

Bank Your Heat & Save

Store The Energy


Premier Energy USA



Thermal Mass Heating System



RADIANT HEATING SYSTEMS

TRANSFORM THE FLOOR AND THE GROUND BELOW IT INTO AN EFFICIENT THERMAL MASS OF STORED ENERGY THAT IS RELEASED INTO THE SPACE ABOVE IT AS NEEDED



(800) 506-7973
premierenergyusa.com



Lowest Life Cycle Costs

Thermal Mass! Thermal Mass! Thermal Mass!



Thermal Mass is the key to low operating costs. Most floor heating systems place insulation below the heat source limiting the thermal mass.

ThermaRay Floor heating systems do Not require or recommend insulation below the heating panels and create a 24"- 30" deep thermal mass. The larger the thermal mass the lower the operating costs.

Systems that limit the thermal mass claim that if you don't insulate, you will lose heat to the earth. The actual physics is that the heat will only go down a certain amount when the thermostat is satisfied. The heat is then stored and is released into the space above it when it is needed.

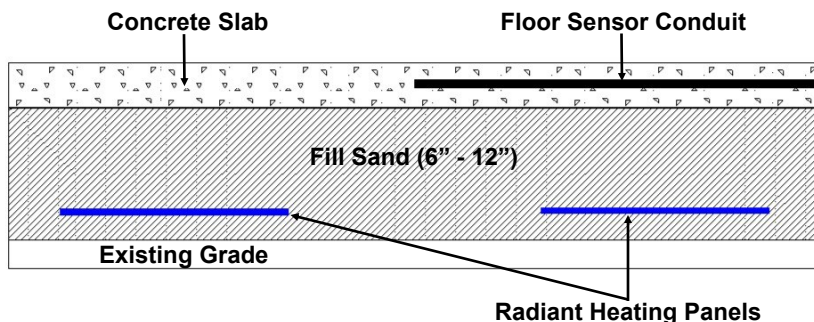


Features & Benefits

- **Energy Efficient**
- **Maintenance Free**
- **Safe** - No open flames, high surface temps or risk of carbon monoxide poisoning
- **Healthy** - No blowing dust, allergens or airborne contaminants
- **Zoning** - Precisely controlled in each room
- **Superior Comfort**
- **Affordable**
- **Aesthetic** - Completely concealed for more decorating freedom
- **Resale Value** - Increases due to low operating costs, superior comfort and no maintenance
- **Quiet** - No Moving parts, fans or pumps

Installation Diagram

Heating Panels are installed 6" - 12" below the bottom of the concrete and on top of 1" - 2" of sand. The ThermaRay heating system creates a Thermal Mass 24" - 30" deep.



Contact Information:

Premier Energy USA (800) 506-7973
Info@premierenergyusa.com
premierenergyusa.com



Features & Benefits

- **Energy Efficient**
- **Maintenance Free**
- **Superior Comfort**
Gentle even temperature from floor to ceiling
- **Affordable and easy to install**
- **Healthy - No blowing dust, allergens or airborne contaminants**
- **Safe - No open flames, high surface temps or risk of carbon monoxide poisoning**
- **Quiet - No Moving Parts, fans or pumps**
- **Unlimited Control**
Options including Invisible Controls
- **Zoning - Precisely controlled in each room**
- **Aesthetic - Completely concealed for more decorating freedom**
- **Elevates resale value with low operating costs and no maintenance**
- **UL & CSA Listed and approved.**



Floor Heat (Under Concrete)

Thermal Mass ! Thermal Mass! Thermal Mass !

For over 40 Yrs. ThermaRay, Inc. has been manufacturing the only true Deep Heat Thermal Mass Floor Heating System. Thermal Mass is the key to low operating costs.

Most floor heating systems place insulation below the heat source limiting the thermal mass. ThermaRay Floor Heating systems do Not require or recommend insulation below the heating panels and create a 24" - 30" deep thermal mass. The larger the Thermal Mass the lower the operating costs.

Systems that limit the thermal mass claim that if you don't insulate, you will lose heat to the earth. The actual physics is that the heat will only go down a certain amount before the thermostat is satisfied. The heat is stored and is released into the space above it when it is needed.

The system is also protected from other trades, mechanical harm, corrosive chemicals and natural disasters. Hazardous areas can also be safely heated because there is no exposed flame or heating element. No Emissions and No Carbon Dioxide. Available in all voltages

Perfect for: Basements, Homes, Garages, Shops, Sunrooms, Warehouses, Shops, Churches, Schools, Commercial / Industrial, Shops, Aircraft Hangars, Etc.



Industrial / Commercial



Residential Installation



Garages & Shops

How Radiant Heat Works

If you step from the shade to the sun on a cool day you experience how Radiant Heat warms our world. If you take an object like a rock and set it in the sun, it will absorb that warmth and then in turn help warm the space around it.

A ThermaRay Radiant Heating System accomplishes exactly that same effect. Whether the heating system is in the floor or the ceiling, the radiant rays travel in straight lines and warm all the objects in the space.

Silent, Invisible and Motionless Warmth is gently radiated to all the objects in the room. The walls, floor, ceiling, windows, furniture and essentially everything in the room become part of the heating system. This stored thermal mass keeps operating costs low, but Most Importantly the Radiant Rays Warm "You".

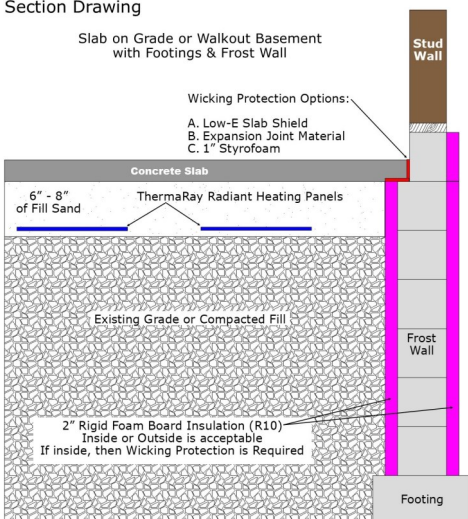
ThermaRay Creates a Natural, Healthy & Comfortable Environment



premierenergyusa.com

(800) 506-7973

INSTALLATION PROCESS

Ground Preparation	Heating Panel Placement	Wiring	Testing	Connection Enclosure
				
Grade must be level and free of debris. 1"-2" of fill or screen sand is recommended as a base for the heating panels. It is also recommended that the rough-in plumbing be completed prior to installation.	A heat loss calculation must be completed to determine the amount of heating panels required. The Heating panels are placed evenly throughout the entire area, beginning approximately 12" from inside walls.	Wiring should be done by a certified electrician and in accordance with NEC code requirements. Heating panels are wired in parallel with 12 Ga. direct bury wire and 3M-567 connectors. 5-8 panels are wired together on a circuit depending upon the wattage.	Each circuit should be re-sistance tested to verify that all the panels are wired correctly and working properly. The ohm readings of each circuit should be recorded on the Load Check form to comply with warranty requirements.	PC-3 Gel Caps are factory and UL listed and approved for protecting the connections against moisture and corrosion. Connectors are completely enclosed in the Gel cap after testing the circuits for continuity.
Circuits & Sensors	Placing Sand Over Panels	Ready For Concrete	Controls	Comfort & Efficiency
				
The 10 Ga. or 12 Ga. Circuits are brought back to the service entrance through plastic pvc or steel conduit. The floor can be controlled with a Radiant Ambient thermostat or a thermostat with a floor sensor.	4" - 8" of Fill or screen sand with no debris is recommended for placing on top of heating panels. Placement of sand can be done in a number of ways including a skidsteer. Special care should taken when using this method to ensure no damage is done to the panels.	The sand can be tamped and a vapor barrier placed. (if required by building code) An Ohm reading should be taken on all circuits after the sand has been placed and once again after the concrete has been poured.	The heating panels are wired to the relay control box and then to the 240v -20 Amp circuit breakers in the service panel. Typically, the ETS system is run on an the Off-Peak or Dual Fuel program offered by the electric provider.	ThermaRay Radiant systems create a healthier, more comfortable space with no maintenance, repair or replacement for the life of your building.
Section Drawing 				
For More Information: Premier Energy USA (800) 506-7973 www.premiereenergyusa.com info@premierenergyusa.com				

ThermaRay - Installed Heating Systems



Manufacturing / Industrial

Design Ready Controls – Brooklyn Park, MN (94,500 Sq.Ft.)
Rock Solid Stabilization - Genoa City, WI (45,000 Sq.Ft.)
All Energy Management - Two Rivers, WI (12,000 Sq.Ft.)
Franz Construction (Welding Shop) - Sidney, MT (8,360 Sq.Ft.)
Franz Construction (Warehouse) - Sidney, MT (7,150 Sq.Ft.)
Franz Construction (Airport Hangar - Sidney, MT (9,030 Sq.Ft.)
PJ's Glass (Shop) - Sidney, MT (3,320 Sq.Ft.)
Northland Fishing Tackle Mfg. Facility & Office – Bemidji, MN
Virnig Manufacturing – Rice, MN
Tuffy's Warehouse (4x) – Perham, MN (52,000 Sq.Ft.)
Kenny Candies Addition – Perham, MN (19,500 Sq.Ft.)
Reeds Family Outdoor - Warehouse – Walker, MN (24,000 Sq.Ft.)
Voyager Aluminum Industries – Brandon, MN (30,000 Sq.Ft.)
Riley Brothers Construction – Morris, MN
Rustad Bus Company – Kerkhoven, MN
Magnum Electric's Office & Shop – Moorhead, MN
Haubrich Electric Shop – Bemidji, MN
Otto Trucking – Fargo, ND
Helm Trucking – Drayton, ND
Dakota Fluid Power – Sioux Falls, SD
Pace Manufacturing – Brandon, SD
Granite City Moving & Storage – Granite City, MN
NW Tire Warehouse – Mapleton, ND (60,000 Sq.Ft.)
Wilcat Trucking – Sidney, MT (9,600 Sq.Ft.)
Kelco Supply Co – Big Lake, MN
Wingfoot Commercial Tire – Fargo, ND
Steven's Welding Service – Glenburn, ND
Welding Shop – Hoffman, MN
Chase Steel Manufacturing – Fargo, ND (50,000 Sq.Ft.)
Frito Lay Facility – Aberdeen, SD
Aberdeen Airport Hangar – Aberdeen, SD
Airport Hangar - Sidney, MT
Trail King – Mitchell, SD
Hibbing Taconite Waste Facility – Hibbing, MN
Hibbing Taconite Ambulance Garage – Hibbing, MN

Electric Coop Facilities

Otter Tail Power - Hoot Lake Operations Building - Fergus Falls, MN
East Central Energy - ECE Fiber Operations Building - Braham, MN
Detroit Lakes Public Utility - Detroit Lakes, MN
Wadena Utilities Maintenance Facility & Office - Wadena, MN
McKenzie Electric Coop – Watford City, ND (100,000 Sq.Ft.)
Otter Tail Power Service Centers 10+ Locations
Cass County Service Center – Arthur, ND
Cass County Service Center – Kindred, ND
Wild Rice Electric Office Complex – Mahanomen, MN
East Central Energy Maintenance Facility and Office – Milaca, MN
East Central Energy Maintenance Facility – Braham, MN (3X)
East Central Energy / MLEC Maint. Facility – Wahkon, MN (2X)
Great River Energy Maintenance Building – Wilmar, MN
Roseau Electric Coop Truck Shop – Roseau, MN
Red Lake Electric Coop Line Truck Building – Red Lake Falls, MN

Agriculture / Implement

Amundson Peterson Implements (John Deere) – Morris, MN
Norman County Implement – Ada, MN
Titan Machinery Headquarters – West Fargo
Titan Machinery – Casselton, ND
Titan Machinery – Crookston, MN
Titan Machinery – Fergus Falls, MN
Titan Machinery – Highmore, SD
Titan Machinery – Lisbon, ND
Northern Grain – Fargo, ND
Westfield Grain – West Fargo, ND
Red River Grain – Breckenridge, ND
Plains Grains & Agronomy – Enderlin, ND

Assisted Living / Multi Unit Housing

Parkside Lutheran Home - Lisbon, ND
Goldmark Casselton 8-Plex – Casselton, ND
The Willows 8 Plex – Breckenridge, MN
Viking Manors Assisted Living – Ulen, MN
Lutheran Home of the Good Shepard – New Rockford, ND
Countryside Assisted Living – Rosholt, MN
Nursing Home – Lakota, ND
Silver Plains Assisted Living – Lake Preston, ND
Community Center - Wannaska, MN
Heritage Commons Townhomes (12X) – Albertville, MN

Retail / Service / Religious

U-Motors Retail – Fargo, ND - (38,000 Sq.Ft.)
U-Motors Retail – Fergus Falls, MN (22,100 Sq.Ft.)
United Farmers and Merchants Bank – Morris, MN
Seven Sisters Spirits – Detroit Lakes, MN (7,000 Sq.Ft.)
Burns Bottle Shop – Nowthen, MN
Casselton Vet Center – Casselton, ND
Lakeside Cabinets & Woodworking – Anoka, MN
Runnings Farm Supply – Carrington, ND
Fortune Bay Casino – Tower, MN
Mystic Lake Casino – Prior Lake, MN
Dean's Grocery – Perham, MN
Hagge's Bar & Grill – Mapleton, ND
Mavericks Restaurant – Aberdeen, SD
Northwoods Bar & Grill – Nowthen, MN (13,400 Sq.Ft.)
DEC Convention Center – Aberdeen, SD
Benny D's Bar & Grill – Wendell, MN
OPES Outdoor Retail Store – Nowthen, MN (7,600 Sq.Ft.)
Fleetwood Collision Center – Nowthen, MN
PJ's Auto Glass Shop – Sidney, MT (3,320 Sq.Ft.)
St. Mark's Lutheran Church – Bemidji, MN
Trinity Lutheran – LaPorte, MN
St. Paul Lutheran Church – Milaca, MN
Trinity Lutheran Church – Grove City, MN
First Baptist Church – Milaca, MN

Government Facilities

Camp Ripley Range Operation Centers (2X) – Camp Ripley, MN
Camp Ripley Hanger Remodel – Camp Ripley, MN
Camp Ripley Maintenance Buildings (2X) – Camp Ripley, MN
Camp Ripley Vehicle Maintenance Facility (2X) – Camp Ripley, MN
Camp Ripley Medical Unit Treatment Facility – Camp Ripley, MN
Camp Ripley Shower / Toilet Facility – Camp Ripley, MN
Dept. of Military Affairs - POL Power Building - Camp Ripley, MN
Richland County Vo-Tech – Wahpeton, ND
Polk County Shop – Fosston, MN
Marshall Polk Rural Water – Warren, MN
Water Treatment Plant – Ulen, MN
Water Treatment Plant – Callaway, MN
Public Safety Building Parking Garage – Aberdeen, SD
West Fargo Park Board Shop – West Fargo, ND
Public Safety Building – Aberdeen, SD
Habitat for Humanity Homes (10x)
US Fish & Wildlife Service – Litchfield, MN
Crookston Ambulance Garage - Crookston, MN
Fire Hall – Walhalla, ND
Fire Hall – Corona, SD
Fire Hall – Hoffman, MN
Fire Hall – Grygila, MN
Fire Hall – Gackle, ND
Fire Hall – Surrey, ND
Fire Hall – Esmond, ND
DOT Building – Beulah, ND
DOT Building – Tioga, ND
DOT Building – Adams, ND
DOT Building – Larimore, ND
DOT Building – Bismarck, ND

Notable Projects:

100's of Hot Yoga Studios & Rooms
Indianapolis Colts Stadium (145 Luxury Boxes) – Indianapolis, IN
McGill Cancer Research Center – Montreal, Quebec Canada
CBS News – Washington DC
Net Zero Energy Project – Calgary, Alberta Canada
Cooper Square Hotel, Manhattan, NY
Jefferson Hotel – Richmond, VA
Geodesic Home – Pease, MN
Energy House I, II & III – Elk River, MN
Touchstone Energy Home – West Fargo, ND
Vandewater Condos - New York, NY
Crown Building Aman Hotel - New York, NY
Lincoln at Bankside Apartment Lobby - Bronx, NY
Tangram—Flushing, NY

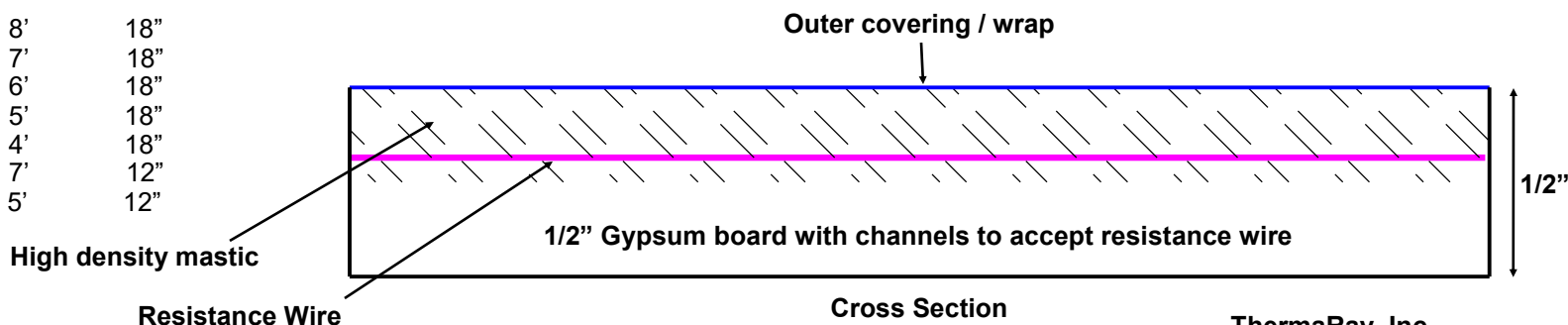
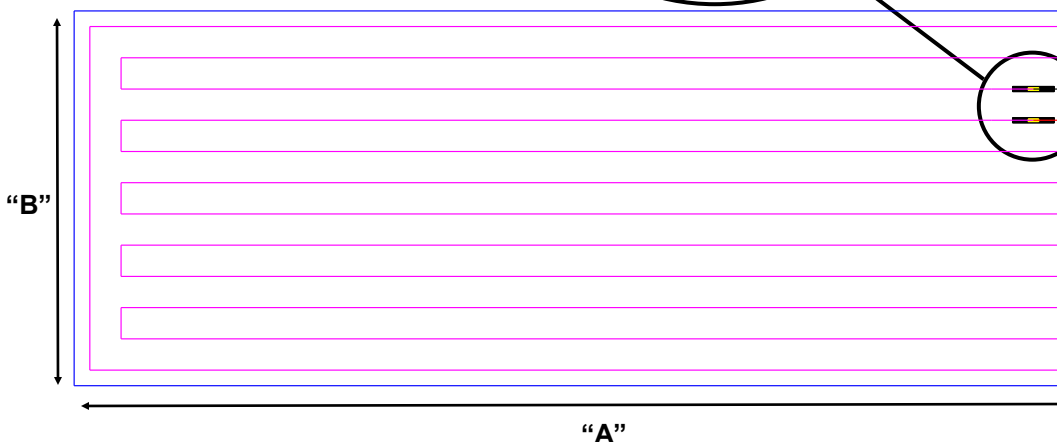
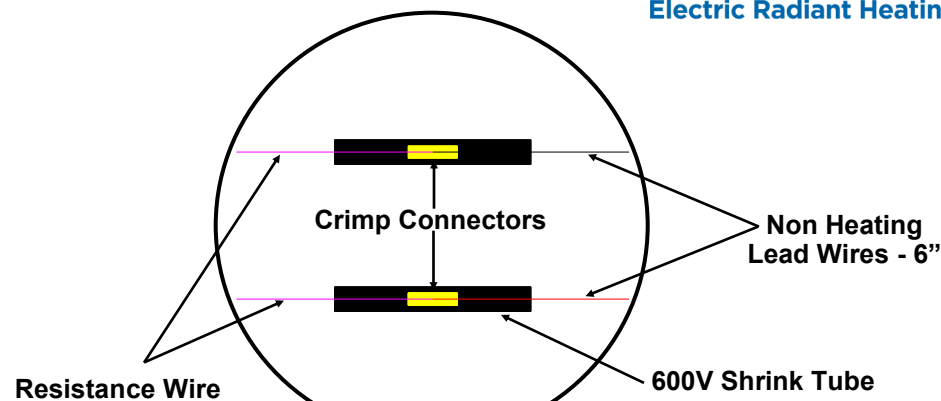
Example - Model # ES7C-460-240

Earth Storage →
 Length in Feet →
 Width B=12" C=18" →
 Total Watts →
 Voltage →



Radiant Heating Panels consist of a copper-free nickel chromium alloy heating element wire insulated with 10 mils of UL listed TEFZEL® compound rated at 200°C / 392° F, embedded in ½ inch gypsum panel with a watt density of 40 to 48 watts per square foot at a rated voltage of 120, 208, 240 or 277. Other Voltages Available.

Model #	Watts	"A" Length Feet	"B" Width Inches
ES8C-600-240	600	8'	18"
ES7C-460-240	460	7'	18"
ES5C-320-240	320	5'	18"
ES4C-280-240	280	4'	18"
ES8C-540-277	600	8'	18"
ES7C-460-277	460	7'	18"
ES5C-300-277	300	5'	18"
ES8C-565-208	565	8'	18"
ES7C-515-208	515	7'	18"
ES6C-405-208	405	6'	18"
ES5C-300-208	300	5'	18"
ES4C-225-208	225	4'	18"
ES7B-325-208	325	7'	12"
ES5B-205-208	205	5'	12"



Radiant Heating Panel - Floor Heating

(Thermal Mass & Limited Mass Applications)

ThermaRay, Inc.
 670 Wilsey Road - #6
 Fredericton, NB E3B 7K4
 Canada
 (800) 506-7973

Thermal Mass Storage Heating system - An electric indoor primary or supplementary heating system. Installed under the concrete in a sand bed or other fill material and requires perimeter sub grade insulation. Insulation is Not recommended or required below the heating panels in most applications.

Limited Mass Heating System - Installed outdoors under concrete, pavers and asphalt as a snow & ice melting system or indoors under concrete for moisture control and frost protection as well as a primary or supplementary heating system. Insulation Is recommended below the heating panels.

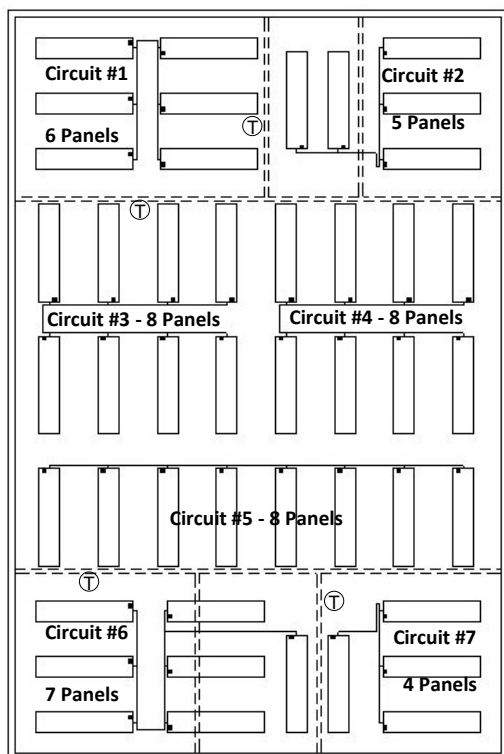


Diagram #1

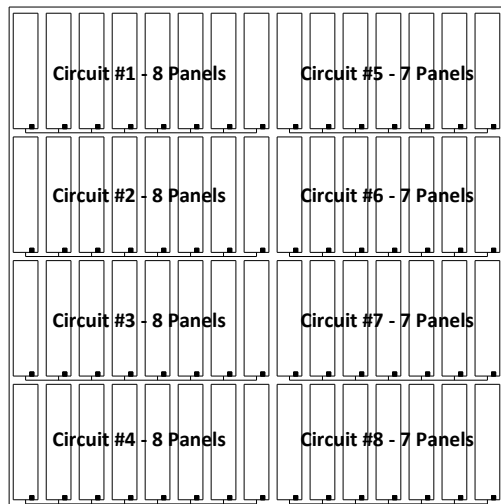


Diagram #2

Section 1 - Planning & Layout

Whether it's a Thermal Mass Storage or Limited Mass Heating System a ThermaRay representative should be consulted to determine the proper amount of heating panels for any given project.

A scaled layout should also be provided, showing the rough placement, of heating panels and thermostat locations (**Refer to Diagram #1**). All below-grade construction, such as footings, column bases, drains, plumbing & electrical lines, which might affect the location of the panels, should be indicated on the layout. Adjustments can be made onsite to avoid obstructions.

For indoor projects, the spacing of heating panels will vary depending on the project and application. The spacing of a Limited Mass System used for exterior Snow/Ice Melting are typically spaced 6" from the outside edge and 6" side to side and end to end from each panel (**Refer to Diagram #2**).

Section 2 - Inspection & Storage

Inspection upon arrival of the panels should be made for any damage that may have happened in transit. If delivered by common carrier, immediately report damage or missing materials to the delivery company. Check the operating voltage marked on the panels to make sure it matches the building supply voltage. Outside storage of the panels is permitted, provided that the protective moisture-proof plastic cover and tarp is intact and the panels are protected from any physical damage.

Floor Heating - Thermal Mass Storage and Limited Mass Heating Systems

Section 3 - Insulation, Site Preparation & Fill Material

1. In a Thermal Mass Storage Heating application, perimeter insulation must be installed to ensure an efficient heating system. Failure to insulate the slab correctly may cause difficulty in maintaining the desired building temperature and/or cause excessive heating costs.

2. A minimum of 2" styrofoam board, closed cell polystyrene insulation or better. Other types of insulation, such as foamed urethane or polystyrene bead-board, will absorb a certain amount of ground moisture that will reduce its effectiveness.

3. Sub Grade Insulation should be a minimum of 48" either vertically or a combination of vertically and horizontally (Refer to Diagram #3, #4 & #5) of this installation guide for the proper methods of installing the perimeter subgrade insulation with various slab configurations. Consult your ThermaRay Representative for additional options.

4. Do Not back fill to final concrete pouring grade until the heating panels are installed. Typically, the grade is left 8" below the bottom of the concrete slab.

5. It is preferable for below concrete slab plumbing or electrical lines to be installed prior to placing and wiring heating panels to avoid damaging the heating panels or connecting feed wires.

6. Ground surface must be relatively level with no debris. Any large stones, which would interfere with or damage the panels or wiring should be removed. 1"- 2" of sand can also be placed prior to installation to help level the surface and protect against sharp stones in the subsoil.

7. A minimum of 2" and a maximum of 12" of sand is allowed. A typical installation is 6"- 8" (Refer to Diagram #3, #4 or #5) of sand with the sand normally being a fill, pit run or screened sand with no debris. Washed sand can be used, but is not necessary or recommended due to the extra cost and the extra care necessary to place the sand. The Sand Rule of Thumb is - 95% sand and 5% rock as long as the rock is less than 1" in diameter.

8. Other material substrates or granular fill or a combination thereof with good compaction (Refer to Diagram #6) can be used for drainage, convenience or to comply with state and local building codes.

9. If the installation is Non-Typical, please consult a ThermaRay representative for alternative solutions.

Two options for a Slab on Grade or Walkout
Basement with Footings & Frost Wall

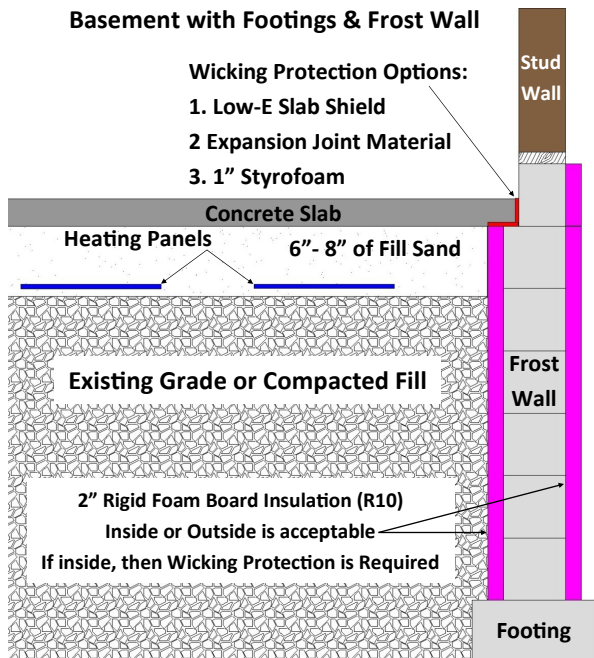


Diagram #3

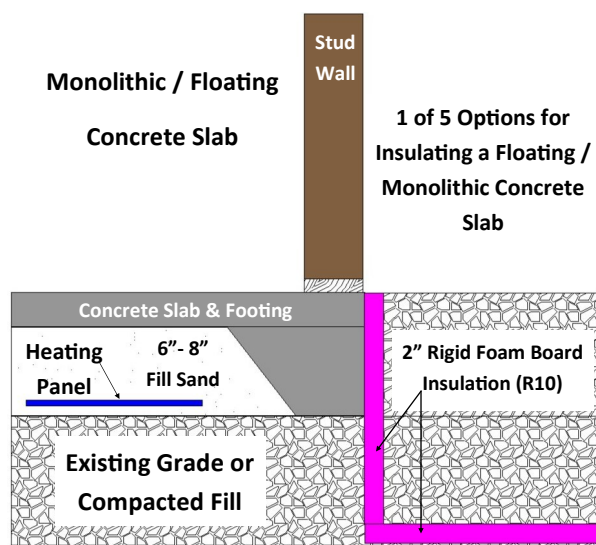
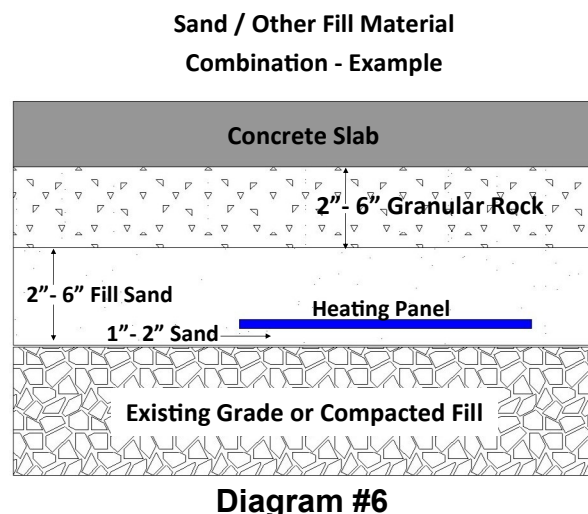
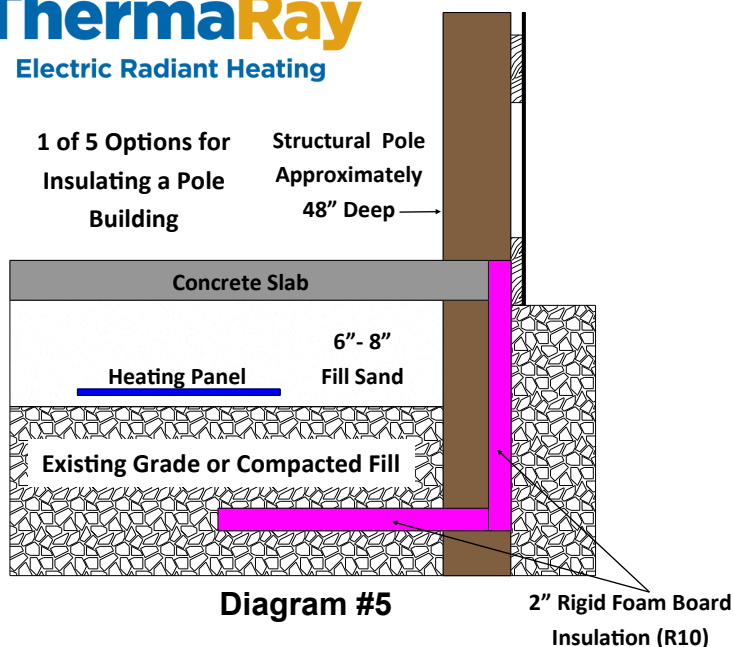


Diagram #4

Floor Heating - Thermal Mass Storage and Limited Mass Heating Systems



Section 3 - (Continued)

10. A high water table that is not moving or changes very slowly with the seasons is generally not a problem. If there is moving water present within the building area, the use of footing drains or other drainage methods can be employed to resolve the situation. Vapor barriers or additional insulation may be necessary as well. Consult a ThermaRay representative for alternative solutions.

11. In a **Limited Mass** application (**Refer to Diagram #7**), perimeter insulation is Not necessary. However, horizontal insulation is recommended below the heating panels in order to direct the heat upwards into the concrete, pavers or asphalt.

A. Site Preparation - Refer to Section #3 Paragraph #6

B. Low-E Slab Shield™ or 2" Styrofoam Boards are recommended below the heating panels.

C. After insulation is in place, the heating panels can be placed directly on the insulation and wired.

D. Optional - A light layer of sand (No more than 1") can also be placed on the insulation prior to placing the heating panels. Once the panels are in place and wired, 1"- 5" of sand, can then be placed and compacted.

E. ThermaRay Heating panels can be embedded directly in concrete or similar material. However, the connecting feed wire must be approved for use directly in concrete or protected with flexible conduit or equal.

F. Extra care should be taken to avoid damaging the heating panels, connections and branch circuit feed wires while placing sand, pavers, concrete or asphalt.

G. Consult a ThermaRay Representative for the best methods of installation based on the equipment available.

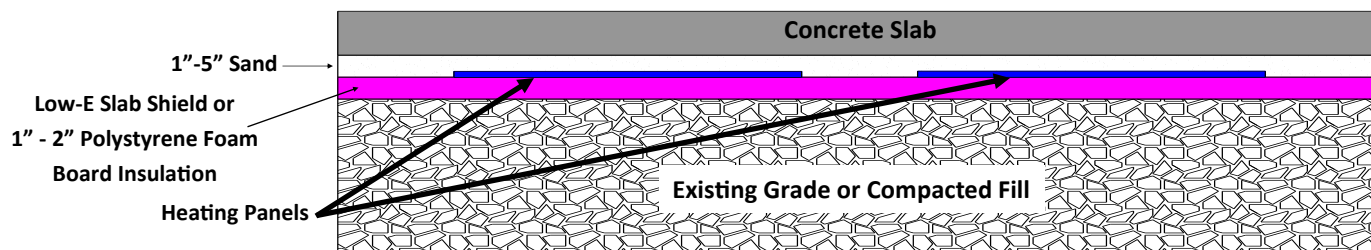
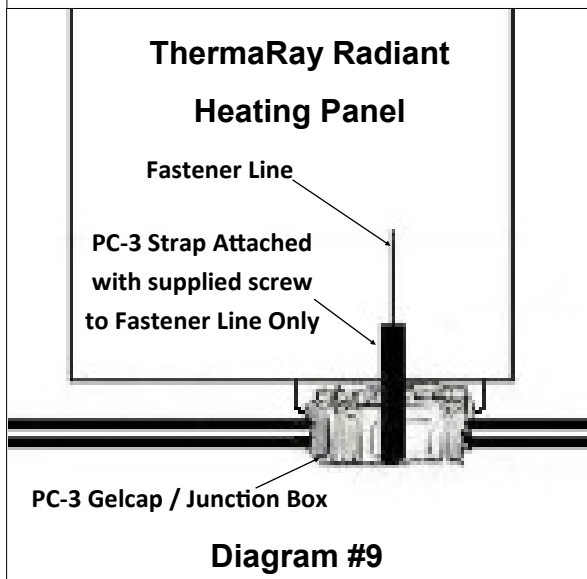
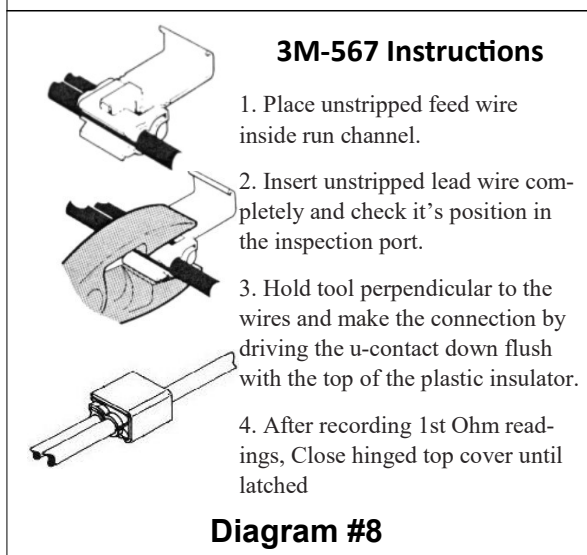
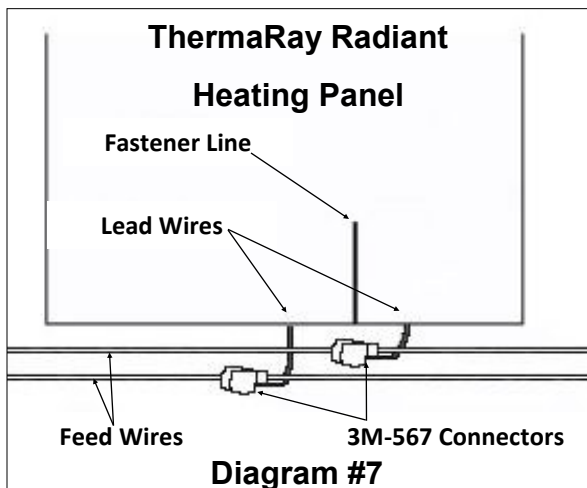


Diagram #7 - Limited Mass

Floor Heating - Thermal Mass Storage and Limited Mass Heating Systems

Section 4 - Heating Panel Installation

1. All work done under this section must comply with all local and/or National Electric Code (NEC) or building codes.
2. To avoid damage by other trades, all below-grade plumbing and electrical work should be roughed in before placing panels. If screed stakes or forms are being used, it is preferable to have them in place prior to placing panels. Otherwise, outline the screed stake line or form areas and avoid placing the panels in this location .
3. Position panels as designed. Typically, the heating panels are relatively evenly spaced throughout the entire area to be heated.
4. Branch circuits entering or leaving the concrete slab must be protected with non-metal conduit. Wire approved for direct burial in sand must be used. 10 or 12 Ga. stranded or solid direct bury wire or 2 - 3 conductor RWU wire is recommended.
5. In Some Snow Melting Applications, a ground wire may be required by local code. In that event, custom snow melting heating panels must be requested and a ground feed wire is added to the installation. The ground connection is also enclosed in the gelcap.
6. Branch circuits must have an amp rating equal to 125 percent of the connected panel load. Typical branch circuit loads are less than 16 Amps. Run branch circuits to make connections at each panel - **Refer to Diagram #7.** Connect panels in parallel to the branch circuit using 3M-567 self-tapping connectors - **Refer to Diagram #8.** A 9" lineman's pliers or 3M crimping tool E-9BM is recommend.
7. Although all panels are fully tested at the factory, a field test of the connected branch circuits should be performed. To comply with warranty requirements, the branch circuit readings should be taken and recorded during three stages of the installation. The 1st reading should be taken and recorded upon completion of wiring the branch circuit. This should be done before closing the connectors. The 2nd reading is after back filling and the 3rd is once the concrete is poured. This can be done at the ends of the branch circuit conductors. All Ohm or Amp readings must be within an acceptable range of the target readings
8. After the 1st reading is taken and verified to be within an acceptable range of the target reading, the connectors can be closed and inserted into the gelcap with feed and lead wires coming out the ends of the gelcap. Using the strap, draw the gelcap as tightly as possible to the panel, then affix the strap using the supplied screw to the fastener line only - **Refer to Diagram #9.**



Floor Heating - Thermal Mass Storage and Limited Mass Heating Systems

Section 5 - Preparation for Pouring Floor

1. Fill to pouring grade and compact as necessary. Extreme care should be taken to avoid damaging the heating panels, connections and branch circuit feed wires. Backhoes, skid steers, pump trucks, buggy's, augers or chutes can all be used for placing sand over the heating panels. However, the amount of fill being placed over the panels and the type of fill determines which equipment is allowed and the method to do so. Consult a ThermaRay representative for the best option and method based on the available equipment and the type of project.
2. A vapor barrier is not necessary but if one is required by state or local building code, then it can be placed per code. A vapor barrier directly below or above the heating panels or between the fill and the concrete are all acceptable. If there is no fill above panels, it should be installed on top of the panels.
3. If screeds will be used, the screed stakes should only be driven in areas designated to avoid damaging the heating panels, connections and branch circuit feed wires.
4. A floor temperature sensor can be used. Sensors are 15' long and conduit for the sensor should be installed accordingly and placed in the center of the concrete - **Refer to Diagram #10**. Typical sensor conduits are 1/2" or 3/4" schedule 40 PVC pipe with 5' going out into the space to be heated and 5' up the wall to the thermostat assembled with a 90 degree rigid conduit elbow between them. A cap on the end of the conduit in the concrete is required. Ambient Sensors/Stats in the space to be heated can be used as well. Consult your ThermaRay representative for sensor recommendations sensors and placement.
5. A high temperature sensor is not necessary but If one is required by local code, then the conduit for the sensor wire should be installed prior to placing fill - **Refer to Diagram #10**. Sensors are 15' long and conduit should be installed accordingly and placed directly on top of one of the heating panels. Typical sensor conduits are either 1/2" or 3/4" schedule 40 PVC pipe with 5' going out into the space to be heated and the end of the conduit directly on a heating panel and 5' up the wall to the thermostat assembled with a 90-degree rigid conduit elbow between them. A cap on the end of the conduit above the heating panels is required.
6. For a **Limited Mass System**, surface mount floor temperature and moisture sensors, in-floor sensors and remote temperature & moisture sensors are all acceptable and can be controlled in a number of different ways. Consult a ThermaRay representative for the best option and installation method for optimum performance. If a surface mount or in floor temperature sensor is chosen, then the conduit and housing will need to be in place prior to or while pouring concrete - **Refer to Diagram #11**

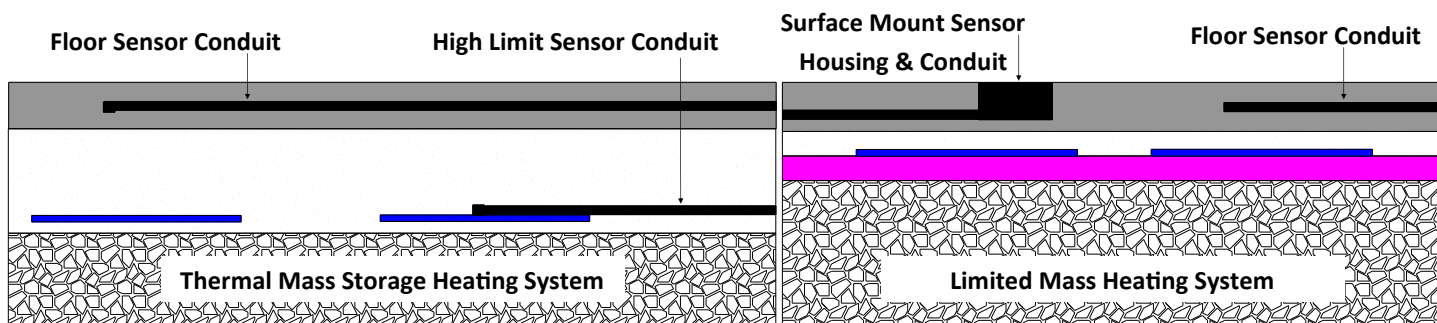


Diagram #10

Diagram #11



Floor Heating - Thermal Mass Storage and Limited Mass Heating Systems



Section 6 - Pouring Concrete

1. The slab and foundation must be installed in accordance with state and local codes.
2. All workers should be cautioned to use care with shovels, rakes and other equipment to avoid damaging the heating panels, connections and branch circuit feed wires.
3. Consideration should be given to the method of pouring concrete on larger projects as well as small. The use of pump trucks, buggy's, augers or chutes may be necessary to avoid disturbing the compacted soil. Pouring over the sides of footings or in sections may be advisable as well.
4. Do Not Energize heating panels until slab is fully cured. Concrete may be affected by rapid curing.

Contact a ThermaRay Representative with any additional questions.

Model #	Watts	Voltage	Length		Weight
			Feet	Inches	
ES7C-515-208	515	208	7	18	17.5
ES6C-405-208	405	208	6	18	15.2
ES5C-300-208	300	208	5	18	12.9
ES7C-460-240	460	240	9	18	17.5
ES5C-320-240	320	240	5	18	12.9
ES4C-280-240	280	240	4	18	10.3
ES7C-460-277	460	277	7	18	17.5
ES6C-400-277	400	277	6	18	15.2
ES5C-320-277	320	277	5	18	12.9
ES4C-280-277	280	277	4	18	10.3
ES3C-230-277	230	277	3	18	7.7

Accessories:

PC-3 - Endcaps / Junction Boxes

3M-567 - Connectors

12 Ga. Or 10 Ga. Direct Bury Feed Wire

Floor Heating Controls:

Controls are custom designed for each individual project using NEMA rated electrical enclosures, UL Listed power relays and transformers.

Options Include:

Floor, surface, air and moisture sensors. Modbus and BACnet interface. Manual, remote and Wi-Fi access. Manual, programmable and automated control. Configurable and wireless controls and thermostats with lockout options. Data trending and collection

SA UL ETL Intertek



ThermaRay, Inc.

670 Wilsey Road - Unit #6

Fredericton, NB E3B 7K4

Canada

www.thermaray-usa.com

info@thermaray-usa.com

(800) 506-7973

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- Min Max Settings
- Programming & Lockout Options
- Load Management
- Strategic Circuit Staging
- Timed Relay Sequencing
- Peak Demand Control
- Off Peak Interface
- Building System Integration Modbus / BACnet
- Complete HVAC Interface
- Door & Window Monitoring
- Light Monitoring & Control
- Outdoor Air Sensing
- Outdoor Air Lockout
- Indoor Air Quality Performance
- Infectious Disease Mitigation
- Snow & Ice Melting Controls
- UL Listed Power Relays & Transformers
- NEMA Rated Electrical Enclosures
- Assembly, Installation and Wiring Diagrams



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We all recognize the importance of effective snow and ice removal, but even the most diligent efforts to shovel, plow, salt or apply chemicals can fall short during those cold and wintery days.

A ThermaRay Snow & Ice Melting System can prevent most slips and falls by melting snow and ice before it freezes and accumulates.

Sensors monitor temperature and moisture to activate the system and keep walkways and ramps free of snow and ice until the inclement weather subsides.

Reduce your liability and keep your building steps, entrances, walkways, ramps and parking lots clear of snow and ice for your visitors, employees and customers this winter.

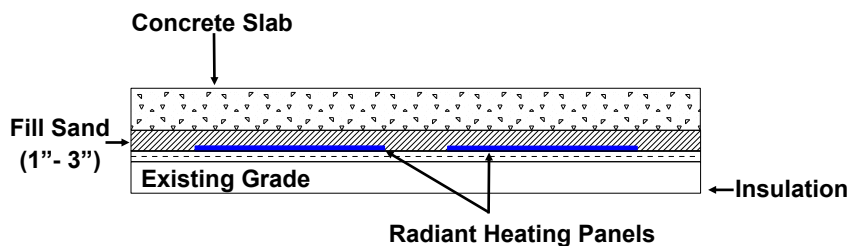


The Engineers Choice

- Reduce Liability & Workers Comp Claims
- Reduce Insurance Premiums
- Reduce Snow Removal Costs
- Safer Environment
- No Maintenance
- Automated Controls
- Remote or In Ground Sensors
- Moisture and Temperature Sensors
- Energy Efficient & Effective
- Installs Under Concrete, Asphalt or Pavers

Installation Diagram

Heating Panels are installed 1" - 3" below the bottom of the concrete. Because the heating panels are not embedded in the concrete, they are protected from the concrete contracting and expanding as well as heaving, cracks, cuts and breaks.



Contact Information:

Premier Energy USA
(800) 506-7973
info@premierenergyusa.com
premierenergyusa.com