

## **08 45 00 - Insulated Translucent Roof Assemblies Master Quadwall Specifications Designed for DoD 5 Min. Forced Entry**

NOTE:

- THIS IS A PERFORMANCE SPECIFICATION IN CSI FORMAT.
- IN ORDER TO ENSURE THE BEST SPECIFICATION FOR YOUR APPLICATION WE RECOMMEND THAT YOU CONSULT WITH ARCHITECTURAL SUPPORT OR YOUR LOCAL CPI REPRESENTATIVE FOR ASSISTANCE.
- DELETE OPTIONAL/UNNECESSARY ITEMS IN [BRACKETS].  
Note:  $\Rightarrow$  in left margin denotes option(s).
- [Downloadable Word Doc. file is available on our web site:  
[www.cpidaylighting.com](http://www.cpidaylighting.com)]

### **KINGSPAN LIGHT + AIR / CPI DAYLIGHTING**

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## PART 1 GENERAL

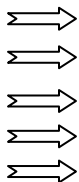
### 1.1 SUMMARY:

Section includes requirements for daylighting insulated translucent panel skylight system as shown and specified herein.

### 1.2 WORK INCLUDED:

- A. Design, engineer, manufacture and installation of two panels insulated translucent skylight panel system. An assembly of two independent insulated single glazing polycarbonate multi-cell panels in one integrated daylighting panel assembly, incorporated into a complete aluminum framed system that has been tested and warranted by the manufacturer as a single source system. Design shall provide for the replacement of the exterior panel using tools, independently of the interior single panel and without exposing the interior or compromising the weather tightness or interfering with the normal working functions of the building. The interior single insulated panel remains intact for the life of the building envelope. Single panel extruded polycarbonate cellular or fiberglass sandwich panel systems will not meet these requirements and are not acceptable.
- B. All anchors, brackets, and hardware attachments necessary to complete the specified structural assembly, weatherability and water-tightness performance requirements. All flashing up to but not penetrating adjoining work are also required as part of the system and shall be included.
- C. Trained and factory authorized labor with supervision to complete the entire panel installation.

### 1.3 RELATED WORK SPECIFIED ELSEWHERE:



- A. Structural Steel/Wood Framing/Concrete, section \_\_\_\_\_
- B. Curbs and supporting members, section \_\_\_\_\_
- C. Roofing, section \_\_\_\_\_
- D. Sheet Metal and Flashing, section \_\_\_\_\_
- E. Sealant, section \_\_\_\_\_

### 1.4 QUALITY ASSURANCE

- A. The glazing panels must be evaluated and listed by recognized building code evaluation organization: International Council Evaluation Service Inc (ICC-ES)
- B. Materials and Products shall be manufactured by a company continuously and regularly employed in the manufacturing, engineering, and designing, stocking and building of skylights using the specified material and system for a period of at least ten (10) years. Manufacturers shall provide a list of at least ten (10) projects having been in place a minimum of ten (10) years, with similar size, scope, climate and type.
- C. Erection shall be by a factory-approved installer who has been in the business of erecting similar material for at least five (5) consecutive years and can show evidence of satisfactory completion of projects of similar size, scope and type.

- D. The manufacturer shall be responsible for the configuration and fabrication of the complete panel system, in accordance with the requirements of this specification.

#### 1.5 SUBMITTALS

- A. Submit shop drawings and color samples in accordance with section \_\_\_\_\_  
 Manufacturer shall submit written guarantee accompanied by substantiating data, stating that the products to be furnished are in accordance with or exceed these specifications.
- B. The manufacturer shall submit certified test reports made by an independent organization. Reports shall verify that the material will meet all performance requirements of this specification. Previously completed test reports will be acceptable if they are indicative of products used on this project. Test reports required are:
1. Self-Ignition Temperature (ASTM 1929)
  2. Smoke Density (ASTM D-2843)
  3. Burning Extent (ASTM D-635)
  4. Interior Flame Spread (ASTM E-84)
  5. Color Difference (ASTM D-2244)
  6. Tests on a weathered system after approximately 10 years of actual exposure in South Florida field conditions. Tests shall include:
    - a. Uniform static air pressure per ASTM 330
    - b. Impact loading per ASTM E695
    - c. Cyclic static air pressure and missile impact level D per ASTM 1886 & ASTM E1996.
  7. Weathering Evaluation before and after exposure to 300°F, 25 minutes include Light Transmission and Color Change, per ASTM E-1175, and ASTM D-2244 respectively.
  8. Large Missile Test - Impact Resistance per SFBC PA 201-94
  9. Insulation's 'U' value for Center of Glazing per NFRC100.
  10. Insulation's 'U' value for skylight system, glazing and aluminum framing, per NFRC 100 & NFRC 700 certification.
  11. Visible light Transmission (VT) per ASTM E972 & ASTM E1084
  12. Solar Heat Gain Coefficient (SHGC) based on tests or calculations which are based on tests per methodology and procedure given in the NFRC/Calorimeter Standard.
  13. Maximum air infiltration rate for fenestration assemblies of Curtain walls, per NFRC 400 or ASTM E283.
  14. Water Penetration (ASTM E-331)
  15. Load Bearing Capability (ASTM E-330)
  16. Performance of exterior windows, curtain walls when impacted by wind-borne debris per ASTM E 1996, Level D
  17. Haze per ASTM D 1003 for glare measurement.
  18. ICC evaluation service report for compliance with IBC building code for polycarbonate glazing as an approved light transmission plastic with CC1 rating per chapter 26, and class A interior finish glazing per chapter 8.
  19. Sound Transmission Loss (STC) per ASTM E413
  - ⇒ 20. Class C [Class A], [Class B], roof construction per ASTM E108, FM 4470, NFPA 256, UBC 32-7, ULC-S107, UL 790,
  - ⇒ 21. 5 Minute Forced Entry certification per Department of State, SD-STD-01.01, Revision G (Amended), code 2114.
  22. Department of Defense Forced Entry Resistance per UFC4-020-1, DOD Security Engineering Planning Manual]
  23. [Optional] DoD Antiterrorism Standard for Buildings per UFC 4-010-01.

- C. MAINTENANCE DATA: The manufacturer shall provide recommended maintenance procedures, schedule of maintenance and materials required or recommended for maintenance.
- D. Submit Installer Certificate signed by installer, certifying compliance with project qualification requirements.

1.6 WARRANTY:



- A. Provide a single source skylight system manufacturer warranty against defective materials and fabrication. Submit manufacturer's written warranty agreeing to repair skylight system work, which fails in materials within one year from date of delivery. [Optional: Provide extended warranty at extra cost, for [2], [3] years from the date of delivery.]
- B. Provide single source skylight manufacturer 10 year glazing panel warranty. Third party warranty for glazing panels shall not be acceptable. Glazing warranty to include:
  - 1. Change in light transmission of no more than 6% per ASTM D-1003
  - 2. No delamination of panel affecting appearance, performance or structural integrity of the panel or the system
  - 3. Thermal aging - the light transmission and the color shall not change after exposure to heat of 300°F for 25 minutes (when measured per ASTM D-1003 and ASTM D-2244 respectively).
- C. In addition submit installer's written warranty agreeing to repair installation workmanship, defects and leaks within one year from date of delivery. [Optional: extended warranty at extra cost for [2 years] [3 years] from the date of delivery]



**PART 2 PRODUCTS**

2.1 MANUFACTURER

- A. The design and performance criteria of this job are based on the Quadwall 2 panel skylight system as manufactured by CPI Daylighting, A division of Kingspan Light + Air  
 Phone: (800) 759-6985, Fax (847) 816-0425  
 Website: [www.cpidaylighting.com](http://www.cpidaylighting.com), [www.kingspanlightandair.com](http://www.kingspanlightandair.com)



And as locally represented by: \_\_\_\_\_



Telephone: \_\_\_\_\_

B. APPROVED MANUFACTURERS

Other manufacturers may bid this project provided they comply with all requirements of the specification and submit evidence of compliance with all performance criteria specified herein. This evidence must include proof of conformance and test reports as per section 1.5. Any exceptions taken from this specification must be noted on the approval request. If no exceptions are noted and approval is given, product performance will be as specified. Should non-compliance be subsequently discovered, the previously given approval will be invalidated and use of the product on the project will be disallowed. All manufacturers acceptable for use on this project under this section must be approved prior to bid. Requests for approval, with all appropriate submittal data and samples must be received no less than 10 days prior to bid date. A list of all approved manufacturers and products will be issued by addendum. No other manufacturers will be acceptable. No verbal approval will be given. Listing manufacturers' names in this specification does not constitute approval of their products or relieve them of compliance with all the performance requirements contained herein. Fiberglass skins are unacceptable. Single panel system in lieu of 2 panel system is unacceptable.

2.2 TRANSLUCENT PANEL PERFORMANCE AND APPEARANCE

A. Panel construction for Longevity and Resistant to Buckling and Pressure:

- 1. Translucent panels must be constructed of tight cell sizes not exceeding 0.18". Wide cell size exceeding 0.18" shall not be acceptable.
- 2. The translucent panel shall include an integral extruded tight-cell structural core. The panel's exterior skins shall be connected with supporting continuous ribs, perpendicular to the skins, at a spacing not to exceed 0.18" (truss-like construction). In addition, the space between the two exterior skins shall be divided by multiple parallel horizontal surfaces, at a spacing not to exceed 0.18".

B. Translucent Skylight Panel - Two Panel Assembly:

- 1. Design, engineer, manufacture and installation of two panels insulated translucent skylight system. An assembly of two independent insulated single glazing polycarbonate multi-cell panels in one integrated daylighting panel assembly, incorporated into a complete aluminum framed system that has been tested and warranted by the manufacturer as a single source system. Design shall provide for the replacement of the exterior panel using tools, independently of the interior single panel and without exposing the interior or compromising the weather tightness or interfering with the normal working functions of the building. The interior single insulated panel remains intact for the life of the building envelope. Single panel extruded polycarbonate cellular or fiberglass sandwich panel systems will not meet these requirements and are not acceptable.
- ⇒ 2. Panel glazing assembly thickness shall be a minimum [2.75" two panel system with concealed interlocking connector/H battens] [4" two panel system with concealed interlocking connector/ H battens]. Minimum thickness of the exterior and the interior single panels shall be 0.315" thick each.
- 3. Panel Width: Shall not exceed 2' to ensure best performance for wind uplift, vibration, oil canning and visual appearance. Panels over 2' wide will not be approved.

C. Thermal and Solar Performance:

- 1. Insulation "U" Value performance per NFRC100 & 700, is required by the IBC/IECC/ASHRE energy code. Such performance values must be certified and labeled by NFRC. Labels shall be displayed on the product. NFRC certified and labeled products shall be published in the Certified Products Directory (CPD) on the NFRC official web site.
- 2. U value for standard panel assembly with no bat or aerogel insulation, Center of Glazing per NFRC100: 0.23
- 3. U value for panel system assembly with no bat or aerogel insulation and including skylight aluminum framing per NFRC100 & NFRC700: [0.28 for mill finish frame], [0.28 for anodize frame], [0.28 for painted frame].
- ⇒ 4. Optional - Custom U value with variety of added insulation inserts. [Adding insulation reduces (VT) Visible Transmission: Please contact CPI technical department for assistance: 800-759-6985 info@cpidaylighting.com.]
  - ⇒ a. Custom U value center of glazing only per NFRC100, U factor: [     ]
  - ⇒ b. Custom U value for a complete system per NFRC100 & 700 U factor: [     ]
- ⇒ 5. Visible Light Transmission Center of Glass (V.T. %) \_\_\_\_\_ per ASTM E972 ASTM & E1084.
- ⇒ 6. Solar Heat Gain Coefficient (SHGC) [\_\_\_\_\_] independently tested or calculated based on testing per methods and procedures given in the NFRC Calorimeter
- ⇒ 7. Exterior Panel Color: \_\_\_\_\_  
Interior Panel Color: \_\_\_\_\_

- D. Translucent Panel Joint System:
1. Panel shall be extruded in one single formable length. Transverse connections are not acceptable.
  2. The panels should be manufactured with grip-lock double tooth upstands that are integral to the unit. The upstands shall be 90 degrees to the panel face (standing seam dry glazed concept). Welding or gluing of upstands or standing seam is not acceptable.
  3. The H battens shall have a grip-lock double tooth locking mechanism to ensure maximum uplift capability.
  4. The panel joint connection shall comply with the deflection limitation of IBC Table 1604.3 for exterior walls with flexible finishes - span/60 per ASTM E-330.
  5. The metal retention clip shall be configured with a 0.4" wide top flange that extends continuously across the web from end to end and from side to side. To allow safety factor, the clip must be tested to meet a wind uplift standard of 90 PSF per ASTM E330.
  6. Water Penetration: No water penetration of the panel H joint connection length at test pressure of 6.24 PSF per ASTM E-331
  7. Free movement of the panels shall be allowed to occur without damage to the weather tightness of the completed system.
- E. Flammability:
1. The exterior and interior panels shall be an approved light transmitting panel with a CC1 fire rating classification per ASTM D-635. Flame spread no greater than 25 per ASTM E-84. Smoke density no greater than 75 per ASTM D2843 and a minimum self-ignition temperature of 1000°F per ASTM 1929.
  2. Interior flame spread classification of Class A per ASTM E84.
- F. Impact Resistance - the panels shall pass the following tests:
1. SFBC – PA 201, impact resistance of 350 ft. lbs.
  2. ASTM E 695 - Impact loading per for 500 ft. lbs.
  3. ASTM E-1996 - Must comply with standard specification for performance of exterior windows or curtain walls when impacted by windborne debris at level D and after cyclic wind loading at the specified design load.
- G. Cyclic Wind Load:
1. Translucent Panels shall be tested for cyclic wind loads and impact resistance per ASTM E 1886 and ASTM E 1996 at test load to verify the positive and negative design loads and level D impact.
- H. Weatherability:
1. The light transmission shall not decrease more than 6% as measured by ASTM D-1003 over 10 years, or after exposure to temperature of 300°F for 25 minutes (thermal aging performance standard).
  2. The weathering performance should be justified by successful testing of the glazing panel's performance after exposure to actual Florida weather conditions for approximately 10 years in comparison to a new panel assembly. This performance must be demonstrated by providing independent lab test reports for the exposed and a new panel assembly of 6' wide x 12' long for:
    - a. Uniform static air pressure per ASTM 330 at negative load of -105psf and positive load of 130psf
    - b. Impact loading per ASTM E695 of 500 ft-lb
    - c. Cyclic static air pressure at 65 PSF and impact level D per ASTM 1886 & ASTM E1996
 Test results must show that there is no deterioration in performance for the 10 year's exposed panels versus a new panel.

- 3. Panels must be manufactured from polycarbonate resin with a permanent, co-extruded ultra-violet protective layer. Post-applied coatings or films of dissimilar materials are unacceptable.
- 4. The faces shall not become readily detached when exposed to temperatures of 300°F and 0°F for 25 minutes.
- 5. Thermal aging - the interior and exterior panel shall not change color in excess of 0.75 Delta E per ASTM D2244 and shall not darken more than 0.3 units Delta L per ASTM D2244 and shall show no cracking or crazing when exposed to 300°F for 25 minutes.
- 6. Panel shall be factory sealed at the sill to restrict dirt ingress.

I. Glare and Diffused Light Transmission:

- 1. To avoid glare per IECC requirements, the panels shall have a matte finish with a minimum Haze measurement of 90% per ASTM D1003.

J. Sound Transmission Class (STC) Rating, provide materials and construction identical to those tested in assembly indicated according to ASTM E-90 and classified according to ASTM E 413 by an independent agency.

- 1. Sound Transmission Class (STC): Paired-panel assemblies shall have a minimum overall acoustic value of the following STC:
  - a. Paired-Panel Assembly; 3 Inches (76mm) Thick: STC [23] [26]
  - b. Paired-Panel Assembly; 4 Inches (101mm) Thick: STC 26 [Optional [27] [32] [34] [35] [38] [39] [43]]



K. Department of Defense Forced Entry Resistance: Provide "5-Minute-Forced Entry" certification according to Department of State, SD-STD-01.01, Revision G (Amended), code 2114 according to UFC 4-020-1, "DOD Security Engineering Planning Manual."



L. [Optional]: Department of Defense Antiterrorism Standard for Buildings: Provide stamped calculation for project-specific conditions for compliance with UFC4-010-01;

2.3 METAL FRAME STRUCTURE

A. Design criteria shall be:

- 1. Negative design wind Load: \_\_\_\_\_ PSF
- 2. Positive design wind load: \_\_\_\_\_ PSF
- 3. Snow/live Load \_\_\_\_\_ PSF
- 4. Snow drifts \_\_\_\_\_ PSF



B. The skylight framing is designed to be self-supporting between the support constructions. The deflection of the structural framing members in a direction normal to the plane of the glazing, when subjected to a uniform load deflection, shall not exceed L/60 for the unsupported span. The skylight will impose reactions to the support construction. All adjacent and support construction must support the transfer of all loads including horizontal and vertical, exerted by the skylight. Design or structural engineering services for the supporting structure or building components is not included in the skylight scope of this section.

C. Water Penetration: The metal framed skylight panels shall allow no water penetration at a minimum differential static pressure of 6.24 lbs. per sqf per AAMA 501 pressure difference recommendations and as demonstrated by prior testing of typical framing sample per ASTM E-331

D. Water test of metal frame structure shall be conducted according to procedures in AAMA 501.2.

E. Maximum air infiltration rate for fenestration of the two panel assemblies of skylight shall be per NFRC 400.

2.4 METAL MATERIALS

- A. Extruded Aluminum shall be ANSI/ASTM B221; 6063-T6: 6063-T5 or 6005-T5.
- B. Flashing:
  - 1. 5005 H34 aluminum,
  - 2. Sheet metal flashings/closures/claddings are to be furnished shop formed to profile - when lengths exceed 10 ft. in nominal 10-ft lengths. Field trimming of the flashing and field forming the ends is necessary to suit as-built conditions. Sheet metal ends are to overlap at least 6-in. to 8-in., set in a full bed of sealant and riveted if required.
- C. All Fasteners for aluminum framing to be stainless steel or cadmium plated steel, excluding the final fasteners to the building.
- D. All exposed ALUMINUM FINISH shall be from manufacturer standard color range:
  - ⇒ [Mill Finish]
  - ⇒ [CPICRF™- STANDARD TGIC Polyester resin powder coat per AAMA 2603 with [1] [5] year warranty]
  - ⇒ [CPICRF™- PREMIUM polymer resin powder coat per AAMA 2604 with 10 years warranty]
  - ⇒ [CPICRF™ - PREMIUM PLUS 70% base resin PVDF wet paint per AAMA-2605 non-exotic, non-metallic with [10] year warranty]
  - ⇒ [CPICRF™- EXOTIC METALIC 70% PVDF base resin wet paint per AAMA-2605 with [10] year warranty]
  - ⇒ [Clear Anodize with [1] [5] year warranty] [Bronze Anodize with [1] [5] year warranty]
  - ⇒ [Black Anodize with [1] [5] year warranty]

**PART 3 EXECUTIONS**

3.1 EXAMINATION

- A. General Contractor to verify when structural support is ready to receive all work in this section and to convene a Pre-Installation Conference at least one week prior to commencing work of this Section. Attendance required of General Contractor, skylight installer and all parties directly affecting and effected by the work of this section.
- B. All submitted opening sizes, dimensions and tolerances are to be field verified by general contractor unless otherwise stipulated.
- C. Installer shall examine area of installation to verify readiness of site conditions. Notify general contractor about any defects requiring correction. Do not work until conditions are satisfactory.

3.2 INSTALLATION

- A. Install components in strict accordance with manufacturer's instructions and approved shop drawings. Use proper fasteners, caulking and hardware for material attachments as specified.
- B. Use methods of attachment to structure allowing sufficient adjustment to accommodate tolerances.
- C. Remove all protective coverings on panels immediately after installation.

3.3 CLEANING

- A. Follow manufacturer's instructions when washing down exposed panel surfaces using a solution of mild detergent in warm water that is applied with soft, clean wiping cloths. Always test a small area before applying to the entire area.
- B. Follow strict panel manufacturer guidelines when removing foreign substances from panel surfaces requiring mineral spirits or any solvents that are acceptable for use. Always test a small sample to validate compliance before applying to the entire glazing panels
- C. Installers shall leave panel system clean at completion of installation. Final cleaning is by others upon completion of project, following manufacturer's cleaning instructions.

**END OF SECTION**