

SECTION TABLE OF CONTENTS  
DIVISION 08 - DOORS & WINDOWS  
SECTION 08110  
STEEL DOORS AND FRAMES

PART 1 GENERAL

- 1.1 REFERENCES
- 1.2 SUBMITTALS
- 1.3 DELIVERY AND STORAGE
- 1.4 WARRANTY

PART 2 PRODUCTS

- 2.1 DOORS AND FRAMES
- 2.2 FIRE RATED DOORS
- 2.3 THERMAL INSULATED DOORS
- 2.4 SECURITY DOORS
- 2.5 SOUND RATED DOORS
- 2.6 WEATHERSTRIPPING
- 2.7 TRANSOM AND SIDELIGHT PANELS
- 2.8 LOUVERS
- 2.9 GLAZING
- 2.10 FACTORY FINISH

PART 3 EXECUTION

- 3.1 INSTALLATION
  - 3.1.1 Thermal Insulated Doors
  - 3.1.2 Security Doors
  - 3.1.3 Sound Rated Doors
- 3.2 FIELD PAINTED FINISH
- 3.3 SPECIAL INSPECTION REQUIREMENTS

-- End of Section Table of Contents --

## SECTION 08110

## STEEL DOORS AND FRAMES

## PART 1 GENERAL

## 1.1 REFERENCES

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

## AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI A250.8 (1998) Steel Doors and Frames

## AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 236 (1989; R 1993) Steady-State Thermal Performance of Building Assemblies by Means of a Guarded Hot Box

ASTM C 976 (1990; R 1996) Thermal Performance of Building Assemblies by Means of a Calibrated Hot Box

ASTM D 2863 (1997) Measuring the Minimum Oxygen Concentration to Support Candle-Like Combustion of Plastics (Oxygen Index)

ASTM E 90 (1997) Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions

ASTM E 283 (1991) Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen

## DOOR AND HARDWARE INSTITUTE (DHI)

DHI A115.1G (1994) Installation Guide for Doors and Hardware

## NATIONAL ASSOCIATION OF ARCHITECTURAL METAL MANUFACTURERS (NAAMM)

NAAMM HMMA 862 (1987) Hollow Metal Manual; Section: Guide Specifications for Commercial Security Hollow Metal Doors and Frames

NAAMM HMMA 865 (1995) Hollow Metal Manual; Section: Guide Specifications for Swinging Sound Control Hollow Metal Doors and Frames

## NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 80	(1999) Fire Doors and FireWindows
NFPA 80A	(1996) Protection of Buildings from Exterior Fire Exposures
NFPA 101	(1997; Errata 97-1; TIA-97.1) Life Safety Code
NFPA 252	(1995) Fire Tests of Door Assemblies

## STEEL DOOR INSTITUTE (SDOI)

SDOI SDI-106	(1996) Standard Door Type Nomenclature
SDOI SDI-107	(1997) Hardware on Steel Doors (Reinforcement - Application)

## 1.2 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

## SD-04 Drawings

Steel Doors and Frames; GA.

Drawings using standard door type nomenclature in accordance with SDOI SDI-106 indicating the location of each door and frame, elevation of each model of door and frame, details of construction, method of assembling sections, location and extent of hardware reinforcement, hardware locations, type and location of anchors for frames, and thicknesses of metal. Drawings shall include catalog cuts or descriptive data for the doors, frames, and weatherstripping including air infiltration data and manufacturers printed instructions.

## SD-09 Reports

Fire Rated Doors; GA.

A letter by a nationally recognized testing laboratory which identifies the product manufacturer, type, and model; certifying that the laboratory has tested a sample assembly in accordance with NFPA 252 and issued a current listing for same.

## SD-13 Certificates

Fire Rated Doors; GA. Thermal Insulated Doors; FIO. Security Doors; FIO. Sound Rated Doors; FIO.

- a. Certification of Oversized Fire Doors: Certificates of compliance in accordance with the requirements of NFPA 252 for fire doors exceeding the sizes for which label service is available.
- b. Certification of Security Door, Sound, Thermal Insulating Rating: Certification or test report for security rating, sound rated,

thermal insulated doors shall show compliance with the specified requirements. The certification, or test report, shall list the parameters and the type of hardware and perimeter seals used to achieve the rating.

#### SD-14 Samples

Steel Doors and Frames; FIO.

Manufacturer's standard color samples of factory applied finishes.

### 1.3 DELIVERY AND STORAGE

During shipment, welded unit type frames shall be strapped together in pairs with heads at opposite ends or shall be provided with temporary steel spreaders at the bottom of each frame; and knockdown type frames shall be securely strapped in bundles. Materials shall be delivered to the site in undamaged condition, and stored out of contact with the ground and under a weathertight covering permitting air circulation. Doors and assembled frames shall be stored in an upright position in accordance with DHI A115.1G. Abraded, scarred, or rusty areas shall be cleaned and touched up with matching finishes.

### 1.4 WARRANTY

Manufacturer's standard performance guarantees or warranties that extend beyond a 1 year period shall be provided.

## PART 2 PRODUCTS

### 2.1 DOORS AND FRAMES

Doors and frames shall be factory fabricated in accordance with ANSI A250.8 and the additional requirements specified herein. Door grade shall be standard (Grade I), heavy duty (Grade II) or extra heavy duty (Grade III), as required by the Task Order, unless otherwise indicated on the door and door frame schedules. Exterior doors and frames shall be designation A40 or G60 galvanized as required by the Task Order. Indicated interior doors and frames shall be designation A40 or G60 galvanized as required by the Task Order. Doors and frames shall be prepared to receive hardware conforming to the templates and information provided under Section 08700 BUILDERS' HARDWARE. Doors and frames shall be reinforced, drilled, and tapped to receive mortised hinges, locks, latches, and flush bolts as required. Doors and frames shall be reinforced for surface applied hardware. Frames shall be welded type. Door frames shall be furnished with a minimum of three jamb anchors and one floor anchor per jamb. Anchors shall be not less than 1.2 mm (18 gauge) 18 gauge steel or 4.5 mm (7 gauge) 7 gauge diameter wire. For wall conditions that do not allow the use of a floor anchor, an additional jamb anchor shall be provided. Rubber silencers shall be furnished for installation into factory predrilled holes in door frames; adhesively applied silencers are not acceptable. Where frames are installed in plaster or masonry walls, plaster guards shall be provided on door frames at hinges and strikes. Full glass doors shall conform to ANSI A250.8, Model 3, and shall include provisions for glazing. Reinforcing of door assemblies for closers and other required hardware shall be in accordance with ANSI A250.8 and the conditions of the fire door assembly listing when applicable. Exterior doors shall have top edges closed flush and sealed against water penetration.

## 2.2 FIRE RATED DOORS

Fire rated door assemblies shall bear the listing identification label of a nationally recognized testing laboratory qualified to perform tests of fire door assemblies in accordance with NFPA 252 and having a listing for the tested assemblies. The fire resistance rating shall be 3 hr. (A), 1-1/2 hr (B or D), 3/4 hr (C or E), 1/2 hr or 1/3 hr rated as required by the Task Order. Doors exceeding the sizes for which listing label service is offered shall be in accordance with NFPA 252. Listing identification labels shall be constructed and permanently applied by a method which results in their destruction should they be removed.

## 2.3 THERMAL INSULATED DOORS

The interior of thermal insulated doors shall be completely filled with rigid plastic foam permanently bonded to each face panel. The thermal conductance (U-value) through the door shall not exceed 2.33 W/sq m times K (0.41 btu/hr times sq f times f) 0.41 btu/hr times sq f times f when tested as an operational assembly in accordance with ASTM C 236 or ASTM C 976. Doors with cellular plastic cores shall have a minimum oxygen index rating of 22 percent when tested in accordance with ASTM D 2863.

## 2.4 SECURITY DOORS

Security type doors and frames shall be factory fabricated in accordance with NAAMM HMMA 862 and the additional requirements specified herein. Doors and frames shall be galvanized 1.7 mm (14 gauge) or 2.3 mm (12 gauge) 14 or 12 gauge construction as required by the Task Order. Doors shall have 1.7 mm (14 gauge) or 2.3 mm (12 gauge) 14 or 12 gauge steel plate on both sides, as required by the Task Order, and be internally reinforced vertically with continuous 1.0 mm (20 gauge) 20 gauge steel stiffeners spaced 150 mm 6 inches on center maximum. Doors shall be fully welded seamless construction with no visible seams or joints on their faces or vertical edges. Door thickness shall be 44.5 mm (1-3/4 inches). 1-3/4 inches. Exterior doors shall be insulated to provide a thermal conductance (U-value) not to exceed 2.33 W/ sq m times K (0.41 btu/hr times sq f times f) 0.41 btu/hr times sq f times f when tested as an operational assembly in accordance with ASTM C 236 or ASTM C 976. Doors with cellular plastic cores shall have a minimum oxygen index rating of 22 percent when tested in accordance with ASTM D 2863. Door frames shall be all welded type, with double rabbet, single rabbet or splayed jamb profile as required by the Task Order. At meeting stiles, an astragal shall be provided by extending the face panel of the active leaf not less than 16 mm 5/8 inch across the gap between the two leaves. Astragal shall be flush with the face panel of the inactive leaf. Frame corners shall be machine-mitered, full (continuously) welded. All exposed welds shall be ground and finished smooth.

## 2.5 SOUND RATED DOORS

Sound rated doors and frames shall be factory fabricated in accordance with NAAMM HMMA 865 and shall be provided at locations shown on the drawings. Door assemblies shall consist of 1.2 mm (18 gauge) 18 gauge minimum thickness door, 1.7 mm (14 gauge) 14 gauge minimum thickness frame, and adjustable perimeter seals. The Sound Transmission Class rating of the assembly shall be 45 or as required by the Task Order when tested in accordance with ASTM E 90.

## 2.6 WEATHERSTRIPPING

Unless otherwise specified in Section 08700 BUILDERS' HARDWARE, weatherstripping shall be as follows: Weatherstripping for head and jamb shall be manufacturer's standard elastomeric type of synthetic rubber, vinyl, or neoprene and shall be installed at the factory or on the jobsite in accordance with the door frame manufacturer's recommendations. Weatherstripping for bottom of doors shall be as shown. Air leakage rate of weatherstripping shall not exceed 0.31 l/s per linear meter (0.20 cfm per linear foot) 0.20 cfm per linear foot of crack when tested in accordance with ASTM E 283 at standard test conditions.

#### 2.7 TRANSOM AND SIDELIGHT PANELS

Panels for transom and sidelight shall be constructed in accordance with ANSI A250.8. Panels shall be nonremovable from the outside of exterior doors or the unsecure side of interior doors.

#### 2.8 LOUVERS

Where indicated, doors shall be provided with full louvers or louver sections. Louvers shall be sightproof type pierced into the panels of the door or inserted into the door as required by the Task Order. Pierced louvers shall not be used on exterior doors. Inserted louvers shall be stationary or adjustable as required by the Task Order. Louvers shall be nonremovable from the outside of exterior doors or the unsecure side of interior doors. Insect screens shall be a removable type with 18 by 16 mesh aluminum or bronze cloth. Full louver doors shall be in accordance with ANSI A250.8, Grade III, Model 3.

#### 2.9 GLAZING

Glazing shall be as specified in Section 08810 GLASS AND GLAZING. Removable glazing beads shall be screw-on or snap-on type.

#### 2.10 FACTORY FINISH

Doors and frames shall be phosphatized, primed, and finished with an electrostatic baked on enamel or polyester base factory finish paint system. Color shall be as required by the Task Order.

### PART 3 EXECUTION

#### 3.1 INSTALLATION

Installation shall be in accordance with DHI A115.1G. Preparation for surface applied hardware shall be in accordance with SDOI SDI-107. Rubber silencers shall be installed in door frames after finish painting has been completed; adhesively applied silencers are not acceptable. Weatherstripping shall be installed at exterior door openings to provide a weathertight installation. Installation and operational characteristics of fire doors shall be in accordance with NFPA 80, NFPA 80A and NFPA 101. Hollow metal door frames shall be solid grouted in masonry walls, solid plaster walls and steel stud walls as required by the Task Order.

##### 3.1.1 Thermal Insulated Doors

Hardware and perimeter seals shall be adjusted for proper operation. Doors shall be sealed weathertight after installation of hardware and shall be in accordance with Section 07900 JOINT SEALING.

### 3.1.2 Security Doors

Door frames shall be rigidly anchored in place and provided with antispread space filler reinforcements to prevent disengagement of the lock bolt by prying or jacking of the frame. Jams shall be filled solid with concrete grout.

### 3.1.3 Sound Rated Doors

Sound rated doors shall be installed in accordance with the manufacturer's printed instructions. Hardware and perimeter seals shall be adjusted for proper operation.

### 3.2 FIELD PAINTED FINISH

Steel doors and frames shall be field painted in accordance with Section 09900 PAINTING, GENERAL. Weatherstrips shall be protected from paint. Finish shall be free of scratches or other blemishes. Color shall be as required by the Task Order.

### 3.3 SPECIAL INSPECTION REQUIREMENTS

Continuous and/or periodic Special Inspection shall be performed for the connection types and connections indicated on the drawings.

-- End of Section --

SECTION TABLE OF CONTENTS  
DIVISION 08 - DOORS & WINDOWS  
SECTION 08120  
ALUMINUM DOORS AND FRAMES

PART 1 GENERAL

- 1.1 REFERENCES
- 1.2 SYSTEM DESCRIPTION
- 1.3 PERFORMANCE REQUIREMENTS
  - 1.3.1 Wind Load Performance
  - 1.3.2 Water Penetration Performance
- 1.4 SUBMITTALS
- 1.5 DELIVERY AND STORAGE
- 1.6 WARRANTY

PART 2 PRODUCTS

- 2.1 ALUMINUM DOORS AND FRAMES
  - 2.1.1 Finishes
  - 2.1.2 Welding and Fastening
  - 2.1.3 Anchors
  - 2.1.4 Hardware
  - 2.1.5 Glazing
  - 2.1.6 Weatherstripping
- 2.2 ALUMINUM FRAMES
- 2.3 ALUMINUM DOORS
  - 2.3.1 Full-Glazed Stile and Rail Doors
  - 2.3.2 Flush Doors
- 2.4 COLOR, TEXTURE, AND PATTERN

PART 3 EXECUTION

- 3.1 INSTALLATION OF DOORS, FRAMES, AND ACCESSORIES
  - 3.1.1 Protection of Aluminum
    - 3.1.1.1 Paint
    - 3.1.1.2 Nonabsorptive Tape or Gasket
  - 3.1.2 Installation

-- End of Section Table of Contents --

## SECTION 08120

## ALUMINUM DOORS AND FRAMES

## PART 1 GENERAL

## 1.1 REFERENCES

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

## ALUMINUM ASSOCIATION (AA)

AA DAF-45 (1980; R 1993) Designation System for Aluminum Finishes

## AMERICAN ARCHITECTURAL MANUFACTURERS ASSOCIATION (AAMA)

AAMA 605 (1998) Voluntary Specification for High Performance Organic Coatings on Architectural Aluminum Extrusions and Panels

AAMA 1503.1 (1988) Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections

## AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM B 209 (1996) Aluminum and Aluminum-Alloy Sheet and Plate

ASTM B 209M (1995) Aluminum and Aluminum-Alloy Sheet and Plate (Metric)

ASTM B 221 (1996) Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes

ASTM B 221M (1996) Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric)

ASTM E 283 (1991) Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen

ASTM E 330 (1990) Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference

ASTM E 331 (1996) Water Penetration of Exterior Windows, Curtain Walls, and Doors by

## Uniform Static Air Pressure Difference

## 1.2 SYSTEM DESCRIPTION

Frames and swing-type aluminum doors, of size and design shown on the drawings, shall be provided at the locations indicated. Frames shall be furnished complete with doors, subframes, transoms, adjoining sidelights, adjoining window wall system, trim, and other accessories indicated and specified as required by the Task Order.

## 1.3 PERFORMANCE REQUIREMENTS

## 1.3.1 Wind Load Performance

Doors and frames shall be of sufficient strength to withstand a design wind load of 1440 Pa (30 pounds per square foot) 30 pounds per square foot of supported area with a deflection of not more than 1/175 times the length of the member. Doors shall be tested in accordance with ASTM E 330 at a pressure not less than 1.5 times the design load.

## 1.3.2 Water Penetration Performance

Frames and fixed areas, and non-handicap complying doors shall have no water penetration when tested in accordance with ASTM E 331 at a pressure of 383 Pa 8 psf.

## 1.4 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

## SD-01 Data

Aluminum Doors and Frames; FIO.

Manufacturer's descriptive data and catalog cuts including air-infiltration data.

## SD-04 Drawings

Aluminum Doors and Frames; GA.

A schedule showing the location of each door and window wall system shall be included with the drawings. Drawings showing elevations of each door and frame type, details and method of anchorage, details of construction, location and installation of hardware, shape and thickness of materials, and details of joints and connections.

## SD-06 Instructions

Installation; FIO. Cleaning; FIO.

Manufacturer's installation instructions and cleaning instructions.

## SD-09 Reports

Aluminum Doors; GA.

For full-glazed and flush doors, certified test reports from an independent testing laboratory, stating that doors are identical in design, materials, and construction to a door that has been tested and meets all test and specified requirements.

#### SD-14 Samples

Finishes; GA.

Samples of the color anodized coating, showing the extreme color range or painted finish.

### 1.5 DELIVERY AND STORAGE

Materials delivered to the jobsite shall be inspected for damage, and shall be unloaded with a minimum of handling. Storage shall be in a dry location with adequate ventilation, free from dust, water, and other contaminants, and which permits easy access for inspecting and handling. Materials shall be neatly stored on the floor, properly stacked on nonabsorptive strips or wood platforms. Doors and frames shall not be covered with tarps, polyethylene film, or similar coverings.

### 1.6 WARRANTY

Manufacturer's standard performance guarantees or warranties that extend beyond a one-year period shall be provided.

## PART 2 PRODUCTS

### 2.1 ALUMINUM DOORS AND FRAMES

Extrusions shall comply with ASTM B 221M ASTM B 221, Alloy 6063-T5 or -T6, except alloy used for anodized color coatings shall be required to produce the specified color. Aluminum sheets and strips shall comply with ASTM B 209M ASTM B 209, alloy and temper best suited for the purpose. Fasteners shall be hard aluminum or stainless steel.

#### 2.1.1 Finishes

Finish shall be clear anodized, color anodized or painted as required by the Task Order. Clear anodized finish shall be AA-M10C22A31 or AA-M10C22A41. Color anodized finish shall be AA-M10C22A32, AA-M10C22A34 AA-M10C22A42 or AA-M10C22A44 in accordance with the requirements of AA DAF-45. Painted finish shall be manufacturers standard fluoropolymer in accordance with the requirements of AAMA 605. All finishes as required by the Task Order

#### 2.1.2 Welding and Fastening

Where possible, welds shall be located on unexposed surfaces. Welds required on exposed surfaces shall be smoothly dressed. Welding shall produce a uniform texture and color in the finished work, free of flux and spatter. Exposed screws or bolts will be permitted only at inconspicuous locations and shall have heads countersunk.

#### 2.1.3 Anchors

Anchors shall be stainless steel or steel with a hot-dipped galvanized

finish. Anchors of the sizes and shapes required shall be provided for securing aluminum frames to adjacent construction. Anchors shall be placed near top and bottom of each jamb and at intermediate points not more than 625 mm 25 inches apart. Transom bars shall be anchored at ends, and mullions shall be anchored at head and sill. Where required by the Task Order, vertical mullion reinforcement shall be of sufficient length to extend up to the overhead structural slab or framing and be securely attached thereto. The bottom of each frame shall be anchored to the rough floor construction with 2.4 mm (3/32 inch) 3/32 inch thick stainless steel angle clips secured to the back of each jamb and to floor construction. Stainless steel bolts and expansion rivets shall be used for fastening clip anchors. Door frames free of window wall system shall be reinforced and securely anchored to floor construction.

#### 2.1.4 Hardware

Hardware for aluminum doors is specified in Section 08700 BUILDERS' HARDWARE. Doors and frames shall be cut, reinforced, drilled, and tapped at the factory to receive template hardware. Reinforcement shall be provided in the core of doors as required to receive locks, door closers, and other hardware. Doors to receive surface applied hardware shall be reinforced as required.

#### 2.1.5 Glazing

Glazing shall be as specified in Section 08810 GLASS AND GLAZING. Metal glazing beads, vinyl inserts, and glazing gaskets shall be provided for securing glass. Glass stops shall be tamperproof on exterior side.

#### 2.1.6 Weatherstripping

Weatherstripping shall be continuous silicone-treated wool pile type, or a type recommended by the door manufacturer and shall be provided on head and jamb of exterior door frames. Weatherstripping for bottom of doors shall be as shown. Weatherstripping shall be easily replaced without special tools, and shall be adjustable at meeting stiles of pairs of doors. Air leakage rate of weatherstripping shall not exceed 0.775 L/s per lineal meter (0.5 cfm per lineal foot) 0.5 cubic feet per minute per lineal foot of crack when tested in accordance with ASTM E 283 at standard test conditions.

### 2.2 ALUMINUM FRAMES

Frames shall be non-glazed for doors only, single-glazed window wall system or double-glazed window wall system and shall have a minimum total average unit thermal resistance of 0.34 square meter degree K per W (R value 1.92) R value 1.92; double-glazed window wall system and shall have a minimum condensation resistance factor as required by the Task Order in accordance with AAMA 1503.1 and as required by the Task Order. Frames shall be fabricated of extruded aluminum shapes to contours as shown on the drawings. Shapes shown are representations of design, function, and required profile. Dimensions shown are minimum. Shapes of equivalent design may be submitted, subject to approval of samples. Minimum metal wall thickness shall be 2.29 mm, 0.090 inch, except glazing beads, moldings, and trim shall be not less than 1.27 mm. 0.050 inch. Frames that are to receive glass shall have removable snap-on glass stops and glazing beads. Joints in frame members shall be milled to a hairline tight fit so that raw edges of the assembly are not visible, sealed internally to prevent water infiltration, reinforced, and secured mechanically by

appropriate screws or by screw spline attachment.

### 2.3 ALUMINUM DOORS

Doors shall be not less than 44.4 mm (1-3/4 inches) 1-3/4 inches thick. Clearances at hinge stiles, lock stiles and top rails, floors and thresholds, shall comply with manufacturer's standard. Single-acting doors shall be beveled 3 mm 1/8 inch at lock and meeting stile edges. Double-acting doors shall have rounded edges at hinge stile, lock stile, and meeting stile edges.

#### 2.3.1 Full-Glazed Stile and Rail Doors

Doors shall have narrow, medium or wide stiles and rails as required by the Task Order, and shall be fabricated from extruded aluminum hollow seamless tubes or from a combination of open-shaped members interlocked or welded together. Doors shall be single-glazed, double-glazed and shall have a minimum total average unit thermal resistance of 0.34 square meter degree K per W (R value 1.92) R Value 1.92 or double-glazed and shall have a minimum condensation resistance factor as required by the Task Order in accordance with AAMA 1503.1 as required by the Task Order. Top and bottom rail shall be fastened together by means of welding or by 10 mm 3/8 inch diameter plated tensioned steel tie rods. An adjustable mechanism shall be provided in the top rail of narrow stile doors to allow for minor clearance adjustments after installation. Extruded aluminum snap-in glazing beads or glazing beads, as required by the Task Order, shall be provided on interior side of doors. Extruded aluminum theft-proof snap-in glazing beads or fixed glazing beads shall be provided on exterior or security side of doors. Glazing beads shall have vinyl insert glazing gaskets, designed to receive glass of thickness required. Glass is specified in Section 08810 GLASS AND GLAZING.

#### 2.3.2 Flush Doors

Doors shall be flush aluminum framed with no glazing, single-glazed with, aluminum or gasket framed vision lites, double-glazed with aluminum or gasket framed vision lites and shall have a minimum total average unit thermal resistance of 0.34 square meter degree K per W (R value 1.92) R value 1.92 or double-glazed with aluminum or gasket framed vision lites and shall have a minimum condensation resistance factor as required by the Task Order in accordance with AAMA 1503.1 as required by the Task Order. Doors shall have a core of foamed-in-place self-extinguishing urethane. Core shall be surrounded at edges and openings with extruded aluminum shapes. Facing sheets shall be 1.27 mm aluminum bonded to 3 mm 0.050 inch aluminum bonded to 1/8 inch thick tempered hardboard backing or 1.27 mm 0.050 inch thick aluminum with embossed pattern or a plain smooth surface or 3 mm 1/8 inch thick fiberglass reinforced polyester (FRP) sheet and shall be of the color and finish specified. Facing sheets shall be bonded to the core and interlocked with the extruded edge members.

### 2.4 COLOR, TEXTURE, AND PATTERN

Color, Texture, and pattern shall be as required by the Task Order .

## PART 3 EXECUTION

### 3.1 INSTALLATION OF DOORS, FRAMES, AND ACCESSORIES

#### 3.1.1 Protection of Aluminum

Aluminum shall not be used where it will be in contact with copper or where it will contact water which flows over copper surfaces. Aluminum that will be in contact with wet or pressure-treated wood, mortar, concrete, masonry, or ferrous metals shall be protected against galvanic or corrosive action by one of the following methods.

#### 3.1.1.1 Paint

Aluminum surfaces to be protected shall be solvent cleaned and given a coat of zinc-molybdate primer and one coat of aluminum paint.

#### 3.1.1.2 Nonabsorptive Tape or Gasket

Nonabsorptive tape or gasket shall be placed between the adjoining surfaces and shall be cemented to the aluminum surface using a cement compatible with aluminum.

#### 3.1.2 Installation

Frames and framing members shall be accurately set in position to receive adjoining components. Frames shall be plumb, square, level, and in alignment, and securely anchored to adjacent construction. Metal-to-metal joints between framing members and joints between framing members and building surfaces shall be sealed as specified in Section 07900 JOINT SEALING. Doors shall be accurately hung with proper clearances, and adjusted to operate properly.

#### 3.1.3 Cleaning

Doors and frames shall be cleaned in accordance with the manufacturer's approved instructions.

-- End of Section --

SECTION TABLE OF CONTENTS  
DIVISION 08 - DOORS & WINDOWS  
SECTION 08210  
WOOD DOORS

PART 1 GENERAL

- 1.1 REFERENCES
- 1.2 GENERAL REQUIREMENTS
  - 1.2.1 Standard Products
  - 1.2.2 Marking
- 1.3 SUBMITTALS
- 1.4 STORAGE
- 1.5 HARDWARE
- 1.6 GLAZING
- 1.7 WARRANTY

PART 2 PRODUCTS

- 2.1 GENERAL FABRICATION REQUIREMENTS
  - 2.1.1 Edge Sealing
  - 2.1.2 Preservative Treatment
  - 2.1.3 Adhesives
  - 2.1.4 Prefitting
  - 2.1.5 Prehung Units
- 2.2 FLUSH DOORS
  - 2.2.1 Core Construction
    - 2.2.1.1 Solid Cores
    - 2.2.1.2 Hollow Cores
  - 2.2.2 Face Panels
    - 2.2.2.1 Natural Finished Wood Veneer Doors
    - 2.2.2.2 Painted Wood Veneer Doors
    - 2.2.2.3 High Pressure Laminate Doors
    - 2.2.2.4 Hardboard Face
- 2.3 PANEL AND LOUVER DOORS
  - 2.3.1 Louvers
  - 2.3.2 Natural Finished Doors
  - 2.3.3 Painted Doors
- 2.4 FIRE RATED DOORS
  - 2.4.1 Reinforcement Blocking
  - 2.4.2 Stile Edges
- 2.5 MOULDING AND EDGING
- 2.6 INSERT LOUVERS
- 2.7 WOOD FRAMES
- 2.8 FINISHING
  - 2.8.1 Factory Coated Natural Finish
  - 2.8.2 Factory Coated Paint Finish

PART 3 EXECUTION

- 3.1 INSTALLATION OF DOORS

- 3.1.1 General Use Doors
- 3.1.2 Fire Doors
- 3.2 INSTALLATION OF WOOD FRAMES
- 3.3 FIELD FINISHING

-- End of Section Table of Contents --

## SECTION 08210

## WOOD DOORS

## PART 1 GENERAL

## 1.1 REFERENCES

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

## AMERICAN HARDBOARD ASSOCIATION (AHA)

AHA 135.4 (1995) Basic Hardboard

## AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM E 283 (1991) Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen

## ARCHITECTURAL WOODWORK INSTITUTE (AWI)

AWI-02 (1994) Architectural Woodwork Quality Standards, Guide Specifications and Quality Certification Program

## NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA LD 3 (1991) High-Pressure Decorative Laminates

## NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 80 (1995) Fire Doors and Windows

NFPA 101 (1997) Safety to Life from Fire in Buildings and Structures

NFPA 252 (1995) Fire Tests of Door Assemblies

## NATIONAL WOOD WINDOW &amp; DOOR ASSOCIATION (NWWDA)

NWWDA I.S. 1-A (1993) Architectural Wood Flush Doors

NWWDA I.S. 4 (1994) Water-Repellent Preservative Non-Pressure Treatment for Millwork

## 1.2 GENERAL REQUIREMENTS

## 1.2.1 Standard Products

Doors shall be of the type, size, and design indicated on the drawings, and

shall be the standard products of manufacturers regularly engaged in the manufacture of wood doors.

#### 1.2.2 Marking

Each door shall bear a stamp, brand, or other identifying mark indicating quality and construction of the door. The identifying mark or a separate certification shall include identification of the standard on which construction of the door is based, identity of the manufacturing plant, identification of the standard under which preservative treatment, if used, was made, and identification of the doors having a Type I glue bond.

#### 1.3 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

##### SD-04 Drawings

Wood Doors and Frames; GA.

Drawings indicating the location of each door, elevation of each type of door, details of construction, marks to be used to identify the doors, and location and extent of hardware blocking. Drawings shall include catalog cuts or descriptive data for doors, weatherstripping, flashing, and thresholds to be used.

##### SD-06 Instructions

Fire Doors; FIO.

Manufacturers preprinted installation and touch-up instructions.

##### SD-13 Certificates

Fire Rated Doors; GA. Adhesives; GA.

Certificates for oversize fire doors and/or door/frame assemblies stating that the doors are identical in design, materials, and construction to a door that has been tested and meets the requirements for the class indicated. Certificate stating that adhesives used for proposed doors do not contain any formaldehyde.

##### SD-14 Samples

High Pressure Laminate Doors; FIO. Factory Coated Natural Finish; FIO. Factory Coated Paint Finish; FIO.

Samples of factory applied natural, paint or high pressure laminate finish as required by the Task Order.

#### 1.4 STORAGE

Doors shall be stored in fully covered areas and protected from damage and from extremes in temperature and humidity. Doors shall be stored on supports to prevent warping or twisting, and to provide ventilation. Factory cartons or wrappers shall be kept intact until installation.

## 1.5 HARDWARE

Hardware, including weatherstripping and thresholds, is specified in Section 08700 BUILDERS' HARDWARE.

## 1.6 GLAZING

Glazing is specified in Section 08810 GLASS AND GLAZING.

## 1.7 WARRANTY

Manufacturer's standard performance guarantees or warranties that extend beyond a 1 year period shall be provided.

## PART 2 PRODUCTS

### 2.1 GENERAL FABRICATION REQUIREMENTS

#### 2.1.1 Edge Sealing

Wood end-grain exposed at edges of doors shall be sealed prior to shipment.

#### 2.1.2 Preservative Treatment

Exterior softwood doors shall be water-repellent preservative treated in accordance with NWWDA I.S. 4.

#### 2.1.3 Adhesives

Adhesives shall be in accordance with NWWDA I.S. 1-A, requirements for Type I Bond Doors (waterproof) for exterior doors and requirements for Type II Bond Doors (water-repellent) for interior doors. Adhesive for doors to receive a transparent finish shall be nonstaining. Adhesives shall contain no formaldehydes.

#### 2.1.4 Prefitting

Doors shall be furnished prefitted or unfitted at the option of the Contractor, except plastic laminate clad doors shall be furnished prefit in accordance with the standards under which they are produced.

#### 2.1.5 Prehung Units

Interior doors shall be mounted prehung to a solid Custom or Premium Grade split jamb with 1-1/2 pair of butt hinges as required by the Task Order. Exterior doors shall be mounted prehung to a solid Custom or Premium Grade split jamb with 1-1/2 pair of butt hinges as required by the Task Order. Units shall be completely weatherstripped and shall have a metal threshold.

Air leakage rate of weatherstripping shall not exceed 0.31 l/s per linear meter (0.20 cfm per linear foot) 0.20 cfm per linear foot of crack when tested in accordance with ASTM E 283 at standard conditions. Units shall be pre-mortised or pre-drilled and fitted to receive hardware. Standards shall be in accordance with AWI-02 Section 900. Hardware shall be in accordance with Section 08700 BUILDERS' HARDWARE.

### 2.2 FLUSH DOORS

Flush doors shall be solid core or hollow core as required by the Task Order and shall conform to NWWDA I.S. 1-A, except for the one year

acclimatization requirement in paragraph T-2, which shall not apply. Wood doors shall be 5-ply or 7-ply construction with faces, stiles, and rails bonded to the cores as required by the Task Order.

## 2.2.1 Core Construction

### 2.2.1.1 Solid Cores

Door construction shall be glued wood block core, particle board core or mineral core with vertical and horizontal edges bonded to the core as required by the Task Order. Blocking and hardware reinforcements for particle board and mineral core doors shall be blocking option HB-1-5, HB-2-5, HB-4 or HB-6 in accordance with NWWDA I.S. 1-A as required by the Task Order.

### 2.2.1.2 Hollow Cores

Hollow core doors shall be provided with wood stiles, rails, and lock blocks of sufficient width for the application of door mounted hardware. Blocking option shall be HB-1, HB-3, HB-4, HB-5 or HB-7 in accordance with NWWDA I.S. 1-A as required by the Task Order.

## 2.2.2 Face Panels

### 2.2.2.1 Natural Finished Wood Veneer Doors

Veneer doors to receive natural finish shall be Custom Grade or Premium Grade, book matched birch, red oak or white oak veneer in accordance with NWWDA I.S. 1-A. Vertical stile strips shall be selected to provide edges of the same species and/or color as the face veneer. Door finish shall be in accordance with paragraph FINISHING or FIELD FINISHING as required by the Task Order.

### 2.2.2.2 Painted Wood Veneer Doors

Veneer doors to receive paint finish shall be Economy Grade or Economy Grade with medium density overlay in accordance with NWWDA I.S. 1-A as required by the Task Order. Door finish shall be in accordance with paragraph FINISHING or FIELD FINISHING as required by the Task Order.

### 2.2.2.3 High Pressure Laminate Doors

Laminate shall be Grade GP50 in accordance with NEMA LD 3. Exposed door stile edges shall be covered with laminate matching the face panels. Color and pattern of laminate shall be as required by the Task Order.

### 2.2.2.4 Hardboard Face

Hardboard face panels shall be in accordance with AHA 135.4. Hardboard face panels shall be composed of 1-ply 3.18 mm (1/8 inch) 1/8 inchthick tempered hardboard. Panels shall be molded interior grade 2, 4 or 6 raised panel design, flush panel interior or exterior grade design as required by the Task Order. Vertical stiles shall be manufacturer's standard softwood or hardwood as required by the Task Order. Doors shall be furnished unfinished or primed for finishing in accordance with paragraph FIELD FINISHING or prefinished in accordance with paragraph FINISHING as required by the Task Order.

## 2.3 PANEL AND LOUVER DOORS

Panel and louver doors shall conform to AWI-02 Section 1400.

#### 2.3.1 Louvers

Slats shall be not less than 6 mm 1/4 inch thick. A center mullion shall be provided for flat slat louvers 500 mm 20 inches or more in width, and for V-slat louvers 600 mm 24 inches or more in width. Doors shall be adequately blocked to provide solid anchorage for the louvers.

#### 2.3.2 Natural Finished Doors

Doors to receive natural finish shall be Premium Grade or Custom Grade Hemlock-Fir or Spruce-Pine-Fir in accordance with AWI-02 as required by the Task Order. Finish shall be in accordance with paragraph FINISHING or FIELD FINISHING as required by the Task Order.

#### 2.3.3 Painted Doors

Doors to receive paint finish shall be Custom Grade in accordance with AWI-02. Finish shall be in accordance with paragraph FINISHING or FIELD FINISHING as required by the Task Order.

#### 2.4 FIRE RATED DOORS

Fire rated door assemblies shall bear the listing identification label of a nationally recognized testing laboratory qualified to perform tests of fire door assemblies in accordance with NFPA 252 and having a listing for the tested assemblies. The specific time interval rating on the labels shall be as required by the Task Order. Door assemblies shall be in accordance with NFPA 80. Listing identification on labels shall be constructed and permanently applied by a method which results in their destruction should they be removed. Fire rated doors shall be mineral core, particleboard core, staved lumber core, hardboard faced hollow core or stile and rail raised panel with time rating as required by the Task Order.

##### 2.4.1 Reinforcement Blocking

Fire rated doors shall be provided, as required, with hardware reinforcement blocking, and top, bottom, and intermediate rail blocking. Lock blocks shall be manufacturer's standard but not less than 125 mm 5 inches by 450 mm 18 inches. Reinforcement blocking shall be in compliance with the manufacturer's labeling requirements. Reinforcement blocking shall not be of mineral material.

##### 2.4.2 Stile Edges

Composite fire rated doors shall be provided with vertical stile edges that do not contain fire retardant salts. Vertical stiles shall be of the same species and/or color as the face veneer.

#### 2.5 MOULDING AND EDGING

Moulding and edging shall be as shown. Wood species for transparent finished doors shall be compatible with veneer.

#### 2.6 INSERT LOUVERS

Where indicated, doors shall be provided with sightproof or lightproof

insert louvers as required by the Task Order. Louvers shall be stationary or adjustable as shown. Blades shall be welded or tenoned to the frame and the entire assembly fastened to the door with metal or wood moldings on both sides as shown. The frame shall be nonremovable from the outside of the door.

## 2.7 WOOD FRAMES

Wood frames shall be provided where shown on the drawings. Wood frames shall be Premium Grade or Custom Grade in species to match door face veneer species as required by the Task Order. For exterior door openings, frames shall be rabbeted from a solid board to provide an integral stop. For interior frames, applied stops are permitted unless otherwise indicated. Jamb sections shall be dadoed and screwed in place. Finish for frames and trim shall match the doors. Wood frames shall comply with AWI-02 Section 900.

## 2.8 FINISHING

### 2.8.1 Factory Coated Natural Finish

Doors indicated to receive factory coated natural finish shall be given a transparent finish conforming to AWI-02, Section 1500, Premium or Custom Grade, dark, medium or light stain; dull rubbed, medium rubbed or full gloss sheen; open or close grain effect as required by the Task Order. Finish shall be AWI factory finish system Number TR3 or TR4. Color of the natural finish shall be as required by the Task Order. Edges of unfitted doors shall be field finished after fitting to the frames.

### 2.8.2 Factory Coated Paint Finish

Doors indicated to receive factory coated finish shall be given manufacturer's standard prime coat, manufacturer's standard paint finish or an opaque finish conforming to AWI-02, Section 1500, system number OP-6 (catalyzed polyurethane) as required by the Task Order. Color of factory coated paint finish shall be as required by the Task Order.

## PART 3 EXECUTION

### 3.1 INSTALLATION OF DOORS

#### 3.1.1 General Use Doors

Doors shall be fit, hung, and trimmed as required. Door shall have a clearance of 3 mm 1/8 inch at the sides and top and shall have a bottom clearance of 6 mm 1/4 inch over thresholds and 13 mm 1/2 inch at other locations unless otherwise shown. The lock edge or both edges of doors shall be beveled at the rate of 3 mm 1/8 inch in 50 mm. 2 inches. Cuts made on the job shall be sealed immediately after cutting, using a clear varnish or sealer. Bottom of doors shall be undercut to allow clear door swing over carpeted areas. Vertical edges of doors which have not been rounded or beveled at the factory shall be eased when the doors are installed.

#### 3.1.2 Fire Doors

Installation, hardware, and operational characteristics shall conform to NFPA 80 and NFPA 101 and shall be in strict conformance with the manufacturer's printed instructions. Properly sized pilot holes shall be drilled for screws in door edges. Factory applied labels shall remain

intact where installed. Labeled hinge stile edge and top edge of door shall not be trimmed. Lockstile edge and bottom edge may be trimmed only to the extent recommended by the door manufacturer.

### 3.2 INSTALLATION OF WOOD FRAMES

Frames shall be set plumb and square, and rigidly anchored in place securely seated to floor using finish type nails. Double wedge blocking shall be provided near the top, bottom, and mid-point of each jamb.

### 3.3 FIELD FINISHING

Doors to receive field finishing, whether paint or natural finish, shall be factory primed or sealed, as required, and then shall be finished in accordance with Section 09900 PAINTING, GENERAL. Factory applied sealer shall not prevent doors from accepting field stain and finish. Color shall be as required by the Task Order. Field touch-up of factory finishes shall be in accordance with manufacturers instructions.

-- End of Section --

SECTION TABLE OF CONTENTS  
DIVISION 08 - DOORS & WINDOWS  
SECTION 08510  
STEEL WINDOWS

PART 1 GENERAL

- 1.1 REFERENCES
- 1.2 WINDOW PERFORMANCE
  - 1.2.1 Structural Performance
  - 1.2.2 Air Infiltration
  - 1.2.3 Water Penetration
  - 1.2.4 Life Safety Criteria
- 1.3 SUBMITTALS
- 1.4 QUALIFICATION
- 1.5 MOCK-UPS
- 1.6 DELIVERY AND STORAGE
- 1.7 WARRANTY

PART 2 PRODUCTS

- 2.1 MATERIALS
  - 2.1.1 Steel Bars
  - 2.1.2 Sheet Steel
  - 2.1.3 Screws and Bolts
- 2.2 STEEL WINDOW TYPES
  - 2.2.1 Projected Windows
  - 2.2.2 Casement Windows
  - 2.2.3 Horizontal/Vertical Sliding Windows
  - 2.2.4 Fixed Windows
- 2.3 FIRE-RATED WINDOWS
- 2.4 WEATHERSTRIPPING
- 2.5 INSECT SCREENS
- 2.6 ACCESSORIES
  - 2.6.1 Fasteners
  - 2.6.2 Window Anchors
  - 2.6.3 Window Cleaner Anchors
  - 2.6.4 Pole Operators
- 2.7 FINISHES
  - 2.7.1 Prime Coat
  - 2.7.2 Baked Enamel
  - 2.7.3 Galvanized Finish

PART 3 EXECUTION

- 3.1 INSTALLATION
- 3.2 ADJUSTMENTS AND CLEANING
  - 3.2.1 Hardware Adjustments
  - 3.2.2 Cleaning
- 3.3 FIELD PAINTED FINISH

-- End of Section Table of Contents --

## SECTION 08510

## STEEL WINDOWS

## PART 1 GENERAL

## 1.1 REFERENCES

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

## AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 123/A 123M	(1997) Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A 569/A 569M	(1997) Commercial Steel (CS) Sheet and Strip, Carbon (0.15 Maximum Percent), Hot-Rolled
ASTM A 653/A 653M	(1997) Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM A 924/A 924M	(1997a) General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process
ASTM B 633	(1985; R 1994) Electrodeposited Coatings of Zinc on Iron and Steel
ASTM B 766	(1986; R 1993) Electrodeposited Coatings of Cadmium
ASTM D 3656	(1994) Insect Screening and Louver Cloth Woven from Vinyl-Coated Glass Yarns
ASTM E 283	(1991) Determining the Rate of Air Leakage through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen
ASTM E 330	(1990) Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference
ASTM E 331	(1996) Water Penetration of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference

## AMERICAN SOCIETY OF CIVIL ENGINEERS (ASCE)

ASCE 7	(1995) Minimum Design Loads For Buildings
--------	---

## and Other Structures

## AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)

ASME A39.1	(1995; A39.1a, A39.1b) Safety Requirements for Window Cleaning
ASME B18.6.3	(1972; R 1991) Machine Screws and Machine Screw Nuts
ASME B18.6.4	(1981; R 1997) Thread Forming and Thread Cutting Tapping Screws and Metallic Drive Screws (Inch Series)

## INSECT SCREENING WEAVERS ASSOCIATION (ISWA)

ISWA IWS 089	(1990) Recommended Standards and Specifications for Insect Wire Screening (Wire Fabric)
--------------	---

## NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 80	(1995) Fire Doors and Fire Windows
NFPA 101	(1997; Errata 97-1) Life Safety Code

## SCREEN MANUFACTURERS ASSOCIATION (SMA)

SMA ANSI/SMA 1004	(1987) Aluminum Tubular Frame Screens for Windows
-------------------	---

## STEEL WINDOW INSTITUTE (SWI)

SWI-01	(1995) The Specifier's Guide to Steel Windows
--------	---

## 1.2 WINDOW PERFORMANCE

Steel windows shall be designed to meet the following performance requirements, and shall be of the type and size indicated.

## 1.2.1 Structural Performance

Windows shall be designed to withstand windloads determined by procedures in ASCE 7 and a wind speed as required by the Task Order. Structural test pressures on window units shall be for positive load (inward) and negative load (outward) equal to 1-1/2 times the minimum design windload when tested in accordance with ASTM E 330. After testing, there shall be no glass breakage, permanent damage to main frame, sash or ventilator member, fasteners, hardware parts, support arms or actuating mechanisms or any other damage which could cause window to be inoperable. There shall be no permanent deformation in excess of the requirements established by SWI-01 for the window types specified in this section.

## 1.2.2 Air Infiltration

Air infiltration shall not exceed the amount established by SWI-01 for weatherstripped window types when tested in accordance with ASTM E 283.

### 1.2.3 Water Penetration

Water penetration shall not exceed the amount established by SWI-01 for weatherstripped window types when tested in accordance with ASTM E 331.

### 1.2.4 Life Safety Criteria

Windows shall conform to NFPA 101 Life Safety Code when rescue and/or second means of escape are indicated.

## 1.3 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

#### SD-01 Data

Steel Windows; FIO.

Manufacturer's descriptive data and catalog cut sheets.

#### SD-04 Drawings

Steel Windows; GA.

Insect Screens; GA.

Drawings indicating elevations of windows, rough-opening dimensions for each type and size of windows, full-size sections, thicknesses of metal, fastenings, methods of installation and anchorage, connections with other work, type of wall construction, size and spacing of anchors, method of glazing, types and locations of operating hardware, mullion details, weatherstripping details, screen details including method of attachment, window cleaner anchor details, and window schedules showing locations of each window type and indicating compliance with fire safety code, where required.

#### SD-06 Instructions

Steel Windows; FIO.

Manufacturer's preprinted installation instructions and cleaning instructions.

#### SD-13 Certificates

Steel Windows; FIO.

Certificates stating that the steel windows conform to requirements of this section.

#### SD-14 Samples

Steel Windows; GA.

Manufacturer's standard color samples of painted finishes.

## SD-16 Operation and Maintenance Manuals

Steel Windows; GA.

Manufacturer's preprinted instructions for operating and maintaining hardware for each type of window specified, including finish.

## 1.4 QUALIFICATION

Window manufacturer shall specialize in designing and manufacturing the type of steel windows specified, and shall have a minimum of 5 years of documented successful experience. Manufacturer shall have the facilities capable of meeting contract requirements, single-source responsibility and warranty.

## 1.5 MOCK-UPS

Before fabrication, full-size mock-up of each type of steel window complete with glass and manufacturer's certification shall be required for the review of window construction and quality of hardware operation. The approval of mock-up will establish the minimum standard of quality required for steel windows.

## 1.6 DELIVERY AND STORAGE

Steel windows shall be delivered to project site and stored in accordance with manufacturer's recommendations. Damaged windows shall be replaced with new windows.

## 1.7 WARRANTY

Manufacturer's standard performance guarantees or warranties that extend beyond a 1 year period shall be provided.

## PART 2 PRODUCTS

## 2.1 MATERIALS

## 2.1.1 Steel Bars

Steel bars shall be solid one-piece sections hot-rolled from new billet steel in accordance with SWI-01.

## 2.1.2 Sheet Steel

Hot-rolled sheet steel shall conform to ASTM A 569/A 569M, commercial quality with a minimum of 0.15 percent carbon. Cold-rolled sheet steel shall conform to ASTM A 653/A 653M. Sheet steel shall be zinc coated (galvanized) by the hot-dip process in accordance with ASTM A 653/A 653M or ASTM A 924/A 924M.

## 2.1.3 Screws and Bolts

Screws and bolts shall conform to ASTM B 766, ASME B18.6.3 and ASME B18.6.4.

## 2.2 STEEL WINDOW TYPES

Steel windows shall be designed for inside or outside field glazing, as required by the Task Order, and for glass types scheduled on drawings and

specified in Section 08810 GLASS AND GLAZING. Units shall be complete with glass and glazing provisions to meet requirements of paragraph WINDOW PERFORMANCE and SWI-01. Glazing material shall be compatible with steel, and shall not require painting.

#### 2.2.1 Projected Windows

Steel projected windows shall conform to SWI-01 Standard Intermediate, Heavy Intermediate or Heavy Custom type as required by the Task Order. Hinges for projected windows shall be concealed four-bar friction type. Sash locks for project-out ventilators shall be cam-action sweep-lock handle with surface-mounted strike. Sash locks for project-in ventilators shall be thru-rail spring catch with concealed strike. Limit stops shall be provided for project-out ventilators that open onto traffic areas. Ventilator operation shall permit cleaning the outside face of glass from inside the building.

#### 2.2.2 Casement Windows

Steel casement windows shall conform to SWI-01 Standard Intermediate, Heavy Intermediate or Heavy Custom type, as required by the Task Order, and shall have ventilators which swing on side jambs and locking devices to secure ventilators tightly in the frame in the closed position. Hinges for casement windows with manual type operation shall be friction extension type. Hinges for use with rotary gear operators shall be non-friction extension type. Operating device shall be rotary gear type operator for use with or without screens. Limit device shall be combination adjustable limit and friction bar assembly. Locks shall be lift type cam-action. Ventilator opening shall provide access for cleaning.

#### 2.2.3 Horizontal/Vertical Sliding Windows

Steel single and double hung, and slider windows shall be made from minimum 20 gauge thickness cold rolled profiles. Single and double hung sash shall slide in formed vertical tracks or channels and shall be fully counterbalanced in any position by means of adjustable balance mechanisms. Two sweep locks shall be furnished for sashes exceeding 0.965 m 38 in width. Horizontal sliders shall be operable with a single or double sash as specified. Vent sash shall roll on 18 gauge track on ball bearing rollers. Sashes shall have a sweep latch at the center rail. Sweep locks and sash handles shall be the manufacturer's standard and shall be attached to the window with corrosion resistant screws.

#### 2.2.4 Fixed Windows

Fixed windows shall be made of hot rolled or cold rolled profiles. If cold rolled profiles are used, steel shall be minimum 20 gauge thickness. Glazing beads shall be of the snap on or screw on type.

### 2.3 FIRE-RATED WINDOWS

Fire-rated windows shall conform to local code and shall be labeled with a 3/4-hour fire test rating. Units shall be designed and fabricated from one-piece hot-rolled steel members to meet glass sizes, window sizes and opening dimensions established by NFPA 80. Hardware shall conform to NFPA 80 requirements. Fire-rated windows shall bear the Underwriters Laboratories, Warnock Hersey, Factory Mutual or other nationally recognized testing laboratory label for the indicated rating.

## 2.4 WEATHERSTRIPPING

Weatherstripping for steel window ventilating sections shall be manufacturer's standard designed to meet water penetration and air infiltration requirements specified under paragraph WINDOW PERFORMANCE in accordance with SWI-01, and shall be manufactured of material compatible with steel and shall be resistant to weather. Weatherstrips shall be factory-applied and shall be easily replaced in the field. Neoprene or polyvinylchloride weatherstripping are not acceptable where exposed to direct sunlight.

## 2.5 INSECT SCREENS

Insect screens shall be steel window manufacturer's standard design, and shall be provided where scheduled on drawings. Insect screens shall be fabricated of roll-formed aluminum or extruded aluminum frames conforming to SMA ANSI/SMA 1004, or roll-formed corrosion resistant steel frames. Plastic-coated (18 x 16) glass fiber mesh screening shall conform to ASTM D 3656. Aluminum mesh (18 x 14) screening shall conform to ISWA IWS 089.

## 2.6 ACCESSORIES

### 2.6.1 Fasteners

Fastening devices shall be window manufacturer's standard design made from non-magnetic stainless steel, cadmium-plated steel, zinc-plated steel, nickel/chrome-plated steel or magnetic stainless steel in compliance with SWI-01. Self-tapping sheet metal screws are not acceptable for material thicker than 2 mm. 1/16 inch.

### 2.6.2 Window Anchors

Anchors for installing windows shall be as a minimum, finished steel or hot-dip to match the prime window.

### 2.6.3 Window Cleaner Anchors

Window cleaner anchors shall be stainless-steel conforming to ASME A39.1. Windows shall be reinforced to receive window-cleaner anchors. Locations of window cleaner anchors and window anchors shall be closely coordinated.

### 2.6.4 Pole Operators

Ventilators over 2 m 6 feet above floor shall be provided with pole operators and pole hangers complete with 1 tubular anodized aluminum pole with rubber cap at lower end and standard push-pull hook at top end to match hardware design.

## 2.7 FINISHES

### 2.7.1 Prime Coat

Steel windows, fins, mullions, cover plates and associated parts shall be cleaned, treated and factory primed with manufacturer's standard primer coat in a dry film thickness of not less than 0.025 mm. 1.0 mil. Primer coat shall be free of scratches and other blemishes. Paint finish shall be in accordance with paragraph FIELD PAINTED FINISH.

### 2.7.2 Baked Enamel

Finish Steel windows shall be coated with a baked-on silicon polyester enamel in a dry film thickness of not less than 0.025 mm. 1.0 mil. Finish shall be free of scratches and other blemishes. Color shall be as required by the Task Order.

### 2.7.3 Galvanized Finish

Steel windows, fins, mullions, cover plates and associated parts shall be electrodeposited with zinc in accordance with ASTM B 633 or hot-dip galvanized in accordance with ASTM A 123/A 123M. Ventilators containing dovetail weatherstrip grooves shall be finished with an electrodeposited coating of zinc in accordance with ASTM B 633.

## PART 3 EXECUTION

### 3.1 INSTALLATION

Steel windows shall be installed in accordance with approved shop drawings and manufacturer's approved recommendations. Fire-rated windows shall be installed in compliance with NFPA 80 and NFPA 101. Steel surfaces in close proximity with masonry, concrete, wood, and dissimilar metals other than stainless steel, zinc, cadmium, or small areas of white bronze shall be protected from direct contact. The completed window installation shall be watertight and shall be in accordance with Section 07900 JOINT SEALING. Glazing shall be installed in accordance with requirements of this section and Section 08810 GLASS AND GLAZING. Fire-rated windows shall be glazed in accordance with NFPA 80.

### 3.2 ADJUSTMENTS AND CLEANING

#### 3.2.1 Hardware Adjustments

Final operating adjustments shall be made after glazing work is complete. When adjustments are completed, operating sash or ventilators shall operate smoothly, and shall be weathertight when locked in closed position.

#### 3.2.2 Cleaning

Steel window finish and glass shall be cleaned on interior and exterior sides in accordance with window manufacturer's recommendations. Alkaline or abrasive agents shall not be used.

### 3.3 FIELD PAINTED FINISH

Steel windows shall be field painted in accordance with Section 09900 PAINTING, GENERAL. Weatherstrips shall be protected from paint. Finish shall be free of scratches and other blemishes. Color shall be as required by the Task Order.

-- End of Section --

SECTION TABLE OF CONTENTS  
DIVISION 08 - DOORS & WINDOWS  
SECTION 08520  
ALUMINUM WINDOWS

PART 1 GENERAL

- 1.1 REFERENCES
- 1.2 WINDOW PERFORMANCE
  - 1.2.1 Structural Performance
  - 1.2.2 Air Infiltration
  - 1.2.3 Water Penetration
  - 1.2.4 Thermal Performance
  - 1.2.5 Life Safety Criteria
- 1.3 SUBMITTALS
- 1.4 QUALIFICATION
- 1.5 MOCK-UPS
- 1.6 DELIVERY AND STORAGE
- 1.7 WARRANTY

PART 2 PRODUCTS

- 2.1 ALUMINUM WINDOW TYPES
  - 2.1.1 Awning/Hopper/Projected Windows
  - 2.1.2 Casement Windows
  - 2.1.3 Single-Hung and Double-Hung Windows
  - 2.1.4 Fixed Windows
  - 2.1.5 Horizontal-Sliding Windows
  - 2.1.6 Top-Hinged Windows
  - 2.1.7 Vertically/Horizontally Pivoted Windows
- 2.2 WEATHERSTRIPPING
- 2.3 INSECT SCREENS
- 2.4 ACCESSORIES
  - 2.4.1 Fasteners
  - 2.4.2 Hardware
  - 2.4.3 Window Anchors
  - 2.4.4 Window Cleaner Anchors
- 2.5 GLASS AND GLAZING
- 2.6 FINISH
  - 2.6.1 Anodized Aluminum Finish
  - 2.6.2 Baked-Acrylic Resin-Based Coating
  - 2.6.3 High-Performance Coating
  - 2.6.4 Color

PART 3 EXECUTION

- 3.1 INSTALLATION
- 3.2 ADJUSTMENTS AND CLEANING
  - 3.2.1 Hardware Adjustments
  - 3.2.2 Cleaning

-- End of Section Table of Contents --

## SECTION 08520

## ALUMINUM WINDOWS

## PART 1 GENERAL

## 1.1 REFERENCES

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

## ALUMINUM ASSOCIATION (AA)

AA DAF-45 (1997) Designation System for Aluminum Finishes

## AMERICAN ARCHITECTURAL MANUFACTURERS ASSOCIATION (AAMA)

AAMA 101 (1997) Voluntary Specifications for Aluminum, Vinyl (PVC) and Wood Windows and Glass Doors

AAMA 603 (1998) Voluntary Performance Requirements and Test Procedures for Pigmented Organic Coatings on Extruded Aluminum

AAMA 605 (1998) voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic coatings on Aluminum Extrusions and Panels

AAMA 1503 (1998) Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections

## AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 3656 (1997) Insect Screening and Louver Cloth Woven from Vinyl-Coated Glass Yarns

ASTM E 283 (1991) Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen

ASTM E 330 (1997e1) Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference

ASTM E 547 (1996) Water Penetration of Exterior Windows, Curtain Walls, and Doors by

## Cyclic Static Air Pressure Differential

## AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)

ASME A39.1 (1995; A39.1a; A39.1b) Safety Requirements  
for Window Cleaning

## INSECT SCREENING WEAVERS ASSOCIATION (ISWA)

ISWA IWS 089 (1990) Recommended Standards and  
Specifications for Insect Wire Screening  
(Wire Fabric)

## NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 101 (1997; Errata 97-1; TIA-97-1) Life Safety  
Code

## SCREEN MANUFACTURERS ASSOCIATION (SMA)

SMA ANSI/SMA 1004 (1987) Aluminum Tubular Frame Screens for  
Windows

## 1.2 WINDOW PERFORMANCE

Aluminum windows shall be designed to meet the following performance requirements. Testing requirements shall be performed by an independent testing laboratory or agency.

## 1.2.1 Structural Performance

Structural test pressures on window units shall be for positive load (inward) and negative load (outward) in accordance with ASTM E 330. After testing, there shall be no glass breakage, permanent damage to fasteners, hardware parts, support arms or actuating mechanisms or any other damage which could cause window to be inoperable. There shall be no permanent deformation of any main frame, sash or ventilator member in excess of the requirements established by AAMA 101 for the window types and classification specified in this section.

## 1.2.2 Air Infiltration

Air infiltration shall not exceed the amount established by AAMA 101 for each window type when tested in accordance with ASTM E 283.

## 1.2.3 Water Penetration

Water penetration shall not exceed the amount established by AAMA 101 for each window type when tested in accordance with ASTM E 547.

## 1.2.4 Thermal Performance

Thermal transmittance for thermally broken aluminum windows with insulating glass shall not be less than an R-Value of 0.59 square meter k/W (R3.33) R3.33 or 0.44 square m k/W (R2.5) R2.5, as required by the Task Order,

when tested in accordance with AAMA 1503.

#### 1.2.5 Life Safety Criteria

Windows shall conform to NFPA 101 Life Safety Code when rescue and/or second means of escape are indicated.

#### 1.3 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

##### SD-01 Data

Aluminum Windows; FIO.

Manufacturer's descriptive data and catalog cut sheets.

##### SD-04 Drawings

Aluminum Windows; GA. Insect Screens; GA.

Drawings indicating elevations of window, rough-opening dimensions for each type and size of window, full-size sections, thicknesses of metal, fastenings, methods of installation and anchorage, connections with other work, type of wall construction, size and spacing of anchors, method of glazing, types and locations of operating hardware, mullion details, weatherstripping details, screen details including method of attachment, window cleaner anchor details, and window schedules showing locations of each window type.

##### SD-06 Instructions

Aluminum Windows; FIO.

Manufacturer's preprinted installation instructions and cleaning instructions.

##### SD-09 Reports

Aluminum Windows; GA.

Reports for each type of aluminum window attesting that identical windows have been tested and meet all performance requirements established under paragraph WINDOW PERFORMANCE.

##### SD-13 Certificates

Aluminum Windows; FIO.

Certificates stating that the aluminum windows are AAMA certified conforming to requirements of this section. Labels or markings permanently affixed to the window will be accepted in lieu of certificates.

##### SD-14 Samples

Aluminum Windows; GA.

Manufacturer's standard color samples of the specified finishes.

#### 1.4 QUALIFICATION

Window manufacturer shall specialize in designing and manufacturing the type of aluminum windows specified in this section, and shall have a minimum of 5 years of documented successful experience. Manufacturer shall have the facilities capable of meeting contract requirements, single-source responsibility and warranty.

#### 1.5 MOCK-UPS

Before fabrication, full-size mock-up of each type of aluminum window complete with glass and AAMA certification label will be required for review of window construction and quality of hardware operation.

#### 1.6 DELIVERY AND STORAGE

Aluminum windows shall be delivered to project site and stored in accordance with manufacturer's recommendations. Damaged windows shall be replaced with new windows.

#### 1.7 WARRANTY

Manufacturer's standard performance guarantees or warranties that extend beyond a 1 year period shall be provided.

### PART 2 PRODUCTS

#### 2.1 ALUMINUM WINDOW TYPES

Aluminum windows shall consist of complete units including sash, glass, frame, weatherstripping, operators, and hardware. Windows shall conform to AAMA 101. Windows shall be single-glazed or double-glazed and shall have a minimum condensation resistance factor as required by the Task Order when tested in accordance with AAMA 1503. Operable windows shall permit cleaning the outside glass from inside the building.

##### 2.1.1 Awning/Hopper/Projected Windows

Aluminum awning (A) windows shall conform to AAMA 101 Designation AP-R15, AP-LC25, AP-C30 or AP-HC40 type, as required by the Task Order, consisting of hinged ventilators arranged in a single or vertical series within a common frame. Ventilators shall be operated by a device which shall securely close the ventilator at both jambs without the use of additional manually-controlled locking device. Operating hardware except ventilator arms and rotary operators, shall be concealed within frame and sill. Ventilator arms shall be concealed when windows are closed.

##### 2.1.2 Casement Windows

Aluminum casement (C) windows shall conform to AAMA 101 Designation C-R15, LC-25, C-C30, C-HC40 or C-AW40 type, as required by the Task Order, with ventilators which swing on side jamb. Hinges shall be butt (close-up) type. Operators shall be roto-type. Locking devices shall be provided to secure ventilators tightly in the frame in the closed position.

##### 2.1.3 Single-Hung and Double-Hung Windows

Aluminum single-hung (H) and double-hung (H) windows shall conform to AAMA 101 H-R15, H-LC25, H-C30, H-HC40 or H-AW40 type, as required by the Task Order, which operate vertically with the weight of sash offset by a counterbalancing mechanism mounted in window to hold the sash stationary at any open position. Windows shall be provided with a tilt-in sash. Single-hung and double-hung windows shall be provided with locking devices to secure the sash in the closed position. Counterbalancing mechanisms shall be easily replaced after installation.

#### 2.1.4 Fixed Windows

Aluminum fixed (F) windows shall conform to AAMA 101 F-R15, F-LC25, F-C30, F-HC40 or F-AW40 type, as required by the Task Order, non-operable glazed frame, complete with provisions for reglazing in the field.

#### 2.1.5 Horizontal-Sliding Windows

Aluminum horizontal (HS) sliding windows shall conform to AAMA 101 HS-R15, HS-LC25, HS-C30, HS-HC40 or HS-AW40 type, as required by the Task Order, consisting of sliding sash and fixed lite. Sash guides shall be nylon wheels. Windows shall be provided with locking devices to secure the sash in the closed position.

#### 2.1.6 Top-Hinged Windows

Aluminum top-hinged (TH) (inswinging) windows shall conform to AAMA 101 TH-C30, TH-HC40 or TH-AW40 type consisting of a ventilator hinged to the main frame at the head to swing into the room as required by the Task Order. Hinges shall be continuous applied type. Holding devices shall be hold-open arms attached to frame and ventilator or removable stay-bar attached when ventilator is opened, as required by the Task Order, to provide positive positioning of ventilator. Locking devices shall be type located at jambs and sill to secure the sash in the closed position.

#### 2.1.7 Vertically/Horizontally Pivoted Windows

Aluminum vertically/horizontally pivoted (VP) windows shall conform to AAMA 101 VP-R15, VP-LC25, VP-C30, VP-HC40 or VP-AW40 type, as required by the Task Order, consisting of a ventilator pivoted head and sill at the center of main frame which can reverse or rotate a full 360 degrees around the vertical axis, and be opened and held at 180 degrees. Pivot assemblies shall be designed to allow for removal of ventilator and provide for smooth operation of ventilator. Pivot assembly and locks shall be stainless steel, manganese bronze, aluminum alloy or other material compatible with aluminum. Pivot pins shall be stainless steel. Windows shall be provided with devices to secure the sash in the closed position.

### 2.2 WEATHERSTRIPPING

Weatherstripping for ventilating sections shall be of type designed to meet water penetration and air infiltration requirements specified in this section in accordance with AAMA 101, and shall be manufactured of material compatible with aluminum and resistant to weather. Weatherstrips shall be factory-applied and easily replaced in the field. Neoprene or polyvinylchloride weatherstripping are not acceptable where exposed to direct sunlight.

### 2.3 INSECT SCREENS

Insect screens shall be aluminum window manufacturer's standard design, and shall be provided where scheduled on drawings. Insect screens shall be fabricated of roll-formed tubular-shaped aluminum frames conforming to SMA ANSI/SMA 1004 and (18 x 16) aluminum mesh screening conforming with ISWA IWS 089, Type III or vinyl coated glass screening conforming to ASTM D 3656 or stainless steel frames conforming to SMA ANSI/SMA 1004 and (18 x 16) bronze mesh screening conforming with ISWA IWS 089, Type I, as required by the Task Order.

## 2.4 ACCESSORIES

### 2.4.1 Fasteners

Fastening devices shall be window manufacturer's standard design made from aluminum, stainless steel, cadmium-plated steel, nickel/chrome-plated steel in compliance with AAMA 101. Self-tapping sheet metal screws will not be acceptable for material thicker than 2 mm (1/16 inch). 1/16 inch.

### 2.4.2 Hardware

Hardware shall be as specified for each window type and shall be fabricated of aluminum, stainless steel, cadmium-plated steel, zinc-plated steel or nickel/chrome-plated steel in accordance with requirements established by AAMA 101.

### 2.4.3 Window Anchors

Anchoring devices for installing windows shall be made of aluminum, cadmium-plated steel, stainless steel, or zinc-plated steel conforming to AAMA 101.

### 2.4.4 Window Cleaner Anchors

Window cleaner anchors shall be manufactured of stainless-steel conforming to ASME A39.1. Window frames shall be reinforced to receive window cleaner anchors. Locations of window cleaner anchors shall be as shown.

## 2.5 GLASS AND GLAZING

Aluminum windows shall be designed for inside glazing, field glazing, and for glass types scheduled on drawings and specified in Section 08810 GLASS AND GLAZING. Units shall be complete with glass and glazing provisions to meet AAMA 101. Glazing material shall be compatible with aluminum, and shall not require painting.

## 2.6 FINISH

### 2.6.1 Anodized Aluminum Finish

Exposed surfaces of aluminum windows shall be finished with anodic coating conforming to AA DAF-45: Architectural Class II, AA-M10-C22-A31, clear anodic coating, 0.010 to 0.02 mm (0.4 to 0.7 mil) 0.4 to 0.7 mil thick, 204-R1 Natural Color or Architectural Class I, AA-M10-C22-A41, clear anodic coating, 0.02 mm (0.7 mil) 0.7 mil or thicker, 215-R1 Natural Color or Architectural Class I, AA-M10-C22-A44, color anodic coating, 0.02 mm (0.7 mil) 0.7 mil or thicker as required by the Task Order. Finish shall be free of scratches and other blemishes.

### 2.6.2 Baked-Acrylic Resin-Based Coating

Exposed surfaces of aluminum windows shall be finished with acrylic resin-based coating conforming to AAMA 603, total dry thickness of 0.03 mm (1.0 mil). 1.0 mils. Finish shall be free of scratches and other blemishes.

### 2.6.3 High-Performance Coating

Exposed surfaces of aluminum windows shall be finished with a two-coat fluoropolymer coating system containing at least 70 percent by weight polyvinylidene fluoride, PVF2 resin, factory-applied, oven-baked, conforming to AAMA 605, with a primer coat of 0.005 to 0.008 mm (0.20 to 0.030 mils) 0.20 to 0.30 mils and a color coat of minimum 0.025 mm (1.0 mils), 1.0 mils, total dry film thickness of 0.030 to 0.033 mm (1.2 to 1.3 mils). 1.20 to 1.3 mils. Finish shall be free of scratches and other blemishes.

### 2.6.4 Color

Color shall be as required by the Task Order.

## PART 3 EXECUTION

### 3.1 INSTALLATION

Aluminum windows shall be installed in accordance with approved shop drawings and manufacturer's published instructions. Aluminum surfaces in contact with masonry, concrete, wood and dissimilar metals other than stainless steel, zinc, cadmium or small areas of white bronze, shall be protected from direct contact using protective materials recommended by AAMA 101. The completed window installation shall be watertight in accordance with Section 07900 JOINT SEALING. Glass and glazing shall be installed in accordance with requirements of this section and Section 08810 GLASS AND GLAZING.

### 3.2 ADJUSTMENTS AND CLEANING

#### 3.2.1 Hardware Adjustments

Final operating adjustments shall be made after glazing work is complete. Operating sash or ventilators shall operate smoothly and shall be weathertight when in locked position.

#### 3.2.2 Cleaning

Aluminum window finish and glass shall be cleaned on exterior and interior sides in accordance with window manufacturer's recommendations. Alkaline or abrasive agents shall not be used. Precautions shall be taken to avoid scratching or marring window finish and glass surfaces.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 08 - DOORS & WINDOWS

SECTION 08590

WOOD WINDOWS - REPAIR AND REHABILITATION

PART 1 GENERAL

- 1.1 REFERENCES
- 1.2 SUBMITTALS
- 1.3 QUALIFICATIONS
- 1.4 STORAGE

PART 2 PRODUCTS

- 2.1 MATERIALS
- 2.2 WOOD
- 2.3 GLASS AND GLAZING
- 2.4 HARDWARE
- 2.5 FASTENERS
- 2.6 GLAZING COMPOUND
- 2.7 GLAZING POINTS
- 2.8 EPOXY CONSOLIDANTS
  - 2.8.1 Liquid Consolidant
  - 2.8.2 Epoxy Paste

PART 3 EXECUTION

- 3.1 GENERAL
- 3.2 EVALUATION
- 3.3 REPAIRS
  - 3.3.1 Example Window
  - 3.3.2 Sash Removal
  - 3.3.3 Paint Removal
  - 3.3.4 Wood Repair
  - 3.3.5 Epoxy Wood Repair
    - 3.3.5.1 Epoxy Liquid Wood Consolidant
    - 3.3.5.2 Epoxy Paste
  - 3.3.6 Wood Replacement
  - 3.3.7 Hardware
  - 3.3.8 Glazing
  - 3.3.9 Operating System
  - 3.3.10 Weatherstripping
- 3.4 PAINTING PREPARATION
- 3.5 PAINTING
- 3.6 REASSEMBLY
- 3.7 ADJUSTMENTS
- 3.8 CLEANING

-- End of Section Table of Contents --

## SECTION 08590

## WOOD WINDOWS - REPAIR AND REHABILITATION

## PART 1 GENERAL

## 1.1 REFERENCES

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

## AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 741	(1993) Accelerated Aging of Wood Sash Face Glazing Compound
ASTM C 742	(1994) Degree of Set for Wood Sash Glazing Compound
ASTM C 1184	(1995) Structural Silicone Sealants

## 1.2 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

## SD-04 Drawings

Shop Drawings; GA.

Shop drawings indicating elevations of units, full-size sections, fastenings, methods of installation and anchorage, method of glazing, locations of operating hardware, mullion details, method and material for weatherstripping, insect screen, details, connections with other work and window schedules showing location of each window unit.

## SD-06 Instructions

Installation; FIO.

Manufacturer's installation instructions for each type of hardware and weatherstripping.

## SD-08 Statements

Qualifications; GA.

Documentation showing qualifications of personnel proposed to perform the window repair and rehabilitation work, and a listing identifying prior installations completed by the Contractor.

## SD-14 Samples

Hardware; FIO.

Representative sample of each type of hardware with identifying tags.

Moldings; FIO.

A 300 mm 12 inch long piece of each molding type required for each window and casing with specified finish.

Weatherstripping; FIO.

A 300 mm 12 inch long sample of each type of weatherstripping required with fasteners.

### 1.3 QUALIFICATIONS

The Contractor shall provide qualified workers trained and experienced in repairing, restoring, replicating, and replacing windows in historic buildings and shall submit documentation of 5 consecutive years of work of this type. A list of installations made shall also be provided identifying when, where and for whom the installations were made.

### 1.4 STORAGE

Materials shall be stored out of contact with the ground and under weathertight covering.

## PART 2 PRODUCTS

### 2.1 MATERIALS

Existing materials shall be reused whenever possible in the repair and rehabilitation of historic wood windows. This includes all wood elements, hardware and glazing that are determined to be of historic significance. Replacement of window elements with new material shall be done only when originals are so deteriorated as to prohibit their useful function.

### 2.2 WOOD

Wood used to replace deteriorated window members shall be of the same species and grade as the original, unless otherwise noted. Finger-jointed stock may be used for interior casing and trim only where scheduled to be painted.

### 2.3 GLASS AND GLAZING

Existing intact original glass shall be reused. Any removed lights shall be reused in their original frames and positions. New glass and glazing materials shall conform to Section 08810 GLASS AND GLAZING.

### 2.4 HARDWARE

Existing original hardware shall be reused, when it is salvageable. Replacement hardware shall match original in design, material, and finish.

### 2.5 FASTENERS

Fasteners shall be stainless steel, galvanized, or non-ferrous metal.

2.6 GLAZING COMPOUND

Glazing compound for single pane glass shall be oil-based, non-staining and non-bleeding, and shall pass the test requirements of ASTM C 741, and ASTM C 742. Existing insulated glass units shall be reglazed with silicone sealant complying with ASTM C 1184 and shall be compatible with the unit seal on the glass unit.

2.7 GLAZING POINTS

Glazing points shall be stainless steel or galvanized steel.

2.8 EPOXY CONSOLIDANTS

2.8.1 Liquid Consolidant

Liquid wood consolidant shall consist of a two-part, low-viscosity liquid epoxy that meets the criteria of Table A.

2.8.2 Epoxy Paste

Epoxy paste shall consist of a two-part, thixotropic paste that meets the criteria of Table A.

	TABLE A	
	LIQUID CONSOLIDANT	EPOXY PASTE
Properties	Low-Viscosity Liquid	No-Slump, Thixotropic Paste
Toxicity	Low	Very Low
Toxicity Cured	Non-Toxic	Non-Toxic
Ratios	1:1 by Volume	1:1 by Volume
Pot Life @ Room Temp.	30 min. minimum	50 min. minimum
Hardening @ Room Temp.	1 hr. or longer	1 hr. or longer
Hardening @ 60 deg. C	16 min. or less	18 min. or less
Viscosity Poises @ 22 deg. C	4.7 max.	Thixotropic paste
Solids	95% min.	98% min.
Tensile Strength	26 MPa 4000 psi	16.2 MPa 2500 psi
Elongation (%)	50	4

PART 3 EXECUTION

3.1 GENERAL

The Contractor shall repair wood windows as indicated, and shall return them to proper operation and sound condition.

### 3.2 EVALUATION

A complete evaluation survey of the existing conditions of each wood window shall be made to determine the extent of repairs necessary. The evaluation survey may be in the form of a schedule and shall note at a minimum:

- a. window location
- b. condition of the paint
- c. condition of the frame and sill
- d. condition of the interior and exterior trim
- e. condition of the sash (including rails, stiles, and muntins)
- f. glazing problems
- g. window hardware and operating system
- h. the overall condition of the window

### 3.3 REPAIRS

#### 3.3.1 Example Window

An existing window of each type to serve as an example of the quality of repairs to be provided shall be prepared for inspection and approval by the Contracting Officer.

#### 3.3.2 Sash Removal

The interior stops shall be removed first in a method so as to not scar the wood. Connecting hardware and operating mechanisms shall then be detached and the sash shall be removed from the frame. Removed sashes and frames shall be identified as to location to assure reinstallation in their original positions. Windows with counter-weight systems shall have the sash cords detached from the sides of the sash and their ends pinned with a nail or tied in a knot to prevent them from falling into the weight pocket; the lower sash can then be removed. The parting bead shall be removed so as to not scar the wood. Plastic covering or plywood shall be installed to cover the window opening during repairs.

#### 3.3.3 Paint Removal

Areas on frame, sill, sash and muntins where paint or varnish has peeled, alligatored, blistered or crazed shall have paint removed to bare wood or first sound paint layer, using non-destructive means such as a chemical stripper or heat gun. If chemical strippers are used, wood shall be neutralized after stripping to a litmus pH of 5 to 8.5. Wood shall be allowed to dry to a moisture content of 8 to 12 percent before repainting. If heat methods are used for paint removal, glass shall be protected from sudden temperature change to avoid breakage.

#### 3.3.4 Wood Repair

Badly decayed areas (with more than 30 percent wood decayed) shall be removed from wood sash, sill, frame, and trim assemblies. Moderately decayed areas (less than 30 percent decayed), weathered, or gouged wood shall be patched with approved patching compounds, and shall be sanded smooth. Intact sash rails and stiles that are loose shall be repaired with new dowels to make joints tight.

### 3.3.5 Epoxy Wood Repair

Epoxy wood repair materials shall be applied in accordance with manufacturer's written instructions. Health and safety instructions shall be followed in accordance with the manufacturer's instructions. The source or cause of wood decay shall be identified and corrected prior to application of patching materials. Wet wood shall be completely dried to a moisture content of 8 to 12 percent to its full depth before patching. Wood that is to be patched shall be clean of dust, grease, and loose paint. Clean mixing equipment shall be used to avoid contamination. Mix and proportions shall be as directed by the manufacturer. Batches shall be only large enough to complete the specific job intended. Patching materials shall be completely cured before painting or reinstallation of patched pieces.

#### 3.3.5.1 Epoxy Liquid Wood Consolidant

Epoxy liquid wood consolidant shall be used to penetrate and impregnate deteriorated wood sections to reinforce wood fibers that have become softened or absorbent.

#### 3.3.5.2 Epoxy Paste

Epoxy paste shall be used to fill areas where portions of wood are missing such as holes, cracks, gaps, gouges, and other voids. Areas to receive epoxy paste patching material shall be primed with compatible epoxy liquid wood consolidant or a primer recommended by the manufacturer.

### 3.3.6 Wood Replacement

Pieces decayed beyond repair shall be replaced with new pieces that match originals in all respects. Joinery shall match that of existing. Muntins shall have coped mortise and tenon joints. Molded members shall have mitered or coped joints.

### 3.3.7 Hardware

Existing hardware which is in good condition shall be reused unless otherwise noted. Reused existing hardware shall be stripped of paint down to bare metal. New hardware shall be installed where original is missing, damaged, or unsuitable for new operation, per manufacturer's directions to provide a secure and smoothly operating window assembly.

### 3.3.8 Glazing

Lights to be reused shall be reinstalled in their original frames and positions. Rabbeted integral glazing recesses shall be brushed with boiled linseed oil prior to the application of bed glazing compound. Broken glass shall be replaced as specified in Section 08810 GLASS AND GLAZING.

### 3.3.9 Operating System

Windows with counter-weight systems shall be repaired to original operating function. Original sash weights (and sash chains, if applicable) shall be reused wherever possible. Missing weights and sash cords or chains shall be replaced. Missing or deteriorated sash cords shall be replaced with new cotton-polypropylene cord rated for sash weight. When new weights are required, they shall match the originals in weight. Replacement weights shall be cast iron or square milled steel bar stock.

### 3.3.10 Weatherstripping

Weatherstripping shall be installed on all operable windows. Weatherstripping shall consist of brass, compression or interlocking weather strips designed for permanent sealing under bumper or wiper action. Weatherstripping shall be provided at the perimeter of each sash including meeting rails and shall be installed per manufacturer's instructions. Weatherstripping shall be completely concealed when sash is closed.

### 3.4 PAINTING PREPARATION

Areas where paint was removed or where existing paint shows crazing, wrinkling, and intercoat peeling shall be scraped, sanded, and shall have edges feathered. Paint shall be removed to bare wood or first sound paint layer. All parts shall be cleaned by brush using bleach and/or trisodium phosphate (TSP) solution, and let dry. Existing finish shall be deglossed. Open joints and cracks shall be filled with epoxy repair materials. Perimeter of fixed sash shall be caulked.

### 3.5 PAINTING

Wood elements shall be primed and painted in accordance with Section 09900 PAINTING, GENERAL.

### 3.6 REASSEMBLY

After repairs are completed, the window shall be reassembled with all parts tight, true and functioning properly. Wood surfaces shall be free of blemishes.

### 3.7 ADJUSTMENTS

Final adjustment for proper operation of ventilating unit shall be made after reassembly. Adjustments shall be made to operating sash or ventilators to assure smooth operation and weathertight performance when locked closed.

### 3.8 CLEANING

Windows shall be cleaned on both exterior and interior.

-- End of Section --

SECTION TABLE OF CONTENTS  
DIVISION 08 - DOORS & WINDOWS  
SECTION 08700  
BUILDERS' HARDWARE

PART 1 GENERAL

- 1.1 REFERENCES
- 1.2 SUBMITTALS
- 1.3 PREDELIVERY CONFERENCE
- 1.4 DELIVERY, STORAGE, AND HANDLING
- 1.5 SPECIAL TOOLS
- 1.6 WARRANTY
- 1.7 OPERATION AND MAINTENANCE MANUALS

PART 2 PRODUCTS

- 2.1 GENERAL HARDWARE REQUIREMENTS
- 2.2 TEMPLATES
- 2.3 HINGES
  - 2.3.1 Hinges for Reverse Bevel Doors with Locks
  - 2.3.2 Contractor's Option
  - 2.3.3 Pivot Hinges
  - 2.3.4 Spring Hinges
  - 2.3.5 Electric Hinges
- 2.4 LOCKS AND LATCHES
  - 2.4.1 Mortise Lock and Latchsets
  - 2.4.2 Bored Lock and Latchsets
  - 2.4.3 Electro-Mechanical Locks
  - 2.4.4 Auxiliary Locks and Associated Products
  - 2.4.5 Lock Cylinders (Mortise, Rim and Bored)
  - 2.4.6 Locksets for Lead-Shielded Doors
  - 2.4.7 Padlocks
  - 2.4.8 Push/Pull Latches
  - 2.4.9 Lock Trim
  - 2.4.10 Electromagnetic Locks
- 2.5 EXIT DEVICES AND EXIT DEVICE ACCESSORIES
  - 2.5.1 Exit Devices and Auxiliary Items
  - 2.5.2 Door Coordinator
  - 2.5.3 Removable Mullions
  - 2.5.4 Electric Exit Devices
  - 2.5.5 Automatic Flush Bolts
- 2.6 DELAYED EGRESS LOCKS
- 2.7 KEYING
- 2.8 DOOR CLOSING DEVICES
  - 2.8.1 Surface Type Closers
  - 2.8.2 Floor Closers and Pivots
- 2.9 DOOR CONTROLS - OVERHEAD HOLDERS
- 2.10 SMOKE DETECTORS AND ELECTRO-MAGNETIC HOLDERS
- 2.11 POWER ASSIST AND LOW ENERGY POWER OPERATORS
- 2.12 ARCHITECTURAL DOOR TRIM

- 2.12.1 Door Protection Plates
  - 2.12.1.1 Armor Plates
  - 2.12.1.2 Kick Plates
  - 2.12.1.3 Mop Plates
- 2.12.2 Door Edge Guards
- 2.12.3 Push Plates
  - 2.12.3.1 Combination Push-Pull Plates
  - 2.12.3.2 Flat Plates
- 2.12.4 Door Pulls and Push/Pull Units
  - 2.12.4.1 Arm Pulls
  - 2.12.4.2 Drop Ring Pulls
  - 2.12.4.3 Door Pulls
- 2.12.5 Push and Pull Bars
- 2.13 AUXILIARY HARDWARE
- 2.14 MISCELLANEOUS
  - 2.14.1 Automatic Door Bottoms
  - 2.14.2 Metal Thresholds
  - 2.14.3 Rain Drips
  - 2.14.4 Aluminum Housed Type Weatherseals
  - 2.14.5 Gasketing
  - 2.14.6 Key Control Storage System
  - 2.14.7 Door Stops
- 2.15 FASTENINGS
- 2.16 FINISHES
- 2.17 HARDWARE FOR FIRE DOORS

### PART 3 EXECUTION

- 3.1 APPLICATION
  - 3.1.1 Hardware for Fire Doors and Smoke-Control Door Assemblies
  - 3.1.2 Door-Closing Devices
  - 3.1.3 Key Control Storage Systems
  - 3.1.4 Kick Plates and Mop Plates
  - 3.1.5 Auxiliary Hardware
  - 3.1.6 Thresholds
  - 3.1.7 Rain Drips
  - 3.1.8 Weatherseals
  - 3.1.9 Gasketing
- 3.2 OPERATIONAL TESTS
- 3.3 FIELD QUALITY CONTROL
- 3.4 HARDWARE SETS

-- End of Section Table of Contents --

## SECTION 08700

## BUILDERS' HARDWARE

## PART 1 GENERAL

## 1.1 REFERENCES

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

## AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM E 283 (1991) Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls and Doors Under Specified Pressure Differences Across the Specimen

ASTM F 883 (1997) Padlocks

## BUILDERS HARDWARE MANUFACTURERS ASSOCIATION (BHMA)

BHMA L & R Directory (Effective thru Jun 1999) Directory of Certified Locks & Latches

BHMA Closer Directory (Effective thru Jul (1999) Directory of Certified Door Closers

BHMA Exit Devices Directory (Effective thru Aug 1998) Directory of Certified Exit Devices

BHMA A156.1 (1997) Butts and Hinges

BHMA A156.2 (1996) Bored and Preassembled Locks and Latches

BHMA A156.3 (1994) Exit Devices

BHMA A156.4 (1992) Door Controls - Closers

BHMA A156.5 (1992) Auxiliary Locks & Associated Products

BHMA A156.6 (1994) Architectural Door Trim

BHMA A156.7 (1997) Template Hinge Dimensions

BHMA A156.8 (1994) Door Controls - Overhead Stops and Holders

BHMA A156.13 (1994) Mortise Locks & Latches

BHMA A156.15	(1995) Closer Holder Release Devices
BHMA A156.16	(1989) Auxiliary Hardware
BHMA A156.17	(1993) Self Closing Hinges & Pivots
BHMA A156.18	(1993) Materials and Finishes
BHMA A156.19	(1997) Power Assist and Low Energy Power Operated Doors
BHMA A156.20	(1996) Strap and Tee Hinges and Hasps
BHMA A156.21	(1996) Thresholds
BHMA A156.23	(1992) Electromagnetic Locks
BHMA A156.24	(1992) Delayed Egress Locks

## DOOR AND HARDWARE INSTITUTE (DHI)

DHI Keying Systems	(1989) Keying Systems and Nomenclature
DHI Locations for CSD	(1997) Recommended Locations for Builders' Hardware for Custom Steel Doors and Frames
DHI Locations for SSD	(1990) Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames
DHI ANSI/DHI A115.1G	(1994) Installation Guide for Doors and Hardware
DHI ANSI/DHI A115-W	(Varies) Wood Door Hardware Standards (Incl A115-W1 thru A115-W9)

## NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 80	(1999) Fire Doors and Fire Windows
NFPA 101	(1997; Errata 97-1; TIA-97-1) Life Safety Code
NFPA 105	(1999) Installation of Smoke-Control Door Assemblies

## 1.2 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Data

Hardware and Accessories; GA.

Manufacturer's descriptive data, technical literature, catalog cuts, and installation instructions. Spare parts data for locksets, exit devices,

closers, electric locks, electric strikes, electro-magnetic closer holder release devices, and electric exit devices, after approval of the detail drawings, and not later than 1 month prior to the date of beneficial occupancy. The data shall include a complete list of parts and supplies, with current unit prices and source of supply.

#### SD-04 Drawings

Hardware Devices; GA.

Detail drawings for hardware devices for computerized keying systems, magnetic cards, keyless push button access control systems, and other electrical hardware devices showing complete wiring and schematic diagrams and other details required to demonstrate proper function of units.

#### SD-07 Schedules

Hardware Schedule; FIO.

Hardware schedule listing all items to be furnished. The schedule shall include for each item: the quantities; manufacturer's name and catalog numbers; the ANSI number specified, sizes; detail information or catalog cuts; finishes; door and frame size and materials; location and hardware set identification cross-references to drawings; corresponding reference standard type number or function number from manufacturer's catalog if not covered by ANSI or BHMA; and list of abbreviations and template numbers.

Keying Schedule; GA.

Keying schedule developed in accordance with DHI Keying Systems, after the keying meeting with the user.

#### SD-13 Certificates

Hardware and Accessories; FIO.

The hardware manufacturer's certificates of compliance stating that the supplied material or hardware item meets specified requirements. Each certificate shall be signed by an official authorized to certify in behalf of the product manufacturer and shall identify quantity and date or dates of shipment or delivery to which the certificates apply. A statement that the proposed hardware items appear in BHMA L & R Directory, BHMA Closer Directory and BHMA Exit Devices Directory directories of certified products may be submitted in lieu of certificates.

### 1.3 PREDELIVERY CONFERENCE

Upon approval of the Hardware Schedule, the construction Contractor shall arrange a conference with the hardware supplier, Contracting Officer and the using agency to determine keying system requirements. Location of the key control storage system, set-up and key identification labeling will also be determined.

### 1.4 DELIVERY, STORAGE, AND HANDLING

Hardware shall be delivered to the project site in the manufacturer's original packages. Each article of hardware shall be individually packaged in the manufacturer's standard commercial carton or container, and shall be properly marked or labeled to be readily identifiable with the approved

hardware schedule. Each change key shall be tagged or otherwise identified with the door for which its cylinder is intended. Where double cylinder functions are used or where it is not obvious which is the key side of a door, appropriate instructions shall be included with the lock and on the hardware schedule. Manufacturer's printed installation instructions, fasteners, and special tools shall be included in each package.

#### 1.5 SPECIAL TOOLS

Special tools, such as those supplied by the manufacturer, unique wrenches, and dogging keys, shall be provided as required to adjust hardware items.

#### 1.6 WARRANTY

Manufacturer's standard performance guarantees or warranties that extend beyond a one year period shall be provided.

#### 1.7 OPERATION AND MAINTENANCE MANUALS

Six complete copies of maintenance instructions listing routine maintenance procedures, possible breakdowns and repairs, and troubleshooting guides shall be provided. The instructions for electric locks, electric strikes, electro-magnetic closer holder release devices, and electric exit devices shall include simplified diagrams as installed.

### PART 2 PRODUCTS

#### 2.1 GENERAL HARDWARE REQUIREMENTS

Hardware shall conform to the requirements specified herein and the HARDWARE SETS listing at the end of this section. Hardware set numbers correspond to the set numbers shown on the drawings.

#### 2.2 TEMPLATES

Requirements for hardware to be mounted on metal doors or metal frames shall be coordinated between hardware manufacturer and door or frame manufacturer by use of templates and other information to establish location, reinforcement required, size of holes, and similar details. Templates of hinges shall conform to BHMA A156.7.

#### 2.3 HINGES

Hinges shall conform to BHMA A156.1. Hinges used on metal doors and frames shall also conform to BHMA A156.7. Except as otherwise specified, hinge sizes shall conform to the hinge manufacturer's printed recommendations.

##### 2.3.1 Hinges for Reverse Bevel Doors with Locks

Hinges for reverse bevel doors with locks shall have pins that are made nonremovable by means such as a set screw in the barrel, or safety stud, when the door is in the closed position.

##### 2.3.2 Contractor's Option

Hinges with antifriction bearings may be furnished in lieu of ball bearing hinges, except where prohibited for fire doors by the requirements of NFPA 80.

### 2.3.3 Pivot Hinges

Pivot hinges shall conform to BHMA A156.4.

### 2.3.4 Spring Hinges

Spring hinges shall conform to BHMA A156.17.

### 2.3.5 Electric Hinges

Electric hinges shall conform to BHMA A156.1 with modification of added electric wires to insure correct operation of electric hardware items.

## 2.4 LOCKS AND LATCHES

To the maximum extent possible, locksets, latchsets and deadlocks, and all components thereof, including cylinders and removable cores, shall be the products of a single manufacturer. Lock fronts for double-acting doors shall be rounded. Strikes for wood frames and pairs of wood doors shall be furnished with wrought boxes.

### 2.4.1 Mortise Lock and Latchsets

Mortise lock, latchsets, and strikes shall be series 1000 and shall conform to BHMA A156.13, operational Grade 1. Strikes for security doors shall be rectangular without curved 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.

### 2.4.2 Bored Lock and Latchsets

Bored lock, latchsets, and strikes shall be series 4000 and shall conform to BHMA A156.2, Grade 1. Bored type locks and latches for doors 35 mm 1-3/8 inches thick and over shall have adjustable bevel fronts or otherwise conform to the shape of the door.

### 2.4.3 Electro-Mechanical Locks

Electro-mechanical locks shall allow for locking and/or unlocking of doors from a remote location by means of push buttons or card reader as required by the Task Order. Locks shall be fail safe mode (unlocked when power is off) or fail secured mode (exterior side only locked when power is off) as required by the Task Order. Locks shall be mortise series conforming to BHMA A156.13 and bored series conforming to BHMA A156.2 with factory installed electric lock modification or manufactured electro-mechanical locks conforming to BHMA A156.13 or BHMA A156.2 test standards. In hazardous locations, products shall use safe power supplies or be pneumatic.

### 2.4.4 Auxiliary Locks and Associated Products

Bored and mortise dead locks and dead latches, narrow style dead locks and dead latches, rim latches, dead latches, and dead bolts, and electric strikes shall conform to BHMA A156.5. Bolt and latch retraction shall be dead bolt style. Strike boxes shall be furnished with dead bolt and latch strikes for Grade 1. Electric strikes shall be locked and/or unlocked, as required by the Task Order, from a remote location in fail safe fail secured mode as required by the Task Order. Electric strike for rated openings shall be fail secured.

#### 2.4.5 Lock Cylinders (Mortise, Rim and Bored)

Lock cylinders shall comply with BHMA A156.5. Lock cylinder shall have not less than six or seven pins as required by the Task Order. Cylinders shall have key removable type cores. A great or grand master keying system shall be provided as required by the Task Order. An extension of the existing keying system shall be provided if required by the Task Order. The cylinders shall be compatible with existing locks that were manufactured as described by the Task Order, or may not have interchangeable cores. As required by the Task Order a construction master keying system or Construction interchangeable cores shall be provided. Disassembly of knob or lockset shall not be required to remove core from lockset. All locksets, lockable exit devices, and padlocks shall accept same interchangeable cores.

#### 2.4.6 Locksets for Lead-Shielded Doors

Locksets for lead-shielded doors shall be provided with factory-installed lead linings. Lead linings shall not be less than the thickness of the lead in the door in which the lockset is required.

#### 2.4.7 Padlocks

Padlocks shall conform to ASTM F 883, Type P01, Option as required by the Task Order. Grade 6. All padlocks shall be keyed alike. All padlocks shall be keyed into master key system. Straps, tee hinges, and hasps shall conform to BHMA A156.20.

#### 2.4.8 Push/Pull Latches

#### 2.4.9 Lock Trim

Lock trim shall be cast, forged, or heavy wrought construction of commercial plain design. In addition to meeting the test requirement of BHMA A156.2 or BHMA A156.13, knobs, lever handles, roses, and escutcheons shall be 1.27 mm 0.050 inch thick, if unreinforced. If reinforced, the outer shell shall be 0.89 mm 0.035 inch thick and the combined thickness shall be 1.78 mm 0.070 inch except that knob shanks shall be 1.52 mm 0.060 inch thick. Knob diameter shall be 54 to 57 mm. 2-1/8 to 2-1/4 inches. Lever handles shall be of plain design with ends returned to no more than 10 mm 1/2 inch from the door face.

#### 2.4.10 Electromagnetic Locks

Electromagnetic locks shall allow for locking or unlocking of doors from a remote location by means of push buttons or card reader as required by the Task Order. Electromagnetic locks shall be fail safe (unlocked when power is off) and shall conform to BHMA A156.23. In hazardous locations, products shall use safe power supplies.

### 2.5 EXIT DEVICES AND EXIT DEVICE ACCESSORIES

Exit devices and exit device accessories shall conform to BHMA A156.3, Grade 1.

#### 2.5.1 Exit Devices and Auxiliary Items

Trim shall be of wrought construction and commercial plain design with straight, beveled, or smoothly rounded sides, corners, and edges.



Master keyed sets:	keys each set as required by the Task Order.
Grand master keys:	total as required by the Task Order.
Control keys:	total as required by the Task Order.
Construction keys:	total as required by the Task Order.
Blank keys:	total as required by the Task Order.

The keys shall be furnished to the Contracting Officer arranged for key control system storage in sets or subsets as scheduled.

## 2.8 DOOR CLOSING DEVICES

Door closing devices shall conform to BHMA A156.4, Grade 1. Closing devices shall be products of one manufacturer for each type specified. The opening resistance of closing devices shall not exceed 67 N 15 lbf applied at the latch stile or exceed 22 N 5 lbf where low opening resistance is scheduled.

### 2.8.1 Surface Type Closers

Surface type closers shall be Grade 1, Series C01000 with options PT-4C and PT-4D, C02000 Standard Cover, C02000 Full Cover or C03000, as required by the Task Order, with options PT-4H, Size 1 or 2 through Size 6, and PT-4D with back check position valve. Closers for screen and storm doors shall be Type C09353. Except as otherwise specified, sizes shall conform to the manufacturer's published recommendations. Closers for outswinging exterior doors shall have parallel arms or shall be top jamb mounted. Closers for doors close to a wall shall be of narrow projection so as not to strike the wall at the 90-degree open position.

### 2.8.2 Floor Closers and Pivots

Floor closers shall be Grade 1 with internal dead stop for all exterior doors. Floor closers shall have cement boxes. Pivots used on doors with floor closers shall be of the same manufacturer as the floor closers. Floor plates are not required where thresholds cover the closer cement box. Floor closers shall have independent latch and sweep speed adjusting valves, backcheck, mechanical selective hold-open (except fire rated openings), and optional delayed action. Setting tools shall be furnished for use in installing floor closers. Electric pivots and floor closers shall comply with BHMA A156.4 with modifications to ensure correct operation of electric hardware items.

## 2.9 DOOR CONTROLS - OVERHEAD HOLDERS

Door controls - overhead holders shall conform to BHMA A156.8.

## 2.10 SMOKE DETECTORS AND ELECTRO-MAGNETIC HOLDERS

Electro-magnetic door holders, electro-mechanical door holders or door closers with integral hold-open device, as required by the Task Order, shall conform to BHMA A156.15 and shall release the door upon activation of the building fire alarm system, a ceiling mounted smoke detector or interruption of electric power as required by the Task Order. Door closers with integral hold-open device and detector which senses visible and invisible particles of combustion shall conform to BHMA A156.15. The door shall be released upon activation of the detector or interruption of electric power.

## 2.11 POWER ASSIST AND LOW ENERGY POWER OPERATORS

Power assist and low energy power operators shall conform to BHMA A156.19 and shall be electrically or pneumatically operated as required by the Task Order.

## 2.12 ARCHITECTURAL DOOR TRIM

Architectural door trim shall conform to BHMA A156.6.

### 2.12.1 Door Protection Plates

#### 2.12.1.1 Armor Plates

Armor plates shall be Type J105 plastic, color as required by the Task Order, J101 aluminum, brass or stainless steel as required by the Task Order, 900 mm 36 inches in height, and 50 mm 2 inches less in width than the width of the door for single doors and 25 mm 1 inch less for pairs of doors. Edges of metal plates shall be square or beveled as required by the Task Order. Where the door has a louver panel, the armor plate shall be omitted if top of louver frame is more than 500 mm 20 inches above the bottom of the door.

#### 2.12.1.2 Kick Plates

Kick plates shall be Type J106 plastic, color as required by the Task Order, J102 aluminum, brass or stainless steel as required by the Task Order. Width of plates shall be 50 mm 2 inches less than door width for single doors and 25 mm 1 inch less for pairs of doors. Height shall be 250, 300 or 400 mm, 10, 12 or 16 inches, as required by the Task Order, except where the bottom rail is less than 250, 300 or 400 mm 10, 12 or 16 inches, as required by the Task Order, the plate shall extend to within 13 mm 1/2 inch of the panel mold or glass bead. Edges of metal plates shall be square or beveled as required by the Task Order.

#### 2.12.1.3 Mop Plates

Mop plates shall be Type J107 plastic color as required by the Task Order, J103 aluminum, brass or stainless steel as required by the Task Order. Width of plates shall be 50 mm 2 inches less than door width for single doors and 25 mm 1 inch less for pairs of doors. The height shall be 100 mm. 4 inches. Edges of metal plates shall be square or beveled as required by the Task Order.

### 2.12.2 Door Edge Guards

Door edge guards shall be furnished to protect door edges with the required cut-outs for hardware items such as hinges, flush bolts, and locks. Door edge guards shall satisfy fire door ratings. Door edge guards shall be 1.27 mm 0.50 inch thick aluminum or stainless steel and type as required by the Task Order.

### 2.12.3 Push Plates

#### 2.12.3.1 Combination Push-Pull Plates

Combination push-pull plates shall be Type J303, 1.27 mm 0.050 inch thick minimum aluminum, brass or stainless steel, as required by the Task Order, beveled four edges.

#### 2.12.3.2 Flat Plates

Flat plates shall be Type J301 1.27 mm 0.50 inch thick aluminum, brass, bronze or stainless steel or Type J304 3.2 mm 1/8 inch thick plastic, color and size as required by the Task Order. Edges of metal plates shall be square or beveled as required by the Task Order.

#### 2.12.4 Door Pulls and Push/Pull Units

##### 2.12.4.1 Arm Pulls

Arm pulls shall be Category J400, double base, aluminum, brass or stainless steel as required by the Task Order.

##### 2.12.4.2 Drop Ring Pulls

Drop ring pulls shall be Type J404, aluminum, brass or stainless steel as required by the Task Order.

##### 2.12.4.3 Door Pulls

Door pulls shall be Category J400 aluminum, brass or stainless steel, as required by the Task Order, of plain modern design. Pulls for hollow metal, mineral core wood or kalamein doors shall be Type J405 thru-bolted to Type J301 flat push plates.

#### 2.12.5 Push and Pull Bars

Push and pull bars shall be Category J500, aluminum. Edges of mounting plates shall be beveled.

### 2.13 AUXILIARY HARDWARE

Auxiliary hardware, consisting of door holders, door stops, and roller latches, shall conform to BHMA A156.16. Lever extension flush bolts shall be Type L14081. Dust-proof strikes shall be Type L04011 for doors that are not fire rated. Dust-proof strikes shall be Type L04021 for fire rated doors. Other auxiliary hardware shall conform to BHMA A156.16.

### 2.14 MISCELLANEOUS

#### 2.14.1 Automatic Door Bottoms

Automatic door bottoms shall be surface, mortised or semi-mortised type with aluminum housing cover, anodized clear or anodized bronze color finish as required by the Task Order. Door bottom shall have a wool, felt, rubber, vinyl, or neoprene seal and shall be actuated by the opening and closing of the door. The door bottom shall exclude light when the door is in the closed position and shall inhibit the flow of air through the unit.

#### 2.14.2 Metal Thresholds

Thresholds shall conform to BHMA A156.21. Thresholds for exterior doors shall be extruded aluminum or bronze, as required by the Task Order, of the type indicated and shall provide proper clearance and an effective seal with specified weather stripping. Thresholds for use with floor closers shall conform to BHMA A156.4. Latching thresholds shall be of such height that the bottom of the door shall be 3 mm 1/8 inch over the tread of the threshold and 3 mm 1/8 inch below the top of the stop. Where required,

thresholds shall be modified to receive projecting bolts or flush bolts, exit devices as required by the Task Order. Thresholds for doors accessible to the handicapped shall be beveled with slopes not exceeding 1:2 and with heights not exceeding 13 mm. 1/2 inch. Air leakage rate of weatherstripping shall not exceed 0.775 liters per second per lineal meter 0.5 cubic feet per minute per lineal foot of crack when tested in accordance with ASTM E 283 at standard test conditions.

#### 2.14.3 Rain Drips

Extruded aluminum, not less than 1.78 mm 0.07 inch thick, mill finished, clear anodized, bronze anodized or painted as required by the Task Order. Door sill rain drips shall be 38 mm to 44 mm 1-1/2 inches to 1-3/4 inches high by 16 mm 5/8 inch projection. Overhead rain drips shall be approximately 38 mm 1-1/2 inches high by 63 mm 2-1/2 inches projection and shall extend 50 mm 2 inches on either side of the door opening width.

#### 2.14.4 Aluminum Housed Type Weatherseals

Weatherseals of the type indicated shall consist of extruded aluminum retainers not less than 1.78 mm 0.07 inch wall thickness with vinyl, neoprene, silicone rubber, polyurethane or vinyl brush inserts. Aluminum shall be clear (natural) or bronze anodized as required by the Task Order. Weatherseal material shall be of an industrial/commercial grade. Seals shall remain functional through all weather and temperature conditions. Air leakage rate of weatherstripping shall not exceed 0.775 liters per second per lineal meter 0.5 cubic feet per minute per lineal foot of crack when tested in accordance with ASTM E 283 at standard test conditions.

#### 2.14.5 Gasketing

Gasketing shall be a compression type seal, silicon based, self-adhesive product for use on steel door frames with wood or steel doors for 20-minute, 45 minute C-label, 1-hour B-label or 1-1/2 hour B-label. Color shall be white or bronze as required by the Task Order. Air leakage rate of weatherstripping shall not exceed 0.775 liters per second per lineal meter 0.5 cubic feet per minute per lineal foot of crack when tested in accordance with ASTM E 283 at standard test conditions.

#### 2.14.6 Key Control Storage System

Key control storage system shall conform to BHMA A156.5, Type and capacity as required by the Task Order, and shall be properly labeled for key identification. Set up, identification labeling and location of the key control storage shall be as directed at the Predelivery Conference.

#### 2.14.7 Door Stops

Wall stops, floor stops and combination stop and holders shall conform to BHMA A156.16.

### 2.15 FASTENINGS

Fastenings of proper type, size, quantity, and finish shall be supplied with each article of hardware. Machine screws and expansion shields shall be used for attaching hardware to concrete or masonry. Fastenings exposed to the weather in the finished work shall be of brass, bronze, or stainless steel. Sex bolts, through bolts, or machine screws and grommet nuts, where used on reverse-bevel exterior doors equipped with half-surface or

full-surface hinges, shall employ one-way screws or other approved tamperproof screws. Screws for the jamb leaf of half-mortise and full-surface hinges attached to structural steel frames shall be one-way or other approved tamperproof type.

## 2.16 FINISHES

Unless otherwise specified, finishes shall conform to those identified in BHMA A156.18. Where painting of primed surfaces is required, painting is specified in Section 09900 PAINTING, GENERAL.

## 2.17 HARDWARE FOR FIRE DOORS

Hardware for fire doors shall conform to the requirements of NFPA 80 and NFPA 101.

# PART 3 EXECUTION

## 3.1 APPLICATION

Hardware shall be located in accordance with DHI Locations for CSD and DHI Locations for SSD, except that deadlocks shall be mounted 1220 mm 48 inches above finish floor. When approved, slight variations in locations or dimensions will be permitted. Application shall be in accordance with DHI ANSI/DHI A115.1G or DHI ANSI/DHI A115-W. Door control devices for exterior doors such as closers and holders, shall be attached to doors with thru bolts and nuts or sex bolts. Alternate fastening methods may be approved by the Contracting Officer when manufacturers' documentation is submitted to verify that the fastening devices and door reinforcements are adequate to resist wind induced stresses. Electric hardware items and access control devices shall be installed in accordance with manufacturer's printed installation procedures.

### 3.1.1 Hardware for Fire Doors and Smoke-Control Door Assemblies

Hardware for fire doors shall be installed in accordance with the requirements of NFPA 80. Exit devices installed on fire doors shall have a visible label bearing the marking "Fire Exit Hardware". Other hardware installed on fire doors, such as locksets, closers, and hinges shall have a visible label or stamp indicating that the hardware items have been approved by an approved testing agency for installation on fire-rated doors. Hardware for smoke-control door assemblies shall be installed in accordance with NFPA 105.

### 3.1.2 Door-Closing Devices

Door-closing devices shall be installed and adjusted in accordance with the templates and printed instructions supplied by the manufacturer of the devices. Insofar as practicable, doors opening to or from halls and corridors shall have the closer mounted on the room side of the door.

### 3.1.3 Key Control Storage Systems

Key control storage system shall be installed where directed or furnished to the Contracting Officer as required by the Task Order.

### 3.1.4 Kick Plates and Mop Plates

Kick plates shall be installed on the push side of single-acting doors and

on both sides of double-acting doors. Mop plates shall be installed on the pull side of the single acting doors.

#### 3.1.5 Auxiliary Hardware

Lever extension flush bolts shall be installed at the top and bottom of the inactive leaf of pairs of doors. The bottom bolt shall operate into a dust-proof floor strike or threshold.

#### 3.1.6 Thresholds

Thresholds shall be secured with a minimum of three fasteners per single door width and six fasteners per double door width with a maximum spacing of 300 mm. 12 inches. Exterior thresholds shall be installed in a bed of sealant with expansion anchors and stainless steel screws, except that bronze or anodized bronze thresholds shall be installed with expansion anchors with brass screws. Minimum screw size shall be No. 10 length, dependent on job conditions, with a minimum of 19 mm 3/4 inch thread engagement into the floor or anchoring device used.

#### 3.1.7 Rain Drips

Door sill rain drips shall align with the bottom edge of the door. Overhead rain drips shall align with bottom edge of door frame rabbet. Drips shall be set in sealant and fastened with stainless steel screws.

#### 3.1.8 Weatherseals

Weatherseals shall be located as indicated, snug to door face and fastened in place with color matched metal screws after door and frames have been finish painted. Screw spacing shall be as recommended by manufacturer.

#### 3.1.9 Gasketing

Gasketing shall be installed at the inside edge of the hinge and head and latch sides of door frame. Frames shall be toleranced for a 3 mm 1/8 inch clearance between door and frame. Frames shall be treated with tape primer prior to installation.

### 3.2 OPERATIONAL TESTS

Prior to acceptance of any electrical hardware system, an operational test shall be performed to determine if devices are operating as intended by the specifications. Wiring shall be tested for correct voltage, current carrying capacity, and proper grounding. Stray voltages in lock wiring shall be eliminated to prevent locking devices from releasing in critical situations.

### 3.3 FIELD QUALITY CONTROL

Architectural Hardware Consultant or Supplier, as required by the Task Order, shall inspect the completed installation and certify that the hardware has been furnished and installed in accordance with the manufacturers' instructions and as specified. The inspection report shall identify any malfunctioning items and recommend adjustment or replacement as appropriate.

### 3.4 HARDWARE SETS

Hardware sets shall be as required by the Task Order

-- End of Section --

SECTION TABLE OF CONTENTS  
DIVISION 08 - DOORS & WINDOWS  
SECTION 08810  
GLASS AND GLAZING

PART 1 GENERAL

- 1.1 REFERENCES
- 1.2 SUBMITTALS
- 1.3 SYSTEM DESCRIPTION
- 1.4 DELIVERY, STORAGE AND HANDLING
- 1.5 PROJECT/SITE CONDITIONS
- 1.6 WARRANTY
  - 1.6.1 Insulating Glass
  - 1.6.2 Monolithic Reflective Glass
  - 1.6.3 Monolithic Opacified Spandrel
  - 1.6.4 Control Tower Insulating Glass

PART 2 PRODUCTS

- 2.1 FLOAT GLASS
  - 2.1.1 Annealed Glass
  - 2.1.2 Heat-Absorbing Glass
  - 2.1.3 Tinted (Light-Reducing) Glass
- 2.2 ROLLED GLASS
  - 2.2.1 Patterned Glass
  - 2.2.2 Wired Glass
- 2.3 INSULATING GLASS
  - 2.3.1 Clear Insulating Glass
  - 2.3.2 Heat-Absorbing Insulating Glass
  - 2.3.3 Reflective Insulating Glass
  - 2.3.4 Low-E Insulating Glass
- 2.4 REFLECTIVE GLASS
  - 2.4.1 Solar-Reflective Glass
  - 2.4.2 Low-Emissivity (Low-E) Glass
- 2.5 HEAT-TREATED GLASS
  - 2.5.1 Tempered Glass
  - 2.5.2 Heat-Strengthened Glass
- 2.6 LAMINATED GLAZINGS
  - 2.6.1 Laminated Glass
  - 2.6.2 Glass Clad Polycarbonate Laminates
- 2.7 SPANDREL GLASS
  - 2.7.1 Ceramic-Opacified Spandrel Glass
  - 2.7.2 Film-Opacified Spandrel Glass
- 2.8 FIRE/SAFETY RATED GLASS
- 2.9 MIRRORS
  - 2.9.1 Glass Mirrors
  - 2.9.2 One-Way Mirrors
  - 2.9.3 Mirror Accessories
    - 2.9.3.1 Mastic
    - 2.9.3.2 Mirror Frames

- 2.9.3.3 Mirror Clips
- 2.10 CONTROL TOWER GLASS
  - 2.10.1 Control Tower Insulating Glass
    - 2.10.1.1 Control Tower Heat-Absorbing Insulating Glass
    - 2.10.1.2 Control Tower Clear Insulating Glass
- 2.11 GLAZING ACCESSORIES
  - 2.11.1 Preformed Tape
  - 2.11.2 Sealant
  - 2.11.3 Glazing Gaskets
    - 2.11.3.1 Fixed Glazing Gaskets
    - 2.11.3.2 Wedge Glazing Gaskets
    - 2.11.3.3 Aluminum Framing Glazing Gaskets
  - 2.11.4 Putty and Glazing Compound
  - 2.11.5 Setting and Edge Blocking

PART 3 EXECUTION

- 3.1 PREPARATION
- 3.2 INSTALLATION
- 3.3 CLEANING
- 3.4 PROTECTION

-- End of Section Table of Contents --

## SECTION 08810

## GLASS AND GLAZING

## PART 1 GENERAL

## 1.1 REFERENCES

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

## AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI Z97.1 (1984; R 1994) Safety Performance Specifications and Methods of Test for Safety Glazing Materials Used in Buildings

## AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 509 (1994) Elastomeric Cellular Preformed Gasket and Sealing Material

ASTM C 669 (1995) Glazing Compounds for Back Bedding and Face Glazing of Metal Sash

ASTM C 864 (1998) Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers

ASTM C 920 (1998) Elastomeric Joint Sealants

ASTM C 1036 (1991; R 1997) Flat Glass

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

ASTM C 1172 (1996) Laminated Architectural Flat Glass

ASTM C 1349 (1996) Architectural Flat Glass Clad Polycarbonate

ASTM D 395 (1989; R 1994) Rubber Property - Compression Set

ASTM E 119 (1998) Fire Tests of Building Construction and Materials

ASTM E 773 (1997) Accelerated Weathering of Sealed Insulating Glass Units

ASTM E 774 (1997) Classification of the Durability of Sealed Insulating Glass Units

ASTM E 1300 (1998) Determining the Minimum Thickness

and Type of Glass Required to Resist a Specified Load

AMERICAN SOCIETY OF CIVIL ENGINEERS (ASCE)

ASCE 7 (1995) Minimum Design Loads for Buildings and Other Structures

CODE OF FEDERAL REGULATIONS (CFR)

16 CFR 1201 Safety Standard for Architectural Glazing Materials

COMMERCIAL ITEM DESCRIPTION (CID)

CID A-A-378 (Basic) Putty Linseed Oil Type, (for Wood-Sash-Glazing)

GLASS ASSOCIATION OF NORTH AMERICA (GANA)

GANA Glazing Manual (1997) Glazing Manual

GANA Standards Manual (1995) Engineering Standards Manual

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 80 (1999) Fire Doors and Fire Windows

NFPA 252 (1995) Fire Tests of Door Assemblies

NFPA 257 (1996) Fire Tests for Window and Glass Block Assemblies

1.2 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Data

Glass; GA. Glazing Accessories; GA.

Manufacturer's descriptive product data, handling and storage recommendations, installation instructions, and cleaning instructions.

SD-04 Drawings

Glazing Materials and Accessories; GA.

Drawings showing complete details of the proposed setting methods, mullion details, edge blocking, size of openings, frame details, materials, and types and thickness of glass.

Control Tower Glazing Units; GA.

Drawing showing complete details of the proposed setting methods and materials.

## SD-13 Certificates

Glass; FIO.

Certificates stating that the glass meets the specified requirements. Labels or manufacturers marking affixed to the glass will be accepted in lieu of certificates.

Control Tower Glazing Units; FIO.

Certificates from the manufacturer attesting that the units meet the luminous and solar radiant transmission requirements for heat absorbing glass.

## SD-14 Samples

Glass; FIO.

Two 203 x 254 mm 8 x 10 inch samples of each of the following: tinted glass, patterned glass, heat-absorbing glass, and insulating glass units.

## 1.3 SYSTEM DESCRIPTION

Glazing systems shall be fabricated and installed watertight and airtight to withstand thermal movement and wind loading without glass breakage, gasket failure, deterioration of glazing accessories, and defects in the work. Glazed panels shall comply with the safety standards, as indicated in accordance with ANSI Z97.1. Glazed panels shall comply with indicated wind/snow loading in accordance with ASTM E 1300.

## 1.4 DELIVERY, STORAGE AND HANDLING

Glazing compounds shall be delivered to the site in the manufacturer's unopened containers. Glass shall be stored indoors in a safe, well ventilated dry location in accordance with manufacturer's instructions, and shall not be unpacked until needed for installation. Glass shall not be stored on site over 1 month.

## 1.5 PROJECT/SITE CONDITIONS

Glazing work shall not be started until outdoor temperature is above 5 degrees C 40 degrees F and rising, unless procedures recommended by glass manufacturer and approved by Contracting Officer are made to warm the glass and rabbet surfaces. Ventilation shall be provided to prevent condensation of moisture on glazing work during installation. Glazing work shall not be performed during damp or raining weather.

## 1.6 WARRANTY

## 1.6.1 Insulating Glass

Manufacturer shall warrant the insulating glass to be free of fogging or film formation on the internal glass surfaces caused by failure of the hermetic seal for a period of 10 years from Date of Substantial Completion. Warranty shall be signed by manufacturer.

## 1.6.2 Monolithic Reflective Glass

Manufacturer shall warrant the monolithic reflective glass to be free of

peeling or deteriorating of coating for a period of 10 years after Date of Substantial Completion. Warranty shall be signed by manufacturer.

#### 1.6.3 Monolithic Opacified Spandrel

Manufacturer shall warrant the opacifier film on the spandrel to be free of peeling for a period of five years after Date of Substantial Completion. Warranty shall be signed by manufacturer.

#### 1.6.4 Control Tower Insulating Glass

Manufacturer shall warrant the control tower insulating glass to be free of fogging or film formation on the internal glass surfaces for a period of one year from Date of Substantial Completion. Warranty shall be signed by manufacturer.

### PART 2 PRODUCTS

#### 2.1 FLOAT GLASS

##### 2.1.1 Annealed Glass

Annealed glass shall be Type I transparent flat type, Class 1 - clear or tinted, as required by the Task Order, Quality q3 - glazing select, percent light transmittance, as required by the Task Order, percent shading coefficient as required by the Task Order, conforming to ASTM C 1036. Color shall be gray or bronze as required by the Task Order.

##### 2.1.2 Heat-Absorbing Glass

Heat-absorbing glass shall be Type I transparent flat type, Class 2-tinted, Quality q3 - glazing select, percent light transmittance, as required by the Task Order, percent shading coefficient, as required by the Task Order, conforming to ASTM C 1036. Color shall be gray or bronze as required by the Task Order.

##### 2.1.3 Tinted (Light-Reducing) Glass

Tinted (light-reducing) glass shall be Type I transparent flat type, Class 3-tinted, Quality q3 - glazing select, percent light transmittance, as required by the Task Order, percent shading coefficient, as required by the Task Order, conforming to ASTM C 1036. Color shall be gray or bronze as required by the Task Order.

#### 2.2 ROLLED GLASS

##### 2.2.1 Patterned Glass

Patterned glass shall be Type II flat type. Class 1 - translucent, 2 - tinted heat absorbing or 3 - tinted heat reducing, as required by the Task Order, Finish f1 - patterned one side or f2 - patterned both sides, as required by the Task Order, Quality q7 - decorative or q8 - glazing, as required by the Task Order, percent light transmittance, as required by the Task Order, percent shading coefficient, as required by the Task Order, conforming to ASTM C 1036. Color shall be as required by the Task Order.

##### 2.2.2 Wired Glass

Wired glass shall be Type II flat type, Class 1 - translucent, 2 - tinted,

heat-absorbing or 3 - tinted, light-reducing, as required by the Task Order, Quality q7 - decorative or q8 - glazing, as required by the Task Order, Form 1 - wired and polished both sides or 2 - patterned and wired, as required by the Task Order, percent light transmittance, as required by the Task Order, percent shading coefficient, as required by the Task Order, conforming to ASTM C 1036. Wire mesh shall be polished stainless steel Mesh 1 - diamond, 2 - square or 3 - parallel as required by the Task Order.

Wired glass for fire-rated windows shall bear an identifying UL label or the label of a nationally recognized testing agency, and shall be rated for 20 or 45 minutes, as required by the Task Order, when tested in accordance with NFPA 257. Wired glass for fire-rated doors shall be tested as part of a door assembly in accordance with NFPA 252. Color shall be as required by the Task Order.

## 2.3 INSULATING GLASS

Insulating glass shall be Class A preassembled units of dual-seal construction consisting of lites of glass separated by an aluminum, steel, or stainless steel, spacer and dehydrated space conforming to ASTM E 773 and ASTM E 774. Spacer shall be roll-formed, with bent or tightly welded or keyed and sealed joints to completely seal the spacer periphery and eliminate moisture and hydrocarbon vapor transmission into airspace through the corners. Primary seal shall be compressed polyisobutylene and the secondary seal shall be a specially formulated silicone. Glass types shall be as follows:

### 2.3.1 Clear Insulating Glass

Glass for two-pane or three-pane insulating units shall be Type I annealed glass, Class 1 - clear, Quality q3 - glazing select, conforming to ASTM C 1036. Glass performance shall be K-Value/Winter Nighttime and R-Value/Winter Nighttime as required by the Task Order.

### 2.3.2 Heat-Absorbing Insulating Glass

Interior and exterior glass panes for heat-absorbing insulating units shall be Type I annealed flat glass, Class 2-tinted, Quality q3 - glazing select, conforming with ASTM C 1036. Glass performance shall be K-Value/Winter Nighttime and R-Value/Winter Nighttime, as required by the Task Order, shading coefficient as required by the Task Order. Color shall be silver.

### 2.3.3 Reflective Insulating Glass

Interior and exterior glass panes for reflective insulating units shall be Type I annealed flat glass, Class 2-tinted, Quality q3 - glazing select, conforming to ASTM C 1036. Glass performance shall be K-Value/Winter Nighttime and R-Value/Winter Nighttime, as required by the Task Order, shading coefficient as required by the Task Order. Color shall be silver, silver green, silver gray or royal blue as required by the Task Order.

### 2.3.4 Low-E Insulating Glass

Interior and exterior glass panes for Low-E insulating units shall be Type I annealed flat glass, Class 1-clear or 2-tinted, as required by the Task Order, with anti-reflective low-emissivity coating on No. 2 surface (inside surface of exterior pane), Quality q3 - glazing select, conforming to ASTM C 1036. Glass performance shall be K-Value/Winter Nighttime and R-Value/Winter Nighttime, as required by the Task Order, shading coefficient as required by the Task Order. Color shall be green, gray,

bronze or blue.

## 2.4 REFLECTIVE GLASS

Reflective glass shall conform to the following requirements.

### 2.4.1 Solar-Reflective Glass

Solar-reflective glass shall be Type I annealed flat type, Class 2-tinted glass with a mirror-like metallic or metallic-oxide highly reflective surface, Quality q3 - glazing select, conforming to ASTM C 1036. Glass performance shall be K-Value/Winter Nighttime and R-Value/Winter Nighttime, as required by the Task Order, shading coefficient as required by the Task Order. Color shall be silver or bronze as required by the Task Order.

### 2.4.2 Low-Emissivity (Low-E) Glass

Low-emissivity (Low-E) glass shall be Type I annealed flat type, Class 2-tinted with low-emissivity coating on No. 2 surface (inside surface of exterior pane), Quality q3 - glazing select. Glass performance shall be K-Value/Winter Nighttime and R-Value/Winter Nighttime, as required by the Task Order, shading coefficient as required by the Task Order. Color shall be green, gray, bronze or blue as required by the Task Order.

## 2.5 HEAT-TREATED GLASS

Heat-treated glass shall conform to the following requirements.

### 2.5.1 Tempered Glass

Tempered glass shall be kind FT fully tempered transparent flat type, Class 1-clear or 2-tinted, as required by the Task Order, Condition A uncoated surface, Quality q3 - glazing select, percent light transmittance, as required by the Task Order, percent shading coefficient, as required by the Task Order, conforming to ASTM C 1048 and GANA Standards Manual. Color shall be clear, bronze or gray as required by the Task Order.

### 2.5.2 Heat-Strengthened Glass

Heat-strengthened glass shall be kind HS heat-strengthened transparent flat type, Class 1-clear or 2-tinted, as required by the Task Order, Condition A uncoated surface, Quality q3 - glazing select, conforming to ASTM C 1048. Color shall be clear, bronze or gray as required by the Task Order.

## 2.6 LAMINATED GLAZINGS

### 2.6.1 Laminated Glass

Laminated glass shall consist of two or more layers of Type I transparent float glass, as required by the Task Order, Class 1-clear or 2-tinted, as required by the Task Order, Quality q3 - glazing select, conforming to ASTM C 1036. Glass shall be bonded together with 0.38, 0.76 or 1.52 mm 0.015, 0.030 or 0.060 inchthick PVB interlayer under pressure, as required by the Task Order, or alternatives such as resin laminates, conforming to requirements of 16 CFR 1201 and ASTM C 1172. Color shall be clear, gray or bronze as required by the Task Order.

### 2.6.2 Glass Clad Polycarbonate Laminates

Glass clad polycarbonate laminates shall consist of two or more layers of Type I transparent float glass, as required by the Task Order, Class 1-clear or 2-tinted, as required by the Task Order, Quality q3 - glazing select, conforming to ASTM C 1036 and one or more layer(s) of 3, 6 or 9.5 mm 0.118, 0.236 or 0.375 inchthick standard or coated mar resistant UV stabilized polycarbonate as required by the Task Order. Glass and polycarbonate shall be bonded together with 0.635 or 1.27 mm 0.025 or 0.050 inch thick clear polyurethane interlayers under pressure as required by the Task Order. The laminate shall conform to ASTM C 1349.

## 2.7 SPANDREL GLASS

### 2.7.1 Ceramic-Opacified Spandrel Glass

Ceramic-opacified spandrel glass shall be kind HS heat-strengthened transparent flat type, Condition B, coated with a colored ceramic material on No. 2 surface, Quality q3 - glazing select, conforming to ASTM C 1048. Glass performance shall be K-Value/Winter Nighttime ,R-Value/Winter Nighttime as required by the Task Order, shading coefficient as required by the Task Order. Color shall be as required by the Task Order.

### 2.7.2 Film-Opacified Spandrel Glass

Film-opacified spandrel glass shall be kind HS heat-strengthened transparent flat type, Quality q3 - glazing select, Condition C glass with a polyester or polyethylene film 0.025 mm to 0.127 mm 2 mils to 5 mils thick attached to No. 2 surface of a sputtered solar-reflective film, conforming to ASTM C 1048. Film opacification shall be compatible to and specifically developed for application to solar reflective films. Glass performance shall be K-Value/Winter Nighttime and R-Value/Winter Nighttime, as required by the Task Order, shading coefficient as required by the Task Order. Color shall be as required by the Task Order.

## 2.8 FIRE/SAFETY RATED GLASS

Fire/safety rated glass shall be laminated Type I transparent flat type, Class 1-clear. Glass shall have a 20, 45 or 60 minute rating, as required by the Task Order, when tested in accordance with ASTM E 119. Glass shall be permanently labeled with appropriate markings.

## 2.9 MIRRORS

### 2.9.1 Glass Mirrors

Glass for mirrors shall be Type I transparent flat type, Class 1-clear or 2-tinted, as required by the Task Order, Glazing Quality q1 6 mm (1/4 inch) 1/4 inch thick conforming to ASTM C 1036. Glass color shall be clear, bronze or gray as required by the Task Order. Glass shall be coated on one surface with silver coating, copper protective coating, and mirror backing paint. Silver coating shall be highly adhesive pure silver coating of a thickness which shall provide reflectivity of 83 percent or more of incident light when viewed through 6 mm (1/4 inch)1/4 inch thick glass, and shall be free of pinholes or other defects. Copper protective coating shall be pure bright reflective copper, homogeneous without sludge, pinholes or other defects, and shall be of proper thickness to prevent "adhesion pull" by mirror backing paint. Mirror backing paint shall consist of two coats of special scratch and abrasion-resistant paint , and shall be baked in uniform thickness to provide a protection for silver and copper coatings which will permit normal cutting and edge fabrication.

### 2.9.2 One-Way Mirrors

Glass for one-way mirrors shall be Type I transparent flat type, Class 1 clear, Glazing Quality q1, 6 mm (1/4 inch) 1/4 inch thick conforming to ASTM C 1036. Glass shall be coated on one face with a hard adherent film of chromium or other approved coating of proven equivalent durability. Glass shall transmit not less than 5 percent nor more than 11 percent of total incident light in visible region, and shall reflect from front surface of coating not less than 45 percent of total incident light in visible region.

### 2.9.3 Mirror Accessories

#### 2.9.3.1 Mastic

Mastic for setting mirrors shall be a polymer type mirror mastic resistant to water, shock, cracking, vibration and thermal expansion. Mastic shall be compatible with mirror backing paint, and shall be approved by mirror manufacturer.

#### 2.9.3.2 Mirror Frames

Mirrors shall be provided with mirror frames (J-mold channels) fabricated of one-piece roll-formed Type 304 stainless steel with No. 4 brushed satin finish and concealed fasteners which will keep mirrors snug to wall. Frames shall be 32 x 6 x 6 mm (1-1/4 x 1/4 x 1/4 inch) 1-1/4 x 1/4 x 1/4 inch continuous at top and bottom of mirrors. Concealed fasteners of type to suit wall construction material shall be provided with mirror frames.

#### 2.9.3.3 Mirror Clips

Concealed fasteners of type to suit wall construction material shall be provided with clips.

### 2.10 CONTROL TOWER GLASS

Control tower glass units shall be of sizes required to properly fit aluminum frames. Tolerances and clearances for units shall be designed to prevent the transfer of stress in aluminum frames to the glass. Resilient setting blocks, spacer strips, clips, bolts, washers, angles, glazing sealants, and resilient channels or cemented-on-materials shall be of the type recommended in the glass manufacturer's approved written instructions. Edges and corners of units shall not be ground, nipped, cut, or fitted after leaving the factory.

#### 2.10.1 Control Tower Insulating Glass

Insulating glass units for air traffic control towers shall meet the wind load design requirement, as required by the Task Order, and as determined in accordance with ASCE 7. Insulating glass shall be Class A preassembled units of dual-seal construction consisting of two lites of glass separated by a dark bronze aluminum, steel, or stainless steel, spacer with desiccant and dehydrated space conforming to ASTM E 773 and ASTM E 774. Spacer shall be roll-formed, with bent or tightly welded or keyed and sealed joints, to completely seal the spacer periphery to eliminate moisture and hydrocarbon vapor transmission into airspace through corners. Primary seal shall be compressed polyisobutylene. Secondary seal shall be silicone. Insulating glass units shall be fabricated for use at an elevation above mean sea

level and above grade as required by the Task Order. Within bottom 1/3 of one of the vertical edges of each unit, the manufacturer shall install an open 305 mm 12 inch long capillary/breather tube for pressure equalization.

The insulating glass units shall be free of parallax or optical distortions. The manufacturer's identifying label shall be permanently affixed to both exterior surfaces of the glass units. The insulating glass units shall be a total thickness of 26 mm (1 inch) 1 inch consisting of two 6 mm (1/4 inch) 1/4 inch thick panels and air space, or a total thickness of 32 mm (1-1/4 inch) 1-1/4 inch consisting of two 10 mm (3/8 inch) 3/8 inch thick panels and air space, or a total thickness of 38 mm (1-1/2 inch) 1-1/2 inch consisting of two 13 mm (1/2 inch) 1/2 inch thick panels and an air space, as required to meet the wind loads indicated. Glass type shall be as follows.

#### 2.10.1.1 Control Tower Heat-Absorbing Insulating Glass

Heat-absorbing insulating glass shall consist of two glass panels separated by an air space and shall conform to ASTM C 1036, Type I, transparent flat glass, Style A, Quality q3 - glazing select. Interior glass shall be Class 1-clear and exterior glass shall be Class 2-tinted green. Glass performance shall be minimum Visible Transmittance of 70.8 percent for each panel and K-Value of 3.07 R-Value of 1.85 for the unit.

#### 2.10.1.2 Control Tower Clear Insulating Glass

Clear insulating glass shall consist of two float glass panels separated by an air space and shall conform to ASTM C 1036, Type I transparent flat glass, Quality q3-glazing select. Interior glass and exterior glass shall be Class 1-clear. Glass performance shall be minimum Visible Transmittance of 87.3 percent for each panel and K-Value of 3.07 R-Value of 1.85 for each unit.

### 2.11 GLAZING ACCESSORIES

#### 2.11.1 Preformed Tape

Preformed tape shall be elastomeric rubber extruded into a ribbon of a width and thickness suitable for specific application. Tape shall be of type which will remain resilient, have excellent adhesion, and be chemically compatible to glass, metal, or wood.

#### 2.11.2 Sealant

Sealant shall be elastomeric conforming to ASTM C 920, Type S or M, Grade NS, Class 12.5, Use G, of type chemically compatible with setting blocks, preformed sealing tape and sealants used in manufacturing insulating glass. Color of sealant shall be as required by the Task Order.

#### 2.11.3 Glazing Gaskets

Glazing gaskets shall be extruded with continuous integral locking projection designed to engage into metal glass holding members to provide a watertight seal during dynamic loading, building movements and thermal movements. Glazing gaskets for a single glazed opening shall be continuous one-piece units with factory-fabricated injection-molded corners free of flashing and burrs. Glazing gaskets shall be in lengths or units recommended by manufacturer to ensure against pull-back at corners. Glazing gasket profiles shall be as indicated on drawings.

#### 2.11.3.1 Fixed Glazing Gaskets

Fixed glazing gaskets shall be closed-cell (sponge) smooth extruded compression gaskets of cured elastomeric virgin neoprene compounds conforming to ASTM C 509, Type 2, Option 1.

#### 2.11.3.2 Wedge Glazing Gaskets

Wedge glazing gaskets shall be high-quality extrusions of cured elastomeric virgin neoprene compounds, ozone resistant, conforming to ASTM C 864, Option 1, Shore A durometer between 65 and 75.

#### 2.11.3.3 Aluminum Framing Glazing Gaskets

Glazing gaskets for aluminum framing shall be permanent, elastic, non-shrinking, non-migrating, watertight and weathertight.

#### 2.11.4 Putty and Glazing Compound

Glazing compound shall conform to ASTM C 669 for face-glazing metal sash. Putty shall be linseed oil type conforming to CID A-A-378 for face-glazing primed wood sash. Putty and glazing compounds shall not be used with insulating glass or laminated glass.

#### 2.11.5 Setting and Edge Blocking

Neoprene setting blocks shall be dense extruded type conforming to ASTM D 395, Method B, Shore A durometer between 70 and 90. Edge blocking shall be Shore A durometer of 50 (+ or - 5). Silicone setting blocks shall be required when blocks are in contact with silicone sealant. Profiles, lengths and locations shall be as required and recommended in writing by glass manufacturer.

### PART 3 EXECUTION

#### 3.1 PREPARATION

Openings and framing systems scheduled to receive glass shall be examined for compliance with approved shop drawings, GANA Glazing Manual and glass manufacturer's recommendations including size, squareness, offsets at corners, presence and function of weep system, face and edge clearance requirements and effective sealing between joints of glass-framing members. Detrimental materials shall be removed from glazing rabbet and glass surfaces and wiped dry with solvent. Glazing surfaces shall be dry and free of frost.

#### 3.2 INSTALLATION

Glass and glazing work shall be performed in accordance with approved shop drawings, GANA Glazing Manual, glass manufacturer's instructions and warranty requirements. Glass shall be installed with factory labels intact and removed only when instructed. Wired glass and fire/safety rated glass shall be installed in accordance with NFPA 80. Edges and corners shall not be ground, nipped or cut after leaving factory. Springing, forcing or twisting of units during installation will not be permitted.

#### 3.3 CLEANING

Upon completion of project, outside surfaces of glass shall be washed clean

and the inside surfaces of glass shall be washed and polished in accordance with glass manufacturer's recommendations.

#### 3.4 PROTECTION

Glass work shall be protected immediately after installation. Glazed openings shall be identified with suitable warning tapes, cloth or paper flags, attached with non-staining adhesives. Reflective glass shall be protected with a protective material to eliminate any contamination of the reflective coating. Protective material shall be placed far enough away from the coated glass to allow air to circulate to reduce heat buildup and moisture accumulation on the glass. Glass units which are broken, chipped, cracked, abraded, or otherwise damaged during construction activities shall be removed and replaced with new units.

-- End of Section --