

**SECTION 08 56 53
BLAST RESISTANT WINDOWS**

SPEC WRITER NOTE:

1. Delete text between // _____ // not applicable to project. Edit remaining text to suit project.
2. See VA Physical Security Design Manual for security requirements.
3. Obtain blast resistance requirements from Physical Security Design Standards Definitions, a separate publication by VA.
4. Before editing this Section request blast resistance and forced entry resistance criteria specific to the Project.

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Prefabricated fixed // stainless steel // aluminum //, // blast resistant // forced entry resistant // blast and forced entry resistances // exterior window units.

1.2 RELATED REQUIREMENTS

SPEC WRITER NOTE: Update and retain references only when specified elsewhere in this Section.

- A. Deal trays for forced entry/ballistic resistant rating: Section 08 56 59, SERVICE AND TELLER WINDOW UNITS.
- B. Window Color: Section 09 06 00, SCHEDULE FOR FINISHES.
- C. Forced entry and ballistic rated glazing: Section 08 80 00, GLAZING.
- D. Guard Booths: Section 13 34 19, METAL BUILDING SYSTEMS.

1.3 APPLICABLE PUBLICATIONS

- A. Comply with references to extent specified in this Section.

SPEC WRITER NOTE: Delete publications that do not apply to Project.

- B. American Architectural Manufacturers Association (AAMA):
 1. AAMA/WDMA/CSA 101/I.S.2/A440-11 Windows, Doors, and Skylights.
- C. American Welding Society (AWS):
 1. D1.1/D1.1M-15 - Structural Welding Code - Steel.
 2. D1.3/D1.3M-08 - Structural Welding Code - Sheet Steel.

3. D1.6/D1.6M-07 - Structural Welding Code - Stainless Steel.

D. ASTM International (ASTM):

1. A36/A36M-14 - Carbon Structural Steel.
2. A123/A123M-15- Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
3. A320/A320M-15a - Alloy-Steel and Stainless Steel Bolting Materials for Low-Temperature Service.
4. A666-15 - Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate and Flat Bar.
5. B221-14 - Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
6. B221M-13 - Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
7. E283-04(2012) - Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
8. E331-00(2009) - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference.

SPEC WRITER NOTE: Depending on the rating needed this reference can be used.

9. F1233-08(2013) - Standard Test Method for Security Glazing Materials and Systems.
10. F1642-12 - Standard Test Method for Glazing and Glazing Systems Subject to Airblast Loadings.

E. National Association of Architectural Metal Manufactures (NAAMM):

1. AMP 500-06 - Metal Finishes Manual.

F. UL LLC (UL):

1. 752-10(R2013) - Bullet Resisting Equipment.

G. Unified Facilities Criteria (UFC):

1. 4-010-01-2012 - DOD Minimum Antiterrorism Standards for Buildings.

1.4 PREINSTALLATION MEETINGS

- A. Conduct preinstallation meeting // at project site // minimum 30 days before beginning Work of this Section.

SPEC WRITER NOTE: Edit participant list to ensure entities influencing outcome attend.

1. Required Participants:
 - a. Contracting Officer's Representative.
 - b. // Architect/Engineer. //
 - c. // Inspection and Testing Agency. //
 - d. Contractor.
 - e. Installer.
 - f. // Manufacturer's field representative. //
 - g. Other installers responsible for adjacent and intersecting work, including // _____ //.

SPEC WRITER NOTE: Edit meeting agenda to incorporate project specific topics.

2. Meeting Agenda: Distribute agenda to participants minimum 3 days before meeting.
 - a. Installation schedule.
 - b. Installation sequence.
 - c. Preparatory work.
 - d. Protection before, during, and after installation.
 - e. Installation.
 - f. Transitions and connections to other work.
 - g. Inspecting and testing.
 - h. Other items affecting successful completion.
3. Document and distribute meeting minutes to participants to record decisions affecting installation.

1.5 SUBMITTALS

- A. Submittal Procedures: Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES.
- B. Submittal Drawings:
 1. Show dimensioned details of window units, including intended metal and glazing materials. 1: 20 (Three quarter inch equals 1 foot) scaled elevations showing interior and exterior. Indicated how window units can be replaced or removed, including replacement of glazing.
 2. Show detailed sections at 1: 5 (3 inch equal 1 foot) scale for members; indicating construction, size, and thickness of components,

together with connections, fasteners, and means of separating dissimilar metals.

3. Provide final submittal drawings as DWG AutoCAD files.

C. Manufacturer's Literature and Data:

1. Description of each product, metal, and alloy when applicable.
2. Indicate manufacturer's recommendations for fasteners, welding, applied finishes, hardware and accessories.
3. Installation instructions.
4. Standard color chart.

D. Sustainable Construction Submittals:

SPEC WRITER NOTE: Retain sustainable construction submittals appropriate to product.

1. Recycled Content: Identify post-consumer and pre-consumer recycled content percentage by weight.

E. Certificates: Indicate each product complies with specifications.

1. Window forced entry resistance.
2. Window blast resistance.

F. Calculations: Prepared by qualified blast consultant verifying window and glazing assembly including anchors comply with specified blast resistance performance.

G. Qualifications: Substantiate qualifications comply with specifications.

1. Manufacturer // with project experience list. //
2. Installer // with project experience list. //
3. Welders and welding procedures.

1.6 QUALITY ASSURANCE

A. Manufacturer and Installer Qualifications:

1. Regularly manufactures and installs specified products.
2. Manufactured and installed specified products with satisfactory service on five similar installations for minimum five years.
 - a. Provide contact names and addresses for completed projects when requested by Contracting Officer's Representative.

B. Welders and Welding Procedures Qualifications:

1. // Stainless Steel: AWS D1.6/D1.6M. //
2. // Steel: AWS D1.1/D1.1M. //
3. // Sheet Steel: AWS D1.3/D1.3M. //

1.7 DELIVERY

- A. Deliver prefabricated unit in manufacturer's original sealed packaging.
- B. Mark packaging, legibly. Indicate manufacturer's name or brand, unit type, and manufacture date.
- C. Before installation, return or dispose of products within distorted, damaged, wet, or opened packaging.

1.8 STORAGE AND HANDLING

- A. Store products indoors in dry, weathertight facility.
- B. Protect products from damage during handling and construction operations.

1.9 FIELD CONDITIONS

- A. Field Measurements: Verify field conditions affecting window fabrication and installation. Show field measurements on Submittal Drawings.
 - 1. Coordinate field measurement and fabrication schedule to avoid delay.

1.10 WARRANTY

SPEC WRITER NOTE: Always retain construction warranty. FAR includes Contractor's one year labor and material warranty.

- A. Construction Warranty: FAR clause 52.246-21, "Warranty of Construction."

PART 2 - PRODUCTS**2.1 SYSTEM PERFORMANCE**

- A. Design windows complying with specified performance:
 - 1. Comply with UFC 4-010-01, ASTM F1642, // ASTM F1233 // and AAMA/WDMA/CSA 101/I.S.2/A440.
 - 2. Provide indicated levels of resistance for // forced entry // blast resistant // forced entry and blast resistances // window assemblies. Resistance level applies to anchorages, interfaces with adjoining substrates, glass retention, and hardware.
 - 3. Provide units meeting UFC 4-010-01 // Medium // High // rating.
 - 4. Would be attackers cannot penetrate through secure closed window assembly.

5. Provide combined performances within rating limitations knowing certain attacks can result in severe damage to unit and require replacement.
- B. Forced-Entry (FE) Resistant Assemblies: Manufacturer's window unit assembled with panels, inserts, hardware, glazing and framing.

SPEC WRITER NOTE: ASTM F1233 notes 5
minute duration for propane torch flame.
Research standards for unit to be
specified.

1. Provide FE rated units where shown or scheduled:
 - a. // No FE resistance rating. //
 - b. // Resistance of 5 minutes for forced entry, using basic hand tools. //
 - c. // Resistance of 15 minutes for forced entry, using basic hand tools. //
- C. Blast Resistant (BR) Assemblies: Manufacturer's window unit assembled with panels, inserts, glazing and framing.
1. Provide BR rated units where shown or scheduled:
 - a. // No BR resistance rating. //
 - b. // UL 752, Level 3. //
- D. Thermal Movement: Assembly capable of withstanding thermal movements resulting from ambient range of 67 degrees C (150 degrees F) to 82 degrees C (180 degrees F).
- E. Design Performance: Comply with structural performance, air infiltration, and water penetration requirements indicated in AAMA/WDMA/CSA 101/I.S.2/A440 for AW Class.
1. Wind Load Resistance: ASCE/SEI 7; Design criteria as indicated on Drawings.
 2. Water Infiltration: ASTM E331; no uncontrolled penetration at 300 Pa (6.2 psf), minimum, pressure differential.
 3. Air Infiltration: ASTM E283; Maximum 6 L/s/sq. m (0.1 cu. Ft./min./sq. ft.) at static pressure difference of 300 Pa (6.2 psf).

2.2 MATERIALS

- A. Stainless Steel: ASTM A666, Type 304; formed stainless steel members.
- B. Aluminum Extrusions: ASTM B221.
 1. Framing Members: Alloy 6063-T5, -T6, or -T52, or alloy 6061-T6; 5 mm (3/16 inch) minimum thickness.

2. Trim and Stops not exposed to forced entry attack: Alloy 6063-T5, -T6, or -T52; 1.5 mm (1/16 inch) minimum thickness.
- C. Steel Shapes/Plates/Bars: ASTM A36/A36M, except where another designation is indicated.
- D. Bolts and Fasteners: ASTM A320/A320M; Type 300-series stainless steel screws, bolts, nuts, and washers. Non-removable type where accessible from attack side.
- E. Window Cleaner's Bolts: Nonmagnetic stainless steel, complying with safety regulations for window cleaning equipment.
- F. Glazing Materials: Rated laminated assembly as specified in Section 08 80 00, GLAZING.

2.3 PRODUCTS - GENERAL

- A. Provide blast resistant windows from one manufacturer.
- B. Sustainable Construction Requirements:

SPEC WRITER NOTE: Specify products containing greatest recycled content practicable to maximize material recovery. See EPA Comprehensive Procurement Guidelines (CPG) for guidance about individual products and available recycled content. Section 01 81 13 sets overall project recycled content requirements. Steel recycled content depends upon furnace type. AISC reports industry wide 32 percent for basic oxygen furnace and 93 percent for electric arc furnace.

1. Steel Recycled Content: 30 percent total recycled content, minimum.

SPEC WRITER NOTE: Specialty Steel Industry of North America (SSINA) reports average 75 - 85 percent recycled content for stainless steel.

2. Stainless Steel Recycled Content: 70 percent total recycled content, minimum.

SPEC WRITER NOTE: Aluminum Association (AA) reports 2008 industry average 85 percent recycled content for aluminum in building construction industry.

3. Aluminum Recycled Content: 80 total recycled content, minimum.

2.4 FABRICATION

- A. Assemblies: Shop fabricate matching profiles indicated on Drawings. Make welds that comply with AWS standards; exposed welds ground smooth. Provide welded-in-place reinforcements and anchorage devices.
1. Removable Glazing Stops: Applied to room side of window.
 - a. Miter and weld removable stops at corners.
 - b. Secure removable stops to frames with countersunk screws, spaced as required for specified performance requirements.
 2. New Building: Frame system with inner frame, outer frame, and fasteners to connect frames together.
 - a. Fabricate continuous outer frame for // masonry // concrete // embedment as exterior wall is constructed.
 - b. Preassemble inner frame with glazing for bolting to outer frame.
 - c. Provide both frames shall be supplied by one manufacturer.
 - d. Anchorage: Provide anchors to provide the following:
 - 1) Yield strength: 900 MPa (130,000 psi).
 - 2) Tensile strength: 1033 MPa (150,000 psi).
 3. Existing Buildings: Fabricate continuous frame for anchoring to existing wall with expansion anchors.
 - a. Provide both inner and outer frames by one manufacturer.
 - b. Anchorage: Provide anchors to provide the following:
 - 1) Yield Strength: 900 MPa (130,000 psi).
 - 2) Tensile Strength: 1240 MPa (180,000 psi).
- B. Unit Anchorages: Fabricate metal anchorage system complying with performance requirements.
- C. Unit Glazing: Laminated glass assembly meeting UFC 4-010-01 and tested according to ASTM F1642, as specified in Section 08 80 00, GLAZING.

2.5 FINISHES

- A. General: Finish fabricated units including framing, sub-framing, hardware, and accessories.
1. // Color // Colors //: Refer to Section 09 06 00, SCHEDULE FOR FINISHES.
- B. Steel Surfaces: ASTM A123/A123M galvanized.
- C. Stainless Steel: NAAMM AMP 500; No. 4 polished finish, except retain manufacturer's standard mill finish on exposed fasteners and similar devices.
- D. Blend welds to match adjacent finish.

SPEC WRITER NOTE: Choose between clear anodized, color anodized, or PVDF noted below.

- E. Aluminum Anodized Finish: NAAMM AMP 500.
 - 1. Clear Anodized Finish: AA-C22A41; Class I Architectural, 0.018 mm (0.7 mil) thick.
 - 2. Color Anodized Finish: AA-C22A42 or AA-C22A44; Class I Architectural, 0.018 mm (0.7 mil) thick.
- F. Aluminum Paint Finish:
 - 1. Fluorocarbon Finish: AAMA 2605; 70 percent fluoropolymer resin, 2-coat system.

2.6 ACCESSORIES

- A. Bituminous Paint: SSPC Paint 12 (cold-applied asphalt mastic).
- B. Welding Materials: Type to suit application for color match, strength and compatibility in fabricated item.
 - 1. Stainless Steel: AWS D1.6/D1.6M, TIG using rods made from alloyed Type 308 stainless steel.
 - 2. Steel: D1.1/D1.1M.
 - 3. Steel Sheet: D1.3/D1.3M-08.
- C. Galvanizing Repair Paint: MPI No. 18.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Examine and verify substrate suitability for product installation.
 - 1. Verify opening is correctly sized and located.
 - 2. Verify substrate is prepared to receive frame anchors.
- B. Protect existing construction and completed work from damage.
- C. Apply bituminous coating approximately 30 mils dry film thickness, or other suitable permanent separator, on surfaces of dissimilar metals, and metal surfaces in contact with concrete.
 - 1. Where the metals are exposed to view, provide a plastic or neoprene separator between dissimilar metals.

3.2 INSTALLATION

- A. Install products according to manufacturer's instructions // and approved submittal drawings //.
- B. Install window units according to manufacturer's installation instructions.

- C. Set units accurately, plumb, and level.
- D. Securely anchor to // masonry // concrete // partition framing // as shown on approved submittal drawings to withstand specified performance.
- E. Anchorage to Existing Building:
 - 1. Spacing: Maximum 300 mm (12 inch) on center through pre drilled bolt holes in structural frame.
 - 2. Anchor Diameter: 10 mm (3/8 inch) minimum.
 - 3. Minimum Embedment and Edge Distances:
 - a. Embedment in Concrete: 88 mm (3-1/2 inches).
 - b. Embedment in Solid Masonry: 150 mm (6 inches).
 - c. Edge Distance: 75 mm (3 inches).
 - 4. Avoid cutting rebar during concrete anchor installation.
- F. Touch up damaged factory finishes.
 - 1. Repair galvanized surfaces with galvanized repair paint.

3.3 CLEANING

- A. Clean exposed window surfaces. Remove temporary labels, contaminants, and stains.
- B. Clean glazing according to Section 08 80 00, GLAZING.

3.4 PROTECTION

- A. Protect window units from construction operations.
- B. Remove protective materials immediately before acceptance.
- C. Repair damage.

- - E N D - -