



GUIDE SPECIFICATIONS FOR
FORCED ENTRY / BULLET
RESISTANT (FE/BR)
SECURITY HOLLOW METAL
DOORS AND FRAMES



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INTRODUCTION

FE/BR SECURITY HOLLOW METAL SYSTEMS

For many years, hollow metal door and framing systems have been used as the primary and initial defense against forced entry. Architects, specifiers, and end users have come to understand the advantages of using hollow metal doors and frames in FE/BR, “Forced Entry / Bullet Resistant”, security applications, such as, airports, convention centers, hotels, and offices, and in foreign and domestic government buildings such as, embassies, offices, and barracks.

The original standard, ANSI/NAAMM HMMA 862-03, was developed to provide guidance in the specification of FE/BR security hollow metal doors and frames where protection from vandalism, forced entry, theft, and firearms attack is a paramount concern.

It is necessary when writing a FE/BR security specification to keep in mind the security aspects of the entire opening – door, frame, hardware, glazing and wall construction. The test performance criteria set forth in this document simulates the “total opening” and its ability to frustrate forced entry, and ballistic penetration.

DESIGN VERSATILITY

FE/BR hollow metal construction provides the architect with a great deal of freedom in the design of hollow metal products. The architect can also take advantage of the expertise acquired by those hollow metal manufacturers experienced in FE/BR security work. Over the years NAAMM/HMMA manufacturers have developed advanced methods and equipment enabling them to efficiently manufacture hollow metal assemblies, which address today’s difficult FE/BR security applications. These applications include working with the latest in burglary and bullet resisting hardware and security glazing. A number of these manufacturers offer proven economical and functional designs of FE/BR security hollow metal systems.

EVALUATING FORCED ENTRY / BULLET RESISTANT (FE/BR) SECURITY HOLLOW METAL SYSTEMS

In order to evaluate the performance of FE/BR security hollow metal, it has been necessary to develop testing methods which simulate in the laboratory the system’s ability to frustrate attacks initiated by unskilled, semi-skilled and skilled assailants and/or the system’s ability to resist ballistic penetrations. One objective of this development work is to provide a standardized means of measuring performance which architects can call for in their specifications. Another objective is to provide manufacturers standardized means of testing and inspecting their products, improving their designs, and maintaining high quality construction. Finally, maintenance of rigorous standards and methods of testing construction and performance gives assurance of protection to the end user and the public in general. The performance requirement and methods of testing set forth in this voluntary standard will go a long way towards realizing the stated objectives.

TESTING

This standard for FE/BR security hollow metal has been developed to allow architects to specify doors and frames based on the level of security required for specific openings. This standard considers two conditions, Forced Entry and Ballistic Resistance, or as is commonly known as “FE/BR”. There are tests described by this specification which are to be conducted in accordance with; SD-STD-01.01, Revision G; “Certification Standard on Forced Entry and Ballistic Resistance of Structural Systems”; ASTM F3038, “Standard Test Methods for Timed Evaluation of Forced-Entry-Resistant Systems”; and UL Standard 752, “Bullet Resisting Equipment”; and LPS 1175: “Specification for Testing and Classifying the Burglary Resistance of Building Components, Strong Points and Security Enclosures”.

The following are brief descriptions of the bullet resistance and the forced entry tests commonly specified for FE/BR products and systems:

The bullet resistance test is conducted in accordance with UL Standard 752 and SD-STD-1.01, Rev. G.

These standards cover bullets fired from super power rated handguns to high-powered rifles.

resisting” signifies protection against complete penetration, passage of fragments of projectiles, or spalling (fragmentation) of the protective material to the degree that injury would be caused to a person standing directly behind the bullet resisting barrier.

The forced entry attack tests demonstrate a “real world” battery of tests where a team of persons actually attacks the face of the assembly and the hinge and locking elements using a host of tools and equipment provided for testing in accordance with the rating classification required.

CONSTRUCTION

The construction of FE/BR security hollow metal varies much depending upon the rating classification required. Also, many manufacturers that have tested to these standards guard the construction of their products with patents or proprietary information. The ensuing specification denotes recommended material thickness, how the doors and frames are to be welded, how and where hardware reinforcements are to be used, and how the product are to be finished and packaged for shipment.

Such prescriptive requirements are not intended to restrict innovative design. This is essentially a performance-based specification, and alternative constructions are to be permitted so long as the manufacturer demonstrates successful completion of the prescribed test requirements and associated certifications.

To summarize, this Specification recommends that the stated minimum material and fabrication requirements herein be followed, and that adherence to the manufacturer’s certified designs is also required.

FOREWORD

These specifications have been prepared in accordance with CSI recommended format with Part 1 - General, Part 2 -Product, and Part 3 -Execution. Guide specifications are intended to be used as the basis for developing job specifications and are to be edited to fit specific job requirements. Inapplicable provisions are to be deleted, appropriate selections are to be made where there are choices, and provisions applicable to the job are to be added where necessary. Optional items or requirements are shown in brackets. Notes and instructions to specifiers are given in italics directly following or at the start of the section to which they apply. Notes that contain permissive language are not considered part of the standard. The standards listed in this Guide are referenced by basic designation only. The edition of a Standard is noted as that in effect on the publication date this Guide, unless specifically noted otherwise. If a more recent standard is available, the specifier should verify its applicability to this guide prior to its inclusion.

Note: While the CSI Section Format locates Delivery, Storage, and Handling in Part 1, NAAMM Standards include them under Part 3 - Execution.

Materials and fabrication methods are specified in detail in Part 2. FE/BR Security Hollow Metal made in accordance with these specifications have successfully met the testing and performance requirements of Section 1.05. However, the materials and fabrication methods called for in these specifications, while providing a sound guide, are not meant to restrict the use of other materials and methods where it can be demonstrated through the specified testing procedures in Section 1.05 that the construction can equal or exceed the performance levels specified in this Section. In order to ensure that a manufacturer’s product meets the desired performance levels, the construction specifications must include the testing and performance requirements of Section 1.05 and the quality requirements of Section 1.06.

The values stated in inch-pound units are to be regarded as the standard. Corresponding metric values are included in parentheses for reference purposes only.

CSI SECTION 08 34 53 SECURITY DOORS AND FRAMES

PART 1 – GENERAL

1.01 SUMMARY

This section includes FE/BR security hollow metal [bullet resistant] [forced entry resistant] assemblies as scheduled in the contract documents and as specified herein.

1.02 PRODUCTS PROVIDED UNDER THIS SECTION

- A. FE/BR security hollow metal [bullet resistant] [forced entry resistant] doors [with 3 hour, 1-1/2 hour, 3/4 hour, 1/3 hour fire rating], swinging type as scheduled in the contract documents and as specified herein.
- B. Include [glazing molding and stops] [louvers] [speaking devices] [other] in FE/BR security hollow metal [bullet resistant] [forced entry resistant] doors as scheduled in the contract documents and specified herein.
- C. FE/BR security hollow metal [bullet resistant] [forced entry resistant] frames [for 3 hour, 1-1/2 hour, 3/4 hour, 1/3 hour fire rating] with anchors.
- D. Include [glazing molding and stops] [pass through devices] in FE/BR security hollow metal [bullet resistant] [forced entry resistant] frames as scheduled in the contract documents and specified herein.
- E. FE/BR security hollow metal [bullet resistant] [forced entry resistant] panels [with 3 hour, 1-1/2 hour, 3/4 hour, 1/3 hour fire rating] of the same construction as the FE/BR security doors.

Indicate bullet resistant/forced entry resistant doors, frames and panels only if applicable to the job. If these are to be fire-rated doors, frames and panels, indicate the required rating. Also indicate those items in 1.02.B and 1.02.D, which need to be included with the doors.

1.03 RELATED SECTIONS

- A. Section 01 66 00 – Product Storage and Handling
- B. Section 03 30 00 – Cast in Place Concrete
- C. Section 04 20 00 – Unit Masonry
- D. Section 05 10 00 – Structural Metal Framing (for Lintels, Posts, Columns or Other Load Bearing Elements)
- E. Section 06 11 00 – Wood Framing
- F. Section 08 11 19 – Stainless Steel Doors and Frames
- G. Section 08 34 73 – Sound Control Doors and Frames
- H. Section 08 71 00 – Door Hardware
- I. Section 08 71 20 – Weather Stripping and Seals
- J. Section 08 80 00 – Glazing
- K. Section 09 20 00 – Plaster and Gypsum Board (for the Installation of FE/BR Hollow Metal Doors and Frames in Steel Stud Partitions).
- L. Section 09 90 00 – Painting and Coating
- M. Section 11 19 00 – Detention Equipment
- N. Section ____ – Field Measurements
- O. Section 08 11 13 Hollow Metal Doors and Frames

Not included in this section are installation of doors, frames, panels, door hardware or rough hardware of any kind, weather-stripping, gasketing, operable windows, items furnished by others, field painting and protection at the building site of products furnished under this section.

1.04 REFERENCES The Standards listed in this Guide are referenced by basic designation only. Use the edition of a Standard that is in effect on the publication date this Guide, unless specifically noted otherwise. If a more recent standard is available, the specifier should verify its applicability to this guide prior to its inclusion.

- A. ANSI A 250.10, Standard Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames
- B. ANSI / NAAMM HMMA 801, Glossary of Terms for Hollow Metal Doors and Frames
- C. ANSI / NAAMM HMMA 840, Installation and Storage of Hollow Metal Doors and Frames
- D. ANSI / NAAMM HMMA 866, Guide Specifications for Stainless Steel Hollow Metal Doors and Frames
- E. ANSI / NFPA 80, Fire Doors and Windows
- F. ANSI / NFPA 105, Standard for the Installation of Smoke Control Door Assemblies
- G. ANSI / NFPA 252, Standard Methods of Fire Tests of Door Assemblies
- H. ANSI / NFPA 257, Methods for Fire Test of Window Assemblies
- I. ANSI / UL 9, Fire Tests of Window Assemblies
- J. ANSI / UL 10B, Fire Tests of Door Assemblies
- K. ANSI / UL 10C, Standard for Positive Pressure Fire Tests of Door Assemblies
- L. ASTM A 653 / A 653M, Specification for Steel Sheet, Zinc-coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot Dipped Process, (FE/BR Steel)
- M. ASTM A 666, Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate and Flat Bar.
- N. ASTM A 1008 / A 1008M, Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability
- O. ASTM A 1011 / A 1011M, Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength
- P. ASTM C 143 / C 143M, Standard Test Method for Slump of Hydraulic Cement Concrete
- Q. ASTM F 3038, Test Method for Timed Evaluation of Forced-Entry-Resistant Systems
- R. ASTM F 3217, Standard Guide for Security Fasteners
- S. CAN/ULC-S104, Standard Method for Fire Tests of Door Assemblies
- T. CAN/ULC-S106, Standard Method for Fire Tests of Window and Glass Block Assemblies
- U. NAAMM HMMA 803, Steel Tables
- V. NAAMM/HMMA 805, Recommended Selection and Usage Guide for Hollow Metal Doors and Frames
- W. NAAMM HMMA 820, Hollow Metal Frames
- X. NAAMM HMMA-820 TN01, Grouting Hollow Metal Frames
- Y. NAAMM HMMA 850, Fire-Rated Hollow Metal Doors and Frames, Second Edition AA.
- Z. UL 752, Bullet Resisting Equipment
- AA. UL 1784, Standard for Air Leakage Tests of Door Assemblies, 3rd Edition.

AB. NAAMM HMMA 850, Fire-Rated Hollow Metal Doors and Frames, 3rd Edition

AC. LPS 1175, Specification for Testing and Classifying the Burglary Resistance of Building Components, Strong Points and Security Enclosures (see LPC Loss Prevention Council)

AD. State Department Standard SD-STD-01.01, Revision G, Certification Standard for Forced Entry and Ballistic Resistance

1.05 TESTING AND PERFORMANCE

These test methods are intended to evaluate simulated forced entry resistance of a door and frame assembly to attacks using battering devices, common hand tools, powered hand tools, static loading, and bullets. These test methods are not to provide a measure of resistance for door and frame assemblies subjected to attack by corrosive agents.

The primary purpose of these test methods is to approximate the levels of abuse to which door and frame assemblies can be subjected in the course of a forced entry attack. The desired result of its use is to help ensure the protection to both public and private property and the safety of the inhabitants or occupants of the building where these door and frame assemblies will ultimately be used.

It is recommended that architects and building design personnel decide which security rating is required for each opening.

A. Test Samples

1. Construct test sample door and frame assemblies in accordance with Part 2 of this specification.
2. Permanently mark the test samples and retain them at the manufacturing facility for future reference for a period of one (1) year from date tested. Engage an independent testing agency to verify all tests. Include photographs of the testing apparatus and installation instructions including templates for the items of hardware used.

B. Specimen Preparation

1. Construct the test door assemblies consisting of single/double doors, frames, mulled systems and all hardware components such that they are representative of the application under investigation and the desired security classification needed for the application. Use the same basic construction and size of test doors and assemblies for all tests. Equip each test door with a vision panel, deal tray, or other features or options if applicable.

C. Forced Entry Fixturing

1. Install the wall and door assembly in a fixture typically constructed from steel tube, I-beam and angles. Construct this fixture such that it simulates the rigidity normally provided to a door assembly in a building by the ceiling, floor and walls in accordance with the applicable forced entry test standard.
2. Construct a rigid vertical test wall that is suitable for mounting the door and frame assembly in its normal attitude. Construct the wall section in such a manner that it will not contribute to the deflection of the door and frame assembly during bullet resistance and forced entry testing.
3. Mount the door and frame assembly under test in the rough opening in accordance with the manufacturer's installation instructions. Secure any opening elements in their optimum locked condition as appropriate.

D. Procedures

1. Bullet Penetration
 - a. When specified by the contract documents, test door assemblies for bullet penetration resistance in accordance with UL-752 or SD-STD-01.01, Rev. G.
 - b. Conduct testing of door, frame, hardware, security glazing, and other features and options as an assembly in accordance with UL-752 or SD-STD-01.01, Rev. G.
 - c. If testing in accordance with UL-752 is specified, meet the level of performance rating required in accordance with Table 1.

TABLE 1

Ratings of Bullet Resistant materials as identified by: UL 752						
Rating	Ammunition	Weight (grains)	Weight (grams)	Min fps	Max fps	No. of shots
Level 1	9mm Full Metal Copper Jacket with Lead Core	124	8.0	1175	1293	3
Level 2	.357 Magnum Jacketed Lead Soft Point .	158	10.2	1250	1375	3
Level 3	.44 Magnum Lead Semi-Wadcutter Gas Checked	240	15.6	1350	1485	3
Level 4	.30 Caliber Rifle Lead Core Soft Point (.30-06 Caliber)	180	11.7	2540	2794	1
Level 5	7.62mm Rifle Lead Core Full Metal Copper Jacket Military Ball (.308 Caliber)	150	9.7	2750	3025	1
Level 6	9mm Full Metal Copper Jacket with Lead Core	124	8.0	1400	1540	5
Level 7	5.56mm Rifle Full Metal Copper Jacket with Lead Core (.223 Caliber)	55	3.56	3080	3383	5
Level 8	7.62mm Rifle Lead Core Full Metal Copper Jacket Military Ball (.308 Caliber)	150	9.7	2750	3025	5
Level 9	.30-06 caliber rifle, steel core, lead point filler, FMJ (APM2)	166	10.8	2715	2987	1
Level 10	.50 caliber rifle, lead core FMCJ Military Ball (M2)	709.5	45.9	2810	3091	1
Shotgun	12-Gauge Rifled Lead Slug	1 Oz.	28.3	1585	1744	3
	12-Gauge 00 Buckshot (12 pellets)	1.5oz	42	1200	1320	3

2. Forced Entry Attack Test

- This test is designed to evaluate the resistance to physical attack of FE/BR security door and frame assemblies prepared for hardware and other options.
- This test is intended to simulate actual field conditions whereby an assailant or group of assailants has full access to certain handheld tools, and attacks the door face, hinge elements, locking elements, glazing, and other features in an attempted forced entry.
- Apparatus: Use the test fixture and wall described in Section 1.05.C in this test.
- Procedure: Install and test door and frame and/or window assemblies in accordance with LPS 1175, "Specification for Testing and Classifying the Burglary Resistance of Building Components, Strongpoints and Security Enclosures", or SD-STD-01.01, Revision G, "Certification Standard for Forced Entry and Ballistic Resistance of Structural Systems" or ASTM F3038, "Test Method for Timed Evaluation of Forced-Entry Resistant Systems".

E. Labeled Fire-Rated Doors and Frames

1. Doors, frames, transom frames and sidelight assemblies provided for openings requiring fire protection, temperature rise, and/or smoke and draft control which are listed and/or classified and bear the label of a testing agency having a factory inspection service. Test the product in accordance with [ANSI/NFPA 252 or ANSI/UL-10B or CAN/ULC-S104] [ANSI/UL-10C] [UL 1784 or in accordance with ANSI/NFPA 105] and constructed as listed or classified for labeling. The architect determines and schedules the Fire, temperature rise and/or smoke and draft control ratings.
2. Provide window frames for openings requiring fire protection ratings which are listed and bear the label of a testing agency having a factory inspection service. Test frames in accordance with ANSI/UL 9 or [ANSI/NFPA 257 or CAN/ULC-S106] and construct frames as listed for labeling. The architect determines and schedules fire and/or smoke and draft control ratings.

UL 10C provides for positive pressure testing to accommodate the requirements of some jurisdictions and should be included only for such.

UL 1784 and ANSI/NFPA 105 provides for smoke and draft control assembly testing to accommodate these specific requirements, and should be included only when required.

Include CAN4-S104 and CAN4-S106 only for projects requiring conformance with Canadian Building Codes.

3. Advise the architect in the submittal documents if any door or frame product specified to be fire-rated cannot qualify for labeling because of design, hardware or any other reason. Advise the architect of hardware, glazing, or other options that affect the fire-rating and that were unknown at the time of submittal document preparation.

For additional information, refer to NAAMM HMMA 850, "Fire-Rated Hollow Metal Doors and Frames"

F. Prime Paint Performance (ANSI A250.10)

1. Meet acceptance criteria described in ANSI A250.10.
2. Include a description of the test specimens, procedures used in testing in all test reports and certificates of compliance, and indicate compliance with the contract documents specified acceptance criteria.

1.06 QUALITY ASSURANCE

A. Manufacturer's Qualifications

1. Provide evidence of having personnel and plant equipment capable of fabricating hollow metal door and frame assemblies of the type specified herein.
2. Provide evidence of having a written quality control system in place.

B. Quality Criteria

Provide that all doors, frames, and assemblies meet the requirements of Section 1.05 of these specifications. Fabricate in strict accordance with the approved submittal drawings. Provide that fabrication methods and product quality 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 the contract documents and NAAMM's HMMA 800 through 850 Series documents.

1.07 SUBMITTALS

A. Submittal Drawings

1. Show dimensioned door and frame elevations and sections.
2. Show listing of opening descriptions including locations, thicknesses, and anchors.
3. Show location and details of openings.
4. Indicate FE/BR ratings on the submittal as they are shown on the contract documents and in the door schedule.

B. Samples (if required)

1. Door: 1 ft x 1 ft (305 mm x 305 mm) corner section with hinge mortise and reinforcement showing internal construction.
2. Frame: 1 ft x 1 ft (305 mm x 305 mm) corner section showing welding of head to jamb. Include hinge mortise, reinforcement and grout guard in one rabbet, and glazing stop applied as specified in the opposite rabbet. Apply glazing stop in both head and jamb section to show corner joint.
3. Fabricate samples for submission that are of the production type and that represent in all respects the minimum quality of work to be furnished by the manufacturer. Do not proceed with any work represented by the samples until the samples are approved. Any deficiency of quality compared to the approved samples may be cause for rejection of the work.

C. Test Report Required from the Manufacturer

1. Submit to the Architect upon request, an independent testing laboratory report certifying that door and frame assemblies meet the performance requirements of Section 1.05 and are constructed in accordance with Sections 2.01 and 2.03 of these specifications.

D. Manufacturer Qualifications

1. Submit to the architect upon request, ten (10) days prior to bid date, his qualifications as required by Section 1.06.

PART 2 – PRODUCTS

2.01 STEEL

- A. Used in the fabrication of hollow metal door and frame products shall meet one, or more, of the following requirements *ANSI and ASTM Standards no longer utilize "gage" to define steel thickness.*

In this Specification steel is expressed in terms of minimum decimal inch (millimeter) thickness. Dimensions or size traditionally expressed in fractional inches are shown in decimal inches (millimeters). HMMA has developed a Table, NAAMM/HMMA 803 to summarize the imperial standards and their corresponding metric values.

1. Cold-rolled steel conforming to ASTM A1008/A 1008M, "Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High Strength Low-Alloy and High Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable" and ASTM A 568/A 568M "Standard Specification for Steel, Sheet, Carbon, Structural, and High-Strength, Low Alloy, Hot-Rolled and Cold-rolled, General Requirements for."
2. Hot-rolled, pickled and oiled (HRPO) steel conforming to ASTM A 1011/A 1011M, "Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High Strength Low-Alloy and High Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable" and ASTM A 568/A 568M "Standard Specification for Steel, Sheet, Carbon, Structural, and High-Strength, Low Alloy, Hot-Rolled and Cold-rolled, General Requirements for."