



INSTALLATION GUIDE

CT SERIES HEATING CABLE



This unit
complies with
CSA and UL
standards



WARNING

Before installing and operating this product, the user and/or installer must read, understand and follow these instructions and keep them handy for future reference.

If these instructions are not followed, the warranty will be considered null and void and the manufacturer deems no further responsibility for this product.

The following instructions must be adhered to in order to avoid personal injuries or property damages, serious injuries and potentially fatal electric shocks.

This product must be installed by a qualified person in accordance with this installation guide. All electric connections must be made by a **qualified electrician**, according to the **electrical** (Canadian Electrical Code Part 1 or National Electrical Code) **and building codes** effective in your region.

This heating cable is designed for indoor embedded floor heating applications in which the heating section of the cable, including the cable connection joint, are embedded in a mortar type layer or thin-set, under a floor covering.

Cut off power supply at circuit breaker/fuse before installation or reparation.

Minimum temperature for cable installation is 0°C.

NEVER CUT THE HEATING CABLE. This would change the cable resistance and could lead to a fire.



WARNING

The heating section of the cable must never touch or cross over itself.

The minimum radius of curvature is 13 mm (1/2 inch).

This cable must be **grounded** and **connected to a ground fault circuit interrupter (GFCI)**. The GFCI must be a class A (5 mA) for a bathroom in Canada. In the U.S the GFCI must be a class A (5 mA) for a bathroom and kitchen.

If the installer or the user modifies the unit, he will be held responsible for any damage resulting from this modification, and the warranty and the CSA certification will be void.

Never energize the cable while it is on the spool. This would lead to overheating that could damage the cable and may cause a fire.

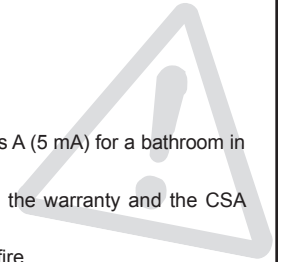
The heating cable must not surpass the room or space where it will be used as a primary heating source (installed with a 3-inch spacing). The heating section of the cable must not pass through or be installed in a wall.

Never use the heating cable for any purpose other than heating a floor INSIDE a building.

Always keep a minimum of 3 inches of space between cable runs. Failure to do so may result in a fire or damage to the floor covering.

Never install a cable designed for a 120 V power source on a 240/208 V power source.

Avoid folding the heating cable on itself, this could damage its sheath and the internal wires.



Note: When a part of the product specification must be changed to improve operability or other functions, priority is given to the product specification itself. In such instances, the instruction manual may not entirely match all the functions of the actual product. Therefore, the actual product and packaging, as well as the name and illustration, may differ from the manual. Make sure that the connections have been made safely and securely. Failing to follow these instructions may cause a fire hazard.

THANK YOU FOR CHOOSING THE STELPRO FLOOR HEATING SYSTEM

This guide has been written to guide you during the installation of your floor heating system. It has been prepared according to North American construction standards. Because construction standards in your area may vary, consult a certified electrician in your region before installing the floor heating system.

The floor heating system is designed to heat a room with a heating cable placed under your floor covering. It can heat floor covering materials such as marble, ceramic and porcelain tiles, slate, granite as well as poured surfaces. Before using the floor heating system under any other floor covering, contact your floor covering manufacturer.

The floor heating system will heat your house regardless of the size or shape of each room. This product is designed for INDOOR USE ONLY, in residential, commercial and institutional buildings.

The floor heating system is available as “cable sets” of 120 volts

and 208 volts/240 volts (see the SELECTION TABLES on page 4). Recommended heating capacity: 12 W/square foot (0.3 m²) or 9 W square foot (0.3m²) when used as supplementary heating.

To ease the installation, Stelpro provides mounting brackets, hot glue sticks and a temperature sensor with the heating cable. You will find installation instructions for these accessories further in this guide. It is important to connect the sensor to the heating cable thermostat. Please note that you must install the sensor before the mortar, even if you haven't bought the thermostat yet.

As a preventative measure it is recommended that you install two sensors: the sensor provided with the thermostat and the sensor provided with the cable. One sensor is connected to the thermostat and the second is kept in the thermostat junction box as a backup.



WARNING

To avoid damaging the heating cable spool when removing it from the packaging, we recommend to pick up the spool from underneath (A) or by the side (B) (by turning the box over).

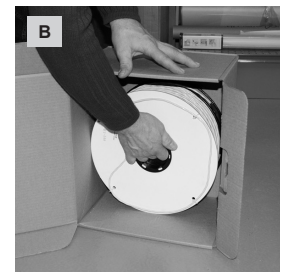


TABLE OF CONTENTS

WHAT YOU SHOULD KNOW	4
CATALOG NUMBER DESCRIPTION	4
REQUIRED TOOLS	4
VALIDATING YOUR FLOOR HEATING CABLE SELECTION	5
AREA TO HEAT	5
CABLE LAYOUT	5
REQUIRED TESTS AND WARRANTY CARD	6
CHRONOLOGICAL ORDER OF THE REQUIRED TESTS	6
TESTS 1, 2 & 3	6
GETTING STARTED	8
SUBFLOOR PREPARATION	8
PLYWOOD SUBFLOORING TIPS	8
CONCRETE SUBFLOORING TIPS	8
MEMBRANES	8
MOUNTING BRACKET INSTALLATION	8
3 OR 4 INCH (76 OR 102 MM) SPACING USING PLASTIC MOUNTING BRACKETS	8
MOUNTING BRACKET SECURING METHODS	9
HEATING CABLE INSTALLATION	9
FIRST SERIES OF TESTS	9
HEATING CABLE INSTALLATION TIPS	9
STEP BY STEP CABLE INSTALLATION	10
SECOND SERIES OF TESTS	10
CONCRETE APPLICATION	11
CONCRETE APPLICATION GUIDELINES	11
SCRATCH COAT (METHOD RECOMMENDED BY STELPRO)	11
THIN SET METHOD (ALTERNATIVE METHOD FOR EXPERIENCED TILE SETTERS ONLY)	12
CURING PERIOD	12
THIRD SERIES OF TESTS	12
FLOOR TRANSITION	13
THERMOSTAT SELECTION	13
WIRING	13
OPERATING TIPS	14

WHAT YOU SHOULD KNOW

CATALOG NUMBER DESCRIPTION

The CT SERIES heating cable part numbers inform you of the following parameters: area coverage, voltage and wattage.

EXAMPLE : Cable #: CT2W0240S023

Voltage: CT2: 208/240 V or CT1: 120 V

W0240: Power: 240 watts

S023: 23 square feet coverage based on 3 inch (76 mm) spacing

SELECTION TABLE 120 V

CABLE #	AREA (SQ. FT.)		CABLE LENGTH (LINEAR FEET)	WATTS	AMPS
	3-INCH SPACING (76mm)	4-INCH SPACING (102mm)			
CT1W0120S012	12	16	40	120	1
CT1W0180S018	18	23	60	180	1.5
CT1W0240S023	23	30	80	240	2
CT1W0360S033	33	44	120	360	3
CT1W0480S044	44	58	160	480	4
CT1W0570S052	52	69	190	570	4.8
CT1W0720S065	65	85	240	720	6
CT1W0810S072	72	96	270	810	6.8
CT1W0930S083	83	109	310	930	7.8
CT1W1020S091	91	120	340	1020	8.5
CT1W1140S101	101	133	380	1140	9.5
CT1W1260S111	111	148	420	1260	10.5
CT1W1500S132	132	175	500	1500	12.5

SELECTION TABLE 208 V/240 V

CABLE #	AREA (SQ. FT.)		CABLE LENGTH (LINEAR FEET)	WATTS 208 V	WATTS 240 V	AMPS 208 V	AMPS 240 V
	3-INCH SPACING (76mm)	4-INCH SPACING (102mm)					
CT2W0120S012	12	16	40	90	120	0.4	0.5
CT2W0180S018	18	23	60	135	180	0.65	0.75
CT2W0240S023	23	30	80	180	240	0.9	1
CT2W0360S033	33	44	120	270	360	1.3	1.5
CT2W0480S044	44	58	160	360	480	1.7	2
CT2W0600S054	54	72	200	450	600	2.2	2.5
CT2W0720S065	65	85	240	540	720	2.6	3
CT2W0840S075	75	99	280	630	840	3.0	3.5
CT2W0960S085	85	113	320	720	960	3.5	4
CT2W1140S101	101	133	380	855	1140	4.1	4.8
CT2W1440S127	127	169	480	1080	1440	5.2	6
CT2W1620S142	142	189	540	1215	1620	5.8	6.8
CT2W1860S163	163	216	620	1395	1860	6.7	7.8
CT2W2040S178	178	237	680	1530	2040	7.4	8.5
CT2W2280S199	199	264	760	1710	2280	8.2	9.5
CT2W2520S220	220	291	840	1890	2520	9.1	10.5
CT2W3000S260	260	345	1000	2250	3000	10.8	12.5

REQUIRED TOOLS

- Measuring tape
- Wire stripper
- Hot glue and hot glue gun (optional)
- Multimeter (ohmmeter)
- 1000 V megohmmeter (megger)
- Screwdrivers
- Wood chisel 1 inch wide
- Hammer
- T-25 stapler (optional)
(see WARRANTY CARD if using a stapler)

VALIDATING YOUR FLOOR HEATING CABLE SELECTION

AREA TO HEAT

Before installing your new floor heating system, first make sure that you have made the right cable selection. Re-measure and recalculate the area that will accommodate the cables. Do not forget to exclude all areas that cannot be heated (cupboards, bathtub, etc.) as well as all areas that you do not want to heat. Compare the area to heat with the total area covered by the selected cable based on the desired density of 9 watts or 12 watts (see packaging for area coverage). The heating cable must be installed at a distance of 3 inches (76 mm) from the walls of the room (or fixed furniture). The nominal surface area that the cable will cover takes into account the loss due to the room perimeter, and the radius of curvature of each cable loop at the installation strapping. This surface area may vary from one installation to the next due to the features of each room. Conversely, if the cable covers an area greater than the area to heat, do not install the cable and call your retailer to ask him which cable length you need. Keep in mind that the spacing between cable runs shall never be less than 3 inches (76 mm).

In Canada only : the heating cable can be installed under the floor covering of a shower floor fabricated on site with a cement base. In this case, it is recommended that the cable be installed under the membrane and within the cement base. In the United States, it is not permitted to install a heating cable in the floor of a shower.

CABLE LAYOUT

In order to facilitate the installation process, you must draw a plan of the cable layout on paper and trace it onto the subfloor, do the same for the thermal sensor and mounting bracket locations.

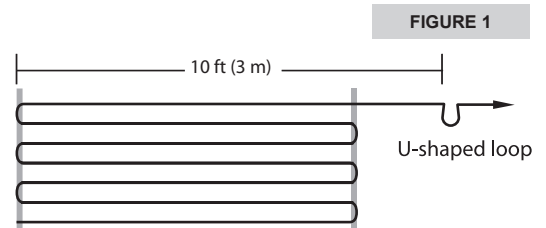
CABLE LAYOUT TIPS

CABLE RUNS EXCEEDING 10 FEET (3.05 M)

In order to minimize the conductor thermal expansion and, thus, avoid potential damages, each cable run must not exceed 10 feet (3.05 m). Accordingly, the layout must be partitioned into 10 feet runs (3.05 m) or less using “U-shaped” loops (see FIGURE 1).

There are two ways to secure the cable in the middle of the long cable run:

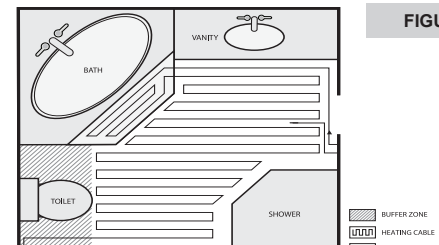
1. Apply hot glue on the cable runs and let dry.
2. Install mounting brackets in place and insert the cable into the slots at the required spacing, apply hot glue on the cable runs and the brackets, and let dry.



Because it is practically impossible to predict precisely where the cable will end, you must plan the location of a buffer zone. A buffer zone is an area where heating is not essential, typically behind a toilet or beside a door opening. The area used for excess cable could be heated or not, without causing any discomfort (see FIGURE 2).

The heating cable SHOULD NEVER “overlap” another cable. Overlapping will generate a hot spot that could damage the cable and lead to overheating.

Never install the heating cable under kitchen cabinets, kitchen islands, podium bathtubs or any other fixed piece of furniture.



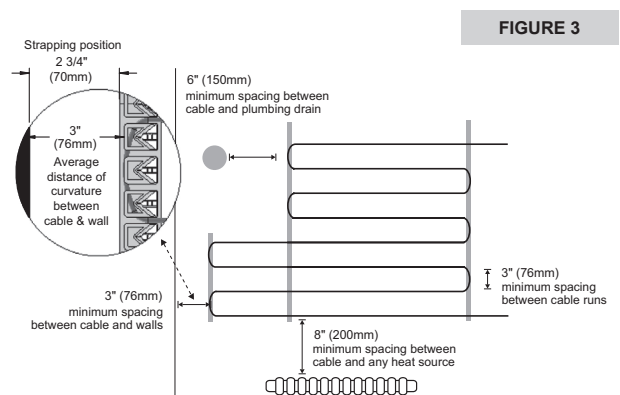
VERY IMPORTANT: throughout the heating area, always maintain a constant cable spacing of either 3 or 4 inches. It is also important to install the cable so that it is perpendicular (90°) to the brackets, in order to respect the clearance. A buffer zone spacing of 2 inches is acceptable but only for a few cable passes (2 or 3). Since the closer spacing will result in a higher temperature, it is only to be used if necessary.

Futons, mattresses, floor-level furniture, pillows, etc. can be placed above a heated floor where the cable spacing is either 3 inches (76 mm) or 4 inches (102 mm). However, they cannot be installed above a buffer zone where the cable is installed at 2 inch (51mm) spacing.

An 8 inch (200 mm) spacing must be maintained between the heating cable runs and all other heat sources (baseboards, fireplaces, etc.).

A 6 inch (150 mm) spacing must be maintained between the heating cable runs and any plumbing drain.

The spacing between walls (or fixed furniture) and the cable must be greater or equal to the established spacing and should never be less than 3 inches (76 mm).



Plan the location of the thermal sensor between two cable runs, at a distance of at least 24 inches (60 cm) from the wall or centered between walls (see FIGURE 14). The sensor should be installed in an area where temperature reflects the overall temperature of the floor. Thus, it should not be located in areas likely to alter the temperature measurement, like an entrance door, an external heat source, under pieces of furniture or an area exposed to the sun. Make sure the sensor wire does not overlap the heating cable.

REQUIRED TESTS AND WARRANTY CARD

INTRODUCTION – IMPORTANCE OF THE REQUIRED TESTS

Each cable is subjected to factory quality control. However, several operations, starting from the moment you unpack the cable to the first start up, may compromise the cable integrity. In order to ensure that the cable quality remains unchanged throughout the installation process, ohms readings must be conducted while the cable is still on the spool and during two specific subsequent steps. If the tests are not performed and duly noted on the warranty card, the warranty will be void.

Measurements must be recorded in the warranty card and be compared to initial measurements taken when the cable was on the spool in order to enable you to detect changes, if any, related to the electrical property of the cable.

Since it could be very expensive to repair the cable once it is embedded in concrete, it is crucial to detect any breaks that may occur during the installation process as soon as possible. Therefore it is important to conduct the required ohms reading when prescribed. If the cable gets damaged during installation, you must call a qualified repair technician referred by Stelpro. To do so, call Stelpro Customer Service or consult the website (www.stelpro.com). Any installation-related cable damages are not covered by the warranty.

CHRONOLOGICAL ORDER OF THE REQUIRED TESTS

FIRST TEST SERIES (TESTS 1, 2, & 3) - while the cable is still on the spool

SECOND TEST SERIES (TESTS 1, 2 & 3) - after the installation of the cable on the subfloor, preceding the pouring of the concrete

THIRD TEST SERIES (TESTS 1, 2 & 3) - once the concrete has completely dried

TESTS 1, 2 & 3

TEST # 1 : CONDUCTOR RESISTANCE TEST

This test requires the use of an ohmmeter (multimeter)

TIPS

USING A MANUAL RANGE MUTLIMETER

The selected range must correspond to the multimeter's lowest ohms range that encompasses the cable nominal ohms value.

In the example (see FIGURE 4), a 200 ohms range has been selected to measure a 28 ohms cable.

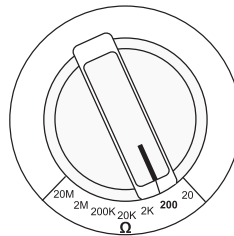


FIGURE 4

In order to perform the resistance test, you must set your multimeter for a resistance measurement and take an ohms reading between the two power leads. If the ohms reading taken on the two power leads varies significantly (10% or more) from the value printed on the spool, it either means that the cable has been damaged, or that the measuring instrument is not set properly, or that it is simply out of calibration. The ohms measurement must be recorded in your warranty card.

TEST 1 - CONNECTIONS



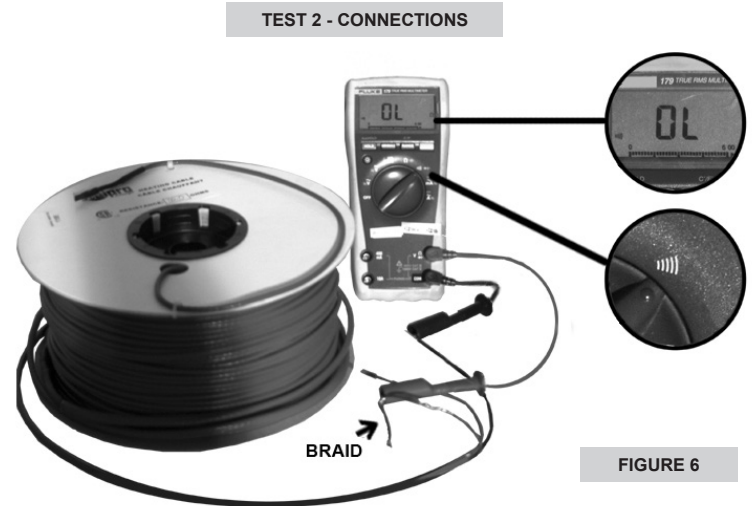
FIGURE 5

TEST # 2: VALIDATION OF THE NON-CONTINUITY BETWEEN THE HEATING WIRE AND GROUND BRAID

This test requires the use of a multimeter.

N.B. Since all measuring instruments are different, we recommend you to consult the non-continuity test section of your instrument user's guide.

The heating cable is protected by a ground braid. An electrical insulator prevents any contact between the braid and the two conductors. To make sure there is no contact between the braid and the conductors, you must perform a non-continuity test. Using the continuity test (buzzer logo) function of your multimeter, test your cable between the braid and one of the two power leads. If there is no continuity (if the test is successful), the multimeter will display, depending on the instrument used, either "OL" for "over load" or "I" for "infinity". Otherwise, if the test fails, neither "OL", nor "I" will be displayed and a warning tone will be heard. The test result must be recorded on your warranty card.



TEST # 3: INSULATION RESISTANCE TEST (CAPACITY OF THE CABLE ELECTRICAL INSULATOR TO PREVENT CURRENT LEAKAGE)

CAUTION: HIGH VOLTAGE TESTING

This test requires the use of a 1000 V megohmmeter.



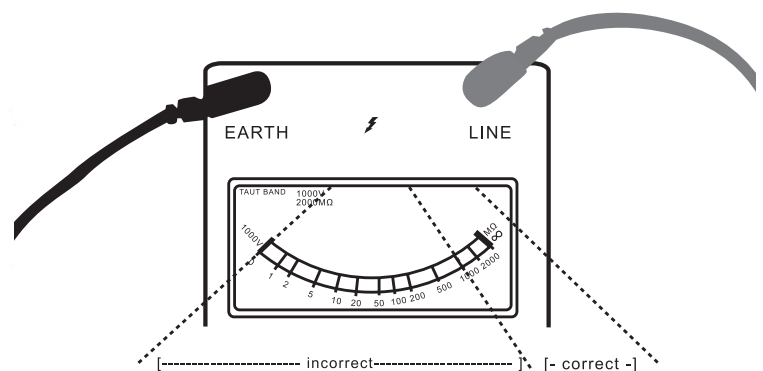
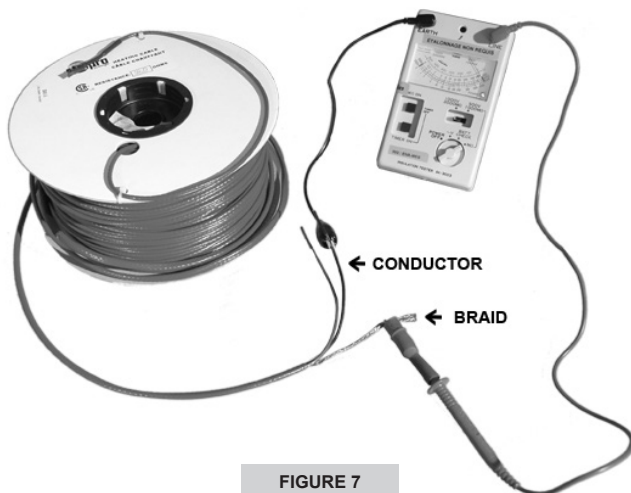
N.B. Since all megohmmeters are different, we recommend you consult your instrument's user guide.

This test is meant to detect very small breaks throughout the cable insulation. These breaks often remain undetected during the continuity test since they are not necessarily short circuits between the conductors and the ground braid.

Even though they are small, these breaks are likely to cause a current leakage to ground. Such a leakage is usually detected by the mandatory ground-fault circuit interrupter "GFCI" (thermostat with integrated GFCI or panel mount GFCI). When a current leakage is detected, the GFCI trips the circuit, hence disabling the floor heating system.

In order to perform the insulation resistance test, you must, using a megohmmeter (Mohm logo), take an insulation measurement between the braid and one of the two power leads. Make sure the megohmmeter range is set at 1000 V. The insulation resistance measurement must be equal to or greater than 1 Gigaohms (1 Gigaohms = 1 G ohms = 1000 M ohms = 1000 Mega ohms). The insulation resistance measurement must be recorded on your warranty card.

TEST 3 - CONNECTIONS



GETTING STARTED

SUBFLOOR PREPARATION

PLYWOOD SUBFLOORING TIPS

Self-leveling mortar

If self-leveling mortar is used to cover the cables, all subfloor gaps must be filled to prevent liquid mortar leaks. You must choose waterproof plywood (BC fir). Before buying another type of plywood, you should call your concrete manufacturer.

Surface preparation

Plywood surface must be clean, solid and dry. Remove any dust, oil, grease, paint, wax, sealant or any other substance that could impede adequate adhesion. Also, the plywood surface must be free of any debris, protruding nails and screw heads, etc. that may damage the heating cable.

Plywood subfloor strength and strengthening

Each plywood sheet must be secured with screws spaced 8 inches (203 mm) apart on its center and 6 inches (150 mm) apart on its perimeter. Plywood sheets must be spaced 1/4 inch (6.3 mm) from each other to allow room for material expansion.

In order to eliminate all risks of damage to the heating cable resulting from floor covering cracks, it is important to ensure sufficient subfloor rigidity.

Floor joists spaced 16 inches apart or less require a plywood subfloor thickness of at least 1 1/4 inch (2 x 5/8 inch sheets). Otherwise, if floor joist spacing exceeds 16 inches, the plywood sheets must be strengthened to achieve a total thickness of 1 7/8 inches (3 X 5/8 inch).

Besides plywood sheeting, there are other methods available for strengthening a subfloor such as the use of metal lathes, concrete boards and others. Seek the advice of a floor covering specialist to make sure that the subfloor is properly strengthened.

CONCRETE SUBFLOORING TIPS

Surface preparation

Concrete surface must be clean, solid and dry. Remove any dust, oil, grease, paint, wax, sealant or any other substance that could impede adequate adhesion. Also, the cement surface must be free of any debris, protruding nails and screw heads, etc. that may damage the heating cable.

Curing period

Before installing the heating cable, the curing period of the concrete must be completed (typically 28 days). If needed, refer to a concrete manufacturer to know the exact curing period of your type of concrete.

MEMBRANES

Waterproof membranes can be used in bathrooms and/or other locations. They are typically unaffected by the heat produced by the heating cable. However, it would be safer to check with the membrane manufacturer to see if their product is compatible with the radiant floor heating system and to learn how to install the membrane properly.

MOUNTING BRACKET INSTALLATION

3 OR 4 INCH (76 OR 102 MM) SPACING USING PLASTIC MOUNTING BRACKETS

The STELPRO mounting brackets enable the easy installation of the cable at 3 inch (76 mm) or 4 inch (102 mm) spacing using their molded hooks.

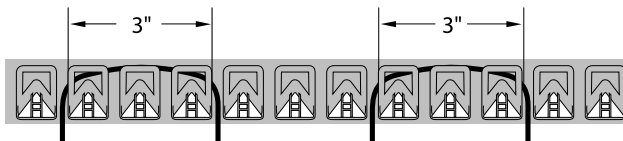


FIGURE 9 FOR PRIMARY HEATING

Plastic mounting brackets: 3 inch spacing for a 12 watts per square foot density

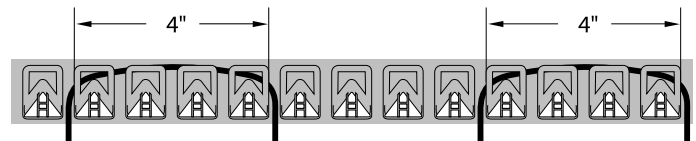


FIGURE 10 FOR COMFORT HEATING (FLOOR)

Plastic mounting brackets: 4 inch spacing for a 9 watts per square foot density

MOUNTING BRACKET SECURING METHODS

The installation strappings must be installed in order to have the first pass of heating cable along a wall, and the cable loops near a wall, both at a 3 inch (76 mm) distance from it. The installation strappings must be mounted at a distance of 3 inches (76 mm) parallel from the wall with respect to the center of the loop of heating cable. It is the center of the cable loop that must be at this distance from the wall, and not the edge of the strapping. See FIGURE 11A.

You can secure the mounting brackets onto the subfloor using one of the following methods.

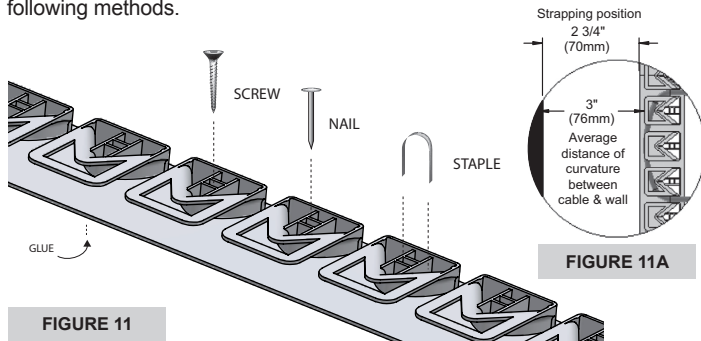


FIGURE 11

HOT GLUE

The end of the hot glue gun must never come into contact with the cable. Apply a line of glue of about 3/16 inch (4.5mm) to be spread over a distance of 1 foot. Then, press the bracket against the line to make sure that it is glued properly.



Lay cardboard over the cable runs to protect the heating cable until the cement application. However, the mounting brackets must remain visible and not be covered with cardboard in order to prevent you from walking on the cable where it hooks onto the mounting brackets and as a result potentially damaging the cable.

HEATING CABLE INSTALLATION

FIRST SERIES OF TESTS

While the cable is still on the spool, perform the first test series as described in section REQUIRED TESTS AND WARRANTY CARD, TESTS 1, 2 & 3. Measured values must be recorded on your warranty card. If a break or damage is detected during the series of tests, the cable should be returned to the original place of purchase.

HEATING CABLE INSTALLATION TIPS

- Avoid dropping objects onto the cable.
- During installation, make sure the shoes you are wearing are free of any debris that could damage the cable.
- Be very careful not to trip over the heating cable. Tripping may cause injury and could damage the cable.
- When the cable is hooked into the mounting bracket, apply a tension of about 5 lb (2.3 kg/22 N) to the cable while heading for the next bracket,

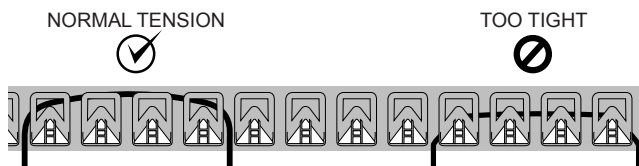


FIGURE 12

N.B. In order to work efficiently with hot glue, the subfloor surface must be very clean to ensure adequate glue adhesion.

STAPLES

To properly secure the mounting bracket when using a stapler (T-25 stapler), you must staple each of the twin holes for the entire length of the bracket. You must use 3/8 inch (10 mm) staples, either 1/4 inch (6 mm) or 3/8 inch (10 mm) in length. Align your stapler to fit each leg of the staple into the twin holes.

N.B. It is important to properly staple down each staple in order to ease the installation of ceramic.

SCREWS

Using screws (preferably countersunk head screws), secure the mounting bracket onto the subfloor. Use one (1) screw per pair of holes for the entire length of the bracket.

N.B. It is important to properly tighten each screw in order to ease the installation of ceramic.

NAILS

Using nails, secure the mounting bracket onto the subfloor. Use one (1) nail per pair of holes for the entire length of the bracket.

N.B. It is important to hammer in each nail properly in order to ease the installation of ceramic.

and allow the cable to reach its natural curve between the molded hooks. Do not fold the cable at a 90 degree angle where it hooks onto the mounting brackets (see FIGURE 12).

- The cable installation must not be performed at a temperature below freezing point (0°C).
- Use a reel to unroll the cable (see FIGURE 13). It is very important not to unroll the cable by pulling it off one side of the spool because it may produce tension that could damage the cable.



FIGURE 13

STEP BY STEP CABLE INSTALLATION

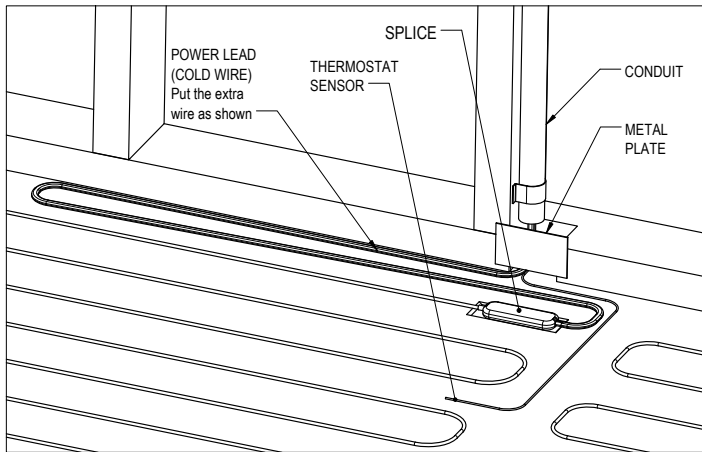


FIGURE 14

To avoid damaging the heating cable, handle it carefully and use a reel to unroll it (see FIGURE 13).

Make sure the circuit is not energized.

Determine the ideal location for the thermostat, in accordance with the electrical codes effective in your area. Cut a hole in the wall for a junction box at the desired location. At floor level, directly below the thermostat box, make a groove in a “U” shape in the base of the wall (sole plate) to accommodate the entrance of the power lead. Determine the length of conduit needed between the inlet knockout of the junction box and the base of the wall (sole plate) according to the electric codes in your area. It is unnecessary to include an elbow at the base of the lead, unless it is required by the electric codes in your area (see FIGURE 14). Pull the cold wire (power lead) and sensor wires through the conduit into the thermostat junction box and leave 6 inches protruding. Position and install the excess of cold wire on the floor (see FIGURE 14) with the help of the floor mounting bracket and hot glue. Ensure that the cold wire installed on the floor does not exceed the height of the floor mounting bracket. Then attach a metal plate to the base of the wall (sole plate) to protect the electric wires in the groove.



Make sure the cable's factory splice is secured to the floor. The splice must not be installed inside the wall.

Mark the splice location on the floor. With the appropriate tool, make a groove in the floor large enough to house the cable splice. Once the splice is in the groove, it should be placed at the heating cable level. (Depth of dig can vary from 1/4 inch (6 mm) to 1/2 inch (6 to 13 mm) (see FIGURE 15).

Clean the floor area, put the splice in the groove and secure it to the floor using hot glue.



FIGURE 15

Using the factory splice as a starting point, secure the cable to the floor in accordance with the pre-established cable layout and the following standard spacing (based on the wattage/square foot selection).

3 inches (76 mm) = 12 W/square foot = 129 W/m²

4 inches (102 mm) = 9 W/square foot = 97 W/m²

When reaching the half way indicator on the cable (see FIGURE 16), evaluate the remaining space and consider the following possibilities:

1. If the cable is too long, the excess can be laid in the buffer zone (see FIGURE 2). A buffer zone spacing of 2 inches is acceptable but only for a few cable passes (2 or 3).

2. If the cable is too short, the buffer zone is considered as a non-heated area.

For an application using a minimal amount of cement, a cavity can be made in the plywood in order to house the termination joint of the cable.

If more than one cable is required, plan the necessary floor space for the location of the factory splices and follow the same installation procedure for each cable. The wiring of the thermostat or relay, whichever is used, must be completed according to the thermostat/relay manufacturer recommendations. Make sure not to exceed the thermostat or relay maximum allowable wattage and/or amperage.

Install the thermostat sensor between two cable runs, at a distance of at least 24 inches (60 cm) from the wall or centered between walls. Choose a location where the sensor does not cross over the heating cable once it is routed, beginning at the base of the wall.

First, mark the sensor location on the floor and, using the appropriate tool, make a groove in the floor large enough to house the sensor. Clean the floor area, set the sensor in the groove and secure it to the floor using small pieces of the mounting bracket and hot glue.

SECOND SERIES OF TESTS

Before performing the second series of tests, lay cardboard over the cable runs to protect it until the concrete application. However, the mounting brackets must remain visible and, thus, not be covered with cardboard in order to prevent you from walking on the cable where it hooks onto the mounting brackets and, therefore, damaging the cable.

As described in section REQUIRED TESTS AND WARRANTY CARD, TESTS 1, 2 & 3, conduct the second series of tests when the cable has been secured to the floor, preceding the pouring of the concrete. Measured values must be recorded on your warranty card. If a break or damage is detected, the installation should be stopped and the cable should be fixed before continuing the installation.

A repair kit is available, for details consult Stelpro's customer service.

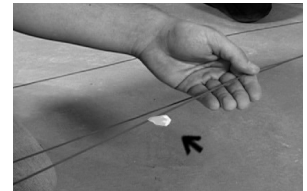


FIGURE 16



FIGURE 17

CONCRETE APPLICATION

The heating cable must always be embedded in concrete or covered by a thin concrete layer. Two methods are available: SCRATCH COAT (method recommended by STELPRO) as well as THIN SET METHOD (alternative method for experienced tile setters only). Please refer to the CONCRETE SELECTOR TABLE on following page to find out the type of concrete recommended for each method.

CONCRETE SELECTOR TABLE*				
USAGE SPECIFIC CONCRETE PRODUCTS	CABLE EMBEDDING (SCRATCH COAT METHOD ONLY)	CERAMIC TILE ADHESIVE	GROUT	STANDARDS
Self-leveling mortar	YES	NO	NO	N/A**
Polymer-modified mortar***	YES	YES	NO	ANSI A118.4 (A)
Polymer-modified grout (with or without sand)	NO	NO	YES	ANSI A118.6 (A) or A118.7 (A)
Epoxy grout	NO	NO	YES	ANSI A118.3

TTMAC: Terrazzo, Tile & Marble Association of Canada
ANSI: American National Standards Institute

* For each of these concrete products, you must check with the manufacturer to ensure compatibility of their product with floor heating systems and your subfloor type. Also, the product must be applied in accordance with their recommendations.

** N/A: Standard not available. Check with the manufacturer to ensure product compatibility with the floor heating system.

*** A polymer-modified mortar can be obtained using one of these two methods: by adding water to a polymer-modified mortar or by adding a liquid additive containing polymers to a non-polymer-modified mortar.

CONCRETE APPLICATION GUIDELINES

Initial start up of the floor heating system must be delayed until the end of the curing period (typically 28 days). Otherwise, the concrete adhesive properties will be compromised, thus reducing the floor covering adhesion. Contact a floor covering specialist to ensure proper adhesion.

Concrete layer thickness must be consistent with the manufacturer's recommendations, which are based on the type of installation as well as the concrete specifications. Furthermore, the concrete layer must entirely cover the cable, but shall never exceed a maximum thickness of 1 inch (25.4 mm).

In order to maintain the spacing between cable runs longer than 6 feet (1.8 m) and to prevent the cable from moving up to the surface during the application of the self-leveling mortar, it is recommended to glue mounting brackets upside down over the cable runs (in the middle) or to glue the cable directly to the floor with hot glue.

N.B. Refer to section GETTING STARTED before proceeding to the concrete covering.

SCRATCH COAT (METHOD RECOMMENDED BY STELPRO)

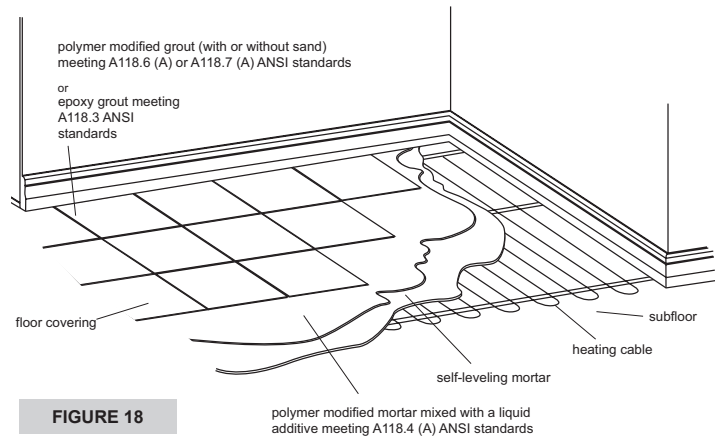
The scratch coat is a thin concrete layer in which the heating cable is embedded. The concrete used can be either a polymer-modified mortar meeting A118.4 (A) ANSI standards applied with a trowel, or a self-leveling mortar poured over the heating cable. Subsequently, the floor covering can be installed onto this concrete layer.

PRIMER APPLICATION

Before applying the scratch coat, check with the manufacturer whether the specific concrete used (polymer-modified mortar meeting A118.4 (A) ANSI standards or self-leveling mortar) requires the use of a primer. If a primer is required, it should only be applied after the cables have been secured to the subfloor in order to reduce traffic over the primer.

APPLYING SCRATCH COAT ONTO THE HEATING CABLE

Once the cable installation has been completed and the primer has been applied (if required), you must, in order to protect the cables and facilitate eventual repairs, cover them with either a polymer-modified mortar meeting A1184 (A) ANSI standards or a self-leveling mortar. Mix the concrete in accordance with manufacturer instructions. The cable must be completely covered by the concrete layer.



Self-leveling mortar

Although self-leveling mortar is by its very nature a self-leveling product, you may have to use a trowel to level the corners of the room.

FLOOR COVERING INSTALLATION OVER THE SCRATCH COAT

Once the concrete is dry, you may proceed with the installation of your floor covering. Ask the concrete manufacturer about the specific curing period of the concrete used.

Lying tiles over the scratch coat

Given the large number of "on/off" cycles dictated by the thermostat, only a highly flexible polymer-modified mortar meeting A118.4(A) ANSI standards may be used to secure the tiles onto the scratch coat. The polymers comprised in this type of mortar contribute to its strength and flexibility ensuring long term efficiency.

Grouting can begin no sooner than 24 hours after the installation has been completed. Either use a polymer-modified grout (with or without sand) meeting A118.6(A) or A118.7(A) ANSI standards or an epoxy grout meeting A118.3 ANSI standards (see FIGURE 18 and FIGURE 20).

Installing floor coverings other than ceramic tiles onto the scratch coat

Before installing any floor covering other than ceramic tiles onto the scratch coat, always consult your floor covering manufacturer to ensure product compatibility with floor heating system.

N.B. Natural hardwood floor treatments are not compatible with floor heating system.

THIN SET METHOD (ALTERNATIVE METHOD FOR EXPERIENCED TILE SETTERS ONLY)

Compatibility of the thin set method

This method is only applicable if ceramic tiles or other type of similar tiles are to be installed over a small flooring area by an experienced tile setter.

Using this method, the same concrete layer is used to embed the cables and to secure the tiles. This technique will not raise the floor level despite the addition of your heating system. Use a 3/8 inch (10 mm) or 1/2 inch (13 mm) notched trowel to cover the cable with concrete-glue. To ensure a maximum adhesion, lay the tiles on the mortar and apply pressure on it to allow air under the tile to escape.

Warning

Since the trowel comes in close contact with the cables when using this method, you must be very careful when applying the concrete to avoid any damage to the cables. Any installation-related cable damages are not covered by the warranty.



FIGURE 19

CURING PERIOD

Initial start up of the floor heating system must be delayed until the end of the curing period (typically 28 days). Otherwise, the concrete adhesive properties will be compromised, thus reducing the floor covering adhesion. Contact a floor covering specialist to ensure proper adhesion.

THIRD SERIES OF TESTS

Once the concrete embedding the cable is dry, perform the third series of tests as described in section REQUIRED TESTS AND WARRANTY CARD, TESTS 1, 2 & 3. Measured values must be recorded on your warranty card. During the series of tests, if a break or damage is detected, you must call a qualified repair technician referred by Stelpro to complete the repair. To do so, call Stelpro's Customer Service or consult the web site (www.stelpro.com). Any installation-related cable damages are not covered by the warranty.

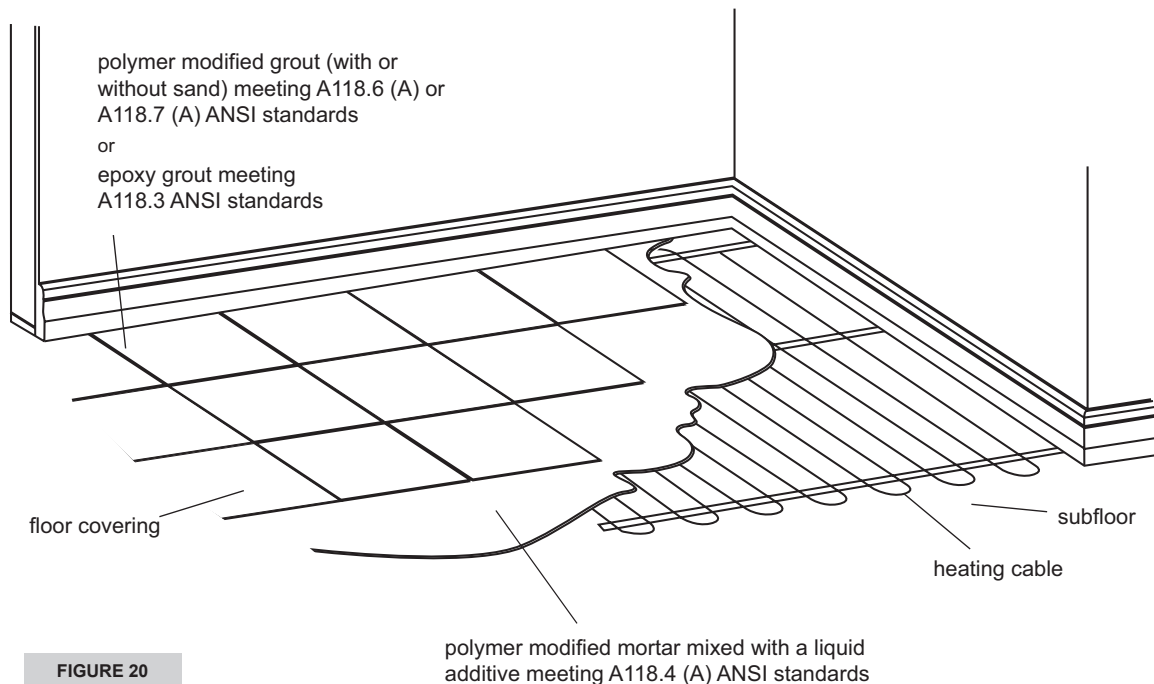
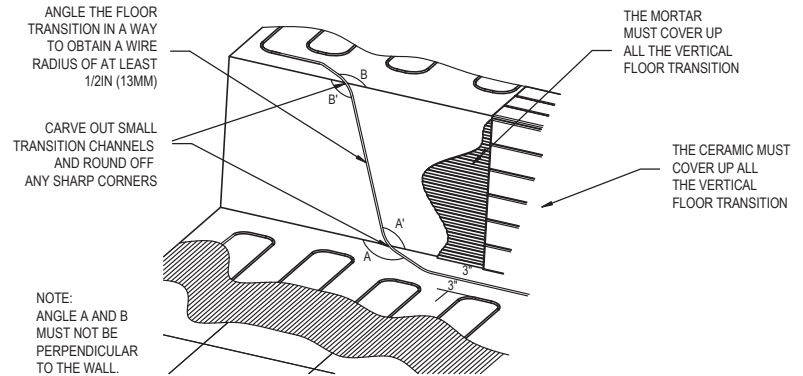


FIGURE 20

FLOOR TRANSITION

To install the heating cable between two horizontal floors please follow the following important notes:

- The heating section of the cable must not pass through a wall and/or be installed inside a structure.
- The minimum radius of curvature of the cable is 0.5 in. (13mm).
- The height of the floor transition does not matter as long as the vertical surface of the transition is covered with ceramic
- Carve out small transition channels (between horizontal and vertical transitions and vice versa) and round off any sharp corners. Make sure the entry angle of the cable is not perpendicular to the wall (see picture). This will allow for a greater radius in the heating cable.



THERMOSTAT SELECTION

Only a thermostat equipped with a floor sensor maximizes the floor heating system's efficiency and, therefore, your comfort. All other control methods (e.g. ambient air thermostat or switch) are not recommended since they cannot control the floor temperature. As a result, the floor temperature will always be either too cold or too warm.

Also, the heating cable must be connected to a ground-fault GFCI circuit interrupter either integrated in the thermostat, or panel mounted. For a bathroom, the GFCI circuit must be class A (5 mA).

The maximum thermostat current must correspond to the sum of cable currents wired to it. Also, the voltage of the branch circuit must correspond to the voltage prescribed for the thermostat. All thermostats wired to the heating cable must be certified by a recognized certification agency and wired in accordance with electrical and building codes applicable in your region.

WIRING

Initial start up of the floor heating system must be delayed until the end of the curing period (typically 28 days). Otherwise, the concrete adhesive properties will be compromised, thus reducing the floor covering adhesion. Contact a floor covering specialist to ensure proper adhesion.

PREPARATION BEFORE THE CONNECTION

- Make sure that the circuit is not energized.
- The CSA identification tag of the heating cable must be in the junction box. Do not remove it from the cable.
- The wiring of the cable to the thermostat or the relay, must be completed accordingly with the thermostat/relay manufacturer's recommendations.
- Connect the ground wire (copper braided wire) to the junction box.
- The floor heating system must be connected to a ground-fault circuit interrupter "GFCI" either integrated in the thermostat, or panel mounted.

Place the warning label below on the electric panel board to mark the branch circuit supplying the floor heating cable.

Stelpro Design

CT2W1728S144

#Prod. :05-04-07-2-13

Resistance :33.3 ohms

This breaker controls a floor heating system in:

Stelpro Design

CT2W1728S144

#Prod. :05-04-07-2-13

Résistance :33.3 ohms

Ce disjoncteur protège un système de plancher chauffant dans :

OPERATING TIPS

Do not place pieces of furniture, carpets or rugs over the thermostat sensor because it would compromise the efficiency of the floor heating system.

The heat generated by the floor heating system may modify the latex, rubber or vinyl backing of some carpets. The backing may stain the floor covering or even stick to it. Thus it is not recommended as floor covering.

Futons, mattresses, floor-level furniture, pillows, etc can be placed directly onto the heated floor when the installation has 3 in (76mm) or 4 in (102mm) spacing. However, they cannot be installed above a buffer zone where the cable is installed at 2 in. (51mm) spacing.

LIMITED WARRANTY LIMITED WARRANTY LIMITED WARRANTY LIMITED WARRANTY LIMITED WARRANTY

LIMITED WARRANTY

This limited warranty is offered by Stelpro Design Inc. ("Stelpro") and applies to the following product made by Stelpro: CT cable. **Please read this limited warranty carefully.** Subject to the terms of this warranty, Stelpro warrants its products and their components against defects in workmanship and/or materials for the following periods from the date of purchase: **25 years (heating cable)**. This warranty applies only to the **original purchaser**; it is non-transferable and cannot be extended.

CLAIM PROCEDURE

If at any time during the warranty period the unit becomes defective, you must cut off the power supply at the main electrical panel and contact 1) your installer or distributor, 2) your service center or 3) Stelpro's customer service department. In all cases, you must have a **copy of the invoice** and provide the **information written on the product nameplate**. Stelpro reserves the right to examine or to ask one of its representatives to examine the product itself or any part of it before honoring the warranty. Stelpro reserves the right to replace the entire unit, refund its purchase price or repair a defective part. Please note that repairs made within the warranty period must be authorized in advance in writing by Stelpro and carried out by persons authorized by Stelpro.

Before returning a product to Stelpro, you must have a Stelpro authorization number (RMA). To obtain it, call the customer service department at: **1-800-363-3414** (electricians and distributors - French), **1-800-343-1022** (electricians and distributors - English), or **1-866-766-6020** (consumers). The authorization number must be clearly written on the parcel or it will be refused.

CONDITIONS, EXCLUSIONS AND DISCLAIMER OF LIABILITY

This warranty is exclusive and in lieu of all other representations and warranties (except of title), expressed or implied, and Stelpro expressly disclaims and excludes any implied warranty of merchantability or implied warranty of fitness for a particular purpose. Stelpro's liability with respect to products is limited as provided above. Stelpro shall not be subject to any other obligations or liabilities whatsoever, whether based on contract, tort or other theories of law, with respect to goods or services furnished by it, or any undertakings, acts or omissions relating thereto. Without limiting the generality of the foregoing, Stelpro expressly disclaims any liability for property or personal injury damages, penalties, special or punitive damages, damages for lost profits, loss of use of equipment, cost of capital, cost of substitute products, facilities or services, shutdowns, slowdowns, or for other types of economic loss or for claims of a dealer's customers or any third party for such damages. Stelpro specifically disclaims all consequential, incidental and contingent damages whatsoever.

This warranty does not cover any damages or failures resulting from: 1) a faulty installation or improper storage; 2) an abusive or abnormal use, lack of maintenance, improper maintenance (other than that prescribed by Stelpro) or a use other than that for which the unit was designed; 3) a natural disaster or an event out of Stelpro's control, including, but not limited to, hurricanes, tornadoes, earthquakes, terrorist attacks, wars, overvoltage, flooding, water damages, etc. This warranty does not cover any accidental or intentional losses or damages, nor does it cover damages caused by negligence of the user or owner of the product. Moreover, it does not cover the cost of disconnection, transport, and installation.

The warranty is limited to the repair or the replacement of the unit or the refund of its purchase price, **at the discretion of Stelpro**. Any parts replaced or repaired within the warranty period with the written authorization of Stelpro will be warranted for the remainder of the original warranty period. This warranty will be considered null and void and Stelpro will have the right to refuse any claims if **products have been altered** without the written authorization of Stelpro and if the nameplate numbers have been removed or modified. This warranty does not cover scratches, dents, corrosion or discoloration caused by excessive heat, chemical cleaning products and abrasive agents. It does not cover any damage that occurred during the shipping.

Some states and provinces do not allow the exclusion or limitation of incidental or consequential damages and some of them do not allow limitations on how long an implied warranty lasts, so these exclusions or limitations may not apply to you. This warranty gives you specific legal rights and you may have other rights which vary from state to state or from province to province.