Specifier – Please [**contact your representative**](https://www.kalwall.com/contact-2/find-a-representative/), or info@kalwall.com for any assistance.

Specification editing notes are hidden. You may enable by going to File:Options:Display:Hidden Text, or by toggling the Show/Hide button, ¶.

**SECTION 084523**

**2-3/4” INSULATED TRANSLUCENT FIBERGLASS SANDWICH PANEL (PANEL UNIT) WALL SYSTEM FOR WINDBORNE DEBRIS RESISTANCE**

Revise this Section by deleting and inserting text to meet Project-specific requirements.

Specifier: Consult Kalwall for assistance at **info@kalwall.com** or 1-800-258-9777.

Some specification choices are very involved and require consultation in order for the Kalwall to meet the performance desired by the Owner and Architect.

1. GENERAL
	* + 1. SUMMARY
				1. Section includes the insulated, translucent sandwich panel system and accessories as shown and specified. Work includes providing and installing:

Delete items that are not applicable.

Flatinsulated, translucent sandwich panels

Aluminum clamptite installation system

Aluminum sill flashing

Thermal break windows (Optional)

Screens (Optional)

* + - * 1. Related Sections:

Insert sections in subparagraph below that contain requirements the Contractor might expect to find in this section but are specified in other sections.

**<Insert Related Sections>**

* + - 1. SUBMITTALS
				1. Submit manufacturer’s product data. Include construction details, material descriptions, profiles, and finishes of components.
				2. Submit shop drawings. Include plans, elevations, and details.
				3. Submit manufacturer’s color charts showing the full range of colors available for factory finished exposed aluminum.

When requested, submit samples for each exposed finish required, in same thickness and material indicated for the work and in size indicated below.

Sandwich panels: 7” x 12” units

Factory finished aluminum: 3” long sections

* + - * 1. Submit Installer Certificate, signed by installer, certifying compliance with project qualification requirements.
				2. Submit product reports from a qualified independent testing agency indicating each type and class of panel system complies with the project performance requirements, based on comprehensive testing of current products. Previously completed reports will be acceptable if for current manufacturer and indicative of products used on this project.

Delete product reports below that are not applicable.

Reports required (if applicable) are:

Flame Spread and Smoke Developed (UL 723) – Submit UL Card

Burn Extent (ASTM D 635)

Color Difference (ASTM D 2244)

ASTM E1886/1996 or TAS 201, 202 and 203

Bond Tensile Strength (ASTM C 297 after aging by ASTM D 1037)

Bond Shear Strength (ASTM D 1002)

Beam Bending Strength (ASTM E 72)

Insulation U-Factor (NFRC 100)

NFRC System U-Factor Certification (NFRC 700)

NFRC Visible Light Transmittance (NFRC 202)

Solar Heat Gain Coefficient (NFRC or Calculations)

Condensation Resistance Factor (AAMA 1503) (Thermally Broken, insulated panels only)

Air Leakage (ASTM E 283)

Structural Performance (ASTM E 330)

Water Penetration (ASTM E 331)

Fire Penetration of Exterior Wall Assemblies Using a Direct Flame Impingement Exposure (ASTM E2707)

Performance for Windows (AAMA/WDMA/CSA-101/I.S.2/A440) (Optional – Walls only)

* + - 1. CLOSEOUT SUBMITTALS
				1. Provide field maintenance manual to include in project maintenance manuals.
			2. QUALITY ASSURANCE
				1. Manufacturer’s Qualifications:

Material and products shall be manufactured by a company continuously and regularly employed in the manufacture of specified materials for a period of at least ten consecutive years and which can show evidence of those materials being satisfactorily used on at least six projects of similar size, scope, and located within 50km of project site. At least three of the projects shall have been in successful use for ten years or longer.

Panel system must be listed by an ANSI accredited Evaluation Service, which requires quality control inspections and fire, structural, and water infiltration testing of sandwich panel systems by an accredited agency.

Quality control inspections shall be conducted at least once each year and shall include manufacturing facilities, sandwich panel components, and production sandwich panels for conformance with AC177 “Translucent Fiberglass Reinforced Plastic (FRP) Faced Panel Wall, Roof and Skylight Systems” as issued by the ICC-ES.

* + - * 1. Installer’s Qualifications: Installation shall be by an experienced installer, which has been in the business of installing Kalwall panel systems for at least two consecutive years and can show evidence of satisfactory completion of projects of similar size, scope, and type.
			1. PERFORMANCE REQUIREMENTS
				1. The manufacturer shall be responsible for the configuration and fabrication of the complete panel system.

When requested, include span analysis data.

Standard panel system shall have less than 0.01 cfm/ft² air leakage by ASTM E 283 at 6.24 PSF (50 mph) and no water penetration by ASTM E 331 at 15 PSF; and structural testing by ASTM E 330.

Insert structural loads, as determined by project’s structural engineer in subparagraphs below.

Insert all loads in PSF, not wind speed. Indicate whether the provided wind load is Ultimate or ASD.

Structural Loads. Provide system capable of handling the following loads:

Positive Wind Load (PSF): <**Insert Number**> **PSF [Ultimate] or [ASD]**

Negative Wind Load (PSF): <**Insert Number**> **PSF [Ultimate] or [ASD]**

* + - * 1. Deflection Limits:

Based on project conditions or requirements of authorities having jurisdiction, more stringent deflection criteria than those specified in options in subparagraphs below may be required. Building codes include different deflection criteria depending on whether panel systems are classified as components and cladding or as part of the main wind-force-resisting system (for example, where a panel system is the structural roof). For discussion of deflection criteria, see "Deflection" Article in the Evaluations in Section 084500 "Translucent Wall and Roof Assemblies."

Walls: Limited to [**L/60**] **or** <**Insert Deflection**> of clear span for each assembly component.

* + - * 1. Windborne Debris Impact Resistance Performance

The International Building Code establishes criteria for buildings in hurricane prone regions. Level of Protection, Wind Zone, and Elevation above grade determine required Missile. See [**Kalwall\_Windborne-Debris-Resistance**](https://www.kalwall.com/wp-content/uploads/2015/03/Kalwall_Windborne-Debris-Resistance.pdf)**.** Insert Missile category required, and more than one type may be required on a project.

Translucent panels must be impact-resistant meeting the requirements of an approved impact-resisting standard: ASTM E 1996 and ASTM E 1886 or TAS 201, 202 and 203.

Panel System designed to meet Missile <**Insert Missile category**> per ASTM E 1996.

* + - * 1. Thermal Movements: Allow for thermal movements from ambient- and surface-temperature changes. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

Temperature Change (Range): 110 deg F (43 deg C), ambient; 150 deg F (66 deg C), material surfaces.

* + - 1. DELIVERY, STORAGE AND HANDLING
				1. Deliver panel system, components, and materials in manufacturer’s standard protective packaging.
				2. Store panels on the long edge; several inches above the ground, blocked and under cover in accordance with manufacturer’s storage and handling instructions.
			2. WARRANTY

Extended Warranties may be available depending on project design, scope, location, and exposure at additional cost. Please consult Kalwall since not all Extended Warranties will apply to all systems, designs, or applications.

Options for Extended Warranties are:

1. Material and Workmanship: Up to 5 year.
2. Panel Warranties:
	1. Up to 10 year Limited Warranty covering separation of faces from grid core affecting structural strength, noticeable surface fiber exposure of the exterior panel face, and/or abnormal color change of the exterior face sheet.
	2. Up to 20 year Limited Warranty against external exposure of the reinforcing glass fibers.
3. Finish Warranty: Up to 10 year Limited Warranty for Manufacturer's factory applied corrosion resistant finish against cracking, peeling, and adhesion failure.
	* + - 1. Provide manufacturer's and installer's written warranties agreeing to repair or replace panel system work, which fails in material or workmanship, within one year from the date of delivery. Failure of material or workmanship shall include deterioration of finish on metal in excess of normal weathering; and defects in accessories; insulated, translucent sandwich panels; and other components of the work.
				2. Extended Panel Warranty: <**Insert Extended Warranty if required**> years from date of delivery.
				3. Extended Manufacturer’s factory applied Finish Warranty: <**Insert Extended Warranty if required**> years from date of delivery.
4. PRODUCTS
	* + 1. MANUFACTURER
				1. The basis for this specification is for products manufactured by Kalwall Corporation. Other manufacturers may bid this project subject to compliance with the performance requirements of this specification and submission of evidence thereof. Listing other manufacturers’ names in this specification does not constitute approval of their products or relieve them of compliance with all the performance requirements contained herein.
				2. Kalwall Corporation, distributed by Bravura Architectural Products. Contact 1-800-803-1235 info@bapgroup.ca
			2. PANEL COMPONENTS
				1. Face Sheets:

Translucent faces: Manufactured from glass fiber reinforced thermoset resins, formulated specifically for architectural use.

Thermoplastic (e.g. polycarbonate, acrylic) faces are not acceptable.

Face sheets shall not deform, deflect, or drip when subjected to fire or flame.

Interior face sheets:

See [**Fiberglass Reinforced Polymer faces - Kalwall**](https://www.kalwall.com/technology/panel-technology/fiberglass-reinforced-polymerfrpskins/)

For Paragraph a, standard S-171 interior face sheet has a flame spread rating of 50, which meets the requirements for an IBC Class B Interior Finish needed in most building spaces.

Optional Type 25 interior face sheet has a flame spread rating of 25 that meets the requirements for an IBC Class A Interior Finish, which may be required in unsprinklered, occupied spaces or exitways (see IBC Chapter 8).

Flame spread: Underwriters Laboratories (UL) listed, which requires periodic unannounced retesting, with flame spread rating no greater than **[50] [25]** and smoke developed no greater than 450 when tested in accordance with UL 723.

Burn extent by ASTM D 635 shall be no greater than 1”.

Exterior face sheets:

Color stability – For standard exterior SW face sheets: select 5 years exposure.

 For Type A exterior face sheet: select 3 years.

Color stability: Full thickness of the exterior face sheet shall not change color more than 3 CIE Units DELTA E by ASTM D 2244 after **[3] [5]** years outdoor South Florida weathering at 5° facing south as measured on a white sample, with and without a protective film or coating to ensure long-term color stability. Color stability shall be unaffected by abrasion or scratching. Accelerated test methods such as G90 are not acceptable.

Strength: Exterior face sheet shall be uniform in strength, with panel meeting ASTM E1996 and ASTM E1886 or TAS 201, 202 and 203.

Erosion Protection: Integral, embedded-glass erosion barrier.

Appearance:

**CAUTION:** Face sheet colors affect solar properties. Refer to [**Light Transmission/SHGC**](https://www.kalwall.com/technology/performance/visible-light-transmission/) chart.

Exterior face sheets: Enter thickness and color.

Windborne Debris Options:

Missile D – Enter .060” Hurricane Hi-impact and White in color.

Missile C – Enter .052” Hi-impact and White in color.

Missile A – Enter .070” and White or Crystal (standard colors) or Kal-tints (optional colors)

Interior face sheet: Enter thickness and color.

Standard interior face sheet is .045” thick and is available in White or Crystal, for either flame spread.

Optional Hi-Impact is .052” thick in White only.

Exterior face sheet: Smooth, <**Insert Thickness**> thick and <**Insert Color**> in color.

Interior face sheet: Smooth, <**Insert Thickness**> thick and <**Insert Color**> in color.

Face sheets shall not vary more than ± 10% in thickness and be uniform in color.

* + - * 1. Grid Core:

The grid core may be Aluminum, or a Thermally Broken Composite of aluminum and fiberglass for maximum thermal efficiency. See [**Structural Grid Cores - Kalwall**](https://www.kalwall.com/technology/panel-technology/structural-grid-cores/).

Note 1: select Aluminum or Thermally Broken composite.

Delete Note 2 if Aluminum I-beam grid core is selected.

**[Aluminum][Thermally Broken Composite]** I-beam grid core shall be of alloy and temper recommended by manufacturer with provisions for mechanical interlocking of muntin-mullion and perimeter. Width of I-beam shall be no less than 7/16”.

I-beam Thermal break: Minimum 1”, thermoset fiberglass composite. Poured and de-bridged thermal break is not acceptable.

* + - * 1. Laminate Adhesive:

Heat and pressure resin type adhesive engineered for structural sandwich panel use, with minimum 25-years field use. Adhesive shall pass testing requirements specified by the International Code Council “Acceptance Criteria for Sandwich Panel Adhesives".

Minimum tensile strength of 750 PSI when the panel assembly is tested by ASTM C 297 after two exposures to six cycles each of the aging conditions prescribed by ASTM D 1037.

Minimum shear strength of the panel adhesive by ASTM D 1002 after exposure to four separate conditions:

50% Relative Humidity at 68° F: 540 PSI

182° F: 100 PSI

Accelerated Aging by ASTM D 1037 at room temperature: 800 PSI

Accelerated Aging by ASTM D 1037 at 182° F: 250 PSI

* + - 1. PANEL CONSTRUCTION
				1. Provide sandwich panels of flat fiberglass reinforced translucent face sheets laminated to a grid core of mechanically interlocking I-beams. The adhesive bonding line shall be straight, cover the entire width of the I-beam and have a neat, sharp edge.

Note 2. Select grid core insulation. Caution: aerogel insulation is not available for walls required to meet Missile D impact resistance. Consult representative.

Note 3. Panel U-factors specified are for just the panel itself. The National Fenestration Rating Council has established standardized procedures for comparing fenestration systems based on a complete installed system. View the [**NFRC Certified Systems values chart**](https://www.kalwall.com/wp-content/uploads/2018/10/kalwall_nfrc-system-u-factors-shgc-vlt_2019.pdf) for most Kalwall systems, if selections include standard aluminum grid core panels and system or thermally broken grid core panels and system. In order to find the appropriate value, specifier must know the properties of the panel specified above as well as the nature of the installation system for the project.

Notes 3-6. Panel U-factor, Visible Light Transmittance, and Solar heat gain coefficient are closely linked and must be specified accordingly. Visible Light Transmittance (VLT) values by NFRC 202 are available for Crystal/Crystal, Crystal/White, White/Crystal, and White/White face sheet combinations. Select 5a or 5b in accordance with face sheet color selection and insert light transmittance value. Delete product report under section 1.2 E, Line k, for NFRC 202 if one of these face sheet combinations is not selected. Refer to [**Thermal Performance / VLT / SHGC chart**](https://www.kalwall.com/technology/performance/thermal-performance/).

Note 6. Insert Grid nominal size (as viewed) and pattern. Standard grids 12 x 24 shoji, 24 x 12 shoji, 8 x 20 shoji, 20 x 8 shoji, or 12” x 12” square pattern called Tuckerman. Custom sizes and patterns are available. See [**Structural Grid Cores - Kalwall**](https://www.kalwall.com/technology/panel-technology/structural-grid-cores/).

Thickness: 2-3/4 inches

Grid Core Insulation: Fill panel cores with **[ air ] [ fiberglass batt ] [ aerogel ]**

Panel U-factor by NFRC certified laboratory:

2-3/4” thermally broken grid <**Insert U-factor**> **OR**

2-3/4” aluminum grid <**Insert U-factor** >

Complete insulated panel system shall have NFRC certified U-factor of <**Insert NFRC U-factor** >

Visible Light Transmittance (VLT): **[Select VLT criteria below]**

Visible LT (NFRC 202) by NFRC certified laboratory: <**Insert Value**> %. **[For Crystal/Crystal, Crystal/White, White/Crystal, or White/White face sheet combinations only]**

 **OR**

Visible LT: <**Insert Value**> %. **[For all other face sheet combinations]**

Solar heat gain coefficient <**Insert Value**>

Grid pattern as viewed: Nominal size <**Insert Grid Size**> ; pattern <**Insert Pattern**>

* + - * 1. Standard panels shall deflect no more than 1.9” at 30 PSF in 10’-0” span without a supporting frame by ASTM E 72.
				2. Panels shall meet the conditions of acceptance according to ASTM E2707 Fire Penetration of Exterior Wall Assemblies Using a Direct Flame Impingement Exposure:

Absence of flame penetration through the wall assembly at any time.

Absence of evidence of glowing combustion on the interior surface of the assembly at the end of the 60-min observation period.

Absence of evidence of flame, glow, and smoke if the test is terminated prior to the completion of the 60-min observation period.

* + - * 1. Thermally broken, insulated panels: Minimum Condensation Resistance Factor of 80 by AAMA 1503 measured on the bond line.
			1. ALUMINUM CLAMPTITE INSTALLATION SYSTEM

Select Standard or Thermally Broken for wall aluminum clamptite installation system. Delete line 2 if not required.

Note: There are some alternative system designs with varying structural, thermal, and aesthetic properties available including back-fasten closure system, wide battens, structural battens, and concealed fasteners. See [**CAD Details - Kalwall**](https://www.kalwall.com/resources/cad-details/facades/).

* + - * 1. Aluminum clamptite installation system:

**[Standard-Flat] [Standard-Curved] [Thermally Broken-Flat]** clamp-tite screw type closure system shall be of extruded aluminum alloy and temper as recommended by manufacturer.

**(Optional 2¾” Thermal Strut System-Flat)** Thermally Broken closure system: Thermal barrier shall consist of polyamide thermal strut construction with multi-directional glass fiber reinforcing. Aluminum components shall be mechanically crimped into cross knurled cavities. Poured and de-bridged thermal break is not acceptable**.**

* + - * 1. Sealing tape: Manufacturer's standard, pre-applied to aluminum clamptite installation system at the factory under controlled conditions.
				2. Fasteners: 300 series stainless steel screws for aluminum clamptite installation system, excluding final fasteners to the building.
				3. Finish:

Delete finishes that are not selected.

The standard finish for the perimeter system is a factory applied finish available in 13 standard colors meeting the performance requirements of AAMA 2604. Review the [**standard KCRF color chart**](https://www.kalwall.com/wp-content/uploads/2016/03/kalwall-kcrf-finish-2020.pdf). Enter the color and number if known.

Options include anodized, available with a maximum 1 year finish warranty.

Alternate finishes are discouraged due to cost and delivery delay, but may be available for specific projects.

Manufacturer's factory applied finish, which meets the performance requirements of AAMA 2604. Color to be <**Insert Color and Number> [selected from manufacturer's standards].**

Mill (optional)

Anodized

* + - 1. WINDOWS FOR WINDBORNE DEBRIS RESISTANCE (OPTIONAL) **Delete this section if windborne debris resistance is not a project requirement.**
				1. Windows shall be designed specifically for inclusion in the translucent panel unit wall system and factory unitized to panels.

Units shall be of the following type(s):

Project-out bottom

Fixed lite

* + - * 1. Performance: Windows shall pass or exceed requirements of AAMA/WDMA/CSA-101/I.S.2/A440-05 (08).

**E-Series Project Out Large Missile windows:** Design Pressure 80 PSF. Tested and certified to TAS 201, TAS 202, TAS 203, ASTM E1886 and ASTM E1996. Poured and debridged thermal breaks are not acceptable.

**E-Series Fixed Large Missile windows:** Design Pressure 80 PSF. Tested and certified to TAS 201, TAS 202, TAS 203, ASTM E1886 and ASTM E1996. Poured and debridged thermal breaks are not acceptable.

* + - * 1. Construction: All window frame members and sash shall be of tubular extruded aluminum. Frame and sash to have enhanced thermal performance and mechanical strength using polyamide thermal strut construction. Frame sections shall be mitered and joined using heavy internal aluminum corner gussets that are mechanically staked and epoxy sealed. All openings are double sealed using continuous EPDM bulb, foam and wedge weather stripping to insure minimum air infiltration and maximum water resistance. Both project-out and fixed lites to have snap-in aluminum glazing bead for ease of field glazing.
				2. Hardware:

Hinges on project out windows shall be four bar stainless steel with adjustable friction blocks.

Locking hardware shall consist of a single centered cast aluminum handle with concealed multi-point locking elements (locking handles optional). Handles are available in **[white] [black] or [silver].**

* + - * 1. Glazing: Insert Glazing specification in this paragraph.

E-Series Large Missile windows shall be factory glazed with 1” nominal laminated insulated large missile resistant glass.

Glazing Specification: <**Insert Glazing Specification**>

* + - * 1. Finish is to be coordinated with closure system.
				2. Insect Screens (Optional) Delete this paragraph if insect screens are not included.

Constructed of hollow box extruded frame

Mitered with reinforcing corners mechanically joined

Screens for project-out windows shall be equipped with wickets for access to handles

Screen cloth shall be of 18-16 aluminum mesh and held in place by spline

PART 3 - EXECUTION

3.1 EXAMINATION

A. Installer shall examine substrates, supporting structure, and installation conditions.

B. Do not proceed with panel installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Metal Protection:

1. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended by sealant manufacturer for this purpose.

2. Where aluminum will contact concrete, masonry, or pressure treated wood, protect against corrosion by painting contact surfaces with bituminous paint or method recommended by sealant manufacturer.

3.3 INSTALLATION

A. Install the panel system in accordance with the manufacturer's fabrication drawings and suggested installation instructions.

1. Anchor component parts securely in place by permanent mechanical attachment system.

2. Accommodate thermal and mechanical movements.

3. Seal aluminum clamptite installation system as shown on the manufacturer’s fabrication drawings and suggested installation instructions.

B. Install joint sealants at perimeter joints and within the panel system in accordance with manufacturers fabrication drawings and suggested installation instructions.

3.4 FIELD QUALITY CONTROL **Delete this section if not applicable.**

A. Water Test: Installer to test a representative section of installed materials according to procedures in AAMA 501.2.

B. Repair or replace work that does not pass testing or that is damaged by testing and retest work.

3.5 CLEANING

A. Clean the panel system, interior and exterior, immediately after installation.

B. Refer to manufacturer's written recommendations.

END OF SECTION 084523