

\*\*\*\*\*  
USACE / NAVFAC / AFCEA / NASA UFGS-08600 (November 2003)  
-----

Preparing Activity: USACE MasterFormat™ 2004 - 08 62 00  
Superseding  
UFGS-08600 (August 2000)

## UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated 23 June 2005

Latest change indicated by CHG tags

\*\*\*\*\*

### SECTION TABLE OF CONTENTS

#### DIVISION 08 - DOORS AND WINDOWS

#### SECTION 08600

#### SKYLIGHTS

11/03

#### PART 1 GENERAL

- 1.1 REFERENCES
- 1.2 GENERAL REQUIREMENTS
- 1.3 SUBMITTALS
- 1.4 QUALIFICATIONS
- 1.5 DELIVERY STORAGE AND HANDLING
- 1.6 WARRANTY
- 1.7 FULL SERVICE MOCK-UP

#### PART 2 PRODUCTS

- 2.1 SKYLIGHT PANELS
- 2.2 GLASS-FIBER PANELS
  - 2.2.1 Weatherability
  - 2.2.2 Non Combustible Grid Core
  - 2.2.3 Adhesive
  - 2.2.4 Panel Construction
- 2.3 THERMOPLASTIC POLYCARBONATE PANELS
- 2.4 COMMON PANEL REQUIREMENTS
  - 2.4.1 Appearance
  - 2.4.2 Panel Fabrication
  - 2.4.3 Thermal Performance
  - 2.4.4 Condensation Index Rating
- 2.5 SKYLIGHT SYSTEMS
  - 2.5.1 Glass Glazed Skylights and Roof Windows
  - 2.5.2 Plastic Glazed Unit Skylight
    - 2.5.2.1 Dome
    - 2.5.2.2 Pyramid
    - 2.5.2.3 Vault
  - 2.5.3 Framed Skylights
- 2.6 FLEXIBLE SEALING TAPE

PART 3     EXECUTION

3.1     PREPARATION

3.2     ERECTION

-- End of Section Table of Contents --

\*\*\*\*\*  
USACE / NAVFAC / AFCEA / NASA UFGS-08600 (November 2003)  
-----  
Preparing Activity: USACE MasterFormat™ 2004 - 08 62 00  
Superseding  
UFGS-08600 (August 2000)

## UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UML dated 23 June 2005

Latest change indicated by CHG tags

\*\*\*\*\*

### SECTION 08600

#### SKYLIGHTS

11/03

\*\*\*\*\*

NOTE: This guide specification covers the requirements for skylights manufactured from glass-fiber or thermoplastic polycarbonate.

Comments and suggestions on this guide specification are welcome and should be directed to the technical proponent of the specification. A listing of technical proponents, including their organization designation and telephone number, is on the Internet.

Recommended changes to a UFGS should be submitted as a Criteria Change Request (CCR).

Use of electronic communication is encouraged.

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

\*\*\*\*\*

## PART 1 GENERAL

### 1.1 REFERENCES

\*\*\*\*\*

NOTE: This paragraph is used to list the publications cited in the text of the guide specification. The publications are referred to in the text by basic designation only and listed in this paragraph by organization, designation, date, and title.

Use the Reference Wizard's Check Reference feature when you add a RID outside of the Section's Reference Article to automatically place the reference in the Reference Article. Also use the Reference Wizard's Check Reference feature to update

the issue dates.

References not used in the text will automatically  
be deleted from this section of the project  
specification when you choose to reconcile  
references in the publish print process.

\*\*\*\*\*

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

ALUMINUM ASSOCIATION (AA)

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

AMERICAN ARCHITECTURAL MANUFACTURERS ASSOCIATION (AAMA)

AAMA 1600 (2000) Voluntary Specification for  
Skylights

AAMA 2605 (2002) Voluntary Specification,  
Performance Requirements and Test  
Procedures for Superior Performing Organic  
Coatings on Aluminum Extrusions and Panels

ASTM INTERNATIONAL (ASTM)

ASTM C 297/C 297M (2004) Flatwise Tensile Strength of  
Sandwich Constructions

ASTM D 1002 (2001) Apparent Shear Strength of  
Single-Lap-Joint Adhesively Bonded Metal  
Specimens by Tension Loading  
(Metal-to-Metal)

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

ASTM D 1037 (1999) Evaluating Properties of Wood-Base  
Fiber and Particle Panel Materials

ASTM D 1929 (1996; R 2001e1) Determining Ignition  
Temperature of Plastics

ASTM D 2843 (1999; R 2004) Density of Smoke from the  
Burning or Decomposition of Plastics

ASTM D 3841 (1997; R 2001) Glass-Fiber-Reinforced  
Polyester Plastic Panels

ASTM D 572 (2004) Rubber Deterioration by Heat and  
Oxygen

ASTM D 635 (2003) Rate of Burning and/or Extent and  
Time of Burning of Plastics in a  
Horizontal Position

ASTM E 108	(2004) Fire Tests of Roof Coverings
ASTM E 283	(2004) Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen
ASTM E 330	(2002) Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference
ASTM E 331	(2000) Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference
ASTM E 72	(2004) Conducting Strength Tests of Panels for Building Construction
ASTM E 84	(2004) Surface Burning Characteristics of Building Materials

#### NATIONAL FENESTRATION RATING COUNCIL (NFRC)

NFRC 100	(2004) Procedure for Determining Fenestration Product U-Factors
NFRC 200	(2004) Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence

### 1.2 GENERAL REQUIREMENTS

The Contractor shall furnish and install commercially available [roof windows] [unit skylights [flat glass] [domed] [pyramidal] [vaulted]] [metal or wood framed skylights] which satisfy all requirements contained in this section and have been verified by load testing and independent design analyses (if required) to meet specified design requirements. The Contractor shall provide environmentally preferable products and work practices, applicable to skylights, considering raw materials acquisition, production, manufacturing, packaging, distribution, reuse, operation, maintenance, and/or disposal of the products or services used in the skylights. The skylight system shall be UV-stabilized, shatter proof and energy efficient. The plastics used in the manufacture of the skylights shall be light transmitting plastics for daylighting applications.

### 1.3 SUBMITTALS

\*\*\*\*\*

**NOTE: Review submittal description (SD) definitions in Section 01330 SUBMITTAL PROCEDURES and edit the following list to reflect only the submittals required for the project. Submittals should be kept to the minimum required for adequate quality control.**

**A "G" following a submittal item indicates that the submittal requires Government approval. Some**

submittals are already marked with a "G". Only delete an existing "G" if the submittal item is not complex and can be reviewed through the Contractor's Quality Control system. Only add a "G" if the submittal is sufficiently important or complex in context of the project.

For submittals requiring Government approval on Army projects, a code of up to three characters within the submittal tags may be used following the "G" designation to indicate the approving authority. Codes for Army projects using the Resident Management System (RMS) are: "AE" for Architect-Engineer; "DO" for District Office (Engineering Division or other organization in the District Office); "AO" for Area Office; "RO" for Resident Office; and "PO" for Project Office. Codes following the "G" typically are not used for Navy, Air Force, and NASA projects.

Choose the first bracketed item for Navy, Air Force and NASA projects, or choose the second bracketed item for Army projects.

\*\*\*\*\*

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are [for Contractor Quality Control approval.] [for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government.] The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

#### SD-02 Shop Drawings

Shop Drawings[; G][; G, [\_\_\_\_\_]]

Drawings showing fabrication details, materials, dimensions, installation methods, anchors, and relationship to adjacent construction.

#### SD-03 Product Data

Skylights

Manufacturer's descriptive data and catalog cuts.

Warranty

Manufacturer's 5 year complete warranty.

#### SD-06 Test Reports

Test Reports[; G][; G, [\_\_\_\_\_]]

Certified test reports from independent testing laboratory for each type and class of panel system. Reports shall verify that the material meets specified performance requirements. Previously completed test reports will be acceptable if they are current and indicative of products used on this project. Where a Class A, B

or C roof is part of the project, a listing certificate for roof covering systems category shall be provided certifying that the product complies with the safety standards of ASTM E 108 and the Uniform Building Code.

#### SD-07 Certificates

Skylights[; G][; G, [\_\_\_\_]]

Manufacturer's certificate stating that products meet or exceed specified requirements. Skylight system shall be evaluated and listed (the whole skylight as a unit, not just a glazing material in the unit) by the recognized building code authorities: ICBO and SBCCI-Public Safety Testing and Evaluation Services Inc. Product ratings determined using NFRC 100 and NFRC 200 shall be authorized for certification and properly labeled by the manufacturer.

#### Qualifications

Documentation of manufacturer's and installer experience indicating compliance with specified requirements.

### 1.4 QUALIFICATIONS

The manufacturer shall be a company specializing in the manufacture of the specified products with a minimum of [5] [10] years documented experience. The installer shall have documented experience of [5] [\_\_\_\_] years minimum performing the work specified.

### 1.5 DELIVERY STORAGE AND HANDLING

System modules shall be factory assembled to the greatest extent possible. Panels shall be shipped to the jobsite in rugged shipping units and shall be ready for erection. All skylights shall have conspicuous decals affixed warning individuals against sitting or stepping on the units. Skylight panels shall be stored on the long edge, several mm inches above the ground, blocked and under cover to prevent warping. Unit skylights shall be delivered in manufacturer's original containers, dry, undamaged, with seals and labels intact. All products shall be delivered, stored and protected in accordance with manufacturer's recommendations.

### 1.6 WARRANTY

The Contractor shall provide to the Government the manufacturer's complete warranty for materials, workmanship, and installation. The warranty shall be for [5] [\_\_\_\_] years from the time of project completion and shall not be prorated. The warranty shall guarantee, but shall not be limited to, the following:

- a. Light transmission and color of the panels shall not change after [exposure to heat of 149 degrees C 300 degrees F for 25 minutes] [5-year exposure at a low angle of 5 degrees in South Florida].
- b. There is no delamination of the panel affecting appearance, performance, weatherability or structural integrity of the panels or the completed system.
- c. There is no fiberbloom on the panel face.

d. Change in light transmission of no more than 6% per ASTM D 1003, and in color (yellowing index) no more than 10 points in comparison to the original specified value over a 10 year period.

#### 1.7 FULL SERVICE MOCK-UP

Before fabrication, a full service mock-up of [each type of skylight] [one skylight unit] [\_\_\_\_\_] complete with glass and AAMA certification label for structural purposes and NFRC temporary and Permanent Label for certification of thermal performance rating shall be provided for review of skylight construction and quality of hardware operation. Glass and glazing shall conform to the applicable requirements of Section 08800 GLAZING.

### PART 2 PRODUCTS

#### 2.1 SKYLIGHT PANELS

\*\*\*\*\*

**NOTE: A polyvinyl fluoride film coating may be specified for the exterior surface of skylight panels when longer wearability is considered necessary. For fire rated construction, panels with fire ratings consistent with the overall construction of the building should be specified. Retain appropriate bracketed statements and corresponding paragraphs below and delete the others.**

**The designer must consider the differences and performance characteristics of the two materials: glass-fiber reinforced polyester and extruded cellular thermoplastic polycarbonate before making the selection to meet specific project requirements.**

\*\*\*\*\*

Skylight panels shall be fabricated of [glass-fiber reinforced polyester] [or] [extruded cellular thermoplastic polycarbonate] panels conforming to the specified requirements and other appropriate lab test specified criteria, weighing not less than 2.4 kg per square meter 8 ounces per square foot. The Contractor shall submit Test Reports as specified in the Submittals paragraph. Size and color of skylight panels shall be as indicated.

#### 2.2 GLASS-FIBER PANELS

Glass-fiber reinforced polyester panels shall conform to ASTM D 3841, Class [\_\_\_\_\_] and to the requirements of AAMA 1600.

##### 2.2.1 Weatherability

The exposed faces of fiberglass sandwich type panels shall have a permanent glass veil erosion barrier embedded integrally to provide maximum long term resistance to reinforcing fiber exposure. The exterior face sheet shall be uniform in strength and be resistant to penetration by pencil point.

##### 2.2.2 Non Combustible Grid Core

The aluminum I-beams shall be 6063-T6 with provisions for mechanical interlocking of muntin-mullion and perimeter to prevent high and low



intersections which do not allow full bonding surface to contact with face material. Width of I-beam shall be no less than 11 mm 7/16 inch. I-beam grid shall be machined to tolerances of not greater than plus or minus 0.05 mm 0.002 inch for flat panels. Panels shall withstand 650 degrees C 1200 degrees F fire for a minimum of one hour without collapse or exterior flaming.

#### 2.2.3 Adhesive

The laminate adhesive shall be heat and pressure resin-type engineered for structural sandwich panel use. Adhesive shall pass testing requirements specified by the International Conference of Building Officials' "Acceptance Criteria for Sandwich Panel Adhesive". Minimum strength shall be:

- a. Tensile Strength of 5.2 MPa 750 psi in accordance with ASTM C 297/C 297M after two exposures to six cycles each of the aging conditions prescribed in ASTM D 1037.
- b. Shear Strength, after exposure to five separate aging conditions in accordance with ASTM D 1002, shall be:
  - (1) 3.7 MPa 540 psi at 50% relative humidity and 23 degrees C 73 degrees F.
  - (2) 5.5 MPa 800 psi under accelerated aging per ASTM D 1037 at room temperature.
  - (3) 1.7 MPa 250 psi under accelerated aging per ASTM D 1037 at 83 degrees C 182 degrees F.
  - (4) 9.7 MPa 1400 psi after 500 hour Oxygen Bomb per ASTM D 572.
  - (5) 690 kPa 100 psi at 83 degrees C 182 degrees F.

#### 2.2.4 Panel Construction

Panels shall consist of fiberglass faces laminated to an aluminum I-beam grid core and shall deflect no more than 48 mm 1.9 inches at 147 kg per square meter in 3 m 30 psf in 10 feet per ASTM E 72, without a supporting frame. Quality control inspections and required testing, conducted at least once each year, shall include manufacturing facilities, sandwich panel components and production sandwich panels for conformance with "Acceptance Criteria for Sandwich Panels" as regulated by the ICBO-ES or equivalent.

#### 2.3 THERMOPLASTIC POLYCARBONATE PANELS

The system shall be manufactured from translucent polycarbonate panels designed for architectural applications. Panels shall consist of a polycarbonate resin with a permanent, co-extruded, ultra-violet protective layer; this layer shall be co-extruded by the manufacturer during the original extrusion of the panel and shall be a permanent part of the exterior and interior layers. Pot-applied coatings or films of dissimilar materials are unacceptable. Panel width shall not exceed 600 mm 2 feet to ensure best performance for wind uplift, vibration, oil canning and visual appearance. The following manufacturing requirements shall be met:

- a. Panel shall be extruded in one single formable length. Transverse sections are unacceptable. The panels shall be manufactured with upstands which are integral to the unit, and the upstands shall be 90 degrees to the panel face (standing seam dry glazed concept). Welding or gluing of upstands or standing seam is unacceptable.
- b. Mullions shall be dry glazed profiles, using no sealant, welding, adhesives or gaskets; mullions shall be thermally broken and continuous for panel length.
- c. For structural performance, the use of adhesives, plastic or sonic welding or sealant is not allowed.
- d. For longevity, the minimum ratio of panel weight to thickness shall be [2.44 kg/m<sup>2</sup> for 10 mm 0.5 psf for 0.4 inch] [3.3 kg/m<sup>2</sup> for 16 mm 0.68 psf for 0.63 inch] [4.4 kg/m<sup>2</sup> for 55, 75, and 100 mm double glazed 0.91 psf for 2.2, 3, and 4 inch double glazed] thick panel.
- e. The extruded panel shall include integral extruded multi-cells, and truss-like structural core for resistance to buckling. The panel's exterior skins shall be interconnected and spaced apart by supporting ribs, perpendicular to the skins, at a spacing not to exceed 4 mm 0.16 inches (truss-like construction). In addition, the space between the two exterior skins in a cross section shall be divided by multiple parallel intermediate surfaces, at a spacing not to exceed 4 mm 0.16 inches.
- f. Interior flame spread classification shall be Class [I] [II] in accordance with ASTM E 84.
- g. Smoke density shall be no greater than 70 in accordance with ASTM D 2843.
- h. The exterior and interior faces shall be an approved light transmitting panel with a CC1 fire rating classification in accordance with ASTM D 635.
- i. Self-ignition shall be greater than 570 degrees C 1058 degrees F in accordance with ASTM D 1929.
- j. Fire rated roof assembly translucent panels shall be successfully evaluated for fire from exterior exposure per [ASTM E 108] [\_\_\_\_\_] to meet Class [A] [B] [C] rating. The panel shall be listed by an independent recognized listing laboratory.

## 2.4 COMMON PANEL REQUIREMENTS

### 2.4.1 Appearance

The face sheets shall be uniform in color to prevent splotchy appearance. Faces shall be completely free of ridges and wrinkles which prevent proper surface contact. Clusters of air bubbles/pinholes which collect moisture and dirt are not acceptable.

### 2.4.2 Panel Fabrication

Panel construction shall meet the following requirements: Light

transmission [\_\_\_\_\_] %; color [\_\_\_\_\_] .

#### 2.4.3 Thermal Performance

\*\*\*\*\*

NOTE: A U factor of up to  $4.3 \text{ W/m}^2\text{K}$  ( $0.75 \text{ Btu/hr-ft}^2$ -F) may be acceptable for particular climate zones in the United States for skylight products. SHGC ratings should be equal to or less than  $2.3 \text{ W/m}^2\text{K}$  ( $0.40 \text{ Btu/hr-ft}^2$ -F). Selection and use of the skylight products should be used only in cooling dominated climates and be dependent upon qualifying for the Southern climate zone as determined by the DOE Energy Star Windows program. Certain products that have aluminum frames and/or thermally improved aluminum frames may qualify for the Central and Northern Climate Zones.

\*\*\*\*\*

Thermal transmittance for skylights with insulating glass shall not exceed a U-factor of  $4.3 \text{ W/m}^2\text{K}$  ( $0.75 \text{ Btu/hr-ft}^2$ -F when determined using NFRC 100, and a SHGC of  $2.3 \text{ W/m}^2\text{K}$  ( $0.40 \text{ Btu/hr-ft}^2$ -F when determined using NFRC 200. Selection and use of the skylight products in this category should be used in the Southern Climate Zone]  $2.6 \text{ W/m}^2\text{K}$  ( $0.45 \text{ Btu/hr-ft}^2$ -F when determined using NFRC 100, and a SHGC of  $3.1 \text{ W/m}^2\text{K}$  ( $0.55 \text{ Btu/hr-ft}^2$ -F when determined using NFRC 200. Selection and use of the skylight products in this category shall be used in a climate where heating and cooling are basically equally used and be dependent upon qualifying for the Central Climate Zone]  $2.6 \text{ W/m}^2\text{K}$  ( $0.45 \text{ Btu/hr-ft}^2$ -F when determined using NFRC 100. Selection and use of the skylight products in this category shall be used in predominately heating dominated climates and be dependent upon qualifying for the Northern Climate Zone] as determined by the DOE Energy Star Windows program.

#### 2.4.4 Condensation Index Rating

\*\*\*\*\*

NOTE: Determination of the resistance of the skylight unit to the formation of condensation in any form, referred to as the Condensation Index, should be accomplished using the NFRC approved software tool THERM. Refer to paragraph Condensation Index Rating in Section 08550 WOOD WINDOWS for examples and guidance.

\*\*\*\*\*

The condensation index rating shall be [\_\_\_\_\_] as determined using National Fenestration Rating Council approved software THERM.

#### 2.5 SKYLIGHT SYSTEMS

\*\*\*\*\*

NOTE: A wide variety of skylight configurations, features, fastening systems, and accessories is commercially available. Unique details of the roof system, which could affect the skylight installation, will be shown on the contract

drawings. It is not possible to indicate all possible combinations and selections which may be utilized in adapting this guide specification to a particular project; therefore, careful editing is necessary to assure that the project is properly and adequately specified.

Since the skylight becomes an integral element of the roofing system after installation, it must meet or exceed the roof requirements for fire protection, insulation value, energy efficiency rating, thermal performance, air infiltration, and water penetration.

\*\*\*\*\*

The skylight systems shall meet the following requirements:

- a. Integral perimeter framing system assembly shall be by the manufacturer.
- b. Exterior panel faces shall be [crystal] [white] [\_\_\_\_\_] in color. Interior panel faces shall be [crystal] [white] [\_\_\_\_\_] in color.
- c. Air infiltration at 300 Pa 6.24 psf shall be less than [0.5] [\_\_\_\_\_] L/s/m<sup>2</sup> [0.1] [\_\_\_\_\_] cfm/ft<sup>2</sup> in accordance with ASTM E 283.
- d. Water penetration at test pressure of 73 kg/m<sup>2</sup> 15 psf shall be zero in accordance with ASTM E 331.
- e. Manufacturer shall be responsible for maximum system deflection, in accordance with the applicable building code, and without damage to system performance. Deflection shall be calculated in accordance with engineering principles.
- f. Proper weepage elements shall be incorporated within the perimeter framework of the glazing system for drainage of any condensation or water penetration.
- g. System shall accommodate movement within the system; movement between the system and perimeter framing components; dynamic loading and release of loads; and deflection of supporting members. This shall be achieved without damage to system or components, deterioration of weather seals and fenestration properties specified.
- h. The exterior panel face shall repel an impact of 81 N-m 60 foot-pounds without fracture or tear when impacted by a 89 mm diameter, 2.9 kg 3.5 inch diameter, 6.37 pound free falling ball. Impact strength shall be measured by the Society of Plastics Industries (SPI) method.
- i. Exposed aluminum color shall be selected from the manufacturer's standard range. Corrosion resistant finish shall be [oven dried Kynar 500, two coats] [baked-on enamel coating] [oven dried acrylic-urethane coating] [anodized finish complying with AA STFA-601711, in accordance with AAMA 2605].
- j. The system shall require no scheduled recoating to maintain its performance or for UV resistance.

k. Design criteria shall be: Wind Load [\_\_\_\_]; snow load [\_\_\_\_].

l. Extruded aluminum shall be 6063-T6 and 6063-T5; all fasteners shall be stainless steel or cadmium plated steel.

#### 2.5.1 Glass Glazed Skylights and Roof Windows

Roof window shall be of the following type:

a. Fixed skylight featuring a select wood frame, mortise and tenon joints, gaskets to drain any condensation to the outside, a choice of tempered clear, laminated, insulated daylight area. The protective exterior cladding shall be [aluminum] [copper] for protection and low profile appearance. The skylight shall have a [ventilation flap that opens to allow air circulation and contains a filter within the flap to keep dust and insects out] [ventilating panel and insect screen with an operator hook that allows easy opening and closing, with control rods, for out-of-reach installations or smooth-turning handle for within-reach installation].

b. Emergency escape and rescue roof window which opens [45] [\_\_\_\_] degrees to satisfy egress requirements for emergency escape. When the unit is closed, a ventilation flap can be opened to allow in fresh air. For easy cleaning from inside the room, the sash rotates completely inward. Insect screen and sunscreening accessories are available.

c. Balcony roof window featuring dual-sash operation: the top sash opens for maximum ventilation and also pivots completely inward for easy cleaning from inside the room; the bottom sash opens outward to create a roof balcony. When the window is closed, a ventilation flap allows fresh air circulation. Insect screen and sunscreen accessories are available.

Roof windows shall withstand dead and live loads caused by pressure and uplift of wind acting normal to the plane of roof and tested by an ICBO listed, independent testing and quality control inspection agency to an allowable downward pressure of [0.57-8.71] [\_\_\_\_] MPa [12-182] [\_\_\_\_] psf and an uplift pressure of [1.05-5.03] [\_\_\_\_] MPa [22-105] [\_\_\_\_] psf measured in accordance with ASTM E 330, as recommended by the manufacturer for the type of window tested.

#### 2.5.2 Plastic Glazed Unit Skylight

##### 2.5.2.1 Dome

Dome skylights shall be factory assembled units each consisting of [a single dome or sealed double domes with a 1.5 mm 0.06 inch extruded aluminum frame and 1.5 mm 0.06 inch] [sealed double or triple domes with 1.5 mm 0.06 inch extruded aluminum frame with a polyurethane thermal break to prevent condensation on the interior portion of the frame and 1.75 mm 0.07 inch] extruded aluminum retainer cap. The skylight shall have an integral condensation gutter with weep hole slots to provide sufficient drainage to the outside. Dome shall be [clear] [white] [bronze] [\_\_\_\_]. For self-flashing domes, the curbs, treated wood nailer, and insulation shall be the manufacturer's standard. Uniform design load capacity of composite dome and frame shall meet or exceed [1.9] [1.4] [\_\_\_\_] MPa [40] [30] [\_\_\_\_] psf snow load. Insulated curbs with PVC thermal barriers connecting the top and bottom of the inner and outer walls are available.

#### 2.5.2.2 Pyramid

Pyramid skylights are, for all practical purposes, just a configuration alternative to the dome skylights; the requirements specified above for the domes shall apply to the pyramids. Pyramid skylight units are available from 1.2 to 6 m 4 to 20 foot square and can be used for both self-flashing or curb mount installations; 22 and 40 degrees are standard. Maximum horizontal thrust load on the pyramid curb shall be [0.4 to 1.5 kN 90 to 330 lbs (1 panel per side)] [1.8 to 3.2 kN 410 to 730 lbs (2 panels per side)] [3.8 to 5.8 kN 850 to 1300 lbs (4 panels per side)] depending on size. Pyramids are available in grid and tandem models.

#### 2.5.2.3 Vault

Vault skylights shall be [single] [double] glazed. Barrel vault height, for low rise vaults, shall be 10% of the vault width, and 50% of the vault width for half round vaults; outside curbs shall be provided by the Contractor in accordance with the manufacturer's details. Vaults shall support a 1.4 or 1.9 MPa 30 or 40 psf roof snow or live load, and a negative 1.2 MPa 25 psf wind load plus dead load; rafter spacing shall be determined by load requirements but shall not exceed 900 mm 36 inches on center for 1.9 MPa 40 psf and 1200 mm 48 inches on center for 1.4 MPa 30 psf.

Sill members shall weep water infiltration and condensation, and shall be factory slotted at anchors for thermal movement. All gaskets shall be EPDM. All units over 2.2 m 87 inches shall be shipped unassembled for access to anchors from roof level.

#### 2.5.3 Framed Skylights

Framed skylights shall [be designed to [\_\_\_\_\_] size] [span up to [3.4] [\_\_\_\_\_] m [12] [\_\_\_\_\_] feet in a single pitch and up to [6] [\_\_\_\_\_] m [20] [\_\_\_\_\_] feet in a double pitch configuration]; rafter and purlin spacing shall be determined by loading requirements. Skylights manufactured in prefabricated sections easy to install are available in a wide range of standardized pitches. Framing members shall be [tubular] [I-beams]; deflection of rafters shall not exceed [L/175] [L/180] [\_\_\_\_\_] of the rafter span. A registered professional engineer shall size all framing members and design all structural connections; the Contractor shall submit a copy of the calculations. Framing shall include a primary gutter system with secondary gutters to control water infiltration and condensation runoff from the underside of the glazing material and channel it to the exterior. Skylight structural members shall be designed for a live load of [\_\_\_\_\_] MPa psf and wind load of [\_\_\_\_\_] MPa psf; no objectionable distortion or stress in fastenings and joinery due to expansion and contraction shall be induced when subjected to a 55 degree C 100 degree F temperature change.

#### 2.6 FLEXIBLE SEALING TAPE

Sealing tape shall be manufacturer's standard pre-applied to closure system at the factory under controlled conditions.

### PART 3 EXECUTION

#### 3.1 PREPARATION

The Contractor shall verify when structural support is ready to receive all specified work and to convene a pre-installation conference, if approved by the Contracting Officer, including the Contractor, skylight installer and

all parties directly affecting and affected by the specified work. All submitted opening sizes, dimensions and tolerances shall be field verified; preparation of openings shall include isolating dissimilar materials from aluminum system to avoid damage by electrolysis. The installer shall examine area of installation to verify readiness of site conditions and to notify the Contractor about any defects requiring correction. Work shall not commence until conditions are satisfactory.

### 3.2 ERECTION

Translucent skylight system shall be erected in accordance with the approved shop drawings supplied by the manufacturer. Fastening and sealing shall be in accordance with the manufacturer's shop drawings. All panel protection shall be removed and, after other trades have completed work on adjacent materials, panel installation shall be carefully inspected and adjusted, if necessary, to ensure proper installation and weather-tight conditions. All staging, lifts and hoists required for the complete installation and field measuring shall be provided. System shall be installed clean of dirt, debris or staining and thoroughly examined for removal of all protective material prior to final inspection of the designated work area. Snow rakes shall not be used on roof windows/skylights.

-- End of Section --