

SECTION 11190 – DETENTION AND COMMERCIAL HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.01 SUMMARY

This Section includes hollow metal detention security products as shown in the contract drawings.

1.02 PRODUCTS FURNISHED BUT NOT INSTALLED UNDER THIS SECTION

- A. Hollow metal detention security doors, swinging type with specified fire and/or bullet resistant ratings as shown in the door schedule. Sliding type doors shall be provided where indicated. Doors shall be of the types and sizes shown on the contract drawings and as specified herein.
- B. Hollow metal detention security frames with specified fire and/or bullet resistant ratings as shown in the door schedule. Frames shall be of the types and sizes shown on the contract drawings and as specified herein.
- C. Hollow metal detention security panels where shown, similar in construction to doors, including fire and/or bullet resistant ratings where specified in the door schedule.

1.03 RELATED PRODUCTS FURNISHED BY OTHERS BUT NOT SPECIFIED IN THIS SECTION

- A. Hardware
- B. Security Glass and Glazing
- C. Gaskets and Weatherstrips

1.04 RELATED SECTIONS

- A. Section 03300 - Cast in Place Concrete
- B. Section 03345 - Concrete Floor Finishing
- C. Section 03400 - Pre-cast Concrete
- D. Section 04200 - Masonry System
- E. Section 05120 - Structural Steel
- F. Section 09900 - Painting
- G. Section 11190 - Detention Locking Control Systems

1.05 REFERENCES

- A. ASTM A 653 / A 653M-06a, Standard Specification for Steel Sheet, Zinc-coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvanneal) by the Hot Dip Process.
- B. ASTM A 666-03 Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate and Flat Bar.
- C. ASTM A 1008 / A 1008M-07, Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability
- D. ASTM A 1011 / A 1011M-06b, Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability
- E. ASTM C 143 / C 143M-05a, Standard Test Method for Slump of Hydraulic Cement Concrete
- F. ASTM D 714-02e1, Standard Test Method for Evaluating Degree of Blistering of Paints
- G. ASTM D 1735-04, Standard Practice for Testing Water Resistance of Coatings Using Water Fog Apparatus
- H. ASTM F 1450-05, Standard Test Methods for Hollow Metal Swinging Door Assemblies for Detention Facilities

- I. ASTM F 1592-05, Standard Test Methods for Detention Hollow Metal Vision Systems
- J. ASTM F 1577-05, Standard Test Methods for Detention Locks for Swinging Doors
- K. ASTM F 1643-05, Standard Test Methods for Detention Sliding Door Locking Device Assembly
- L. ANSI A 250.10 – 1998, Standard Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames
- M. ANSI/NAAMM/HMMA 863-04, Guide Specifications for Detention Security Hollow Metal Doors and Frames
- N. ANSI/NAAMM/HMMA 840-99, Guide Specifications for Installation and Storage of Hollow Metal Doors and Frames
- O. ANSI/NAAMM/HMMA 801-05, Glossary of Terms for Hollow Metal Doors and Frames
- P. ANSI/NAAMM/HMMA 850-00, Fire-Rated Hollow Metal Doors and Frames, Third Edition
- Q. ANSI/NAAMM/HMMA 866-01, Guide Specifications for Stainless Steel Hollow Metal Doors and Frames
- R. ANSI/NFPA 80-07, Fire Doors and Windows
- S. ANSI/NFPA 252-03, Standard Methods of Fire Tests of Door Assemblies
- T. ANSI/NFPA 257-07, Methods for Fire Test Window Assemblies
- U. ANSI/UL 10 (B) 2001, Fire tests of door assemblies, 9th edition, 1997
- V. ANSI/UL 10 (C) 2001, Positive pressure fire tests of door assemblies, first edition, 1998
- W. ANSI/UL 752-00, Bullet - Resisting Equipment 10th Edition

ANSI American National Standards Institute, Inc.
 11 West 42nd Street
 13th Floor
 New York, NY 10036
 Telephone: 212/642-4900 www.ansi.org

ASTM American Society for Testing and Materials
 100 Barr Harbor Drive
 West Conshohocken, PA 19428-2959
 Telephone: 610/832-9585 www.astm.org

NAAMM National Association of Architectural Metal Manufacturers
 800 Roosevelt Rd.
 Bldg. C, Suite 312
 Glen Ellyn, IL 60137
 Telephone: 630/942-6591 www.naamm.org

NFPA National Fire Protection Association
 1 Batterymarch Park
 P.O. Box 9101
 Quincy, MA 02269
 Telephone: 617/770-3000 www.nfpa.org

UL Underwriters Laboratories
 333 Pfingsten Road
 Northbrook, Illinois 60062
 Telephone: 847/272-2020 www.ul.com

1.06 TESTING AND PERFORMANCE

- A. Load Testing of Doors and Door/Frame Assemblies Performance Grades for each individual opening shall be as indicated on the contract drawings and in the door schedule. Performance Test requirements for each opening shall be as indicated for individual grade number designations shown in Table 1.

Table 1: Security Grades and Test Load Requirements

| Grade No. | Recommended Door Face Sheet and Frame Thickness in. (mm) gage, minimum | Static Load Test B lbf. (N) | Rack Load Test C Lbf. (N) | Impact Test A Impact Energy - 200 ft. Lbf (271.2 J) | | | ASTM Reference Standards |
|-----------|--|-----------------------------|---------------------------|--|---------------|-----------------|--------------------------|
| | | | | Lock Impacts | Hinge Impacts | Glazing Impacts | |
| 1 | 0.093 (2.3) 12 | 14000 (62 272) | 7500 (33 360) | 600 | 200 | 100 | F1450, F1577, F1643 |
| 2 | 0.093 (2.3) 12 | 14000 (62 272) | 7500 (33 360) | 400 | 150 | 100 | F1450, F1577, F1643 |
| 3 | 0.067 (1.7) 14 | 11000 (48 939) | 5500 (24 470) | 200 | 75 | 100 | F1450, F1577 |
| 4 | 0.067 (1.7) 14 | 11000 (48 939) | 5500 (24 470) | 100 | 35 | 100 | F1450, F1577 |

1. Test Specimens

Test doors shall be 3 ft. 0 in. x 7 ft. 0 in. (914 mm x 2134 mm) constructed in accordance with section 2.01 herein, with 100 square inch vision panel, 4 in. (102 mm) x 25 in. (635 mm) clear opening, positioned generally as shown in ASTM F 1450, Figure 3. Test Frames shall be constructed in accordance with section 2.03 herein. Test doors and frames shall be prepared for hardware as specified in ASTM F 1450, Section 6 "Specimen Preparation".

2. Testing Procedures

a. Door Assembly Impact Test

Test doors and frames shall be furnished with hardware in accordance with ASTM F 1450 Section 6, "Specimen Preparation". Latch throw of the lock shall not exceed 1 in. (25.4 mm). Assemblies shall be tested in accordance with Table 1 herein and procedures outlined in ASTM F 1450, 7.2 "Door Assembly Impact Test".

b. Door Static Load Test

Doors shall be tested in accordance with Table 1 herein and procedures outlined in ASTM F 1450, 7.3 "Door Static Load Test".

c. Door Rack Test

Doors shall be tested in accordance with Table 1 herein and procedures outlined in ASTM F 1450, 7.4 "Door Rack Test".

d. Door Edge Crush Test

Doors shall be tested in accordance with Table 2 herein and procedures outlined in ASTM F 1450, 7.7 "Door Edge Crush Test".

3. Performance Criteria

Performance criteria for load testing of each grade indicated in Table 1, shall be in accordance with applicable paragraphs of ASTM 1450, Section 7 "Procedures".

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. (1270 mm) wide x 50 in. (1270 mm), shall be constructed in accordance with this specification, Section 2.03, and shall be impact tested in accordance with ASTM F1592, Sections 5, 6 and 7.2. The test assembly shall meet the acceptance criteria in Section 7.2 in order to qualify under this Section 1.06.
2. A single sidelight security hollow metal assembly, door dimensions 3 ft. 0 in. x 7 ft. 0 in. (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 this Section 1.06.

C. Bullet Resistance

Where specified for individual openings, bullet resistance shall be certified by an independent testing laboratory under the testing procedure described in UL Standard 752, and consistent with ASTM F 1450, Section 6, "Specimen Preparation" and Paragraph 7.1 "Bullet Penetration". The bullet resistance ratings shall comply with levels 1 through 8 in accordance with UL-752 as noted on the door schedule.

D. Test Reports

Reports and documentation of testing and performance shall be in accordance with ASTM F 1450, Section 9, "Report", and in accordance with ASTM F 1592, Section 8, "Certification and Reports". The manufacturer shall submit to the architect evidence of compliance with ASTM F 1450 and ASTM F 1592. All test reports shall be current within two (2) years and performed under the manufacturer's current organizational structure.

E. Prime Paint Performance

1. Sheet steel specimens, with the product manufacturer's production primer, replicating Finish "as shipped", shall be tested in accordance with ANSI A 250.10.
2. Performance shall meet the Acceptance Criteria described in ANSI A 250.10.
3. Test Reports or Certificates of Compliance shall include a description of the test specimens and procedures used in testing.

1.07 QUALITY ASSURANCE

Approval as a Qualified Manufacturer shall require, as a minimum, substantiation of the following requirements no less than ten (15) days prior to bid date: No substitutions will be allowed thereafter.

A. Manufacturer's Qualifications

1. Qualified manufacturers shall have personnel, plant equipment, and capacity capable of fabricating hollow metal door and frame assemblies of the types and quantities required for this project. These capabilities shall be substantiated by current documentation of number of employees, a current listing of production equipment, and production space.
2. Qualified manufacturers shall employ production welders qualified to weld material types, thicknesses, and joint types typical for the hollow metal doors and frames on this project. These qualifications shall

be substantiated by a copy of “Welders Certification” in accordance with AWS QC-3, D1.3, for employees performing welding operations on hollow metal for this project.

3. Qualified manufacturers shall have a minimum of ten (10) consecutive years of experience regularly and successfully producing hollow metal of the type required for this project. This experience shall be substantiated by a list of representative projects for which the manufacturer has supplied detention security hollow metal including dates of the project completion.
4. Qualified manufacturers shall have tested frame and door construction specified in sections 2.01 and 2.03 within the last two (2) years, in accordance with Section 1.06 “Testing and Performance” and successfully met the performance criteria of the same. This qualification shall be substantiated by an independent laboratory test report in accordance with Section 1.06 “Testing and Performance” as specified herein.
5. Qualified manufacturers shall present a copy of their “Certificate of Registration” certifying that the manufacturer’s Quality System is in conformance with, and functions as required under ISO-9001: 2000. The manufacturer’s registrar shall be a nationally recognized, independent and accredited registrar, which provides periodic factory followup surveillance audits assuring the manufacturer’s continuing compliance with their certified Quality System.
6. All security hollow metal doors and frames shall be produced by the same manufacturer. All fire and ballistics rated security hollow metal assemblies shall bear a UL or ITS label. The Detention Equipment Contractor (DEC), Hollow Metal Manufacturer, Hardware Manufacturer, Glazing Manufacturer/Vendor and the General Contractor shall all furnish within 24 hours prior to the time that proposals are submitted, affidavits from each certifying that hollow metal assemblies (glass, hardware, and hollow metal in assembly) shall be capable of bearing a UL or ITS label as called for on each fire and/or ballistics rated assembly. Said assemblies shall be capable of bearing additional certifications for temperature rise ratings and positive pressure ratings as required by the contract documents. The required affidavit forms are included as part of this specification (Pages 11190-22 through 25). Non-compliance will constitute grounds for rejection of any General Contractors proposal. After bidding and awards are completed, any requirements determined by the Architect to be necessary to meet the intent of this qualification shall be accomplished by the General Contractor & DEC at no cost to the owner. The DEC along with the hollow metal, hardware and glazing manufacturers will be held accountable for the assurance of this requirement.

B. Quality Criteria

1. All door and frame construction shall be in accordance with construction of assemblies that meet the requirements of Section 1.06 “Testing and Performance”.
 - a. The detention hollow metal manufacturer shall submit a notarized certificate stating that the construction, materials, and methods used are in accordance with these specifications and have been proven to meet performance standards described in Section 1.06 “Testing Performance”.
2. 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.
3. Fire rated 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 UL-10C or NFPA-252 and labeled by a recognized testing agency having a factory followup inspection service.
 - a. All stair well doors, all mezzanine level cell doors, and all mezzanine level exit doors shall be 1 ½ hour fire rated under UL-10 (C), and shall be additionally rated for 450 degree F. (232 degree C.) maximum temperature rise on the unexposed side for the first 30 min. of fire exposure. This requirement applies to both security and non-security doors.

C. On-site Testing and Inspection of Products

Upon direction of the Architect, the detention hollow metal manufacturer shall supply one (1) additional cell door and/or frame for the purpose of random on-site testing in accordance with the following:

1. One cell door shall be randomly selected from the job site and sawed in half or otherwise taken apart as necessary for verification that construction is in accordance with test report details.
 - a. Further, the door shall be cut apart at the edge seams, end channels, stiffeners, or other components as necessary to investigate the method and quality of welding. Welds at such locations shall be chiseled and/or pried apart to insure that weld fusion is such that the parent metal tears before the weld breaks loose. If more than 5% (1 out of 20) of the welds investigated fail, the doors will be condemned because of insufficient weld quality. If the doors are condemned, the hollow metal manufacturer shall replace or rework all doors to bring them into compliance, and shall be held responsible for any negative impact on the construction schedule.
2. One cell frame shall be randomly selected from the job site and cut apart at the corner joints to insure continuous welding at the joint, and cut apart at the mull joints to insure that welding methods comply with Section 2.03 of this specification.
 - a. Hinge reinforcements, strike reinforcements, or other components shall be chiseled or pried out of the frame to insure that weld fusion is such that the parent metal tears before the weld breaks loose. If more that 5% (1 out of 20) of the welds investigated fail, the frames will be condemned because of insufficient weld quality. If the frames are condemned, the hollow metal manufacturer shall replace or rework all frames to bring them into compliance, and shall be held responsible for any negative impact on the construction schedule.
3. If investigation of welds results in condemnation of materials, the manufacturer shall be allowed a 7 day maximum time period to begin rework or replacement. Rework or replacement shall be done in a manner not to incumber the project schedule.
4. If welds, methods and materials are judged to be satisfactory, the materials will be approved, and the destroyed materials will be replaced at no cost to the owner. The manufacturer shall be allowed a minimum of 2 weeks to fabricate and ship replacement materials.

1.08 SUBMITTALS

A. Submittal Drawings

1. Show door and frame elevations, sections and construction.
2. Show listing of opening descriptions including quantities, gages, locations, and anchors.
3. Identify materials on the submittal such that they may be referenced by markings used on the contract drawings.
4. Indicate Performance Grade levels on the submittal as they are shown on the contract drawings and in the door schedule.

B. Submit samples as follows, upon the request of the Architect:

1. Door: 1 ft. 0 in. x 1 ft. 0 in. (304 mm x 304 mm) corner section with hinge preparation showing top and internal construction.
2. Frame: 1 ft. 0 in. x 1 ft. 0 in. (304 mm x 304 mm) corner section showing weld joint of head to jamb. Include hinge mortise, reinforcement and mortar guard in one rabbet, and glazing stop

applied as specified in the opposite rabbet. Glazing stop shall be applied to 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 comparison with the samples may be cause for rejection of the work.
- C. Following the submittal of detention hollow metal drawings, a coordination and review meeting shall be held as directed by the Architect. The meeting shall be attended by representatives of the Architect, Contractor, hollow metal manufacturer, hardware supplier, and other related trades as necessary. The purpose of this meeting shall be to obtain approval of hollow metal and hardware submittals in order that production may begin. A three (3) day time frame shall be allocated for this meeting, and representatives shall be prepared to attend the full three days if necessary. Following approval, all revisions shall be made and field use drawings available for distribution within two weeks after the coordination meeting.
- D. Production of hollow metal shall begin not more than two weeks after final approved submittal drawings and hardware has been received by the manufacturer. Production shall be coordinated to provide for trailer load quantities to be delivered on a regular schedule such that the progress of the job is not delayed. Provisions shall be made by the responsible contractor for on site storage as necessary to prevent any delays in the hollow metal production schedule. A hollow metal delivery priority list shall be provided by the General Contractor and shall be used as a production guideline by the hollow metal manufacturer. The priority list shall be provided at the time of the coordination meeting. Upon changes in priority by the General Contractor, the manufacturer shall provide a revised delivery schedule.
- E. It shall be the direct responsibility of the manufacturer of both detention and commercial hollow metal to furnish to the General Contractor guaranteed clear opening sizes where glass and/or panels are indicated on the drawings within 2 weeks after the subject frames/doors have been detailed for production.

The “approved submittal drawings” and the “approved hardware schedules” are the versions that have been provided to the hollow metal manufacturer at the time of release for fabrication. These drawings and schedules are considered part of the project “contract documents.”

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.

1.10 ACCEPTABLE MANUFACTURERS

Habersham Metal Products, Co. – Cornelia, GA – Phone: 706.778.2212, Fax: 706.778.2769
Website: www.habershammetal.com

PART 2 - PRODUCTS

2.01 HOLLOW METAL DOORS

A. Materials

1. Doors shall be constructed of commercial quality, level, cold-rolled steel conforming to ASTM A1008 / A1008M or hot rolled, pickled and oiled steel conforming to ASTM A1011 / A1011M. The steel shall be free of scale, pitting, coil breaks or other surface blemishes. The steel shall also be free of buckles, waves or any other defects caused by the use of improperly leveled sheets.
2. Exterior Doors: Face sheets shall be 14 Ga., 0.067 in., 1.7 mm or 12 Ga., 0.093 in., 2.3 mm minimum thickness as indicated in the schedule, and shall have a zinc coating applied by the hot-dip process conforming to ASTM A 653/A 653M, Coating designation A60.

3. Interior Doors: Face sheets shall be 14 Ga., 0.067 in., 1.7 mm or 12 Ga., 0.093 in., 2.3 mm minimum thickness, as indicated in the schedule. Where scheduled, face sheets of interior doors shall have a zinc coating conforming to ASTM A 653/A 653M, Coating designation A60.
4. For severely corrosive conditions and where specified for individual openings either interior or exterior: Doors shall be 14 Ga., 0.067 in., 1.7 mm or 12 Ga., 0.093 in., 2.3 mm minimum thickness as indicated in the schedule, and shall be stainless steel meeting ASTM A 666, Type #304.

B. Construction:

1. All doors shall be of the types, sizes, and grades shown in the contract documents and on the approved submittal drawings. Doors shall be constructed in accordance with these specifications and as tested in accordance with the applicable performance requirements of Section 1.06.
2. Door thickness shall be 2 in. (51 mm) minimum. Doors shall be neat in appearance and free from warp and buckle. Edge bends shall be true and straight and of minimum radius for the material used.
3. Door face sheets shall be joined at their vertical edges by a continuous weld extending the full height of the door. After welding, edge seams shall be ground, filled and finished flush in order to completely conceal the seams. Edge seam continuous welding shall comply with the definitions in the Glossary of Terms for Hollow Metal Doors and Frames, ANSI/NAAMM/HMMA-801. See “weld, continuous” and “welded, continuously”.
4. Door face sheets shall be vertically stiffened by formed steel sections which are continuous and upon assembly, shall span the full thickness of the interior space between door faces. These stiffeners shall be 18 Ga., 0.042 in., 1.0 mm minimum thickness, spaced so that the vertical interior webs shall be no more than 4 in. (102 mm) apart and securely attached to both face sheets by spot welds spaced a maximum of 3 in. (76 mm) o.c. vertically. After assembly of the door, stiffeners shall be welded together, on both sides, over their entire length with tack welds or spot welds spaced 16 in. (406 mm) O.C. maximum. Spaces between stiffeners shall be filled with 6 lbs./cu.ft. density mineral rockwool batt-type material, minimum.
5. A continuous steel channel shall reinforce the vertical edges, not less than 10 Ga., 0.123, 3.1 mm thickness extending the full height of the door. Channel which is notched or broken at the hinge mortises shall not be acceptable. Non-continuous channel at the lock edge shall be acceptable only to accommodate hardware options. In such cases, hardware reinforcements shall be welded to the channel such that they become an integral part of the channel. The top and bottom edges shall be closed with a continuous channel not less than 10 Ga., 0.123, 3.1 mm thickness. The vertical channels shall be spot welded 3 in. (76 mm) o.c. The 10 Ga., 0.123, 3.1 mm closing end channel shall be spot welded to both face sheets 3 in. (76 mm) o.c. maximum and continuously welded to the vertical reinforcing channel at all four corners producing a fully welded perimeter reinforcing channel.
6. The end channels shall be fitted with an additional flush closing channel of not less than 12 Ga., 0.093 in., 2.3 mm thickness. The flush closing channel shall be welded in place at the corners with continuous welds and 1 in. (25.4 mm) long welds, 12 in. (304 mm) o.c. maximum along the length, on both sides. Installation of closing channel using screws, security or otherwise, shall be unacceptable. The end channel and flush closing channel shall be installed so they are permanent and non-removable.
7. Edge profiles shall be provided on both vertical edges of doors as follows:
 - Single acting doors - beveled 1/8 in. (3.2 mm) in 2 in. (51 mm) profile
 - Sliding doors or equivalent - square profile
8. Hardware reinforcements:
 - a. Doors shall be mortised, reinforced, drilled and tapped at the factory for fully templated mortised hardware only, in accordance with the final approved hardware schedule and templates provided by the hardware supplier. Where surface mounted - anchor hinges, thrust pivots, pivot reinforced hinges, 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 thickness of hardware reinforcements shall be as follows:
- Full mortise hinges and pivots - 7 Ga., 0.167 in., 4.2 mm
 - Surface applied maximum security door hinges – 0.240 in., 6.0 mm
 - Surface applied food pass hinges - 7 Ga., 0.167 in., 4.2 mm
 - Strike reinforcements - 7 Ga., 0.167 in., 4.2 mm
 - Reinforcements for slider device hanger attachment - per device manufacturer's recommendations
 - Reinforcements for lock fronts, concealed holders, or surface mounted closer - 12 Ga., 0.093 in., 2.3 mm
 - Internal reinforcements for all other surface applied hardware - 12 Ga., 0.093 in., 2.3 mm
- c. Hinge and pivot reinforcements shall consist of a press formed 7 Ga., 0.167 in., 4.2 mm angle which is projection welded in 6 places to the face of the door and additionally plug welded at each end to the opposite door face sheet forming a rigid structural angle reinforcement at each hinge. All reinforcements for mortised hardware occurring in the door edge shall be securely welded to both face sheets of the door. Flat or offset hinge reinforcements welded to the inside edge of the door or to perimeter edge channel which has been notched or cut to accommodate hinge mortise shall be unacceptable.
- d. Door Mounted Mechanical Lock Preparations
1. Doors requiring mechanical pocket type locks shall be prepared using a unitized pocket preparation which after fabrication, forms a one-piece box. The lock box shall provide for the lock mounting plate to be recessed into the door such that, when secured in place, the outside surface of the mounting plate is flush with the surface of the door face sheet. The unitized lock box shall be 10 Ga., 0.123 in., 3.1 mm, and drilled and tapped to receive the lock mounting plate. Before assembly of the door, the lock preparation shall be spot welded inside the door face sheet with a minimum of 6 spotwelds.
 2. The front two corners of the lock box shall be welded to the perimeter edge channel thereby becoming an integral part of the internal frame work of the door. A 22 in. (558 mm) long minimum, 10 Ga., 0.123 in., 3.1 mm channel shall be positioned vertically and adjacent to the rear edge of the lock box, then spot welded to the inside of the face sheet. Providing the location of other options allow, the reinforcing channel shall be located such that equal lengths extend above and below the lock box. The back corners of the lock box shall be welded to the reinforcing channel.
 3. After assembly of the door, the back of the lock box shall be spotwelded, six places evenly spaced, to its matching door face sheet. The finished preparation shall be such that the 10 Ga., 0.123 in., 3.1 mm lock box completely surrounds the lock and is securely welded to both face sheets, the reinforcement channel, and the perimeter edge channel.
- e. Where electrically operated hardware is required, and as shown on approved submittal drawings, hardware enclosures and junction boxes for doors shall be provided and shall be interconnected using U.L. approved ½ in. (13 mm) conduit, elbows, and connectors. Also, where shown on approved submittal drawings, junction boxes with access plates shall be provided to facilitate the proper installation of wiring. Access plates shall be the same gage as the door and fastened with a minimum of four 8-32 torx drive tamper resistant 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 provided by the contractor and shown on approved submittal drawings.
 - b. Fixed glazing molding shall be not less than 12 Ga., 0.093 in., 2.3 mm, and shall be spot welded to both face sheets 3 in. (76 mm) o.c. maximum.
 - c. Removable glazing stop in detention hollow metal doors shall be pressed steel angle, not less than 10 Ga., 0.123 in., 3.1 mm thickness. Angle stops shall be notched and tight fitting at the corner joints, and secured in place using 1/4-20, SAE grade #8, button head, tamper resistant screws, spaced 6 in. (152 mm) o.c. maximum. Glazing stops and screws shall satisfy the performance criteria outlined in Section 1.06.B.
 - d. Where glass thickness dictates, 12 Ga., 0.093 in., 2.3 mm offset surface mounted glazing stop shall be used. The corners shall be tight fitting, welded and ground smooth. The glass stop shall be secured to the face of the door using 1/4-20, SAE grade #8, button head, tamper resistant screws, spaced 6 in. (152 mm) o.c. maximum.
 - e. The metal surfaces to which glazing stops are secured and the inside of the glazing stops shall be chemically treated for maximum paint adhesion and painted with a rust inhibitive primer prior to installation in the door.
10. Louvers shall be of the welded inverted “V” type construction providing free air delivery as specified. A rectangular louver shall not exceed 18 in. (457 mm) in width without being reinforced at its midpoint by a vertical steel bar not less than 3/4 in. (19 mm) in diameter. The inverted “V” type vanes shall be not less than 12 Ga., 0.093 in., 2.3 mm and shall be spaced so that no rigid flat instrument can be passed through them. Insect screens and/or flattened expanded metal not less than 12 Ga., 0.093 in., 2.3 mm shall be provided on louvered doors in exterior locations where shown on approved submittal drawings.
11. Speaking devices shall consist of a rectangular pattern of round holes, no more than 1/4 in. (6.3 mm) diameter, in both face sheets directly across from each other. The minimum size of the rectangular hole pattern shall be 1 in. (25.4 mm) high x 4 in. (102 mm) wide with a minimum of two rows of holes spaced no more than 1 in. (25.4 mm) o.c. The interior of the door between the rectangular hole patterns shall be baffled using pressed steel sections, not less than 14 Ga., 0.067 in., 1.7 mm, so that no objects can be passed through.
12. Food pass openings:
 - a. The food pass opening shall be a flush opening fabricated using interior channels, 12 Ga., 0.093 in., 2.3 mm thickness, securely welded to the inside of both face sheets. The four corner seams shall be continuously welded from the interior side. 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 shall be constructed from two 10 Ga., 0.123, 3.1 mm steel plates spot welded together to produce an inset fit that, when closed, will prevent tampering with the lock and hinges.
 - c. The shutters shall be treated for maximum paint adhesion and given a shop coat of rust inhibitive primer. Shutters shall be shipped loose for installation in the field by others.
13. Stainless steel doors and panels shall be manufactured using fabrication and finishing methods outlined in ANSI/NAAMM/HMMA-866, for “moderately corrosive” conditions (P. 2.01.A.3 Note), and using “steel stiffened” construction (P. 2.01.B.4.a). Stainless steel doors and panels shall also be manufactured using the same fabrication methods and material thicknesses outlined in ANSI/NAAMM/HMMA-863 and in this specification, for the security grade levels specified for the individual openings.

2.02 HOLLOW METAL PANELS

- A. Hollow metal panels shall be of the same materials, construction, and finish as specified for detention hollow metal doors.

2.03 HOLLOW METAL FRAMES

A. Materials

1. Frames shall be constructed of commercial quality, cold rolled steel conforming to ASTM A 366/A 366M or hot rolled, pickled and oiled steel conforming to ASTM A 569/A 569M. The steel shall be free of scale, pitting, coil breaks or other surface defects.
2. Exterior openings: Steel for these openings shall be 12 Ga., 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, Coating designation A60.
3. Interior openings: Steel for these openings shall be 12 Ga., 0.093 in., 2.3 mm minimum thickness. Where scheduled, interior frames shall have a zinc coating conforming to ASTM A 653/A 653M, Coating designation A60.
4. For severely corrosive conditions and where specified for individual openings either interior or exterior: frames shall be 14 Ga., 0.067 in., 1.7 mm or 12 Ga., 0.093 in., 2.3 mm minimum thickness as indicated in the schedule, and shall be stainless steel meeting ASTM A 666, Type #304.

B. Construction:

1. All frames shall have integral stops and be welded units of the sizes and types shown in the contract documents and on the approved submittal drawings. Frames shall be constructed in accordance with these specifications and as tested in accordance with applicable performance criteria specified in Section 1.06.
2. All finished work shall be neat in appearance, square, and free of defects, warp or buckle. Pressed steel members shall be straight and of uniform profile throughout their lengths.
3. Jamb, header, mullion and sill profiles shall be in accordance with the contract drawings and as shown on the approved submittal drawings.
4. Corner joints shall have all contact edges closed tight with faces mitered and stops butted. Corner joints shall be continuously welded and faces finished smooth. The use of gussets or splice plates shall not be acceptable.
5. Minimum height of stops in door openings shall be 5/8 in. (15.8 mm). Height of stops in security glass or panel openings shall be as shown on approved submittal drawings. Cut-off (sanitary type) stops, where scheduled, shall be capped as detailed on the contract drawings at the heights shown. Meeting edges of jambs below cut-off stops shall be free of burrs and tightly joined to form a smooth hairline joint. Welds shall be concealed.
6. Frames for multiple openings shall have mullion members which, after fabrication, are closed tubular shapes conforming to profiles shown on approved submittal drawings, and having no visible seams or joints. 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 height of the stop and shall be left neat and uniform in appearance.
7. When shipping limitations dictate, frames for large openings shall be fabricated in sections designed for assembly in the field by others. Alignment plates or angles shall be installed at the corners of the profile, and shall extend at least 4 in. (102 mm) on either side of the joint. Such components shall be the same gage as the frame. Field joints shall be made in accordance with the approved submittal drawings. The contractor responsible for installation shall provide for welding and finishing all field joints between faces of abutted members.

8. Hardware Reinforcement 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:

Hinge and pivot reinforcements - 7 Ga., 0.167 in., 4.2 mm x 1-1/2 in. (38 mm) x 10 in. (254 mm) long

Surface applied maximum security door hinges – 0.240 in., 6.0 mm

Strike reinforcements - 7 Ga., 0.167 in., 4.2 mm

Closer reinforcements - 7 Ga., 0.167 in., 4.2 mm

Flush bolt reinforcements - 7 Ga., 0.167 in., 4.2 mm

Reinforcements for surface applied hardware - 12 Ga., 0.093 in., 2.3 mm

- c. Hinge and pivot reinforcements shall consist of 7 Ga., 0.167 in., 4.2 mm x 1-1/2 in. (38 mm) x 10 in. (254 mm) long straps spot welded in three places in a triangular pattern at each end for a total of six welds per hinge. All hinge reinforcements shall be additionally reinforced by a 7 Ga., 0.167 in., 4.2 mm x 1-1/2 in. (38 mm) wide angle welded in two places to the strap reinforcement and two places to the inside face of the frame to prevent possible twisting and deformation of the reinforcement while in use. Tapped holes in reinforcements shall be protected by a 26 Ga., 0.016 in., 0.4 mm minimum thickness grout guard which is welded in place and made grout tight.

- d. Jamb Mounted Detention Lock Preparations

1. Frames requiring jamb mounted detention locks shall be prepared with a wide face lock jamb to accept a unitized pocket which consists of a lock box fabricated from one piece of 10 Ga., 0.123 in., 3.1 mm steel. The box preparation shall be punched for keying options and conduit fittings as required. The box shall be drilled and tapped to receive a 10 Ga., 0.123 in., 3.1 mm lock preparation cover plate furnished by the hollow metal manufacturer. The cover plate shall be furnished installed with (8) 1/4 - 20 torx drive flat head security screws.
2. The box preparations shall be furnished with factory installed threaded studs of size and location to accommodate lock mounting. The manufacturer shall furnish lock nuts installed or shipped separately, at the option of the manufacturer.
3. Where hardware requirements allow, the box preparation shall be fabricated and mounted such that the cover plate is recessed and flush with the outside face of the frame. The frame rabbet is to be cut only to allow passage of the latch bolt and deadlock actuator, providing a lock preparation which prevents the lock front and case from being exposed.
4. Frames prepared to accept locks keyed on both sides shall be provided with a keywell 5 in. (127 mm) wide x 5 in. (127 mm) high of the depth required, in order to allow access to the cylinder opposite the cover plate side. The keywell shall be welded to the back of the lock box at the four corners and inside the frame face at the four corners. Welds shall be 1/2 in. (13 mm) long. The 5 in. (127 mm) square opening in the frame face shall be deburred and dressed smooth.

- e. Jamb Mounted Narrow-line (Mortised) Lock Preparations

1. Preparation for locks mortised in jambs having a narrow face dimension shall provide for support of the lock on three sides by the lock reinforcement.

2. The reinforcement shall be fabricated and installed in the frame such that rotation or twist of the lock under impact conditions is minimized thus enhancing the impact resistance of the assembly.
 3. The lock reinforcement shall be 10 Ga., 0.123 in., 3.1 mm minimum thickness and shall be welded inside the frame face and inside the frame rabbet. Lock mounting tabs shall be an integral part of the lock reinforcement. The lock reinforcement shall be punched as required to accommodate keying options.
 4. The lock preparation and reinforcement shall be covered with a grout guard which shall provide for protection from grout of a 4" maximum slump consistency which is hand troweled in place. Grout guards shall be prepared with conduit fittings where required for field connections.
- f. In cases where electrically operated hardware is required, and as shown on approved submittal drawings, hardware enclosures and junction boxes for frames shall be provided, and shall be interconnected using UL approved ¾ in. (19 mm) EMT conduit, elbows, 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 gage as the frame and fastened with a minimum of four 8-32 torx drive tamper resistant screws, not to exceed 6" o.c.
 - g. Conduit runs around frame section joints shall be ¾ in. (19 mm) U.L. approved EMT to facilitate unrestricted wire feed. Where meeting sections permit, conduit shall be bent at a 2 in. (51 mm) minimum radius at turns, and shall provide minimum radius and cross sectional area equivalent to ½ in. (13 mm) EMT at every point along the turn. Where narrow profiles prevent bending conduit, turns shall be fabricated using 90-degree sweep elbows. Short 90-degree elbows are permitted only at entrances to junction boxes, which allow adequate hand access and not in conduit runs. Conduit fittings shall be U.L. approved and either compression type or a combination of compression and threaded type.
9. Grout guards shall be provided at all hardware preparations, glazing stop screws and silencer preparations. Grout guards shall be sufficient to protect preparations from grout of a 4 in. (102 mm) maximum slump consistency, which is hand troweled into place.
 - a. Grout guards for glazing screws shall be tight fitting plastic caps covering 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 steel grout guards welded in place.
 - b. Silencer preparations shall be protected by steel grout guards where accessible from the frame throat. Where limited access prevents installation of metal grout guards in mullions, silencers shall be factory furnished and installed.

10. Floor Anchors:

- a. Floor anchors provided with two holes for fasteners shall be secured inside jambs with four (4) spot welds per anchor minimum.
- b. Where scheduled, adjustable floor anchors, providing not less than 2 in. (51 mm) height adjustment, shall be secured inside jambs with four (4) spot welds per anchor minimum.
- c. Material thickness of floor anchors shall be the same as frame.

11. Jamb Anchors:

- a. Frames for installation in masonry walls shall be provided with adjustable jamb anchors of the strap and stirrup type made from the same gage steel as the frame. Straps shall be not less than 2 in. (51 mm) x 10 in. (254 mm) in size and perforated. The number of anchors provided on each jamb shall be as follows:

Borrowed lite frames.....2 anchors plus 1 for each 18 in. (457 mm) or fraction thereof over 3 ft. 0 in. (914 mm), spaced at 18 in. (457 mm) maximum between anchors

Door frames.....2 anchors plus 1 for each 18 in. (457 mm) or fraction thereof over 4 ft. 6 in. (1372 mm), spaced at 18 in. (457 mm) maximum between anchors (fire ratings may require additional anchors)

b. Embedment Masonry Type

1. Frames for installation in pre-finished masonry or concrete openings shall be provided with removable faces at the jambs, and 7 Ga., 0.167 in., 4.2 mm x 2 in. (51 mm) x 2 in. (51 mm) angle anchors 4 in. (102 mm) long spaced as described in Paragraph 2.02B.11.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 7 Ga., 0.167 in., 4.2 mm x 2 in. (51 mm) x 2 in. (51 mm) angle anchors 4 in. (102 mm) long welded in place at locations to match angle anchors in frames. The embed plate shall be provided with two #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.11.a. Embedments shall be prime painted in accordance with Paragraph 2.06.
3. Angle anchors shall each be secured to jamb and to embed plate with two 1 in. (25.4 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.

c. 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 countersunk hole for a 3/8 in. (9.5 mm) diameter bolt and a 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.11.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.
 - d. 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.
12. Frames indicated to be installed in prefinished openings and required to have jambs grouted shall be provided with grout holes at each jamb to allow for grouting after installation.
- a. Grout holes shall consist of a 1-1/4 in. (32 mm) square hole in the face of each jamb at the top of the frame. The square hole shall be backed up by a plate with a 1-1/4 in. (32 mm) round hole to allow for grouting. Frames shall be furnished with plugs to be installed by the responsible contractor after grouting. Plugs shall be welded in place and finished smooth.
 - b. Precautions shall be taken by the installation contractor to protect all frame preparations from grout leakage resulting from the use of a light consistency grout (greater than a 4 in. (102 mm) slump).
13. All frames shall be provided with two temporary steel spreaders welded to the bottom of the jambs to serve as bracing during shipping and handling. Spreaders shall be removed prior to installation.

14. Removable glazing stops:

- a. Removable glazing stop in detention hollow metal frames shall be pressed steel angle, not less than 10 Ga., 0.123 in., 3.1 mm thickness. Angle stops shall be notched and tight fitting at the corner joints, and secured in place using 1/4-20, SAE grade #8, button head, tamper resistant screws, spaced 6 in. (152 mm) o.c. maximum. Glazing stops and screws shall satisfy the performance criteria outlined in Section 1.06.B.
- b. The metal surfaces to which glazing stops are secured and the inside of the glazing stops shall be chemically treated for maximum paint adhesion and painted with a rust inhibitive primer prior to installation in the frame.

15. Stainless steel frames shall be manufactured using fabrication and finishing methods outlined in ANSI/NAAMM/HMMA-866, for “highly corrosive” conditions (P.2.03.A.3-Note). Stainless steel frames shall also be manufactured using the same fabrication methods and material thicknesses outlined in ANSI/NAAMM/HMMA-863, and in this specification, for the grade levels specified for individual openings.

PART 3 – COMMERCIAL PRODUCTS

3.01 COMMERCIAL HOLLOW METAL DOORS

A. Materials

1. Doors shall be made of commercial quality, level, cold-rolled steel conforming to ASTM A 1008 / A 1008M-04b, or hot-rolled, pickled and oiled steel conforming to ASTM A 1011 / A 1011M-04a. The steel shall be free of scale, pitting, coil breaks or other surface blemishes. It shall be free of buckles, waves or other defects caused by the use of improperly leveled sheets.
2. Interior doors: Face sheets shall be 16 Ga., 0.053 in. (1.3 mm) minimum thickness.
Note: For interior areas subject to corrosive conditions it is recommended that zinc coated face sheets as specified in 2.01.A.3 be used.
3. Exterior Doors: Face sheets shall be 16 Ga., 0.053 in. (1.3 mm) minimum thickness and shall have a zinc coating applied by the hot-dip process conforming to ASTM A 653/A 653M Coating Designation A60 (ZF180) or G60 (Z180).

B. Construction

1. Doors shall be the types, sizes, and construction in accordance with the contract documents, and shall meet the performance requirements of Section 1.05.
2. Door face sheets shall be joined at their vertical edges by a continuous weld extending the full height of the door with no visible seams on their faces or vertical edges.
Note: See “welded, continuously” in the Glossary of Terms for Hollow Metal Doors and Frames, ANSI/NAAMM HMMA 801.
3. Door thickness shall be 1 3/4 in. (44 mm) nominal. 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 metal used.
4. The door shall be stiffened by continuous vertically formed steel sections which, upon assembly, shall span the full thickness of the interior space between door faces. These stiffeners shall be 22 Ga., 0.026 in. (0.6 mm) minimum thickness, spaced so that the vertical interior webs shall be no more than 6 in. (152 mm) apart and securely fastened to both face sheets by spot welds spaced a maximum of 5 in. (127 mm) o. c. vertically. Spaces between stiffeners shall be filled with fiberglass or mineral rock wool batt-type material.
5. The top and bottom edges shall be closed with a continuous channel, not less than 16 Ga., 0.053 in. (1.3 mm) thickness, spot welded to both face sheets.
6. Exterior doors shall be closed flush at the top edge. Where required for attachment for weatherstripping, a flush closure channel shall also be provided at the bottom edge. Openings shall be provided in the bottom closure channel of exterior doors to permit the escape of entrapped moisture.
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. (50.8 mm) profile
 - Double acting doors - rounded on 2-1/8 in. (54 mm) radius
8. Hardware reinforcements:
- a. Doors shall be mortised, reinforced, drilled and tapped at the factory for 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 apply, doors shall be reinforced, with drilling and tapping done by others in the field.
 - b. Minimum thickness for hardware reinforcements shall be as follows:
 - Full mortise hinges and pivots 7 Ga., 0.167 in. (4.2 mm)
 - Reinforcements for lock fronts, concealed holders, or surface mounted closers 12 Ga., 0.093 in. (2.3 mm)
 - Internal reinforcements for other surface applied hardware 14 Ga., 0.067 in. (1.7 mm)
 - c. In cases where electrically operated hardware is required, and indicated on architectural door schedule, conduit, hardware enclosures and/or junction boxes within the door shall be provided. Access plates, where required, shall be the same thickness as the door face sheet and shall be fastened with a minimum of four (4) #8-32 machine screws or #6 sheet metal screws at a spacing not to exceed 12 in. (305 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 welded to the secure side.
 - c. Removable glass stops shall be channel shaped not less than 20 Ga., 0.032 in. (0.8 mm) thickness with tight fitting butt or mitered corner joints, and secured with #6 zinc coated countersunk sheet metal screws.
 - d. The metal surfaces to which glazing stops are secured and the inside of the glazing stops shall be chemically treated for maximum paint adhesion and painted with a rust inhibitive primer prior to installation in the door.
10. Louvers shall be of the welded inverted V type or Y type construction. The inverted V and Y type vanes shall be not less than 18 Ga., 0.042 in. (1.0 mm) thickness. Insect screens and/or bird screens shall be provided on louvered doors in exterior locations where shown on contract documents.
11. Stainless steel detention doors and panels shall be manufactured using fabrication and finishing methods outlined in ANSI/NAAMM/HMMA-866, for “moderately corrosive” conditions (P. 2.01.A.3 Note), and using “steel stiffened” construction (P. 2.01.B.4.a).

3.02 COMMERCIAL 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 3.01 of this specification.

3.03 COMMERCIAL HOLLOW METAL FRAMES

Note: Provisions of Section 2.03 are applicable to frames, transom frames, sidelights, and window assemblies.

- A. Materials
 1. Frames shall be constructed of commercial quality, cold rolled steel conforming to ASTM A 366/A 366M or hot-rolled, pickled and oiled steel conforming to ASTM A 569/A 569M, the steel shall be free of scale, pitting, coilbreaks or other surface defects.
 2. Interior openings: For door openings 4'-0" (1219 mm) or less in width and for window frames, steel shall be 16 Ga., 0.053 in. (1.3 mm) minimum thickness. For door openings greater than 4'-0" (1219 mm) in width, steel shall be 14 Ga., 0.067 in. (1.7 mm) minimum thickness.

Note: For interior areas subject to corrosive conditions it is recommended that zinc coated frames as specified in 3.03.A.3 be used.

3. Exterior openings: Openings shall have a zinc coating applied by the hot-dip process conforming to ASTM A653/A653M Coating Designation A60 (ZF180) or G60 (Z180). For door openings 4'-0" (1219 mm) or less in width and for window frames, steel shall be 16 Ga., 0.053 in. (1.3 mm) minimum thickness. For door openings greater than 4'-0" (1219 mm) in width, steel shall be 14 Ga., 0.067 in. (1.7 mm) minimum thickness.

B. Construction

1. Frames 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 Section 1.05. Knock down frames are not acceptable.
2. 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, mullion and sill profiles shall be in accordance with the frame schedule and as shown on the approved submittal drawings.
4. Corner joints shall have contact edges closed tight with faces mitered and stops either butted or mitered. Faces and soffits shall be continuously welded (see Figure 1) and the faces finished smooth. The use of gussets or splice plates as a substitute for welding shall not be acceptable.
5. Other face joints shall be continuously welded and smoothly finished.

Note: See NAAMM HMMA 820 "Hollow Metal Frames" page 6 for further details on frame welding.

6. Minimum depth of stops shall be 5/8 in. (15.8 mm). Cut-off stops, where shown, shall be capped at heights as shown on approved submittal drawings, and jamb joints below cut-off stops shall be welded, filled and ground smooth so that there are no visible seams.

Note: It is recommended that cut off stops not be used at exterior, lead lined, or gasketed openings.

7. When shipping limitations so dictate, frames for large openings shall be fabricated in sections designated for assembly in the field by others. Alignment plates or angles shall be installed at each joint. Such components shall be the same thickness as the frame. Field joints shall be made in accordance with approved submittal drawings and shall be field welded by others.

8. Hardware Reinforcements:

- a. Frames shall be mortised, reinforced, drilled and tapped at the factory for 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 apply, frames shall be reinforced, with drilling and tapping done by others in the field.
- b. Minimum thickness of hardware reinforcing plates shall be as follows:
 - Hinge and pivot reinforcement 7 Ga., 0.167 in. x 1.25 in. x 10 in. length (4.2 mm x 31.7 mm x 254 mm)
 - Strike reinforcements..... 12 Ga., 0.093 in. (2.3 mm)
 - Closer reinforcements..... 12 Ga., 0.093 in. (2.3 mm)
 - Flush bolt reinforcements 12 Ga., 0.093 in. (2.3 mm)
 - Reinforcements for surface applied hardware 12 Ga., 0.093 in. (2.3 mm)
 - Reinforcements for hold open arms..... 12 Ga., 0.093 in. (2.3 mm)
 - Reinforcements for surface panic devices 12 Ga., 0.093 in. (2.3 mm)

9. Floor anchors:

- a. Where applicable, floor anchors shall be provided with two holes for fasteners and shall be fastened inside jambs with at least four (4) spot welds per anchor.
- b. Where so scheduled, adjustable floor anchors, providing no less than 2 in. (50.8 mm) height adjustment, shall be fastened in place with at least four (4) spot welds per anchor.
- c. Thickness of floor anchors shall be a minimum of 16 Ga., 0.053 in. (1.3 mm).

10. Jamb Anchors

a. Masonry Type

Frames for installation in masonry walls shall be provided with adjustable jamb anchors of the strap and stirrup or T-strap type not less than 16 Ga., 0.053 in. (1.3 mm) thickness, or wire type not less than 0.156 in. (4 mm) in diameter. Straps shall be no less than 2 in. x 10 in. (50 mm x 254 mm) in size, corrugated and/or perforated. Anchors shall be placed not greater than 18 in. (457 mm) from top and bottom of openings. The minimum number of anchors spaced at maximum of 32 in. (813 mm) o.c. provided on each jamb based on frame opening height shall be as follows:

- up to 60 in. (1524 mm) 2 anchors
- greater than 60 in. (1524 mm) up to 90 in. (2286 mm) 3 anchors
- greater than 90 in. (2286 mm) up to 96 in. (2438mm) 4 anchors
- greater than 96 in. (2438 mm) 4 anchors plus 1 for each 24 in. (610 mm) or fraction thereof over 96 in. (2438 mm), spaced at 24 in. (610 mm) maximum between anchors

b. Dry Wall Type

Frames for installation in stud partitions shall be provided with steel anchors of suitable design, not less than 18 Ga., 0.042 in. (1.0 mm) thickness, securely welded inside each jamb. Anchors shall be placed not greater than 18 in. (457 mm) from top and bottom of openings. The minimum number of anchors spaced at maximum of 32 in. (813 mm) provided on each jamb based on frame opening height shall be as follows

- up to 60 in. (1524 mm) 3 anchors
- greater than 60 in. (1524 mm) up to 90 in. (2286 mm) 4 anchors
- greater than 90 in. (2286 mm) up to 96 in. (2438mm) 5 anchors
- greater than 96 in. (2438 mm) 5 anchors plus 1 for each 24 in. (610 mm) or fraction thereof over 96 in. (2438 mm), spaced at 24 in. (610 mm) maximum between anchors

c. Expansion Bolt Type

Frames for installation in existing masonry or concrete walls shall be prepared for expansion bolt type anchors. The preparation shall consist of a countersunk hole for a 3/8 in. (9.5 mm) diameter bolt and a spacer from the unexposed surface of the frame to the wall. The spacer shall be welded to the frame and spaced a maximum of 6 in. (152 mm) from the top and bottom of the door opening, with intermediate spacing at a maximum of 26 in. (660 mm) o.c. Fasteners for such anchors shall be provided by others.

d. 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. Fasteners for such anchors shall be provided by others.

Note: A pre-finished opening may be one that is constructed in the shop as part of another assembly or system (e.g., precast concrete panel) and which requires anchors similar in performance to those covered by 2.03 B. 10. a, b, and c.

11. Frames for installation in masonry wall openings more than 4'-0" (1219 mm) in width shall have an angle or channel stiffener factory welded into the head when the head is to be grouted. Such stiffeners shall be not less than 12 Ga., 0.093 in. (2.3 mm) in thickness and not longer than the opening width, and shall not be used as lintels or load bearing members.
12. Plaster guards made from not less than 26 Ga., 0.016 in. (0.4 mm) thick steel shall be attached at hardware mortises on frames to be set in masonry or concrete openings.
13. Frames shall be provided with a temporary steel spreader welded to the feet of the jambs to serve as bracing during shipping and handling and which shall not be used for installation.

14. Loose glazing stops
 - a. Removable glass channel stops shall be cold rolled steel, not less than 20 Ga., 0.032 in. (0.8 mm), butted at corner joints and secured to the frame using cadmium or zinc plated #6 minimum countersunk sheet metal screws.
 - b. The frame underneath the glazing stops and the inside of the glazing stop shall be treated for maximum paint adhesion and painted with a rust inhibitive primer prior to installation in the frame.
15. Stainless steel frames shall be manufactured using fabrication and finishing methods outlined in ANSI/NAAMM/HMMA-866, for “highly corrosive” conditions (P.2.03.A.3-Note).

PART 4 – MANUFACTURING AND INSTALLATION OF DETENTION AND COMMERCIAL HOLLOW METAL

4.01 CLEARANCES

A. Edge clearances for swinging doors shall not exceed the following:

1. Between doors and frames at head and jambs:.....1/8 in. (3.2 mm)
2. Between edges of pairs of doors:..... 1/8 in. (3.2 mm)
3. At door sills where a threshold is used:.....3/8 in. (6.4 mm)
4. At door sills where no threshold is used:.....3/4 in. (19 mm)
5. Between door bottom and nominal surface of floor coverings at fire rated openings as provided in ANSI/NFPA 80..... 1/2 in. (13 mm)

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.

4.02 MANUFACTURING TOLERANCES

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

1. Frames for single or pair of doors:

Width measured between rabbets at the head:.....Nominal opening width +1/16 in. (1.6 mm),
-1/32 in. (0.8 mm)

Height (total length of jamb rabbet):.....Nominal opening height +/- 3/64 in. (1.1 mm)

Cross sectional profile dimensions:

Face..... +/- 1/32 in. (0.8 mm)
 Stop..... +/- 1/32 in. (0.8 mm)
 Rabbet..... +/- 1/32 in. (0.8 mm)
 Depth +/- 1/32 in. (0.8 mm)
 Throat..... +/- 1/16 in. (1.6 mm)

Frames overlapping walls to have throat dimension 1/8 in. (3.2 mm) greater than dimensioned wall thickness to accommodate irregularities in wall construction.

2. Doors:

- Width +/- 3/64 in. (1.1 mm)
- Height +/- 3/64 in. (1.1 mm)
- Thickness +/- 1/16 in. (1.6 mm)
- Hardware Cutout Dimensions -Template Dimensions + 0.015 (0.38 mm), “-0”
- Hardware Location +/- 1/32 in. (0.8 mm)
- Bow/Flatness..... +/- 1/16 in. (1.6 mm) in 7 ft. (2134 mm)

4.03 HARDWARE LOCATIONS

A. The location of hardware on doors and frames shall be as listed below. All dimensions except the hinge locations are referenced from the finished floor as defined in Paragraph 4.A. When hollow metal frames only are specified for use with doors to be furnished by others, the hardware preparation on the door is to be governed by its location on the frame. The door supplier is responsible for coordinating hardware locations.

B. Hinges:

Top.....5 in. (127 mm) from frame head to top of hinge

Bottom.....10 in. (254 mm) from finished floor to bottom of hinge

Intermediate.....Centered between top and bottom hinges

On Dutch Doors..... 5 in. (127 mm) from frame opening to top of top hinge;

10 in. (254 mm) from finished floor to bottom of bottom hinge;

5 in. (127 mm) from split line to top and bottom respectively of lower and upper intermediate hinges.

Locks and latches.....40-5/16 in. (1024 mm) to centerline of strike

Deadlocks.....48 in. (1219 mm) to centerline of strike

Exit hardware.....38 in. (965 mm) to centerline of cross bar

Door pulls.....42 in. (106 mm) to centerline of grip

Push/pull bars..... 42 in. (106 mm) to centerline of bar

Arm pulls.....46 in. (1168 mm) to centerline

Push plates.....46 in. (1168 mm) to centerline of plate

Intercoms.....48 in. (1219 mm) to centerline of intercom push buttons

4.04 FINISH

After fabrication, all tool marks and surface imperfections shall be filled and sanded as required to make exposed surfaces smooth and free from irregularities. After appropriate metal preparation, all exposed surfaces of doors and frames shall receive a factory applied rust inhibitive primer which meets or exceeds the performance requirements of Section 1.06.E. Primer must be fully cured prior to shipment.

4.05 SITE STORAGE AND PROTECTION OF MATERIALS

The Contractor responsible for storage and installation shall perform the following in accordance with HMMA-840 “Installation and Storage of Hollow Metal Doors and Frames.”

A. The contractor responsible for storage and installation shall remove wraps or covers from doors and frames upon delivery at the building site. The contractor responsible for installation shall see that any scratches or disfigurement caused in shipping or handling are promptly sanded smooth, cleaned and touched up with a compatible rust inhibitive primer.

- B. The contractor responsible for storage and installation shall see that materials are properly stored on planks in a dry location. Doors shall be stored in a vertical position and spaced by blocking. Materials shall be covered to protect them from damage but in such a manner as to permit air circulation.

4.06 INSTALLATION

The Contractor responsible for installation shall perform the following in accordance with HMMA-840 "Installation and Storage of Hollow Metal Doors and Frames."

- A. Prior to installation, all frames shall be checked for size, swing, and with temporary spreaders removed, corrected for squareness, alignment, twist and plumbness. Permissible installation tolerances shall not exceed the following:

Squareness:..... +/- 1/16 in. (1.6 mm) measured on a line, 90 degrees from one jamb, at the upper corner of the other jamb

Alignment +/- 1/16 in. (1.6 mm) measured on jambs on a horizontal line parallel to the plane of the wall.

Twist: +/- 1/16 in. (1.6 mm) measured on jambs on horizontal lines perpendicular to the plane of the wall.

Plumbness: +/- 1/16 in. (1.6 mm) measured on the jamb from the head to floor.

These tolerances provide a guideline for proper installation of hollow metal frames. The cumulative affect of the tolerances at their maximum levels will result in sufficient misalignment to prevent the door from functioning properly. Installers should take care not to create a tolerance buildup. Tolerance buildup occurs when more than one dimension is at or near its 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, glazing stop screws, and junction boxes are intended to protect hardware mortises, tapped mounting holes, and exposed removable screws 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 when tested in accordance with ASTM C 143) is to be used, special precautions shall be taken in the field by the installation contractor to provide protection from grout.

Frames shall not be used as forms for grout or concrete. Grouting of hollow metal frames shall be done in "lifts", or precautions shall be otherwise taken by the contractor to insure that frames are not deformed or damaged by this process.

- C. Proper door clearances shall be maintained in accordance with 2.04 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. Hollow metal surfaces shall be kept free of grout, tar, or other bonding material or sealer.
- F. Primed or painted surfaces which have been scratched or otherwise marred during installation (including field welding) and/or cleaning shall promptly be finished smooth, cleaned, treated for maximum paint adhesion and touched up with a rust inhibitive primer.

END OF SECTION

DETENTION EQUIPMENT CONTRACTOR

AFFIDAVIT

1. THIS IS TO CERTIFY that _____ expressly warrants that
(Company Name)
all fire and/or ballistics rated detention hollow metal doors, frames, windows, security glazing and hardware assemblies shown on drawings and specified to receive rating labels shall bear the same as a condition of award of contract. The affiant further warrants that verification and certification of all assembly labeling requirements have been coordinated with the hollow metal manufacturer, the security glazing manufacturer, hardware manufacturer, and the parties submitting proposals represented herein have demonstrated that their products, in concert with one another in any rated assembly shown on drawings or specified, are capable of bearing the required rating label. (Labels of preference shall be Underwriters Laboratories or Intertek Testing Services).
2. This affidavit is pendent upon changes, noted in fax sent to _____,
(Architect)
being corrected by the project Architect.
3. THE CERTIFICATIONS of the affiant are not mere declarations but are in consideration of and in fulfillment of express contractual requirements established in the bidding documents for construction of _____.
(Project Name)
4. THIS AFFIDAVIT applies to _____, this _____ day
(Project Name)
of _____, _____.

NAME OF COMPANY: _____

By: _____
(Print Name)

(Signature)

Title: _____
(Corporate Officer Only)

CERTIFICATE OF NOTARY PUBLIC

Sworn and subscribed to before me, an officer authorized to administer oaths.

This _____ day of _____, _____.

Notary Public

My commission expires on: _____

DETENTION HOLLOW METAL MANUFACTURER

AFFIDAVIT

1. THIS IS TO CERTIFY that _____ expressly warrants that
(Company Name)
all fire and/or ballistics rated detention hollow metal doors, frames, windows, security glazing and hardware assemblies shown on drawings and specified to receive rating labels shall bear the same as a condition of award of contract. The affiant further warrants that verification and certification of all assembly labeling requirements have been coordinated with the Detention Equipment Contractor (DEC) along with the security glazing manufacturer, hardware manufacturer, and the parties submitting proposals represented herein have demonstrated that their products, in concert with one another in any rated assembly shown on drawings or specified, are capable of bearing the required rating label. (Labels of preference shall be Underwriters Laboratories or Intertek Testing Services).
2. This affidavit is pendent upon changes, noted in fax sent to _____,
(Architect)
being corrected by the project Architect.
3. THE CERTIFICATIONS of the affiant are not mere declarations but are in consideration of and in fulfillment of express contractual requirements established in the bidding documents for construction of _____.
(Project Name)
4. THIS AFFIDAVIT applies to _____ this _____ day
(Project Name)
of _____, _____.

NAME OF COMPANY: _____

By: _____
(Print Name)

(Signature)

Title: _____
(Corporate Officer Only)

CERTIFICATE OF NOTARY PUBLIC

Sworn and subscribed to before me, an officer authorized to administer oaths.

This _____ day of _____, _____.

Notary Public

My commission expires on: _____

DETENTION HARDWARE MANUFACTURER

AFFIDAVIT

1. THIS IS TO CERTIFY that _____ expressly warrants that
(Company Name)
all fire and/or ballistics rated detention hollow metal doors, frames, windows, security glazing and hardware assemblies shown on drawings and specified to receive rating labels shall bear the same as a condition of award of contract. The affiant further warrants that verification and certification of all assembly labeling requirements have been coordinated with the Detention Equipment Contractor (DEC) along with the security glazing manufacturer, hollow metal manufacturer, and the parties submitting proposals represented herein have demonstrated that their products, in concert with one another in any rated assembly shown on drawings or specified, are capable of bearing the required rating label. (Labels of preference shall be Underwriters Laboratories or Intertek Testing Services).
2. This affidavit is pendent upon changes, noted in fax sent to _____,
(Architect)
being corrected by the project Architect.
3. THE CERTIFICATIONS of the affiant are not mere declarations but are in consideration of and in fulfillment of express contractual requirements established in the bidding documents for construction of _____.
(Project Name)
4. THIS AFFIDAVIT applies to _____, this _____
day _____
(Project Name)
of _____, _____.

NAME OF COMPANY: _____

By: _____
(Print Name)

(Signature)

Title: _____
(Corporate Officer Only)

CERTIFICATE OF NOTARY PUBLIC

Sworn and subscribed to before me, an officer authorized to administer oaths.

This _____ day of _____, _____.

Notary Public

My commission expires on: _____

DETENTION GLAZING MANUFACTURER/VENDOR

AFFIDAVIT

1. THIS IS TO CERTIFY that _____ expressly warrants that
(Company Name)
all fire and/or ballistics rated detention hollow metal doors, frames, windows, security glazing and hardware assemblies shown on drawings and specified to receive rating labels shall bear the same as a condition of award of contract. The affiant further warrants that verification and certification of all assembly labeling requirements have been coordinated with the Detention Equipment Contractor (DEC) along with the hollow metal manufacturer, hardware manufacturer and the parties submitting proposals represented herein have demonstrated that their products, in concert with one another in any rated assembly shown on drawings or specified, are capable of bearing the required rating label. (Labels of preference shall be Underwriters Laboratories or Intertek Testing Services).
2. This affidavit is pendent upon changes, noted in fax sent to _____,
(Architect)
being corrected by the project Architect.
3. THE CERTIFICATIONS of the affiant are not mere declarations but are in consideration of and in fulfillment of express contractual requirements established in the bidding documents for construction of _____.
(Project Name)
4. THIS AFFIDAVIT applies to _____, this _____ day
(Project Name)
of _____, _____.

NAME OF COMPANY: _____

By: _____
(Print Name)

(Signature)

Title: _____
(Corporate Officer Only)

CERTIFICATE OF NOTARY PUBLIC

Sworn and subscribed to before me, an officer authorized to administer oaths.

This _____ day of _____, _____.

Notary Public

My commission expires on: _____