
USACE / NAVFAC / AFCEA / NASA UFGS-08 34 02 (April 2006)

Preparing Activity: USACE Replacing without change
UFGS-11035 (February 2004)

UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated January 2008

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04/06

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SECTION 08 34 02

BULLET-RESISTANT COMPONENTS 04/06

NOTE: This section covers requirements for bullet resistant components including doors, windows, louvers, gunports, pass drawers, deal trays, and speaking apertures.

Edit this guide specification for project specific requirements by adding, deleting, or revising text. For bracketed items, choose applicable items(s) or insert appropriate information.

Remove information and requirements not required in respective project, whether or not brackets are present.

Comments and suggestions on this guide specification are welcome and should be directed to the technical proponent of the specification. A listing of technical proponents, including their organization designation and telephone number, is on the Internet.

Recommended changes to a UFGS should be submitted as a Criteria Change Request (CCR).

PART 1 GENERAL

1.1 REFERENCES

NOTE: This paragraph is used to list the publications cited in the text of the guide specification. The publications are referred to in the text by basic designation only and listed in this paragraph by organization, designation, date, and title.

Use the Reference Wizard's Check Reference feature when you add a RID outside of the Section's Reference Article to automatically place the reference in the Reference Article. Also use the

Reference Wizard's Check Reference feature to update
the issue dates.

References not used in the text will automatically
be deleted from this section of the project
specification when you choose to reconcile
references in the publish print process.

The publications listed below form a part of this specification to the
extent referenced. The publications are referred to within the text by the
basic designation only.

AIR MOVEMENT AND CONTROL ASSOCIATION INTERNATIONAL (AMCA)

AMCA 500-D (1998) Laboratory Methods of Testing
Dampers for Rating

ALUMINUM ASSOCIATION (AA)

AA DAF-45 (2003) Designation System for Aluminum
Finishes

AMERICAN ARCHITECTURAL MANUFACTURERS ASSOCIATION (AAMA)

AAMA 611 (1998) Voluntary Specification for
Anodized Architectural Aluminum

ASTM INTERNATIONAL (ASTM)

ASTM A 123/A 123M (2002) Standard Specification for Zinc
(Hot-Dip Galvanized) Coatings on Iron and
Steel Products

ASTM A 653/A 653M (2007) Standard Specification for Steel
Sheet, Zinc-Coated (Galvanized) or
Zinc-Iron Alloy-Coated (Galvannealed) by
the Hot-Dip Process

ASTM C 1036 (2006) Standard Specification for Flat
Glass

ASTM C 1048 (2004) Standard Specification for
Heat-Treated Flat Glass - Kind HS, Kind FT
Coated and Uncoated Glass

ASTM C 1172 (2003) Standard Specification for
Laminated Architectural Flat Glass

ASTM D 1003 (2000) Haze and Luminous Transmittance of
Transparent Plastics

ASTM D 1044 (2005) Resistance of Transparent Plastics
to Surface Abrasion

ASTM D 1922 (2006a) Propagation Tear Resistance of
Plastic Film and Thin Sheeting by Pendulum
Method

ASTM D 256	(2006a) Determining the Izod Pendulum Impact Resistance of Plastics
ASTM D 3595	(2002) Polychlorotrifluoroethylene (PCTFE) Extruded Plastic Sheet and Film
ASTM D 3951	(1998; R 2004) Commercial Packaging
ASTM D 4093	(1995; R 2005e1) Photoelastic Measurements of Birefringence and Residual Strains in Transparent or Translucent Plastic Materials
ASTM D 4802	(2002) Poly(Methyl Methacrylate) Acrylic Plastic Sheet
ASTM D 542	(2000; R 2006) Index of Refraction of Transparent Organic Plastics
ASTM D 5420	(2004) Impact Resistance of Flat, Rigid Plastic Specimen by Means of a Strike Impacted by a Falling Weight (Gardner Impact)
ASTM D 570	(1998; R 2005) Standard Test Method for Water Absorption of Plastics
ASTM D 635	(2006) Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Self-Supporting Plastics in a Horizontal Position
ASTM D 638	(2003) Standard Test Method for Tensile Properties of Plastics
ASTM D 648	(2007) Deflection Temperature of Plastics Under Flexural Load in the Edgewise Position
ASTM D 696	(2003) Standard Test Method for Coefficient of Linear Thermal Expansion of Plastics Between -30 degrees C and 30 degrees C With a Vitreous Silica Dilatometer
ASTM D 792	(2000) Density and Specific Gravity (Relative Density) of Plastics by Displacement
ASTM D 882	(2002) Tensile Properties of Thin Plastic Sheet
ASTM D 905	(2003) Strength Properties of Adhesive Bonds in Shear by Compression Loading
ASTM E 1300	(2007) Determining Load Resistance of Glass in Buildings
ASTM E 168	(2006) General Techniques of Infrared

Quantitative Analysis

ASTM E 169	(2004) General Techniques of Ultraviolet-Visible Quantitative Analysis
ASTM E 204	(1998; R 2002) Identification of Material by Infrared Absorption Spectroscopy, Using the ASTM Coded Band and Chemical Classification Index
ASTM E 831	(2006) Linear Thermal Expansion of Solid Materials by Thermomechanical Analysis
ASTM E 90	(2004) Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements
ASTM F 1233	(1998; R 2004) Security Glazing Materials and Systems
ASTM F 428	(2003a) Intensity of Scratches on Aerospace Glass Enclosures
ASTM F 520	(1997; R 2004) Environmental Resistance of Aerospace Transparencies
ASTM F 521	(1983; R 2004) Bond Integrity of Transparent Laminates
ASTM F 548	(2003ae1) Intensity of Scratches on Aerospace Transparent Plastics
ASTM F 735	(2006) Abrasion Resistance of Transparent Plastics and Coatings Using the Oscillating Sand Method
ASTM F 791	(1996; R 2002e1) Stress Crazeing of Transparent Plastics
ASTM G 155	(2005a) Operating Xenon Arc Light Apparatus for Exposure of Non-Metallic Materials

BUILDERS HARDWARE MANUFACTURERS ASSOCIATION (BHMA)

BHMA A115.1	(2006) Preparation of 1-3/8" and 1-3/4" Standard Steel Doors and Steel Frames for Series 1000 Mortise Locks and Latches
BHMA A156.1	(2006) Butts and Hinges
BHMA A156.13	(2005) Mortise Locks & Latches, Series 1000
BHMA A156.16	(2002) Auxiliary Hardware
BHMA A156.18	(2006) Materials and Finishes
BHMA A156.4	(2000) Door Controls - Closers

BHMA A156.5	(2001) Auxiliary Locks & Associated Products
BHMA A156.8	(2005) Door Controls - Overhead Stops and Holders
GLASS ASSOCIATION OF NORTH AMERICA (GANA)	
GANA Glazing Manual	(2004) Glazing Manual
H.P. WHITE LABORATORY (HPW)	
HPW TP-0501.01	(1989) Ballistic Resistance of Structural Materials (Opaque and Transparent); Test Procedures and Acceptance Criteria
NATIONAL ASSOCIATION OF ARCHITECTURAL METAL MANUFACTURERS (NAAMM)	
NAAMM HMMA 810	(1987) Hollow Metal Doors
NAAMM HMMA 820	(1987) Hollow Metal Frames
NAAMM HMMA 830	(2002) Hardware Selection for Hollow Metal Doors and Frames
NAAMM HMMA 840	(1999) Installation and Storage of Hollow Metal Doors and Frames
NAAMM HMMA 850	(2000) Fire Rated Hollow Metal Doors and Frames
NAAMM HMMA 862	(2003) Guide Specifications for Commercial Security Hollow Metal Doors and Frames
NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)	
NEMA ICS 2	(2000; Errata 2002; R 2005; Errata 2006) Standard for Industrial Control and Systems: Controllers, Contractors, and Overload Relays Rated Not More than 2000 Volts AC or 750 Volts DC: Part 8 - Disconnect Devices for Use in Industrial Control Equipment
NEMA ICS 6	(1993; R 2006) Standard for Industrial Controls and Systems Enclosures
NEMA MG 1	(2006; Errata 2007) Standard for Motors and Generators
NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)	
NFPA 70	(2007) National Electrical Code
NFPA 80	(2007) Standard for Fire Doors and Other Opening Protectives

NATIONAL INSTITUTE OF JUSTICE (NIJ)

NIJ Std 0108.01 (1985) Ballistic Resistant Protective Materials

U.S. DEPARTMENT OF STATE (SD)

SD Std-01.01 (1993 Rev G Amended; Inx Certified Prod/Mfg) Certification Standard Forced Entry and Ballistic Resistance of Structural Systems

U.S. NAVAL FACILITIES ENGINEERING SERVICE CENTER (NFESC)

NFESC CR 80.025 (1980) Testing and Evaluation of Attack Resistance and Hardening Retrofits of Marine Barrack Construction Types to Small Arms Multiple Impact Threat

UNDERWRITERS LABORATORIES (UL)

UL 752 (2005; Rev thru Dec 2006) Bullet-Resisting Equipment

1.2 SYSTEM DESCRIPTION

1.2.1 Design Requirements

Bullet resistant components shall conform to the requirements specified for the particular items and as much as possible shall be complete assemblies by a single manufacturer.

1.2.2 Performance Requirements

All items specified shall be bullet resistant to the threat specified. Movable and operable components shall operate smoothly and freely. When a reference for performance is listed, operation shall conform to referenced requirements.

1.3 SUBMITTALS

NOTE: Review submittal description (SD) definitions in Section 01 33 00 SUBMITTAL PROCEDURES and edit the following list to reflect only the submittals required for the project. Submittals should be kept to the minimum required for adequate quality control.

A "G" following a submittal item indicates that the submittal requires Government approval. Some submittals are already marked with a "G". Only delete an existing "G" if the submittal item is not complex and can be reviewed through the Contractor's Quality Control system. Only add a "G" if the submittal is sufficiently important or complex in context of the project.

For submittals requiring Government approval on Army projects, a code of up to three characters within

the submittal tags may be used following the "G" designation to indicate the approving authority. Codes for Army projects using the Resident Management System (RMS) are: "AE" for Architect-Engineer; "DO" for District Office (Engineering Division or other organization in the District Office); "AO" for Area Office; "RO" for Resident Office; and "PO" for Project Office. Codes following the "G" typically are not used for Navy, Air Force, and NASA projects.

Choose the first bracketed item for Navy, Air Force and NASA projects, or choose the second bracketed item for Army projects.

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for [Contractor Quality Control approval.] [information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government.] The following shall be submitted in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

NOTE: Submittals SD-03 and SD-10, are to be used only when bifold doors are part of the work. Edit out those paragraphs if no bifold doors are required in the work.

SD-02 Shop Drawings

Installation[; G][; G, [_____]]

Drawings containing complete wiring and schematic diagrams, where appropriate, and any other details required to demonstrate that the system has been coordinated and will properly function as a unit. Drawings shall show proposed layout and anchorage of components and appurtenances, and relationship to other parts of work including clearances for operation and maintenance. Drawings sufficient to show conformance to all requirements, including fabrication details, sizes, thickness of materials, anchorage, finishes, hardware location and installation.

SD-03 Product Data

Bullet Resistant Components

Manufacturer's descriptive data and installation instructions. Descriptive data shall include cleaning instructions as recommended by the plastic sheet manufacturer. Spare parts data for each bifold door, after approval of the related submittals, and not later than [_____] months prior to the date of beneficial occupancy. Data shall include a complete list of parts and supplies, with current unit prices and supply source. Air flow calculations for louvers and louvers in doors shall be included.

Lists including schedule of all components to be incorporated in

the work with manufacturer's model or catalog numbers, specification and drawing reference numbers, warranty information, threat level certified, [fire ratings,] [sound transmission coefficient ratings,] [insulation "U" value,] and number of items provided. Evidence that standard products essentially duplicate items that have been satisfactorily in use for two years or more, including name of purchasers, locations of installations, dates of installations, and service organizations.

Bifold Doors

A copy of the instructions proposed to be framed and posted.

SD-07 Certificates

Bullet Resistant Components

Manufacturer's certificates attesting that all components conform to the requirements on drawings and in specifications. Submittal shall include testing reports from independent testing laboratories indicating conformance to regulatory requirements.

SD-10 Operation and Maintenance Data

Bullet Resistant Components[; G][; G, [_____]]

[Six] [_____] copies of operation and [six] [_____] copies of maintenance manuals for the bifold doors furnished. The manuals shall be approved prior to beneficial occupancy.

1.4 STANDARD PRODUCTS

NOTE: In the event that the designer chooses to design and detail the component for shop fabrication, the materials and construction should be specified in Section 05 50 00 METAL: MISCELLANEOUS AND FABRICATIONS.

Bullet-resisting ratings of metals shall be determined by ballistics tests in accordance with the threat specified in paragraph COMPONENT TEST REQUIREMENTS.

Materials and components shall be the standard products of a manufacturer regularly engaged in the manufacture of such products unless otherwise indicated and detailed on the drawings, and shall essentially duplicate items that have been in satisfactory use for at least two years prior to bid opening. Components shall be supported by a service organization that is, in the opinion of the Contracting Officer, reasonably convenient to the site, or by the manufacturer. Where components are detailed on the drawings and do not conform to a manufacturer's standard product, components shall be constructed of manufacturer's standard materials which conform to the specified ballistic standard or test.

1.5 COMPONENT TEST REQUIREMENTS

NOTE: The threat must be identified before selection of the applicable test standard from Table I. If project criteria includes more than one threat, each component will be correlated with the appropriate regulation or standard it is required to meet. Coordinate with the drawings.

The design threat must be determined based on the importance of the assets in the facility, facility location, history, a likelihood of attacks at the location, and many other factors. The process used to determine design criteria for applicable threat and design guidance to resist the threat is provided in the manuals listed below:

UFC 4-020-1FA Security Engineering - Project Development

UFC 4-020-2FA Security Engineering - Concept Design

UFC 4-020-3FA Security Engineering - Final Design

These manuals are marked "For Official Use Only". and they may be ordered by Department of the Army agencies from the U.S. Army Publications Distribution Center, 2800 Eastern Blvd., Baltimore, MD 21220-2896.

The identified threat criteria should be recorded in the Design Analysis for the project. The designer will indicate the applicable threats, selected from Table I below, under paragraph COMPONENT TEST REQUIREMENTS or in door, window, or other component schedules as appropriate.

There is no single, uniform standard for bullet resistance. Each testing agency has its own parameters. Variables include firing distance to the test component; number of shots fired and proximity to each other; and failure criteria, such as penetration, amount of spall or further operability of the item. Most ballistic threats are based on complete penetration by projectiles or fragments of projectiles through a construction material, or on spall of the material to the degree that injury would be caused to a person standing behind the material. Some standards require only material specimen testing rather than testing of complete assemblies. This enables a designer to specify materials as bullet resistant, but does not ensure that fasteners, anchors, frames, etc., are bullet resistant. Designer should:

- (1) Verify criteria requirements, define threats using standards which test complete assemblies and specify threat accordingly, or

- (2) Specify that all materials and connections be certified to resist the specified threat.

Some standards also include different temperature requirements depending upon whether the component is for indoor or outdoor installation. Verify testing requirements with specification of components.

Designer will also note adverse environmental conditions which require galvanized coatings on carbon steel, stainless steel, or criteria such as temperature, weather, humidity, ventilation, and illumination required for proper installation or application. If necessary, designer will explain existing conditions through statements or by references to documents where information such as existing structures or geophysical reports can be found.

Most bullet-resistant components are custom fabricated from manufacturer's standard designs. Coordinate installation details with adjacent construction.

TABLE I - TABLE OF RELATIVE BALLISTIC STANDARDS

STANDARD THREAT LEVEL	CALIBER	WEAPON	BULLET WEIGHT & TYPE	VELOCITY (FT/SEC) / NO. SHOTS RESISTED
NIJ- TYPE I	.22	Handgun 6-6.5 in. Barrel	40 gr. LRHV Lead	1010-1090/ 5 Shots
	and .38 Special	Handgun 6-6.5 in. Barrel	158 gr. LRN	800-900/ 5 Shots
UL-MPSA	.38 Super	Pistol Automatic 5 in. Barrel	130 gr. FMJ	1152-1344/ 3 Shots
ASTM- Submachine Gun	9 mm. Parabellum		124 gr.	1350-1450/ 3 Shots
	and 12 gauge 3 in. Magnum (adjunct)		No. 00 Buckshot	1265-1465/ Variable

(UFC 4-020-1FA Low Severity Level, Ballistics Tactic):

HPW Minimum	9 mm.	Submachine Gun	115 gr. FMJ	1350-1450/ 3
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Minimum

TABLE I - TABLE OF RELATIVE BALLISTIC STANDARDS

STANDARD THREAT LEVEL	CALIBER	WEAPON	BULLET WEIGHT & TYPE	VELOCITY (FT/SEC) / NO. SHOTS RESISTED
and 1 each @ Standards Specified or SD Locations Submachine Gun (S)	and 12 gauge (Optional)	Shotgun	(Steel) No. 4 Buckshot	1275-1375/ 3
Minimum and 1 each @ Specified Locations				
NIJ- TYPE IIA	.357 Magnum and 9 mm.	Handgun 4-4.75 in. Handgun 4-4.75 in. Barrel	158 gr. 124 gr.	1200-1300/ 5 Shots 1050-1130/ 5 Shots
ASTM- Handgun (.44 Magnum)	.44 Magnum and 12 gauge 3 in. Magnum (adjunct)		240 gr. Soft Point No. 00 Buckshot	1400-1500/ 3 Shots 1265-1465/ Variable
ASTM- Handgun (.38 Super)	.38 Super and 12 gauge 3 in. Magnum (adjunct)		130 gr. FMJ No. 00 Buckshot	1230-1330/ 3 Shots 1265-1465/ Variable
NIJ- TYPE II	.357 Magnum and 9 mm.	Handgun 6-6.5 in. Barrel Handgun 4-4.75 in. Barrel	158 gr. JSP 124 gr. FMJ	1345-1445/ 5 Shots 1135-1215/ 5 Shots
UL-HPSA	.357 Magnum	Handgun	158 gr.	1305-1523/

TABLE I - TABLE OF RELATIVE BALLISTIC STANDARDS

STANDARD THREAT LEVEL	CALIBER	WEAPON	BULLET WEIGHT & TYPE	VELOCITY (FT/SEC) / NO. SHOTS RESISTED
		8.35 in. Barrel	Lead	3 Shots
NIJ- TYPE IIIA	.44 Magnum	Handgun 5.5- 6.25 in. Barrel	240 gr. Lead SWC Gas Checked	1350-1450/ 5 Shots
	and 9 mm.	Submachine Gun 9.5- 10.25 in. Barrel	124 gr. FMJ	1350-1450/ 5 Shots
(UFC 4-020-1FA Medium Severity Level, Ballistics Tactic):				
UL-SPSA	.44 Magnum	Handgun 6.5 in. Barrel	240 gr. Lead	1323-1544/ 3 Shots
UL-HPR	.30-'06 Springfield	Rifle Bolt Action 24 in. Barrel	220 gr. Soft Point	2169-2531/ 1 Shot
ASTM- Rifle (.44 Magnum)	7.62x51 mm. (.308 Winchester) and 12 gauge 3 in. Magnum (adjunct)		M-80 Ball	2750-2850/ 3 Shots
			No. 00 Buckshot	1265-1465/ Variable
NIJ- TYPE III	7.62x51 mm. NATO	Rifle	147 gr. M-80 Ball	2700-2800/ 5 Shots

(SEM High Severity Level, Ballistics Tactic):

HPW Rifle Standard Specified	5.56x45 mm. NATO	Rifle	55 gr. M-193 Ball	3135-3235/ 1 @
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TABLE I - TABLE OF RELATIVE BALLISTIC STANDARDS

STANDARD THREAT LEVEL	CALIBER	WEAPON	BULLET WEIGHT & TYPE	VELOCITY (FT/SEC) / NO. SHOTS RESISTED
Locations	and 7.62x51 mm. NATO	Rifle	147 gr. M-80 Ball	2700-2800/ 2 @
Specified				
Locations	and 12 gauge	Shotgun	No. 4 Buckshot	1275-1375/ 3-6 @
Specified				
Locations				
SD Military Minimum and 1 each @ Rifle (R) Specified	5.56 mm. NATO	Rifle	55 gr. M-193 Ball	3135-3235/ 2
Locations				
	5.56 mm. (Optional)	Rifle	63 gr. M-855 Ball	2950-3050 1 each @
Specified				
Locations				
	and 7.62 mm. NATO	Rifle	147 gr. M-80	2700-2800/ 1
Minimum and 1 each @ Specified				
Locations				
	12 gauge 2-3/4 in. (Optional)	Shotgun	No. 4 shot (00 Buckshot)	1275-1375/ 1 each @
Specified				
Locations				

TABLE I - TABLE OF RELATIVE BALLISTIC STANDARDS

STANDARD THREAT LEVEL	CALIBER	WEAPON	BULLET WEIGHT & TYPE	VELOCITY (FT/SEC) / NO. SHOTS RESISTED
NFESC SAMIT	7.62x51 mm. NATO	Machine gun Light 25-1/2 in. Barrel M60E3 (US)	147 gr. M-80 Ball	2750-2850/ 25 Shots
ASTM- Rifle AP	.30-'06 and 12 gauge 3 in. Magnum (adjunct)		M2AP No. 00 Buckshot	2725-2825/ 3 Shots 1265-1465/ Variable
(SEM Very High Severity Level, Ballistics Tactic):				
HPW Rifle AP Standard Specified	7.62x51 mm.	Rifle	150 gr. M61 AP	2700-2800/ 3-6 @
Locations	or .30-'06	Rifle	165 gr. M2 AP	2800-2900/ 3.6 @
Specified				
Locations	and 12 gauge	Shotgun	No. 4 Buckshot	1275-1375/ 3.6 @
Specified				
Locations				
SD Rifle (AP)	.30-'06 (Optional)	Rifle	165 gr. M2 AP	2750-2850/ 1 each @
Specified				
Locations	12 gauge 2-3/4 in. (Optional)	Shotgun	No. 4 shot (00 Buckshot)	1275-1375/ 1 each @ Specified

TABLE I - TABLE OF RELATIVE BALLISTIC STANDARDS

STANDARD THREAT LEVEL	CALIBER	WEAPON	BULLET WEIGHT & TYPE	VELOCITY (FT/SEC) / NO. SHOTS RESISTED
Locations				
NFESC SAMIT (AP)	7.62x51 mm. NATO	Machine gun Light 25-1/2 in. Barrel M60E3 (US)	150 gr. M61 AP	2800/ 25 Shots
NIJ- TYPE IV	.30-'06	Rifle 22 in. Barrel	166 gr.	2750-2850/ 1 Shot

ABBREVIATIONS:

AP - Armor Piercing
 LRN - Lead Round Nose Bullet
 FMJ - Full Metal Jacketed
 MPSA - Medium Power Small Arms
 HPR - High Power Rifle
 HPSA - High Power Small Arms
 SPSA - Super Power Small Arms
 JSP - Jacketed Soft Point
 US - United States
 LRHV - Long Rifle High Velocity

BALLISTIC TESTING STANDARDS:

ASTM - American Society for Testing and Materials;
 ASTM F 1233, "Security Glazing Materials and
 Systems," 1989.

HPW - H.P. White Laboratory, Inc.; HPW-TP-0501.01,
 "Ballistic Resistance of Structural Materials
 (Opaque and Transparent); Test Procedures and
 Acceptance Criteria," 1989.

NFESC-SAMIT - Naval Facilities Engineering Service
 Center (NFESC), Department of the Navy; NFESC-CR
 80.025 "Testing and Evaluation of Attack Resistance
 and Hardening Retrofits of Marine Barrack
 Construction Types to Small Arms Multiple Impact
 Threat (SAMIT) 1980.

NIJ - National Institute of Justice; NIJ Standard
 0108.01, "Ballistic Resistant Protective Materials,"
 1985.

SD - Department of State; SD Std-01.01 Rev F,

**"Certification Standard Forced Entry and Ballistic
Resistance of Structural Systems Test Procedures,"
1992.**

**UL - American National Standards
Institute/Underwriters Laboratories, Inc.; ANSI/UL
752, "Standard for Bullet-Resisting Equipment," 1995.**

Bullet-resistant components shall be provided at locations shown on the drawings. Bullet-resistant components [where indicated] [_____] shall be in accordance with [[NIJ Type I] [NIJ Type IIA] [NIJ Type II] [NIJ Type IIIA] of **NIJ Std 0108.01.**] [[UL MPSA] [UL HPSA] [UL SPSA] [UL HPR] of **UL 752.**] [[ASTM Submachine Gun] [ASTM Handgun (.44 Magnum)] [ASTM Handgun (.38 Super)] [ASTM Rifle (.44 Magnum)] [ASTM Rifle (AP)] of **ASTM F 1233.**] [[HPW Minimum Standard] [HPW Rifle Standard] [HPW Rifle AP Standard] of **HPW TP-0501.01.**] [[SD Submachine Gun (S)] [SD Military Rifle (R)] [SD Rifle (AP)] of **SD Std-01.01.**] [the test requirement of [NFESC SAMIT] [NFESC SAMIT (AP)] of **NFESC CR 80.025.**]

1.6 DELIVERY, STORAGE, AND HANDLING

Components shall be delivered to the job site with the brand, name, and model number clearly marked thereon. All components shall be delivered, stored and handled so as not to be damaged or deformed, and in accordance with **ASTM D 3951**. Doors, windows, and louvers shall be handled carefully to prevent damage to the faces, edges, corners, ends, and glazing. Abraded, scarred, or rusty areas shall be cleaned, repaired, or replaced immediately upon detection. Damaged components that cannot be restored to like-new condition shall be replaced. Components and equipment shall be stored in a dry location on platforms or pallets that are ventilated adequately, free of dust, water, and other contaminants, and stored in a manner which permits easy access for inspection and handling.

1.7 WARRANTY

Manufacturer's warranty for [_____] [5] years shall be furnished for glazing materials. Warranty shall provide for replacement and installation of glazing if delamination, discoloration, or cracking, or crazing occurs.

PART 2 PRODUCTS

2.1 GENERAL

Bullet-resistant component assemblies shall be of size and type indicated and shall be provided at locations shown. All items included for exterior installation shall be designed to resist water penetration or entrapment.

2.2 ELECTRICAL WIRING

Electrical wiring and conduit shall be provided as specified in Section **26 20 00 INTERIOR DISTRIBUTION SYSTEM.**

2.3 FINISHES

All ferrous metal components except stainless steel shall be furnished primed for painting unless indicated otherwise. Finish painting shall be in accordance with Section **09 90 00 PAINTS AND COATINGS** unless otherwise indicated. Aluminum items shall be finished in standard mill finish unless

otherwise specified. When anodic coatings are specified, the coatings shall conform to AAMA 611, with coating thickness not less than that specified for protective and decorative type finish in AA DAF-45. Items to be anodized shall receive a polished satin finish pretreatment and a clear lacquer overcoat.

2.4 BULLET-RESISTANT STEEL PERSONNEL DOORS

Door/frame assemblies shall be factory fabricated units, designed to be bullet resistant to the specified threat level, and shall conform to applicable requirements of NAAMM HMMA 810, NAAMM HMMA 820, NAAMM HMMA 862, this section, and requirements indicated on drawings. Frames shall be furnished by the door fabricator. Door silencers shall be provided to cushion the impact of the door on the frame so that steel to steel contact is not made during closing. Exterior doors shall be completely weatherstripped, weatherproof, and fully insulated. Exterior doors shall close at flush top and bottom edges. Tops of doors shall be sealed against water penetration.

2.4.1 Fire Rated Doors

Fire rated doors shall be provided at locations shown on the drawings. Door assemblies shall bear the identifying label of the Underwriters Laboratories, or a nationally recognized testing agency qualified to perform certificate programs, indicating that the units conform to the requirements for Special Purpose Type Fire Doors in accordance with NFPA 80. Fire rated doors shall be constructed in accordance with NAAMM HMMA 850. Certificate may be furnished in lieu of label. For oversized fire doors, certificate shall state that doors are manufactured in compliance with the requirements for doors of this type and class, and have been tested and meet the requirements for the class indicated.

2.4.2 Sound Rated Doors

Sound rated doors shall be provided at locations shown on the drawings. Door assemblies shall consist of door, hardware, frame, threshold, and adjustable gaskets. The assembly shall have a Sound Transmission Class (STC) rating [of] [_____] [as shown on the drawings] when tested in accordance with ASTM E 90. [Manufacturer's descriptive data, and certificate or test report showing compliance with the specified requirements shall be submitted.] [The Contractor shall perform a field test on the door assembly to determine if the STC is within 2 points of the equivalent laboratory tested product. If the test reveals a less than acceptable STC, the Contractor shall replace the door assembly and test the new assembly to provide an acceptable rating.]

2.4.3 Door and Frame Fabrication

Special care shall be exercised during welding to prevent warping. Design of stiffeners and attachment method of interior armor plates shall be such that heat-affected areas which result from welding do not allow a potential ballistic leak in product construction. The subsurfaces shall be flat, parallel, and plumb after fabrication. Doors and frames shall be constructed of [bullet-resistant steel] [or] [hollow metal with internal armoring] and the completed assembly shall meet the specified regulatory requirements. Doors shall be reinforced [and fully insulated] in accordance with manufacturer's design. Steel door frames shall be mitered or coped and welded at the corners with all welds ground smooth. Corner assemblies shall be designed to eliminate ballistic penetrable seams.

Where structural channel frames are used, stops shall be made of 38 mm 1-1/2 inch by 16 mm 5/8 inch bars welded or top screwed to the frame at not more than [150] [300] mm [6] [12] inch centers. Screws shall be countersunk. Stops shall be so placed that full contact with the frame will be assured. Any necessary reinforcements shall be made and the frames shall be drilled and tapped as required for the hardware. Frame channels shall be mitered or coped and welded at corners with full penetration groove welds. Exposed welds shall be dressed smooth.

2.4.4 Sidelight Frames

Sidelight frames shall be constructed using door frame sections as shown on the drawings. Stop height and rabbet depth shall be as required to accommodate the bullet-resistant glazing material specified. Exterior (attack side) glazing stops shall be welded or integral to the frame. Interior (protected side) glazing stops shall be removable stops attached with high-strength alloy steel machine screws with tamper-resistant heads.

2.4.5 Preparation for Hardware

Doors and frames shall be prepared for hardware in conformance with Section 08 71 00 DOOR HARDWARE, and NAAMM HMMA 830. Drilling and tapping of frames for surface applied hardware shall be performed in the field.

2.4.6 Hardware

NOTE: The hardware options listed below apply only to those bullet resistant door assemblies for which extra-heavy-duty standard commercial hardware is suitable. This includes the following types of doors:

- (1) Single and pairs of swinging personnel doors, up to 1.2 m (4 feet - 0 inches) by 2.44 m (8 feet - 0 inches) per leaf.
- (2) Bullet-resistant threat levels up to maximum listed in paragraph COMPONENT TEST REQUIREMENTS.
- (3) Bullet-resistant only or combined bullet and fire resistive, manual or powered opening.

For the following assemblies, custom or specially designed hardware should be specified (with manufacturer's guidance):

- (1) Oversized single and pairs of swinging doors, such as those for vehicle entry.
- (2) Sliding doors of all types.
- (3) Folding doors of all types.
- (4) Upward moving doors of all types.
- (5) Bullet-resistant threat levels above the maximum listed in paragraph COMPONENT TEST REQUIREMENTS.

(6) Bullet-resistant doors of any type with additional forced entry blast, missile or pressure resistive requirements.

For sound rated doors rated for STC 52 or more with cypher lock requirements, designers should specify electronic cypher locks rather than mechanical locks.

Where balanced magnetic switches (BMS) are required on door/frames, specify shop drilled hardware preparation and installation of magnets.

Hardware for bullet-resistant door assembly shall be provided by the door assembly manufacturer to ensure a complete bullet resistant assembly. Where test standard requires hardware to be tested with the door assembly, hardware shall be included in the labeling and/or test certification. Keying shall be as specified in Section 08 71 00 DOOR HARDWARE.

2.4.6.1 Mortise Locks and Latchsets

Mortise lock and latchsets shall be series 1000, operational Grade 1, Security Grade 1 or 1A, functions as indicated in the Hardware Schedule, and shall conform to BHMA A156.13. Strikes for all mortise locks and latches, including deadlocks, shall conform to BHMA A115.1 except strikes for security doors shall be rectangular, without lip. Mortise-type locks and latches for doors 44 mm 1-3/4 inches thick and over shall have adjustable bevel fronts or otherwise conform to the shape of the door. Mortise locks shall have armored fronts. Mortise locks and latches shall have full escutcheon, thru-bolted, extruded stainless steel trim.

2.4.6.2 Hinges

All 2.1 m 7 feet - 0 inch high doors shall be equipped with a minimum of three Grade 1 hinges in accordance with BHMA A156.1, minimum size 125 mm 5 inches high, heavy, double or triple weight as required for weight of door, or a single, continuous extra-heavy-duty piano-type hinge sized to carry the weight of the door without sagging. For each additional 300 mm 12 inches of door height beyond 2.1 m 7 feet - 0 inch, provide minimum of one more hinge shall be provided. Doors greater than 2.1 m 7 feet - 0 inches shall be equipped with a minimum of four hinges. Hinges shall be full mortise, half mortise, full surface or half surface design as recommended by manufacturer for frame and door design, and shall be tamperproof or mounted on the inside face of the door. The Contractor shall provide hinge manufacturer's certification that the hinge supplied meets all applicable test requirements of BHMA A156.1, type, number of hinges specified, and that the hinge is suitable for the size and weight of the door assembly on which it will be utilized. If continuous piano-type hinges are provided with door, independent laboratory reports covering both the door weight capacity and a 2,500,000-cycle testing to match BHMA A156.1 Grade 1 requirements shall be furnished by the Contractor. Interior door hinges shall be furnished in steel, prime coated. Exterior door hinges shall be nonferrous metal or stainless steel.

2.4.6.3 Electric Strikes

Electric strikes shall conform to BHMA A156.5, Grade 1. Strike boxes shall be furnished with dead bolt and latch strikes for Grade 1.

2.4.6.4 Door Closers

NOTE: Due to the excessive weight of
bullet-resistant doors, they will present a safety
hazard if allowed to close unchecked. Coordinate
with manufacturers to ensure selection of proper
size and types of closers.

Closers shall be extra heavy duty of size and type recommended by
manufacturer, and shall be Grade 1 in accordance with BHMA A156.4. Door
closer finish shall be [600] [689] [690] [691] [692] in accordance with
BHMA A156.18.

2.4.6.5 Door Stops and Holders

NOTE: Due to the excessive weight of
bullet-resistant doors, they will present a safety
hazard if allowed to have an uncontrolled opening
cycle, particularly exterior out-swinging doors
subject to wind pressure. Coordinate with
manufacturers to ensure selection of proper size and
type of stops and holders. If hold-open feature is
not required or permitted (fire doors) specify equal
grade stop without hold-open feature.

Door stops [and holders] shall be extra heavy duty, [Type C08511 in
accordance with BHMA A156.8] [[Type L11251] [and] [Type L11271] in
accordance with BHMA A156.16] [_____].

2.4.7 Frame Anchors

Jamb anchors shall be provided with door/frame assembly and shall conform
to manufacturer's recommendations to ensure complete bullet-resistant
assemblies. Provisions shall be made to stiffen the top member of all
spans over 900 mm 3 feet. The bottom of the frames shall extend below the
finish floorline and shall be secured to the floor slab by means of angle
clips and expansion bolts. Floor clips are not required for installation
in pre-built or existing openings.

2.4.8 Weatherstripping

Head and jambs shall be provided with compression-type neoprene bulb or
closed-cell neoprene adjustable-type weatherstripping. Door stops shall be
weatherstripped with a surface-mounted sponge neoprene strip in bronze
housing not less than 1.78 mm 0.070 inch thick installed to make contact
with the door. Weatherstripping shall be installed in conformance with the
manufacturer's directions after completion of finish painting.

2.4.9 Louvers for Doors

NOTE: Due to louver thickness and heavy weight,
designers should avoid louvers in doors. If used,
place louvers in inactive leaf of door pair where

possible.

Where indicated, doors shall be provided with full louvers or louver section. Louvers shall be certified resistant to the same ballistic threat level as the rest of the door assembly. Louvers shall be sightproof type inserted into the door. Pierced louvers shall not be used. Inserted louvers shall be stationary and shall be nonremovable from the outside of exterior doors or the threat side of interior doors. [Insect screens shall be removable type with 18 by 16 mesh aluminum or bronze cloth.] [Where required by test standard, louvers shall be provided with a spall-resistant screen of fine stainless steel mesh.] The free area of the total square meters feet of the louver shall be [17 percent for channel style louvers] [39 percent for chevron style louvers (inverted angles at 25 mm 1 inch on center)] [[_____] percent]. Louver submitted shall have been tested in accordance with AMCA 500-Dairflow test, minimum airflow shall be [[_____] percent for channel style] [[_____] percent for chevron style] [[_____] percent]. Airflow calculations and test data showing compliance shall be submitted.

2.5 BULLET-RESISTANT LOUVERS

Louvers and frames shall be fabricated from steel shapes to the opening dimensions indicated. The louvers shall be factory fabricated units designed to be bullet-resistant to the specified test standard in paragraph COMPONENT TEST REQUIREMENTS. Manufacturer's descriptive data, certificate, and test report showing compliance with the specified forced entry standard shall be submitted. The free area of the total square meters feet of the louver shall be [17 percent for channel style louvers] [39 percent for chevron style louvers (inverted angles at 25 mm 1 inch on center)] [[_____] percent]. Louver submitted shall have been tested in accordance with AMCA 500-D airflow test. Minimum airflow shall be [[_____] percent for channel style] [[_____] percent for chevron style] [[_____] percent]. Airflow calculations and test data showing compliance shall be submitted.

2.6 BULLET-RESISTANT STEEL BIFOLD DOORS, FRAMES, AND HARDWARE

Bifold doors shall consist of two leaves per door, four per opening, as indicated on the drawings. Hardware shall allow easy manual movement of doors. Doors and hardware shall be either entirely jamb-supported or jamb-supported with floor rollers to reduce bearing load on hinges. Steel hinges shall be of ample length to prevent sagging, and shall be through-bolted in accordance with manufacturer's instructions. Operators and all installation hardware shall be the product of a manufacturer which specifically designs and produces hardware for heavy-duty industrial-type doors. Door surfaces shall be factory primed for painting and reinforced and prepared for hardware installation. [Bifold doors shall be manually securable from the protected side through actuation of surface-mounted cane bolt or similar device as recommended by manufacturer.] Maximum clearance at bottom of doors shall be 25 mm 1 inch. Exterior doors shall be provided with weather seals at jambs, head, and sill.

2.6.1 Testing

Bullet-resistant bifold door shall be subjected to testing by manufacturer to demonstrate appropriate design, strength, and application and operation of all hardware, both manual and electric. Door tests shall replicate actual installation to the maximum extent possible. The Contractor shall coordinate arrangements with Contracting Officer as to time and location of

tests. Tests shall be witnessed and results subjected to approval by representatives of the Contracting Officer prior to delivery of the doors to the job site.

2.6.2 Bifold Doors

Bullet-resistant bifold doors shall be furnished complete with [pneumatic operators] [electric operators] [and other] accessories specified. The operator shall be so designed that the motor may be removed without affecting emergency auxiliary operators. [A manual operator of crank-gear or chain-gear mechanism shall be provided to allow manual operation in case of power failure. A device shall be provided for locking the chain or crank.]

2.6.3 Power Operators

Power operators shall be [pneumatic] [electric] type conforming to NFPA 80 and the requirements specified herein. Readily adjustable limit switches shall be provided to automatically stop the door in its full open or closed position. [All operating devices shall be suitable for the hazardous Class, Division, and Group shown, as defined in NFPA 70.]

2.6.3.1 Pneumatic Operators

NOTE: Designer will coordinate with the drawings to ensure compressed air is available at door locations.

Pneumatic operators shall be heavy-duty industrial type designed to operate the door at not less than 0.2 nor more than 0.3 m/second 8 inches nor more than one foot/second with air pressure of [_____] kPa psi. Pressure regulator shall be provided if operator is not compatible with previously specified air pressure. Dryer, filter, and filter alarm shall be provided. Pneumatic piping shall be provided up to connection with building compressed air, but not more than 6 m 20 feet from door jambs. Operators shall have provision for immediate emergency manual operation of the door in case of failure. The operator shall open, close, start, and stop the door smoothly. Control shall be [electric, conforming to NEMA ICS 2 and NEMA ICS 6; enclosures shall be Type 12 (industrial use), Type 7 or 9 in hazardous locations, or as otherwise indicated] [pneumatic] with [push button wall switches] [ceiling pull switches] [rollover floor treadle] as indicated.

2.6.3.2 Electric Operators

Electric operators shall be heavy-duty industrial type designed to operate the door at not less than 0.2 nor more than 0.3 m/second 8 inches nor more than 1 foot/second. Electrical controls shall be [push button wall switches] [ceiling pull switches] [rollover floor treadle] as indicated. Electric power operators shall be complete with electric motor, brackets, controls, limit switches, magnetic reversing starter, and all other accessories necessary. The operator shall be designed so that the motor may be removed without disturbing the limit-switch timing and without affecting the emergency operator. The power operator shall be provided with a slipping clutch coupling to prevent stalling of the motor. Operators shall have provisions for immediate emergency manual operation of the door in case of electrical failure. Where control voltages differ from motor voltage, a control voltage transformer shall be provided in and as

part of the starter. Control voltage shall be 120 volts or less.

- a. Motors: Drive motors shall conform to **NEMA MG 1**, shall be high-starting torque, reversible type, and shall be of sufficient horsepower and torque output to move the door in either direction from any position at the required speed without exceeding the rated capacity. Motors shall be suitable for operation on [_____] volts, [60] [_____] hertz, [single] [three] phase, and shall be suitable for across-the-line starting. All motors shall be designed to operate at full capacity over a supply voltage variation of plus or minus 10 percent of the motor voltage rating.
- b. Controls: Each door motor shall have an enclosed reversing across-the-line type magnetic starter having thermal overload protection, limit switches, and remote control switches. The control equipment shall conform to **NEMA ICS 2**; enclosures shall be **NEMA ICS 6**, Type 12 (industrial use), Type 7 or 9 in hazardous locations, or as otherwise indicated. Each wall control station shall be of the three-button type, with the controls marked and color coded: OPEN - white; CLOSE - green; and STOP - red. When the door is in motion and the "STOP" control is pressed, the door shall stop instantly and remain in the stop position; from the stop position, the door shall be operable in either direction by the "OPEN" or "CLOSE" controls. Controls shall be of the full-guarded type to prevent accidental operation.

2.6.4 Safety Device

The leading edge of doors shall have a safety device that will immediately reverse the door movement upon contact with an obstruction and cause the door to return to its full open position. The safety device shall not substitute for a limit switch. Exterior doors shall be provided with a combination weather seal and safety device on the leading edge.

2.7 BULLET-RESISTANT STEEL WINDOWS

NOTE: Bullet-resisting glazing materials may be glass, plastic, or composite of the two. Edit out all inappropriate items. Do not specify thickness of glazing. Selection of no-spall criteria generally requires use of plastic or composite glazing materials. Therefore, if these options are edited out, use low-spall criteria. Verify that glass glazing, where required, is available to meet low-spall criteria for threat specified.

Window assemblies shall be fabricated from [bullet-resistant steel shapes] [or] [hollow metal with internal armoring] and bullet-resistant glazing materials specified herein; the entire assembly shall meet or exceed the specified regulatory requirements. Frames shall be welded units of sizes and shapes indicated on the drawings with minimum frame face dimensions of **50 mm 2 inches**. Glazing material shall be furnished with window assembly for on-site installation, or windows shall be factory glazed units. Entire assembly shall be furnished by same manufacturer. Exterior (attack side) glazing stops shall be welded or integral to frame. Interior (protected side) glazing stops shall be removable stops attached with high-strength alloy steel machine screws with tamper-resistant heads.

2.7.1 Glazing Materials

Glazing material shall be factory fabricated units designed to be bullet-resistant to the specified test standard in paragraph COMPONENT TEST REQUIREMENTS. Glazing material shall be [glass,] [plastic,] [or] [composite] with a [no-spall] [low-spall] protected (interior) face. [Low-spall interior face shall meet or exceed requirements for spall resistance defined in [UL 752](#).] [No-spall interior face shall meet requirements for spall resistance defined in [HPW TP-0501.01](#).] Glazing material shall conform to applicable requirements contained in [ASTM C 1036](#), [ASTM C 1048](#), and [ASTM E 1300](#). Glazing materials shall be tested in accordance with the applicable sections of the following testing procedures: [ASTM D 905](#), [ASTM D 1003](#), [ASTM F 428](#), [ASTM F 548](#), [ASTM D 4093](#), and [ASTM F 520](#). All plastic glazing exposed to the interior or exterior environment shall have an applied hardcoat.

2.7.1.1 Laminated Glass

Bullet-resistant laminated glass shall be all glass laminated construction conforming to applicable sections of [ASTM C 1172](#). The adhesive interlayer material for bonding glass to glass shall be chemically compatible with the surfaces which are to be bonded. Materials selected for lamination purposes shall be tested in accordance with the following testing procedures: [ASTM D 905](#), [ASTM D 1044](#), [ASTM F 735](#), [ASTM D 4093](#), [ASTM F 521](#), [ASTM F 520](#), and [ASTM D 1003](#). Glass plies used in the lamination shall be [annealed float glass conforming to Type I, quality q3 Class 1, in accordance with [ASTM C 1036](#)] [or] [heat-strengthened or fully heat tempered, float glass, Condition A, Type I, q3 Class 1, in accordance with [ASTM C 1048](#)].

2.7.1.2 Acrylic Plastic Sheets

Bullet-resistant acrylic plastic glazing sheets shall be for use "as cast" and in stretching operations with improved moisture absorption resistance conforming to [ASTM D 4802](#). Acrylic materials shall be tested in accordance with the applicable sections of the following testing procedures: [ASTM D 256](#), [ASTM D 5420](#), [ASTM D 542](#), [ASTM D 570](#), [ASTM D 635](#), [ASTM D 648](#), [ASTM D 638](#), [ASTM D 696](#), [ASTM D 792](#), [ASTM D 1003](#), [ASTM E 831](#), [ASTM F 791](#), and [ASTM G 155](#). Plastic glazing sheets shall be clear and smooth on both sides.

2.7.1.3 Polycarbonate Plastic Sheets

Bullet-resistant laminated polycarbonate sheets, ultraviolet stabilized, [flame resistant] [high abrasion resistant] sheets shall conform to [ASTM D 3595](#). Polycarbonate materials shall be tested in accordance with the applicable sections of the following testing procedures: [ASTM D 256](#), [ASTM D 5420](#), [ASTM D 648](#), [ASTM D 792](#), [ASTM F 735](#), [ASTM D 1003](#), [ASTM D 635](#), [ASTM D 638](#), [ASTM D 1044](#), [ASTM D 882](#), [ASTM D 1922](#), [ASTM D 570](#), [ASTM F 520](#), [ASTM E 168](#), [ASTM E 169](#), [ASTM E 204](#), [ASTM G 155](#), and [ASTM F 791](#). Polyvinyl butyral shall not be used in contact with polycarbonate because its plasticizer may craze polycarbonate.

2.7.1.4 Glass/Plastic Laminate Glazing

Bullet-resistant glass/plastic laminated glazing materials shall be glass/plastic laminated construction or glass-clad plastic "sandwich" construction conforming to applicable sections of [ASTM C 1172](#).

Polycarbonate shall be ultraviolet stabilized.

2.7.1.5 Glass/Plastic Air-Gap Glazing

Bullet-resistant glass/plastic air-gap glazing shall consist of an assembly in which glass forms the exterior [and interior (protected side)] layer, separated by an air space from the laminated plastic plies. Exterior glass plies shall be [annealed float glass conforming to Type I, quality q3 Class 1, in accordance with [ASTM C 1036](#)] [or] [heat-strengthened or fully heat tempered, float glass, Condition A, Type I, q3 Class 1, in accordance with [ASTM C 1036](#)] [or] [heat-strengthened or fully heat tempered, float glass, Condition A, Type I, q3 class 1, in accordance with [ASTM C 1048](#)]. [Interior (protected side) glass plies shall be [annealed float glass conforming to Type I, quality q3 Class 1, in accordance with [ASTM C 1036](#)] [or] [heat-strengthened or fully heat tempered, float glass, Condition A, Type I, q3 Class 1, in accordance with [ASTM C 1048](#)].] [Where annealed glass is used on the protected side of the window, a sheet of 0.102 mm 4 mil thick clear mylar fragment retention film shall be applied to the interior surface in accordance with film manufacturer's instructions. Film that wraps around the edges of the glass shall be applied prior to glazing the window.] Plastic plies shall consist of laminated ultraviolet stabilized polycarbonate sheets, conforming to paragraph Polycarbonate Plastic Sheets and/or acrylic sheets for use "as cast" and in stretching operations with improved moisture absorption resistance conforming to applicable requirements of paragraph Polycarbonate Plastic Sheets.

2.7.2 Adhesive Interlayer Materials

Adhesive interlayer materials for bonding laminates (glass-glass, glass-plastic, or plastic-plastic bonds) shall be chemically compatible with the surfaces being bonded. Interlayer materials may be polyvinyl butyral, cast-in-place urethane, proprietary materials, sheet form urethane and other materials. Polyvinyl butyral shall not be used to bond polycarbonate. Adhesives shall be in accordance with [ASTM D 905](#) and manufacturer's recommendations.

2.7.3 Sealants

Sealants for glazings shall be chemically compatible with the glazing materials they contact with no deleterious effects to the glazing materials or to the adhesives used in laminates. Sealants shall be in accordance with glazing manufacturer's recommendations and [GANA Glazing Manual](#).

2.7.4 Deal Trays

Deal tray shall provide nominal 325 mm 12-3/4 inch wide by 40 mm 1-5/8 inch high opening in sill of window frame [and shall include a 165 mm 6-1/2 inch steel writing ledge on exterior side of window]. Deal tray shall be welded subassembly of window assembly and shall conform to specified requirements for entire window assembly. Opening configuration of deal tray shall prevent ballistic penetration or spall from the threat weapon, and shall resist lead spray from a shotgun blast. Tray opening shall prevent insertion of the muzzle of a firearm.

2.8 BULLET-RESISTANT SPEAKING APERTURES

Speaking apertures shall allow passage of voice at normal speaking volume without distortion, shall be fabricated to resist the specified threat level for [outdoor] [indoor] use, and shall be designed to prevent direct

aim by the insertion of the muzzle of any firearm. Finish shall match [window] [door] construction in which aperture is installed.

2.9 BULLET-RESISTANT GUNPORTS

Gunport shall operate only from the protected side of the barrier, with a protected side shutter that closes automatically and is lockable from the protected side. Gunport shall be fabricated from bullet resistant steel shapes and the entire assembly shall meet or exceed the specified regulatory requirements. Gunport shall be sized for operation using submachine guns and rifles. [Assembly shall provide a weather resistant opening.] Shutter shall be hinged or pivoted and shall not obstruct operation when in open position. Attachment to wall assembly shall be in accordance with manufacturer's recommendations. All aspects of gunport assembly, including hardware and method of anchorage to wall, shall be included in labeling or test certification. Finish shall be [primed for painting] [satin stainless steel]. Gunport shall not be operable from exposed side.

2.10 BULLET-RESISTANT PASS-THROUGH DRAWER

Pass-through drawer shall be fabricated from bullet-resistant steel shapes and the entire assembly shall meet or exceed the specified regulatory requirements. Pass-through drawer shall be of size indicated on the drawings and shall be designed to prohibit forcible entry or direct aim by the insertion of the muzzle of a firearm from exterior side when drawer is in the open position. [Assembly shall provide a weather resistant opening.] Attachment to wall assembly shall be in accordance with manufacturer's recommendations. All aspects of the assembly, including hardware and method of anchorage to wall, shall be included in the labeling or test certification. Finish shall be [primed for painting] [satin stainless steel].

2.11 BULLET-RESISTANT PREFABRICATED MODULAR ENCLOSURE

NOTE: Prefabricated enclosures as specified herein are intended for use primarily as hardlines on the interior of a facility, i.e., bullet-resistant partitions. Develop separate specifications if bullet resistant guards houses, control towers, etc., are required. Coordinate this specification with other disciplines where electrical work, plumbing, or HVAC are required.

Enclosure shall consist of prefabricated, bullet-resistant, modular [insulated] wall [and] [ceiling] [and floor] panels with [doors,] [windows,] [louvers,] [gunports,] [and] all necessary connecting posts, hardware and accessories. Complete enclosure shall be of minimum dimensions shown on the drawings. [Doors,] [windows,] [louvers,] [and] [gunports] shall be in accordance with the requirements specified in those respective paragraphs. Components shall be factory-welded assemblies. All metal components shall be factory painted with rust inhibitive primer unless indicated otherwise. All exposed welds shall be dressed smooth. Workmanship shall be rigid, neat in appearance, and free from defects. [Enclosure shall be designed to be relocatable by [crane] [forklift].]

2.12 ACCESSORIES

All accessories shall be provided for the installation or erection of above components into the surrounding structure. Anchorage shall be as strong and bullet-resistant as the components. Installation/erection shall be per manufacturer's recommended instructions.

2.13 LABELING

NOTE: Model numbers and rating labels advertise the level of threat which the component is capable of resisting. Require removable labels where possible. Where this information cannot be removable, specify that it shall be on the protected side or concealed from view by casual observers.

Bullet-resistant equipment shall be plainly [and permanently] labeled in accordance with regulatory requirements. Label shall be compatible with plastic or coating. Label shall be visible only on protected side, after installation and shall include the following information:

- a. Manufacturer's name or identifying symbol
- b. [Model Number, Control Number, or equivalent]
- c. Date of manufacture by week, month or quarter and year. This may be abbreviated or be in a traceable code such as the lot number.
- d. Correct mounting position including threat side and secure side (by removable label on glazing material).
- e. Code indicating bullet-resistant rating and test standard used (by removable label on glazing material).

2.14 FASTENERS

Fasteners exposed to view shall match in color and finish and shall harmonize with the material to which fasteners are applied. Fasteners shall be in accordance with Section 05 50 00 METAL: MISCELLANEOUS AND FABRICATIONS.

2.15 CORROSION PROTECTION - DISSIMILAR MATERIALS

Contact surfaces between dissimilar metals and aluminum surfaces in contact with concrete, masonry, pressure-treated wood or absorptive materials subject to wetting, shall be given a protective coating in accordance with Section 09 90 00 PAINTS AND COATINGS.

2.16 SHOP/FACTORY FINISHING

All factory or manufactured components shall be shop finished as indicated below.

2.16.1 Ferrous Metal

Surfaces of ferrous metal, except galvanized and stainless steel surfaces, shall be cleaned and shop coated with the manufacturer's standard

protective coating other than a bituminous protective coating, compatible with finish coats. Prior to shop painting, surfaces shall be cleaned with solvents to remove grease and oil, and with power wire-brushing or sandblasting to remove loose rust, loose mill scale and other foreign substances. Surfaces of items to be embedded in concrete shall not be shop painted.

2.16.2 Galvanizing

Items specified to be galvanized shall be hot-dip processed after fabrication. Galvanizing shall be in accordance with [ASTM A 123/A 123M](#) or [ASTM A 653/A 653M](#) as applicable.

2.16.3 Aluminum

Unless otherwise specified, aluminum items shall be standard mill finish. Anodic coatings shall conform to paragraph FINISHES.

PART 3 EXECUTION

3.1 EXAMINATION

Existing work shall be examined to ensure that it is ready for installation or erection of the components. Components shall be checked and corrected for racking, twisting, and other malformation prior to installation. Frames must be set true and plumb and remain aligned for proper installation. All surfaces and connections shall be examined for damage prior to installation.

3.2 PREPARATION AND PROTECTION

The Contractor shall field verify dimensions of rough openings for components, and shall verify that surfaces of openings are plumb, true, and provide required clearances. The Contractor shall protect surrounding work prior to installation of bullet-resistant components. Surrounding work which is damaged as a result of the installation of bullet-resistant components shall be restored to like-new condition prior to acceptance of the work described herein.

3.3 INSTALLATION

The finished work shall be rigid, neat in appearance and free from defects. Equipment shall be installed plumb and level, and secured rigidly in place. Installation of doors and frames shall conform to [NAAMM HMMA 840](#). Doors, frames, and hardware shall be installed in strict compliance with approved printed instructions and detail drawings provided by the manufacturer. The Contractor shall be responsible for proper installing of the door assembly so that operating clearances and bearing surfaces conform to manufacturer's instructions. Weatherstripping and thresholds shall be installed at exterior door openings to provide a weathertight installation. All other components shall be installed in accordance with approved manufacturer's recommended instructions. All operable parts of components shall be tested for smooth, trouble-free operation, in the presence of the Contracting Officer's representative.

3.4 FRAMED INSTRUCTIONS

Framed instructions, under glass or in plastic with all edges laminated, including wiring and control diagrams showing the complete layout of each

bifold door unit, shall be posted where directed. Condensed operating instructions explaining preventive maintenance procedures, methods of checking for normal safe operation, and procedures for safely starting and stopping shall be prepared in typed form, framed as specified above and posted beside the diagrams. The framed instructions shall be posted before acceptance testing.

3.5 ELECTRICAL WORK

All electrical work shall be in accordance with Section 26 20 00 INTERIOR DISTRIBUTION SYSTEM. Flexible connections between doors and fixed supports shall be made with extra flexible type SO cable, except in hazardous locations where wiring shall conform to NFPA 70. The cable shall have a spring-loaded automatic take up reel, or an equivalent and approved device.

3.6 ADJUSTING/CLEANING

Adjustments shall be made to doors and pass-thru drawers to assure smooth operation. Units shall be weathertight when closed and locked. All components shall be cleaned in accordance with manufacturer's instructions.

3.7 SCHEDULING

Glazing of bullet-resistant windows except factory-glazed units shall occur only after all concrete, masonry, ceiling, electrical, mechanical, plumbing and adjacent finish work has been completed to avoid damage to the glazing material. Factory-glazed windows shall be covered to protect them from damage during adjacent finish work.

-- End of Section --