anchors:

- a. Floor anchors with two holes for fasteners shall be fastened inside jambs with at least four (4) spot welds, or MIG welded on both sides, per anchor.
- b. Where so scheduled, adjustable floor anchors, providing not less than 2 in. (50 mm) height adjustment, shall be fastened in place with at least four (4) spot-welds per anchor.
- c. Thickness of floor anchors shall be the same as frame.

10. Jamb Anchors:

a. Anchor Spacing

The number of anchors provided on each jamb shall be as follows:

Borrowed lite frames	2 anchors plus 1 for each 16 in. (406 mm) or fraction thereof over 36 in. (914 mm), spaced at 16 in. (406 mm) maximum between anchors
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Door frames	2 anchors plus 1 for each 16 in. (406 mm) or fraction thereof over 54 in. (1372 mm), spaced at 16 in. (406 mm) maximum between anchors (fire ratings can require additional anchors)
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b. Masonry Type

Frames for installation in masonry walls shall be provided with adjustable jamb anchors of the strap and stirrup type made from the same thickness steel as frame. Straps shall be 2 in. x 10 in. (50 mm x 254 mm) in size, corrugated and perforated.

c. Embedment Masonry Type

- 1. Frames for installation in prefinished masonry or concrete openings shall be provided with removable faces at the jambs, and 0.167 in. x 2 in. x 2 in. (4.2 mm x 50 mm x 50 mm) angle anchors 4 in. (102 mm) long spaced as described in Paragraph 2.03.B.10.a. The frame anchors shall be located to coincide with matching embedded anchors to be provided for installation in the wall.

2. Embedded wall anchors shall consist of a 0.167 in. (4.2 mm) x 4 in. (102 mm) wide x 6 in. (152 mm) plate with 0.167 in. x 2 in. x 2 in. (4.2 mm x 50 mm x 50 mm) angle anchors 4 in. (102 mm) long welded in place at locations to match angle anchors in frames. The embedded plate shall be provided with two (2) #4 re-bar wall anchors 10 in. (254 mm) long minimum, with 2 in. (51 mm) x 90 degree turn down on ends continuously welded in place, and spaced as described in Paragraph 2.03.B.10a. Embedments shall be prime painted in accordance with Paragraph 2.03.B.14.
  3. Angle anchors shall each be fastened to jamb and to embedded plate with two (2) 1 in. (25 mm) long arc welds at each end of the anchor. Anchors shall be shipped loose.
  4. The complete anchorage system shall provide that the jamb faces be removed from the frames in the field by the contractor responsible for installation, and the frames be moved into the opening until the frame anchors contact and match the embedded anchors. The contractor responsible for installation shall field weld all anchors and install the jamb faces in place. Embedment anchoring details shall be provided on approved submittal drawings.
- d. Expansion Bolt Type
1. Frames for installation in existing masonry or concrete walls shall be prepared for expansion bolt type anchors. The preparation shall consist of a punch and dimpled hole for a 0.5 in. (13 mm) diameter bolt and a .093 in. (2.3 mm) spacer from the unexposed surface of the frame to the wall. The spacer shall be welded to the frame and the preparation spaced as described in Paragraph 2.03.B.10.a.
  2. After sufficient tightening of the bolt, the bolt head shall be welded by the installation contractor so as to provide a non-removable condition. The welded bolt head shall be ground, dressed and finished smooth.
- e. Frames to be installed in pre-finished concrete, masonry or steel openings shall be constructed and provided with anchoring systems of suitable design as shown on the approved submittal drawings.
11. Grout guards shall be provided at all hardware preparations, glazing stop screws and silencer preparations on frames to be set in masonry or concrete openings. Grout guards shall be sufficient to protect preparations from grout of a 4 in. (102 mm) maximum slump consistency which is hand troweled in place. All hinge grout guards and lock pockets shall be caulked after priming to ensure maximum protection from grout seepage.

- a. Grout guards for glazing stop screws shall be factory installed and shall cover the exposed portion of the screws inside the frame throat, around the perimeter. Where mullions are required to be grouted, screws inside mullions shall be protected with grout guards.
  - b. Steel grout guards shall protect silencer preparations where accessible from the frame throat. Silencers shall be furnished and installed by the contractor responsible for frame installation except where limited access prevents installation of the metal grout guards in mullions, in which case silencers shall be factory furnished and installed.
12. All frames shall be provided with two (2) temporary steel spreaders welded to the bottom of the jambs to serve as bracing during shipping and handling. The installation contractor shall be responsible for removing, finishing, and touch-up of marks caused by spreader removal.
13. Removable glazing stops:
- a. In openings where security glazing is specified and where shown on the approved submittal drawings, pressed steel angle glazing stops, not less than 0.093 in. (2.3 mm), shall be provided. Angle stops shall be mitered or butted and tight fitting at the corner joints, and secured in place using machine screws of the size and spacing necessary to satisfy the performance criteria outlined in Section 1.06.D, spaced 2 in. (51 mm) maximum from each end and 8 in. (203 mm) o.c. maximum.

*Note: It is recommended that view window stop heights be specified to provide 1 in. (25.4 mm) glass engagement.*

- b. The frame underneath the glazing stops and the inside of the glazing stops shall be treated for maximum paint adhesion and painted with a rust inhibitive primer prior to installation in the frame.

## **2.04 MANUFACTURING TOLERANCES**

*Note: The manufacturer of the doors and frames is responsible only for the manufacturing tolerances listed in Section 2.04. The final clearances and relationships between door and frame depends on the setting of the frame and the hanging and adjustment of the door and hardware. (See Sections 3.02 and 3.03.)*

A. Manufacturing tolerance shall be maintained within the following limits:

1. Frames for single doors or pairs of doors:

- a. Width, measured between rabbets at the head: Nominal opening width + 1/16 in. (1.6 mm), - 1/32 in. (0.8 mm).
- b. Height (total length of jamb rabbet): Nominal opening height +/- 3/64 in. (1.2 mm).

2. Cross sectional profile dimensions (see Figure 8):

- a. Face +/- 1/32 in. (0.8 mm)
- b. Stop +/- 1/32 in. (0.8 mm)
- c. Rabbet +/- 1/32 in. (0.8 mm)
- d. Depth +/- 1/32 in. (0.8 mm)
- e. Throat +/- 1/16 in. (1.6 mm)

*Note: Frames overlapping walls to have throat dimension 1/8 in. (3.1 mm) greater than wall thickness to accommodate irregularities in wall construction.*

3. Flatness of large frames 1/8 in. (3.1 mm) in 10 ft. (3048 mm) of length or width

4. Doors – Doors are undersized to fit the frame. Edge clearances are based upon individual door manufacturer’s designs. Tolerance on actual door sizes are as follows:

- a. Width +/- 3/64 in. (1.2 mm)
- b. Height +/- 3/64 in. (1.2 mm)
- c. Thickness +/- 1/16 in. (1.5 mm)
- d. Bow/flatness +/- 1/8 in. (3.2 mm) in 7 ft. (2134 mm)

5. Hardware

- a. Cutout and template dimensions +/- 0.015 in. (0.38 mm) - 0 in.
- b. Location +/- 1/32 in. (0.8 mm)
- c. Between hinge centerlines +/- 1/64 in. (0.4 mm)

**2.05 HARDWARE LOCATIONS**

The location of hardware on doors and frames shall be as listed below. Note that all dimensions except the hinge locations are referenced from the finished floor as defined in Section 3.03.

A. Hinges:

- Top 7 in. (177.8 mm) from frame head to top of hinge
- Bottom 10 in. (254 mm) from floor to bottom of hinge
- Intermediate centered between top and bottom hinges

B. Locks and latches	38 in. (965 mm) to centerline of knob or lever shaft
C. Deadlocks	46 in. (1168 mm) to centerline of cylinder
D. Exit hardware	38 in. (965 mm) to centerline of cross bar or as shown on hardware template
E. Door pulls	42 in. (1066 mm) to centerline of grip
F. Push/pull bars	42 in. (1066 mm) to centerline of bar
G. Arm pulls	46 in. (1168 mm) to centerline
H. Push plates	46 in. (1168 mm) to centerline of plate
I. Intercoms	48 in. (1219 mm) to centerline of intercom push button

## 2.06 FINISH

After fabrication, all tool marks and surface imperfections shall be filled and sanded as required to make face sheets, vertical edges and weld joints free from irregularities. After appropriate metal preparation, all exposed surfaces of doors and frames shall receive a rust inhibitive primer which meets or exceeds ANSI A 250.10, "Test Procedures and Acceptance Criteria for Prime Painting Steel Surfaces for Steel Doors and Frames." For stainless steel finishes refer to ANSI/NAAMM/HMMA-866.

*Note: All primer and finish paint must be formulated for Direct to Metal (DTM) application.*

## PART 3 - EXECUTION

*Note to Architect: Proper storage and protection is essential to the proper performance of doors and frames. The requirements for proper storage are given in the following sections. However, it is important to recognize that proper storage is not the responsibility of the hollow metal manufacturer. For this reason, the requirements for storage and protection of detention hollow metal doors and frames shall be referenced in that section of the specifications where installation of work is specified. (Reference: HMMA 840 "Installation and Storage of Hollow Metal Doors and Frames".)*

### 3.01 SITE STORAGE AND PROTECTION OF MATERIALS

- A. The contractor responsible for installation shall remove wraps or covers from doors and frames upon delivery at the building site. The contractor responsible for installation shall ensure that any scratches or disfigurement caused in shipping or handling are promptly sanded smooth, cleaned and touched up with a compatible rust inhibitive Direct to Metal (DTM) primer.
- B. The contractor responsible for installation shall ensure that materials are properly stored on planks or dunnage in a dry location. Doors and frames shall be stored in a vertical position and spaced by blocking. Figure 9 illustrates recommended storage positioning. Materials shall be covered to protect them from damage but in such a manner as to permit air circulation.

### 3.02 INSTALLATION

*Note to Architect: Correct installation is essential to the proper performance of detention doors and frames. The requirements for proper installation are given in the following sections. However, it is important to recognize that installation is not the responsibility of the detention hollow metal manufacturer. For this reason, the requirements for installation of detention hollow metal doors and frames shall be referenced in that section of the specifications where installation of work is specified. It is the responsibility of the general contractor using experienced personnel to perform the work outlined in this section. (Reference: HMMA 840 "Installation and Storage of Hollow Metal Doors and Frames.")*

The Contractor responsible for installation shall perform the following:

- A. Prior to installation, all frames shall be checked for correct size and swing, and with temporary spreaders removed be corrected for squareness, alignment, twist and plumb. Permissible installation tolerances shall not exceed 1/16 in. (1.5 mm):

Squareness:	Measured at rabbet on a line from jamb, perpendicular to frame head.
Alignment:	Measured at jambs on a horizontal line parallel to the plane of the face.
Twist:	Measured at opposite face corners of jambs on parallel lines, perpendicular to the plane of the door rabbet.
Plumbness:	Measured at jambs on a perpendicular line from the head to the floor.

During the setting of the frames, check and maintain these tolerances for squareness, alignment, twist and plumbness.

The details in Figure 10 illustrate methods of measuring the above specified tolerances.

*Note: The tolerances above provide a reasonable guideline for proper installation of hollow metal frames. However, it should be noted that the cumulative affect of the installation tolerances at or near their maximum levels could result in sufficient misalignment which prevents the door from functioning properly. Installers should be careful not to create an installation tolerance buildup. Tolerance buildup occurs when several dimensions are at or near their maximum tolerance.*

- B. Frame jambs shall be fully grouted to provide added security protection against battering, wedging, spreading and other means of forcing open the door. Jamb mounted lock preparations, grout guards for hardware preparations and glazing stop screws, and junction boxes are intended to protect hardware mortises, exposed removable screws, and tapped mounting holes from masonry grout of 4 in. (102 mm) maximum slump consistency which is hand troweled in place. If a light consistency grout (greater than 4 in. (102 mm) slump in accordance with ASTM C 143 / C 143M) is to be used, special precautions shall be taken in the field by the installation contractor to protect tapped holes, electrical knock-outs, lock pockets, grout guards, junction boxes, etc. in the frames.

Large frame sections, such as lock columns and lock jambs, are not intended or designed to act as forms for grout or concrete. Grouting of large hollow metal sections shall be done in “lifts” or precautions shall otherwise be taken by the contractor to insure that frames are not deformed or damaged by the hydraulic forces that occur during this process.

*Note: The drawbacks and benefits associated with the use of water-based masonry grouts, with or without antifreeze agents, should be carefully weighed during the detailing and specification process. Plaster-based grouts should not be used under any circumstances. Please refer to NAAMM's HMMA Technical Note, “Grouting Hollow Metal Frames,” HMMA-820 TN01-03, included as Appendix 2 of this Guide Specification for further guidance.*

- C. Proper door clearances shall be maintained in accordance with 3.03 of these specifications, except for special conditions otherwise noted. Where necessary, metal hinge shims, furnished by the Contractor responsible for installation, are acceptable to maintain clearances.
- D. Hardware shall be applied in accordance with hardware manufacturer's templates and instructions.
- E. Any grout or other bonding material shall be cleaned off of frames or doors immediately following installation. Exposed hollow metal surfaces shall be kept free of grout, tar, or other bonding material or sealer.
- F. Exposed field welds shall be finished smooth and touched up with a rust inhibitive primer.
- G. Primed or painted surfaces which have been scratched or otherwise marred during installation, cleaning, and/or field welding, including marks caused by spreader removal, shall promptly be finished smooth, cleaned, treated for maximum paint adhesion and touched up with a rust inhibitive Direct to Metal (DTM) primer comparable to and compatible with the shop applied primer and finish paint specified in Section 09900. All touch-up primer and finish paint must be formulated for DTM application.

- H. Finish paint in accordance with Section 09900.
- I. Install door silencers.
- J. Install glazing materials in accordance with Section 08800.

### 3.03 CLEARANCES

- A. Edge clearances for swinging doors shall provide for the functional operation of the assembly and shall not exceed the following:
  - 1. Between doors and frames at head and jambs: 3/16 in. (4.7 mm)
  - 2. Between edges of pairs of doors: 3/16 in. (4.7 mm)
  - 3. At doorsills where a threshold is used: 3/8 in. (9.5 mm)
  - 4. At doorsills where no threshold is used: 3/4 in. (19.1 mm)
  - 5. Between door bottom and nominal surface of floor coverings at fire rated openings as provided in ANSI/NFPA 80, 1/2 in. (12.7 mm).
- B. Clearances for detention sliding doors shall be in accordance with the approved slider device drawings furnished as part of the approved hardware schedule.

*Note: Floor is defined as the top of the concrete slab or structural floor. Where resilient tile, hardwood or other floor coverings are used, undercuts must be increased in order to accommodate those floor coverings. The Architect must define the distance from the top of the floor/finished floor to the top of the floor covering so that appropriate undercuts can be provided (See Figure 11).*

*The final clearances and relationship between door and frame depend upon the setting of the frame and the hanging and adjusting of the door and hardware. If everything is perfect in the setting of the frame, and the manufacturing of the doors and frames, the clearances should be as shown in 3.03. However, if the frame is set to its maximum allowable tolerances, and the doors and frames are manufactured to their maximum allowable tolerances, the clearances could be greater.*

*All clearances are subject to change depending upon the requirements of the specified hardware.*

END OF SECTION