



CABLE

ELECTRIC FLOOR HEATING
FOR UNCOUPLING MEMBRANE SYSTEMS

INSTALLATION GUIDE





WARNINGS – IMPORTANT NOTES	3
BACKGROUND OF UNCOUPLING MEMBRANES	7
INSTALLATION CROSS SECTION OF THE TRM FLOOR HEATING SYSTEM	10
WOOD SUBFLOORS	11
CEMENT SUBFLOORS	15
GYPSON SUBFLOORS	19
EXISTING STRUCTURALLY SOUND VINYL FLOORS	21
WATERPROOFING & MOVEMENT/EXPANSION JOINTS	23
INSTALLING THE MEMBRANE	25
SELECTING THE HEATING CABLE	26
TESTING THE HEATING CABLES	27
INSTALLING THE HEATING CABLES	29
ELECTRICAL CONNECTIONS	31
WATERPROOFING	32
TILE LAYING	34
CABLE PRODUCTS	36
THERMOSTAT PRODUCTS	37
CABLE TEST LOG	38

WARNINGS – IMPORTANT NOTES

- The entire heating portion of the cable (including the hot/cold splice joint) must be installed/embedded using self-leveling compound or thinset mortar.
- TRM heating cable is intended for indoor embedded floor heating applications, which may include heat loss replacement, comfort warming or primary heating.
- TRM heating systems should be connected to a dedicated 15A or 20A electrical circuit depending on amperage load for the room, which has been clearly labeled in the electrical panel.
- The Sub-floor surface must be prepared in accordance with ANSI standards before proceeding with installation.
- Do not use power tools, or sharp implements when cleaning grout lines as this may damage the heating system/membrane.
- Be sure that the floor is not penetrated by nails, screws, or similar devices that can cause damage to the heating system/membrane.
- TRM recommends insulating above concrete slab (or high heat loss) Sub-floors prior to installing the heating cable, as this will improve system performance and efficiency.
- All electrical cable connections and equipment should be kept clean and dry throughout the installation/testing/repair process.
- Caution must be used to prevent the possibility of electrical shock, fire and/or personal injury. Always De-energize power circuits before installing, testing or repairing the TRM electric heating system.
- Do not install the TRM heating cable(s) closer than 3" to: Walls, permanent floor fixtures, adjacent heating devices or floor vents.
- Do not install the TRM heating cable(s) closer than 6" from drains (4" from a toilet wax ring)

- Do not install the TRM heating cable(s) closer than 1" from combustible surfaces (not including wood based substrates)
- Do not install TRM heating cable(s) in/on/underneath walls, in/on ceilings, under permanent floor fixtures or under any materials which prevent air flow and proper heat transfer away from the floor surface.
- Ensure that any object(s) placed above the heated floor area are appropriate for use with electric radiant heat, and will not insulate the floor surface (trapping heat underneath), as this may cause unsafe floor temperatures to be reached between the object and the flooring material.
- TRM recommends the maximum R-value for floor covering layer(s) installed above the heating system be limited to:
 - 2.0-R for 10W/sqft systems
 - 1.5-R for 12W/sqft systems
 - 1.0-R for 15W/sqft systems

With a total maximum value of 2.5-R for areas with throw carpets or similar type covering where the majority of the floor is uncovered

- The cross sectional height of the TRM uncoupling membrane; which fully encases the TRM heating cable, is 0.22" (5.5mm). The membrane is adhered to the sub-floor with modified thinset (or unmodified thinset depending on the sub-floor material) using a 1/4" x 3/8" notched trowel. The cable is installed and the top of the membrane is filled with modified thinset using the flat side of a trowel to fully encase the heating cable prior to applying mortar and tile. If an engineered/laminate floor is being installed above the cable/membrane assembly, you will need to apply a 1/4" skim coat above the membrane and cables prior to proceeding with installation of the approved engineered/laminate flooring materials.

IMPORTANT NOTES

- Read the instructions carefully before installing the system.
- Remember to measure the resistance several times.
- The minimum installation temperature is 40°F (5°C).
- **The heating cable cannot be cut to length, crossed over itself, or installed closer than the spacing patterns noted on page 36.**
- Remember to check that the supply voltage matches the voltage of the cable.
- Only for indoor installation.
- Metal structures or materials used for the support of or on which the Cable is installed must be grounded in accordance with CSA Standard C22.1, section 10 and the NEC.
- Please consult TRM for any other questions or advice.

Before installation, the user and/or installer must read, understand and adhere strictly to the instructions below.

- Any deviation from the instruction below will completely void the manufacturer warranty and liability.
- The instructions below are intended to avoid personal injury and/or property damage.
- The **TRM Heating Cable** must be installed by qualified personnel and all electrical connections must be performed by a qualified electrician according to local and national building codes and norms.
- The heating cables must be grounded in accordance with local and national electric codes.

- Any modification or tampering of the heating cable will completely void the manufacturer warranty and liability.
- Do not energize the cable when on the spool; this could damage the cable and cause a fire.
- Lay the cables with a spacing not less than minimum spacing suggested and recommended by **TRM** and in any case not to exceed 15watts/square foot.
- NEVER use a cable designed for 110V/120V with 208V/220V/240V power.
- Never cut/shorten/modify the heating cable: it will change the electrical characteristics of the cables, and possibly cause overheating or a fire.
- Avoid bending the heating cable with a radius of curvature less than 3.5 times its outside diameter, otherwise you may damage the insulation and integrity of the wire.

The minimum application temperature of the cable is 32F or Zero °C.

UNDERFLOOR ELECTRIC HEATING SYSTEM WITH UNCOUPLING TECHNOLOGY

TRM underfloor electric heating system with uncoupling/vapor management/load distribution and waterproof properties.

Advances in tile manufacturing in the past few decades have improved the quality and choices available to the consumer. New colors, new materials, larger format, thinner tiles and digital printing have all contributed to a steady growth of the use of tiles as a surface. When compared to other flooring options such as carpeting and wood floors, tiles are normally preferred because they are easy to clean, resilient and hygienic. Unfortunately ceramic tile and natural stone, if not installed properly, are subject to cracking, delamination and are cold to the touch. Use of electrical floor heating can minimize the cold, but subjects the tile assembly to additional stress that can lead to cracking and delamination.

Traditionally most electric floor heating, and anti-fracturing membrane manufacturers have recommended covering the electrical heating cables with a self-leveling cement layer or a thin-set layer followed by an uncoupling crack isolating membrane and then finally installing the tiles. This process needlessly increases time, difficulty, thickness, height differentials, weight and cost of the overall installation.

The patented **TRM SYSTEM** by Progress Profiles combines the benefit of an underlayment membrane with the comfort and convenience of electrical floor heating. The Prodeso Heat Membrane can be installed over the entire subfloor as an uncoupling, crack isolating and waterproofing membrane. The **TRM Heating Cable** is then installed in the areas where heat is desired. Once the **TRM Heating Cable** is installed you can begin tiling immediately, no waiting is necessary.

The **MEMBRANE** is a polypropylene uncoupling, crack isolation, waterproofing membrane, with rounded square shaped reliefs. These reliefs form a channel specially designed to embed and hold the **TRM Heating Cable**. **PRODESOS HEAT MEMBRANE** has a polypropylene thermo welded woven underneath to increase the bond between the subfloor and the membrane.

PRODESΟ HEAT MEMBRANE ADVANTAGES



Uncoupling: PRODESΟ HEAT MEMBRANE compensates for the longitudinal movement between the subfloor and the tile preventing breakage, and making it possible to install underfloor electric heating, even on problematic substrates such as wood and cracked substrates.



Vapor Management: PRODESΟ HEAT MEMBRANE'S unique and patented design allows for air pockets to form between the subfloor and the membrane itself. Excess moisture from the substrate will find its way to these air pockets and create a vapor cycle. This vapor cycle will balance the vapor content of the substrate, protecting the tile from potential damage and making it possible to install underfloor electric heating, even on substrates that are not perfectly cured or are moisture sensitive such as wood, concrete, and gypsum based subfloors.



Waterproofing: PRODESΟ HEAT MEMBRANE is a Polypropylene membrane and as such is naturally waterproof. For indoor installations in areas that are prone to water damage, such as bathrooms and kitchens, the perimeter, corners, and seams of the PRODESΟ HEAT MEMBRANE need to be waterproofed utilizing PROBAND 150/250 waterproofing foil tape (double sided Polypropylene foil tape) and modified (ANSI A118.11) or unmodified (ANSI 118.1) thin sets. (Please consult with your thin set manufacturer for proper thin set selection and proper curing time for your specific installation).



Load distribution: PRODESΟ HEAT MEMBRANE'S unique and patented designs allow loads to be evenly distributed from the tile covering to the subfloor. Each rounded square relief has a central cavity shaped like an inverted pyramid. When filled with thin-set this inverted pyramid becomes an incompressible structure. These cavities act like pillars in a building support structure, evenly distributing and transferring the load from the tile floor to the subfloor below.

TRM Electric Floor Heating Cables need to be installed by qualified and licensed installers in accordance with this manual, PLUS local and national codes. ALL electrical connections need to be executed by a licensed electrician in accordance with local and national codes.

The advantages of a radiant heat floor system have long been known but the **TRM FLOOR HEATING SYSTEM** has game changing advantages



- Thanks to the uncoupling and crack isolating properties of the PRODESO® HEAT MEMBRANE, it's possible to install tile and floor heating over a variety of difficult substrates such as Plywood, Cement Slabs etc.



- Thanks to the uncoupling and crack isolating properties of PRODESO® HEAT MEMBRANE, it's possible to eliminate some of the otherwise necessary expansion joints in your installation.

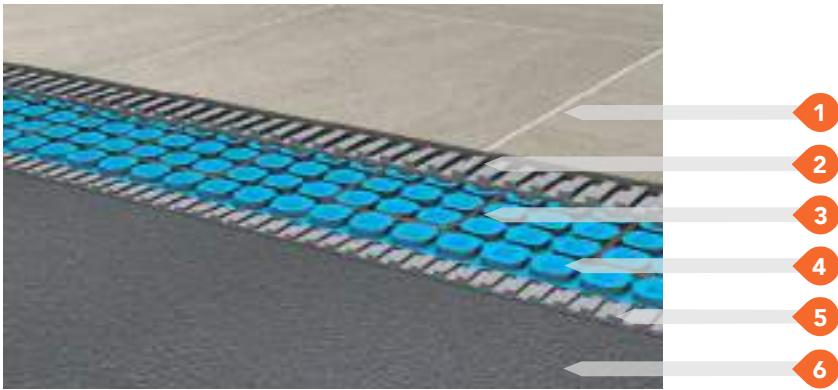


- With its low profile design, the height of the membrane is only 5,5 mm (1/4-inch) PRODESO® HEAT MEMBRANE is the perfect solution for remodeling projects where the new floor needs to transition over an existing surface.

- The low overall weight of the system makes it the perfect choice for applications when load bearing capacity of the subfloor is a limitation.
- Low thermal inertia. Tiles are installed directly on top of the heating cable. The heat will transfer rapidly and efficiently to the above tile for instant comfort and enjoyment.
- The benefit of choosing exactly where to install your heat areas will allow you to maximize your return on investment. Heat where you want it, when you want it, reducing the operating cost of the overall system while increasing the comfort and value of your home.

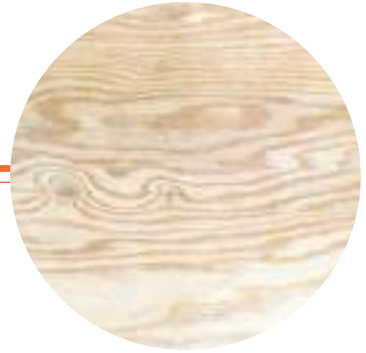
- Cost effective/time saving installation, coupled with the efficiency and safety of electric radiant heat, make **TRM FLOOR HEATING SYSTEM** the obvious choice.
- **TRM FLOOR HEATING SYSTEM** does not require any maintenance over time.

INSTALLATION CROSS SECTION OF THE TRM FLOOR HEATING SYSTEM



- 1 Ceramic, Porcelain or Natural Stone Tiles
- 2 Modified (ANSI A118.11) or Unmodified (ANSI 118.1) thin sets
- 3 PRODESO HEAT MEMBRANE
- 4 **TRM** Electrical Radiant Heat Cable
- 5 Modified (ANSI A118.11) or Unmodified (ANSI 118.1) thin sets
- 6 Subfloor Cement, Plywood, OSB etc.

WOOD



Wood subfloor considerations and installation details

Wood and its derivatives are commonly used in today's construction. All wood materials expand, contract, bend and flex with changes in temperature, humidity and load in the surrounding environment. These deformations can be seasonal or due to an isolated incident such as a plumbing accident, and will naturally occur over the life of a building structure.

TRM FLOOR HEATING SYSTEM properties provide a solution for these challenges.

UNCOUPLING



PRODESO HEAT MEMBRANE will compensate for relative longitudinal movement between the Sub-floor and the tiles eliminating the major cause of tile cracking and delamination making it possible to install underfloor electric heating on wood substrates. PRODESO HEAT MEMBRANE eliminates the need for the second layer of Plywood with the exception of Natural Stone tile installations.

VAPOR MANAGEMENT



WATERPROOFING



LOAD DISTRIBUTION



Wood is particular sensitive to relative moisture changes in their environment. PRODESO HEAT MEMBRANE's unique and patented design allows for air pockets to form between the subfloor and the membrane itself. These air pockets allow for a vapor cycle to form and balance the vapor content of the subfloor assembly, increasing the mechanical and structural property of the wood subfloor.

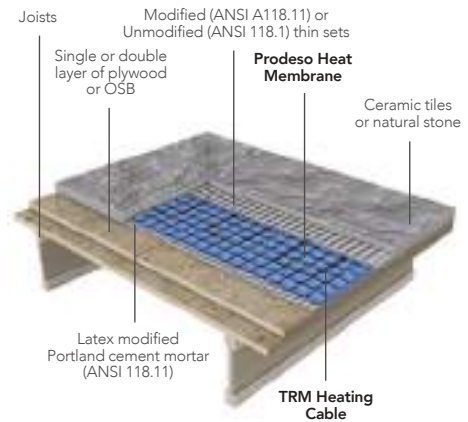
Wood structures are particularly sensitive to variation in humidity in their environment. **PRODESO HEAT MEMBRANE** is made of polypropylene, a completely waterproof substance that will protect the wood subfloor from water damages to ensure a long lasting installation. For areas prone to flood, please follow the waterproofing instructions on page 30.

PRODESO HEAT MEMBRANE's unique and patented designs allow loads to be evenly distributed from the tile covering to the subfloor. Each rounded square relief has a central cavity shaped like an inverted pyramid. When filled with thin-set, this inverted pyramid becomes an incompressible structure. These cavities act like pillars in a building support structure, evenly distributing and transferring the load from the tile floor to the subfloor below.

PRODESO HEAT MEMBRANE

The uncoupling membrane is laid directly over the entire surface intended for tile installation. The heating cable is then installed in the areas where heat is desired, using the channels formed between the rounded square reliefs. It's NOT necessary to use self-leveling cement to cover and protect the **TRM Heating Cable** before starting tile installation. This results in significant savings of material, time, cost and overall weight. Tile installation can start immediately after installing the **TRM Heating Cable(s)**.

WOOD STRUCTURE



WOOD SUBFLOORS (OSB OR PLYWOOD)

SPACING Joist/I-beam / floor trusses	OsB Plywood Layers	Tile Type	Minimum Tile Size	Minimum Subfloor Thickness
16.0" OC OSB OR PLYWOOD	Single	Ceramic/porcelain	2" x 2"	19/32" or 5/8" Nominal with 1/8" gap
19.2" OC OSB OR PLYWOOD	Single	Ceramic/porcelain	2" x 2"	23/32" or 3/4" Nominal with 1/8" gap
24.0" OC OSB OR PLYWOOD	Double	Ceramic/porcelain	2" x 2"	23/32" or 3/4" Nominal with 1/8" gap
16.0" OC OSB OR PLYWOOD	Double	Natural stone	2" x 2"	19/32" or 5/8" Nominal with 1/8" gap
19.2" OC OSB OR PLYWOOD	Double	Natural stone	2" x 2"	23/32" or 3/4" Nominal with 1/8" gap
24.0" OC OSB OR PLYWOOD	Double	Natural stone	2" x 2"	23/32" or 3/4" Nominal with 1/8" gap

- Minimum thickness for additional underlayment 3/8" or 10mm.
- Underlayment: APA C-C PLUGGED EXTERIOR.
- Additional Underlayment is required for Joist/I-Beam /Floor Trusses spaced more than 19.2" for any type of tile.
- Additional Underlayment is required for all types of natural stone regardless of Joist/I beam/Floor trusses spacing.
- Underlayment 1/2" (13mm) or thinner: Fasteners Spacing 4" (102mm) around the perimeter and 6" (152mm) in the field.
- Underlayment thicker than 1/2" (13mm): Fasteners spacing 6" (152mm) around the perimeter and 6" in the field.
- Seams, perimeters, and corners need to be sealed with Proband 150/250 when water migration is expected.
- Seams, perimeters, and corners need to be sealed with Proband 150/250 when a waterproof installation is necessary.

TEST PROCEDURE: ASTM C627:

“Standard test method for evaluating ceramic floor tile installation systems using the robinson-type floor tester”

Report Number	Substrate	Tile	Joist Spacing	Achieved Rating
TCNA-772-14	Concrete	12 x 12 Porcelain Tile	Not Applicable	Extra Heavy
TCNA-773-14	OSB/plywood	12 x 12 Porcelain Tile	19.2”	Extra Heavy

WOOD SUBFLOORS (OSB OR PLYWOOD) SETTING AND GROUTING MATERIALS

Adhesive to fix PRODESIO HEAT MEMBRANE to subfloor	Latex Modified Portland Cement Mortar (ANSI A118.11)
Adhesive to fix Tiles to PRODESIO HEAT MEMBRANE	Modified (ANSI A118.11) or Unmodified (ANSI 118.1) thin sets
GROUT	Polymer-modified cement grout (ANSI A118.3, A118.6, A118.7, A118.8) *

**Please consult with your thin-set manufacturer for proper thin-set selection and proper curing time for your specific installation.*

WOOD SUBFLOORS (OSB OR PLYWOOD) ANSI INSTALLATION SPECIFICATION

TILE FIXING	ANSI (108.5)
GROUTING	ANSI (A108.6, A108.9, A108.10)

EXPANSION JOINTS:

PRODESIO HEAT does NOT eliminate the need for movement joints, including perimeter joints, within the tiled surface. Movement joints must be installed in accordance with industry standards and norms TCNA EJ171, and TTMAC 301 MJ.

SUBSTRATE PREPARATION:

Wood panels need to be properly fastened and secured to framing structure.

Wood panels need to be clean of dust, residue, wax, oil, and grease.

Wood panels need to be levelled before the installation of PRODESIO HEAT MEMBRANE.

Remove all exposed nails, screws, fasteners, and debris.

CEMENT



Cement based subfloor considerations and installation details

Thermal expansion, shrinkage and any other relative movement between a cement based screed and the tiles assembly above will subject the tile assembly to stress. This stress can ultimately cause cracking and delamination. Tile installers cannot always be certain of the curing stage of the cement based subfloor in addition cracks may be already present or develop over time.

TRM FLOOR HEATING SYSTEM properties below provide a solution for these challenges.

UNCOUPLING



VAPOR MANAGEMENT



WATERPROOFING



LOAD DISTRIBUTION



The unique and patented design of PRODESO HEAT MEMBRANE allows for uncoupling and crack isolation to take place in the tile assembly while embedding the heating cable for radiant floor heating. PRODESO HEAT MEMBRANE compensates for the longitudinal movement between the subfloor and the tile preventing breakage and making it possible to install underfloor electric heating even on cracked or not completely cured screeds.

PRODESO HEAT MEMBRANE design allows for air pockets to be formed between the subfloor and the membrane itself. Excess moisture from the substrate will find its way to these pockets and create a vapor cycle. This vapor cycle will balance the vapor content of the substrate protecting the tile surface and the substrate from undesired damages, and allows for tile installation immediately after the slab is ready for foot traffic.

PRODESO HEAT MEMBRANE is made of polypropylene, a completely waterproof substance that will protect the cement subfloor from water damages to ensure a long lasting installation. Waterproof properties have 2 major functions.

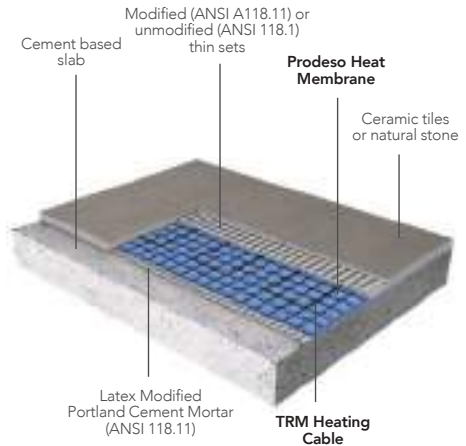
1. Slow-down the curing of the fresh cement slab preventing cracking and curling.
2. Prevent water and other substances from reaching the cement subfloor and the possible damages to the screed and the tile floor. For areas prone to flood please follow the waterproofing instructions on page 32.

PRODESO HEAT MEMBRANE's unique and patented designs allow loads to be evenly distributed from the tile covering to the subfloor. Each rounded square relief has a central cavity shaped like an inverted pyramid. When filled with thin-set, this inverted pyramid becomes an incompressible structure. These cavities act like pillars in a building support structure, evenly distributing and transferring the load from the tile floor to the subfloor below.

The **TRM FLOOR HEATING SYSTEM** is the ideal solution for the installation of ceramic and natural stone tiling.

PRODESO HEAT MEMBRANE uncoupling membrane is laid directly over the entire surface intended for tile installation. The heating cable is then installed in the areas where heat is desired using the channels formed between the rounded square reliefs. It's NOT necessary to use self-leveling cement to cover/protect the wire before starting tile installation. This results in saving material/weight/time/cost. Tile installation can start immediately after installing the **TRM Heating Cable(s)**.

CEMENT BASED SLAB



Installing tiles on a cement based subfloor presents many challenges. The following table illustrates the difference in thermal expansion between a cement subfloor and the tile surface.

TILE SURFACE MATERIAL	THERMAL EXPANSION RATIO
Ceramic	6 times the thermal expansion of cement
Marble	7 times the thermal expansion of cement
Granite	9 times the thermal expansion of cement

CEMENT SUBFLOOR SETTING AND GROUTING MATERIALS	
Adhesive to fix PRODESO HEAT MEMBRANE to subfloor	Latex Modified Portland Cement Mortar (ANSI A118.11)
Adhesive to fix Tiles to PRODESO HEAT MEMBRANE	Modified (ANSI A118.11) or unmodified (ANSI 118.1) thin sets
GROUT	Polymer-modified cement grout (ANSI A118.3 A118.6, A118.7, A118.8)*

** Please consult with your thin-set manufacturer for proper thin-set selection and proper curing time for your specific installation.*

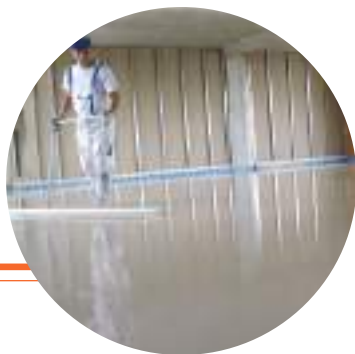
CEMENT SUBFLOOR ANSI INSTALLATION SPECIFICATION	
TILE FIXING	ANSI (108.5)
GROUTING	ANSI (A108.6, A108.9, A108.10)

- Cement Based Substrate must be compact and structurally sound
- Cracks and Fissure in the substrate need to present only longitudinal movement (NO VERTICAL MOVEMENT)
- Debris, dust, wax, grease, and oil residue must be removed or abraded/ scored to offer better bond to the thin set.
- Minimum Tile Size 2" x 2" (50mm x 50mm)
- Seams, perimeters, and corners need to be sealed with Proband 150/250 when water migration is expected.
- Seams, perimeters, and corners need to be sealed with Proband 150/250 when a waterproof installation is necessary.

EXPANSION JOINTS:

TRM FLOOR HEATING SYSTEM does NOT eliminate the need for movement joints, including perimeter joints, within the tiled surface. Movement joints must be installed in accordance with industry standards and norms TCNA EJ171, and TTMAC 301 MJ.

GYPSUM BASED UNDERLAYMENT



TRM FLOOR HEATING SYSTEM installed over Gypsum based underlayment

Gypsum based underlayment or more properly gypsum based substrate present many advantages, but also a few challenges to the tile installer. CaSO_4 calcium sulfate is the component of gypsum based underlayment and when in contact with water could lead to the formation of ettringite (hydrate calcium aluminium sulfate), which could cause an increase in volume. Gypsum based underlayments need to be waterproofed if any exposure to water or moisture throughout the life of the installation is possible. Please follow underlayments manufacture direction for proper preparation and primer application before fixing PRODESO HEAT MEMBRANE to the gypsum based underlayment. Gypsum based underlayments need to be applied to a structural subfloor (Cement based subfloor or wood based subfloor).

TRM FLOOR HEATING SYSTEM properties below provide a solution for these challenges.

UNCOUPLING



The unique and patented design of PRODESO HEAT MEMBRANE allows for uncoupling and crack isolation to take place in the tile assembly while embedding the heating cable for radiant floor heating. PRODESO HEAT MEMBRANE compensates for the longitudinal movement between the subfloor and the tile preventing cracking and delamination even on gypsum based subfloor.

VAPOR MANAGEMENT



WATERPROOFING



LOAD DISTRIBUTION



PRODESO HEAT MEMBRANE unique and patented design allows for air pockets to be formed between the subfloor and the membrane itself. Excess moisture from the

substrate will find its way to these pockets and create a vapor cycle. This vapor cycle will balance the vapor content of the substrate, protecting the tile surface and the substrate from undesired damages.

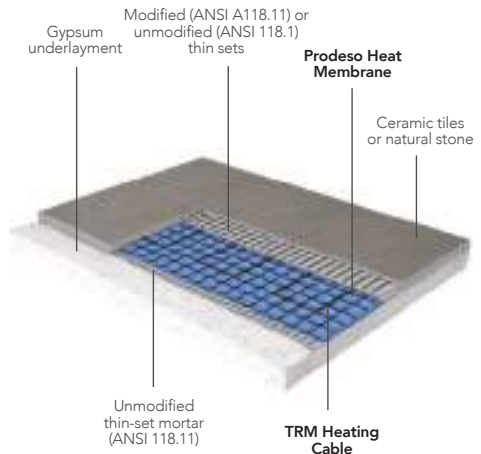
Gypsum based subfloors are particularly sensitive to variation in humidity in their environment. It is particularly important to prevent reintroducing moisture into a gypsum based substrate. PRODESO HEAT MEMBRANE's waterproof properties prevent water and other substances from reaching the gypsum based underlayment and the possible damages to the tile floor.

PRODESO HEAT MEMBRANE's unique designs allow to evenly distribute load from the floor to the subfloor. Each rounded square relief has a central cavity shaped like an inverted pyramid. When filled with thin-set, this inverted pyramid become an incompressible structure that like pillars will evenly distribute and transfer the load from the tile floor to the subfloor.

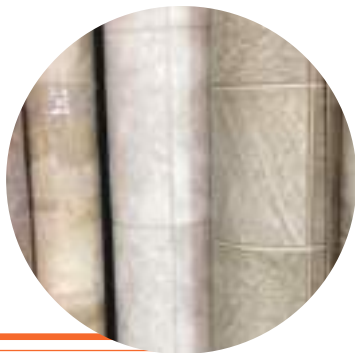
The TRM FLOOR HEATING SYSTEM is the ideal solution to install ceramic and natural stone tiles on gypsum based underlayment.

PRODESO HEAT MEMBRANE is laid directly over the entire surface intended for tile installation, the TRM Heating Cable is then installed in the areas where heat is desired, using the channels formed between the rounded square reliefs. It's NOT necessary to use self-leveling cement to cover/protect the wire before starting tile installation. This results in saving material/weight/time/cost. Tile installation can start immediately after installing the **TRM Heating Cable(s)**.

GYPSUM BASED UNDERLAYMENT



Indoor tile floor installation of ceramic or natural stone over an existing structurally sound vinyl floor



Vinyl floor tiles are a non-supporting layer over a supporting subfloor typically wood or cement. Supporting subfloor preparation and consideration are identical as per application without the Vinyl floor.

ADDITIONAL CONSIDERATIONS INSTALLATION OVER EXISTING VINYL FLOOR:

- Vinyl floor needs to be secured and flat over the entire surface.
- Installation over top of a single layer of existing vinyl floor is permitted. If multiple layers of existing vinyl floor are present, these must be removed first before the sub-floor surface is prepared to ANSI standards to proceed with installation.
- If foam or any under cushioning mat had previously been installed under the vinyl floor, the vinyl floor needs to be removed entirely and PRODESO HEAT MEMBRANE will be fixed directly to the subfloor.
- The vinyl floor needs to be clean of debris, dust, grease, and wax substance.
- Outside perimeter secured vinyl flooring is NOT acceptable for direct installation of PRODESO HEAT MEMBRANE as it may cause undesired stress to the tile assembly.
- To adhere PRODESO HEAT MEMBRANE to existing vinyl floor, please use Fast-setting latex modified thin set. ANSI A118.4 or A118.15.
- **TRM FLOOR HEATING SYSTEM** does NOT eliminate the need for movement joints, including perimeter joints, within the tiled surface. Movement joints must be installed in accordance with industry standards and norms TCNA EJ171, and TTMAC 301 MJ.

OVER EXISTING VINYL FLOOR SETTING AND GROUTING MATERIALS

Adhesive to fix PRODESO HEAT MEMBRANE to subfloor	Fast Setting Latex Modified thin set (ANSI A118.4 -A118.15)
Adhesive to fix Tiles to PRODESO HEAT MEMBRANE	Modified (ANSI A118.11) or unmodified (ANSI 118.1) thin sets
GROUT	Polymer-modified cement grout (ANSI A118.3 A118.6, A118.7, A118.8) *

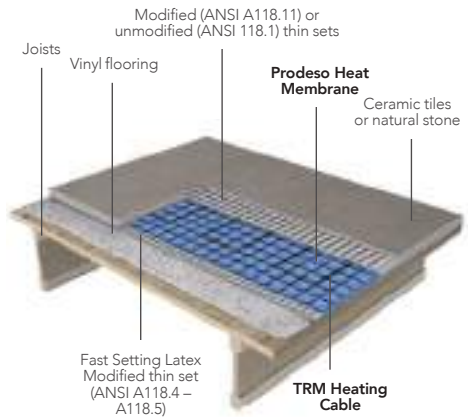
* Please consult with your thin-set manufacturer for proper thin-set selection and proper curing time for your specific installation.

OVER EXISTING VINYL FLOOR ANSI INSTALLATION SPECIFICATION

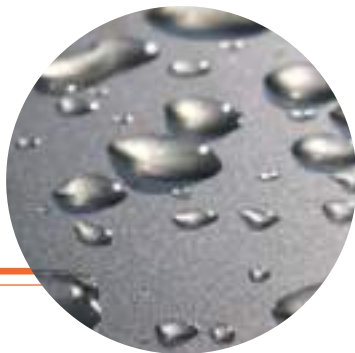
TILE FIXING	ANSI (108.5)
GROUTING	ANSI (A108.6 A108.9 A108.10)

- Minimum Tile Size 2" x 2" (50mm x 50mm)
- Seams, perimeters, and corners need to be sealed with Proband 150/250 when water migration is expected.
- Seams, perimeters, and corners need to be sealed with Proband 150/250 when a waterproof installation is necessary.
- PRODESO-HEAT does NOT eliminate the need for movement joints, including perimeter joints, within the tiled surface. Movement joints must be installed in accordance with industry standards and norms TCNA EJ171, and TTMAC 301 MJ.

EXISTING VINYL FLOOR



WATERPROOFING – MOVEMENT/ EXPANSION JOINTS



Waterproofing

Tile surfaces (Ceramic and Natural Stone) are preferred and chosen because of their Beauty, Color, Design, Finish, and Texture. Tile surfaces are used for both floor and walls in a variety of project from residential, commercial, hospitality, institutional, health care and industrial. The use of tile has become so extensive that tile installers find themselves facing new challenges every day. Water penetration can cause extensive damages to the tile assembly itself as well the subfloor and the floors underneath the tile assemblies. Waterproofing is required under and around tubs and showers. It's also recommended to waterproof tile assemblies that can possibly be exposed to considerable amounts of water because of flooding. Waterproofing the tile assembly is cheaper and safer than repairing water damages.

PRODESO HEAT MEMBRANE is a Polypropylene membrane and as such is naturally waterproof. For indoor installations in areas that are prone to water damage, the corners and seams of the PRODESO HEAT MEMBRANE need to be waterproofed utilizing PROBAND 150/250 waterproofing foil tape (double sided Polypropylene foil tape) and modified (ANSI A118.11) or unmodified (ANSI 118.1) thin sets.

Movement/Expansion joints

Any tile surface assembly cross section is made of several different materials, Tiles, Wood, Fasteners, Cement, Gypsum, Adhesives, Beams and more. All these different materials contract and expand in different ways when temperature, moisture and load change, causing stress in the overall tile assembly and ultimately cracks and possibly delamination of the tiles. Ceramic and Natural Stone Tiles are rigid and are not capable to compensate for movements. An expansion/movement joint is the part of the assembly designed to absorb the stress on the assembly by allowing movement. PRODESO HEAT MEMBRANE does NOT eliminate the need for expansion/movement joints, including perimeter joints, within the tiled surface. Movement joints must be installed in accordance with industry standards and norms TCNA EJ171, and TTMAC 301 MJ.

Expansion/Movement Joint Placement

- Perimeter Joint need to be installed around the entire installation perimeter.
- Surface Joint: 16'–20' (4.9meters – 6.1meter) in both direction. Reduce separation by 25% if exposed to direct sunlight, heating cable or moisture.
- Surface Joint near any structural element (columns, beams, stairways), doorways.
- Structural Joint when 2 separate supporting structure meet under the tile or the underlayment.
- Areas enclosed within joint should be a rectangle with ratio between each dimension not to exceed 1:1.5.

Preparation

- Before laying PRODESO HEAT MEMBRANE make sure that the substrate is load bearing, compact, flat and free of oils, greases and waxes which could prevent proper adhesion.
- Before laying PRODESO HEAT MEMBRANE make sure that the substrate is in accordance with local and national building codes and norms.
- In case of a wood based substrate, check that the panels are properly secured.
- In the case of vinyl flooring, make sure that the underlying structure is sound and suitable for the intended use and that the vinyl flooring is securely attached.
- In case of gypsum-based underlayment verify that the moisture content is less than 2%.

Mortar required for fixing PRODESO HEAT MEMBRANE to substrate.

50lbs (22.70Kg) for 100ft² (9.3 m²) using ¼" x 3/8" (6 mm x 10 mm) square or U-notched trowel.



Laying the Membrane



Attach a compatible adhesive to the substrate using a suitable trowel.



Apply PRODESO HEAT MEMBRANE, previously cut, on the adhesive.



Press the membrane with a roller or a plastic flat trowel.



Check coverage of PRODESO HEAT MEMBRANE; in case of partial coverage, increase the amount of adhesive or its fluidity.



Lay the next sheet of PRODESO HEAT MEMBRANE taking care to align it with the previous one, without overlapping. Align the square reliefs to facilitate the installation of the heating cables.

WARNING:

If heavy mechanical loads are foreseen (frequent passages), it is recommended to protect the laid membrane with wooden planks to ensure proper bonding.

FLOOR HEATING DESIGN AND PRODUCT SELECTION

Design the Installation

1 STEP 1: Measure the heated area

Determine the heated area of the floor where there are no permanent fixtures or furniture such as shower, toilets, vanities, or cabinets. Measure the heated area of the floor.

2 STEP 2: Determine the power supply voltage

The available supply voltages include 120 V, 208 V or 240 V.

Important:

Operating the 240V cable at 208V reduces the power output by approximately 25%.

3 STEP 3: Plan the design

Determine the optimum floor heating cable layout for your heated area to ensure coverage. Select a spot for the **TRM Thermostat** in the wall above the heated area where it can be reached by the cold lead on the cable, and the floor temperature sensor.

Important:

The predetermined Cable spacing (pillars) must be maintained to ensure proper floor heating. Ensure even, consistent heating cable spacing when you lay out the cable or the floor may have cold spots. Please refer to the pillar spacing guidelines on page 36, or contact **TRM** with any questions.

TRM HEATING CABLE TESTS

Before installing the electric heating cable you need to perform a series of tests, to ensure that the heating cable is working and will performed as specified by TRM. These tests must be repeated and recorded before, during and after installation of the cable and again after installation of the flooring. This is to ensure that the electrical heating cable has not been damaged during the installation. To conduct the tests please ensure you have a digital multimeter/ohmmeter available.



1 TEST 1: Electric heating cable resistance measurement

To measure the electrical resistance of the heating cable(s), you must connect a digital multimeter (set to 200 ohms) across its two power leads (conductors). If the measured resistance in ohms varies significantly ($\pm 10\%$) from the resistance value printed on the spool, it may mean that:

- a) the cable is damaged
- b) the measuring instrument is not set or set incorrectly (or the multimeter has a bad calibration or bad battery). The value of resistance in ohms measured must be logged in the "Test Log" located on page 38, and sent TRM within 30 days of purchase.



2 TEST 2: Continuity between the ground cable and the two conductors

- a) The two power leads are separated from the ground cable by an insulator that prevents any contact with them. To verify that there is no contact between the ground cable and the two conductors, you must perform a continuity test; using a digital multimeter set to 200 ohms. Test between conductor and ground (record reading) then test from other conductor to ground (record reading). The measured value must be recorded in the "Test Log" located on page 38, and sent to TRM within 30 days of purchase.



3 TEST 3: Insulation resistance Measurement between power leads and ground cable

- a) This test is designed to detect very small “holes” in the insulating layer that separates the power leads from the ground cable. These small holes are often not detected during the continuity test because they are not necessarily short circuits between the cable conductors and ground cable. Although these holes are very small, they may cause current leakage to ground, which may be detected by the ground fault circuit interrupter, located in the thermostat, thus disabling the floor heating system. To measure the insulation resistance between the power leads and the ground cable, you must connect a megohmmeter, calibrated to 1000 V, to a cable conductor and ground cable. If there is no current leakage, insulation resistance between the power leads and the ground cable must be equal to or greater than 1 Gigohms (1 Gigohms = 1 G ohms = 1000 M ohms = 1000 Mega ohms). The measured value must be logged in the “Test Log”, and sent to TRM within 30 days of purchase.



Floor temperature sensor testing

Connect a digital multimeter, calibrated to 20k ohm on meter to read 8-14 thousand ohms set for current reading, to the two conductors of the floor temperature sensor and measure its resistance at room temperature. The resistance of the floor temperature sensor varies depending on the ambient temperature in an inversely proportional way or the lower the temperature, the greater the resistance of the floor temperature sensor. Record the value of the testing obtained in the “Test Log” located on page 38, and sent to TRM within 30 days of purchase (making sure is in compliance with the values indicated in this manual).

LAYING THE HEATING CABLES

Warnings: Do not run the TRM heating cables closer than 3" to Walls, Cabinets, Furniture and Appliances.



Before removing the cable from the spool, you need to conduct the resistance, continuity, insulation resistance tests. These first set of tests are required, please write the values obtained in the "Test Log" located on page 38.



Begin the installation at the thermostat location, ensuring that the heating cable(s) cold lead reaches the thermostat jbox with 6" of slack, and the cable hot/cold splice joint is installed in the membrane where it will be fully embedded in modified thinset or self leveler.



Ensure that the **TRM Heating cable** is evenly spaced across the entire floor. Using the appropriate minimum spacing suggested by TRM, located on page 36.

Note: smaller spacing could cause overheating, which may damage the assembly structure.



Perform floor temperature sensor test to ensure functionality.



Install the floor temperature sensors centered between two cables and at a distance of at least 2 ft (60cm) from the wall. Do not cross sensor cables with heating cables. It is recommended to install a second temperature sensor as a backup in case the primary fails throughout the life of the installation. All TRM thermostats include one floor sensing probe; spare floor sensing probes are available for purchased from your distributor. Record the exact position of the sensors.



After installation of heating cables, repeat all previous tests and record the values obtained in the "Test Log", located on page 38.



NEVER exceed 15 watts per square foot.



NEVER cross heating cables.

Warning:

- During installation of the heating cables, leave space for the placement of the floor temperature sensors.

BEFORE YOU BEGIN – important notes

- 1) Ensure you have your digital multimeter/ohmmeter available
- 2) Ensure you have the thermostat probe/sensor
- 3) Note the TRM Heating Cable components are:
 - a. TRM Heating Cable element (orange color)
 - b. Cold lead (non heating) section (black)
 - c. Mechanical joint (black)
- 4) Follow the electrical connections instructions in this manual, shown below

Electrical Connection notes:

- All connections must be made by a certified electrician
- All wiring must follow your local/national codes
- A separate installation and wiring manual is include inside the **TRM thermostats** – please refer to this document for specific details related to connecting the thermostats.
- Cold leads / lead wires must be installed inside a suitable conduit/ raceway from the heated area up to your connection/thermostat junction box.
- Please ensure the **TRM Heating Cable** label is kept intact, on the cold lead end, and left visible at the junction box, to allow inspection or future testing.
- Verify the **TRM Heating Cable** you are connecting is at the correct voltage before making your final connections.
- Connect the ground wire to the ground of your electrical junction box, using a screw or suitable copper conductor wire.
- Connect the **TRM Heating Cable** conductors to your power wiring, using a minimum of 14 awg supply wiring, and ensure size and connections follow your local code/authority having jurisdiction.

WATERPROOFING

The following steps are required only in case waterproofing is necessary:

Warning: Be careful not to damage the TRM Heating Cable with the notched trowel while applying the adhesive to the membrane.



Apply the same type of adhesive used for tiling along the joints between two adjacent sheets with the flat side of the trowel, 4" (100 mm) each side of the joint), making sure to fill the cavities of the membrane, leaving a thin layer of adhesive on top of the reliefs.



Fix PROBAND 150/250 tape to the same type of adhesive used for tiling following the joint. Using a flat trowel apply strong and even pressure along PROBAND 150/250 to ensure sealing. Smooth over to eliminate bends and folds.



Apply the same type of adhesive used for tiling to the corner (wall and floor) with a 3/16" X 3/16" (4 mm X 4 mm) notched trowel to a width of about 4" (100mm).



Fix PROBAND 150/250 tape to the same type of adhesive used for tiling following the perimeter joint. Inside and outside corners can be cut from PROBAND 150/250 tape, but pre-cut corners (PRBI and PRBE) are also available on page 19. Using a flat trowel apply strong and even pressure along PROBAND 150/250 to ensure sealing.



Apply the same type of adhesive used for tiling along the perimeter floor with the flat side of the trowel, to a width of about 4" (100 mm). Particular attention must be paid to fill the cavities of the Prodeso Heat membrane and leaving a thin layer of adhesive on top of the reliefs. Apply the same type of adhesive used for tiling to the perimeter wall with a 3/16" x 3/16" (4 mm x 4 mm) notched trowel to a width of about 4" (100 mm).



Fix PROBAND 150/250 tape to the same type of adhesive used for tiling following the perimeter joint.



Warning:

When using PROBAND 150/250, PROBAND FIX is to be used in the place of the same type of adhesive used for tiling for non-cement based substrates.

LAYING THE TILES

Warning: Be careful while applying the adhesive on the membrane not to damage the heating cable with the flat/notched trowel.

Mortar required for fixing Tile to PRODESO HEAT MEMBRANE.

50 lbs (22.70 Kg) for 40/50 ft² (3.7 m² / 4.6 m²) using ¼" x 3/8" (6 mm x 10 mm) square or U-Notched trowel
 50 lbs (22.70 Kg) for 30/40 ft² (2.8 f²/ 3.7m²) using X" (12.5 mm X 12.5 mm) square or U-Notched trowel.



Tiles can be immediately laid after the installation of the heating cables is completed. Using the flat side of the trowel, fill with thin set mortar the cavities of the membrane. Apply additional of the same mortar with a notched trowel over according to the tile size. Both modified (ANSI A118.11) or unmodified (ANSI 118.1) thin sets can be used when installing tiles to Prodeso Heat Membrane.

(please consult with your thin set manufacturer for proper thin set selection and proper curing time for your specific installation).

Warning:

Full back coverage may vary depending on the consistency of the adhesive, the angle of inclination of the notched trowel, and the flatness of the substrate. If full back coverage is not achieved, remove the tile and apply new adhesive, paying attention to the consistency of the thin set and its application. In case of large format tiles (12" x 12" and larger), it is recommended to back butter each tile before laying them.



Apply the thin set to the back of the tiles with a notched trowel and lay them on the layer of thin set previously applied. Occasionally remove and check some tiles, to ensure full back coverage.



Carefully lay the tiles and press them on the layer of thin set. If a layer of skin has formed on the thin set, remove and apply again.



After laying the tiles, repeat all previous tests and record the values obtained in the "Test Log" located on page 38. Ensure all tests are repeated before during and after install.

TRM FLOOR HEATING CABLE 120 V

MODEL #	SQUARE FEET COVERED		WATTS	AMPS	LENGTH (FEET)
	AT 3 PILLARS *	AT 2/3/2 PILLARS **			
	12 WATTS/SQ. FT.	15 WATTS/SQ. FT.			
TRM-FH-1-10	10.5	8	120	1	33
TRM-FH-1-15	15.7	12	180	1.5	49.5
TRM-FH-1-21	21.0	16	240	2	66
TRM-FH-1-26	26.2	20	300	2.5	82.5
TRM-FH-1-31	31.4	24.1	360	3	99
TRM-FH-1-42	41.9	32.1	480	4	132
TRM-FH-1-52	52.4	40.1	600	5	165
TRM-FH-1-63	62.9	48.1	720	6	198
TRM-FH-1-73	73.3	56.1	840	7	231
TRM-FH-1-84	83.8	64.2	960	8	264
TRM-FH-1-94	94.3	72.2	1080	9	297
TRM-FH-1-105	104.8	80.2	1200	10	330
TRM-FH-1-115	115.3	88.2	1320	11	363
TRM-FH-1-125	125.7	96.3	1440	12	396

TRM FLOOR HEATING CABLE 240 V

MODEL #	SQUARE FEET COVERED		WATTS	AMPS	LENGTH (FEET)
	AT 3 PILLARS *	AT 2/3/2 PILLARS **			
	12 WATTS/SQ. FT.	15 WATTS/SQ. FT.			
TRM-FH-2-15	15.7	12	180	0.75	49.5
TRM-FH-2-21	21	16	240	1	66
TRM-FH-2-26	26.2	20.1	300	1.25	82.5
TRM-FH-2-31	31.4	24.1	360	1.5	99
TRM-FH-2-36	36.7	28.1	420	1.75	115.5
TRM-FH-2-47	47.1	36.1	540	2.25	148.5
TRM-FH-2-63	62.9	48.1	720	3	198
TRM-FH-2-73	73.3	56.1	840	3.5	231
TRM-FH-2-84	83.8	64.2	960	4	264
TRM-FH-2-94	94.3	72.2	1080	4.5	297
TRM-FH-2-105	104.8	80.2	1200	5	330
TRM-FH-2-125	125.7	96.3	1440	6	396
TRM-FH-2-146	146.7	112.3	1680	7	462
TRM-FH-2-167	167.6	128.3	1920	8	528
TRM-FH-2-188	188.6	144.4	2160	9	594
TRM-FH-2-210	209.6	160.4	2400	10	660
TRM-FH-2-230	230.5	176.5	2640	11	726
TRM-FH-2-250	251.5	192.5	2880	12	792

* Standard spacing = 3 Pillars, to achieve 12 watts per sq. ft.

** Alternative spacing = 2/3/2 Pillars, to achieve 15 watts per sq. ft.

Note: use 3/4 Pillar spacing to achieve 10 watts per sq. ft.

These pillar spacings above are based on utilizing membrane supplied by TRM.

Please contact TRM for alternative design options.

TRM FLOOR HEATING THERMOSTATS



TRM-FH-GOLD

- Bluetooth®, Wifi, Cloud connected
- 3.5" Color touchscreen with interactive control
- Full programmability
- Tracks power consumption
- 120 Volt, 208 Volt, and 240 Volt voltages
- 15 Amp capacity
- 15' Floor sensor (included)
- Complete with GFCI protection



TRM-FH-SILVER

- 3.5" Color touchscreen with interactive control
- Full programmability
- Tracks power consumption
- 120 Volt and 240 Volt dual voltage
- 15 Amp capacity
- 15' Floor sensor (included)
- Complete with GFCI protection



TRM-FH-BRONZE

- Non-programmable
- Tracks power consumption
- 120 Volt and 240 Volt dual voltage
- 15 Amp capacity
- 15' Floor sensor (included)
- Complete with GFCI protection



Optional - TRM-FH-Relay (USG-4000)

The TRM-FH-Relay power expansion module can be used in concert with any TRH-FH thermostat in projects with large heated floor areas that exceed a single thermostat's 15 amp capacity. Low voltage master/slave wiring between the thermostat and relay(s) is required.

TRM FLOOR HEATING CABLE – TEST LOG

Customer or Job name info:

Installer name and contact:

Cable Model number _____

Factory Measured Resistance ... Ohms _____

Resistance test ... Ohms ... before install _____

Resistance test ... Ohms... during install _____

Resistance test ... Ohms ... after install _____

Resistance test ... Ohms ... after flooring is complete _____

WARRANTY



We believe in the superior quality of our products, that's why we offer a 25-Year Product Warranty on all TRM floor-heating products that covers product defects along with a 3-year warranty on all TRM thermostats.

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

GET IN TOUCH

TRM Heating Cables

175 Idema Road, Markham, ON, Canada
L3R1A9



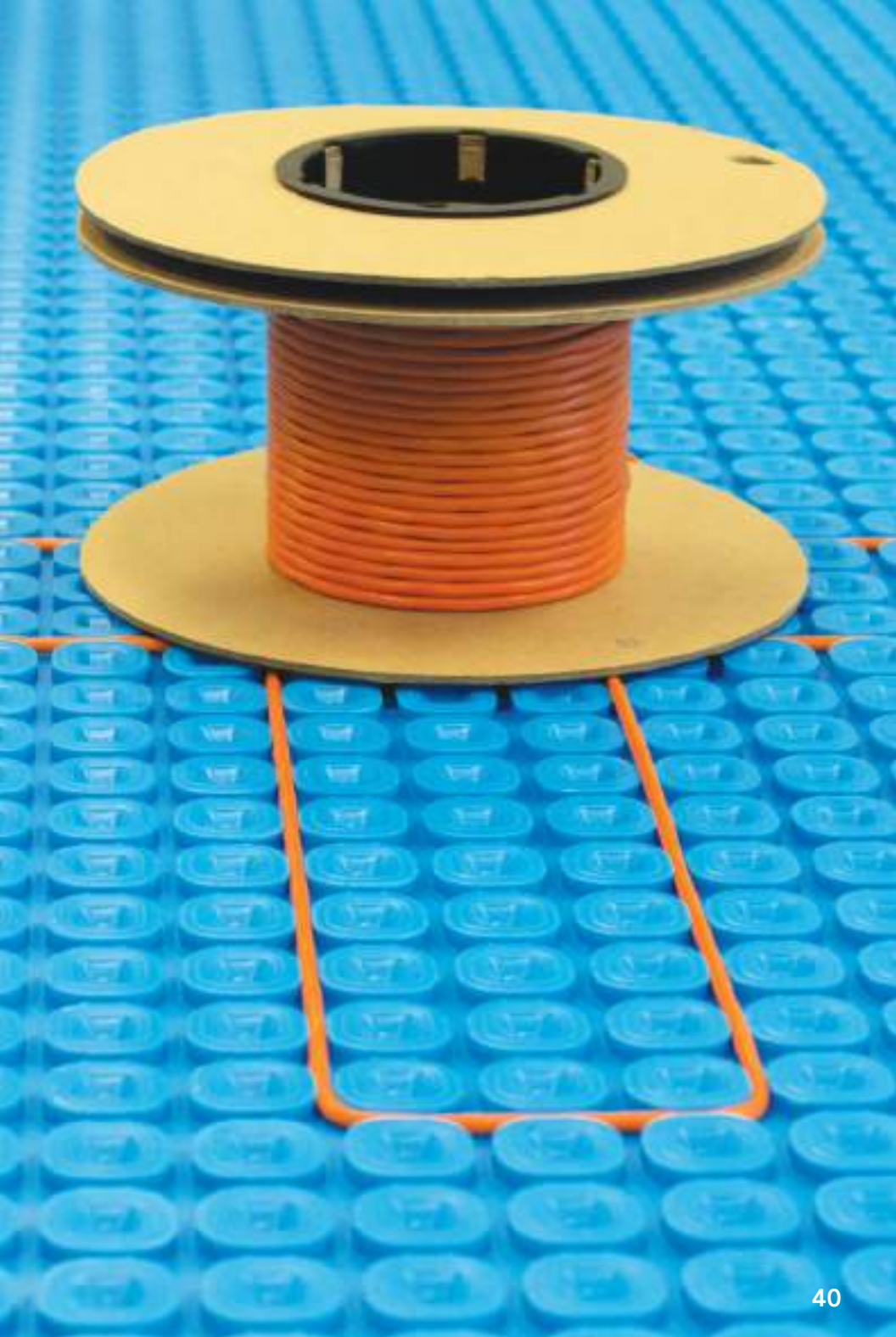
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Heating Cables

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