
USACE / NAVFAC / AFCEA UFGS-11025 (February 2004)

Preparing Activity: USACE Superseding
UFGS-11025 (August 2001)

UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated 25 June 2004

Latest changes indicated by CHG tags

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SECTION 11025

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02/04

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SECTION 11025

FORCED ENTRY RESISTANT COMPONENTS 02/04

NOTE: This guide specification covers requirements for forced entry resistant door assemblies, window assemblies, louvers, pass-through drawers, and prefabricated guardhouses.

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).

Use of electronic communication is encouraged.

Brackets are used in the text to indicate designer choices or locations where text must be supplied by the designer.

PART 1 GENERAL

1.1 REFERENCES

NOTE: Issue (date) of references included in project specifications need not be more current than provided by the latest guide specification. Use of SpecsIntact automated reference checking is recommended for projects based on older guide specifications.

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

AA STFA-601711 (2001) Surface Treatment and Finishing of
Aluminum and Its Alloys (2 Vol.)

AMERICAN WELDING SOCIETY (AWS)

AWS D1.1/D1.1M (2002) Structural Welding Code - Steel

ASTM INTERNATIONAL (ASTM)

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

ASTM A 653/A 653M (2003) Steel Sheet, Zinc-Coated
(Galvanized) or Zinc-Iron Alloy-Coated
(Galvannealed) by the Hot-Dip Process

ASTM C 1036 (2001) Flat Glass

ASTM C 1048 (1997b) Heat-Treated Flat Glass - Kind HS,
Kind FT Coated and Uncoated Glass

ASTM C 1172 (2003) Laminated Architectural Flat Glass

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

ASTM D 1044 (1999) Resistance of Transparent Plastics
to Surface Abrasion

ASTM D 1922 (2003) Propagation Tear Resistance of
Plastic Film and Thin Sheet by Pendulum
Method

ASTM D 256 (2002e1) Determining the Izod Pendulum
Impact Resistance of Plastics

ASTM D 3029 (1995) Impact Resistance of Flat Rigid
Plastic Specimens by Means of a Tup
(Falling Weight)

ASTM D 3595 (2002) Polychlorotrifluoroethylene (PCTFE)
Extruded Plastic Sheet and Film

ASTM D 3951 (1998) Commercial Packaging

ASTM D 4093 (1995; R 2001e1) 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) Index of Refraction of Transparent Organic Plastics |
| ASTM D 570 | (1998) Water Absorption of Plastics |
| ASTM D 635 | (2003) Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position |
| ASTM D 638 | (2002a) Tensile Properties of Plastics |
| ASTM D 638M | (1996) Tensile Properties of Plastics (Metric) |
| ASTM D 648 | (2001) Deflection Temperature of Plastics Under Flexural Load in the Edgewise Position |
| ASTM D 696 | (2003) Coefficient of Linear Thermal Expansion of Plastics Between Minus 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 Sheeting |
| ASTM D 905 | (2003) Strength Properties of Adhesive Bonds in Shear by Compression Loading |
| ASTM E 1300 | (2003) Determining Load Resistance of Glass in Buildings |
| ASTM E 168 | (1999) General Techniques of Infrared Quantitative Analysis |
| ASTM E 169 | (1999) General Techniques of Ultraviolet-Visible Quantitative Analysis |
| ASTM E 831 | (2003) Linear Thermal Expansion of Solid Materials by Thermomechanical Analysis |
| ASTM E 90 | (2002) Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements |
| ASTM F 1233 | (1998) Security Glazing Materials and Systems |
| ASTM F 428 | (2003) Intensity of Scratches on Aerospace Glass Enclosures |

| | |
|------------|---|
| ASTM F 520 | (1997) Environmental Resistance of Aerospace Transparencies |
| ASTM F 521 | (1983; R 1997e1) Bond Integrity of Transparent Laminates |
| ASTM F 548 | (2003) Intensity of Scratches on Aerospace Transparent Plastics |
| ASTM F 735 | (1994; R 2001) Abrasion Resistance of Transparent Plastics and Coatings Using the Oscillating Sand Method |
| ASTM F 791 | (1996; R 2002) Stress Crazing of Transparent Plastics |
| ASTM G 26 | (1996) Operating Light-Exposure Apparatus (Xenon-Arc Type) With and Without Water for Exposure of Nonmetallic Materials |

BUILDERS HARDWARE MANUFACTURERS ASSOCIATION (BHMA)

| | |
|--------------|---|
| BHMA A115.1 | (1990) 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 | (2000) Butts and Hinges |
| BHMA A156.13 | (2002) Mortise Locks & Latches, Series 1000 |
| BHMA A156.16 | (2002) Auxiliary Hardware |
| BHMA A156.18 | (2000) Materials and Finishes |
| BHMA A156.4 | (2000) Door Controls - Closers |
| BHMA A156.5 | (2001) Auxiliary Locks & Associated Products |
| BHMA A156.8 | (2000) Door Controls - Overhead Holders and Holders |

GLASS ASSOCIATION OF NORTH AMERICA (GANA)

| | |
|---------------------|-----------------------|
| GANA Glazing Manual | (2004) Glazing Manual |
|---------------------|-----------------------|

H.P. WHITE LABORATORY (HPW)

| | |
|----------------|--|
| HPW TP-0500.02 | (2003) Transparent Materials for use in Forced Entry or Containment Barriers |
| HPW TP-0502.01 | (1989) Forced Entry Resistance of Structural Materials (Opaque and Transparent); Test Procedures and Acceptance Criteria |
| HPW TP-0506.00 | (1993) Forced Entry Resistance of Security Structures and Structural Subassemblies VERY LOW THREAT LEVEL |

| | |
|----------------|---|
| HPW TP-0507.00 | (1993) Forced Entry Resistance of Security Structures and Structural Subassemblies LOW THREAT LEVEL |
| HPW TP-0508.00 | (1993) Forced Entry Resistance of Security Structures and Structural Subassemblies MEDIUM THREAT LEVEL |
| HPW TP-0509.00 | (1993) Forced Entry Resistance of Security Structures and Structural Subassemblies HIGH THREAT LEVEL |

NATIONAL ASSOCIATION OF ARCHITECTURAL METAL MANUFACTURERS (NAAMM)

| | |
|----------------|---|
| NAAMM HMMA 801 | (1998) Glossary of Terms for Hollow Metal Doors and Frames |
| NAAMM HMMA 802 | (1992) Manufacturing of Hollow Metal Doors and Frames |
| 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 |

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

| | |
|----------|---|
| NFPA 80 | (1999) Fire Doors and Fire Windows |
| NFPA 80A | (2001) Protection of Buildings from Exterior Fire Exposures |

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 |
|--------------|---|

UNDERWRITERS LABORATORIES (UL)

| | |
|--------|---|
| UL 10B | (1997; Rev thru Oct 2001) Fire Tests of Door Assemblies |
|--------|---|

1.2 COMPONENT DESCRIPTION

NOTE: This specification is to be used for components identified as forced entry resistant. The designer will clearly distinguish on the drawings, such as on door, window, and louver schedules, which components are to be forced entry resistant.

Components covered in this specification are designed to resist forced

entry attacks with increasing severity levels of hand, power, and thermal tools and weapons and explosives. The components include forced entry resistant [personnel door/frame assemblies] [louvers] [windows] [glazing for doors] [pass-through drawers] [prefabricated guardhouses]. Each type of forced entry resistant component shall be a complete assembly produced by a single manufacturer. Movable and operable components shall operate smoothly and freely. Items for exterior installation shall be designed to resist water and vapor penetration or entrapment.

1.3 SUBMITTALS

NOTE: Submittals must be limited to those necessary for adequate quality control. The importance of an item in the project should be one of the primary factors in determining if a submittal for the item should be required.

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 projects.

Submittal items not designated with a "G" are considered as being for information only for Army projects and for Contractor Quality Control approval for Navy projects.

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are [for Contractor Quality Control approval.] [for 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 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Installation[; G][; G, [____]]

Drawings showing anchorage of components and appurtenances into the actual surrounding construction and clearances for operation.

Drawings sufficient to show hardware location and installation details. Complete drawings for forced entry resistant prefabricated guardhouses.

SD-03 Product Data

Forced Entry Resistant Components

Manufacturer's descriptive data and finish samples. The forced entry resistant door lock functions, for selection by the Contracting Officer. Airflow calculations for louvers.

Installation

A copy of installation instructions and recommended cleaning and maintenance instructions.

Components

Lists including schedule of components to be incorporated in the work with manufacturer's model or catalog numbers, specification and drawing reference numbers, warranty information, threat level designated, [fire ratings,] [sound transmission coefficient ratings,] [insulation "U" value,] and number of items provided. Listing of similar products that have been satisfactorily in use for two years or more, including name of purchasers, locations of installations, dates of installations, and service organizations.

SD-07 Certificates

Forced Entry Resistant Components[; G][; G, [_____]]

Manufacturer's certificates attesting that components conform to the requirements on drawings and in specifications. Testing reports from independent testing laboratories indicating conformance to regulatory requirements shall be included. Fire rated doors may be furnished with certificate in lieu of a label. Certificate shall indicate compliance with the requirements for doors of the type and fire rating class. Manufacturer shall certify that compliance with the installation instructions and/or drawings will provide the specified degree of forced entry resistance.

1.4 STANDARD PRODUCTS

NOTE: The manuals listed below contain information on the forced entry tactic.

TM 5-853-1/AFMAN 32-1071, Vol. 1, Security Engineering - Project Development

TM 5-853-2/AFMAN 32-1071, Vol. 2, Security Engineering - Concept Design

TM 5-853-3/AFMAN 32-1071, Vol. 3, 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.

TM 5-853-1 defines threats to military assets including the forced entry tactic in terms of weapons, tools, and explosives. The threat to an asset may be developed using the threat analysis procedure described in TM 5-853-1. TM 5-853-2 and TM 5-853-3 contain guidance on design and protective measures to resist forced entry and other tactics. To be effective, a forced entry resistant component must be part of a forced entry resistant construction envelope that protects and asset. Refer to appendix C of TM 5-853-2 for a table of components and construction elements that are rated against various threat severity levels of the forced entry tactic. If a designer chooses to design components for shop fabrication, the materials should be specified in appropriate sections including Section 05500A, MISCELLANEOUS METALS.

At the time of preparation of this specification, manufacturers had not tested vehicle doors to the forced entry test standards covered herein. The designer may specify oversized swinging doors or specify a door for vehicle entry to meet a forced entry test standard as an alternate bid item, or under a separate bid request doors to be tested in accordance with the required test standard. If the latter is chosen, allow long lead time for the manufacturer to design, test, and receive approval of the door.

Each type of forced entry resistant component shall be the standard product of a manufacturer regularly engaged in the manufacture of such products and shall duplicate items that have been tested and approved in accordance with the forced entry test standard specified in paragraph COMPONENT TEST REQUIREMENTS. Manufacturer's descriptive data, installation instructions, and certificate and test report showing compliance with the specified forced entry test standard as specified in paragraph COMPONENT TEST REQUIREMENTS shall be submitted for all components. [Following approval of manufacturer's descriptive data, a schedule listing the items and components to be furnished shall be submitted.] [Drawings shall be submitted.] Manufacturer's certificate shall be submitted indicating that compliance with the installation instructions [and drawings] will provide the specified degree of forced entry resistance.

1.5 COMPONENT TEST REQUIREMENTS

NOTE: The project forced entry threat must be identified before selection of test standard. The designer will then select the forced entry testing standard that most represents the threat, using Table I. The designer will then indicate the applicable test standard in paragraph COMPONENT TEST

REQUIREMENTS or on the drawings in door, window, or other component schedule.

If project criteria includes more than one forced entry threat, each component will be correlated with the appropriate test standard it is required to meet.

Test standards should be selected based on the forced entry threat as defined in TM 5-853-1 for a given asset. The forced entry tactic has associated with it five threat severity levels consisting of very low, low, medium, high, and very high.

The HPW TP-0506.00 (very low) through HPW TP-0509.00 (high) test standards for the forced entry threats identified in TM 5-853-1 are for use in performance specifications.

There is no single uniform standard for forced entry resistance. Each testing agency has its own parameters. Variables include the tools used, the attack time, the attack team size, and the failure criteria. Some standards apply only to specific components. Verify that the test standard is applicable to components being specified.

Several forced entry test standards are described in Note F, and correlated to threats in Table I. Test standards described in Table I and Note F include both those developed and used by independent testing laboratories and those developed for specific application by other Government agencies.

Equivalent Standards. Table I indicates how the existing forced entry standards relate to the forced entry threat severity levels. Because many of the standards indicated as "equivalent" include differences in tools, numbers of attackers, attack duration, and failure criteria, designers should obtain the most recent revisions, become familiar with them, and develop specifications accordingly.

Bullet and forced entry resistant window design. Refer to UFGS 11035, BULLET-RESISTANT COMPONENTS, when specifying ballistic threats only. Where both forced entry and ballistic resistance are required, the designer must substantially alter and combine the pertinent parts of this UFGS and UFGS-11035. Combined forced entry and ballistic testing procedures are included in SD Std-01.01 and ASTM F 1233. Also HPW TP-0501.01, "Ballistic Resistance of Structural Materials (Opaque and Transparent); Test Procedures and Acceptance Criteria" was written to be used with HPW TP-0502.01 for dual forced entry and ballistic testing.

TABLE I

EQUIVALENT FORCED ENTRY STANDARDS

| Threat Severity Levels | | | Very | Low | Medium |
|------------------------|---|---|------|-----|--------|
| High | | | Low | | |
| Forced Entry Standards | (where applicable) Number of Attackers | (where applicable) Attack Times in Minutes | | | |
| ASTM F 1233 | | | | | |
| Class IV | --- | Variable | X | | |
| Class V | --- | Variable | | X | |
| HPW TP-0506.00 | | | | | |
| VL5 | 2 | 5 | X | | |
| VL15 | 2 | 15 | X | | |
| VL60 | 2 | 60 | X | | |
| HPW TP-0507.00 | | | | | |
| L5 | 3 | 5 | | X | |
| L15 | 3 | 15 | | X | |
| L60 | 3 | 60 | | X | |
| HPW TP-0508.00 | | | | | |
| M5 | 6 | 5 | | | X |
| M15 | 6 | 15 | | | X |
| M60 | 6 | 60 | | | X |
| HPW TP-0509.00 | | | | | |
| H5 | 6 | 5 | | | |
| | | X | | | |
| H15 | 6 | 15 | | | |
| | | X | | | |
| H60 | 6 | 60 | | | |
| | | X | | | |
| HPW TP-0502.01 | | | | | |
| Temporary | 6 | 45 | | X | |
| Prolonged | 6 | 180 | | X | |
| HPW TP-0500.02 | | | | | |
| Level II | --- | Variable | X | | |
| Level III | --- | Variable | X | | |
| Level IV | --- | Variable | | X | |
| Level V | --- | Variable | | X | |
| SD Std-01.01 | | | | | |
| 5 Minute | | | | | |
| Protection Level | 2 | 5 | | X | |
| 15 Minute | | | | | |

TABLE I

EQUIVALENT FORCED ENTRY STANDARDS

| Threat Severity Levels | | | Very Low | Low | Medium |
|-------------------------------|--|--|-------------|-----|--------|
| High | | | | | |
| Forced Entry Standards | (where applicable) Number of Attackers | (where applicable) Attack Times in Minutes | | | |
| | Protection Level | | | | |
| | 6 | 15 | | X | |
| 60 Minute Protection Level | 6 | 60 | | X | |

ABBREVIATIONS:

| | |
|------|--|
| ASTM | - American Society for Testing and Materials |
| HPW | - H. P. White Laboratories |
| UL | - Underwriters Laboratories, Inc. |
| SD | - U. S. Department of State |

The forced entry test standards described below include both those developed and used by independent testing laboratories and those developed for specific application by other Government agencies. These standards differ in attack tools employed, the number of persons (if any) used in the attack force, the attack duration, and the failure criteria. Before specifying construction components to meet a standard, obtain the standard and become familiar with it. A brief description follows each standard and, when possible, the standard is equated to forced entry severity levels from TM 5-853-1.

1. American Society for Testing and Materials (ASTM).

a. "Standard Test Method for Security Glazing Materials and Systems," ASTM F 1233. Acceptance of component is determined by one of the following: ballistics attack only; physical attack only to include blunt tool impacts, sharp tool impacts, thermal stress, and chemical deterioration; or ballistics attack followed by and in combination with physical attack. The physical attack tools used in the Class V testing sequence are similar to the "low forced entry severity level." The physical attack tools used in the Class IV testing sequence are similar to the "very low forced entry severity level." The use of power tools or devices requiring more than two persons to transport or operate is specifically exempted from testing. This test method defines two factors (the tools employed and the techniques and methods used by the attackers)

and allows a third factor (duration) to vary in order to establish severity levels of forced entry.

b. "Test Methods for Resistance of Window Assemblies to Forced Entry, Excluding Glazing", ASTM F 588. This specification applies to window assemblies of various materials and types of construction. Five window types are classified. The tests are intended to establish a measure of resistance to attack by unskilled or opportunistic burglars. Tests include hand manipulation, tool manipulation, static load, and locking device strength resistance. This testing is at a level comparatively below the "very low forced entry severity level."

2. H. P. White Laboratories

a. "Forced Entry Resistance of Security Structures and Structural Subassemblies, Very Low Threat Level," HPW TP-0506.00. This standard represents the Army "very low forced entry severity level." The attack times are 5, 15, and 60 minutes using limited tools. The test includes a vigorous attack by two active attackers on a material specimen or a complete assembly.

b. "Forced Entry Resistance of Security Structures and Structural Subassemblies, Low Threat Level," HPW TP-0507.00. This standard represents the Army "low forced entry severity level." The attack times are 5, 15, and 60 minutes using unlimited hand tools. The test includes a vigorous attack by three active attackers on a material specimen or on a complete assembly.

c. "Forced Entry Resistance of Security Structures and Structural Subassemblies, Medium Threat Level," HPW TP-0508.00. This standard represents the Army "medium forced entry severity level." The attack times are 5, 15, and 60 minutes. The test includes a vigorous attack by four active attackers on a material specimen or on a complete assembly. The attack uses unlimited hand tools, limited power and thermal tools, a hand-held hydraulic jack, and weapons.

d. "Forced Entry Resistance of Security Structures and Structural Subassemblies, High Threat Level," HPW TP-0509.00. This standard represents the Army "high forced entry severity level." The attack times are 5, 15, and 60 minutes. The test includes a vigorous attack by four active attackers on a material specimen or on a complete assembly. The attack uses unlimited hand and power tools, limited thermal tools, a hand-held hydraulic jack, weapons, and limited explosives.

e. "Forced Entry Resistance of Structural Materials

(Opaque and Transparent); Test Procedures and Acceptance Criteria," HPW TP-0502.01. On opaque portions of the assembly, the time is 15 or 60 minutes against attack tools similar to the "low forced entry severity level." However, note that on transparent portions, sharp-edge cutting tools are specifically exempted from the test tools. The tests include a vigorous attack by six persons. Ballistic tests may be performed on the same samples before the forced entry testing, and without changing or repairing damaged assemblies, in accordance with HPW-TP-0501.01, "Ballistic Resistance of Structural Materials (Opaque and Transparent); Test Procedures and Acceptance Criteria."

f. "Transparent Materials and Assemblies for Use in Forced Entry or Containment Barriers," HPW TP-0500.02. This standard was developed by H. P. White Laboratories for commercial, governmental, or military application and generally is used in testing prison (forced exit resistant) components. This test method defines two of three factors (tools and techniques) and varies the third factor (time) to establish five levels of forced entry resistance. Levels I, II, III, IV, and V specify attack tools and sequences of attacks with the specified tools. Attack weapons and tools include hand tools, propane and acetylene torch, chemical solvents, and five levels of ballistic assault. The ballistic threats are considered integral to the forced entry rating in this standard and differ from those in other H. P. White standards. Tests are conducted on either a 915 x 1220 mm (3 x 4 foot) specimen of transparent material or on a complete assembly.

3. International Conference of Building Officials, "Tests for Window Assemblies," UBC 41.2. Describes the following tests which are related to security windows: hand manipulation, tool manipulation, static load, and locking device tests. This testing is at a level comparatively below the "very low forced entry severity level."

4. National Institute of Justice (NIJ). "Physical Security of Window Units," NIJ 0316.00-80. Use of the NIJ standard for Army application is limited because it describes construction types which have been demonstrated to have minimal penetration times against the more sophisticated threats. This specification describes four classes of physical security by describing the window types indicated below. This testing is at a level comparatively below the "very low forced entry severity level."

a. Class I (Grade 10)--minimum level: Regular glazing in commercial sash; double locks; wood frame acceptable.

b. Class II (Grade 20)--moderate level: Heavy-duty sash with laminated or polycarbonate glazing; wood sash must be reinforced or heavy.

c. Class III (Grade 30)--medium level: Heavy-duty sash with laminated glass over 6 mm (1/4 inch) thick or polycarbonate glazing 6 mm (1/4 inch) thick; locks should include two heavy-duty deadlocking bolts.

d. Class IV (Grade 40)--high level: Very heavy fixed frames with laminated glass over 6 mm (1/4 inch) thick or security screen, bars, or shutters with special locking devices.

e. Window performance requirements include lock tests for stability (cycles of unlocking motion) and strength (loads ranging from 218 N (49 lb. force) to 3350 N (753 lb. force); sash strength (218 N (49 lb. force) primary and secondary loads to 445 N (100 lb. force) primary load, 3350 N (753 lb. force) secondary load) and impact resistance (not applicable to Class I, Grade 10; other classes range from one impact at 50 J (37 ft-lb force) to 10 at 100 J (74 ft-lb force)); and glazing impact test (same as for sash impact).

5. Underwriters Laboratories Inc. (UL), "Standard for Burglary Resisting Glazing Material," UL 972, evaluates a glazing material's ability to withstand multiple impacts over a wide temperature range. Impact testing is standardized rather than subjecting the specimen to actual physical attack simulations by persons who can analyze and exploit the weaknesses of specimens. A steel ball is dropped a number of times from different heights. The intent of this standard is to replicate hit-and-run burglary attacks on commercial establishments. This testing is at a level below the "very low forced entry severity level."

6. U. S. Department of State (SD).

"SD Std-01.01. This standard was developed for determining the forced entry resistance of building components to be used in State Department facilities. The protection level is 5, 15, or 60 minutes. The tools are similar to the low forced entry severity level. This standard is for the testing of louvers, fixed windows and panels, and doors. Testing is performed by a two-member team for the 5-minute protection level and by a six-member team for the 15- and 60-minute protection levels. Penetration time is considered to be when an opening has been created which allows passage of either a solid, incompressible object 300 x 300 x 200 mm (12 x 12 x 8 inches) or a solid, incompressible right cylinder 300 x 300 mm (12 x 12 inches). Both a forced entry and a ballistic rating

can be obtained on the same component if the component passes the ballistic and forced entry tests contained in the test standard.

Add more rows of information when necessary.

Forced entry resistant components shall be certified as resistant to the forced entry test standards indicated herein. Forced entry resistant components shall be tested as specified below. The test results and certification thereof shall be approved by the Contracting Officer before delivery of the component to the job site.

| Component | Test Standard | Level Within Test | Minimum Attack |
|-----------|----------------|-------------------|----------------|
| | | Standard (If Any) | Time (Minutes) |
| [[]] | ASTM F 1233 | Class IV | Variable] |
| [[]] | ASTM F 1233 | Class V | Variable] |
| [[]] | HPW TP-0506.00 | VL5 | 5] |
| [[]] | HPW TP-0506.00 | VL15 | 15] |
| [[]] | HPW TP-0506.00 | VL60 | 60] |
| [[]] | HPW TP-0507.00 | L5 | 5] |
| [[]] | HPW TP-0507.00 | L15 | 15] |
| [[]] | HPW TP-0507.00 | L60 | 60] |
| [[]] | HPW TP-0508.00 | M5 | 5] |
| [[]] | HPW TP-0508.00 | M15 | 15] |
| [[]] | HPW TP-0508.00 | M60 | 60] |
| [[]] | HPW TP-0509.00 | H5 | 5] |
| [[]] | HPW TP-0509.00 | H15 | 15] |
| [[]] | HPW TP-0509.00 | H60 | 60] |
| [[]] | HPW TP-0502.01 | Temporary | 45] |
| [[]] | HPW TP-0500.02 | Prolonged | 180] |
| [[]] | HPW TP-0500.02 | Level II | Variable] |
| [[]] | HPW TP-0500.02 | Level III | Variable] |
| [[]] | HPW TP-0500.02 | Level III | Variable] |
| [[]] | HPW TP-0500.02 | Level V | Variable] |
| [[]] | SD Std-01.01 | 5 Minute | 5] |

| Component | Test Standard | Level Within Test | Minimum Attack |
|-----------|---------------|-------------------|----------------|
| | | Standard (If Any) | Time (Minutes) |
| [____] | SD Std-01.01 | 15 Minute | 15] |
| [____] | SD Std-01.01 | 60 Minute | 60] |

1.6 QUALIFICATIONS

Welding procedures, welders, and welding operators shall be qualified in accordance with AWS D1.1/D1.1M.

1.7 DELIVERY, STORAGE, AND HANDLING

Components shall be delivered to the job site with the manufacturer, name, and model number clearly marked thereon. Components shall be delivered, stored, and handled so as not to be damaged or deformed and shall be in accordance with ASTM D 3951. Components shall be handled carefully to prevent damage to the faces, edges, corners, ends, and glazing where applicable. Abraded, scarred, or rusty areas shall be cleaned, repaired, or replaced immediately upon detection of the damage. Damaged components that cannot be restored 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.

1.8 SEQUENCING AND SCHEDULING

When testing of a previously untested component is specified, sufficient lead time shall be allowed so that testing will not delay construction. The test results and component shall be approved by the Contracting Officer before delivery of the component to the job site.

1.9 WARRANTY

NOTE: A warranty for all glazings should be specified. The designer will determine availability of 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 FORCED ENTRY RESISTANT PERSONNEL DOOR AND FRAME ASSEMBLIES

Doors and frames shall be factory fabricated assemblies. Sizes shall be as indicated. Doors shall be of steel, hardened steel, or be reinforced internally with steel shapes and clad with aluminum. Interior composition and reinforcement shall be determined by the manufacturer. Rubber silencers shall be installed on door frames. Exterior doors shall have top edges closed flush and sealed against water penetration, be insulated, and shall be provided with weatherstripping and thresholds. Locks and hinges

shall be the same or equal in performance and number as the hardware used on the tested door. Lock and hardware shall be provided by the manufacturer as a complete assembly. Frames shall be furnished by the door fabricator, with anchorage to wall construction completely specified as to number of anchors, anchor size, material, and length.

2.1.1.1 Fire Rated Doors

Fire rated doors shall be provided at locations indicated. Door assemblies shall comply with the forced entry test standard specified and shall bear the listing identification label of the Underwriters' Laboratories, Inc. or a nationally recognized testing laboratory that is qualified to perform tests of fire door assemblies in accordance with UL 10B, and that has a listing service for the tested assemblies. Door assemblies include door, hardware, frame, closers, and glazing. A certificate indicating that the units were inspected in accordance with NFPA 80 and NFPA 80A may be furnished in lieu of label. For oversized doors, a certificate from Underwriters' Laboratories, Inc. or a nationally recognized testing laboratory may be furnished in lieu of label. The certificate shall state that oversized doors are manufactured in compliance with the requirements for doors of the type and fire rating class. Manufacturer's descriptive data shall be submitted.

2.1.1.2 Sound Rated Doors

Sound rated doors shall be provided at locations indicated. Door assemblies shall comply with the forced entry test standard specified and shall consist of door, hardware, frame, threshold, and adjustable gaskets. The assembly shall have a laboratory Sound Transmission Class (STC) rating [of [____]] [as indicated] when tested in accordance with ASTM E 90. Manufacturer's descriptive data, test report, and certification of the test report showing compliance with the specified requirements shall be submitted.

2.1.1.3 Door and Frame Fabrication

The subsurfaces shall be flat, parallel, and plumb after fabrication. Doors shall be reinforced [and fully insulated] in accordance with manufacturer's design. Door frames shall be anchored as specified by the door manufacturer. The Contractor shall coordinate the door manufacturer's requirements for welding to wall reinforcement or casting frame embedments into wall before wall is placed. Steel door frames shall be mitered or coped and welded at the corners with welds ground smooth. Where structural channel frames are used the size, weight, stops, welding, and anchorage into surrounding construction must be specified and tested along with the door as an assembly. Any necessary reinforcements in the door and the frame shall be made in the factory. Door and frame shall be drilled and tapped as required for the specified hardware. Frame channels shall be mitered or coped and welded at corners with full penetration groove welds. Exposed welds shall be dressed smooth. Hollow metal doors and frames shall be manufactured in accordance with NAAMM HMMA 801, NAAMM HMMA 802, NAAMM HMMA 810, and NAAMM HMMA 820 as a standard of quality, and shall meet the specified forced entry testing standard.

2.1.1.4 Sidelight Frames and Door Glazing

NOTE: Designers should avoid sidelights because they make the door assembly more susceptible to

prying and jamb spreading. When they are used,
reinforce side jambs with heavy structural steel
anchored at the top and bottom.

Sidelight frames shall be constructed using forced entry resistant door frame sections. For glazing in door or sidelight, stop height and rabbet depth shall be as required to accommodate the glazing material that is resistant to the forced entry test standard specified. The assembly shall be tested with the specified glazing and stops installed. 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 or as required by the manufacturer. Glazing is specified in paragraph Forced Entry Resistant Glazing Materials.

2.1.5 Preparation for Hardware

Doors and frames shall be prepared for hardware in accordance with [NAAMM HMMA 830] [manufacturer's instructions]. Surface applied hardware shall be drilled and tapped in the field.

2.1.6 Hardware

NOTE: Panic hardware on a forced entry rated door renders the door more susceptible to compromise. If panic hardware is required, use a push pad type which has a flush-mounted bar. Locks and hinges are an integral part of the forced entry resistance of a door assembly.

The following hardware guidance refers to single and pairs of swinging personnel doors, up to 1.22 x 2.44 m (4 x 8 feet) per leaf. The locks and hinges listed below provide minimum levels of protection only. The locks and hinges for forced entry resistant door assemblies should be a tested part of a door manufacturer's assembly. For other door hardware, extra-heavy-duty standard commercial hardware is suitable.

Hardware for forced entry resistant door assemblies shall be provided by the door assembly manufacturer to ensure a complete forced entry resistant assembly. Where test standard requires hardware to be tested with the door assembly, locks and hinges shall be included in the labeling and/or test certification. Locks and hinges shall be the same or equal in performance, quality, grade, and quantity as used on the successfully tested door assembly in accordance with the specified forced entry testing standard. The Contractor shall provide certification that the locks, latches, and hinges provide the same degree of forced entry resistance as required by the specified forced entry testing standard. Keying shall be as specified in Section 08710 DOOR HARDWARE.

2.1.6.1 Locks and Latchsets

NOTE: Most forced entry resistant door assemblies

require two or more specialty locks severely limiting lock functions. Coordinate with codes for fire exiting and safety. Hardware for doors located in a means of egress must comply to the requirements of NFPA 101, Life Safety Code. Add specialized requirements for locking, keying, and opening to this paragraph.

The door manufacturer shall submit available lock functions for selection of function by the Contracting Officer. Mortise lock and latchsets shall be, as a minimum, series 1000, operational Grade 1, Security Grade 1 or 1A, and shall conform to BHMA A156.13. Strikes for mortise locks and latches (including deadbolt locks), as a minimum, shall conform to BHMA A115.1 except strikes shall be rectangular (without curved lip). Mortise-type locks and latches for doors 45 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, through-bolted, extruded stainless steel trim. Lock finish shall be [630] [639] [652] in accordance with BHMA A156.18.

2.1.6.2 Hinges

Steel doors and frames required to resist the "very low" or "low" threat severity level that are up to and including 2.13 m 7 feet 0 inches high shall, as a minimum, be equipped with 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. For each additional 300 mm 12 inches of door height beyond 2.13 m 7 feet 0 inches, provide a minimum of one more hinge. Hinges shall be full mortise, half mortise, full surface, or half surface design as recommended by the manufacturer for frame and door design and shall be tamperproof unless mounted on the protected side of the door. Hinges shall have [pins as recommended by the manufacturer] [nonremovable pins] [security pins] [and be equipped with a safety stud]. Spot welding of hinge pin will not be acceptable. The Contractor shall provide hinge manufacturer's certification that the hinge supplied meets applicable test requirements for BHMA A156.1 type number of hinge specified and that the hinge is suitable for the size and weight of the door assembly on which it will be utilized. Continuous extra heavy-duty piano-type hinge sized to carry the weight of the door without sagging is permitted. If continuous piano-type hinges are provided with the door, independent laboratory reports covering both the door weight capacity and a 2,500,000 cycle testing to match the BHMA A156.1 Grade 1 requirements shall be furnished by the Contractor. Interior door hinges shall be furnished in prime coated steel. Exterior door hinges shall be furnished in nonferrous metal or stainless steel.

2.1.6.3 Electric Strikes

NOTE: Use of an electric strike makes the door assembly more susceptible to compromise, especially on doors swinging into a protected area.

Where required, electric strikes shall conform to BHMA A156.5 Grade 1. Strike boxes shall be furnished with deadbolt and latch strikes for Grade 1. Strikes shall be [fail secure] [fail safe].

2.1.6.4 Door Closers

NOTE: Excessively heavy doors require coordination with manufacturers to ensure selection of proper sizes and types of closers.

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

2.1.6.5 Door Stops and Holders

NOTE: Excessively heavy doors require coordination with manufacturers to ensure selection of proper sizes and types of stops and holders.

Door stops [and holders] shall be extra heavy duty, conforming to [BHMA A156.8, Type C08511 overhead surface mounted type] [BHMA A156.16, Type L11251 for floor mounted installation] [BHMA A156.16, Type L11271 for wall mounted installation] [_____].

2.1.7 Frame Anchors

NOTE: Some manufacturers require frame anchors to be built or cast into the surrounding construction.

Jamb and head anchors shall be provided with door/frame assembly and shall be as specified by the manufacturer and forced entry resistant to the same degree as the component. Contractor shall coordinate concrete work with component manufacturers when the manufacturer specifies frame anchors to be embedded into a concrete or concrete masonry unit surface during construction.

2.1.8 Weatherstripping

Head and jambs of exterior doors 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.

2.1.9 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 sightproof type inserted into the door. Pierced louvers shall not be used. Inserted louvers shall be stationary and shall be nonremovable from the attack side of forced entry resistant doors. [Insect screens shall be removable type with 18 by 16 mesh aluminum or bronze cloth.] The free area of the total square meters square 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]. Louvers shall be 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.

2.2 FORCED ENTRY RESISTANT LOUVERS

Louvers and frames shall be fabricated from steel shapes to the opening dimensions indicated. The free area of the total square meters square 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.

2.3 FORCED ENTRY RESISTANT WINDOW ASSEMBLIES

NOTE: Forced entry resistant glazing materials may be glass, plastic, or composites. Specify glazing only at the "very low" or "low" threat severity levels. Do not specify glazing thickness.

Forced entry resistant window assemblies shall be constructed using forced entry resistant frame sections. Frames shall be welded units of sizes and shapes indicated with minimum frame face dimensions of 50 mm 2 inches. Frame anchorage shall be as specified by the manufacturer and forced entry resistant to the same degree as the component. Top height and rabbet depth shall be as required to accommodate the glazing material resistant to the forced entry test standard specified. Exterior (attack side) glazing stops shall be welded to 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, or as required by the manufacturer.

2.3.1 Deal Trays

NOTE: Install in windows only; do not use in doors.

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 165.1 mm 6-1/2 inch steel writing ledge on exterior side of window] [and shall be provided with a weatherproof closure]. Deal tray shall be of the same materials and finish, shall be a welded subassembly of the window assembly, and shall conform to specified forced entry requirements for the entire window assembly.

2.3.2 Speaking Apertures

Speaking apertures shall allow passage of voice at normal speaking volume without distortion and shall be fabricated to resist the referenced forced entry resistant standard for [outdoor] [indoor] use. Speaking aperture shall be a welded subassembly of the window assembly and shall conform to the specified requirements for the entire window assembly.

2.3.3 Forced Entry Resistant Glazing Material

Glazing material shall be [glass,] [plastic,] [or] [composite] and shall conform to applicable requirements ASTM C 1036, ASTM E 1300, and ASTM C 1048.

Glazing materials shall be tested in accordance with the applicable sections of the following test procedures: ASTM D 905, ASTM D 1003, ASTM F 428, ASTM F 548, ASTM D 4093, and ASTM F 520. Plastic glazing shall be acrylic plastic sheets, polycarbonate plastic sheets, or approved equal. Plastic glazing shall be smooth and clear on both sides. [Glazing material shall be factory installed.] Factory-glazed components shall be covered to protect them from damage during adjacent finish work.

2.3.3.1 Laminated Glass

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 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, ASTM C 1036] [or] [heat-strengthened or fully heat-tempered float glass, Condition A, Type I, quality q3, Class 1, ASTM C 1048].

2.3.3.2 Acrylic Plastic Sheets

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 3029, ASTM D 542, ASTM D 570, ASTM D 635, ASTM D 648, ASTM D 638M ASTM D 638, ASTM D 696, ASTM D 792, ASTM D 1003, ASTM E 831, ASTM F 791, and ASTM G 26.

2.3.3.3 Polycarbonate Plastic Sheets

Polycarbonate plastic sheet shall be laminated or solid, 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 3029, ASTM D 648, ASTM D 792, ASTM F 735, ASTM D 1003, ASTM D 635, ASTM D 638M 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 G 26, and ASTM F 791. Polyvinyl butyral shall not be used in contact with polycarbonate because its plasticizer may craze polycarbonate.

2.3.3.4 Glass/Plastic Laminate Glazing

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.

2.3.3.5 Glass/Plastic Air-Gap Glazing

Forced entry 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. Glass plies shall be [annealed float glass conforming to Type I, quality q3, Class 1, ASTM C 1036] [or] [heat-strengthened or fully heat-tempered float glass, Condition A, Type I, quality q3, Class 1, ASTM C 1048]. 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 paragraph Acrylic Plastic Sheets.

2.3.4 Adhesive Interlayer Materials

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

2.3.5 Sealants

Sealants for glazings shall be chemically compatible with the glazing materials they are in contact with and shall have no deleterious effects to the glazing materials or to the adhesives used in glazing laminates. Sealants shall conform to the glazing manufacturer's recommendations and the requirements of GANA Glazing Manual.

2.4 FORCED ENTRY RESISTANT PASS-THROUGH DRAWER

Pass-through drawer shall be fabricated of steel and of the size indicated. Assembly shall provide a weather resistant opening. Attachment to wall assembly shall be in accordance with the manufacturer's recommendations. Finish shall be [primed for painting] [satin stainless steel] [_____].

2.5 FORCED ENTRY RESISTANT PREFABRICATED GUARDBOUSES

Guardhouse shall consist of prefabricated, forced entry resistant, modular wall [and] [ceiling] [and floor] panels insulated to R-value of [_____] with [doors] [windows] [louvers] [gunports] and necessary connecting posts, hardware, and accessories. Complete enclosure shall be submitted. Components shall be factory painted with rust inhibitive primer unless indicated otherwise. Exposed welds shall be dressed smooth. Workmanship shall be rigid, neat in appearance, and free from defects. [Guardhouse shall be of rain and weatherproof design.] [Guardhouse shall be designed to be relocatable by [crane] [forklift].] Electrical work shall be in accordance with local codes.

2.6 ACCESSORIES

Accessories shall be provided for the installation of components into the surrounding structure. Anchorage shall be forced entry resistant to the same degree as the component. Installation shall be in accordance with the

manufacturer's recommended instructions. Materials, parts, bolts, anchors, supports, braces, fasteners, and connections necessary for completion of the work.

2.7 LABELING

Forced entry resistant components shall be plainly and permanently labeled as to the applicable forced entry test standard and level within the test standard under which the component was tested and approved. Label shall be visible only from the protected side after component installation and shall include the following information: (1) manufacturer's name or identifying symbol; (2) model number, control number, or equivalent; (3) date of manufacture with the week, month or quarter, and year (this may be abbreviated or be in a traceable code such as the lot number); (4) correct mounting position (by removable label); and (5) forced entry resistant rating by indicating the test standard, level within the test standard (if any), and minutes of attack time withstood (if variable in the standard).

2.8 FABRICATION

Components shall be constructed, assembled, welded, and equipped with all hardware and accessories required to complete the assembly in the shop of a competent fabricator.

2.9 FASTENERS

Fasteners exposed to view shall match in color and finish and shall harmonize with the material to which fasteners are applied. Holes for bolts and screws shall be drilled or neatly punched. Poor matching of holes shall be cause for rejection of the work. Fasteners shall be concealed where practicable. Unless otherwise specified, fasteners shall conform to Section 05500A MISCELLANEOUS METAL.

2.10 SHOP/FACTORY FINISHING

Unless otherwise specified, all factory or manufactured components shall be shop finished as indicated below.

2.10.1 Ferrous Metal

Surfaces of ferrous metal, except galvanized and stainless steel surfaces, shall be cleaned and factory primed for painting. Finish painting shall be in accordance with Section 09900 PAINTS AND COATINGS. 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.

2.10.2 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.

2.10.3 Aluminum

Unless otherwise specified, aluminum items shall be standard mill finish. When anodic coatings are specified, coatings shall conform to AA STFA-601711, with treatment to a 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 conforming to the above-referenced standard.

PART 3 EXECUTION

3.1 PREPARATION AND PROTECTION

The Contractor shall field verify dimensions of rough openings for components and shall verify that surfaces of openings are level, plumb, and provide required clearances. Components shall be examined for racking, twisting, and other malformation and corrected prior to installation. Damaged components that cannot be corrected shall be replaced. The Contractor shall protect surrounding work prior to installation of forced entry resistant components. Surrounding work which is damaged as a result of the installation of forced entry resistant components shall be repaired in an approved manner prior to acceptance. Glazed units shall be protected from damage during adjacent work.

3.2 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 09900 PAINTS AND COATINGS.

3.3 INSTALLATION

The finished work shall be free from defects. Components shall be installed plumb and level and secured rigidly in place. Components shall be installed in accordance with approved manufacturer's recommended instructions. Operable parts of components shall be tested for smooth operation in the presence of the Contracting Officer. The Contractor shall coordinate frame embedments into the construction where required by the component manufacturer. Materials which incur damage as a result of adjacent finish work shall be replaced or repaired as specified above. Window assemblies which are not specified as factory glazed shall have glazing installed in accordance with GANA Glazing Manual and the manufacturer's recommended instructions. Field glazing shall occur only after concrete, masonry, ceiling, electrical, mechanical, plumbing and adjacent finish work has been completed. The Contractor shall be responsible for proper installation of forced entry resistant door assemblies so that operating clearances and bearing surfaces conform to the manufacturer's instructions. The bottom of door frames shall be secured to the floor slab in accordance with the manufacturer's recommendations. Weatherstripping and thresholds shall be installed at exterior door openings to provide a weathertight installation.

3.4 MANUFACTURER'S SERVICES

NOTE: Designer will only use this paragraph when justified.

The manufacturer shall provide the services of a manufacturer's representative who is experienced in the installation, adjustment, and operation of the component specified. At the request of the Contracting Officer, the representative shall supervise the installation, adjustment,

and operation (if operable) of the component. The representative shall be onsite [1] [2] [_____] working days.

3.5 ADJUSTING/CLEANING

Adjustments shall be made to assure smooth operation. Units shall be weathertight when closed and locked. All Components shall be cleaned in accordance with manufacturer's instructions. Only cleanser recommended by the manufacturer shall be used to clean polycarbonate, plastic, and applied hardcoats.

-- End of Section --