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High Security Doors - Safe Room Doors
Blast Resistant Doors - Bullet Resistant Doors

Specification Sections noted are based on MasterSpec 2004/2010. It is intended as an "editable" proprietary specification, not necessarily following the individual paragraph numbering of any other source. Specified note: Include, add, or delete items marked "select" as applicable to this individual building. Items marked (other) allow the addition of relevant, specific requirements. Specified notes or selections are for reference only and should be edited out of the finished specification, retaining only the pertinent selection.

SECTION 08 39 53 BLAST-RESISTANT DOORS AND FRAMES

PART 1 GENERAL 1.1 SECTION INCLUDES Swinging Hollow Metal Doors and Frames for protection against explosive blast pressures in Anti-Terrorism situations. 1.2 RELATED SECTIONS (Delete items not applicable to project) 03 30 00 Cast-in-place Concrete. 03 40 00 Precast Concrete. 03 60 00 Grouting. 04 00 00 Masonry (including 04 05 16 and 04 00 20). 05 12 00 Structural Steel. 08 71 63 Detention Door Hardware. 08 74 00 Access Control Hardware. 08 88 00 Special Function Glazing. 09 00 00 Finishes. 09 20 00 Plaster and Gypsum Board. 08 10 00 Doors and Frames. 09 90 00 Painting and Coating.

1.3 REFERENCES (Delete items not applicable to project) ASTM E1300 - 12ae1 Standard Practice for Determining Load Resistance of Glass in Buildings ASTM F1642 - 12 Standard Test Method for Glazing and Glazing Systems Subject to Air blast Loadings ASTM F2247 - 11 Standard Test Method for Metal Doors Used in Blast Resistant Applications (Equivalent Static Load Method)

ASTM F2248 - 12 Standard Practice for Specifying an Equivalent 3-Second Duration Design Loading for Blast Resistant Glazing Fabricated with Laminated Glass ASTM F2912 - 11 Standard Specification for Glazing and Glazing Systems Subject to Air blast Loadings ASTM F2927 - 12 Standard Test Method for Door Systems Subject to Air blast Loadings SD-STD-01.01, Revision G (1993) Certification Standard Forced Entry and Ballistic Resistance of Structural Systems

UFC 4-010-01 (2013) Unified Facilities Criteria (UFC) DoD Minimum Antiterrorism Standards for Buildings ASTM A 568/A 568M Standard Specification for Steel, Sheet, Carbon, Structural, and High-Strength, Low Alloy, Hot-Rolled and Cold-Rolled. ASTM A 653/A 653M Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process.

(Specifier: Delete this reference if not applicable) ASTM A 666/666M Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Bar. ASTM A 924/A 924M Standard Specification for General Requirements for Sheet Steel, Metallic-Coated by the Hot-Dip Process.

ASTM A 1008/A 1008M, Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High Strength Low Alloy, High Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable.

ASTM A 1011/A 1011M, Specification for Steel, Sheet, and Strip, Hot-Rolled, Carbon, Structural, High Strength Low-Alloy and High Strength Low-Alloy with Improved Formability ANSI/SDI A250.10 Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames. ANSI/SDI A250.11 Recommended Erection Instructions for Steel Frames. HMMA 820-TN01 Grouting Hollow Metal Frames. HMMA 840-TN01 Painting Hollow Metal Products. HMMA 840 Installation and Storage of Hollow Metal Doors and Frames. HMMA 841 Tolerances and Clearances for Commercial Hollow Metal Doors and Frames.

1.4 DESIGN and PERFORMANCE REQUIREMENTS Where noted on the door schedule, Hollow Metal Blast-Resistant Doors and Frames shall have been evaluated, certified, or physically tested to resist explosive blast loads and UFC 4-010-01 defined levels of protection as follows Specifier: select applicable one(s) and delete the others:

- a. Very Low Level of Protection (VLLOP) – Category IV in ASTM 2247-11: Limited Hazard Failure. The door leaf may become separated from the frame or the frame anchorage may fail and the entire door leaf and assembly may become separated from the structure wall and be thrown into occupied space. The dislodged door leaf or assembly and all hardware must remain within a 10-ft (3-m) of the inside face of the door after responding.
- b. Low Level of Protection (LLOP) - Category III in ASTM 2247-11: Non-catastrophic Failure. The door may get lodged into the frame from the blast force or the door may swing open in rebound. The door may be inoperable and may hinder ingress / egress. Acceptable permanent deformation or damage is determined by the Specifier based on the end use of the door. The door and hardware components are not permitted to detach from the frame and be thrown into occupied space. The frame and frame anchorage must remain an integral system and maintain attachment to the structure wall.
- c. Medium Level of Protection (MLOP) - Category II in ASTM 2247-11: Damaged but Openable. The door panel, frame, and/or hardware has acceptable permanent deformation or damage; however, the door remains Openable. An Openable door can successfully unlatch and swing open far enough to allow ingress / egress. Acceptable permanent deformation or damage and degree of opening to permit ingress / egress is determined by the Specifier based on the end use of the door.
- d. High Level of Protection (HLOP) – Category I in ASTM 2247-11: Undamaged. The door is substantially unchanged, responding essentially elastically to blast loading and remains fully operable. Any permanent deformation shall be within 3 mm (1/8 in.) of the initial condition. The door must be able to unlatch and swing open and then closed and latch. The door can be secured. The external portion of the frame, frame anchorage, latches, and hinges shall not show any visible damage.

Where laminated glazing is used in the door system, it shall have been evaluated, certified, or physically tested to resist explosive blast loads and UFC 4-010-01 defined levels of protection as follows

Specifier: select applicable one(s) and delete the others:

- a. Very Low Level of Protection (VLLOP) – H4 Low Hazard Rating in ASTM F2912-11. Glazing may fracture, come out of the frame and is likely to be propelled into occupied space with potential to cause serious injuries. Ejected fragments typically land 3.33-ft (1-m) from the inside face of the window on the finished floor to less than 20-in. (50-cm) above the floor on a vertical witness panel located 10-ft (3-m) from the interior face of the window.
- b. Low Level of Protection (LLOP) – H3 Very Low Hazard Rating in ASTM F2912-11. Glazing may fracture and come out of the frame at a reduced velocity that does not present a significant injury hazard. Ejected fragments will land on the floor within 3.33-ft (1-m) of the interior face of the window.
- c. Medium Level of Protection (MLOP) – Minimal Hazard Rating. Glazing will fracture but remains in the frame with minimal hazard consisting of glass dust and slivers.
- d. High Level of Protection (HLOP) – No Hazard Rating. Glazing remains in the frame and does not crack or break.

Compliance with these criteria are demonstrated through equivalent static testing using the methodology in ASTM F2247-11, dynamic testing using the methodology in ASTM F2927-12, or non-linear dynamic analysis calculations using computer programs such as SBEDS v4.1a. Where glazing is provided that must resist blast loads, it shall be a laminated single lite or an insulating glazing unit (IGU) with laminated interior lite and monolithic fully tempered exterior lite with a minimum ¼-in. thickness. Compliance with glazing requirements may be demonstrated through dynamic testing to meet the applicable level of protection and performance requirements in ASTM 2912 – 2011 by the testing methodology in ASTM F1642 – 2012, static analysis using the 3-second duration load from ASTM F2248 – 2012 and the analysis methodology in ASTM E1300 – 2012ae1, or non-linear dynamic analysis calculations using the computer dynamic analysis programs WinGARD PE v5.5.1 or SBEDS-W v1.0. Compliance with forced entry requirements may be demonstrated through testing in accordance with DoS.

SD-STD-01.01, Revision G. If any door or frame product cannot meet these requirements because of design, hardware or any other reason, the Architect shall be so advised in the submittal documents. If hardware, glazing, or other options are unknown at the time of submittal document preparation, the architect shall be advised prior to fabrication. Hollow Metal Blast-Resistant doors and frames shall incorporate recycled materials in at least 30% by weight.

1.5 SUBMITTALS Submit shop drawings showing profiles, product components, anchors, and accessories. Details deemed to be proprietary by the manufacturer may be identified as such. Submit installation instructions and installation tolerances if other than as specified in ANSI/SDI A250.11 or HMMA 840. Submit jobsite storage and protection requirements if other than as specified herein or in HMMA 861 or HMMA 840-TN01. Provide certification of compliance or calculations demonstrating compliance with all explosive blast load performance criteria as noted in 1.4.

1.6 QUALITY ASSURANCE Installer shall have documented experience in installation of Hollow Metal Blast-Resistant doors and frames, including the specialized hardware required. Fabricate products to tolerances in compliance with HMMA 841.

1.7 DELIVERY, STORAGE, AND HANDLING Store and handle products in accordance with HMMA 840, and HMMA 840-TN01 in manufacturer's original, unopened, undamaged containers. Assure that protection for glazing (if applicable) is intact. Protect materials, including accessories, in a secure area protected from adverse temperature and humidity conditions. Store doors and frames upright on wood planking, protected at corners to prevent damage. Do not store in non-vented plastic or canvas shelters.

1.8 COORDINATION Coordinate work with other directly affected trades, wall construction, and hardware installation. Coordinate hardware locations with Sections 08 11 13 and 08 12 13. The Hollow Metal Blast-Resistant door and frame manufacturer shall be provided with the final approved hardware schedule along with current templates for ALL hardware items prior to beginning any manufacturing. Coordinate placing of material orders and fabrication schedules with construction progress. Where glazing occurs, coordinate removable stop side, clearly indicated on shop drawings.

1.9 WARRANTY Submit written copy of manufacturer's standard warranty documents.

2.2 HOLLOW METAL BLAST-RESISTANT DOORS Specifier Note: Actual door thickness, face sheet thickness, internal construction, etc. depend on performance required and therefore cannot be individually specified. Provide "MegaBlast" Series Hollow Metal Blast-Resistant doors not less than 1 3/4" nominal thickness as listed in the door schedule and indicated on the Drawings in accordance with this specification. Opening sizes, configurations and types shall be as indicated on the Drawings and/or door schedule. Fabricate doors with face thickness required to meet performance specified. Cold and hot rolled steel for door faces and reinforcing shall comply with ASTM A568, A1008 or A1011. Hot-dip galvanized steel, where indicated on the door schedule, shall comply with ASTM A653 or A924. Coating thickness shall be (select) (Class A40) (Class A60).

Specifier: select or delete this paragraph: Stainless steel for door faces, where indicated on the door schedule, shall comply with ASTM A 666 and shall be (select) (type 304) (type 316). Finish shall be (select) (# 4 grained) (# 2B mill finish). Grain for # 4 finish shall run vertically. Fabricate faces and edges as seamless doors from two sheets of steel with no visible seams on either face or vertical edges; continuously weld door edges, fill and finish smooth. All doors shall be handed with either square or bevel edges (at manufacturer's option). Vertical edges shall be reinforced with continuous channels at hinge and lock edges. Channel shall be formed from one member; spliced channels are not permitted. Internal stiffeners shall be continuous (interrupted only in the areas of hardware, visions, or other such devices) formed steel sections spanning the full interior thickness between door faces. Thickness, size, spacing, and welding of stiffeners shall be as required by performance specified. Spaces between stiffeners shall be filled with fiberglass or mineral rock wool batt-type material. Top and bottom of doors shall be closed flush by steel channels configured to meet performance specified. Hardware Preparation: Mortise, reinforce, drill, and tap to receive templated mortise hardware using reinforcement thicknesses configured to meet performance specified. Reinforce only for specified surface hardware or hardware mounted to top/bottom channels using reinforcement configured to meet performance specified. Where double doors (pairs) of Hollow Metal Blast-Resistant doors are scheduled, configure meeting edges, tubular edge members, reinforcing, mullions, or other such accessories as required to meet performance specified in 1.4. Where doors must meet blast performance requirements, a 3-side supported condition will be provided through the use of (select) (drop pin door reinforcing) (bearing on the threshold piece) (a removable center mullion). This means of additional support will be shown to be adequate through (select) (dynamic testing) (static testing) (non-linear dynamic analysis) (static design for the peak dynamic reaction transferred to the support). Where doors are scheduled to include vision panels, fabricate vision framing integrally welded opposite the potential blast side of the door and removable angle or zee shaped stop on potential blast side with dimensions as required to suit glazing material. Removable stops shall be welded at corners into 4-sided frame. Preparation for glazing detail shall be shown on shop drawings. Removable stops shall be attached with pan or button head screws of size and spacing to meet performance requirements. Glazing material shall be as required to meet performance requirements and shall be (select) (furnished and installed by glazier) (furnished by door manufacturer and installed by glazier) (furnished and installed by door manufacturer). Blast performance of laminated glazing for the applicable level of protection shall be shown through (select) (dynamic testing) (static testing) (dynamic non-linear analysis) as noted in 1.4.

2.3 HOLLOW METAL BLAST-RESISTANT FRAMES Specifier Note: Actual frame thickness, reinforcing or component thickness, and anchoring depend on performance required and therefore cannot be individually specified. Provide "MegaBlast" Series Hollow Metal Blast-Resistant frames as listed in the door schedule and indicated on the Drawings in accordance with this specification. Opening sizes, profiles, anchors, and types shall be as indicated on the Drawings. Fabricate frame thickness as required to meet performance specified. Cold and hot rolled steel for frames and reinforcing shall comply with ASTM A568, A1008 or A1011. Hot-dip galvanized steel for frames shall comply with ASTM A653 or A924. Coating thickness shall be (select) (Class A40) (Class A60).

Specifier: select or delete this paragraph: Stainless steel for frames, where indicated on the door schedule, shall comply with ASTM A 666 and shall be (select) (type 304) (type 316). Finish shall be (select) (# 4 grained) (# 2B mill finish). Grain for # 4 finish shall run vertically on head and jambs.

Fabricate frames with tightly fitting mitered corners and butted stops. Continuously weld frame faces, rabbets, soffits, and stops at corners internally or externally; fill, and finish smooth. Provide temporary shipping spreader welded to jambs at bottom. Hardware Preparation: Mortise, reinforce, drill, and tap to receive templated mortise hardware using reinforcement thicknesses configured to meet performance specified. Reinforce only for specified surface hardware using reinforcement configured to meet performance specified. Provide frames with one welded-in floor anchor per jamb and wall anchors to suit the substrate. Quantity and spacing of wall anchors shall be as required to meet performance specified.

2.4 HOLLOW METAL BLAST-RESISTANT FRAMES WITH GLAZING Where door frames, windows, or borrowed light frames are scheduled to include glazing, fabricate frame perimeter similar to 2.3. Mullions or bars shall be reinforced to meet performance specified and shall be continuously face welded both sides at all intersections. Integral frame stops shall be notched and butted at intersections. Removable stops shall be angle or zee shaped members on potential blast side with dimensions as required to suit glazing material. Removable stops shall be welded at corners into 4-sided frame. Preparation for glazing detail shall be shown on shop drawings. Removable stops shall be attached with pan or button head screws of size and spacing to meet performance requirements. Glazing material shall be as required to meet performance requirements and shall be (select) (furnished and installed by glazier) (furnished by door manufacturer and installed by glazier) (furnished and installed by door manufacturer). Adequate performance under blast loading shall be shown through (select) (dynamic testing) (static testing) (dynamic non-linear analysis) as described in 1.4. Structural silicone sealant and mechanical bite will be designed to ensure adequate behavior of the system under blast loading.

2.5 OPERATING CLEARANCES Doors shall be undersized from frame opening sizes at head, jamb, and threshold in accordance with HMMA-841.

2.6 HARDWARE LOCATIONS Unless otherwise specified, hinges and locks shall be located in accordance with door manufacturer's standard and shall be shown on shop drawings. Specifier: delete the following paragraph only if unpainted stainless steel is required:

2.7 PRIMER FINISH Clean and treat exposed surfaces of doors and frames to ensure prime paint adhesion; apply one shop coat of "low VOC" gray rust-inhibitive primer meeting acceptance criteria of ANSI A250.10.

PART 3 EXECUTION 3.1 EXAMINATION Before beginning installation contractor shall verify that substrate conditions are acceptable for supporting completed assemblies; adequately protect any areas of frames from grout penetration or for mounting screws where frames are fully grouted. Refer to HMMA 820-TN01. Review manufacturer's design calculations for familiarity and assure that proper anchors are available. Select fasteners of adequate type, number, and quality to perform intended functions. Specifier: select this sentence only if stainless steel is required: Remove protective wrappings only after construction is sufficiently completed so that doors and frames will not be scratched or damaged.

3.2 INSTALLATION Install frames plumb, straight, and true, rigidly secured in place and properly braced; comply with ANSI/SDI A250.11, and HMMA-841. Grout fill frames in new masonry in accordance with ANSI/SDI A250.11, and HMMA 820-TN01. Secure any bolted connections to adjacent construction using bolts suitable for the substrate. Install accessories, doors, and hardware in accordance with manufacturers' templates and instructions. Specifier: delete the following two sentences only if unpainted stainless steel is required: Touch-up exposed surfaces, scratches or bare edges with a rust inhibitive Direct to Metal primer. Prepare surfaces for field painting as recommended by door and frame manufacturer and as specified in Section 09 90 00.

3.3 PROTECTION Protect installed products and finished surfaces from damage during construction. Specifier: select this sentence only if stainless steel is required: Remove protective wrappings only after construction is sufficiently completed so that doors and frames will not be scratched or damaged.

3.4 FINAL ADJUSTMENTS After construction work has been completed in the area, clean and adjust hinges, locks, and closers to assure proper operation prior to turn-over to Owner.

