SECTION 08 55 23 – BLAST RESISTANT WINDOWS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Factory glazed windows complete with perimeter frames, reinforcing, shims, anchors and attachment devices for installation of windows.

1. Sentry Series 2000 Triple Pane Blast Window System.

1.2 RELATED REQUIREMENTS

A. Section 07 92 00 "Joint Sealants:" Perimeter joint sealants.

B. Section 08 80 00 – Glazing

C. Section 08 43 13 – Aluminum Framed Storefronts and Window Walls.

D. Section 08 81 00 – Glass and Glazing.

1.3 REFERENCES

A. Applied Research Associates (ARA):

1. ARA WINGARD - Window Glazing Analysis Response and Design, version 6.

B. Architectural Aluminum Manufacturers Association (AAMA):

1. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum.
2. AAMA 1801 – Voluntary Specification for Determining the Acoustical Performance of Windows, Doors, Skylight, and Glazed Wall Systems.
3. AAMA 2603 - Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix).

C. ASTM International (ASTM):

1. ASTM A 36/A 36M - Standard Specification for Carbon Structural Steel.
2. ASTM B 221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
3. ASTM B308 - Aluminum-Alloy 6061-T6 Standard Structural Shapes, Rolled or Extruded.
4. ASTM C509 Cellular Elastomeric Pre-Formed Gasket and Sealing Material.
5. ASTM C 834 - Standard Specification for Latex Sealants.

6. ASTM C 864 - Dense Elastomeric Compression Seal Gaskets, Setting Blocks and Spacers.
7. ASTM C 1036 - Standard Specification for Flat Glass.
8. ASTM C 1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass.
9. ASTM C 1172 - Standard Specification for Laminated Architectural Flat Glass.
10. ASTM C 1376 - Standard Specification for Pyrolytic and Vacuum Deposition Coatings on Glass.
11. ASTM E 283 - Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
12. ASTM E 1332 – Standard Classification for Determination of Outdoor-Indoor Transmission Class.
13. ASTM E 1425 - Standard Practice for Determining the Acoustical Performance of Windows, Doors, Skylight, and Glazed Wall Systems.
14. ASTM E 1886 - Standard Test Method for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Missile(s) and Exposed to Cyclic Pressure Differentials.
15. ASTM E 1996 - Standard Specification for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Windborne Debris in Hurricanes.
16. ASTM E 2190 - Standard Specification for Insulating Glass Unit Performance and Evaluation.
17. ASTM F 1642 - Standard Test Method for Glazing and Glazing Systems Subject to Airblast Loadings.
18. ASTM F 3057 - Standard Test Method for Electromagnetic Shielding Effectiveness of Glazings.

D. Consumer Product Safety Commission (CPSC):

1. CPSC 16 CFR Part 1201) - Safety Standard for Architectural Glazing Materials.

E. Lawrence Berkley National Laboratory (LBNL):

1. LBNL THERM 7.4 / WINDOW 7.4 - NFRC Simulation Manual.

F. United States Department of Defense (DoD):

1. DoD Policy, Infrared and radio Frequency Emanation Standard, Intelligence Community Directive 705.2, Certified Tempest Technical authority (CTTa) specifications.

2. UFC 4-010-01.

G. United States General Services Administration (GSA):

1. GSA TS01-2003 - Standard Test Method for Glazing and Window Systems Subject to Dynamic Overpressure Loadings.

2. ISC 2011 – General Services Administration Facility Security Requirements for Explosive Devices Applicable to Facility Security Levels III and IV.

1.4 PREINSTALLATION MEETINGS

A. Conduct pre-installation meeting minimum two weeks before starting installation.

1. Required Attendees: Contractor, installer, [**other affected subcontractors**] [**Architect**] [**Owner**].
2. Agenda: Review work restrictions for occupied building, work area access, materials movement, installation conditions, limitations, and details.

1.5 SEQUENCING

A. Coordinate Work with other contractors affecting or affected by work of this Section. Cooperate with other contractors to ensure efficient progress of the Work.

1.6 ACTION SUBMITTALS

A. Submit under provisions of Section 01 30 00 - Administrative Requirements.

B. Product Data: Submit data for each specified product

1. Frame Materials: Show materials, profiles, sizes, construction, and finishes.
2. Glass and Glazing Materials: Show materials, thickness, construction, and performance.

C. Shop Drawings: Submit drawings for each window configuration and mounting condition [**signed and sealed by Professional Engineer**].

1. Show installation details and relation to existing prime window and adjacent wall construction.

2. Show field measurements for existing windows.
3. Indicate clearances and tolerances required to accommodate existing construction.
4. Show window assembly component profiles and sizes.
5. Show mounting hardware types and locations.

D. Design Calculations: Submit design calculations signed and sealed by Professional Engineer indicating specified performance criteria compliance.

1. Include design narrative with table of contents, assumptions listing, and cross references coordinated with design calculations and shop drawings.

E. Selection Samples: Submit samples for color selection.

1. Frame and Sash Materials: Submit [**two**] color chip sets showing manufacturer's [**standard anodized colors**] [**standard paint colors**] [**custom paint color range**].

F. Verification Samples: For each finish product specified, two samples, minimum size 6 inches (150 mm) square representing actual product, color, and patterns.

1. Frame and Sash Materials: Submit [**three**] frame and sash samples minimum 6 inches (150 mm) long showing selected finish.

1.7 INFORMATIONAL SUBMITTALS

A. Qualification Data: Submit [**manufacturer**] [**and**] [**installer**] qualifications.

1. Verify years of experience.:
2. Submit list of similar completed projects. Include project name, location, reference names and phone numbers.

1.8 QUALITY ASSURANCE

A. Manufacturer Qualifications: Minimum 5years experience manufacturing specified products [**with products included in GSA schedule**].

B. Installer Qualifications: Minimum 2 years experience installing specified products [**certified by manufacturer**].

C. Professional Engineer: Licensed in Project jurisdiction and experienced in designing blast resistant windows and window anchorage to building structure.

D. Mock-Up: Provide mock-up to show fabrication, existing opening preparation, and installation for [**typical window**] [**typical window of each type**].

1. Size: [**Selected by Architect.**] <**Insert size.**>
2. Location: [**Selected by Architect.**] <**Insert location.**>
3. Request Architect review and approval of product and workmanship.
4. Accepted mock-up may remain as part of Work.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store products in manufacturer's unopened packaging identified with manufacturer and product name.

B. Store materials protected from environment as recommended by manufacturer.

C. Prevent damage to glass and glass coatings.

D. Handle products to avoid damage.

1.10 FIELD CONDITIONS

A. [**Coordinate with Owner to maintain**] [**Maintain**] work area environmental conditions within limits recommended by manufacturer.

1.11 WARRANTY

A. Manufacturer's Warranty: Provide [**five**] year warranty against defective materials.

B. Installer's Warranty: Provide two-year warranty against defective workmanship.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer: Therm-O-Lite, LLC.

1. 1330 High Street.; South Bend, IN 46601.
2. Telephone: 574-234-4004.
3. Fax: 574-234-4005.
4. Website: http://www.thermolitewindows.com.
5. Email: info@thermolitewindows.com.

B. Substitutions: [**Not permitted.**]

2.2 PERFORMANCE REQUIREMENTS

A. Thermal Performance: LBNL Therm 7.4/Window 7.4 computed center of glass values, in combination with prime window.

1. 1” IGU (1/4” [**tempered**] glass, 1/2” airspace or argon, 1/4” [**tempered**][**Low E**] glass) w/ 5/16” laminated [**Low E**] flat glass with (.060) PVB interlayer;

a. Minimum R-Value: [**5.3**] sf•h•degree F/Btu.
b. Maximum U-Value: [**0.19**] Btu/sf•h•degree F.
c. Maximum Solar Heat Gain Coefficient: [**0.55**].

2. Framing systems shall accommodate expansion and contraction movement due to surface temperature differentials of 180 degrees Fahrenheit (82 degrees Celsius) without causing buckling, stress on glass, failure of joint seals, excessive stress on structural elements, reduction of performance, or other detrimental effects.

B. Air Infiltration Resistance: ASTM E 283; maximum 0.06 cfm/sf (0.0003 m3/sm2) of surface area when tested at differential static pressure of 6.24 psf. (300 Pa).

C. Sound Transmission: Range: 48 STC and 40 OITC.

D. Water Infiltration: No uncontrolled water penetration when tested in accordance with ASTM E 331 at test pressure of [8.0] [10.0] psf ([380] [480] Pa).

E. Structural Requirements as measured in accordance with ANSI/ASTM E330:

1. Wind loads for exterior assemblies:

a. Basic loading:

1) [_____] psf acting inward.
2) [_____] psf acting outward.

F. Deflection: Maximum calculated deflection of any framing member in direction normal to plane of wall when subjected to specified design pressures shall not exceed [L/175] of its clear span.

G. Allowable stress with a safety factor of 1.65.

H. Therm-O-Lite blast window uses dynamic loading to keep glass from penetrating into the building and minimizes required anchoring.

2.3 SENTRY SERIES BLAST WINDOW SYSTEM:

A. Basis of Design: Therm-O-Lite LLC., Sentry Series Blast window system.

B. Performance Requirements: Design windows and anchors to resist 6 psi (41.3 kPa) pressure, 42 psi-msec (289 kPa-msec) impulse, blast load and other specified loads.

1. ASTM F 1642: Minimal hazard response.
2. GSA TS01-2003: Level 2 protection
3. ISC Security Design Criteria, dated September 29, 2010 Rating: minimum 3b performance.
4. Mullion End Rotation: Maximum 2 degrees (L/60) in response to applied blast pressures.
5. Design window components with allowable stresses equal to material yield capacity.
6. Design anchors with minimum 1.5 factor of safety relative to ultimate capacity.
7. Snap-on elements or other architectural extrusions that do not have a positive connection to the main supporting element may not be included in determining the mullion resistance or attachment capacity.
8. Maintain profiles of surrounding interior and exterior construction as indicated in the drawings.

9. Glazing Properties: Default values specified by WINGARD software or as required by

C. Storefront Windows (Exterior): Aluminum Framed 1” Insulated glass unit: 1/4"[**tempered**] glass, 1/2" airspace [argon], 1/4"[**tempered**] [**Low E**] glass.

1. 2” x 4 1/2" thermally broken frame.
2. Front set glazing.
3. Screw spline construction.
4. Single pour and de-bridged thermal break.
5. System must be provided with E.P.D.M. Top Load Gasketing.
6. Concealed fastening.
7. Pre-punched weep slots.
8. Storefront Assemblies shall be free from rattles, wind whistles and noise due to thermal and structural movement and wind pressure.

9. Storefront Assemblies shall not have: Vibration harmonics, wind whistles, noises caused by thermal movement, thermal movement transmitted to other building elements, loosening, weakening, or fracturing of attachments or components of system.

D. Integral Blast windows (Interior): Aluminum framed, fixed sash with laminated [**Low E**] [**RF shielding**] glass and integral slotted magnetic jamb extrusion with compression release system [**and blinds**]; removable from interior for regular maintenance and cleaning. Glass must have a minimum 10.16mm (.4) inch engagement (bite) into the supporting window sash system.

1. Compression Release System: T-bar, J-channel, T-bar cover,
2. Frame components: Deep track, shallow track and angle jambs.
3. Frame thickness: 11/16 inches. Compression release system at jambs: 1 15/16 inches.
4. Sash siteline: 7/8 inches at sill, sash and T-bar siteline at jambs: 1-1/8 inches.
5. Misc.: Wool pile weather strip.
6. Align frames with existing prime window framing to preserve [**historic**] appearance.

2.4 FRAME AND SASH MATERIALS

A. Aluminum Extrusions: ASTM B 221; alloy 6063-T5 for extrusions; ASTM B209, alloy 5005-H34 for sheets; or other alloys and temper recommended by manufacturer appropriate for specified finish.

B. Steel Shapes: ASTM A 36/A 36M. for structural aluminum: ASTM B308. Size and shape required for application. For Storefront: Shop coat steel components after fabrication with alkyd type zinc chromate primer complying with FS TT-P-645.]

C. Operable Sash Hardware: Corrosion resistant, compatible with aluminum frame and sash.

1. Restrict operation with custodial lock requiring special tool as key.

D. Magnetic Seals: Manufacturer's standard to retain sash within perimeter frame.

E. Protective Coatings: For Storefront: Cold-applied asphalt mastic complying with SSPC-Paint 12, compounded for 30 mil (0.77 mm) thickness for each coat; or alkyd type zinc chromate primer complying with FS TT-P-645.

F. Weatherstripping: Wool pile conforming to AAMA 701.2; or extruded EPDM elastomeric conforming to ASTM C509 or C864.

G. "Anti-Walk" Edge Blocking: "W" shaped EPDM blocks for use in keeping glazing material stationary under vibration or seismic loading.

H. Baffles (at weep holes): Type as recommended by system manufacturer and shown in published installation instructions.

2.5 GLASS AND GLAZING MATERIALS

A. Flat Glass: Clear, thickness required for specified performance.

1. Heat Strengthened Glass: ASTM C 1048, [**fully tempered**] [**CSPC 16 CFR Part 1201 safety glass**].

B. Low E Coated Glass: ASTM C 1376; type required for specified performance.

C. Laminated Glass: ASTM C 1172; flat glass with PVB interlayer; construction required for specified performance.

D. RF Shielding Glass: ASTM F 3057.

1. Horizontal Antennae: Average [**Enter choice here**] dB reduction.
2. Vertical Antennae: Average [**Enter choice here**] dB reduction.

E. Security Glass: Laminated glass clad polycarbonate construction meeting specified performance.

F. Insulating Glass: ASTM E 2190;

1. Dual pane flat glass, [**air**] [**argon**] filled. Construction required for specified performance.

G. Glazing Sealant: Dow 995 structural sealant.

H. Glazing Gaskets (Exterior Storefront): Compression type design, replaceable, molded or extruded, of neoprene or ethylene propylene diene monomer (EPDM). Profile and hardness as required to maintain uniform pressure for watertight seal.

I. Glazing Splines (Interior Blast): Marine type, continuous.

2.6 FABRICATION

A. Coordination of Fabrication:

1. Check actual frame openings required in construction work by accurate field measurements before fabrication.
2. Fabricate units to withstand loads that will be applied when system is in place

B. General:

1. Reinforce work as necessary for performance requirements and for support to structure.

2. Separate dissimilar metals and aluminum in contact with concrete utilizing protective coating or pre-formed separators that will prevent contact and corrosion.

3. Comply with Section 08 81 00 for glazing requirements.

C. Aluminum Storefront Framing:

1. Supply size of members, shape, and profile designed to provide for glazing from [exterior] [interior].
2. Fabricate frame assemblies with joints straight and tight fitting.
3. Reinforce internally with structural members as necessary to support design loads.
4. Seal horizontals and direct moisture accumulation to exterior.
5. Provide flashings and other materials used internally or externally that are corrosive resistant, non-staining, non-bleeding and compatible with adjoining materials.
6. Make provisions in framing for minimum edge clearance, nominal edge cover and nominal pocket width for thickness and type of glazing or infill used in accordance with recommendations of manufacturer and FGMA Glazing Manual.
7. Provide tight fitting, injection molded, water deflectors at all intermediate horizontals.
8. Flashings: Form from sheet aluminum with same finish as extruded sections. Apply finish after fabrication. Material thickness as required to suit condition without deflection or "oil-canning".

D. Fabricate frames and sashes to sizes and configurations shown on Drawings (Interior Blast).

E. Assemble and factory glaze sashes with specified glass (Interior Blast).

2.7 FINISHES

A. Anodizing: AAMA 611 Class II; [**clear**] [**black**] [**bronze**] [**champagne**] color.

B. Painting: AAMA 2603; powder coated.

1. Color: [**White.**] [**Black.**] [**Custom, as selected by Architect.**]

2.8 ACCESSORIES

A. Louver Blinds:

1. Louver Blinds: Aluminum slats; [5/8] [1] [2] inch ([15] [25] [50] mm) wide, colors selected from blind manufacturer's standard colors; interior tilt control knob for tilt adjustment [**and interior lift mechanism to raise and lower blinds**].

B. Fasteners:

1. Fasteners: Aluminum, stainless steel, or other non-corrosive material compatible with window components and substrate materials.

C. Anchors:

1. Anchors: Corrosion resistant, concrete, wood, steel, and epoxy anchors, to suit application with no additional structural reinforcement required.

D. Joint Sealants: ASTM C 834; latex for joints between dissimilar materials.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Field measure existing windows to permit window fabrication to sizes matching existing windows.

3.2 PREPARATION

A. Prepare openings to be in tolerance, plumb, level and provide for secure anchoring.

B. Verify openings are in accordance with approved shop drawings.

C. Clean existing frames and glass.

3.3 INSTALLATION

A. Install windows according to manufacturer's instructions.

B. Set units plumb, square and level without warp or rack of frames.

C. Securely anchor windows to surrounding substrate.

D. Separate dissimilar materials at contact points, including metal in contact with masonry or concrete surfaces, with bituminous paint or pre-formed separators to prevent contact and corrosion.

E. Seal perimeter members as shown on manufacturer’s installation instructions or as required for unique job conditions. Set other members with internal sealants and baffles as called for in manufacturer’s installation instructions. Use sealants as recommended by sealant manufacturer.

F. Coordinate installation of perimeter sealant and backing materials between assemblies and adjacent construction in accordance with requirements of Section 07920.

G. Glazing: Refer to requirements of Section 08 81 00. Utilize "anti-walk" edge blocking on all vertical edges of glazing.

3.4 ADJUST AND CLEAN

A. Adjust windows for tight air seals [**and proper operation**].

B. Leave windows clean and free of construction debris.

3.5 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION