SECTION 08 34 53 / 08 39 53– FORCED ENTRY, BALLISTICS, BLAST AND FIRE RESISTANT DOORS AND FRAMES

PART 1 - GENERAL

1.01 SUMMARY

This Section includes Forced Entry, Ballistics, Blast and Fire Resistant (FE/BBFR) products as shown in the contract drawings.

5 minute, 15 minute and 60 minute rated FE/BBFR doors and windows as designated on the Door Schedule, shall be constructed in accordance with designs of doors and windows that have met the test criteria in accordance with Section 1.06.A, and shall be equipped with FE/BR locks, FE/BR hinges, FE/BR glazing, and other options in accordance with the manufacturer's certified designs. The FE/BR hardware, glazing and other specified options, shall be pre-installed and the units furnished completely assembled in accordance with the manufacturer's certified designs.

1.02 PRODUCTS FURNISHED BUT NOT INSTALLED UNDER THIS SECTION

A. FE/BBFR doors, swinging type with specified ratings as shown in the door schedule. Doors shall be of the types and sizes shown on the contract drawings and as specified herein.

B. FE/BBFR frames with specified 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. FE/BBFR panels where shown, similar in construction to doors, including ratings where specified in the door schedule.

D. FE/BBFR hardware, FE/BBFR glass and glazing, conventional hardware and other items to be provided as components of the FE/BBFR assemblies as shown on the contract drawings and as specified herein.

E. Install FE/BR door assemblies only into a steel substrate in such a manner that allows for future frame adjustment. This may be either a structural steel wall or other structural steel assembly, steel sub-frame in concrete, or a steel sub-frame attached to concrete or masonry.

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

A. 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 – Security Locking Control Systems

1.05 REFERENCES

A. ANSI A 250.10 – 2011, Standard Test Procedure and Acceptance Criteria for Prime Painted Steel for Steel Doors and Frames.

B. ANSI A250.03-2007(R2011) – Test Procedure and Acceptance Criteria for Factory Applied Finish Coatings for Steel Doors and Frames

C. ANSI/NAAMM/HMMA 840-07 Guide Specifications for Installation and Storage of Hollow Metal Doors and Frames

D. ANSI/NAAMM/HMMA 801-12 Glossary of Terms for Hollow Metal Doors and Frames

E. ANSI/NAAMM/HMMA 850-14, Fire-Rated Hollow Metal Doors and Frames, Third Edition

F. ANSI/NAAMM/HMMA 866–12, Guide Specifications for Stainless Steel Hollow Metal Doors and Frames

G. ANSI/NFPA 80-13, Fire Doors and Windows

H. ANSI/NFPA 252–2012, Standard Methods of Fire Tests of Door Assemblies

I. ANSI/NFPA 257–2012, Standard on Fire Test for Window and Glass Block Assemblies

J. ANSI/UL 10 (C) - 2015, 2nd edition, Fire Tests of Door Assemblies

K. ASTM A 1008 / A 1008M – 13, Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability

L. ASTM A 1011 / A 1011M – 14, Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability

M. ASTM A 653 / A 653M – 13, Specification for Steel Sheet, Zinc-coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot Dipped Process.

N. ASTM A 666–10, Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate and Flat Bar.

O. ASTM A 36-14, Standard Specification for Carbon Structural Steel

P. ASTM C 143 / C 143M – 12, Standard Test Method for Slump of Hydraulic Cement Concrete

Q. SD-STD-01.01, Rev. G (amended April 30, 1993), Certification Standard for Forced Entry and Ballistics Resistance of Structural Systems

R. ANSI/UL 752-09, Bullet - Resisting Equipment 11th Edition

S. ASTM F 2247–03, Standard Test Method for Metal Doors Used in Blast Resistant Applications (Equivalent Static Load Method)

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New York, NY 10036
Telephone: 212/642-4900 www.ansi.org

ASTM American Society for Testing and Materials
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West Conshohocken, PA 19428-2959
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NAAMM National Association of Architectural Metal Manufacturers
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1.06 TESTING AND PERFORMANCE

A. Forced Entry and Ballistics Resistance Test

5 minute, 15 minute and 60 minute rated FE/BR doors and windows shall be designated on the Door Schedule, and shall be constructed in accordance with designs of doors that have met the following test criteria.

1. Test doors shall be 3’ 0” x 7’ 0” (914 mm x 2134 mm) minimum, constructed in accordance with Section 2.01 herein. Test frames shall be constructed in accordance with Section 2.03 herein. Test doors and frames shall be fitted with FE/BR hardware in accordance with the manufacturer’s design and selection. Test doors, frames, glazing and hardware assembled shall constitute the “test door assemblies”.

2. Test windows shall be constructed in accordance with Section 2.03 herein. Test frames, mullions, glazing, and other options, such as deal trays, shall constitute the "test window assemblies".

3. The test door and window assemblies shall be submitted to an independent materials testing laboratory and FE/BR testing shall be conducted on the test assembly in accordance with SD-STD-01.01, Rev. G. (Amended April 30, 1993). The time periods for forced entry certification shall be 5 minutes, 15 minutes and 60 minutes. Reporting shall be in accordance with the standard.

B. Uniform Static Pressure Test:

5 minute, 15 minute and 60 minute rated FE/BR sample Door assemblies shall be constructed in accordance with the manufacturer's certified designs and shall be subjected to the following static pressure test criteria. Assemblies shall include doors, frames, hardware, and glazing as applicable.

3'0" (914 mm) min. x 7'0" (2134 mm) min FE/BR sample door assemblies shall be mounted into a pressure test chamber in accordance with ASTM F2247:

1. 5 minute sample door assemblies shall be exposed to a static air pressure of 6 p.s.i.g (41 kPa).

2. 15 minute and 60 minute sample door assemblies shall be exposed to a static air pressure of 15 p.s.i.g. (103 kPa).

3. At openings indicated on the project door schedule and contract documents, 5 minute assemblies shall be rated by certified engineering calculation to a dynamic design pressure of 32 p.s.i. (220 kPa) short duration.

4. At openings indicated on the project door schedule and contract documents, 15 minute assemblies shall be rated by certified engineering calculation to a dynamic design pressure of 41p.s.i. (283 kPa) short duration.

5. At openings indicated on the project door schedule and contract documents, 60 minute assemblies shall be rated by certified engineering calculation to a dynamic design pressure of 71 p.s.i. (489 kPa) short duration.

Acceptability according to pass/fail criteria, and reporting shall be in accordance with the standard.

Note: The static pressure test or a certified engineering blast calculation is required in order to provide assurance that the manufacturer's basic FE/BR door assembly constructions have the capability to resist uniformly distributed pressure such as may be encountered during an attack using explosives in addition to forced entry techniques and ballistics. (Performance can vary based on threat scenario. Project specific analysis required.)

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 10 in accordance with UL-752 as noted on the door schedule.

D. Test Reports

The manufacturer shall provide test reports and documentation by independent testing laboratories in accordance with the reporting requirements of SD-STD-01.01, Rev. G, and ASTM F2247, and certifying compliance Section 1.06 of this specification. Current DS/OBO certifications are required for each door elevation (opaque, single vision, double vision, single and pair door configurations)

1.07 QUALITY ASSURANCE

Approval as a Qualified Manufacturer shall require, as a minimum, substantiation of the following requirements no less than ten (10) 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 doors and frames for this project.

3. 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.

4. 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: 2015. The manufacturer's registrar shall be a nationally recognized, independent and accredited registrar which provides periodic factory follow-up surveillance audits assuring the manufacturer's continuing compliance with the certified Quality System.

5. 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.

B. Quality Criteria

1. All door and frame construction shall be in accordance with the designs of assemblies which meet the requirements of Section 1.06 "Testing and Performance."

   a. The FE/BBFR assembly 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. [5 minute] [15 minute] [60 minute] rated FE/BBFR doors and frames shall be fire rated for [3/4 hour] [1-1/2 hour] [3 hour] under fire test standard ANSI/UL – 10C. The manufacturer shall be listed as a producer of these types of doors under a recognized testing agency having a factory follow-up inspection and labeling service, such as UL or ITS. These doors and frames shall be constructed in accordance with the manufacturer's fire rating procedures.

   a. 5 minute rated FE/BBFR doors at stairwells shall be additionally rated for a maximum temperature rise (MTR) on the unexposed side of the door of 450 deg F (232 deg C) during the first 30 minutes of fire exposure.

   b. At openings indicated on the project door schedule and contract documents, 60 minute fire rated assemblies shall be equipped with certified fire rated forced entry locking hardware. These assemblies must meet egress requirements for fire exits and 60 minute forced entry resistance requirements without the need for a separate action to engage forced entry locking systems. Proposed assemblies that require a separate action to engage forced entry locking will not be approved.

1.08 SUBMITTALS

A. FE/BBFR Assembly Submittal Drawings

1. Show door and frame elevations, sections and construction.

2. Show listing of opening descriptions including quantities, locations, and anchors.

3. Identify materials on the submittal such that they may be referenced by markings used on the contract documents.

4. Include schedule for all conventional hardware, FE/BBFR hardware, FE/BBFR glazing, and other items to be provided as components of the FE/BBFR assemblies.

B. Production of FE/BBFR assemblies shall begin not more than four (4) weeks after the final approved submittal drawings 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 FE/BBFR assembly production schedule. A FE/BBFR assembly delivery priority list shall be provided by the General Contractor and shall be used as a production guideline by the manufacturer. Upon changes in priority by the General Contractor, the manufacturer shall provide a revised delivery schedule.

1.09 WARRANTY

All FE/BBFR work shall be warranted from defects in workmanship and quality for a period of three (3) years 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 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 A653/A653M, Coating designation G90.

3. Interior Doors: Face sheets shall be 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, or otherwise shall conform to either ASTM A1008/A1008M or ASTM A1011/A1011M.

4. For severely corrosive conditions and where specified for individual openings either interior or exterior: Face sheets shall be 0.093 in. (2.3 mm) minimum thickness as indicated in the schedule, and shall be stainless steel meeting ASTM A666, type 304.

B. Materials, General

1. Stainless Steel Sheets where required for finish: AISI Type 304; commercial quality, No. 4 directional polish.

2. Supports and Anchors: Fabricate to endure required performances, but of not less than 1.5 mm sheet steel. For exterior wall assemblies, hot-dip zinc coat support/anchor units after fabrication in compliance with ASTM A153, Class B.

3. Inserts, Bolts Fasteners: Standard units of strengths required to endure performances; hot-dip zinc coated where used in exterior wall assemblies in compliance with ASTM A153, Class C/D.

4. Paint for Shop Application: Rust-inhibitive primer suitable as base for finish coats, which are specified as work of other sections.

5. Door Core Insulation:

   a. Ceramic Fiber Wool: IS :15402 & ASTM C892, ASTM C201.

6. Vision Panels, General: Fabricate vision panels of sizes shown and scheduled with same performance capabilities as specified/shown for door assembly where installed. Where applicable, achieve performances and combined performances through lamination of transparent sheets, films, and screens of standard manufactured/tested products. Comply with applicable provisions of Division 08 glazing section and Division 08 Section, "Security Glazing."

a. Forced-Entry (FE) Resistance: Where assembly is indicated for forced-entry resistance rating (FE), provide light of size shown or scheduled in accordance with DS certification.

b. Ballistic Resistance (BR): Where assembly is indicated for ballistic-resistance rating (BR), provide light of size shown or scheduled in accordance with DS certification.

7. Hot-Dip Galvanizing: All doors must be hot-dip galvanized in accordance with ASTM A123M-09; ASTM A123 standards or made of galvanneal material per ASTM Specification A653/A653M, G90

8. Sealants: For sealants required within fabricated security doors, provide type recommended by manufacturer for joint size and movement. Sealant shall remain permanently elastic, non-shrinking, and non-migrating.

C. Hardware

1. General: Provide special units of door hardware to achieve performances, and as shown and scheduled. Standard units for each security door assembly are specified to be furnished as work of "Security Door Hardware" Section; see Project "Finish Hardware Schedule" and "Data Sheets," and provisions of this Section, as well as notes on door-and-frame schedule.

2. FE and FE/BR Hinges: For FE and FE/BR provide ANSI/BHMA compliant extra-heavy duty needle bearing type hinges, minimum 910 kg (2000 pound) capacity per hinge, for door leafs weighing 200 kg (450 pounds) or more and minimum 450 kg (1000 pound) capacity per hinge for door leafs weighing 200 kp (450 pounds) or less.. Polymer and Teflon bearing hinges are not permitted. Provide cycle tested hinges per ANSI/BHMA 156.1-2013 on an actual door specimen to a minimum of 1,000,000 cycles. Test shall be done using 3 hinges. Other minimum requirements are as follows:

a. Cycle Testing: 1,000,000 (Exceeds ANSI requirements, DOS specific requirement)
b. Hinge Pin Rise: None Allowed
c. Hinge Play: 0.38 mm (.015 in)
d. Vertical Wear: 0.76 mm (.030 in)
e. Lateral Wear: 1.60 mm (.062 in)

3. All forced entry locks (FEL) shall include an adjustable and removable strike plate that is bolted in place. Strike plates shall be adjustable (in and out) a minimum of 2-mm in each direction.

D. Fabrication and Assembly

1. General: Fabricate, test, and pre-assemble security door assemblies with hardware at factory; disassemble hardware only to extent necessary for handling, packaging, shipment, and installation at Project. Fabricate metal work to comply with performance requirements. Fabrications shall be rigid, neat, and free from warp/buckle/similar defects, with eased edges and continuously-welded joints, ground where exposed, to provide smooth, flush, invisible joints. Weld in accordance with AWS D1.1, Structural Welding Code for Steel.

a. Prepare door leafs and frames of each assembly to receive hardware, devices, and accessory units as shown and scheduled. Reinforce work for hardware and devices, and cut work for mortised or concealed units; comply with ANSI A115 series specifications, working from templates supplied by unit manufacturers and suppliers.

i. Locate hardware, devices, and accessories as shown and scheduled (including on approved shop drawings) or, if not otherwise indicated: 1) in accordance with DHI Recommended Locations for Builder's Hardware or, 2) in accordance with security device manufacturer's recommendation for optimum responses, but 3) in any case, as required to achieve required assembly performances. Do not cut or otherwise alter hardware in order to install on door.

ii. Except where assembly is equipped with door-seal stripping at jambs and head, provide neoprene door silencers on stops; three at strike jamb for single door, and four at head for double door.

iii. Except as otherwise indicated, pre-fabricate and pre-assemble security door assemblies to include full extent of required conduit-protected electrical/electronic power and control wiring placed and supported to avoid conflicts with other elements and subsequent drilling/cutting-in of work during installation of units. Provide access ports as required to support 25 mm conduit in door frames and sub-frames.

iv. Clearances: Not more than 3 mm (1/8”) at jambs and head, except not more than 6 mm (1/4”) between fire-rated pair of doors. Not more than 10 mm (3/8”) at bottom. Undercut for carpets are not permitted where doors are used in corridors.

v. Fabricate frames with horizontally slotted bolt holes to allow for future frame adjustment.

vi. Locate terminal block access on hinge side of door frame, between 1.2 meters (47”) and 2 meters (80”) above the finished floor. The terminal block opening must have a removable cover and provide a clear opening of 50 millimeters (2”) wide by 250 millimeters (10”) long.

b. Provide the removable glazing stops and similar moldings on interior or "protected" side of assemblies. Glazing shall be removable without removing door from frame, through the top of the door or removing any surface steel panel. Select and size stops, moldings, and anchors to conform to Bureau of Diplomatic Security (DS) certified design.

c. Shop painting: Provide base-coat, factory-applied painting of ferrous metal elements of assemblies excluding other specified exposed-finish surfaces of stainless steel, aluminum, bronze, and similar metals not intended for painting. Provide touch-up paint with each painted door.

i. Clean steel and zinc-coated steel surfaces of mill scale, rust, oil, grease, dirt, and other substances, immediately before finish application.

ii. Apply pretreatment of cold phosphate solution (SSPC--PT2), hot phosphate solution (SSPC-PT4), or basic zinc -chromate/vinyl-butryal solution (SSPC-PT3).

iii. Apply paint coat specified for shop application recommended by manufacturer of pretreatment. Apply in a uniform, smooth coat to result in dry film thickness of not less than 0.05 mm.

d. Vision panels:

i. The transparencies shall be enclosed and cushioned within core of door for continuous perimeter bite of not less than 20 mm on each side and 6 mm cushion clearance to fixed metal stop on glazing edges. Glazings shall be factory installed with no raw metal edges evident or in contact with glass in door vision openings. Vision opening edges shall be cushioned and trimmed neatly to provide acceptable appearance.

ii. If external frames are used to either side or to both faces of door, frame(s) shall not exceed 40 mm in width and shall be configured internally to cushion all perimeter edges and faces of glazing and provide minimum bite of 20 mm and 6 mm cushion clearance to fixed metal stop on glazing edges. Frame shall not produce pinch point with hardware. All external bolts to attach frame shall be flush mounted. Alternatively, protruding bolt heads shall be covered with additional trim frame and flush mounted screws.

e. Sub-frames: Provide tube steel sub-frames for all FE or FE/BR doors for installation at concrete, masonry, and other non-steel rough openings and for structural steel openings where the depth is less than the door frame depth. For individual openings, sub-frames shall be provided by the door supplier. For larger, multi-panel openings, sub-frames may be provided by either the door supplier or the Contractor; in either case they shall be designed by the door supplier and shown with the door shop drawings. Sub-frames shall be 6 mm thick minimum for interior applications and a minimum of 10 mm for exterior applications, with a minimum depth equal to or greater than the door frame depth. Coordinate the sub-frame anchor locations with the door frame bolt hole locations. The steel sub-frame shall be assembled and braced by the manufacturer prior to shipping, in order to avoid out of plane deformation during transportation, installation and concrete pouring. The steel sub-frame shall be installed plumb and square.

i. For New Concrete -Exterior sub-frames shall be constructed of A36 mild steel 10-mm (3/8 inch) thick tube steel or greater as required to comply with engineer's report for blast resistance, if applicable, and shall be hot dip galvanized for corrosion resistance or made of galvanneal material per ASTM Specification A653/A653M, G90.

ii. Attach tube steel embed per the blast report or with a minimum 12 mm x 150 mm steel studs, spaced 150 mm on center. All fasteners for doors or windows shall be SAE J429 Grade 8 (ASTM A490) (ISO Class 10.9) or other appropriate high strength bolt as identified in the blast report and complying with certification for FE/BR and Blast resistant products. All door sub-frames shall be pre-punched for the technical security conduit. Sub-frames without adjustment features or blank plates for field drilling and tapping shall not be permitted. Final sub-frame design; construction and features shall be approved prior to fabrication and shipment.

iii. Interior tube steel sub-frames shall be A36 mild steel 6-mm (1/4 inch) minimum thickness and shall be prime painted with a high-grade metal primer. All sub-frames shall be factory drilled and tapped with an anchor design to allow minimum 10-mm (3/8 inch) adjustment 360 degrees from the centerline of the center of the drilled and tapped hole. All fasteners for doors or windows shall be SAE J429 Grade 8 (ASTM A490) (ISO Class 10.9) or other appropriate high strength bolt as identified in the blast report and complying with standard specifications for FE/BR and Blast resistant products. All door sub-frames shall be pre-punched for the technical security conduit. Sub-frames without adjustment features or blank plates for field drilling and tapping shall not be permitted. Final sub-frame design; construction and features shall be approved prior to fabrication and shipment.

iv. For Existing Concrete - Provide a tube steel sub-frame, typically a 50 mm x 150 mm x 6 mm steel tube or 12 mm plate. Anchor the sub-frame with either 12 mm diameter x 90 mm long drop-in type expansion anchors or with Hilti HY150 injection or equivalent strength anchoring system with 12 mm diameter x 200 mm long Hilti HIT threaded rods spaced at 300 mm on center.]

v. [For Solid Masonry - Provide a tube steel sub-frame, typically a 50mm x 150mm x 6mm steel tube or 12 mm plate. Anchor the sub-frame with a Hilti HY150 or equivalent strength injection anchoring system with 12 mm diameter

x 200 mm long Hilti HIT threaded rods spaced at 300 mm on center.] [For Hollow Masonry - Provide a tube steel sub-frame, typically a 50 mm x 150 mm x 6 mm steel tube. Anchor the sub-frame to the masonry with a Hilti HY20 or equivalent strength injection anchoring system with 12 mm diameter x 200 mm long Hilti HIT threaded rods and screen tubes spaced at 300 mm on center.]

f. Protect the bottom forced entry lock thumbturn with a "U" shaped metal guard, with the opening at the bottom. Attach the guard to the door surface with counter-sunk screws on the inside of the "U." The finish of the guard shall match the finish of the door.

g. Doors, windows and glazed panels in multi-unit elevations shall be designed and fabricated with minimum 50mm x 150mm x 6mm steel tubes or as required by blast loading to separate the head and jambs of each door frame from other door, window frames and glazed panels.

2. Flashing: Provide through wall flashing at all head locations of exterior doors. Provide counter flashing at locations where building finish materials interface with door systems. Provide flashing at door jambs and sills. Provide drip edges at all exterior door heads. Flashing materials must be protected from interaction with dissimilar materials.

E. Door Components

1. Glazing: Comply with requirements in Division 08 Section "Security Glazing" for performance indicated.

2. Compression-Type Glazing Strips and Weather Stripping: Unless otherwise indicated, provide compressible stripping for glazing and weather stripping, such as molded EPDM or neoprene gaskets complying with ASTM D 2000, Designations 2BC415 to 3BC620; molded PVC gaskets complying with ASTM D 2287; or molded, expanded EPDM or neoprene gaskets complying with ASTM C 509, Grade 4.

3. Miscellaneous Glazing Materials: Provide material, size, and shape complying with requirements of glass manufacturers, and with a proven record of compatibility with surfaces contacted in installation.

   a. Cleaners, Primers, and Sealers: Type recommended by sealant or gasket manufacturer.
   b. Setting Blocks: Elastomeric material with a Type A Shore durometer hardness of 85, plus or minus 5.
   c. Spacers: Elastomeric blocks or continuous extrusions with a Type A Shore durometer hardness required by glass manufacturer to maintain glass lites in place for installation indicated.
   d. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).

4. Anchors, Clips, and Door Accessories: Stainless steel; hot-dip, zinc-coated steel or iron, complying with ASTM B633; provide sufficient strength to withstand design pressure indicated.

F. Construction:

1. All doors shall be of the types and sizes shown in the contract documents and on the approved submittal drawings. Doors shall be constructed in accordance with these specifications and in accordance with the applicable performance requirements of Section 1.06.

2. Doors shall be neat in appearance and free from warpage 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. The internal construction of FE/BBFR doors shall be in accordance with the manufacturer's certified design as shown in the manufacturer's submittal package in accordance with Section 1.08 or this specification.

5. The vertical edges as well as the tops and bottoms of FE/BBFR assemblies shall be reinforced by a continuous steel channel of the necessary thickness and welded in place in such a manner as to enable the completed assembly to meet the performance requirements set forth in Section 1.06 "Testing and Performance."

6. The end channels shall be fitted with an additional flush closing channel of not less than 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 mm) long welds, 12 in. (305 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

8. Hardware reinforcements:
   5 minute, 15 minute and 60 minute rated FE/BBFR doors shall be provided with hardware reinforcements and preparations in accordance with the manufacturer's certified design, and in accordance with the following minimum specifications:

   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 FE/BBFR assembly manufacturer.

   b. Door Mounted Lock Preparations:
      Door mounted lock preparations shall be pressed steel unitized reinforcements and enclosures securely welded in place in accordance with the manufacturer's certified design.

9. Glass moldings and stops:

   5 minute, 15 minute and 60 minute rated FE/BBFR doors shall be provided with glazing reinforcements and preparations in accordance with the manufacturer's certified design, and in accordance with the following minimum specifications:

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

b. Removable glazing stops shall be notched and tight fitting at the corner joints, and secured in place using fasteners and spacing in accordance with the manufacturer's certified design.

c. The material to which glazing stops are secured and the material that the glazing stops are fabricated from shall be galvanized material conforming to ASTM A 653/A 653M, Coating designation A60, or shall be chemically treated for maximum paint adhesion and painted with a rust inhibitive primer prior to installation in the door.

2.02 FE/BBFR PANELS

A. FE/BBFR panels shall be of the same materials, construction, and finish as specified for FE/BBFR doors of the same ratings.

2.03 HOLLOW METAL FRAMES

A. Materials:

1. Frames shall be constructed of commercial quality, 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 defects.

2. Exterior openings: Steel for these openings shall be 0.093 in. (2.3 mm) minimum thickness and shall have a zinc coating applied by the hot-dip process conforming to ASTM A653/A653M, Coating designation G90.

3. Interior openings: Steel for these openings shall be 0.093 in. (2.3 mm) minimum thickness, and shall conform to ASTM A1008 / A1008M or ASTM A1011 / A1011M.

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.

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 the approved submittal drawings. All frame sections shall be fabricated, and all frames shall be assembled, in accordance with the manufacturer's certified FE/BBFR design.

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.

5. Minimum height of stops in door openings of stops in FE/BBFR glass or panel openings shall be as shown on approved submittal drawings.

6. Hardware Reinforcement and Preparation:

5 minute, 15 minute and 60 minute rated FE/BBFR frames shall be provided with hardware reinforcements and preparations in accordance with the manufacturer's certified design, and in accordance with the following minimum specifications:

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.

b. Minimum thickness of hardware reinforcing plates shall be as follows:

Hinge and pivot reinforcements – 0.167 in. (4.2 mm)

Strike reinforcements – 0.167 in. (4.2 mm)

Closer reinforcements – 0.167 in. (4.2 mm)

Flush bolt reinforcements – 0.167 in. (4.2 mm)

Reinforcements for surface applied hardware – 0.123 in. (3.1 mm)

c. Hinge and pivot reinforcements shall consist of 0.167 in. (4.2 mm) x 1 1/2 in. (38 mm) x 10 in. (254 mm) straps welded in place. All hinge reinforcements shall be additionally reinforced by a 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 and sagging of the door while in normal use.

d. 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 3/4 in. (19.1 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.

e. Conduit runs around frame section joints shall be 3/4 in. (19 mm) U.L. approved EMT to facilitate unrestricted wire feed. Where meeting sections permit, conduit shall be bent at a 2 in. (50 mm) minimum radius at turns. 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.

7. Jamb Anchors:

5 minute, 15 minute and 60 minute rated FE/BBFR frames shall be provided with jamb anchor systems in accordance with the manufacturer's certified design, and in accordance with the following minimum specifications:

8. Removable glazing stops:

5 minute, 15 minute and 60 minute rated FE/BBFR frames shall be provided with glazing reinforcements and preparations in accordance with the manufacturer's certified design, and in accordance with the following minimum specifications:

a. Removable glazing stops shall be pressed steel angle, notched and tight fitting at the corner joints, and secured in place using fasteners and spacing in accordance with the manufacturer's certified design.

b. The material to which glazing stops are secured and the material that the glazing stops are fabricated from shall be galvanized material conforming to ASTM A 653/A 653M, Coating designation A60.

2.04 CLEARANCES AND TOLERANCES

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. (9.5 mm) from bottom of door to top of threshold

4. At door sills where no threshold is used:.....3/4 in. (19.1) above floor

5. Between door bottom and nominal surface of floor coverings as provided in NFPA 80 -1995, Paragraph 2-2.7:.....1/2 in. (12.7 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.

B. 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. (1.2 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. (1.2 mm)
Height..... +/- 3/64 in. (1.2 mm)
Thickness.....+/- 1/16 in. (1.6 mm)
Hardware cutout dimensions.....Template dimensions
+ 0.015 in. (0.38 mm) – 0 in.
Hardware location.....+/- 1/32 in. (0.8 mm)
Bow/Flatness.....+/- 1/8 in. (3.2 mm)

2.05 HARDWARE LOCATIONS

5 minute, 15 minute and 60 minute rated FE/BBFR doors and frames shall be provided with hardware locations in accordance with the manufacturer's certified design, and in accordance with the following minimum specifications:

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 2.04.A.

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

Locks and latches.....40 - 5/16 in. (1024 mm) to centerline of strike
Deadlocks.....46 in. (1168 mm) to centerline of strike
Exit hardware.....38 in. (965 mm) to centerline of cross bar
Door pulls.....42 in. (1067 mm) to centerline of grip
Push/pull bars.....42 in. (1067 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

2.06 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 rust inhibitive primer which meets or exceeds ANSI A250.10. Interior components of the door and frame may also receive a rust inhibitive primer which meets or exceeds ANSI A250.10. When required, finish coats shall consist of a two part component system, Sherwin Williams MacroPoxy 646, or equivalent, and shall comply with ANSI A250.03. Stainless steel surfaces shall be finished in accordance with ANSI/NAAMM/ HMMA – 866, Glass Bead Finish similar to #4 Polish without grain.

PART 3 - EXECUTION

3.01 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 in a dry location. Materials shall be covered to protect them from damage but in such a manner as to permit air circulation.

3.02 INSTALLATION

A. General: Install security door assemblies in accordance with approved shop drawings, manufacturer's data and instructions, and requirements of these specifications and the attached Certificate of Compliance

1. Install the assemblies in compliance with recommendations and instructions of HMMA-840, “Installation and Storage of Hollow Metal Doors and Frames, and shall abide by the manufacturer’s installation instructions.

   At fire-rated door openings, comply with NFPA Standard No. 80.

2. Anchorage: The door manufacturer shall provide anchors appropriate for substrate to which door frame and sub-frame is to be fastened. Door frames shall have pre-drilled horizontally slotted bolt hole patterns not to exceed 300 mm on center. The manufacturer shall verify substrates involved, and supply any special fastening tools (e.g., special drill, bit, tap) required by anchoring system. The anchor shall be acceptable for shock/short duration loading, and have potential for removal and re-installation during life of building.

   a. Avoid cutting rebar during concrete sub-frame installation.
   b. Provide 1.5 mm (1/16 inch) thick plastic shims with break-off tabs, minimum 2 shims per bolt, for rough opening (RO) frame clearance.
   c. Match finish of cap plugs used in frame with frame finish to the maximum extent possible.

3. Adjust and Clean

   General: Repair damaged elements, restore abraded surfaces, touch-up base-coat paint finish with air-drying primer, and remove imperfections from exposed natural metal finishes.

   a. Check and readjust hardware, devices, and accessories with door-to-frame-and-sill/ threshold clearances set for proper operation of locks, door seals, and other operational units. Do not remove permanently applied performance labels.
   b. Comply with "Security Door Hardware" section requirements for protection and handling of keys, locking devices, and associated information.
   c. Exercise extreme care in cleaning exposed surfaces of polycarbonate; comply with manufacturer's directions.

4. 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 at the 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. 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.

C. 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 by the installation contractor.

END OF SECTION