

SECTION 088500  
BLAST RESISTANT OPENINGS

1.1 STIPULATIONS

- A. The specifications sections " General Conditions of the Construction Contract ", "Special Conditions", and "Division 1 - General Requirements" form a part of this Section by this reference thereto and shall have the same force and effect as if printed herewith in full.

1.2 SUMMARY

- A. This Section includes security/blast requirements as determined by the United States Department of Defense for the following products:
  - 1. Steel Doors and Frames
  - 2. Storefronts and Entrances
  - 3. Security Glazing for Doors
- B. Products and applications specified in other sections where requirements are specified by reference to this Section:
  - a) 081113 – Steel Doors and Frames
  - b) 084113 – AF Storefronts and Entrances
  - c) 087111 – Door Hardware
- C. NOTE: This section is to be utilized in conjunction with sections listed in Part 1.2.B.

1.3 DEPARTMENT OF DEFENSE REQUIREMENT

- A. All exterior doors, windows, associated framing and glazing, **must** comply with the following regulation(s):
  - 1. Unified Facilities Criteria (UFC) 4-010-0: *DoD Minimum Antiterrorism Standards for Buildings*
  - 2. Unified Facilities Criteria (UFC) 4-020-01: *DoD Security Engineering Facilities Planning Manual*

1.4 DEFINITIONS

- A. Manufacturer: A firm that produces and/or fabricates products referenced herein.
- B. DoD: United States Department of Defense
- C. ATFP: Antiterrorism – Force Protection

- D. ATFP Threat Assessment: Facility Assessment completed by PA Department of Military & Veterans' Affairs personnel and reviewed by National Guard Bureau in conjunction with the Department of Defense and utilized to determine specific security and blast resistant requirements for a given facility, whether it be of new construction, retrofit of an existing building or a combination of both.
- E. Stand-Off Distance: Measurement (in meters or feet) from exterior face of opening to the closest perimeter threat (i.e. road, parking lot, fence, etc.)
- F. Explosive Weight: Given as a WI or WII rating and utilized in conjunction with the stand-off distance to determine the equivalent 3-second duration design loading.

#### 1.5 PERFORMANCE REQUIREMENTS

- A. General: Contractor and Manufacturer shall provide products/materials capable of complying with the requirements as specified herein and based on the following Government provided data. The information provided is based on the Facility ATFP Threat Assessment and is as follows
  - 1. Stand-Off Distance: 33 meters
  - 2. Explosive Weight: 25kg
  - 3. DOD Window Type: Type 'A'
- B. Structural Performance: All fabricated doors and windows that utilize laminated glass glazing shall be designed in accordance with the following:
  - a) ASTM F 2248 – *Standard Practice for Specifying an Equivalent 3-Second Duration Design Loading for Blast Resistant Glazing Fabricated with Laminated Glass*
  - b) ASTM E 1300 – *Standard Practice for Determining Load Resistance of Glass in Buildings*

#### 1.6 SUBMITTALS

- A. Product Data: For each DoD ATFP Type of door and window as depicted on the Project Design Drawings.
- B. Glazing Schedule: Use same designations indicated on Drawings for glazed openings in preparing a schedule listing glass types and thicknesses for each size opening and location.
- C. Glazing Accessories: To include, but not limited to; Glazing Sealants, Tapes, Gaskets, etc.
- D. Product Certificates: Signed by manufacturers of products certifying that products furnished comply with requirements.

- E. Professional Engineer Certification: Shop Drawings for all products contained within this section shall be sealed and signed by a Structural Engineer certifying that the following meet and or exceed the requirements as stated in Part 1.3.A and Part 1.5.B of this section:
  - 1. Materials for doors, door glazing, and door frames
  - 2. Fabrication methods
  - 3. Glazing
  - 4. Connection Design
- F. Qualification Data: For Installer.
- G. Product Test Reports: For each type of product indicated.
- H. Warranties: Special warranties specified in this Section.

#### 1.7 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who has completed glazing similar in material, design, and extent to that indicated for this Project; whose work has resulted in glazing installations with a record of successful in-service performance; and who employs glazing installers for this Project who are certified under the National Glass Association Glazier Certification Program as Level 2 (Senior Glaziers) or Level 3 (Master Glaziers).
- B. Source Limitations for Glazing: Obtain products from a single manufacturer for all glazing products.
- C. Source Limitations for Glazing Accessories: Obtain glazing accessories from one source for each product and installation method indicated.
- D. Source Limitations for Doors: Obtain products from a single manufacturer for all doors and associated framing.
- E. Source Limitations for Window Frames: Obtain products from a single manufacturer for all window framing.

Glazing Publications: Comply with published recommendations of glazing product manufacturers and organization below, unless more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.

- 1. GANA Publications: GANA'S "Glazing Manual" and "Laminated Glass Design Guide."
- F. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of the Insulating Glass Certification Council.

#### 1.8 DELIVERY, STORAGE, AND HANDLING

- A. Protect glazing materials according to manufacturer's written instructions and as needed to prevent damage to glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.
- B. Deliver window frames, doors and door frames palletized, wrapped, or crated to provide protection during transit and Project-site storage. Do not use non-vented plastic.
- C. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.
- D. Store doors and frames under cover at Project site. Place units in a vertical position with heads up, spaced by blocking, on minimum 4-inch- high wood blocking. Avoid using non-vented plastic or canvas shelters that could create a humidity chamber.
  - 1. If wrappers on doors become wet, remove cartons immediately. Provide minimum 1/4-inch space between each stacked door to permit air circulation.

## 1.9 WARRANTY

- A. Refer to sections listed under Part 1.B for product specific warranties.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products listed in other Part 2 articles.

### 2.2 FRAMES (Doors and Windows):

- A. Contractor/Manufacturer shall refer to the UFC 4-010-01 (and UFC 4-020-01 respectively) for a complete list of requirements.
- B. Provide frames, mullions and sashes of aluminum or steel. In accordance with ASTM F 2248, ensure that framing members restrict deflections of edges of the blast resistant glazing the support to 1/160 of the length of the supported edge to allowable stress levels under the equivalent 3-second design loading.
- C. Punched windows: Supported edge length will be taken as equal to the span of the glass, regardless of any intermediate support connections.
- D. Multi-panel glazing systems: Supported edge length to be considered shall be taken as equal to the span of a single glass panel and the deflection will be calculated based on simple support conditions for that length.

### 2.3 GLAZING (Door and Window):

- A. Contractor/Manufacturer shall refer to the UFC 4-010-01 (and UFC 4-020-01 respectively) for a complete list of requirements.
- B. Determine the required thickness of laminated glass and associated polyvinyl-butylal interlayers in single panes and insulating glass unit (IGU) windows using the UFC 4-010-01.
  - 1. Guidance within the UFC 4-010-01 is based on the application of ASTM F 2248 and E 1300, which result in higher levels of protection than those required within the UFC 4-010-01. The following adjustments to the ASTM standards are made to provide the appropriate performance:
    - a) Where the UFC 4-010-01 indicate ASTM F 2248 and/or E 1300, determine the glass thickness using the procedures in ASTM F 2248 and E 1300, respectively based on the applicable charge weight and stand-off distance.
    - b) Do not use less than 1/4 in (6mm) nominal laminated glass for any single pane exterior window. The 1/4 in (6mm) laminated glass consists of two (2) nominal 1/8 in (3mm) annealed glass panes bonded together with a minimum of a 0.030 in (0.75mm) polyvinyl-butylal (PVB) interlayer. For insulating glass units, use 1/4 in (6mm) laminated glass for the inboard pane as a minimum.
  - 2. **NOTE:** ASTM F 2248 can only be utilized for a limited range of charge weights and stand-off distances, included those covered within the UFC 4-010-01. For charge weights and stand-off distances outside of the range of ASTM F 2248, refer to the UFC 4-020-01 DoD Security Engineering Facilities Planning Manual.

#### 2.4 GLAZING FRAME BITE (Door and Window):

- A. Contractor/Manufacturer shall refer to the UFC 4-010-01 (and UFC 4-020-01 respectively) for a complete list of requirements.
- B. Refer to ASTM F 2248 for glazing frame bite requirements for structurally and non-structurally glazed windows and doors.
- C. Structurally Glazed Applications: Apply silicone bead to both sides of the glass panel for single pane glazing. For insulating glass units, apply silicone bead to only the inboard side.

#### 2.5 CONNECTION METHODS (Door and Window): Refer to UFC 4-010-01, Appendix B for Requirements

- A. Contractor/Manufacturer shall refer to the UFC 4-010-01 (and UFC 4-020-01 respectively) for a complete list of requirements.
- B. Design for connection of door and windows to surrounding walls, of hardware and associated connections, of glazing stop connections and of other elements in shear shall be based upon allowable stress levels.
- C. Connection Design Loads: Shall be determined in accordance with ASTM F 2248 and based on the applicable explosive weight at the **actual** stand-off distance at which the window is sited, but not greater than the conventional construction stand-off distance.

- D. Fastener Loads: As recommended by the fastener manufacturer for the materials to which the door and/or window system is being connected.
- E. All connections shall be capable of preventing the frame from being dislodged from the supporting structural element.

NOTE: The actual connection design load is dictated by the glass type and thickness determined by ASTM E 1300. In order to keep connection loads reasonable, utilize a glass type and thickness that just exceeds the required glazing resistance.

END OF SECTION