TRM SM Heating Cable Installation Guide

Thermal Resources Management brand snow melt (SM) heating cables produce 15 Watts per linear foot, making it the ideal solution for residential exterior embedded concrete slab, and paver applications.

It is important to read the instructions carefully before installing the SM Snow Melting System.
• Installation must be performed by qualified personnel, in accordance with local codes and standards.

Read these important warnings and all installation instructions prior to installation. Failure to so do can result in fire, shock, property damage, personal injury and/or death.
• For outdoor installation only.
• Never cut the red heating cable.
• Extreme care must be used to ensure the SM cables are not damaged when using sharp tools, wheelbarrows, heavy machinery and paving equipment, shovels, rakes, or other implements. Avoid walking on the cables during installation.
• It is not recommended to install the SM heating cables with a controller that does not contain an integrated temperature limiter.
• The SM Heating Cable must be embedded in mortar or mortar mixture, concrete, sand or similar material.
• The power lead and heating cable splice connection must be embedded at least 1′ (30 cm) from the edge of the paved surface or conduit entry.
• NEVER pull any of the heating cable or factory splices into any conduit. Remaining power lead should be run through the conduit.
• The power lead may be extended or cut shorter if required, but never cut/remove heating cable.
• Do not install the SM cables in such a manner that two red heating cables touch, cross or overlap, or place heating cable closer than 2 inches from another heating cable, power lead cable, underground cable or piping to keep from overheating them.
• Always keep ends of the power leads dry before and during installation.

Always remember to measure, verify and record the actual resistance throughout the installation process:

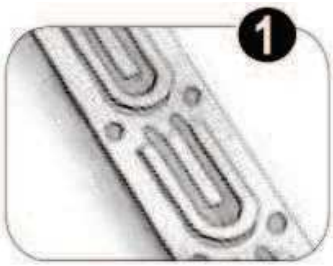
1. Out of the box
2. After installation
3. Before pouring the sand/concrete/mortar
4. After surface material application

Record these values in the table 3 and on the warranty card, failure to do so will void the warranty;
• Measure the resistance between two live conductors as well as the resistance between each conductor and the ground wire.
• TRM recommends using a megohmmeter to test the insulation resistance.
• Never attempt to repair a damaged cable. Contact TRM for assistance.
• Remember to check that the supply voltage matches the voltage required for your 240V SM heating cable.
• Always de-energize all circuits before installing or servicing.
• Always provide ground fault protection (GFCI) for the snow melting system. This may be at the circuit breaker or the control.
• Always install in accordance with all local codes and the National Electrical Code (ANSI/NFPA 70 Article 426) and Section 62 of the Canadian Electrical Code (CEC) Part I.
Please consult TRM for any other questions, concerns or advice.

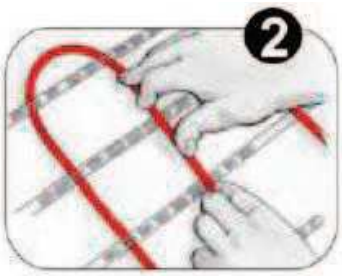
General Installation Guidelines

Specifications:							Approximate heated coverage area		
TRM Part Numbers	Length (ft)	Length (m)	Ohms	Wattage	Voltage	Amps	3" (60w/sqft)	4" (45w/sqft)	5" (36w/sqft)
TRM-SM-0540W-240	36	11	106.7	540	240	2.3	9	12	18
TRM-SM-0810W-240	55	16.8	71.1	810	240	3.4	14	18	28
TRM-SM-1060W-240	70	21.3	54.3	1060	240	4.4	18	23	35
TRM-SM-1350W-240	90	27.4	42.7	1350	240	5.6	23	30	45
TRM-SM-1620W-240	110	33.5	35.6	1620	240	6.8	28	37	55
TRM-SM-1950W-240	130	39.6	29.5	1950	240	8.1	33	43	65
TRM-SM-2250W-240	150	45.7	25.6	2250	240	9.4	38	50	75
TRM-SM-2500W-240	165	50.3	23	2500	240	10.4	41	55	83
TRM-SM-2780W-240	185	56.4	20.7	2780	240	11.6	46	62	93
TRM-SM-3300W-240	220	67.1	17.5	3300	240	13.8	55	73	110
TRM-SM-3820W-240	255	77.7	15.1	3820	240	15.9	64	85	128
TRM-SM-4350W-240	290	88.4	13.2	4350	240	18.1	73	97	145
TRM-SM-4950W-240	330	100.6	11.6	4950	240	20.6	83	110	165
TRM-SM-5500W-240	370	112.8	10.5	5500	240	22.9	93	123	185
TRM-SM-6300W-240	420	128	9.1	6300	240	26.3	105	140	210

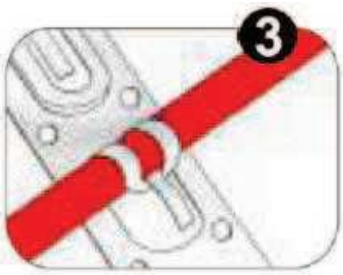
Cable Strapping:
If the cable is to be laid on top of an existing slab, select enough Cable Strap to secure the cable to the surface. One box contains 25 ft. of strap, enough to secure about 50 sq. ft. of cable at 4-ft parallel spacing. Cable strap is usually spaced 3 to 4 feet apart.



Attach the Cable strapping to the properly prepaired ground surface. (3'-4' apart)



Place the SM cable approx 3" - 4" apart depending on the required output. Please contact TRM for assistance.



Clip the SM cable into place

Cable Spacing
All TRM SM heating cable designs must be installed using the following minimum spacings:

- 2” from all adjacent heating cables
- 2” from the extent of the heated area
- Embedded beneath 1.5”(min) - 3”(max) of the finished surface
    - Cable hot/cold splice joint is ¾” thick requiring a minimum of 1” to embed, plus finished topping.

Installing a Sensor and a Conduit
The sensor/housing and the conduit(s) may be installed during the construction work and connected later. The following applies for all types of installations:

- All conduit(s) must be installed following all local electrical codes.
- A feeder cable for a sensor may be needed (to be supplied by a 3rd party).
- Ensure all embedded conduit(s) are sealed prior to backfilling area with embedding material.
- The sensor/housing need to be installed per the manufacture's instructions.

Installing the Heating Cable
Determine general areas where you want to install SM Heating Cable.
Applications include driveways, walkways, patios, ramps, masonry steps and benches, under garage door seals and more. Anywhere outdoors in residential locations where snow or ice accumulate may be considered, as long as the SM heating cable is completely embedded in concrete, sand, or a thick mortar bed.

SM Cable **cannot be installed**:
- Indoors
- in commercial or industrial locations
- in an Asphalt medium
- Areas with hazardous classifications
- It cannot be used for gutter or pipe freeze protection or roof snowmelt.
- Under non-masonry stairs or wooden or composite construction decks.

If you have an application you are unsure of, please call TRM for advice.

Make a drawing and measure the area where you want snow melting to occur
Eliminate those areas where SM Heating Cables cannot be installed, keeping in mind the following obstructions and Allowances:
- Cables to be installed an appropriate distance away from extents of areas based on site conditions.
- If railings or impedances are to be drilled into the slab, the cables MUST be installed a minimum of 6" away from these locations.
- **Junction boxes MUST be located within 15' of the heated slab.**
- Avoid placing the heating cable any closer than 2 inches from other items such as underground cable or piping to prevent overheating them.
- **Allow at least 2 inches between adjacent cables.**
- SM Cable must be laid such that the surface will not have other obstructions placed on top, capturing heat.
- The heating cable and factory splices of SM Heating Cable must be completely embedded in the concrete, sand, or mortar. Never try to use up excess heating cable in surrounding soil, walls, or other unprotected applications.
- Never overlap the heating cable on itself or place heating cable closer than 2 inches from other heating cable.
- Only the power lead may exit the heating area. It will be pulled through a conduit to protect it up to a junction box.
- **NEVER** pull any of the heating cable or factory splices into any conduit.
- For construction work above/within the heated area, care must be taken to prevent damage when installing mounting brackets, bolts, or similar (pedestals, support columns, walls, light posts, etc.).

    - TRM recommends the installer take photos and retain all dimensional drawings and site notes; these should be passed to the end user in order to prevent damage during future improvements/installations within the area.
- All expansion joints and saw cuts must be clearly identified by GC prior to cable installation.
    - Avoid crossing expansion joints in a slab, unless proper technique and protection steps are followed. For any questions, please contact TRM.

Warning
THE HEATING CABLE CANNOT BE CUT TO LENGTH. Order the correct size cable to fit the area. Modifying the heating cable is not allowed and may lead to overheating, damage, and fire hazard.

Determine where junction box(es) may be placed
Determine where junction box(es) may be placed to receive the SM Cable power leads. It is important to ensure the SM cable(s) you select fill the area correctly and reach the appropriate connection locations. It is best to locate junction boxes on a wall indoors and within the distance of the power leads (20-foot long) power leads on the cable.
If a junction box must be located outdoors, it is imperative for it to be installed above grade and be properly listed for rain tight use outdoors.

Select the cable(s) you need
Determining the correct heating output required for your application is critical to ensure the heating system will function appropriately.
Your design must consider:

- Local weather conditions
- How critical it is to clear the heated area
- Ensure an appropriate drain path for melt water at the low point of the heated area to prevent water from pooling and refreezing.

TRM recommends a snow melt design base on ASHREA standards for the installation's geographic location.

Please contact TRM for assistance in determining the correct heating cable for your specific application.

Site electrical
It is the responsibility of the installer to ensure all site electrical work is done by a certified electrician. The electrician will need to pay careful attention to the amperage of the design to make sure your controls, circuit breaker panel, and all wiring will meet code and function properly.

- The SM Cable and its control must be placed on a dedicated power supply from the circuit breaker panel.
- The SM Cable is a resistance heating system and should be considered as a continuous load for branch circuit sizing purposes.
- The circuit breaker must open all ungrounded conductors at the same time. A GFCI type (typically Class B, 30mA trip) is required to directly protect the SM Heating Cable.
- Follow NEC, CEC, and local code guidelines for branch circuit wiring, conduit, and junction box installations.
- Outdoor and underground junction boxes and conduit must meet rain tight or watertight requirements as required.

Breaker capacities

- 20 Amp breaker for loads up to 16 Amps
- 30 Amp breaker for loads up to 24 Amps
- 40 Amp breaker for loads up to 32 Amps
- 50 Amp breaker for loads up to 40 Amps
- 70 Amp breaker for loads up to 50 Amps

Verify everything before the installation

Remove the SM Cable, control, and sensor from their packages. Inspect them for any visible damage and verify everything is the correct size and type according to your plan and order. Do no attempt to install a damaged or incorrect product.

Record the cable information on the Warranty Card. Give this information to the homeowner to keep in a safe place.

The cable model number, serial number, voltage, and resistance range are shown on a nameplate label attached to the power leads.

Do not remove this nameplate label, the electrical inspector will need to see this.

Important

Before installing the SM Heating Cable, make sure to carefully plan your site. The following steps may not necessarily occur in the order shown, depending on contractor and electrician scheduling and variations in site preparation requirements. A good discussion with all parties involved will help eliminate costly errors and damage.

Testing

Warning

Megohmmeters apply high voltage and could shock or cause serious injury if improperly used. Follow megohmmeter instructions for safe and proper use.

Measure the resistance:

- Use a digital multi-meter to measure the resistance between the conductors of the cable power leads. Record these resistances in warranty card. The resistance between the white and black lead.
- Wires should be within the resistance range on the nameplate label.
    - If it is a little low, it may be due to low air temperatures or meter calibration. Consult TRM if you are in doubt.
- The resistance between the white and black leads and ground lead should be “open”, usually indicated by an “OL” or whatever your meter shows when the test leads are not touching anything.
    - If there is any change in the reading, record this information and contact TRM before installing, as this could indicate damage, test lead problems, or several other issues.
    - Try “pinning” the test leads to the cable lead wires against a hard non-metal surface if your readings fluctuate.
- Your electrician should perform an insulation resistance test on the Cable. A megohmmeter adjusted to a minimum 500 VDC should give a measured value at least 20 megohm (MΩ).

Electrical installation

- Install junction boxes in the location(s) planned during the design process.
- Install conduit and branch circuit wiring from the circuit breaker panel to the control location, and from the control to the junction boxes. Follow local code for wire size, conduit requirements, and proper installation procedure.
- Install conduit from the junction box to the edge of the slab to be heated. Extend this conduit into the slab edge about 2 to 6 inches and attach a bushing to the end to prevent damaging the cable power leads.
- Follow electrical code for burial depth of the conduit.
- Plan carefully if you are installing edge pavers, edge drainage systems, landscaping, or other items that affect where the conduit comes in.
- If a slab sensor is to be embedded in the heated area, install conduit from the control location to the desired slab location. Follow the sensor instructions for proper placement and connections.
- Install the circuit breaker size and type as determined earlier. ***DO NOT connect the branch wiring to the breaker yet.***
- Label the circuit breaker in the panel which feeds this Snow Melt system with “Snow Melt” or similar.

Prepare the base material

Prepare the site that you want to heat with SM Cable. This includes making sure all utilities and obstructions are accounted for.

Lay a smooth, well-compacted gravel base. Ensure proper slope and drainage to avoid water buildup in any heated or surrounding areas. This is especially important for brick paver applications, as melted water may pool, re-freeze and heave surrounding sand and paver areas. Follow local building code and construction guidelines for grade thickness and type.

Make sure you account for the total grade and slab thickness as required for pedestrian and vehicular traffic use.

If the cable is to be placed on an existing pavement, make sure it is inspected for any sharp objects, loose sections, or other potentially damaging issues that could cause problems later. It is very important for the cable to be completely embedded.

Prepare to install

Determine a time to install the cable when equipment, heavy tools, and site traffic will be minimal to keep from possibly damaging the product. Be prepared to apply the surfacing courses over the cable on the same day so it will be protected from damage.

If installing cable in the upper layer of a two-stage concrete slab the cable should be completely ready for the second stage. There is limited time between stages, as the slab should not be allowed to fully cure.

Inspect the area and remove any sharp objects.

Install in temperatures of at least 40°F (4.5°C).

Test fit the cable within the area to be heated

Make sure the heating cable will fit the area with no excess cable remaining.

Important

- This heating cable CANNOT be cut shorter to fit! Do not overlap or cross over heating cable on itself. Do not space heating cable closer than 2 inches.
- Cable cannot be laid closer than 6 inches from the edges of slabs.

- Avoid crossing expansion joints in a slab, unless proper technique and protection steps are followed.
- Avoid placing the heating cable any closer than 2 inches from other items such as underground cable or piping to keep from overheating them.
- Allow at least 2 inches, but not more than 4 inches, between adjacent cables.
- Do not repeatedly bend the heating cable, and never bend factory splices.
- Place the power leads of the cable next to the conduit entry. The electrician will pull this through the conduit later. Make sure it is positioned so that the **no part of the splice connection** or the heating cable will be pulled into the conduit.

Warning
The heating cable and factory splices of SM Cable must be completely embedded in the concrete, sand, or a thick mortar bed. Never try to use up excess heating cable in surrounding soil, walls, or other unprotected applications.

Typical Cable Installations:

Concrete Applications

Step 1: Attach reinforcement, such as wire mesh, over the base at about 2 inches below the level of the top surface. You must use "chairs" or other appropriate objects to raise the wire mesh to the correct level. The SM Cable will be attached to this reinforcement later.
If a suitably prepared base is available, the heating cable can be affixed directly to it using pre-punched strapping (see step 2).
It is very important for the cable to be completely embedded in concrete.
Protect or remove sharp protrusions by bending them over, capping, or cutting. Sharp edges may damage the heating cable.

Step 2: Begin securing the heating cable at the desired spacing to the prepared base, or mesh using plastic cable ties. These cable ties should be applied at the ends of each run and at every 3 to 4 feet. Turn the cable tie ends downward or trim them so they will not poke up through the surface layers. Do not use metal ties as they may damage the cable.
If installing on top of existing slab, secure Cable Strap to the surface. Use nails or similar, every 6 to 10 inches.
Cable Strap should be placed at either end of the heated area, and additional straps should be applied every 3 to 4 feet in between to hold the cable in place during surfacing.

Step 3: Use a digital multi-meter to measure the resistance between the conductors of the cable power leads again. Record these resistances in the warranty card.

Step 4: Feed the power leads through the conduit into the junction box, leaving at least 6 inches of free lead length. Secure the heating cable and splice so that they will not be pulled into the conduit.
Insert a generous amount of electrical conduit sealant into the conduit end around the power leads to prevent water entry.

Step 5: If a slab sensor is being installed, place the sensor socket according to the instructions. Secure and seal it to the conduit installed earlier. It should be located halfway between heating cables and in an

area that is recommended by the sensor manufacturer. Make sure the top of the sensor will be flush with the surface of the finish layer. Make sure it is protected with a cap or seal.

Step 6: Take a photo of the cable installation. This can be very helpful later for utility work, changes to the site, etc. to avoid possible damage. Keep the photos with this installation manual.

Step 7: Before beginning work, inspect the cable for damage and secure any cable that may have come loose.

To avoid burying any possible damage that may have occurred since the cable was laid, the following tests should be performed:
Use a digital multi-meter to measure the resistance between the conductors of the cable power leads again. If possible, your electrician should perform an insulation resistance test on the cable. A megohmmeter adjusted to a minimum 500 VDC should give a measured value at least 20 megohm (MΩ).

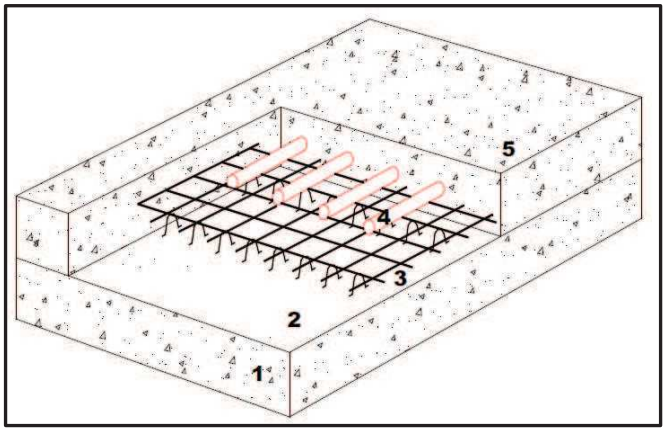
Important
Be prepared to install a marker plate or other identification indicating the presence of SM Heating Cable within the slab. This helps alert and avoid possible damage from future on-site. Install a marker plate where clearly visible in each snow-melted area. A marker plate is placed flush in the wet concrete surface. Other types of surfaces should be made to allow the marker plate to be installed flush with the surface.

Step 8: Pour concrete over the base and SM Heating Cable so that no less than 1-1/2 inches and no more than 3 inches covers the top of the heating cables. The slab should be a minimum of 4 inches thick total; Driveways normally require a thicker slab. Follow building code requirements for required thicknesses.

Important
Do not use sharp tools which could damage the SM cable. Blunted shovels should allow you to work the concrete carefully into all areas.
Make sure the heating cable is fully embedded as well as 2 to 6 inches of the conduits enclosing the power lead and slab sensor wiring (if used).
Allow the concrete to fully cure as required by the concrete supplier. Do not energize the SM Heating Cable except to briefly test it, as this would improperly accelerate the curing and potentially cause concrete damage.

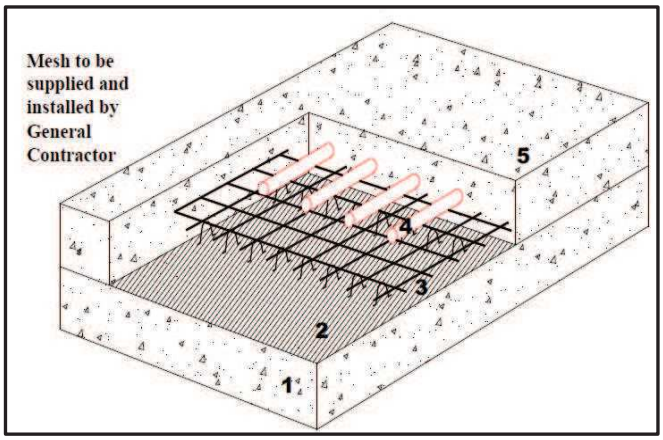
Step 9: Use a digital multi-meter to measure the resistance between the conductors of the cable power leads again. Record these resistances on the warranty card under “After coverings are applied”.

Typical Concrete 1 Pour – Cable on Mesh Cross Section



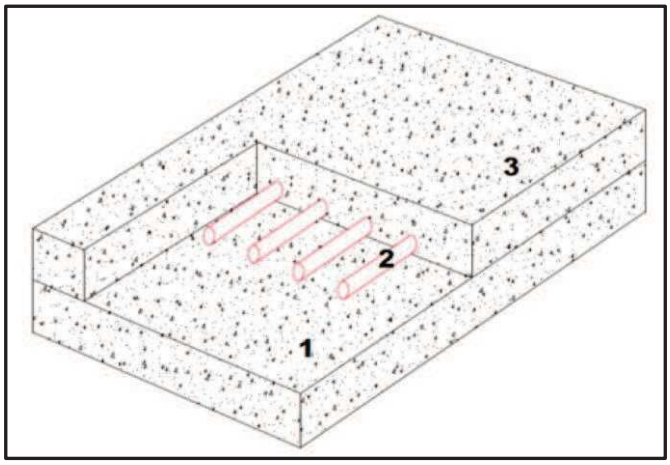
NOTES:
1) STRUCTURALLY SOUND SLAB ON WELL DRAINED COMPACTED BASE
2) CONCRETE BASE SLAB TO BE CLEANED WITH BLASTRAC MACHINE OR HIGH PRESSURE WATER
3) 6X6 #8 (152 X 152mm) MESH SUPPORTED ON CHAIRS OR 10mm REBAR. SPACING OF CHAIRS NOT TO EXCEED 18 INCHES (460mm) IN ANY DIRECTION. FINAL ELEVATION OF CABLES TO BE WITHIN 2 TO 3 INCHES (50 TO 75 mm) FROM THE COMPLETED SURFACE.
4) TY-WRAP TRM HEATING CABLES ON 6X6 (152 X 152) MESH
5) CONCRETE TOPPING

Typical Concrete – Cable on Mesh with Waterproofing Membrane Cross Section



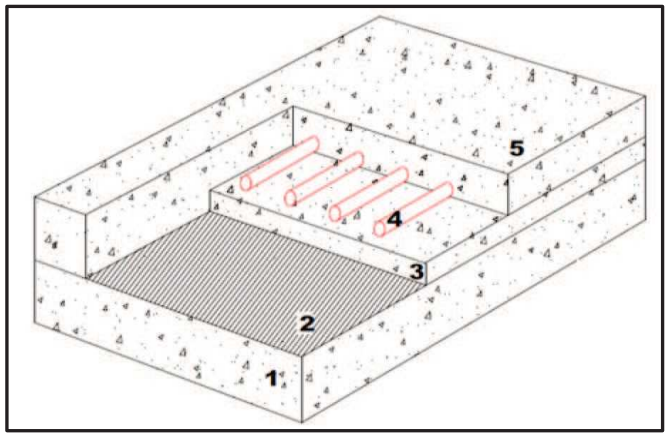
NOTES:
1) CONCRETE SUBSTRATE BLAS-TRACKED OR SAND BLASTED
2) HOT APPLIED MEMBRANE WITH ASPHALTIC PROTECTION BOARD
3) 6X6 #8 MESH SUPPORTED ON CHAIRS. SPACING OF CHAIRS NOT TO EXCEED 18 INCHES (460mm) IN ANY DIRECTION. FINAL ELEVATION OF CABLES TO BE WITHIN 2 TO 3 INCHES (50 TO 75 mm) FROM THE COMPLETED SURFACE.
4) TY-WRAP TRM HEATING CABLES ON 6X6 MESH
5) CONCRETE TOPPING

Typical Concrete 2 Pour Cross Section



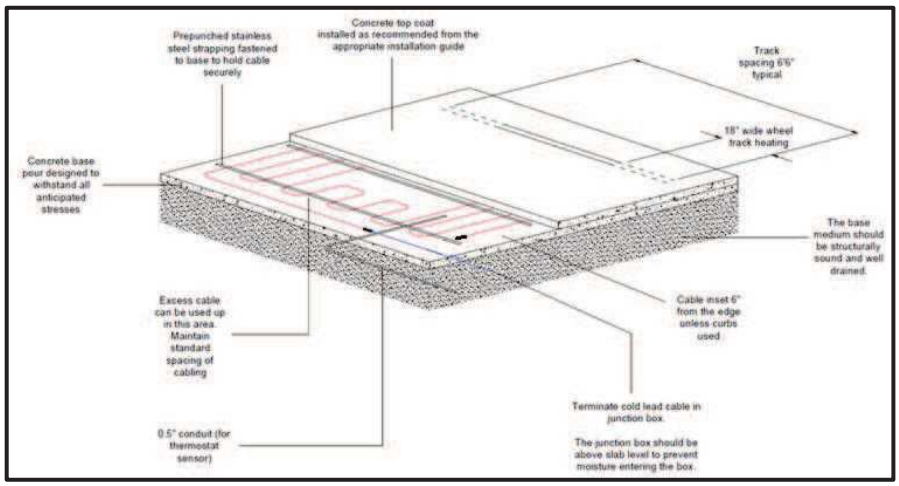
NOTES:
1) CLEANED CONCRETE SURFACE
2) TRM HEATING CABLES SECURED BY PRE-PUNCHED STRAPPING
3) 3 INCH (75MM) CONCRETE TOPPING

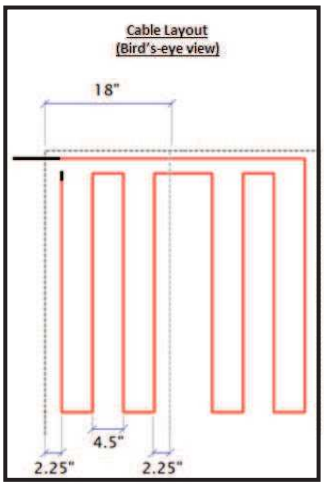
Typical Concrete 2 Pour with Waterproofing Cross Section



NOTES:
1) CONCRETE SUBSTRATE BLAS-TRACKED OR SAND BLASTED
2) HOT APPLIED MEMBRANE WITH ASPHALTIC PROTECTION BOARD
3) PLACE A 1.25 TO 1.5 INCH CONCRETE BASE
4) INSTALL STAINLESS STEEL PREPUCHED STRAPPING AT 3 FT SPACING. ENSURE THAT FASTENERS DO NOT PENETRATE MEMBRANE.. TRM HEATING CABLES SECURED BY PREPUNCHED STRAPPING.
5) PLACE A THREE INCH CONCRETE TOPPING
CONCRETE MIX - 32 MPA, 20MM CRUSHED, 75MM SLUMP 6% AIR

Typical Wheel/Tire Track Cross Section





Wheel Track Notes

- Only applicable for concrete surfaced driveways.
- Check the track spacing is equal to the wheel spacing for the vehicle which will use the driveway.
- Typically use 4 runs of heating cable
    - Spaced at 4.5" spacing between heating cables – for each wheel track
- The free space between the tracks can be used to embed and remaining cable.

Stone or Paver Application

If installing snow melting cables under brick pavers over a sand base, we recommend installing cables under the entire area. This is because the non-heated area will receive melt water that may re-freeze under the pavers causing the pavers to heave in the non-heated area. For this reason, Wheel/Tire track and partial coverage designs are not approved in Stone/Paver applications using a sand base.

Step 1: Follow guidelines recommended by the paver manufacturer. If a course of sand is to be applied over the gravel base, the cable must **first** be secured in place and then covered with a minimum 1-1/2 inch layer of sand to completely embed the cable.

Step 2: Secure plastic mounting cable ties to the gravel base, driving long nails or similar through the head of the cable tie. These cable ties should be applied at the end of each run and at every 3 to 4 feet. Do not use metallic cable ties as they may damage the cable.
Lay out the cable and secure with the cable ties.

Step 3: Use a digital multi-meter to measure the resistance between the conductors of the mat/cable power leads again. Record these resistances on the warranty card under "After cable is secured in place".

Step 4: Feed the power leads through the conduit into the junction box, leaving at least 6 inches of free lead length. Secure the heating cable and splice so that they will not be pulled into the conduit.
Insert a generous amount of electrical conduit sealant into the conduit end around the power leads to prevent water entry.

Step 5: If a slab sensor is being installed, place the sensor housing according to the instructions. Secure and seal it to the conduit installed earlier. It should be located halfway between heating cables and in an area that is recommended by the sensor manufacturer. Make sure the top of the sensor will be flush with the surface of the finish layer. Make sure it is protected with a cap or seal.

Step 6: Take a photo of the cable installation. This can be very helpful later for utility work, changes to the site, etc. to avoid possible damage. Keep the photos with this installation manual.

Step 7: Before beginning work, inspect the cable for damage and secure any cable that may have come loose.

To avoid burying any possible damage that may have occurred since the cable was laid, the following tests should be performed:
Use a digital multi-meter to measure the resistance between the conductors of the cable power leads again. If possible, your electrician should perform an insulation resistance test on the cable. A megohmmeter adjusted to a minimum 500 VDC should give a measured value at least 20 megohm (MΩ).

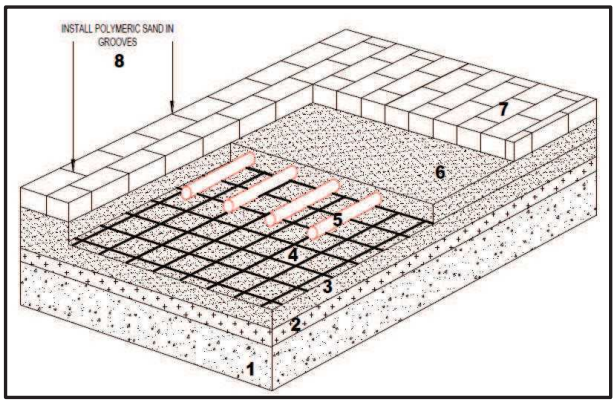
Important
Be prepared to install a marker plate or other identification indicating the presence of SM Heating Cable within the slab. This helps alert and avoid possible damage from future on-site. Install a marker plate where clearly visible in each snow-melted area. A marker plate is placed flush in the wet concrete surface or soft asphalt surface. Other types of surfaces should be made to allow the marker plate to be installed flush with the surface. Do not damage the heating cable.

Step 8: Manually spread sand over the top of the cables and base so that no less than 1-1/2 inches covers the top of the heating cables. Be careful not to use sharp tools. Compact the sand as recommended by the paver supplier, being careful not to uncover any of the SM Heating Cable and not to damage the conduits coming into the slab area. Use hand compacting tools around the conduit area. Add more sand if necessary, to maintain minimum 1-1/2 inches over all the cables and conduit. Place the pavers over the top and finish as required.

Important
Make sure the heating cable is fully embedded as well as 2 to 6 inches of the conduits enclosing the power lead and slab sensor wiring (if used). It is highly recommended that pavers be no more that 2-1/2 inches thick.

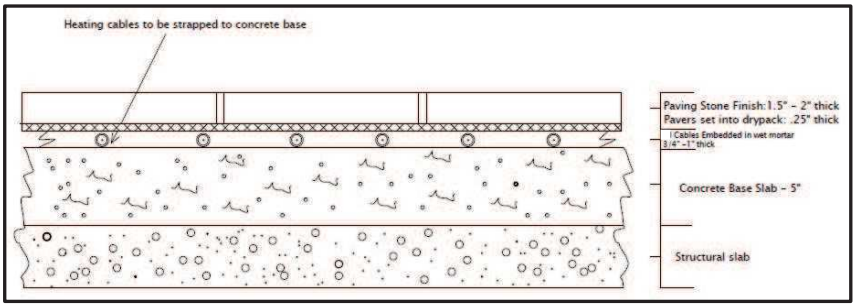
Step 9: Use a digital multi-meter to measure the resistance between the conductors of the cable power leads again. Record these resistances on the warranty card under “After coverings are applied”.

Typical Pavers on Sand with Mesh Cross Section



NOTES:
1) GRANULAR SUB-BASE MATERIAL
2) FILTER CLOTH
3) 1 TO 1.5 INCH (25 TO 38 mm) OF COMPACTED LIMESTONE SCREENINGS IN GRAINS AS FINE AS SAND OR SAND
4) 6X6 #8 FLAT WELD SHEET MESH
5) TY-WRAP TRM HEATING CABLES ON 6X6 MESH
6) 1 INCH (25mm) (ABOVE CABLES) LIMESTONE SCREENINGS IN GRAINS AS FINE AS SAND OR SAND
7) CONCRETE PAVERS – 2" – 2.25" THICK MAXIMUM FOR OPTIMAL PERFORMANCE OF SNOW MELTING CABLES
8) INSTALL POLYMERIC SAND IN GROOVES

Typical Pavers cross section for cables embedded in mortar



Total Depth of cables from finished surface MUST not exceed 3"

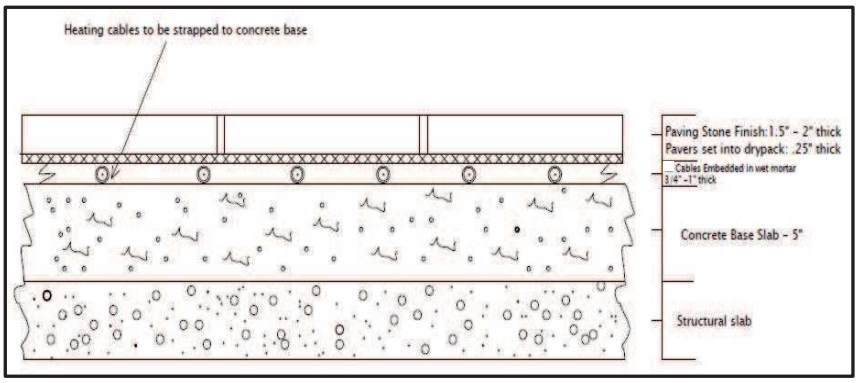
Cables to be fastened to stainless steel strapping

Cables to be entirely embedded with .75"- 1" of wet flowing mortar or thinset topping

Heated lengths of cables must be completely embedded in mortar, thinset, or concrete; exposure of heating cable will lead to cable burn outs, faults, and physical damage

All railing locations (if applicable) to be marked out prior to cable installation

Typical Paver Cross section for cables embedded in mortar with dry pack



Total Depth of cables from finished surface MUST not exceed 3"

Cables to be fastened to stainless steel strapping

Cables to be entirely embedded with .75"- 1" of wet flowing mortar or thinset topping

Heated lengths of cables must be completely embedded in mortar, thinset, or concrete; exposure of heating cable will lead to cable burn outs, faults, and physical damage

All railing locations (if applicable) to be marked out prior to cable installation

Ceramic or Stone Tile Application

Step 1: SM Heating Cable can be installed in the structural slab or in a thick mortar bed above a structural slab. In either case, the base material should be prepared according to the Concrete Application section.

Step 2: Secure plastic mounting cable ties to the gravel base, driving long nails or similar through the head of the cable tie. These cable ties should be applied at the end of each run and at every 3 to 4 feet. Do not use metallic cable ties as they may damage the cable.
Lay out the cable and secure with the cable ties.

Step 3: Use a digital multi-meter to measure the resistance between the conductors of the cable power leads again. Record these resistances on the warranty card under “After Cable is secured in place”.

Step 4: Feed the power leads through the conduit into the junction box, leaving at least 6 inches of free lead length. Secure the heating cable and splice so that they will not be pulled into the conduit.
Insert a generous amount of electrical conduit sealant into the conduit end around the power leads to prevent water entry.

Step 5: If a slab sensor is being installed, place the sensor housing according to the instructions. Secure and seal it to the conduit installed earlier. It should be located halfway between heating cables and in an area that is recommended by the sensor manufacturer. Make sure the top of the sensor will be flush with the surface of the finish layer. Make sure it is protected with a cap or seal.

Step 6: Take a photo of the cable installation. This can be very helpful later for utility work, changes to the site, etc. to avoid possible damage. Keep the photos with this installation manual.

Step 7: Before beginning work, inspect the cable for damage and secure any cable that may have come loose.

To avoid burying any possible damage that may have occurred since the cable was laid, the following tests should be performed:
Use a digital multi-meter to measure the resistance between the conductors of the cable power leads again. If possible, your electrician should perform an insulation resistance test on the cable. A megohmmeter adjusted to a minimum 500 VDC should give a measured value at least 20 megohm (MΩ).

Important
Be prepared to install a marker plate or other identification indicating the presence of SM Heating Cable within the slab. This helps alert and avoid possible damage from future on-site. Install a marker plate where clearly visible in each snow-melted area. A marker plate is placed flush in the wet concrete surface. Other types of surfaces should be made to allow the marker plate to be installed flush with the surface. Do not damage the heating cable.

Step 8: For either application below, exterior-grade materials should be selected and installed per manufacturer's recommendations. Only vitreous tile (non-porous) tile should be used as other tile will absorb moisture which will lead to failure. The maximum thickness above the cable should be no less than 1.5" and no more than 2.5". A movement joint should be installed between any heated and non-heated area.

Notes: Dry-set or Latex-Portland Cement (thin-set) Mortar:
In this application, the cable is already installed in the concrete slab. The primary concern is to install a cement mortar bond coat (thin-set) and tile according to Tile Council of North America (TCNA) recommendations for exterior applications (F102-07). Mortar and grout materials should be as specified per American National Standards Institute (ANSI) for exterior applications.

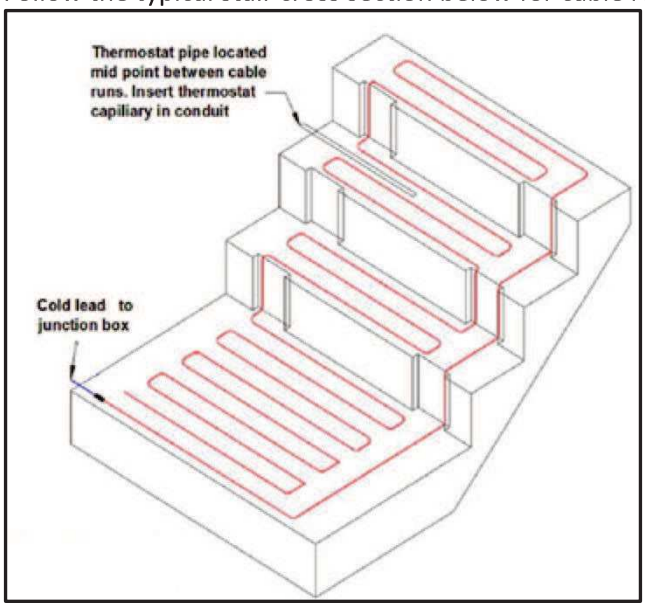
Notes: Cement Mortar or Thick-set Application:
In this application, the cable is installed above the structural slab in a thick mortar bed and bond coat according to TCNA F101.07. A 1.25" minimum mortar bed should be placed over the cable according to ANSI A108.1A guidelines. Above this layer, the mortar bond coat and tiles are installed.

Step 9: Use a digital multi-meter to measure the resistance between the conductors of the cable power leads again. Record these resistances on the warranty card under "After coverings are applied".

Stairs and Vertical transitions

When installing SM heating cable on stairs or making a vertical transition to a heated area (i.e. a step up/down), the base material must be a continuous piece of concrete.

Follow the typical stair cross section below for cable routing.



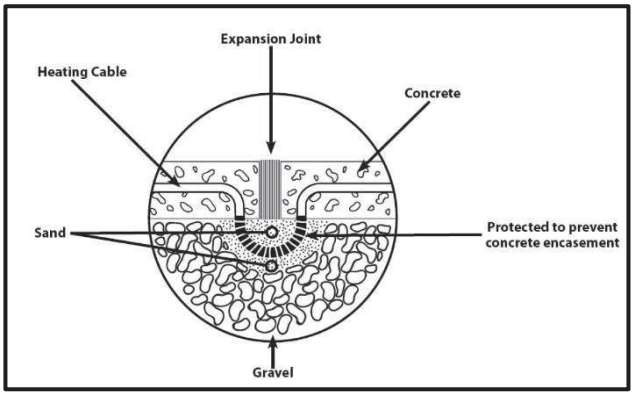
Stair Installation Notes:

1. If rail posts are to be installed, mark their locations. Heating cable must be installed at least 4" away from rail posts.
2. If installation is 2 pour, round off the sharp outside edges of the steps where the heating cable will transition from the vertical to horizontal surface.
3. Ensure the heating cable is covered with at least 1.5".
4. Cables to be secured to concrete by pre-punched strapping.

Please use the previous cross sections to determine the appropriate method for embedding the cable and finishing the surface.

Expansion Joints

SM heating cable must never be run through an expansion joint. Doing so may cause damage to the cable with slab movement. It is recommended to lay the cable so these joints are avoided; however, if it is necessary, a portion of the heating cable may be dropped into the grade below the expansion joint as shown. Fill around the cable with at least 1-inch thick sand. The loop of heating cable should be long enough to allow flexing, and must not be embedded into the concrete (the sand should protect against this) since this would not allow the cable to flex with slab movement.



Controls and Sensors Installation

- De-energize all circuits feeding this system before doing any electrical work.
- If a slab sensor is being installed, uncover the cap or seal on the embedded sensor socket. Feed the sensor leads through the conduit up to the control. Secure the sensor into the socket and finish this installation as required by the sensor manufacturer.
- Make wire connections at junction boxes for the SM Heating Cable power leads to the power wiring from the control. If the junction box is located outdoors, it is highly recommended to use wet location rated wire nuts or crimps to avoid corrosion.
- Install the control at its location according to the instructions provided with the control. Make wiring connections to the power source and to the sensor wires and cable lead wires.

Important
The ground wire supplied with the cable must be connected to a suitable grounding/earthing terminal.

- After careful inspection of all wiring, connect the power supply wiring to the GFCI type circuit breaker and turn it on.
- Follow instructions for the control to set it up. The sensor should not allow the system to energize the SM Heating Cable until proper conditions exist. The control may allow you to temporarily test the system for just a few minutes. If you have a clamp-on type electrical test meter, energize the system briefly and verify it is drawing the proper level of current into the cable as planned.
- Do not fully energize the SM Heating Cable, except for this brief test, until the concrete is cured, as this could cause improper curing of the surface materials.

CAUTION: Do not operate the system with air temperatures above 50°F (10°C) except for this brief test. This will stress the materials and reduce the life of the heating cable and may cause damage to the materials and heating cables.

Testing/ Commissioning:

Important: For the extended 2-year limited warranty to apply, you must perform these tests, and record the results on the warranty card. Retain a copy for your records and give a copy to the end-user.

Insulation Resistance Test with a megohmmeter
This test ensures that the insulating jackets of the cable(s) are not damaged. A low value indicates the cable has been damaged and must be replaced. A megohmmeter adjusted to a minimum 500 VDC should give a measured value at least 20 megohm (MΩ).

Warning
Megohmmeters apply high voltage and could shock or cause serious injury if improperly used. Follow megohmmeter instructions for safe and proper use.

- Connect the ground wire to the black lead and both power wires to the red lead of the megohmmeter.
- Adjust the megohmmeter to a minimum 500 VDC.
- Make sure the megohmmeter reads at least 20 megohm (MΩ).
    - If you get a different reading, contact TRM.
- Record these readings on the warranty card.

Insulation Resistance Test with a digital multi-meter

This test ensures that the insulating jacket of the cable(s) are not damaged. A low value indicates the cable has been damaged and must be repaired or replaced.

- Connect the ground wire to the black lead and both power wires to the red lead of the multi-meter.
- Make sure the meter reads “Open”, “OL” or whatever indication your specific meter shows when the test leads are not touching anything.
    - If you get a different reading, please contact TRM.
- Record these readings on the warranty card.

Heating Cable Resistance Test

This test measures the resistance of the SM Heating Cable and is used to determine circuit integrity.

- Set your multimeter to the 200 or 2000 ohm range.
- Connect the multimeter leads to the black and white cold lead wires.
- Compare this resistance reading to the resistance specified on the Product label. The value should be within ±10%.
    - If you get a different reading, please contact TRM.

• Record these readings on the warranty card.

Warranty Card			
Cable info:	**Cable 1**	**Cable 2**	**Cable 3**
Serial Number			
Model Number			
Voltage			
Resistance Range			
Out of the box, Before installation:			
White to Black			
White to Ground			
Black to Ground			
After cables have been secured in place:			
White to Black			
White to Ground			
Black to Ground			
After coverings have been applied:			
White to Black			
White to Ground			
Black to Ground			

Retain this log for warranty purposes!

Troubleshooting

If not qualified to perform electrical installations, it is strongly recommended that a qualified, licensed electrician be hired to install the heating cables and related electrical components. If problems with the system arise, please consult the troubleshooting guide below. Any troubleshooting work should be done with the power removed from the circuit, unless otherwise indicated. Call TRM for further assistance.

Problem	Possible Cause	Solution
SM Cable resistance measurement is outside the range printed on the nameplate label.	An analog ohmmeter (using a moving needle) was used to take the reading.	Obtain a digital ohmmeter (multi-meter) able to read 0 to 20,000 ohms (Ω) and re-measure the resistance.
	If measurement shows an open or short circuit, the heating cable has been damaged.	Record resistances between all power lead wires and contact the manufacturer.
	If measurement is just a little low or high, air temperature has affected the resistance.	Place the cable in a room 65-75 ° F and re-measure after an hour.
	The resistance measurement could be from more than one cable.	Disconnect all cables from each other and from controls and re-measure.
	The ohmmeter (multimeter) is set to the wrong scale.	If the ohmmeter (multi-meter) has multiple ranges (e.g. 200 Ω, 2k Ω, 20k Ω, 200k Ω, 20M Ω) set the range to 200 Ω and re-measure.
Snow/ice is not melting.	cable has been damaged.	Measure cable resistances between all power lead wires as shown in this manual. If there is an open or short-circuit damage, record these resistances and contact the manufacturer.
	GFCI has tripped.	Try resetting the GFCI on the circuit breaker ONCE. If it trips again, do not continue to try resetting it. Check for loose wire connections in the breaker panel, junction boxes, controls, etc. Measure cable resistances between all power lead wires as shown in this manual. If there is an open or short-circuit damage, record these resistances and contact the manufacturer.
	Incorrect voltage applied.	Briefly energize the system and use a multi-meter to measure the voltage between power lead wires of the mat/cable. Check voltage ratings for each control and cable to make sure they match. If possible, use an "amp clamp" meter to measure the current into each mat/cable.
	Mats/cables are connected in series.	Multiple cables must be connected in "parallel".
System operates continuously.	Incorrect wiring. Control was "bypassed".	Check wire connections. See wire instructions with control and in this manual.
	Faulty control. Relay is not opening properly.	Check instructions with the control.

WARRANTY

We believe in the superior quality of our TRM SM cable products. Our standard warranty is 2 years from the date of purchase. Contact us regarding extended warranty terms and conditions.

TRM is a Canadian-owned leading designer, and manufacturer of premium heating cable and systems in the commercial, industrial, and residential sectors.