hempitecture®

PlantPanel X

EXTERIOR RIGID BOARD

Installation Guide

PlantPanel X is a rigid continuous insulation material used in exterior above-ground applications. With an R Value of R3.25 per inch, PlantPanel adds to thermal and acoustic comfort and performance.

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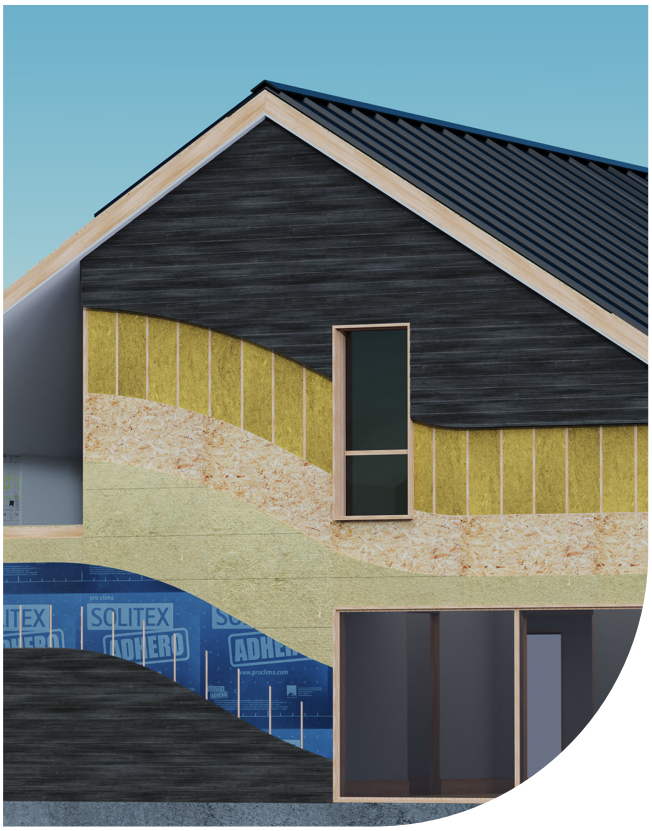


PlantPanel X

Engineered with a density to resist compression and deflection, PlantPanel is used in split-insulation wall and roof assemblies with either a rain screen cladding or roofing material, depending on the application. With 100% biobased and recycled content, PlantPanel is a sustainable, low carbon continuous insulation solution that's easy to install and safe to handle.

Treated with biobased fire retardants that are Red List ingredient free, free of VOC's, and non-toxic, PlantPanel is a safe to use material, tested in accordance with ASTM C612 testing methods.

PlantPanel is an ideal material for exterior rigid insulation due to its ease of installation, dimensional stability, fire resistance, sustained R-value across diverse temperatures, and exceptional vapor permeability.

Why PlantPanel

As we work towards reducing our energy consumption and energy codes drive building performance higher, continuous insulation is a solution that eliminates thermal bridging and improves thermal performance. Most rigid insulations on the market are manufactured from synthetic foams or with mineral fiber. These materials have high carbon footprints that outweigh the operational energy savings. **PlantPanel is a high performance, low carbon solution to these conventional materials.**

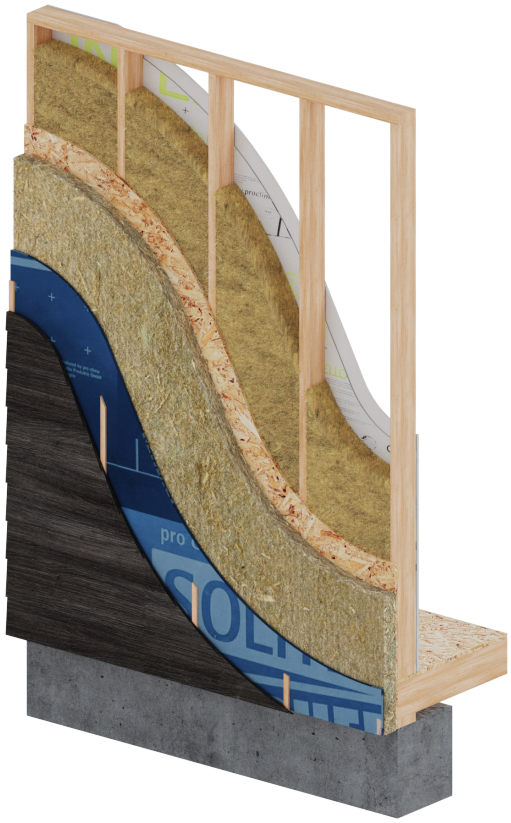
Hempitecture manufactures PlantPanel with primarily US grown hemp fiber. Hemp fiber is a natural bast fiber from the industrial hemp crop that is durable, moisture wicking, and requires minimal to zero pesticides or fertilizers to produce. During its growth, the hemp plant captures carbon dioxide, storing it in the soil and in the plant mass itself. As a result, PlantPanel has a low to negative carbon footprint, thanks to the carbon sequestering capabilities of industrial hemp. There is no THC or psychoactive compounds in industrial hemp fiber.

Alternatively, rigid foam boards are produced from an array of industrial petrochemical based synthetic polymers that are harmful to human health. Similarly, mineral fiber boards require huge amounts of energy to produce, while causing irritation to the skin and lungs. This is why we have developed PlantPanel, as a more healthy and sustainable solution to increasing thermal performance with continuous insulation.

This is why we have engineered PlantPanel: to make homes healthier, more sustainable, and to have less impact both on our own indoor environment, as well as our planet.

PRIMARY USE - *RAIN SCREEN* EXTERIOR WALLS

PlantPanel is most often used for exterior walls in a split-insulation wall configuration, referred to as a rain screen.



A rain screen wall configuration using PlantPanel comprises rigid insulation affixed to the outer surface of an above-grade, standard 2x4 or 2x6 insulated wood-frame wall. Hempitecture PlantPanel™ insulation is applied to the outside of the sheathing, secured with vertical strapping or alternative attachment methods, offering a surface for cladding attachment and ensuring a drained/ventilated cavity behind the cladding. Particularly, PlantPanel is completed with an adhesive vapor permeable membrane before the installation of the vertical strapping or furring strips.

An important benefit of this wall design is its elevated effective R-values resulting from the uninterrupted insulation outside the structural framing, therefore mitigating thermal bridging. Consequently, the continuous exterior insulation offers superior R-value per unit thickness compared to traditional stud cavity insulation. The interior wooden or metal components of the configuration retain more warmth due to the external insulation layer, thus reducing the risk of condensation within these layers.

There are many potential insulation combinations for a this type of wall assembly. The most common scenario is batt insulation installed within the stud cavity and rigid insulation installed on the exterior of the sheathing.

TECHNICAL DATA

ASTM C518
Thermal Resistance @ 75 F - R3.25
Apparent Thermal Conductivity (Btu·in/ft²·h·°F) = .3154
Thermal Resistivity Per Inch (ft²·h·°F/Btu·in) = 3.17

ASTM E84
Flame Spread and Smoke Developed - Class B
Flame Spread Index = 40
Smoke Developed Index = 250

ASTM C165
Stress at 10% Displacement - 5.64 lb/in^2

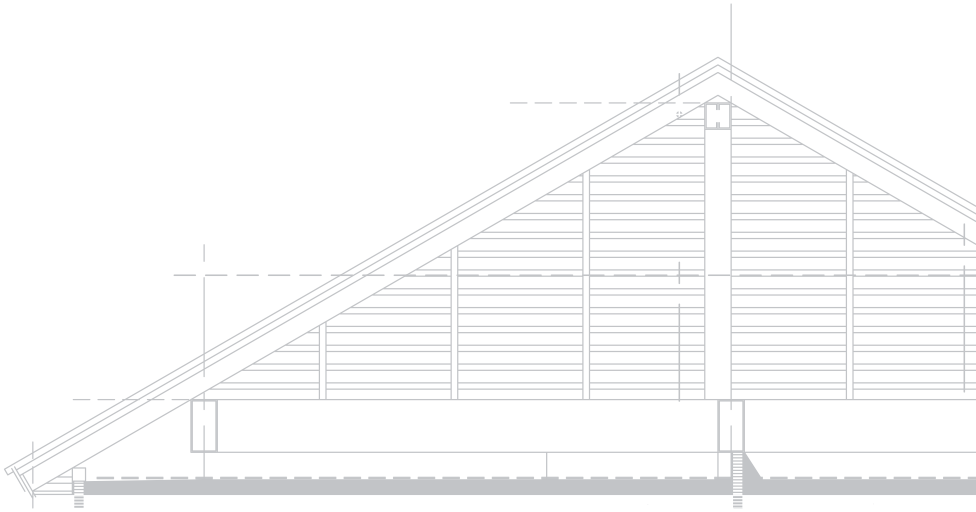
ASTM C303
Specimen Mass (lb) = 1.2
Average Thickness (in) = 2.06
Specimen Density (lb/ft3) = 7.02

ASTM C1338
Fungi Resistance - Pass

ASTM C1617
Corrosion Mass Loss - Pass

ASTM D2126
Thermal and Humid Aging - Pass
After 168 hours of exposure to 158 F / 97% RH - 24% Deviation

ASTM E96
Water Vapor Transmission - 26 Perms / Pass



VENTILATED ROOF SYSTEMS

PlantPanel is additionally used as a continuous insulation layer for roof assemblies. This method follows many of the same principles as the rain screen exterior wall system. PlantPanel is affixed to the roof sheathing, secured with vertical strapping or alternative attachment methods, offering a surface for finished roofing material attachment. As in the wall system detailing, PlantPanel should be covered with a vapor permeable adhesive membrane, allowing the vapor permanence of the material to remain, and ensures a ventilated cavity behind the roofing material.

When PlantPanel is used as continuous insulation for roofing systems, the layers of build up may change as required by the finish material. This may result in a ventilated gap between the layer of insulation, with an additional layer of sheathing above to carry a roofing material.

Often, the combination of assembly with PlantPanel for ventilated roof systems is on a structural roof constructed from dimensional lumber, engineered joists, or trusses.

PlantPanel X

When it comes to whole home performance and durability of materials within your assembly, the use of vapor permeable continuous insulation is beneficial for a number of reasons. PlantPanel insulation, with its high vapor permeability, as tested with ASTM E96 Water Vapor Transmission tests, provides improved durability for wood frame wall and roof assemblies in all climate zones. Alternate exterior insulation types such as vapor-impermeable foam insulation (EPS, Polyiso, or XPS) can increase the risk of trapping moisture within the sheathing. This can occur either through moisture penetration, residual construction moisture, or condensation & vapor drive. The use of vapor-permeable PlantPanel addresses this concern.

In addition to vapor permeability, PlantPanel has been tested to numerous standards under ASTM C612, Standard Specification for Mineral Fiber Board and Block. Despite not being of mineral fiber origin, PlantPanel meets and exceeds a number of the standard tests within ASTM C612.

Preparing for Installation

Tools for installation of PlantPanel are commonly available tools that generally are within most carpenters tool kits. PlantPanel cuts like wood, and it should generally be treated as a wood like material.

Tools Needed

Tape measure
Framing square
Utility knife
Permanent marker
Chalk string line
4 Ft Level
Circular saw with wood blade (Diablo)
Air compressor
Galvanized Widecrown staples
Pneumatic widecrown stapler
Impact Driver
Timberlok screws for battens
Widecrown washer
Screws compatible with widecrown washer
Tablesaw
WRB installation tools and tapes
Tarps and cover for the dry storage of PlantPanel
PPE

Installation Guidelines For Walls

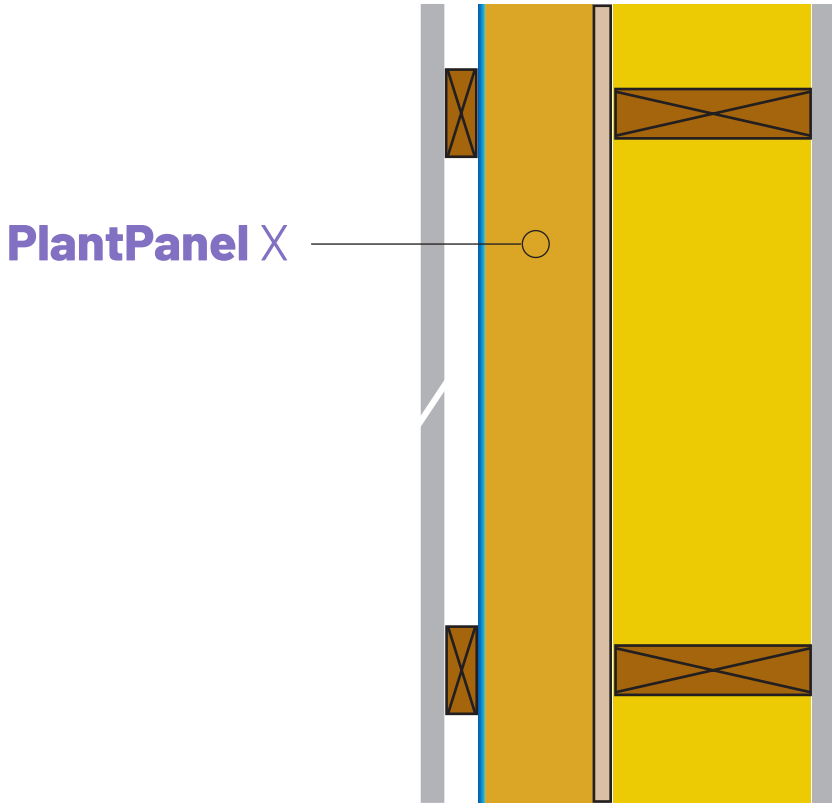
Installing PlantPanel follows many of the principles of installing conventional continuous insulation.

In all climate zones, it is advisable to incorporate a ventilated wall cavity beyond the rigid insulation. This ventilated space facilitates airflow behind the cladding, situated on the exterior side of the insulation, effectively preventing inward vapor drive and meeting the specifications of a rainscreen assembly. Ventilated wall cavities are particularly recommended when utilizing vapor-permeable exterior insulations in combination with vapor open finish materials like wood, as well as in warmer climates where the primary vapor flow tends to be inward. Ventilation offers several advantages, including lowered cladding temperatures in warmer regions, thereby aiding in the reduction of heat absorption.

Various types of siding or cladding materials are compatible with PlantPanel for a ventilated rain screen installation. The method of cavity build up to support and carry your cladding will depend on your support requirements, and other factors, such as your siding orientation. For instance, if your siding material is horizontal, you may only need vertical furring strips. If your siding material is vertical, you may need an additional layer of strips to create a grid, which allows consistent attachment.

In either case, most residential claddings can be directly affixed to the vertical strips, which, in turn, is secured through the insulation to the primary structure. These strips commonly comprise 1x3 or 1x4 lumber or ripped strips of ¾" plywood. Depending on your climate, you may opt for a pressure treated, moisture resistant strap material.

While 3/8" plywood meets the minimum thickness requirements for rainscreen walls, it may not offer adequate nail base or structural stability for certain claddings. Builders may opt for 2x3 or 2x4 lumber to enhance the stiffness of the cladding attachment base. When choosing the strapping material and thickness, it is essential to consider local building code mandates regarding the openness of ventilated cavities/capillary breaks and gap depth in your area.



Stud framed wall with HempWool insulated cavity, shear panel on exterior, and continuous insulation on exterior of shear panel. A WRB on top of PlantPanel, underneath the batten strips, is required. Finish with a siding material of your choosing.

While Installing PlantPanel is subject to your specific design requirements, local building code, and environmental factors.

Installation for Exterior Walls

Installing PlantPanel follows many of the principles of installing conventional continuous insulation.

Step 1

Ensure that all of your exterior sheathing is complete, inspected and ready for cover.

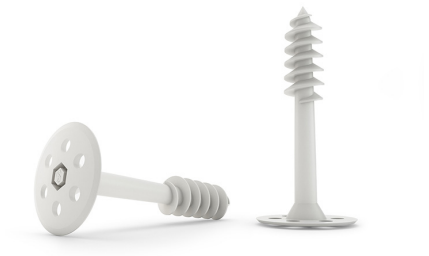
Step 2

While there is no particular recommendation of moisture level, structural materials such as dimensional lumber and sheathing should not be wet before installing PlantPanel. Similarly, PlantPanel should be kept dry during installation, before the adhesive weather resistive barrier is applied.

Step 3

PlantPanel can be attached to the sheathing through various attachment methods. Wide crown staples can be used as a method to temporarily affix the panels to the sheathing before air gap strips are installed, which will be secured through the insulation and to the sheathing below. Alternatively, screw fasteners with wide washer heads can be used to secure PlantPanel to the sheathing both as a temporary and permanent attachment method.

A 24" OC pattern is recommended for attachment, with the additional placement of an attachment in the center of the 24" OC grid.



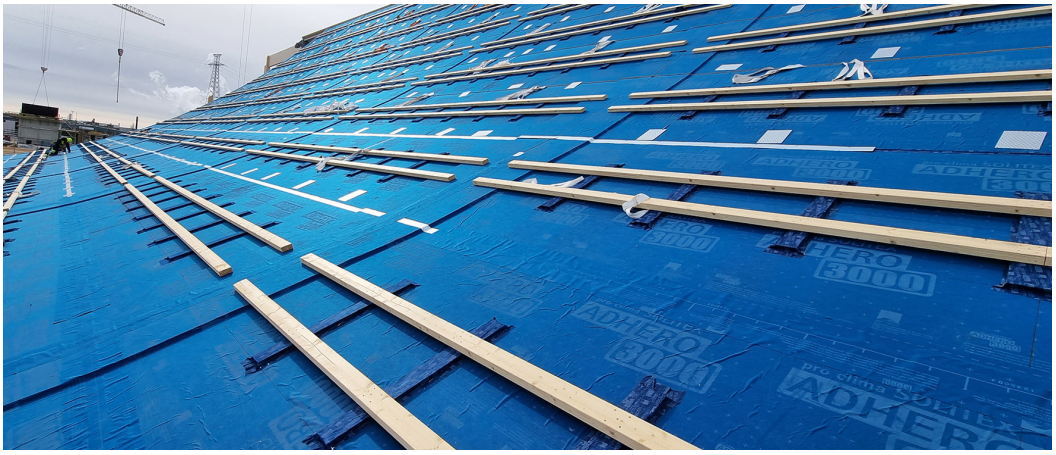
Installation for Ventilated Roof Systems

Installing PlantPanel in a ventilated roof assembly follows many of the principles of installing conventional continuous insulation on a roof.

In all climate zones, it is advisable to incorporate a ventilated gap on the exterior of PlantPanel. This ventilated space facilitates airflow behind the finished roofing material, situated on the exterior side of the insulation, effectively preventing inward vapor drive. In terms of roof assembles for PlantPanel, it is imperative that the design details are considered within the design phase, as connecting vertical ventilated facades (rainscreens) with a roof cavity, requires a design approach that is the responsibility of the design team to address. A ventilated rainscreen siding may be connected to the roof cavity ventilation, providing that there is an approach for maintaining ventilation at the peak of the roof. These details are subject to design considerations, desired aesthetics, etc.

Ventilated wall cavities are particularly recommended when utilizing vapor-permeable exterior insulations in combination with vapor open finish materials like wood, as well as in warmer climates where the primary vapor flow tends to be inward. Ventilation offers several advantages, including lowered cladding temperatures in warmer regions, thereby aiding in the reduction of heat absorption.

Roof installation follows many the same practices as wall installation of PlantPanel, however on a pitched surface. This method follows many of the same principles as the rain screen exterior wall system.



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Note

When PlantPanel is used as continuous insulation for roofing systems, the layers of build up may change as required by the finish material. This may result in a ventilated gap between the layer of insulation, with an additional layer of sheathing above to carry a roofing material such as a standing seam metal roof. These details are to be determined by a design professional.

Suggestions for Weather Resistive Barrier Integration

Step 1

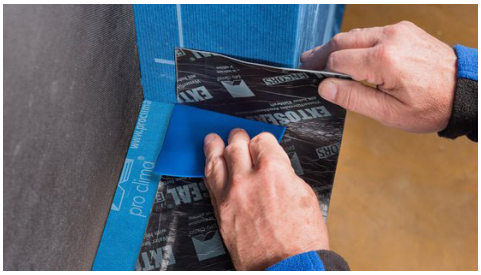
Hempitecture recommends a vapor open adhesive backed membrane, such as ProClima Solitex Adhero, or equivalent. ProClima recommends that for installation on wood or fiber based surfaces, you use a primer for installation. Our suggested method is relying on the adhesive backing for a semi-permanent fixing to the PlantPanel substrate, with the ventilation batten strips serving as a permanent means to affixing the weather resistive barrier. It is up to you to determine if you want to use a primer on PlantPanel, and ultimately this will be determined by WRB manufacturer recommendations.

Step 2

Following the installation of the WRB, it is imperative that all exposed edges of PlantPanel are taped with a compatible tape with the membrane. For instance, if you are cutting into PlantPanel for fenestrations like windows and doors, the exposed edge should be taped to make the edge integral with the WRB.

Step 3

Where possible, fold the WRB into fenestrations and create continuity with the structural framing. From this sense, the WRB is wrapping into window and door openings. Part of the reason we love adhesive, vapor permeable membranes is due to the fact that you can completely wrap the openings and PlantPanel within the assembly.



Step 4

In the event that you are not able to wrap the WRB into the fenestration, utilize more conventional window detailing methods such as Vycor Ice & Water Shield, DuPont FlexAll, or similar by following best practices and your specific design guidance. It is suggested that if you are to cut PlantPanel to your window openings during installation, versus running PlantPanel over windows and door openings and cutting out later, that you tape the exposed either edges immediately, or after you run your WRB and are then able to tape the WRB and exposed PlantPanel seems together, to create continuity.

The intent is that because PlantPanel is an extremely vapor permeable material, it should not be exposed to wetting from rain during the installation and before the WRB is installed. Should a WRB with adhesive backing be installed on wetted PlantPanel, the adhesive will be less effective, moisture will be contained within the panel, and the material is subject to swelling. This is of no concern once the product is installed and properly detailed, thanks to the vapor permeable nature of PlantPanel.

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