RAYCORE

STRUCTURAL INSULATED PANELS - SIPS®

INSTALLATION GUIDE

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RAYCORE STRUCTURAL INSULATED PANELS - SIPS

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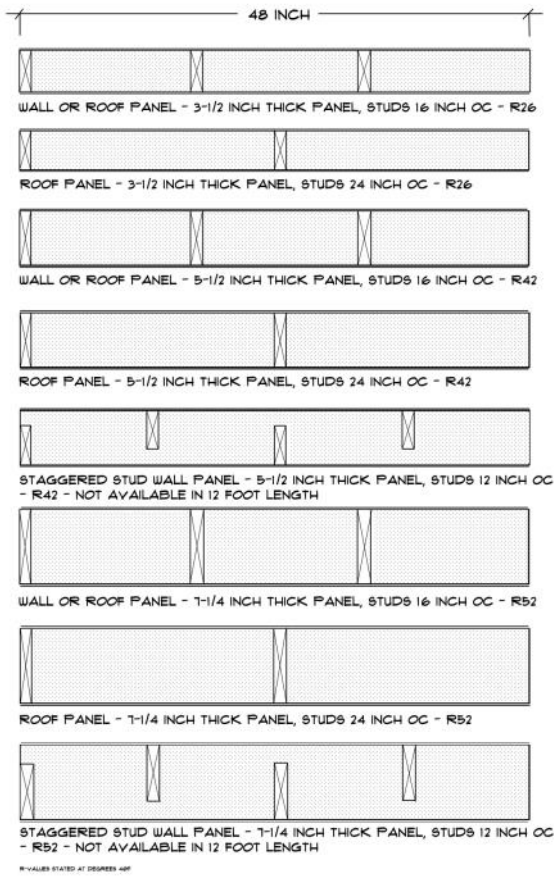
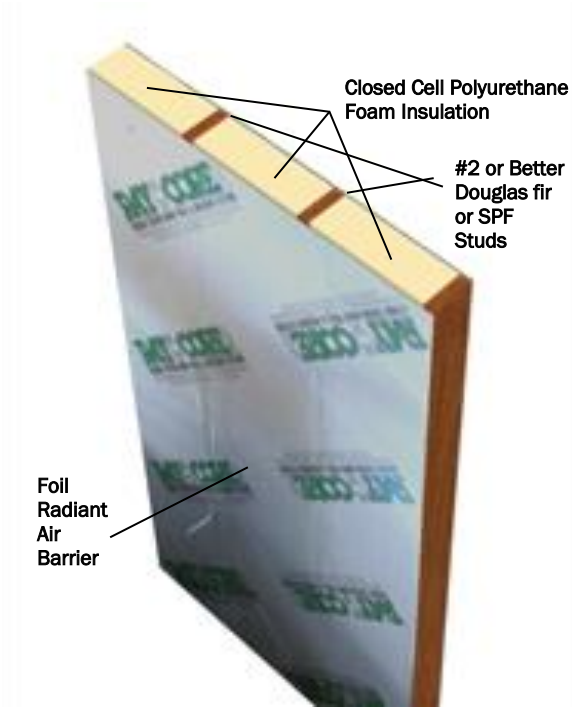
What Are RAYCORE Structural Insulated Panels?

RAYCORE Structural Insulated Panels—SIPs ® are innovative, composite panels designed for structural integrity and exceptional insulation. Featuring high-density closed cell polyurethane foam insulation injection molded between integrated studs, they boast the highest insulation R-value per inch in the Structural Insulated Panel market. Each panel is wrapped with a low-perm foil radiant air barrier on both sides.

These panels are crafted with conventional #2 or better Douglas fir studs, available in 2x4 (38x89mm), 2x6 (38x140mm) or 2x8 (38x184mm), configured 16 inch (406mm) or 24 inch (610mm) on-center.





With widths of 48 inches (1.2m) and standard lengths including precut options of 92-5/8 inch (2.3m), 8 foot (2.4m), 104-5/8 inch (2.6m), 9 foot (2.7m), 10 foot (3.0m) and 12 foot (3.7m), they offer versatility in construction.

Achieving superior R-values with minimal panel thickness, RAYCORE SIPs ® provide impressive insulation: R26 for 2x4, R42 for 2x6 and R52 for 2x8 panels. (Reported at 40° F / 4° C)

Reported Per ASTM C518 Standards:
R-values at 75°F / 24°C—R19 for 2x4, R30 for 2x6 and R39 for 2x8 panels.

R-values at 25° F / -4° C—R28 for 2x4, R44 for 2x6 and R58 for 2x8 panels.

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Materials Delivery, Handling & Storage

RAYCORE Structural Insulated Panels® are an investment in the future of your new home. To ensure optimal performance, it's crucial to care for the panels before, during and after installation.

Upon delivery, typically via common carrier in a box trailer, on a flatbed trailer, or hotshot truck and trailer, someone must be present to unload the shipment. Ideally, a forklift with fork extensions and an operator should be available. If not, a sufficient crew will be needed for manual unloading, as truck drivers will not assist with unloading.

Detailed instructions covering delivery procedures will be emailed at the time the panels are shipped to assist you in preparing for the delivery.

Upon receipt, store the panels in a protected, elevated area and on stickers to avoid ground contact. Use covers or tarps to shield from sunlight, moisture, and the elements. Improper storage could lead to damage, decomposition and possible tolerance issues.

After installation, promptly cover external surfaces with suitable exterior siding or roofing materials to shield from moisture and sunlight. Remember, RAYCORE Panels are not a permanent exterior finish. Interior surfaces should be finished with a minimum 15-minute thermal barrier, such as 1/2 inch (12.7mm) gypsum wallboard or other approved materials per local code requirements.

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Safety

Exercise ordinary care and safety precautions when handling RAY-CORE SIPs® Panels, as with any construction materials. Adhere to proper lifting techniques to prevent strain or injury.

Exercise extra caution in wet, icy or windy conditions. Always exercise caution when walking on panels and use fall protection as required. Under no circumstances should panels be handled or walked on in adverse weather conditions.

Wear approved eye protection and dust protection as necessary, when working with or cutting panels to ensure safety and prevent potential hazards.

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Panel Installation Overview

RAYCORE Structural Insulated Panels ® are installed using conventional construction tools, materials and practices in compliance with various building standards such as NBCC, NRCC, NECC, UCC, IBC, IRC, ICC, and NBC, as well as all national, state and local codes.

When installing RAY-CORE SIPs ® Panels, combine them with standard dimensional lumber studs, plates, nailers, headers and sills, etc., sheathing, construction adhesive, polyurethane canned foam, vaporproof air-sealing tape and appropriate fasteners, etc., and any other necessary materials provided onsite by the builder.

Installation shall strictly adhere to the manufacturer's published instructions, utilizing conventional construction materials, methods, and practices. All installation methods and practices must comply with the specifications of engineers or architect's, and meet national, state, and local building code requirements.

It's important to note that no recommendations in this installation guide should override those specifications and requirements. Any deviations from standard or conventional building methods and practices must be calculated, specified, signed and sealed by a licensed professional engineer and/or architect.

Items You Will Want To Have Onsite At the Time of Installation:

- Foam-friendly Construction Adhesive (such as Liquid Nails or equal)
- Polyurethane Canned Foam (such as Great Stuff or equal)
- Inexpensive Flexible Caulk
- Vaporproof Air-Sealing Tape (For Best Results, RAY-CORE Recommends Compatible FSK tape Supplied by RAY-CORE)
- Panel Screws for Roof Assembly Sized Appropriately for Panel Thickness (Screws available through RAY-CORE)
- Standard Framing Tools
- Circular "Panel" or "Beam" Saw 10-1/4 inch for 3-1/2 inch (89mm) 16 inch for 5-1/2 inch (140mm) or 7-1/4 inch (184mm) RAYCORE Panels (NOTE: Panel saws can be rented at a local construction equipment rental shop)
- 6 mil Plastic Sheeting (visqueen) for Roof Assembly

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Benefits of Building An Energy-Efficient Home

Building A High-Performance Energy Efficient Home with RAYCORE Structural Insulated Roof Panels, Wall Panels and insulated Headers involves a few additional steps and attention to detail. However, the minimal extra time and cost are outweighed by the outstanding energy-saving benefits achieved, paying dividends for the lifetime of the home.

Builder's Benefits:

- **Market Differentiation**: Stand out as a leader in energy- efficient construction.
- **Market Recognition**: Homeowners value brands that provide safe, long-lasting, energy-efficient, and comfortable homes.
- **Referrals:** Satisfied customers eagerly share their energy savings with friends, and quick to recommend their builder.
- **Financial Incentives:** Communities, states and federal governments offer financial incentives to offset the cost of building a more energy-efficient homes.
- **Competitively Pricing:** Many builders state that building with RAY-CORE SIPs ® Panels ads no more than $1 per square foot of living space.
- **Increased Profits:** Customers are willing to pay for energy efficiency, leading to faster sales and higher profit margins.

Homeowners Benefits:

- **Minimal Initial Cost:** The extra investment in a home built with RAYCORE Structural Insulated Panels ® is minimal, usually around $1 per square foot, offering better value.
- **Quick Payback:** Recoup that investment within the first year or two through savings on lower utility bills.
- **Lower Cost of Ownership:** Enjoy monthly savings on utility bills for the lifetime of the home.
- **Improved Comfort:** Experience higher comfort levels with reduced outside noise, less pollen, dust, and insects entering the home, better humidity control, lower risk of ice dams, and elimination of drafts.
- **Safety:** RAY-CORE SIPs ® polyurethane foam insulation is class 1 fire rated.
- **Smart Investment:** Energy-efficient homes have higher resale values and sell faster, making them a wise investment for the future!

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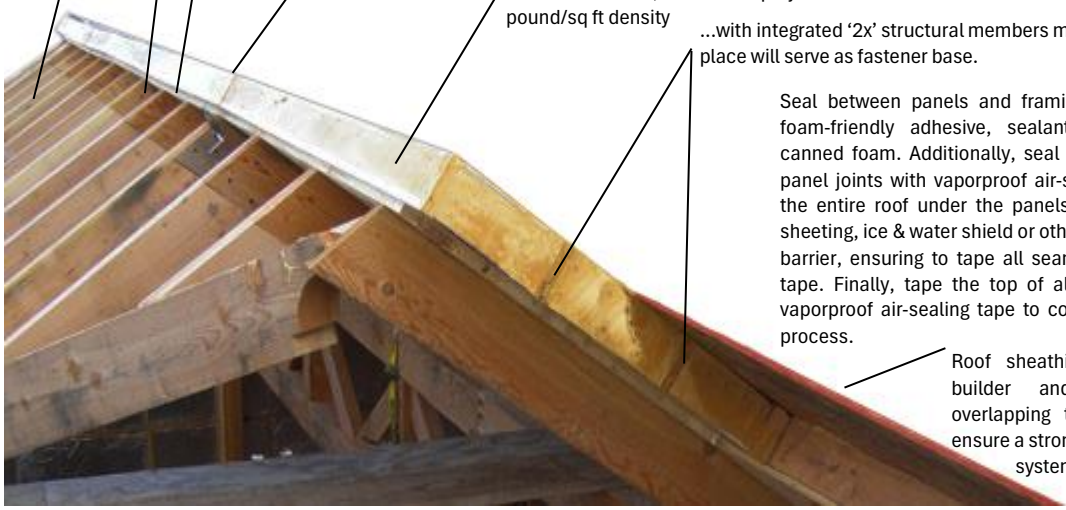
Roof Panel Installation Guide

RAYCORE Insulated Roof Panels are tailored to meet the needs of environmentally conscience builders and homeowners. The highly-insulated RAY-CORE SIPs ® Roof Panels are offer an energy-efficient solution for various home construction styles including Log, Timber Frame, Post & Beam, Straw Bale, and ICF homes, as well as those with vaulted ceilings and open floor plan designs.

For large commercial roof projects, RAYCORE Insulated Roofing Panels present a cost-effective "win-win" solution. They enable builders to submit competitive bids, ultimately boosting the bottom line upon project completion.

Here's a brief overview of how these panels are utilized in an "open-beam cathedral" style roof system. While detailed information can be found on engineered truss roofs on Page 24 under *"Rafters, Trusses and Attic Insulation"* the panels are also applicable to other roof styles.

One Example... Quick Roof Panel Installation Overview



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Step-by-Step Roof Panel Installation

Installation must adhere to manufacturer's published instructions and utilize conventional construction methods and practices. All methods and practices must comply with the specifications of engineers or architects and meet national, state, province and local building code requirements. No recommendations in this installation guide should override these specifications and requirements. Any deviations from standard and conventional building methods and practices must be calculated, specified, signed and sealed by a licensed professional engineer or architect.

Step 1: **Preparation:** Before installing the panels, prepare the roof surface accordingly. For exposed beam ceiling applications, typically tongue and groove decking or other finishes are applied prior to placement of panels. Alternatively, other specified finish materials may also be specified.

For finished drywall or unexposed beam applications, plywood or OSB may be specified for decking before panel installation. However, decking is not required, roof panels can be installed directly onto rafters or trusses.

Best Practices: Spread 6 mil plastic sheeting over the entire roof decking surface under the panels. Tape the seams of the sheeting with waterproof tape or use ice and water shield or other waterproof vapor barrier. If no decking is specified, tape the underside of panels with 3 inch (76mm) vaporproof air-sealing tape. Ensure all joints are checked and filled to prevent air infiltration, condensation and moisture transfer and maximizing energy efficiency.

Step 2. Application of Panels & Sealing: Place the RAYCORE Panels on roof surface. Typically, the panels are applied perpendicular to the rafters or trusses, although some applications may be called for vertical installation. Specify application orientation when ordering the panels for estimating purposes.

To ensure an air-tight joint, apply a continuous bead of foam-friendly construction adhesive or polyurethane canned foam to all edges, between the panels and all other framing members to seal joints. Push panels firmly together, ensuring there are no gaps and that the panels are tight and square. Attach the panels to the roof structure as instructed in Step 3. If further sealing is required, do so once the panels are permanently attached to ensure an air-tight structure.

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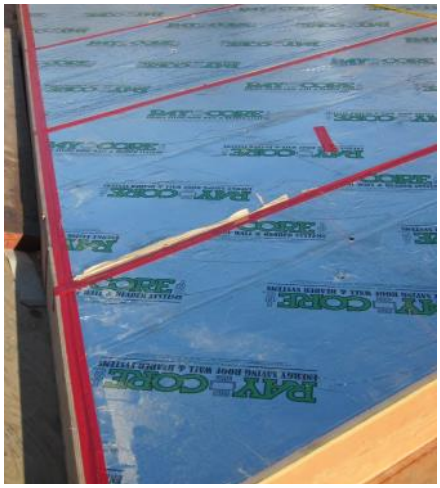
Step-by-Step Roof Panel Installation

Step 3. Attach Panels: Use panel screws ranging from 5-1/2 inches (140mm) to 12 inches (305mm) as required and specified to fasten panels to rafters and/or decking. Ensure the screws penetrate through the roof panel's integrated structural members. Self-driving torque screws are recommended for efficiency. Predrilling may be necessary in some cases. Depending on the framing and materials supporting the panels, some applications may require that the panels structural members span from rafter to rafter. However, if sufficient material supports the panels, this may not be necessary. Consult with your engineer for guidance. The penetration depth of screws should comply with local building codes, with a minimum of 2 inches (51mm) into the supporting structure. Follow the screw schedule specified by the engineer or architect. Generally, RAY-CORE recommends 9 to 12 screws per panel. (Screws can be supplied by RAY-CORE).

Step 4. Sealing and Taping: Sealing the envelope and eliminating air infiltration is crucial for energy-saving performance of RAY-CORE SIPs® Roof Panels and will prevent vapor transference, which could result in condensation and water damage. Fill any open joints, cracks or voids, and penetrations with canned polyurethane foam. Once cured, remove any excess foam. Smaller voids can be sealed with flexible caulk.



To achieve optimal performance and further prevent air infiltration and vapor transference, seal all seams, joints to additional framing members, and penetrations with vaporproof air-sealing tape. For best results, RAY-CORE recommends using compatible FSK tape supplied by RAY-CORE.

When handling the panels, care should be taken to prevent damage to the foil facing. However, small tears, bumps or gouges may occur occasionally. These can be easily repaired by filling with polyurethane canned foam, caulk and/or by applying vaporproof air-sealing tape to seal.

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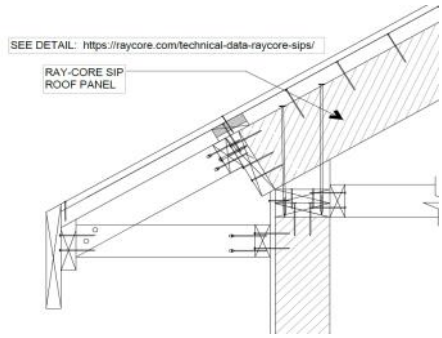
Step-by-Step Roof Panel Installation

Extending Roof Overhang or "Eaves": Roof overhangs or "eaves" are typically extended by "ladder-framing" the eaves after the installation of the roof panels and before sheathing the roof. Another method involves extending the panels out to the fascia. However, insulating overhangs provides no energy saving value and the cost of the insulating materials far greater than the cost of hand framing. Therefore, this is generally not done. The detail provided demonstrates one of the more common methods for completing this installation. For further details, please visit RAY-CORE's comprehensive website Technical Data page at: *https://raycore.com/technical-data-raycore-sips/*

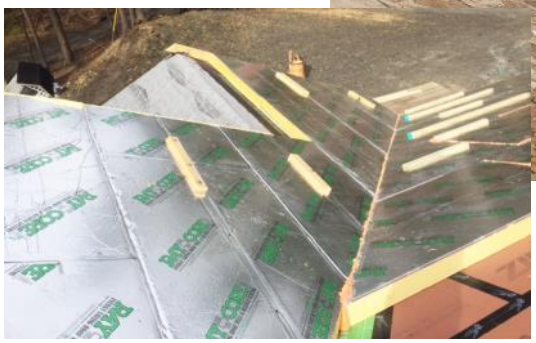


"Cold" Roof (Vented) Application: If your project requires a vented application, this can be achieved by placing 2x battens or "sleepers" on top of sealed and taped RAYCORE Roof Panels. These battens are screwed to the integrated structural members included in the RAYCORE Roof Panels at a spacing per code requirements. It's recommended to use ice and water shield and/or roofing felt on top of the panels to ensure a leak-proof seal. Apply roof deck material and finish roof in a conventional manner and with conventional materials. Always consult the roofing material manufacturer, your roofing specialist, your engineer/architect, and local code officials for proper application of roofing materials.

Metal Roof Application: When using metal roofing, it may be possible to apply the metal roofing directly to the properly taped and sealed RAYCORE Roof Panels without requiring additional battens. However, approval from the roofing manufacturer and code officials is necessary. Ice and water shield must be installed on top of the sheathing, and your builder should ensure a water/moisture proof seal. Finish roof in a conventional and code approved manner. Again, check with the roofing material manufacturer, roofing specialist, engineer/architect, and local code officials for approval and proper application of roofing materials.

Adding Insulation To An Existing Roof: RAY-CORE's lightweight, easy to use, modular roof panels with integrated framing members offer and ideal solution for adding insulation to the roof of an existing structure without disturbing the interior. Simply remove the old roofing material, frame the edge of the roof, extending fascia and soffits, and apply panels to the existing roof decking following installation instructions. Sheath over panels as required, and apply roofing membrane and materials in an appropriate manner to properly seal the roof.

Step-by-Step Roof Panel Installation



RAYCORE Structural Insulated Panels—SIPs® used on the roof should be fully shielded from sunlight, moisture and the elements. This can be achieved by using tarps, roofing materials, or other methods to provide temporary protection. Permanent roofing materials should be applied as soon as possible upon the completion of installation. The panels are not intended to be left as a finished product.

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Wall Panel Installation Guide

When building with SIPs, RAY-CORE's Structural Insulated Wall Panels are far superior to Sandwich Panel SIPs by a wide margin. RAY-CORE SIPs® Wall Panels are crafted with integrated structural members or "studs", closed-cell polyurethane foam insulation, and a foil radiant air barrier, ensuring both structural integrity and the highest R-value per inch insulation available on the market. Assembling RAYCORE Wall Panels is a breeze, providing superior insulation, airtight construction that translates into a lifetime of energy efficiency, saving homeowners money throughout the life of their home. RAY-CORE SIPs® are unequivocally the premier choice for wall panels.

- **Factory Completed Insulation, Studs and Wrapping :** Everything is done at the factory, making assembly a straightforward process.
- **Integrated Studs:** Available at 16 inch (406mm) and 24 inch (610mm) on center, ensuring structural soundness for the lifetime of the structure.
- **Not Dependent on Glue:** Unlike Sandwich Panel SIPs, RAY-CORE SIPs® do not rely on glue for the adhesion of polystyrene to OSB for structural integrity.
- **Resistance to Moisture, Mold, and Rot:** RAYCORE Wall Panels are not prone to the issues of moisture, mold and rotting commonly associated with Sandwich Panel SIPs.
- **Effective Air Barrier:** According to the US Department of Energy, 40% or more of a home's heating and cooling costs are attributed to air leakage. RAYCORE SIP Panel®, with their airtight construction and superior closed-cell polyurethane foam insulation, act as an effective air barrier, reducing energy costs significantly.
- **Half the Price & Twice the R-value:** RAYCORE Structural Insulated Panels® are half the price and twice the R-value per inch compared to Sandwich Panel SIPs.

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Step-by-Step Wall Panel Installation

Installation must adhere to manufacturer's published instructions and utilize conventional construction methods and practices. All methods and practices must comply with the specifications of engineers or architects and meet national, state, province and local building code requirements. No recommendations in this installation guide should override these specifications and requirements. Any deviations from standard and conventional building methods and practices must be calculated, specified, signed and sealed by a licensed professional engineer or architect.

Step 1. Precut / Frame Window and Door Openings: Precut materials for window and door openings according to specifications provided. Pre-assemble using RAYCORE's Insulated Headers in preparation for framing walls. This saves time and ensures proper alignment and fitment of window and door openings during the framing process.

Step 2. Wall Layout: Begin by establishing your layout, starting with the corners (see Step 3 & 4). Place lumber, measure, and mark the top and bottom plates. Lay out panels, door and window frames, etc., according to your design plan. This step ensures accurate positioning and alignment of structural components before assembly.

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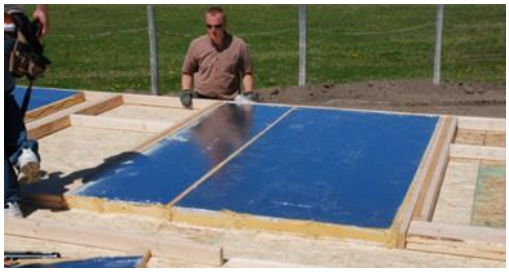
Step-by-Step Wall Panel Installation

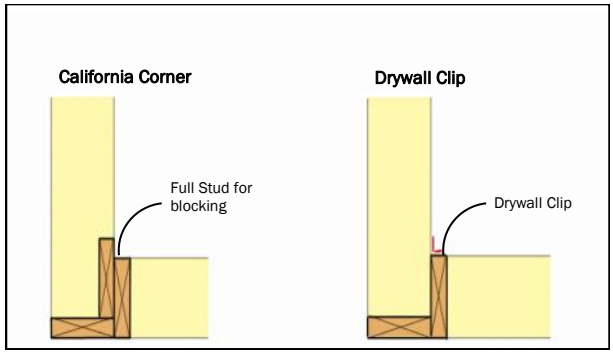


Step 3. Remember… Think "Conventional Framing": Decide how you will frame your corners based on the information provided. Begin by framing your first corner according to conventional framing practices. As you lay out panels cut the panel so it fits snuggly against the king stud on the window or door frame. Use cut material to continue on the side opposite the opening, cutting where necessary to maintain the layout. Minimize panel waste by regularly evaluating and utilizing surplus material from cuts.

For best results and clean cuts, cut panels with a circular "panel" or "beam" saw, utilizing a **10-1/4 inch** for 3-1/2 inch (89mm) thick panels or **16 inch** for 5-1/2 inch (140mm) and 7-1/4 inch (184mm) thick panels.
If you don't own one, check with your local equipment rental store.

Step 4. Corner Detail: Framing a corner is similar to conventional stick framing with a minimum of 2 studs required at corners according to code. While traditional corner approaches are valid, two energy-efficient methods are outlined below.

The California Corner Approach: There are two ways to implement this. Firstly, you can channel out the foam to insert the stud blocking, ensuring not to remove more foam than necessary for the stud. Alternatively, frame your corner conventionally and start the panel with a stud at the edge of the corner stud, filling the void with surplus foam. Use construction adhesive or polyurethane canned foam to adhere and seal the panels to one another and the framing members. Fill any voids with polyurethane canned foam. As always, when framing corners follow code requirements for your area.



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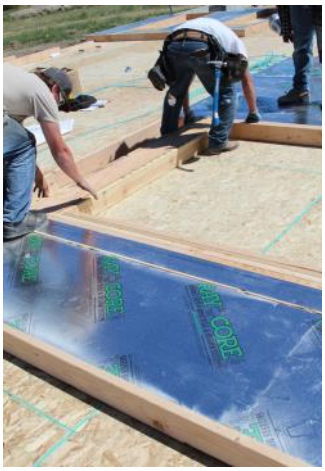
Step-by-Step Wall Panel Installation

Step 5. And You're Off! Apply a continuous bead of construction adhesive or polyurethane canned foam to sides of the RAYCORE Wall Panel and adjoining framing members. This will adhere the panels and provide an airtight seal. Push the panels firmly together so that the foam side of one panel touches the wood side of the adjoining panel, maintaining your layout. Ensure that the panel joints are tight and square at all times to eliminate air infiltration, and prevent condensation and moisture transfer, maximizing the energy efficiency of the envelope. Fill voids above and below windows with pieces of surplus cut panels to complete the installation.



Step 6. Attach Top and Bottom Plates: Apply a continuous bead of construction adhesive or polyurethane canned foam to the bottom and top of the panels and all adjoining panels or framing members to provide an airtight seal. Match studs in panels and window and door frames to the layout marked on top and bottom plates. Nail tightly bottom and top plates to the RAYCORE Wall Panel's integrated studs and all other framing members using appropriately sized fasteners per conventional framing practices. This ensures a secure attachment and reinforces the airtight seal of the wall assembly.

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Step-by-Step Wall Panel Installation

Step 7. Sealing and Taping: Sealing the envelope and eliminating air infiltration is a critical installation detail that significantly impacts the energy-saving performance of any structure, reducing heating and cooling costs and preventing vapor transference, condensation and water damage. When building with RAY-CORE SIPs® wall panels, fill any open joints, cracks or voids, and penetrations with canned polyurethane foam. Once cured, remove any excess foam. Smaller voids can be sealed with flexible caulk. Seal all seams, joints to additional framing members, and penetrations with vaporproof air-sealing tape. For best results, RAY-CORE recommends the using compatible FSK tape supplied by RAY-CORE. Take care to prevent damage to the panels and their foil facing during handling. However, if small tears, occasional bumps or gouges occur, they can be easily repaired by filling with canned polyurethane foam, flexible caulk, and/or by applying vaporproof air-sealing tape. This will ensure the long-term efficiency and reliability of the wall assembly.

Step 8. Standing the Walls: Sheathing can be attached either before or after the wall has been raised, depending on the framer's preference. This flexibility allows framers to choose the sequencing that works best for their specific Construction process and project requirements. Apply a continuous bead of foam-friendly construction adhesive to the bottom plate to create an airtight seal between the subfloor and the wall. Securely face nail the bottom plate on both sides to the rim board and floor joists using appropriate fasteners per conventional framing practices and building code requirements.

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Step-by-Step Wall Panel Installation

RAYCORE Structural Insulated Wall Panels® are not intended to serve as a finished and exposed surface. Internal surfaces of panels must be covered with a minimum 15-minute thermal barrier, such as 1/2 inch (12.7mm) gypsum wallboard or other approved materials. External surfaces of the panels should be finished promptly with materials that offer protection from sunlight, weather, moisture and all other elements. This ensures the longevity and performance of the wall system.

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Wiring, Plumbing & Ventilation

Wiring: Wiring channels of a sufficient depth per code can be routed out of the panels using a router, rotozip, sawzall or other appropriate tool. Its important not to cut through panels or completely remove the foam. Only remove as much foam and material as necessary for wiring while maintaining the energy efficiency of the panels. Drill studs per code requirements where needed and use nail plates where necessary to protect wiring.

Place wires in the chase. Once inspections have been performed and rough wiring has been approved, backfill channels and penetrations with polyurethane canned foam. Once cured, remove any excess foam and cover with a vaporproof air-sealing tape to ensure an airtight seal. This ensures the safety and efficiency of the electrical wiring system while maximizing the energy efficiency of the wall panel system.

Plumbing & Ventilation: For optimal energy efficiency, RAY-CORE highly recommends avoiding the installation of plumbing and ventilation in the exterior RAYCORE Insulated Panel walls whenever possible. Interior partitions and alternative ventilation solutions can often be utilized instead. Alternatively, a “wet wall” framed inside the paneled wall may be considered and utilized. If plumbing or mechanicals must be installed in the panels, take care to remove as little foam as possible. Ensure that all chases and penetrations with polyurethane canned foam. Once cured, remove any excess foam and cover with a vaporproof air-sealing tape to maintain the integrity of the panel’s insulation and ensure an airtight seal. This approach maximizes the energy efficiency of the wall system while accommodating necessary plumbing and ventilation requirements.

For More Details and Videos, Go To:

www.youtube.com/raycoresips

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Attaching Wall Panel to a Concrete Wall or Slab

Attaching RAYCORE Wall Panels to a Concrete Wall or Slab: Attaching the walls to the foundation follows similar principles as attaching any wall to concrete. Here's a step-by-step guide:

- Frame your walls according to the instructions provided by the engineer or architect and in compliance with code requirements.
- Mark the locations of all foundation bolts on the panels.
- Create an OSB template sized appropriately to allow for attachment of foundation bolts. Attach the template to the foam with nails.
- Use a drywall saw or sawzall to carefully cut away the foam from the bottom plate at the anchor bolt locations. Number and reserve the foam blocks as they will be reinserted later fill the voids once the bolts are secured to the bottom plate.
- Pre-drill the bottom plate for bolts.
- Apply a foam sealant (sill sealer) per code between the bottom plate and concrete to provide an airtight seal.
- Stand the wall over the bolts and attach it with plates and nuts per code. Tighten nuts to properly secure the wall.
- Reinsert the foam blocks into the panel voids matching numbers on blocks to location in the wall panel. Seal the blocks in place with foam-friendly construction adhesive or polyurethane canned foam. Apply vaporproof air-sealing tape for additional sealing.

Best Practices: After installation of the wall, inspect the attachment to concrete for any open joints, cracks or voids. Seal the bottom plate with flexible caulk on both sides of the wall to prevent air infiltration and ensure airtightness.

Hurricane Strapping Installation

Installing Tension Ties and Hurricane Strapping:
Attaching tension ties and hurricane straps to RAYCORE Wall Panels follows similar principles to conventionally framed walls. Here's a step-by-step guide:

- Frame your walls according to the instructions provided by the engineer or architect and in compliance with code requirements.
- Mark the locations of all ties or strapping on the panels.

Installing a Wall Tie (such as a Simpson HTT5 Tension Tie):

- If foam must be removed to install and secure, use a drywall saw or sawzall to carefully cut away the foam from the bottom plate at the anchor bolt locations. Number and reserve the foam blocks as they will be reinserted later fill the voids once the bolts are secured to the bottom plate.
- Appropriately secure to the foundation and the wall framing using required fasteners.
- Upon completion, if possible reinstall foam block to void at appropriate location or fill with polyurethane canned foam.
- Seal the filled voids by covering with vaporproof air-sealing tape to ensure an airtight seal and maintain the integrity and energy efficiency of the wall panel installation.

Installing a Hurricane Strap (such as Simpson STHD Strap):

- Align the hurricane strap with the
- Integrated studs in the RAYCORE SIP Panel® .
- If the integrated stud in the panel does not line up with the position of the hurricane strap, ensure that a stud is placed in the proper location during the framing process.
- Nail the hurricane strap securely into the stud using required fasteners.

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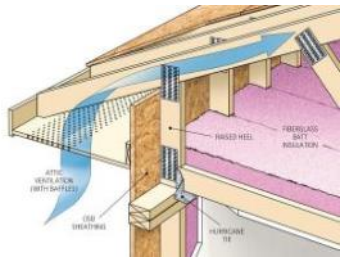
Best Practices

A few suggested practices to enhance the performance of your new RAYCORE Structural Insulated Panels® home...

Rim Joist / Band Joists Insulation: The only materials that likely separate the inside from the outside at the rim joist is the sheathing and the siding. Traditionally, this space has been insulated with fiberglass batts. Because fiberglass is air permeable, it does nothing to prevent warm, humid air from coming in contact with the rim joist where condensation can cause mold and then rot of the rim joist and floor joists and accumulate in the insulation, drastically reducing it's effectiveness. Although spray foam is not the best insulation choice, it is a very good air sealer. Consider adding 2 to 6 inches (50 to 152mm) of polyurethane closed cell spray foam, installed by an experienced installer, to each floor's rim board and back it with additional insulation whether it be fiberglass, cellulose, rockwool or even better, RAYCORE panel scraps to achieve at least an R-value equal to that of your walls.

Floor Insulation: Whether your foundation is a concrete slab, full basement or crawlspace, the comfort of your home will be greatly increased if your floor temperature is close to that of your living area. Floor insulation not only increases energy savings but also level of comfort. Don't forget to properly insulate your floors! RAYCORE SIP Panels might be considered for this application.

Rafters, Trusses and Attic Insulation: First and foremost, you want at least 25% more insulation value in your attic space than the rest of the house. If your new home includes vaulted ceilings, RAYCORE Structural Insulated Roof Panels are most likely the perfect solution for efficiently and effectively insulating your roof with the highest R-value possible. Should your home plans specify engineered wood trusses, you can still use RAYCORE SIP Roof Panels. If you don't wish to condition your attic space, consider requesting raised-heel trusses. As with all modern trusses, raised heel trusses are engineered to ensure uniformity and accuracy while exceeding building code requirements. The energy savings that is gained with a "raised-heel" providing additional space for more insulation and the full depth of insulation extended to the outside of the top plate without compression. Consider, as with the rim joist, adding a few inches of spray foam at the heal for sealing. If your plans do not allow for a raised heel truss, sealing with spray foam will reduce air infiltration, transfer of warm moist air into the attic space and prevent winter condensation. Don't forget sealing! Seal all penetrations between the living and attic space. Seal over recessed lights, around ducting vents, etc.



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Best Practices

Recessed Lighting: When choosing lighting for open beam and cathedral ceilings, many people consider the use of recessed lights. Recessed lights have a low profile that provides an almost unperceivable source of lighting to more open spaces. But, recessed light fixtures are definitely not the best choice when it comes to energy efficiency. Recessed lights generally require fairly large holes that remove or reduce insulation to accommodate the fixture and heat loss can cause a substantial increase in energy costs. Some states, notably California's Title 24 has strict regulations regarding recessed lights requiring air-tight lights or the installation of fixture covers so that installation can be installed above. Installation of recessed light fixtures in RAYCORE's Structural Insulated Roof Panels would require either the framing of an lighting chase between the interior ceiling and the exterior panels to avoid the removal of all or most all of the foam insulation for the fixture. Much better and more energy efficient solutions are readily available today. Some people opt to install surface mounted or hanging fixtures and pendants. Spots and track lighting in cathedral or vaulted ceilings is a common choice. Others choices include the use of wall mounted fixtures, indirect lighting and even freestanding floor or table fixtures. One of the most comparable solutions to recessed or can lights available today are surface mounted disk lights. This bright flush-mount LED light can provide the same warm glow of an incandescent recessed "can light" with a similar, almost unnoticeable appearance and is an affordable, outstanding choice.

Solar Panels: As with conventionally stick-framed structures, it is possible to install solar panels on a roof framed with RAY-CORE SIPs ®. Once the RAYCORE SIP Panels® have been securely attached to the roof framing, the solar panels can be secured to the integrated framing members of the panels during installation. The type of hardware used to install the solar panels will be determined by the solar panel installer. As always, all fasteners and penetrations should be properly sealed to prevent air infiltration, condensation or water damage. For heavier loads, it is advised that an engineer be consulted to ensure that the roof system can support the weight of the panels and that the manner of installation is suitable for the structure.

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Additional Documents You Might Find Useful

Attached you will find additional documents that may be required before, during and after the construction process. The following documents have been supplied for your convenience to expedite the construction process.

RAYCORE Structural Insulated Panels—SIPs ® Submittal Sheet
RAYCORE Structural Insulated Panels—SIPs ® Warranty Documents

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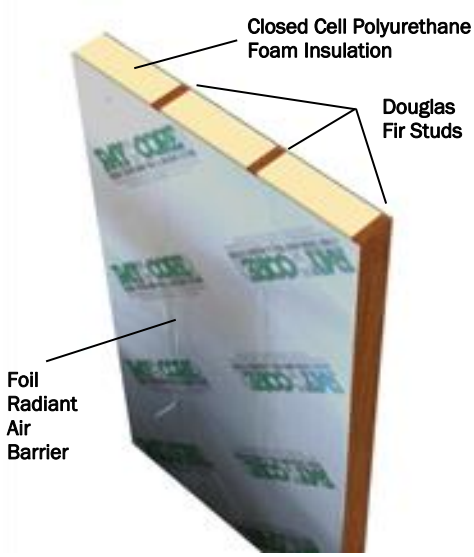
Panel Details

SUBMITTAL
20240501

RAYCORE Structural Insulated Panels—SIPs®

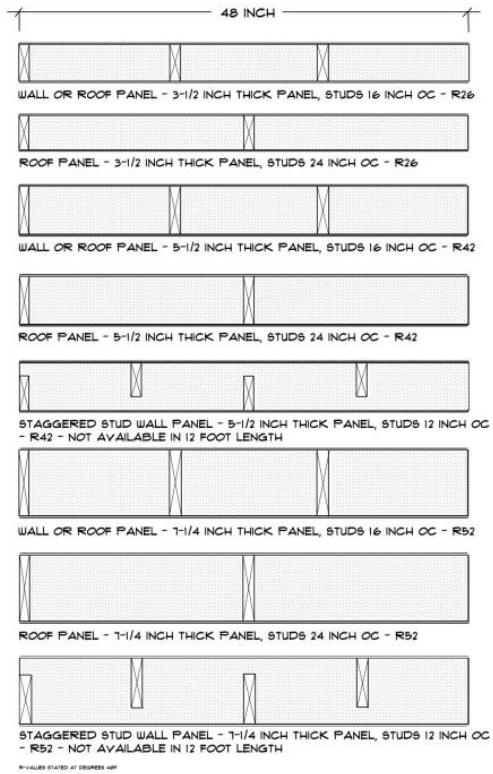


STANDARD FEATURES

- Insulation, Framing and Wrap in a 4 foot wide panel
- Available in 3-1/2 inch/89mm (R26), 5-1/2 inch/140mm (R42) and 7-1/4 inch/189mm (R52) thick panels (@ 40°F)
- Available in precut 92-5/8 inch/2.3m, 8 foot/2.4m, precut 104-5/8 inch/2.6m, 9 foot/2.7m, 10 foot/3.0m and 12 foot/3.7m lengths
- Class 1 fire rated 2.2 lb density closed cell polyurethane foam insulation
- #2 or better Douglas fir or SPF studs
- Foil radiant air barrier on either side of panel

IMPORTANT NOTES

Installation must strictly adhere to manufacturer's published instructions, conventional construction methods and practices, engineers or architect's specifications, and compliance with all code requirements. Any deviations from standard building methods and practices must be calculated, specified, approved, signed and sealed by a licensed professional engineer or architect.



Reported Per ASTM C518 Standards:
R-values at 75°F / 24°C—R19 for 2x4, R30 for 2x6 and R39 for 2x8 panels.

R-values at 50° F / 4° C—R26 for 2x4, R42 for 2x6 and R52 for 2x8 panels.
R-values at 25° F / -4° C—R28 for 2x4, R44 for 2x6 and R58 for 2x8 panels.

TYPE OF PANEL

❑ Wall ❑ Roof

STYLE OF PANEL

❑ Studs 16 in oc (406mm oc) ❑ Studs 24 in oc (610mm oc)

SIZE— PANEL THICKNESS

❑ 3-1/2 inch / 89mm ❑ 5-1/2 inch / 140mm ❑ 7-1/4 inch 184mm

PANEL LENGTH

❑ 92-5/8 inch / 2.3m ❑ 104-5/8 inch / 2.6m ❑ 120 inch (10 ft) / 3.0m
❑ 96 inch (8 ft) / 2.4m ❑ 108 inch (9 ft) / 2.7m ❑ 144 inch (12 ft) / 3.7m

Date: Job Name:
Customer: Phone: Email:
General Contractor Approval: Date:
Architect Approval: Date:

❑ Approved ❑ Approve with Changes Noted
❑ Revise and Resubmit ❑ Rejected_____

_____ _____

SHOP DRAWING / SUBMITTAL REVIEW

Acceptance is for general compliance with the contract documents only. The contractor is responsible for confirming and correlating all quantities and dimensions; selecting fabrication processes and techniques for construction; coordinating its work with that of all other trades; and performing its work in a safe and satisfactory manner.

By:_____ Date:_____

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RAYCORE Structural Insulated Panels – SIPs®
and the Residential Building Code

RAYCORE Structural Insulated Panels – SIPs ®, are a stick-frame module or panel comprised of polyurethane foam insulation with prepositioned integrated Douglas fir wooden studs. As RAY-CORE SIPs ® utilize wooden studs as their primary structural component, their use in construction falls under Chapter 6, Section R602 of the International Residential Code (IRC), which governs "Wood Wall Framing" and "control(s) the design and construction of walls for buildings" in "accordance with the provisions of this chapter". Simply stated, the plan design for incorporating these panels mirrors conventional *stick-frame* design, requiring no special design, engineering, plans, third-party quality assurance, or ICC-ES and other types of special assurance reports. RAY-CORE SIPs ® are acceptable for use in all code jurisdictions.

Structural Insulated Panels (SIPs) of the sandwich panel style are defined by the International Residential Code as "a structural sandwich panel that consist(s) of a lightweight foam plastic core securely laminated between two thin, rigid wood structural panel faces." Unlike RAYCORE SIP Panel ®'s, sandwich panel SIPs lack wooden studs as their primary structural element and rely most commonly on oriented strand board (OSB) adhered with a structural adhesive or glue to a solid foam core. The unconventional design of these panels necessitated the creation of a specific code section. In 2007, the International Code Council (ICC) adopted this building system into the International Residential Code (IRC) under Chapter 6, Section R610 – "Structural Insulated Panels," to "control the construction of walls built with this product".

According to the IRC, sandwich panel SIPs must be designed in accordance with the provisions be "identified by grade mark or certification of inspection issued by an approved agency in accordance with ANSI/APA PRS 610.1". Typically, this identification involves a quality assurance ICC-ES Report, ensuring compliance with code requirements acceptable manufacturing criteria, including third-party quality assurance. This Prescriptive Method enables builders and design professionals to demonstrate equivalency to the IRC when using sandwich panel SIPs in residential projects.

The IRC sets forth various limits and requirements for sandwich panel SIPs, including maximums building dimensions, number of stories high, and in design considerations for wind speed, roof snow/live load, and use in Seismic Zones. Additionally, some states, counties and municipalities may impose further requirements or limitations specific to their jurisdiction, possibly necessitating design documents to be stamped by a state-licensed architect or engineer.

Ref: 2018 International Residential Code

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Fax: 866.503.1314
Email: raycore@raycore.com

LIMITED LIFETIME WARRANTY

Materials and Workmanship: RAY-CORE offers a Limited Lifetime Warranty on its Structural Insulated Roof, Wall and Header products to the original purchaser or structure owner. This warranty is valid as long as they own the covered structure. It covers defects in workmanship and/or material from the date of manufacture, provided that the products were handled, specified, utilized and installed in a correct and proper manner, in conformance with the standards and specifications established by RAY-CORE, INC.'s Installation Guide, purchaser's architect or engineer's design specifications, standard building practices and national and local code requirements.

Exceptions: This warranty is specific to manufacturing defects and not apply to damage resulting from violent or unusual weather conditions, acts of God (including seismic and volcanic activity), fire, water or flood, animal, rodent or insect damage, mold or mold-related damage, fungal growth of any kind, settlement or failure of the building foundation, damage caused by structural changes, alterations, additions, distortion, or failure or settlement of foundation or other structural elements. It also des not cover damage caused by engineering, design or builder's failure to appropriately interpret or follow specifications, alteration, misuse or abuse of materials prior to, during or after installation. Additionally, it does not cover damage resulting from improper installation or use of incompatible installation processes or materials. This warranty does not cover any cause or failure other than that resulting from a manufacturing defect of the product. RAY-CORE assumes no responsibility that the product will be fit for any particular purpose for which the purchaser is buying except as provided under "Materials and Workmanship". This warranty replaces all or other warranties, express or implied, including the warranties of merchantability and fitness. RAY-CORE, INC. shall not be liable for incidental, special, indirect or consequential damages resulting from a defect in the product, including but not limited to loss of time or use of a structure constructed with RAY-CORE products, inconvenience, commercial loss, excessive energy costs, injury, illness or other consequential damages. This warranty is extended only to the original purchaser or structure owner, as long as they own the covered structure and is otherwise non-transferable. This warranty is not applicable outside the United States and Canada.

Activation of Warranty: To activate this warranty, you must complete the warranty form and return it to RAY-CORE, INC. within sixty (60) days of receipt of your RAY-CORE products. By completing the warranty form, you verify that the RAY-CORE products were specified, utilized and installed in a correct and proper manner, in conformance with the standards and specifications established by RAY-CORE, INC.'s Installation Guide, purchaser's architect or engineer's design specifications, standard building practices and national, and local code requirements.

Notification of Claims: Claims must be made in writing to RAY-CORE, INC. Customer Service, 305 E. Elva Street, Idaho Falls, ID 83401, immediately upon detection or perception of defective product. RAY-CORE, INC. reserves the right to inspect, and the owner must allow a RAY-CORE agent to enter the property and inspect the said defective product by an authorized representative prior to the settlement of any claim.

RAY-CORE's Commitment: If any of the RAY-CORE products listed above are found have a Manufacturing Defect in workmanship and/or materials during the warranty period, causing a loss to the original purchaser or structure owner only, as long as they own the covered structure during the warranty period, RAY-CORE, INC. will provide that owner with materials required to repair the problem or replacement product as RAY-CORE deems necessary, at the discretion of RAY-CORE, comparable to that originally purchased. If RAY-CORE elects to provide materials to repair or to replace the product, RAY-CORE will not be responsible for permits, design, engineering, labor, additional material or any other costs incurred in replacing the panels.

Questions: For questions concerning this warranty, contact RAY-CORE, INC. Customer Service at 1.877.552.2440; 305 E. Elva Street, Idaho Falls, ID 83401.

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Email: raycore@raycore.com

WARRANTY FORM

PURCHASER: INVOICE NO_____

NAME _____

ADDRESS _____

_____

PHONE NUMBER _____ FAX NUMBER _____

EMAIL_____

DATE OF PURCHASE_____ DATE OF RECEIPT_____

PROPERTY OWNER:

NAME _____

ADDRESS _____

_____

PHONE NUMBER _____ FAX NUMBER _____

EMAIL_____

I certify that I have read and understand RAY-CORE, INC. Limited Lifetime Warranty and that all RAY-CORE products referenced above were specified, utilized and installed in a correct and proper manner, in conformance with the standards and specifications established by RAY-CORE, Inc's Installation Guide, purchaser's architect or engineer's design specifications, standard building practices and national, state and local code requirements.

Signature_____

Name_____ Date_____

Activation of Warranty: To activate this warranty, you must complete the warranty form and return it to RAY-CORE, INC. Customer Service, 305 E. Elva Street, Idaho Falls, ID 83401 within sixty (60) days of receipt of your RAY-CORE products.

Additional Installation Procedures

For Additional Information Regarding Installation Procedures, visit RAYCORE's website:

www.raycore.com/technical-data-raycore-sips
and check out the data below "Installation Guide & Detail Drawings"

OR contact a RAY-CORE technical representative:

Phone Toll Free: 1.877.552.2440
Email: info@raycore.com