

RAYCORE INCTM

USER'S INSTALLATION GUIDE



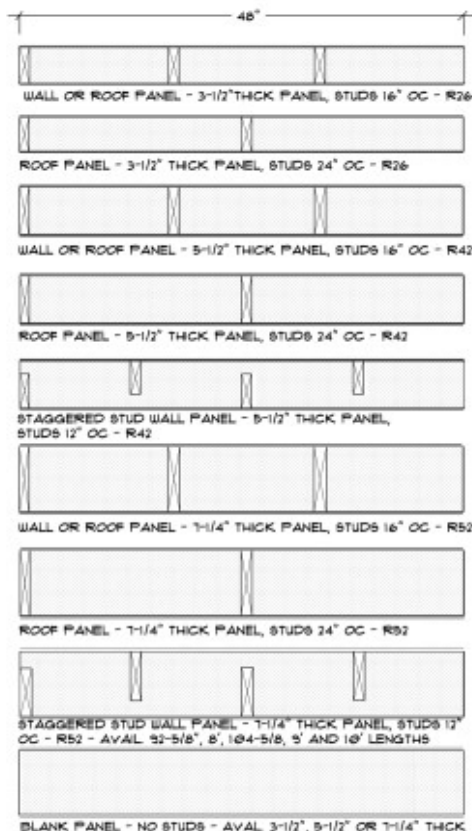
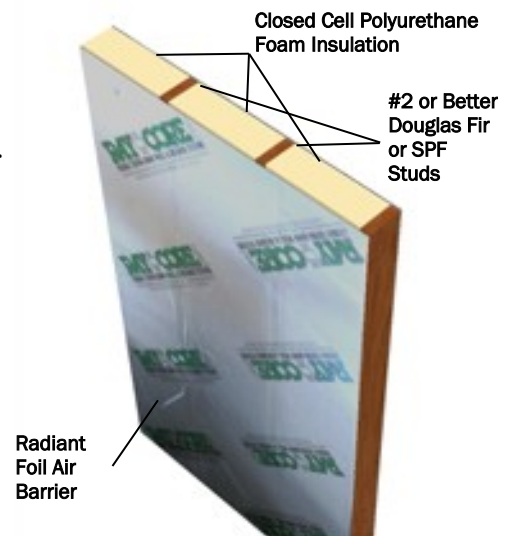
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What Are RAYCORE Structural Insulated Panels?

RAYCORE Structural Insulated Panels (SIPs) are a unique, component structural insulated panel, RAY-CORE SIPs™ rely on integrated structural members or studs to provide the structural integrity of the building. Superiorly insulating high-density closed cell polyurethane foam insulation is injection molded to provide the highest insulation R-value per inch in the Structural Insulated Panel market. The panel comes wrapped on either side with a low-perm foil radiant barrier.



The panels consist of conventional #2 or better Douglas Fir or SPF 2x4, 2x6 or 2x8 studs, configured 16" or 24" on-center.

Other stud configurations including 12" on center staggered studs for those requiring a thermal break, and panels with no studs are available in a variety of sizes and corresponding R-values. Additional options include Select Douglas Fir, engineered lumber — LSL and LVL studs, borate pressure treated studs, and fire treated studs.

Standard panel lengths include 92-5/8", 8', 104-5/8", 9', 10' and 12'.

Based on the thickness of the panel, superior R-values are achieved with minimal panel thickness—2x4 (R26), 2x6 (R42) and 2x8 (R52)!

Materials Delivery, Handling & Storage

RAYCORE Structural Insulated Panels are an investment in the future of your new home. For best performance and results you will want to care for the panels before, during and after installation.



Most likely the panels will be delivered by common carrier in either a box trailer or flatbed trailer. It will be necessary for someone to be onsite when the panels are delivered to inspect, sign for and unload the shipment.



It is advised that when possible, a forklift with fork extensions and an operator be available. If this is not possible, the panels can be unloaded by hand. In this case, a sufficient crew will be required to do this quickly and

efficiently. Truck drivers will not assist with the unloading of the panels. To help things go smoothly, detailed shipping delivery receipt instructions will be emailed at the time the panels are shipped.



Upon receipt, store the panels in a protected area and elevated to prevent ground contact. Cover to prevent excessive exposure to sunlight, moisture and the elements. Stack panels on “stickers”. Do not allow the panels to be stored in an unsupported manner. Improper storage may cause materials damage or decomposition and possible tolerance problems in the field.

After installation, cover external surfaces of the panels with appropriate exterior siding or finishes and/or roofing materials as soon as is possible to keep the panels dry and protected from excessive sunlight or moisture. RAYCORE Panels are not to be considered a permanent exterior finish. Interior surfaces should be finished with a minimum 15-minute thermal barrier, such as 1/2” gypsum wallboard or other approved materials as required by local code.



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Safety



Ordinary care and safety precautions should be followed when handling RAYCORE Panels as with other construction materials. Proper lifting techniques should be followed.

Extra caution should be taken in wet, icy or windy conditions. As with other construction materials, always exercise caution when walking on panels and always use appropriate and approved

fall protection when appropriate. Do not walk on panels in wet, icy or windy conditions.

Wear approved eye protection and dust protection, if necessary, when working with or cutting panels.



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Panel Installation Overview

RAYCORE Structural Insulated Panels are installed using conventional construction tools, materials and practices per UCC, IBC, IRC, ICC, and NBC standards and codes. RAYCORE Panels are to be combined with standard dimensional lumber studs, plates, nailers, headers and sills, sheathing, construction adhesive, vapor sealing tape and appropriate fasteners, etc., as required, supplied onsite by the builder.

Installation shall be in accordance with manufacturer's published instruction, utilizing conventional construction materials, methods and practices. Furthermore, all methods and practices should comply with engineers or architect's specifications, and conform to national, state, and local building code requirements. No recommendations in this guide should supersede those specifications and requirements. Deviations from standard and conventional building



methods and practices should be calculated, specified, signed and sealed by a licensed professional engineer or architect.

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

Foam-friendly Construction Adhesive
(Liquid Nails or equal)

Polyurethane Canned Foam
(Great Stuff or equal)

Inexpensive Flexible Caulk

Vapor Proof Tape
(FSK tape can be supplied by
RAYCORE)

Standard Framing Tools

Circular "Panel" or "Beam" Saw
10-1/4" for 3-1/2" Panels or
16" for 5-1/2" or 7-1/4" Panels
(Can be rented at a local
construction equipment rental
shop)



Benefits of Building An Energy-Efficient Home

Building A High-Performance Energy Efficient Home requires a few extra steps and some attention to detail, but in the end any additional time or cost spent will be minimal when building with RAYCORE Structural Insulated Roof and Wall Panels and Insulated Headers, and the outstanding energy saving benefits achieved will pay you back for the lifetime of the home.

Builder's Benefits:

- **Market Differentiation:** Distinguish themselves as leaders in energy efficient construction.
- **Market Recognition:** Homeowners recognize the brand providing them with a safe, long lasting, energy efficient and comfortable home.
- **Referrals:** Happy customers are thrilled to share their energy savings with friends, and quick to share their builder's contact information as well!
- **Financial Incentives:** Communities, states and federal governments are continually offering financial incentives to builders to offset the cost of building a more energy efficient home.
- **Competitively Priced:** It is estimated that the added cost of building with RAYCORE Panels is no more than \$1 per square foot of living space.
- **Increased Profits:** Customers want the added value of an energy efficient home, and are also willing to pay for it, giving the builder a distinct sales advantage, meaning faster sales and increased profit margins.

Homeowners Benefits:

- **Minimal Cost:** Additional initial investment in a home built with RAYCORE Structural Insulated Panels is minimal, and should cost no more than \$1 per square foot of living space—making your home a better value for today.
- **Pays You Back:** Recoup that investment within the first year or two of living in the home through savings as a result of lower utility bills.
- **Lower Cost of Ownership:** Receive a financial payback each month through lower utility bills for the lifetime of the home.
- **Higher Comfort Level:** Enjoy a higher home comfort level, contributing to a better quality of life through: reduced noise from outside; less pollen, dust and insects entering your home; better humidity control; lower chance for ice dams on the roof and eaves in cold and snowy climates; elimination of drafts and cold spaces.
- **Wise Investment:** Energy efficient homes have higher resale values and sell more quickly—making your home a better investment for tomorrow!

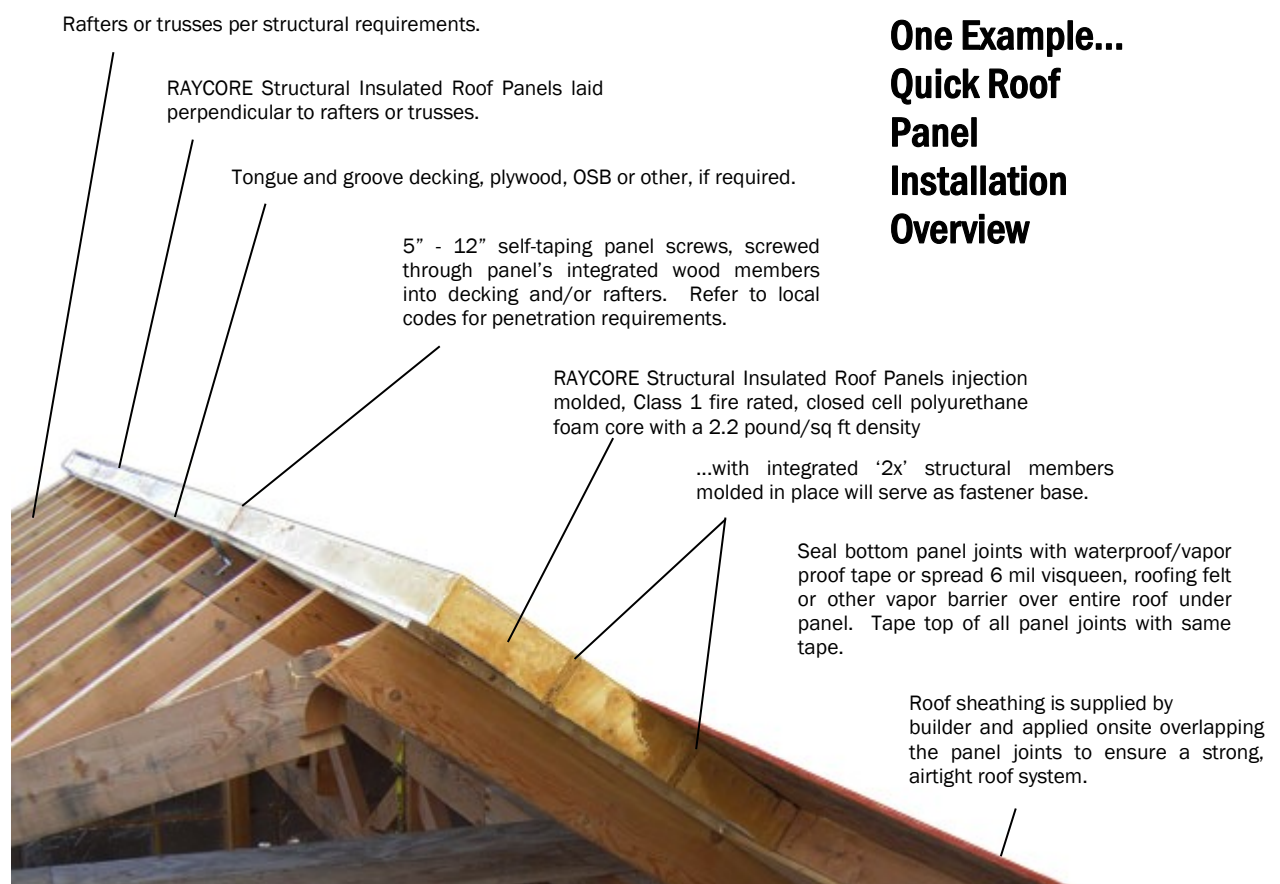


Roof Panel Installation Guide

RAYCORE Structural Insulated Panels are designed to meet the needs of energy conscience builders and homeowners. RAYCORE Roof Panels are a highly-insulated and energy efficient, green home construction, energy saving solution that will help to meet the unique roof insulation needs of Log, Timber Frame, Post & Beam, Straw Bale, and other types of home utilizing the current, open floor plan design elements. They also are a low cost “no-brainer” solution for those looking to add roof insulation to an Existing Structures.

RAYCORE Insulated Roofing Panels are a low-cost “win-win” solution for large Commercial roof projects, providing a competitive solution to offer a bid that cannot be beat and increasing bottom line at the completion of the project.

For engineered truss roofs, see Page 22, “Rafters, Trusses and Attic Insulation”.



One Example... Quick Roof Panel Installation Overview



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Step-by-Step Roof Panel Installation

Installation shall be in accordance with manufacturer's published instruction, utilizing conventional construction methods and practices. Furthermore, all methods and practices should comply with engineers or architect's specifications, and conform to national, state, and local building code requirements. No recommendations in this guide should supersede those specifications and requirements. Deviations from standard and conventional building methods and practices should be calculated, specified, signed and sealed by a licensed professional engineer or architect.

Step 1: Preparation: Prepare roof surface for panels to be installed. For exposed beam ceiling applications, typically tongue and groove decking or other finishes are applied prior to placement of panels. Other finish materials may also be specified.

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



Best Practices: Spread 6 mil visqueen, roofing felt or other vapor barrier over entire roof decking surface under panel. If no decking is specified, underside of panels should be taped with 3" vapor proof tape, and all joints check and filled for a tight seal, to prevent air infiltration or moisture transfer.

Step 2. Application of Panels & Sealing: Place the RAYCORE panels on roof. The panels are typically applied perpendicular to the rafters or trusses, although some applications have called for them to be installed vertically. Specify application at the time of ordering the panels for estimating.



To ensure an air-tight joint, apply a continuous bead of foam friendly construction adhesive, (such as Liquid Nails or equal) to all edges, between the panels and all other framing members to seal joints. Push panels firmly together, leaving no gaps and assuring the panels are tight and square. Attach to roof as instructed in Step 3. Further sealing, if required, can be performed once the panels are permanently attached.



Step-by-Step Roof Panel Installation (continued)



Step 3. Attach Panels: Use 5"- 12" panel screws to fasten panels to rafters and/or decking, drilling through the roof panel's integrated structural members ("studs") found 16" or 24" oc. Self-driving torque screws are recommended. Based on the framing and materials that will support the panels, some applications may require that the panels structural members span from rafter to rafter. When sufficient material will support the panels, this may not be required. Use screw schedule per engineer or architect's requirements. Penetration depth shall be dictated by local code. RAYCORE generally recommends 9–12 screws per panel, (Screws can be supplied by RAYCORE) with at least 2" of penetration.



Step 4. Sealing and Taping: Sealing the envelope and eliminating air infiltration is critical to the energy-saving performance of the RAYCORE roof panels and will prevent vapor transference. Fill any open joints, cracks or voids, and penetrations with canned polyurethane foam (Great Stuff or equal) and once cured, remove any excess. Smaller voids can be sealed with flexible caulk.



To get the best performance and ensure that there be no air infiltration and resulting vapor transference, all seams, joints to additional framing members, and penetrations should be sealed with vapor proof tape. (FSK tape can be supplied by RAYCORE.)

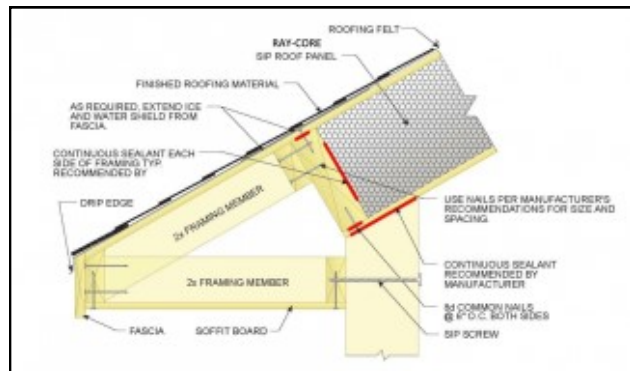
Although care should be taken to prevent damage of the panels foil facing when handled, small tears, occasional bumps or gouges may occur. The panels can be simply repaired by filling with canned polyurethane foam or by applying vapor proof tape to seal.



Step-by-Step Roof Panel Installation (continued)

Extending Roof Overhang or "Eaves":

Roof overhangs or "eaves" can be extended either by carrying the panel out to the fascia or by framing the eaves after the installation of the roof panels and before sheathing the roof. The detail to your right demonstrates one way to complete this installation.



"Hot" Roof (Unvented) Application: Most shingle manufacturers today warrant their products for unvented roof application when properly installed, but it is recommended that you check with your shingle manufacturer to assure that this is an approved application. For unvented applications, simply apply roof deck materials, such as plywood or OSB, directly on top of the properly sealed and taped RAYCORE Roof Panels, overlapping the joints in the panels with the joints of the sheathing to produce a strong base. Install ice and water shield, roofing felt or membrane on top of sheathing and builder should ensure a water/moisture proof seal. Finish roof in a code approved manner. Check with the roofing material manufacturer, your roofing specialist, your engineer/architect and local code officials for proper application of roofing materials.

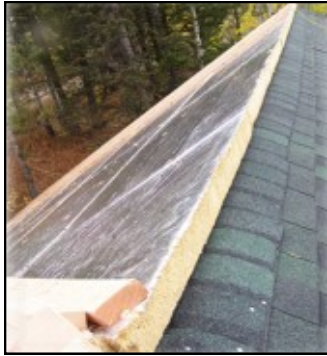
"Cold" Roof (Vented) Application: Should your project require a vented application, this can be achieved by placing 2x2 or 2x4 battens or "sleepers" to the top of sealed and taped RAYCORE Roof Panels, screwed to the integrated structural members ("studs") included in the RAYCORE Roof Panels. Ice and water shield and/or roofing felt or membrane should be installed on top of the panels and builder should ensure a water/moisture proof seal. Finish roof in a conventional and code approved manner. As always, check with the roofing material manufacturer, your roofing specialist, your engineer/architect and local code officials for proper application of roofing materials.



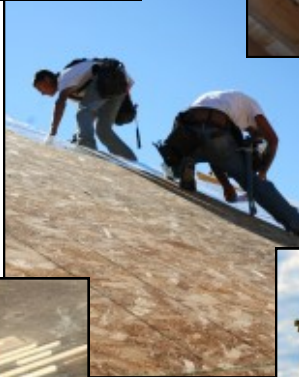
Metal Roof Application: When using a metal roofing it may be possible to apply the metal roofing directly to the properly taped and sealed RAYCORE roof panels without requiring additional sheathing or battens. Roofing manufacturer and code official approval is required. Ice and water shield must be installed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



Step-by-Step Roof Panel Installation (continued)



Adding Insulation To An Existing Roof: RAYCORE's lightweight, easy to use, modular roof panels with integrated framing member or "studs" is the perfect solution for adding insulation to the roof of an existing structure without disturbing the interior of the home. Simply frame the edge of the roof extending fascia and soffits and apply panels to existing roof. Deck as required, and apply roofing in an appropriate manner.



RAYCORE Structural Insulated Panels used on the roof should be fully protected from sunlight, moisture and the elements utilizing tarps, roofing materials or other means to provide temporary protection and permanent roofing materials should be applied as soon as possible upon the completion of installation. The panels are not meant to be left as a finished product.



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Wall Panel Installation Guide

When building with SIPs, RAYCORE's Structural Insulated Wall Panels are far superior to Sandwich Panel SIPs. RAYCORE wall panels consist of integrated structural members or studs, closed cell polyurethane insulation and a foil radiant vapor barrier to ensure structural integrity and the highest R-value per inch insulation on the market. RAYCORE wall panels are easy to assemble and provide superiorly insulating, air-tight construction that will result in a lifetime of energy efficiency, saving the homeowner money for the life of their home. RAY-CORE SIPs are simply the best wall panels available.



- Insulation, studs and wrapping all completed at the factory. All you do is assemble.
- RAYCORE's integrated studs are available 16", 24", or staggered 12" oc ensuring that the wall panels will be structurally sound for the lifetime of the structure.
- No dependency on glue and the adhesion of polystyrene to OSB for structural integrity like Sandwich Panel SIPs.
- RAYCORE wall panels are not prone to moisture, mold and rotting associated with Sandwich Panel SIPs.
- According to the US Department of Energy, 40% or more of a home's heating and cooling costs are attributed to air leakage. Air-tight construction, with superior closed cell polyurethane foam insulation is an effective air barrier.



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Step-by-Step Wall Panel Installation

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Step 1. Precut / Frame Window and Door Openings: Precut materials for, and if you wish construct, window and door openings using RAYCORE's insulated headers in preparation for assembling walls.



Step 2. Wall Layout: Establish your layout by starting with your corner (See Step 3 & 4), placing lumber, measuring and marking top and bottom plates, and laying out panels, door and window frames, etc.



Step-by-Step Wall Panel Installation (continued)

Step 3. Remember... Think “Conventional Framing”. Decide how you will choose to frame your corners based on the information below and



frame your first corner. Start laying panels out, cutting panels when necessary. When your wall meets a door or window simply cut the panel so it butts tight against the king stud on the window or door frame, and use cut material to continue on the side opposite the opening, cutting where

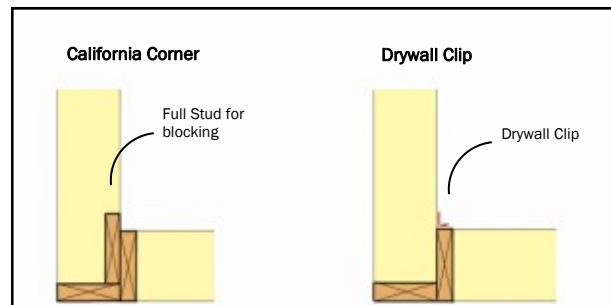


necessary to stay on layout. Avoid panel waste by taking the time along the way

For best results and clean cuts, cut panels with a circular “panel” or “beam” saw, utilizing a **10-1/4”** for 3-1/2” thick panels or **16”** for 5-1/2” and 7-1/4” thick panels. If you don’t own one, check with your local equipment rental store.



Step 4. Corner Detail: Framing a corner is not unlike framing any corner with conventional stick framing. There are a couple of ways to do this, but ultimately code requires a minimum of 2 studs at corners. Although you may choose to take your traditional corner approach, two of the most energy efficient approaches are shown below. Simply establish your layout, cut the panel to fit and off you go. If you choose to take the California Corner approach, there are two ways you can do it. It will take a little more time, but you can channel out the foam to insert the stud blocking, taking care not to remove more foam than necessary for the stud. Or simply frame your corner and start the panel with a stud at the edge of the corner stud and fill the void with surplus foam, as shown below. Use construction adhesive (Liquid Nails or equal) to glue the foam in place and fill any voids with canned polyurethane foam.



Step-by-Step Wall Panel Installation (continued)

Step 5. And You're Off! Apply a continuous bead of construction adhesive to sides of the RAYCORE wall panel to adhere and provide an airtight seal.



Push panels firmly together so the foam side of panel touches the wood side of the adjoining panel, maintaining your layout, and at all times ensuring that the panel joints are tight and square to eliminate air infiltration and maximize energy efficiency of the envelope. Fill voids above



and below windows with pieces of surplus cut panels.



Step 6. Attach Top and Bottom Plates:

Apply a continuous bead of construction adhesive to the bottom of the panels to provide an airtight seal and match studs in panels and window and door frames to the layout marked on your 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.



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Step-by-Step Wall Panel Installation (continued)

Step 7. Sealing and Taping: Sealing the envelope and eliminating air infiltration is critical to the energy-saving performance of any home reducing heating and cooling costs and preventing vapor transference. When building with RAYCORE wall panels, fill any open joints, cracks or voids, and penetrations with canned polyurethane foam (Great Stuff or equal) and once cured, remove any excess. Smaller voids can be sealed with flexible caulk. All seams, joints to additional framing members, and penetrations should be sealed with vapor proof tape. (FSK tape can be supplied by RAYCORE). Although care should be taken to prevent damage of the panels and their foil facing when handled, small tears, occasional bumps or gouges may occur. The panels can be simply repaired by filling with canned polyurethane foam or by applying vapor proof tape.



Step 8. Standing the Walls:



Sheathing can be attached either before or after the wall has been raised. Framer's preference.



Apply a continuous bead of foam friendly construction adhesive to the bottom plate to provide an airtight seal to subfloor and stand wall.

Securely nail face nail bottom plate on both sides to rimboard and floor joists with appropriate fastener per conventional framing and to code.



Step-by-Step Wall Panel Installation (continued)



RAYCORE Structural Insulated Wall Panels are not meant to be a finished and exposed surface. Internal surfaces of panels should be covered with a minimum 15-minute thermal barrier, such as 1/2" gypsum wallboard or other approved materials. External surfaces of panels should be finished as soon as possible with materials that provide protection from sunlight, weather, moisture and all elements.



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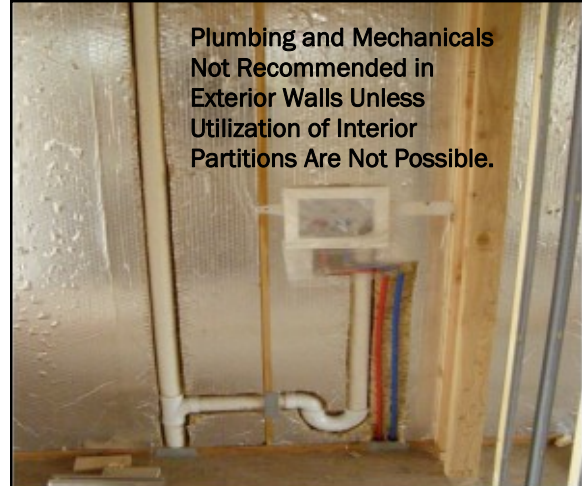
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Wiring, Plumbing & Ventilation

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. Do not cut through panels or completely remove the foam and only remove as much foam and material as is necessary for wiring to maintain the energy efficiency of the panels. Drill studs per code requirements where needed. Use nail plates where needed. Place wire in chase.



Once inspections have been performed and rough wiring has been approved, backfill channels and penetrations with canned polyurethane foam (Great Stuff or equal) and once cured, remove any excess.



Plumbing & Ventilation:

Best Practices - For maximum energy efficiency, RAYCORE highly recommends that every effort be made to avoid the installation of plumbing and ventilation in the exterior RAYCORE Structural Insulated Panels. In most cases, interior partitions and alternative ventilation solutions can be utilized. Also a "wet wall" framed inside the paneled wall might be considered and utilized. If plumbing or mechanicals must be installed in the panels, take care to remove as little foam as possible, and be certain to backfill all chases and penetrations with canned polyurethane foam (Great Stuff or equal) and once cured, remove any excess.

For More Details and Videos, Go To:

www.youtube.com/raycoreinc



Attaching Wall Panel to a Concrete Wall or Slab

Attaching RAYCORE Wall Panels to a Concrete Wall or Slab is handled basically in the same manner as attaching any wall to a slab or concrete wall. Frame your walls as instructed previously per engineer or architect and code requirements. In preparation, mark on panel the locations of all foundation bolts. Make a 4"x4" OSB template and attach to the foam with nails. Take a drywall saw and carefully cut the foam away from the



bottom plate at the anchor bolt locations. Number and reserve the foam blocks as they will be reinserted, filling the voids once the bolts are secured to the bottom plate. Predrill bottom plate for bolts.

Apply a foam sealant per code between the bottom plate and concrete to provide an airtight seal. Stand wall over bolts. Attach with washers and nuts per code. Reinsert foam blocks in panel voids and seal in place with construction adhesive as previously instructed.

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



Hurricane Strapping Installation

Attaching RAYCORE Wall Panels to Hurricane Strapping on a Slab is handled basically in the same manner as attaching hurricane strapping to any wall. Frame your walls as instructed previously per engineer or architect and code requirements. Take a drywall saw and carefully cut the foam away from the bottom plate in the shape of the strap sufficient to allow installation and attachment to the wall framing. Remove only the amount of foam necessary to perform the installation. Upon completion of the installation, fill the voids and seal with a foam friendly construction adhesive.



Hurricane Straps example (ie. Simpson STHD straps).

As you would with conventional stick framing, hurricane straps are nailed into the RAYCORE Wall Panel's integrated studs. If the integrated stud in the panel does not line up with the STHD strap then you will need to place a stud in proper location during the framing process.



Best Practices

A few suggested practices that can enhance the performance of your new RAYCORE Structural Insulated Panel home...

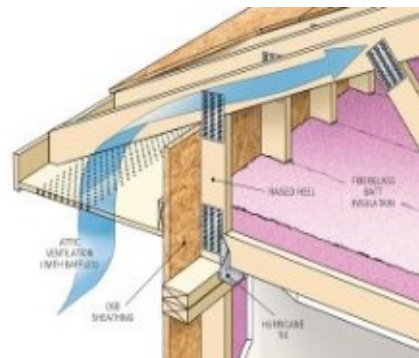
Rim Joist / Band Joists Insulation:

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, but because fiberglass is air permeable, they do nothing to prevent warm, humid interior air from coming in contact with the rim joist, and in winter months when the rim joist is cold, condensation can cause mold and then rot of the rim joist and floor joists and accumulate in the insulation drastically reducing its effectiveness. Although spray foam is not a great insulation choice, it is a very good air sealer. Consider adding 2" to 6" of spray foam to each floor's rim board and back it with an additional insulation whether it be fiberglass, cellulose, rockwool or even 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!

Rafters, Trusses and Attic Insulation: First and foremost, you want approximately 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, 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 heel 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 canned lights, around ducting vents, etc.



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Additional Documents You Might Find Useful

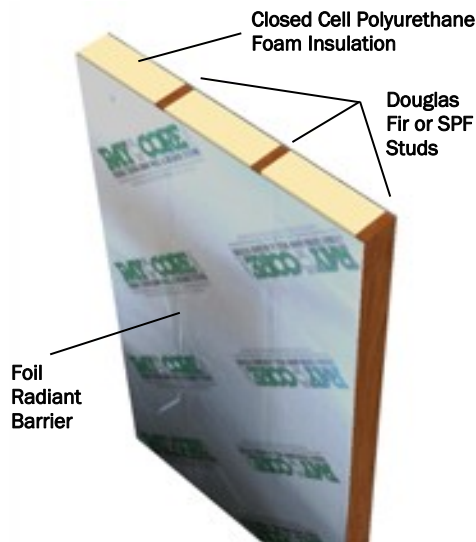
Attached you will find additional documents that may be required before, during and after the construction process. The following documents have been supplied for your convenience to expedite the construction process.

- ❑ RAYCORE Submittal Sheet
- ❑ RAYCORE Technical Data Sheet
- ❑ Warranty Documents

Panel Details

SUBMITTAL
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RAYCORE Structural Insulated Roof and Wall Panels

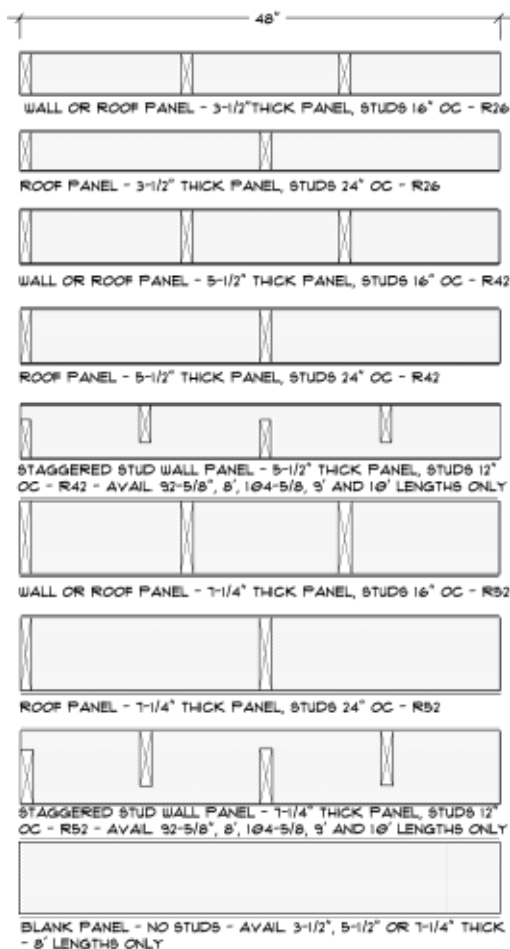


STANDARD FEATURES

- Insulation, Framing and Wrap in a 4' wide panel
- Available in 3-1/2" (R26), 5-1/2" (R-42) and 7-1/4" (R52) thick panels
- Available in precut 92-5/8", 8', precut 104-5/8", 9', 10' and 12' lengths
- Class 1 fire rated 2.2 lb density closed cell polyurethane foam insulation
- #2 or better Douglas fir, larch or SPF (if other, will be specified)
- Radiant foil vapor barrier on either side of panel

IMPORTANT NOTES

Installation shall be in strict accordance with manufacturer's published instructions and conventional construction methods and practices, engineers or architect's specifications, and compliance with local code requirements. Deviations from conventional building methods and practices should be calculated, specified, signed and sealed by a licensed professional engineer or architect.



TYPE OF PANEL

- ☐ Wall ☐ Roof

STYLE OF PANEL

- ☐ Studs 16" oc ☐ Studs 24" oc ☐ Staggered Stud 12" oc
- ☐ No Studs

SIZE - PANEL THICKNESS

- ☐ 3-1/2" ☐ 5-1/2" ☐ 7-1/4"

PANEL LENGTH

- ☐ 92-5/8" (8-pre) ☐ 104-5/8" (9-pre) ☐ 120" (10')
- ☐ 96" (8') ☐ 108" (9') ☐ 144" (12')

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

SHOP DRAWING / SUBMITTAL REVIEW

- ☐ Approved ☐ Approve with Changes Noted
- ☐ Revise and Resubmit ☐ Rejected _____

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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SECTION 06 12 00

STRUCTURAL INSULATED PANELS

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes: Structural Insulated Panels
- B. Related Sections: Section(s) related to this section include:
 - 1. Section 06 10 00 Rough Carpentry
 - 2. Section 07 21 00 Building Insulation
 - 3. Section 07 21 20 Radiant Barriers

1.02 SYSTEM DESCRIPTION

RAY-CORE Structural Insulated Panels are component product consisting of conventional 2x4, 2x6, or 2x8's Douglas Fir or spf lumber studs prepositioned 16" or 24" on center with polyurethane foam insulation molded in place between studs and foil radiant vapor barrier applied to the exterior sides of the panels.

RAY-CORE Structural Insulated Panels are installed using conventional construction methods and practices per UCC, IBC, IRC and ICC standards. RAY-CORE Panels are to be combined with standard dimensional lumber studs, plates, nailers, headers and sills, as required, supplied onsite by contractor as detailed in manufacturer's installation details meeting all current building codes.

1.03 REFERENCES

- A. UCC – Universal Construction Code – Framing
- B. IBC – International Building Code - Framing
- C. IRC – International Residential Code - Framing
- D. UL-723 – Foam Surface Burning Characteristics
- E. ASTM E-72-05 - Compressive Load and Transverse Load
- F. ASTM D 1622 - Foam Density
- G. ASTM C 518 – Foam Initial K-Factor
- H. ASTM D-2856 –Foam Closed Cell Content
- I. ASTM D-2842 – Foam Water Absorption
- J. ASTM D-2126 – Foam Dimensional Stability
- K. ASTM E-96, Procedure A – Foil Permeance
- L. ASTM C-1258 – Foil Humidity Resistance
- M. UL-723 / ASTM #84 – Foil Flame Spread

1.04 DESIGN REQUIREMENTS

- A. Provide panels which have been manufactured to standard taking care to maintain performance criteria stated by manufacturer without defects, damage or failure. Provide labeling of all insulation used in the manufacture of panels. Manufacturer's listing programs shall cover both flame and physical properties.
- B. Panel manufacturer will provide R-value documents for building owner acceptance and execution upon request. Manufacturer's standard forms will be submitted.

1.05 SUBMITTALS

- A. Product Data: Submit product data for specified products
- B. Installation Guide: Submit installation guide for specified products
- C. Warranty: Warranty documents specified herein

1.06 QUALITY ASSURANCE

- A. Installer Qualifications: Installer should be experienced in performing work with a degree of experience equal to conventional wood framing construction and other conventional construction methods and practices similar to that required for this project.
- B. Source Limitations: Obtain all panels through one source.

1.07 REGULATORY REQUIREMENTS

- A. RAY-CORE Structural Insulated Panels shall be sized and installed in conformance and compliance with local codes.

1.08 DELIVERY, STORAGE & HANDLING

- A. Prior to installation, RAY-CORE Structural Insulated Panels shall be stored in a protected area and elevated to prevent ground contact and covered to prevent exposure to sunlight, moisture and the elements.
- B. Prior to installation, RAY-CORE Structural Insulated Panels shall be covered and protected from exposure to sunlight and moisture.
- C. After installation, RAY-CORE Structural Insulated Panels shall be protected from prolonged exposure to sunlight and covered to prevent contact with water and /or moisture on all exposed panel edges and faces.

PART 2 - PRODUCTS

2.01 MANUFACTURERS/SUPPLIERS

- A. RAY-CORE, INC., 305 E. Elva Street, Idaho Falls, ID 83401

2.02 MATERIALS

- A. RAY-CORE Structural Insulated Panels are component building panel product using proprietary manufacturing method consisting of the following:
 1. Integrated SPF #2 or better kiln dried or treated or engineered lumber
 2. UL certified polyurethane foam – meeting manufacturer quality standards
 3. Aluminum foil faced radiant vapor barrier with kraft substrate and direction reinforcing

2.03 FABRICATION

- A. Sizes: RAY-CORE Structural Insulated Panels come in 4 foot widths and are available in standard Douglas Fir or spf lumber 2x4, 2x6 or 2x8 thicknesses and standard lengths of 92.625", 96", 104.625", 108, 120" and 144" based on stud configuration. Custom stud configurations may be available as required.

2.04 PERFORMANCE CHARACTERISTICS

- A. Thermal Resistance, R-value:

RAYCORE TYPICAL R-VALUES		
PANEL THICKNESS (IN)	ASTM C518 Standard	Tested At
	75° F	50° F
3-1/2"	25	26
5-1/2"	40	42
7-1/4"	51	52

- B. Panel Dimensional Tolerances: RAY-CORE Structural Insulated Panels shall comply with values listed in the manufacturer's Quality Control Manual.
- C. Structural Testing: Each RAY-CORE Structural Insulated Panel type shall meet or exceed performance standards, values, testing and applicable technical data reports when tested in accordance with:
1. ASTM E84 Surface burning characteristics for the rigid insulation core.
 2. ASTM E84 Surface burning characteristics conducted for the interior and exterior surfaces of the finished panel.

PART 3 – EXECUTION

3.01 MANUFACTURER'S INSTRUCTIONS

- A. Compliance: Installation shall be in strict accordance with manufacturer's published instructions and conventional construction methods and practices, and compliance per local code requirements. Deviations from conventional building methods and practices should be calculated, signed and sealed by a registered professional engineer.
- B. Certification: Builders plans and panel manufacturer's installation manual

3.02 EXAMINATION

- A. Site Verification of Conditions: The contractor shall inspect conditions of substrate, grade and other conditions, which may affect the proper installation of panels. Verify substrate conditions are acceptable for product installation in accordance with manufacturer's instructions. Any adverse conditions are to be reported in writing to the construction manager. Do not proceed with the installation until adverse conditions are corrected.

3.03 INSTALLATION

Installation shall be in strict accordance with manufacturer's published instructions and conventional construction methods and practices and compliance per local code requirements. Deviations from conventional construction methods and practices should be calculated, signed and sealed by a registered professional engineer.

- A. Panel Supports: Provide level and square foundation/structural system/substrate to support wall and/or roof panels. Provide adequate bracing of panels during erection. Remove debris from panel edge prior to attachment of plates.
- B. Panel Fastening: Connect panels to plates by construction adhesive, nails, staples or screws as required. Where screw fasteners are used, provide a minimum of 2" penetration into support. Join panels using plates. Apply adhesive and foam sealant to all joints, penetrations, cracks and voids to fill and seal, following manufacturer recommendations.
- C. Tape: Provide tape at joints between panels and at intersection of roof and wall.
- D. Thermal Barriers: Internal surfaces of panels shall be finished with a minimum 15-minute thermal barrier, such as ½" gypsum wallboard other approved materials as required by local code requirements.
- E. External Finishes: External surfaces of panels shall be finished with materials that provide protection from sunlight, weather, moisture and all elements.
- F. Restrictions: Panels shall be protected from exposure to sunlight, moisture, the elements, solvents and their vapors, and any other substance that will damage the aluminum vapor barrier or polyurethane foam.

3.04 PROTECTION

- A. When storing RAY-CORE Panels, panels shall be stored in a protected area and elevated to prevent ground contact and covered to prevent exposure to sunlight, moisture and the elements. Do not allow panels to be stored in an unsupported manner. Improper storage may cause materials damage or decomposition and tolerance problems in the field.
- B. RAY-CORE Panels used on walls must be covered by an external finish to fully protect from sunlight, moisture and the elements.
- C. RAY-CORE Panels used on roof must be fully protected from sunlight, moisture and the elements utilizing tarps, roofing materials or other means to provide temporary protection at the end of the day, or when rain or snow is imminent, and permanently upon completion of construction.
- D. Remove and replace RAY-CORE panels, which have become excessively wet or damaged before proceeding with installation of additional panels or other work.
- E. The construction manager, or his designee, shall remove all refuse created by the installation of work in this section.
- F. Ordinary care and safety precautions should be followed when handling panels, as with other construction materials. Proper lifting techniques should be followed. Extra caution should be taken in wet, icy or windy conditions. Panel surface can be slippery. Exercise caution walking on panels and always use appropriate and approved fall protection. Do not walk on panels in wet, icy or windy conditions. Wear appropriate eye and dust protection when cutting panels.



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LIMITED WARRANTY

Materials and Workmanship: RAY-CORE offers a Limited Lifetime Warranty on their Structural Insulated Roof, Wall and Header products to the original purchaser or structure owner, as long as they own the covered structure, against defects in workmanship and/or material from the date of manufacture, provided 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 Manual, purchaser's architect or engineer's design specifications, standard building practices and local code requirements.

Exceptions: This warranty is a Manufacturing Defect Warranty and does not apply to damage resulting from violent, unusual weather conditions or acts of God including seismic and volcanic activity; fire, water or flood; animal, rodent or insect damage; mold or mold-related damage or 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; engineering, design or builder's failure to appropriately interpret or follow specifications; alteration, misuse or abuse of materials prior to, during or after installation; damage resulting from improper installation or use of incompatible installation processes or materials; or any other 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 and 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 ninety (90) days of receipt of your RAY-CORE products. By completing the warranty form, you are verifying 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 Manual, purchaser's architect or engineer's design specifications, standard building practices and local code requirements.

Notification of Claims: Notification of claims to RAY-CORE, INC. must be made in writing at 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 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 as listed above, causing a loss to the original purchaser or structure owner only, as long as they own the covered structure during the warranty period as listed above, 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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WARRANTY FORM

PURCHASER:

INVOICE NO _____

NAME _____

ADDRESS _____

PHONE NUMBER _____ FAX NUMBER _____

EMAIL _____

DATE OF PURCHASE _____ DATE OF RECEIPT _____

ORIGINAL STRUCTURE OWNER:

NAME _____

ADDRESS _____

PHONE NUMBER _____ FAX NUMBER _____

EMAIL _____

I certify that I have read and understand RAY-CORE, INC. Limited Warranty and that all RAYCORE 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 Manual, purchaser's architect or engineer's design specifications, standard building practices and federal, 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 RAYCORE products.

Additional Installation Procedures

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

www.raycore.com/techdata.php
and check out the data below "Installation Manual & Detail Drawings"

OR contact a RAYCORE technical representative:

Phone Toll Free: 877.552.2440
Email: info@raycore.com



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