

GREENSTONE
BUILDING PRODUCTS



ICE
PANEL

ASSEMBLY MANUAL

UPDATED AS OF 2023.04.04

Table of Contents

DISCLAIMERS/RECOMMENDATIONS

STRUCTURAL INSPECTION CHECKLIST

1.0 INTRODUCTION

- 1.1 GREENSTONE ICE PANEL
- 1.2 BEFORE YOU GET STARTED
- 1.3 DRAWING AND ELEMENT NUMBERS

2.0 ASSEMBLY

2.1 ICE PANEL ASSEMBLY

- STEP 1: UNLOADING & STAGING YOUR SITE
- STEP 2: TRACK LAYOUT, INSTALLATION, AND PANEL LAYOUT
- STEP 3: CORNER INSTALLATION
- STEP 4: WALL PANEL ASSEMBLY
- STEP 5: BRACING
- STEP 6: INSTALLING THE LOAD BEARING CHANNEL (LBC)
- STEP 7: STRAIGHTENING & FINAL FASTENING
- STEP 8: SEALING WALLS: INTERIOR VAPOUR BARRIER/EXTERIOR WEATHER BARRIER

2.2 ALTERNATIVE ASSEMBLY OF INTERCHANGEABLE PANELS

2.3 WALL ASSEMBLY BELOW GRADE

2.4 ROOF AND FLOOR ASSEMBLY

2.5 INSTALLATION COMPLIANCE

3.0 QUALITY CONTROL

- 3.1 INSPECTION OF PANELS
- 3.2 ON-SITE CHANGES
- 3.3 DIMENSIONAL TOLERANCES

4.0 SAFETY

5.0 DRAWINGS & REFERENCE DOCUMENTS

APPENDIX A

HOW TO GET YOUR INSTALLATION APPROVAL

DISCLAIMERS/ RECOMMENDATIONS

Greenstone ICE Panels are manufactured with galvanized cold-formed steel studs and Type 2 EPS insulation. Thermal barrier or ignition barriers are generally required to cover the inside face of the panels to meet local building codes. Check with your local authority for areas in question.

Greenstone ICE Panels are compliant as a Class II vapour barrier when installed in accordance with the installation instructions and proper measures have been taken to seal all transitions and joints tightly. Proper sealing and quality control during this process falls solely on the installer. Measures to ensure a good seal like blower door testing, or alternative sealing methods like installing AeroBarrier® are good building practices and avoid quality control concerns regarding the sealing process.

Greenstone recommends all panel joints be sealed on the interior face. All accessible voids in the assembly should be filled with low expansion foam insulation prior to interior sealing of the joints and transitions. Expanding foam should not be relied on for air or vapour sealing.

The Greenstone assembly is not detailed to repel water and requires a weather resistive barrier on the exterior (such as building wrap or equal, and ice and water shield for roofs) as a minimum covering before installing exterior finishes.

Once installed, ICE Panels should be protected from large temperature swings whenever possible. For residential and commercial building applications, Greenstone recommends maintaining an interior temperature above -10°C once the envelope is installed to manage contraction and expansion of the envelope. Excessive temperature swings may compromise the vapour barrier characteristics of an exposed panel.


An ICE Panel assembly should not be left exposed to the elements for more than 3 months after erection without any covering. UV light may damage the surface of the EPS causing it to develop a yellow chalking powder on the surface. Any self adhering membranes will no longer adhere to this surface. ICE Panels produced with graphite EPS are more susceptible to sun damage due to the darker color. Ensure these panels are covered as soon as possible during summer installations, especially on roof applications.

The installer must provide Greenstone with photos of the complete ICE Panel installation after structural assembly is complete **before covering**. Approval from Greenstone is required before making any portion of the assembly inaccessible to inspection. See Appendix A for more information.

STRUCTURAL INSPECTION CHECKLIST



INSPECTION ITEMS:	EXTERIOR ✓	INTERIOR ✓	WAS THIS 📷?
<p>REQUIRED REFERENCE DOCUMENTATION: Installation Documents binder provided in the Project Installation Package.</p> <p><i>Please note that not all details referenced below will apply to this project. The standard connection details that directly apply to this project are listed in the project installation documents binder.</i></p>	<p><i>REMINDER: To complete your Installation Review, you must photograph the panels before covering them. See the Installation Review Process in Appendix A of the Assembly Manual.</i></p>		
<p>Is the split track anchored correctly (if anchors are visible)?</p> <p>Mushroom head spikes are used for concrete applications.</p> <ul style="list-style-type: none"> Standard Connection Details to reference: 201, 202, 203, 204, 205, 208, 220 <p>2.5" Deck screws are used for wood applications.</p> <ul style="list-style-type: none"> Standard Connection Details for reference: 207, 222, 223, 241, 420, 421, 422, 423, 424, 425, 426, 430, 431, 432, 433, 434 			
<p>Are screws at stud locations?</p> <p>1 screw for every stud through the Split Track and the Load Bearing Channel (LBC).</p> <ul style="list-style-type: none"> Standard Connection Details to reference: 301, 302, 320, 321, 322, 340, 341, 346, 347, 349, 352, 360, 361, 362, 380, 381, 382 			
<p>Are the clip spacings and placement correct?</p> <ul style="list-style-type: none"> Standard Connection Details to reference: 301, 302, 303, 304, 306, 345, 346, 347, 351, 352 			
<p>Are the LBC's joined at the stud with stagger joints inside to outside?</p> <ul style="list-style-type: none"> Standard Connection Details to reference: 320, 321, 322, 323 			
<p>Are LBC's correctly installed on sills?</p> <p>LBC's cover corner-to-corner and are notched into the jack studs on either side by 1".</p> <ul style="list-style-type: none"> Standard Connection Details to reference: 340, 341, 351, 362 			
<p>Are Panelizing Clips installed in the right locations?</p> <ul style="list-style-type: none"> Standard Connection Details to reference: 347, 349, 360, 361, 362 			
<p>Are all joist notch ledges fastened correctly?</p> <ul style="list-style-type: none"> All joist notch ledges are to have 2x nominal lumber fastened to top track below the joists. The joists are to be fastened to the lumber as well. 			

INSPECTION ITEMS:	EXTERIOR ✓	INTERIOR ✓	WAS THIS  ?
<p>REQUIRED REFERENCE DOCUMENTATION: Installation Documents binder provided in the Project Installation Package.</p> <p><i>Please note that not all details referenced below will apply to this project. The standard connection details that directly apply to this project are listed in the project installation documents binder.</i></p>	<p><i>REMINDER: To complete your Installation Review, you must photograph the panels before covering them. See the Installation Review Process in Appendix A of the Assembly Manual.</i></p>		
<p>Are beam pockets and bearing points for non-Greenstone headers installed correctly?</p> <ul style="list-style-type: none"> • Beam pockets and bearing points for non-Greenstone headers are to have a minimum of two layers of plywood as specified in the Greenstone assembly drawings. 			
<p>Are all the pre-drilled screw holes filled with screws?</p> <ul style="list-style-type: none"> • At minimum, 4 pre-drilled holes in Greenstone connection hardware are to be filled with screws. • In the event that the pre-drilled holes do not line up with the steel stud of the wall panel, the installer must drill new screw holes. • Number of new holes must match number of existing pre-drilled holes. 			

1.0 INTRODUCTION

1.1 Greenstone ICE Panel

The ICE Panel is an engineered combination of expanded polystyrene and galvanized steel studs. The panel has load bearing, sound transmission, thermal insulation, and vapour barrier characteristics. This manual outlines the proper method for erecting buildings using the ICE Panel. The directions found in this manual must be observed to achieve the full effectiveness of the characteristics of the system and for Greenstone's Engineer approval.

IMPORTANT | DO NOT cover the Greenstone ICE Panel installation without written installation approval from Greenstone Building Products. (see section 2.5).

1.2 | Before You Get Started..



Review and complete the Greenstone Pre-Build Checklist.



Read all installation and connection details provided in the Install Package.

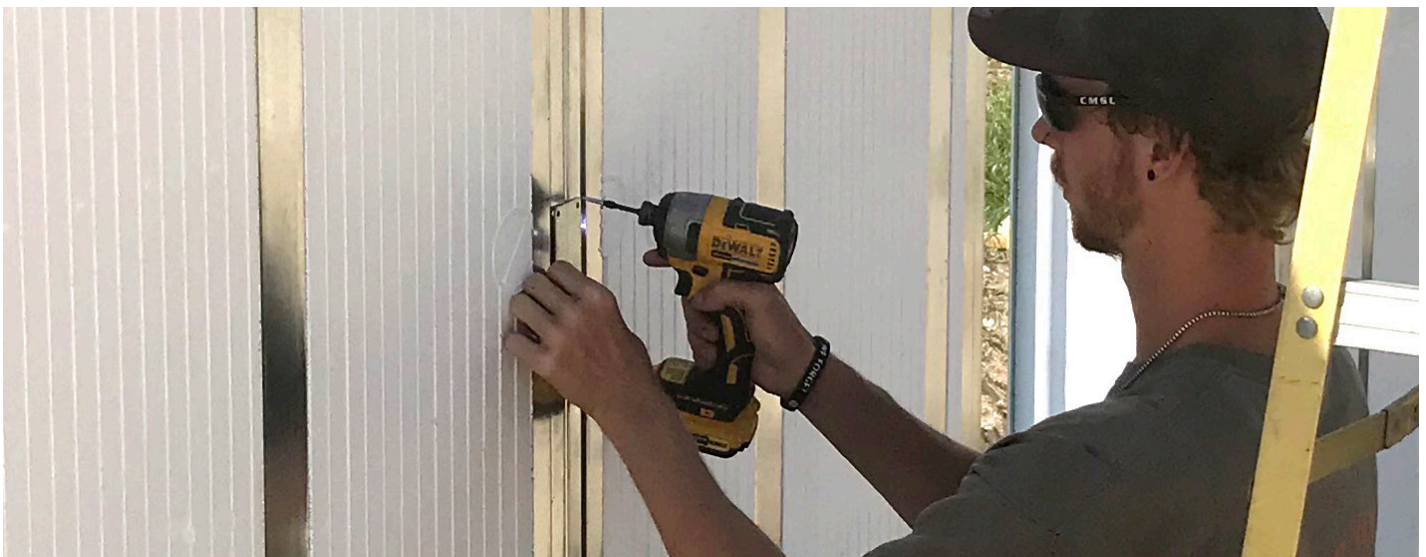


Confirm a square and level foundation. The maximum tolerance is 1/8" for an efficient Greenstone installation. If foundation is not level, grind high spots and/or shim Greenstone base track.

IMPORTANT | Always use foams, adhesives, membranes, and sealants approved for use with EPS and Steel.



Tape is used on interior connections. Foam is for use to fill gaps and voids.



Be sure not to strip your screws as this will VOID Greenstone's warranty.

1.3 | Drawing & Element Numbers



Builders should study the appropriate drawings before beginning construction and assembly.



The provided Installation Drawings show an element number for each panel in the floor plan, which appears on the top and bottom end of each panel.



The leading edge of a ship lap panel always points the intended direction of assembly.

2.0 ASSEMBLY

2.1 ICE Panel Assembly

STEP 1: Unloading & Staging your Site



Verify that the dimensions of your slab or subfloor match the contract drawings and coordinate with the Greenstone Installation Drawings.



Identify opening starts and stops and mark for reference. You will adjust the panels to these during installation by leaving slight gaps between panels on the interior wall.



When unloading, stack the panel bundles where they can easily be accessed for distribution once the base track is installed.



Protect panels from high winds and sharp impact.

STEP 2: Track Layout, Installation and Panel Layout

ICE Panels are attached to the foundation using specified steel base track with wedge anchors (concrete) or specified screw fasteners (wood sub base). Size and spacing of anchors shall be installed as per installation drawings.



BELOW GRADE



ABOVE GRADE



Set interior split track to building dimensions & secure to slab or subfloor using specified anchors. Self adhered membrane must be installed overlapping the bottom flange of the inside split track and run out to overlap the rim board or face of wall below and extend past the transition by a minimum of 4.



Using a small panel (header) or foam block sized to match wall thickness (typically within the panel stacks), set exterior track relative to interior track.



Be sure the track is level and corners are square. If the foundation is not level, shim and fill below track to obtain level.

IMPORTANT | Do NOT shim individual panels.



Mark start and stop of rough openings on exterior track per layout.

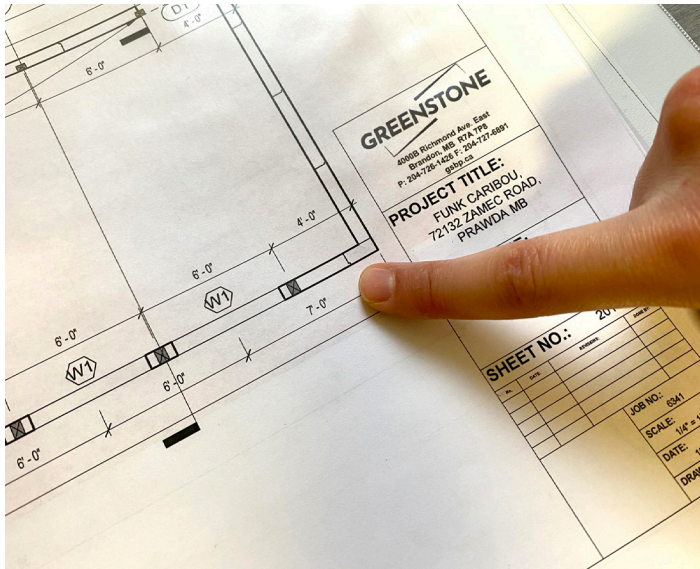


Determine sequence of panel assembly. It can initiate in any building corner, with the direction of assembly as shown on your installation drawings.



Unbundle and lay the panels near their install location for easy access during erection.

STEP 3: Corner Installation



Reference the installation drawings to determine which panel runs to the outer edge of the corner.



Install **outside corner connector plate (OC)** at approximately 6', or 2' down from top of first panel.



Place first corner panel into the corner.



Straighten, square and secure panel to bottom track with one screw.



Place other corner panel approximately 1" from the first panel.



Apply foam (in a corner butt joint application) between the panels from top to bottom, and push panels together.



Plumb both ways and secure with the outside corner connector. Screw to the bottom track so the panels cannot move.



You should have a straight and plumb starting point.

STEP 4: Wall Panel Assembly

Once the corner is installed, follow the install direction on the installation drawings.



IMPORTANT | Do not winch panels tight.
Any gaps will be foamed shut later.



Place the next panel into track and tilt up against previous panel.



Plumb panel and install connector plate with 4 screws into the leading edge of the previous panel.

IMPORTANT | When there is no shiplap, the panels may not touch when correctly placed.



Gaps will be foamed and the interior joints will be sealed with approved tape. Install 1 screw in second stud from edge on either side (exterior typically) of the panel on one side of the base track only.



Only install fasteners on one side of the envelope during erection at this time.
Final fastening per connection details is completed as the final step in the installation process.



Opening size & placement must be as per installation drawings. Adjust panel placement at openings accordingly as per layout.



Insulated Header panels are built 3/8" shorter than the opening to allow for placement and foaming.

IMPORTANT | Do NOT strip screws during installation.
If you strip a screw, be sure to add another right beside to ensure Greenstone Warranty remains valid.

STEP 5: Bracing



Install temporary wall bracing at MAX 10' intervals during wall panel erection.



Bracing can be installed to the inside or outside of the building.



Use the side of rough openings to secure bracing when available.



Field Bent Connector Plate can be used as temporary brace connectors.



Use appropriate screws to fasten bracing.



Ensure walls are straight as you brace to minimize adjustments.

STEP 6: Installing the Load Bearing Channel (LBC)



Load Bearing Channels (LBC) are longer sections which tie the building together. They must end on a stud. They should never end on a joint (6" past) and always join at a stud.



IMPORTANT | Begin LBC installation once more than 12' of straight wall length is erected.

Stagger LBC's termination from inside to outside a minimum of 24" to further straighten and stiffen the wall.

Gap between adjacent LBC's (ie. due to cutting error) shall not exceed 1/4".



On-site modification will be required to install exterior LBC's in the corner per connection details.



Interior LBC's stop at interior face of intersecting panel;
DO NOT run to exterior of wall.



Install a continuous piece of LBC on the bottom of window openings on the interior & exterior panel faces of the opening.

STEP 7: Straightening & Final Fastening



Once the panels are in place for one level, the overall dimensions and squareness of the building should be checked before proceeding with the assembly of any upper level floor or roof system.



String line the wall before final foaming any gaps.



Do a visual inspection of all joints after erection is complete. Spray foam any gaps on the inside & outside of the assembly.

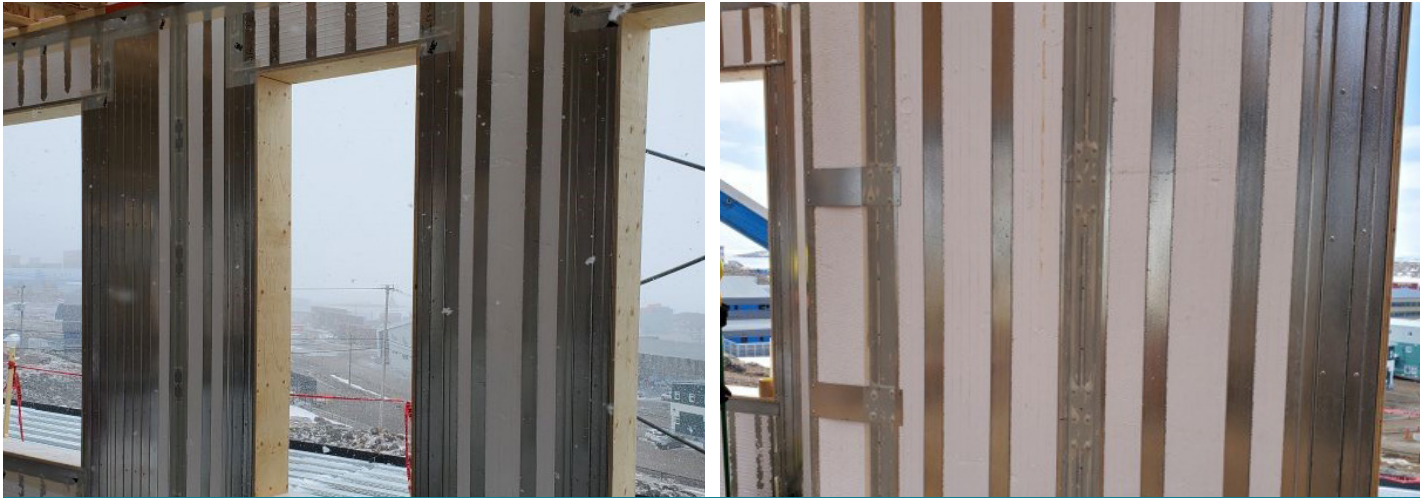


IMPORTANT | Do NOT strip screws during installation.

If you strip a screw, be sure to add another right beside to ensure Greenstone Warranty remains valid.

Install all connection plates and screws per connection details.

STEP 8: SEALING WALLS: INTERIOR VAPOUR BARRIER/ EXTERIOR WEATHER BARRIER



Gaps and voids must be filled with low expansion foam. After final foaming and fastening, seal all interior joints with approved vapour tape. Tape must be approved for EPS and galvanized steel for air and vapour tightness.



Panel joints, floor to wall, and roof to wall joints require spray foam and approved tape on the inside of the assembly.

STOP! BEFORE YOU COVER IT, PHOTOGRAPH IT!

DO NOT Cover Your ICE Panel Installation Without Receiving Your **INSTALLATION REVIEW** From Greenstone.

Before proceeding with the installation of the weather barrier, Greenstone requires photos of ALL installed panels (interior and exterior views) including all panel joints and connections in order to issue your **Installation Confirmation**.

See Appendix A for more information.



Always install a high vapour permeance weather barrier membrane on the exterior to act as a drainage plane to drain water away from the panel joints.

2.2 Alternative Assembly of Interchangeable Panels

In assembly, some panels are identical and marked so by a Designation number before the individual panel identifying tag (ie. FA2). These panels are interchangeable and can be swapped out for other panels with the same Interchangeability Code.

Panel Labeling Chart

INTERCHANGEABILITY CODE			
Prefix	Prefix	Level	Number
1, 2, 3, etc..	F = Floor	A = First	1, 2, 3, etc..
1, 2, 3, etc..	R = Roof	B = Second	1, 2, 3, etc..
1, 2, 3, etc..	W = Wall	C = Third	1, 2, 3, etc..
1, 2, 3, etc..	H = Header	D = Fourth	1, 2, 3, etc..
1, 2, 3, etc..	C = Ceiling	E = Fifth	1, 2, 3, etc..

Example

Panel 1-FA27, as it would be labeled on the supplied shop drawing and the panel itself, could fit in place of any other panel starting with “1FA”. A panel labeled as 3-WA106 could fit where 3-WA1 is called for on the drawings, or 9-RB27 could fit where 9-RB43 is called for on the shop drawings.

The preceding number, along with the letters indicating the type of panel and what level it is at, dictate where the panel can go in the assembly. The letters along with the numbers track the individual panel for inventory, shipping and quality control purposes.

Panels without a number before the letter are unique and must be installed in the location designated by the shop drawings. Differences may not be apparent, and no assumptions may be made about their interchangeability.

Important Note

If panels are substituted for identical panels other than the ones designated in the supplied shop drawings, the panel used as alternate needs to be recorded on a copy of the shop drawing, as an as built, and returned to the supplier after the project is assembled. This is for our product tracking, and is a necessary component of our quality control, and is therefore required for validity of Greenstone's warranty and engineer sign-off. As-built drawings are not required for interchangeable panels used in non-structural elements such as floors and roofs supported by trusses.

2.3 Wall Assembly Below Grade

Reference GSS Typ. Foundation Detail for either deep burial or shallow burial below grade installation. Follow wall assembly instructions above. Add PWF Plywood / dimple board and waterproofing membrane as shown.

2.4 Roof and Floor Assembly

Reference Connection Details provided for assembly requirements for Roof and Floor Assembly.

Leading edge for floor and roof assembly is on the bottom side, placed against support and attached with a roof/floor clip through the ship lap and leading edge.

When sealing roof and floor connections, refer to Connection Details:

- **Ship Lap Connection** – Apply continuous bead of foam to ship lap joint before installing next roof panel. Foam any remaining gap with foam after installation. Fill any gap between panels with foam. Address all connections on the interior with vapour tape and use peel and stick membrane as per connection detail.
- **Butt Joint Connection** – Space panel approximately 1" apart from installed panel. Apply continuous bead of foam to fill void between panels. Press panels together and tape interior side of butt joint after installation is complete.

2.5 Installation Compliance

To certify the ICE Panel installation and provide written installation approval, Installation Photos (panel connections, both interior and exterior sides, as well as connections to foundation, roof and other structural elements) must be provided to Greenstone for approval. An on-site inspection by an authorized Greenstone representative may also be required.

PLEASE NOTE

Do not cover the Greenstone ICE Panel installation without written installation approval from Greenstone.

The completed installation photos will be reviewed by Greenstone and a letter will be provided to you for the Structural Engineer of Record for the project. An engineering letter cannot be provided without installation review by Greenstone.

See Appendix A for a guide to achieving your Greenstone Installation Confirmation.

3.0 QUALITY CONTROL

3.1 Inspection of Panels

Panels have been checked for density and fusion quality and for dimensions before shipment, but should be checked for damage and spot-checked for dimensions as they are unloaded and stacked. For dimensional tolerances refer to section 3.3 below.

As a general rule, any defect in the polystyrene core of the panel such as small cuts or nicks will not affect the integrity of the panel. Damage to the metal will affect the panel's strength and integrity and can result in a rejected panel; refer to 3.2 below.

3.2 On-site Changes

In general, any changes deemed necessary on-site must be cleared with the manufacturer before the changes are made.

The following site changes may be made:

- Reject any panel with vertical steel members that are buckled.
- Electrical Boxes: Use a hot knife or other acceptable cutting tool. Do not exceed the box dimensions and, where possible, locate the box beside a vertical steel channel for screw attachment. Boxes should have recessed “ears” or brackets behind the wall cladding.
- Wiring or Conduit Chases. Vertical chases may be cut in to the polystyrene with a hot knife or other acceptable cutting tool. Vertical chases shall be cut a minimum of 2” from any vertical steel channel. Do not exceed half the panel thickness in depth or 1” in width when making these cuts. Do not cut or drill any steel without approval from an engineer.
- After installing wire, conduit or boxes, refill cut areas with low-expansion foam to seal and secure wires and boxes.

3.3 Dimensional Tolerances

PANELS:

- Thickness $\pm 1/8$ "
- Panel Bow $\pm 1/8$ "
- Width ± 0 ", - $1/4$ "
- Additional Width Deviation at mid height + 0 ", - $1/4$ "
- Length $\pm 1/4$ "
- Length difference between panels of same nominal length $\pm 1/8$ "
- Diagonal out of square $\pm 1/4$ "

DOOR, WINDOW, AND OTHER ROUGH OPENINGS:

- Width $\pm 1/4$ "
- Length $\pm 1/4$ "
- Diagonal out of square $\pm 3/8$ "

4.0 SAFETY

The panels may be handled by one or two people. The following rules should be followed:

- Gloves should be worn at all times when moving panels. The metal edges can cut and must be handled carefully.
- Do not remove panels in high wind conditions. The surface of the panel will catch the wind and can create a potentially hazardous condition.
- If high winds are possible, panels must be sheltered, weighted, or otherwise protected from moving.

5.0 DRAWINGS AND REFERENCE DOCUMENTS

The following documents are required for installation and will be provided as part of the GREENSTONE Installation Documents sent by your Greenstone Supplier:

- Greenstone Ice Panel Assembly Manual
- Greenstone Project Specific Installation Drawing Package
- Greenstone Project Specific Connection Details
- Greenstone Structural Inspection Checklist

Appendix A

STOP..

Before you cover it,

photograph it.

DO NOT Cover Your ICE Panel Installation Without Receiving Your **INSTALLATION REVIEW** From Greenstone.

Greenstone requires photos of ALL installed panels (interior and exterior views) including all panel joints and connections in order to issue your **Installation Confirmation**.


Free PROMO
On our Social Media    


We want to promote you on our social media! Send us some photos of your team at the job site and we will post about it on our Facebook, Instagram, and LinkedIn accounts. Love our product? Let's make a testimonial video! Contact your sales rep to make arrangements.

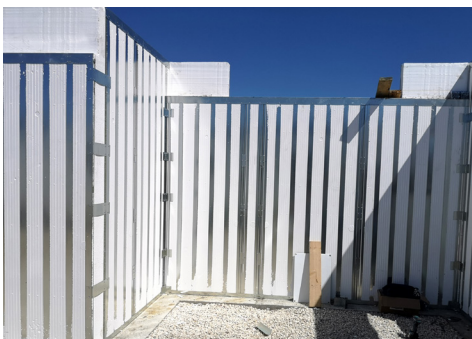


Here's How to Complete Your Installation Review:

To review the ICE Panel installation and provide written installation confirmation, **INSTALLATION PHOTOS** (panel connections, both interior and exterior sides, as well as connections to foundation, roof and other structural elements) must be provided to Greenstone for review. An on-site inspection by an authorized Greenstone representative may also be required. The completed installation photos will be reviewed by Greenstone and a confirmation letter will be provided to you for the project's Structural Engineer of Record. An engineering letter cannot be provided without installation review by Greenstone.

 Please send photos of each completed stage of the project as they are done to expedite your review process. Timeline for installation photo review is a minimum of 5 business days.

 DO NOT send photos of incomplete work. Ensure all installation criteria has been met **before** submitting photos for review.



Take photos in a walk-around fashion starting with Panel #1 in a corner.



Take exterior photos showing 15-20 foot sections of wall per photo.



Make sure the photos overlap so the picture progression can be followed.

RULE OF THUMB | If you can see the screws when you zoom in, you are close enough. Extreme close-ups are not required; we can zoom in to see the connections.



Take a few shots from far away showing the whole building.



Take Interior photos from as far back from the wall as possible, and include 15-20 foot sections of wall per photo.



When a close-up photo is warranted (ie. a beam pocket) take a photo further back first, then close up.

REMEMBER! We need to see all installed panels, panel-to-panel connections, as well as connections to foundation, roof, and other structural elements.