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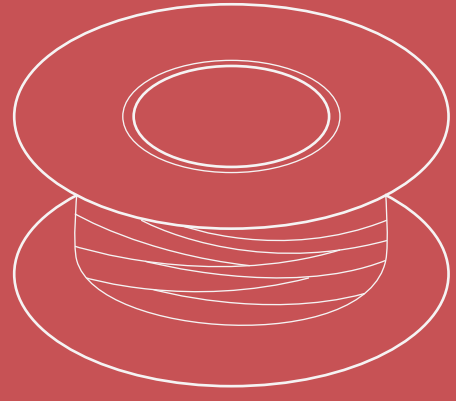
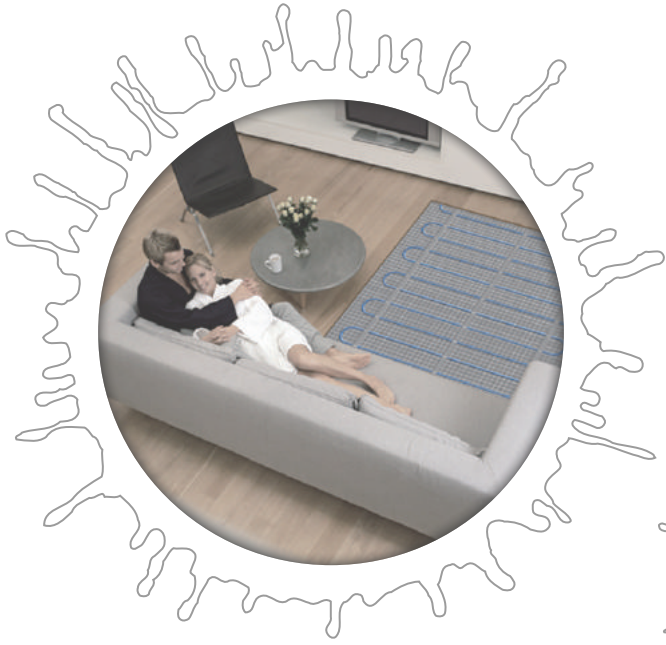
Heated Floor



Installation Guide
Floor Heating Cable



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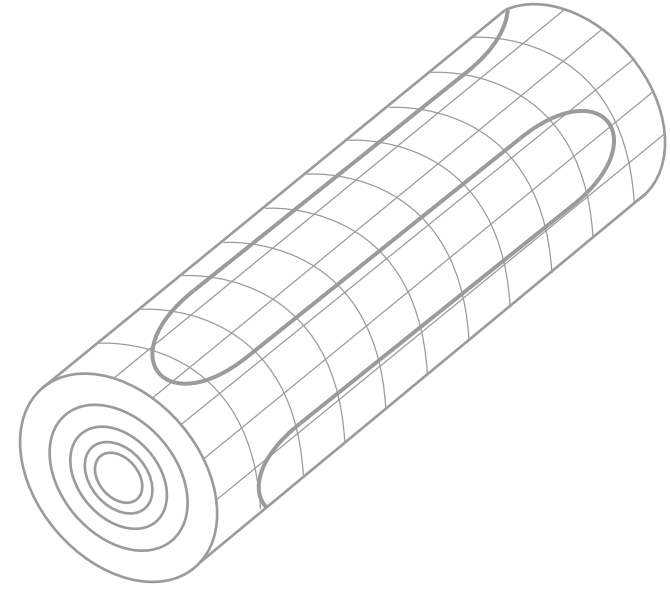

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This guide describes the Cable Floor Heating System – how to design the installation and install the system. It is important to review this guide and the Thermostat Installation and Operation Manual prior to installation. For additional information regarding any aspect of the cable system, contact Arta Ceramic.

General Information

The safety and reliability of any floor heating system depends on proper design, installation and testing. The guidelines and instructions contained in this guide are important.

The Cable Floor Heating System is only designed for under floor heating purposes.
The floor heating system must be installed by qualified professionals familiar with the proper sizing, installation, construction and operation of floor heating systems and the hazards involved. The installation of the equipment must comply with all national and/or local electrical codes.

This cable can be installed at (2 in.; 5 cm); (3 in.; 7.6 cm) or (4 in.; 10 cm). Do not change the spacing during the installation; this will change the heat output of the system.

This system can be used as a main source of heat in a room. The heat loss of the room must be less than the heating output of the system. The programmable thermostat can be set at floor or ambient room temperature. Refer to the thermostat instructions for more information.

This product must be installed by a qualified person in accordance with this installation handbook and with the Canadian Electric Code Part I (Canada) or the National Electric Code (U.S.) as applicable. All electric connections must be made by a qualified electrician, according to the electrical and building codes effective in your region.

WARNING: Shock and fire hazard

If the cable system is not installed properly and/or damaged, fire or shock can occur and can result in serious personal injury or damage to property.

25 Year Limited Warranty

The manufacturer warrants the heating cable for a period of 25 years. The limited warranty is valid based on correct installation methods and completion of all test requirements. See the Warranty for complete details.

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Safeguards and Warnings

- If the cable system is damaged, it must be replaced. Do not attempt to splice or repair any part of the system;
- Heating cable must be at least 15 cm (6 in) away from any heat source;
- Only install cables above 40 degrees Fahrenheit or 5 degrees Celsius;
- Install cables a minimum of 2 inches apart;
- Never energize the cable while it is on the spool;
- This cable must be grounded;
- Never install a cable designed for a 120 V power source on a 208/240V power source;
- Do not install product if the packaging seal on the box has been broken;
- The cable system must not extend beyond the room or area in which it originates;
- The cable should be installed at a minimum distance of 2 inches from the base of a counter;
- The cable should be installed at a minimum distance of 2 inches from any walls;
- The cable should be installed at a minimum distance of 6 inches from any type of drain;
- The cable cannot be overlapped, cut or modified;
- All the heating portion of the cable (including the connection between red heating wire and the black cold lead wire must be fixed to the floor and covered with thin-set mortar;
- The heating cable should never be installed in/on walls;
- The system must not be installed under fixed furniture where air does not flow;
- The cable should never be installed over an expansion joint;

Remember to measure the resistance four times during the installation

Remember to always measure, verify and record the actual resistance throughout the installation process. Recordings are taken when the cable is taken out of the box, after installation on sub-floor, after covering the cable with mortar, and after installation of final floor covering.

Cable Heating System

Cable Specifications

Cable construction:	twin conductor
Rated voltage:	120V, 240V
Output:	3W/ft (9.84W/m) ±10%
Heating element size:	40 ft to 800 ft (12.2 to 243.8 m)
Bending radius:	1 in (25.4 mm)
Cable diameter:	1/8 to 1/6 in (3.2 to 4.2 mm)
Conductor insulation:	fluoropolymer
Outer insulation:	fluoropolymer or TPE
Max. ambient temp.:	85°F (30°C)
Min. installation temp.:	40°F (5°C)
Cold lead:	2-wire 16 AWG plus ground braid; 10 ft (3 m) length

Floor Surface Preparation

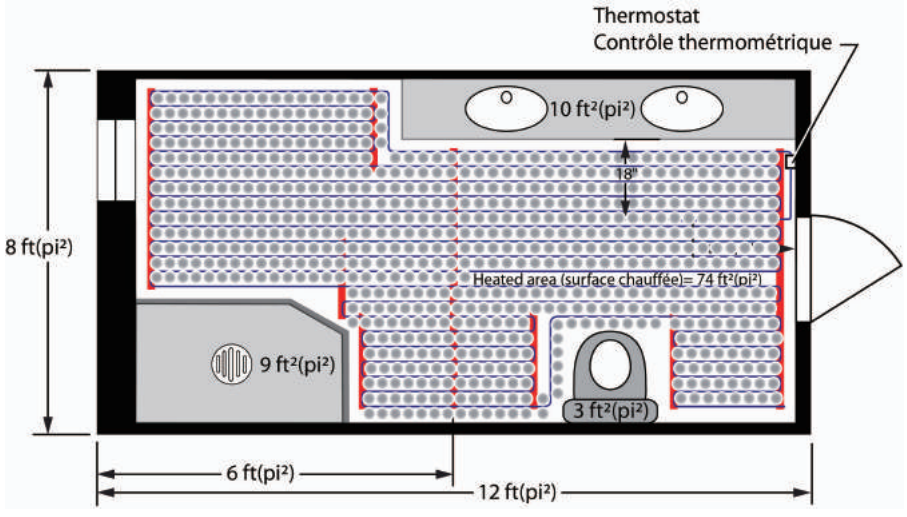
The sub-floor must meet all construction standards relevant to the floor covering and the use of a floor heating system.

Verify with the sub-floor manufacturer for compatibility with a floor heating system.
The floor must be clean, flat and clear of all debris, nails, screws …

Verify that the sub-floor is compatible with the thin-set mortar or the self-leveling that will be use during the installation.

Sub-floor compatibility

- Plywood
- Cement board
- Structural concrete slabs
- Poured concrete slab on an existing floor
- Acoustic membrane
- Anti-fracture membrane
- Sand coat
- Scratch coat
- Existing ceramic; refer to the mortar manufacturer regarding proper floor preparation



96 ft² of total area minus 22 ft² of permanent fixture space equals 74 ft² of heated area
Surface totale 96 pi² moins surface d'installations fixes 22pi² égale surface chauffée 74pi²

Example of the wire installation on the floor
Exemple d'installation du fil sur le plancher

Plan the Design

The design of the installation is required to achieve the intended floor heat system specification. All cables can be spaced either 2, 3 or 4 inches apart, and are available for either 120V or 240V supply voltage. It is possible to install a 240V cable on a 208V circuit. Power loss will be about 25%. To optimize heat, install the cable at 2 inch apart; that will give you about 12W per Sq./Ft.

Measure and calculate the heated area of the floor where there are no permanent fixtures or furniture, such as showers, toilets, vanities, or cabinetry.

For example, the area of the bathroom is 96 ft2. When you subtract the area of the vanity, shower and toilet, the total heated area is 74 ft2.

With all specifications determined and total heat area calculated, select the required cable.

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Determine the optimum floor heating cable layout with the help of the layout chart below for the heated area to ensure adequate coverage. Select a spot for the thermostat in the wall above the heated area where it can be reached by the 10-ft cold lead on the cable and the 15-ft floor temperature sensor. It is recommended to leave a minimum of 2 inches between the perimeter walls and the first heating cable.

Technical Information cable 120Volts

Wire with no return, no magnetic field and with plastic cable guides

Type	Ohms	Watts	Amps	Length(ft)	mm Thickess	15watts Sq/ft at 2 inches	12watts Sq/ft at 3 inches	9watts Sq/ft at 4 inches
3CWF-120V-10	120	120	1	40	3.4	7	10	13
3CWF-120V-15	80	180	1.5	60	3.4	10	15	20
3CWF-120V-20	60	240	2	80	3.4	13	20	27
3CWF-120V-25	48	300	2.5	100	3.4	17	25	33
3CWF-120V-30	40	360	3	120	3.4	20	30	40
3CWF-120V-35	34	420	3.5	140	3.5	23	35	47
3CWF-120V-40	30	480	4	160	3.5	27	40	53
3CWF-120V-45	26	540	4.5	180	3.5	30	45	60
3CWF-120V-50	24	600	5	200	3.5	33	50	67
3CWF-120V-60	20	720	6	240	3.5	40	60	80
3CWF-120V-70	17	840	7	280	3.6	47	70	93
3CWF-120V-80	15	960	8	320	3.6	53	80	107
3CWF-120V-90	13	1080	9	360	3.8	60	90	120
3CWF-120V-100	12	1200	10	400	4	67	100	133
3CWF-120V-110	11	1320	11	440	4.2	73	110	147
3CWF-120V-120	10	1440	12	480	4.4	80	120	160
3CWF-120V-130	9	1560	87	520	4.6	87	130	173
3CWF-120V-140	8	1680	93	560	4.8	93	140	187
3CWF-120V-150	7	1800	100	600	5	100	150	200

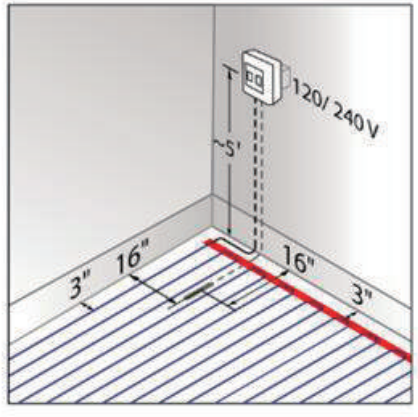
Technical Information cable 240Volts

Wire with no return, no magnetic field and with plastic cable guides

Type	Ohms	Watts	Amps	Length(ft)	(mm) Thickess	15watts Sq/ft at 2 inches	12watts Sq/ft at 3 inches	9watts Sq/ft at 4 inches
3CWF-2400V-15	320	180	0.75	60	3.2	10	15	20
3CWF-240V-20	240	240	1	80	3.4	13	20	27
3CWF-240V-25	200	200	1.25	100	3.4	17	25	33
3CWF-240V-30	160	360	1.5	120	3.4	20	30	40
3CWF-240V-35	140	420	1.75	140	3.4	23	35	47
3CWF-240V-40	120	480	2	160	3.4	27	40	53
3CWF-240V-45	108	540	2.25	180	3.4	30	45	60
3CWF-240V-50	96	600	2.5	200	3.4	33	50	67
3CWF-240V-60	80	720	3	240	3.4	40	60	80
3CWF-240V-70	68.6	840	3.5	280	3.5	47	70	93
3CWF-240V-80	60	960	4	320	3.5	53	80	107
3CWF-240V-90	53.3	1080	4.5	360	3.5	60	90	120
3CWF-240V-100	48	1200	5	400	3.5	67	100	133
3CWF-240V-110	44	1320	5.5	440	3.5	73	110	147
3CWF-240V-120	40	1440	6	480	3.5	80	120	160
3CWF-240V-140	34.3	1680	7	560	3.5	93	140	187
3CWF-240V-160	30	1920	8	640	3.6	107	160	213
3CWF-240V-180	26.7	2160	9	720	3.7	120	180	240
3CWF-240V-200	24	2400	10	800	3.8	133	200	267
3CWF-240V-220	22	2640	11	880	4.2	147	220	293
3CWF-240V-240	20	2880	12	960	4.4	160	240	320
3CWF-240V-260	18.5	3120	13	1040	4.6	173	260	347
3CWF-240V-280	17	3360	14	1120	4.8	187	280	373
3CWF-240V-300	16	3600	15	1200	5	200	300	400

IMPORTANT

Confirm that your cable is no larger than the heated area before removing product seal.



Sensor location in floor warming system

N.B.: The floor sensor is in the thermostat box.

Floor Sensor

The floor probe (sensor) has to be installed directly between two cables. Hold down the head of the sensor with hot glue or tape. The sensor should be installed a least 16 inches (30 cm) inside the heating area. Do not cross the sensor wire over the heating wire. The sensor should be installed away from any heating source other than the heating cable.

Installation

IMPORTANT

Perform all mandatory resistance tests described in this guide and follow all instructions in the limited warranty.
Before removing the plastic that covers the cable on the spool, the cable insulation and resistance should be verified and compared to the factory testing to ensure the cable is intact. Factory test data is on the grey tag at one ende of the cold lead cable. Results should be similar to the factory results. If it is more than a10% difference, call Arta Ceramic.

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You must perform the Insulation Resistance Test, the Heating Cable Resistance Test, and the Sensor Resistance Test (the floor sensor is in the thermostat box) during the installation process.

Use an appropriate multimeter to measure the resistance between the black leads. If an automatic multimeter is used the reading will be taken instantly. If the multimeter is not automatic, set it to 200 Ω for a cable under 200 Ω or at the higher value for a cable over 200 Ω. Write the results on the warranty card.

Electrical Circuit

This floor heating system should be connected to a dedicated heating circuit. The maximum load of our thermostat is 15 Amps on 120V & 240V. If the installation requires more than 15 Amp, you can add an expansion unit (power unit) or a second thermostat.
The current (amps) drawn by the cable is indicated on the cable label.

Important: Only connect the thermostat and the electrical power once the cable system has been installed and covered with the proper floor covering.

Cold Lead

The cold lead is the non-heating part of the cable system. It is joined to the heating cable by a heavy duty mechanical shrink. The mechanical joint must be installed on the floor and covered with thin-set mortar. It is possible to groove in the sub-floor to install the mechanical joint.

Cable installation:

- Cable should be installed in runs lesser than 12 Feet (3.75 M).
- The plastic cable guides are the only approved anchoring system. The use of any other way (staples, nails, …) will void the warranty;
- All the heating cable including the mechanical joint must be installed on the sub-floor and completely covered with thin-set mortar;
- Install plastic cable guides no more than 6 Ft apart.

Begin drawing the design on the sub-floor

TRANSFER LAYOUT TO FLOOR

Draw an outline of the layout on the floor including a footprint of all furnishings that are not yet installed. In accordance with the design, map out the cable spacing (standard 2, 3 or 4 inch) and cable guide (recommended 5 to 6 feet apart) locations.

Mark the position of the connection point between the power lead and the black heating cable. When using a floor-temperature-sensing thermostat, mark the sensor position in the middle of two heating cables, about 16 in (40 cm) away from the wall (within the heated area), as close as possible to the thermostat.

PREPARE SUB-FLOOR SURFACE

Clean and vacuum the sub-floor to remove dust and debris. Assure no nails, screws, or similar devices are protruding through the sub-floor as this can cause damage to the cables during installation.

Also ensure that the sub-floor is stable and suitable to meet the construction standards of the final intended floor surface.

MEASURE THE RESISTANCE OF THE CABLES (FIRST TIME)

Test the resistance of the cable system prior to unraveling the cable and breaking the packaging seal.

CABLE GUIDE INSTRUCTIONS

Secure the cable guides to the sub-floor perpendicular to the cable layout direction with adhesive, staples, nails, or double-sided tape.taples, nails, or double-sided tape.

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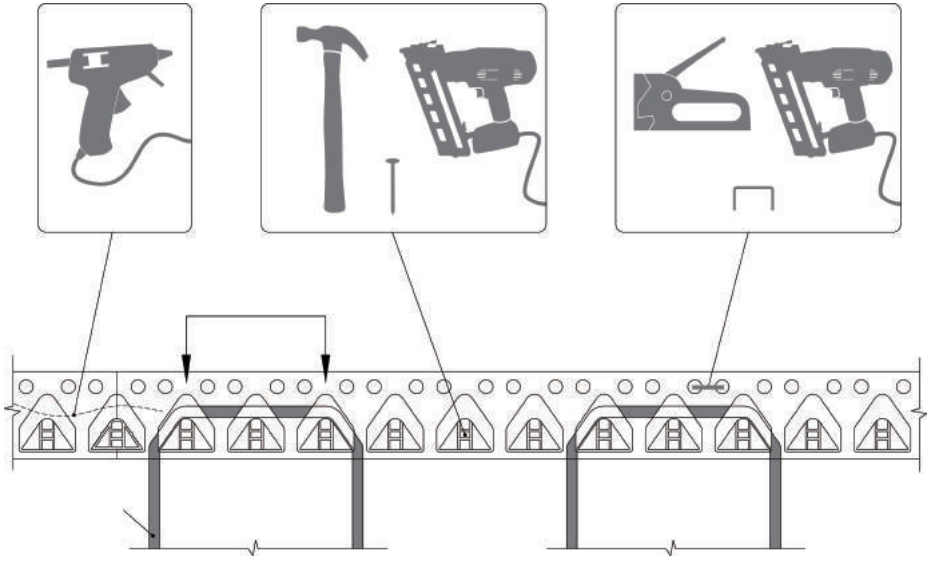

Cables spaced at 3 inches apart = 12 watts per Sq/ft

The cable can be installed at intervals of:

- **2 inches apart = 15W per Sq/Ft;**
- **3 inches apart = 12W per Sq/Ft;**
- **4 inches apart = 9W per Sq/Ft.**

LAY THE CABLE

After completing the first resistance tests and confirming that the cable is free of defects, place the cable so that the connection point and the temperature sensor are in their intended positions and bring the power lead cable to the electrical connection box. Begin laying the heating cable according to the design, and secure the cable to the sub-floor using approved cable guide.

WARNING: ⚠

Never cut or shorten the heating cable. Do not expose the cable to any mechanical stress. Avoid walking on the heating cable. Wear only shoes with soft soles.

MEASURE THE RESISTANCE OF THE CABLES (THE SECOND TIME)

Test the resistance of the cable system after the cable is properly laid and secured on the sub-floor.

If using a floor-temperature-sensing thermostat, measure the resistance and install either in conduit tube or directly to the sub-floor after confirming the sensor is free of defects.
The manufacturer recommends that the sensor be installed in a conduit tube to allow the sensor to be easily replaced in the unlikely event of failure.

The sensor must be installed at a minimum of 16 inches away from the wall towards the middle of the floor. If a conduit tube is used, the conduit tube must be partially countersunk into the sub-floor. Cut a channel approximately 5/16 in deep × 5/16 in wide in the floor from the wall.

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The sensor conduit must be centered in the cable loop between two heating wires.
Duct tape or hot glue should be used to close the end of the conduit and hold the sensor conduit into the groove to prevent it from floating up when the mortar is poured.
Duct tape or hot glue should be used to secure it to the sub-floor if the sensor is installed directly in the mortar bed.

WARNING:

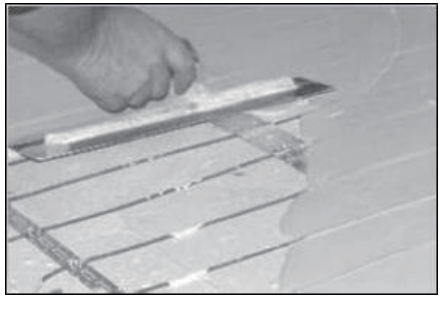
The sensor conduit must never be laid directly over the heating cable.

IMPORTANT

The manufacturer recommends that the installation be documented with photos to note the location of connections and the sensor.

EMBED THE FLOOR HEATING CABLE IN MORTAR

Based on the selected installation of the floor covering (such as concrete, ceramic tiles, engineered wood, laminate, etc.), cover the installed heating cable system including sensors and connections with an appropriate mortar thickness to obtain an even and level finish.



The manufacturer recommends calling the flooring manufacturer for any special or minimum requirements to assure the proper function of the floor system and floor heating cables.
The floor preparation and installation must be in accordance with industry best practices and a lways in accordance to the manufacturer's instructions and recommendations.

MEASURE THE RESISTANCE (THE THIRD TIME)

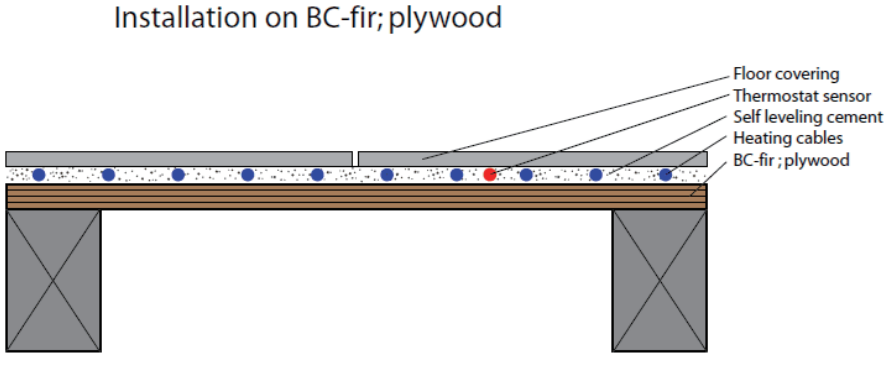
Test the resistance of the cable system after the cable is covered in mortar.

WARNING

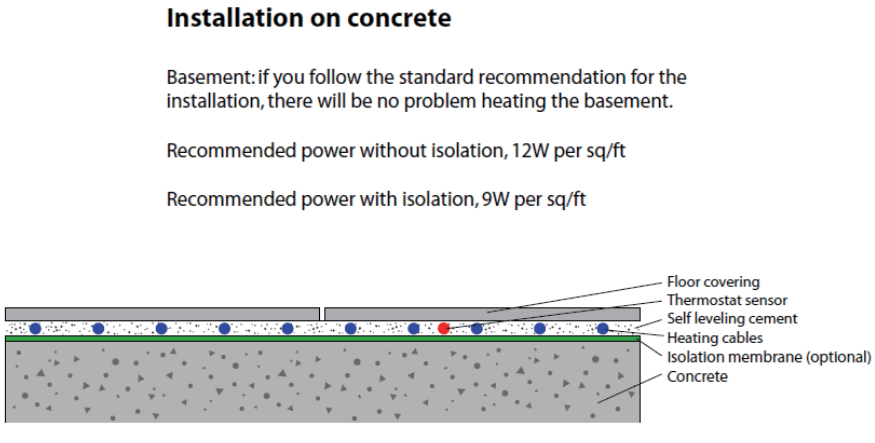
The system must not be turned on until the mortar has fully dried. A minimum of 4 weeks is recommended.

Example of Typical Installations and Applications

DIRECTLY ON PLYWOOD:



DIRECTLY ON CONCRETE:



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CONNECT THERMOSTAT AND POWER SUPPLY

The thermostat can now be installed in accordance with the Thermostat Installation and Operation Manual.

As required, a professional must validate the minimum power supply requirement are installed and available to power the cable heating system.

IMPORTANT

Mark the appropriate circuit breaker reference label indicating which branch supplies the circuits to the cables.

MEASURE THE RESISTANCE (THE FOURTH TIME)

RECORD INFORMATION AND AFFIX LABELS

It is important for the installer to send in the warranty test card with all recorded results immediately after installing the system. Failure to do so will void the manufacturer's warranty. A copy of the warranty card should be kept for your reference.

ENJOY THE COMFORT OF YOUR HEATED FLOOR

The cable heating system is ready to use.

Mandatory Resistance Testing Requirements

For the extended 25 year limited warranty to apply, you must perform the tests in this section, and follow all instructions noted in the Limited Warranty.

You must perform the Insulation Resistance Test, the Heating Cable Resistance Test, and the Sensor Resistance Test during the installation process.

You must perform the Insulation Resistance Test, the Heating Cable Resistance Test, and the Sensor Resistance Test during the installation process.

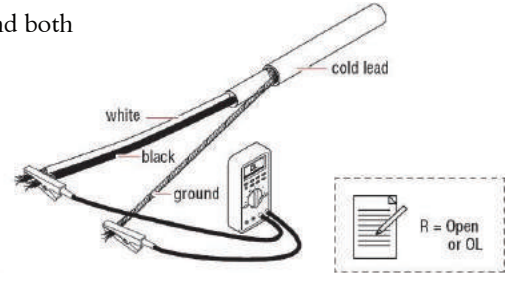
Insulation Resistance Test

This test ensures that the insulating jackets of the cable are not damaged. A low value indicates the cable has been damaged and must be replaced.

1.Connect the ground wire to the black lead and both power wires to the red lead of the multimeter.

2.Make sure the meter reads “open” or “OL.” If you get a different reading, contact Arta Ceramic.

3.Record these readings on the warranty card.



Heating Cable Resistance Test

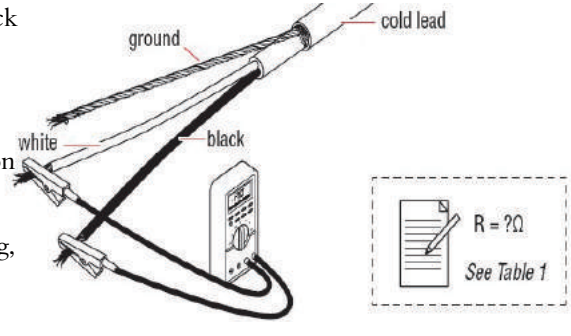
This test measures the resistance of the Cable and is used to determine circuit integrity.

1.Set your multimeter to the 200 or 2000 ohm range.

2.Connect the multimeter leads to the black and white cold lead wires.

3.Compare this resistance reading to the resistance specified in the Product Selection “Table 1 or Table 2”. The value should be within ±10%. If you get a different reading, contact Arta Ceramic.

4.Record these readings on the warranty card.



Sensor Resistance Test

This test measures the resistance of the floor sensor and is used to verify the sensor integrity.

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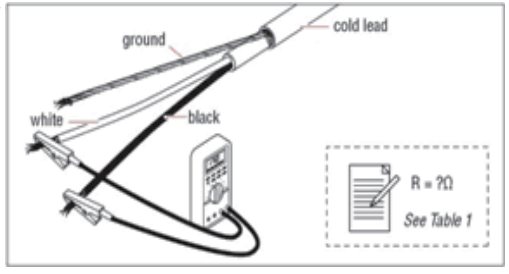
1.Set your multimeter to the 200K ohm range.

2.Connect the mutimeter leads to the red and green lead wires.

3.Make sure the meter reads between 9-25K ohms. If you get a different reading, contact Arta Ceramic.

4.Record these readings on the warranty card.



Troubleshooting

Symptom	Probable Causes	Corrective Action
	No voltage.	Check circuit breaker
	Circuit breaker tripped.	Ensure that there are not too many multi outlet assemblies (MOAs) or other appliances connected on the same circuit. The cable may require a dedicated circuit. See the Product Selection Table 1 or Table 2 in this manual.
	Ground-fault tripped in the thermostat.	Refer to the Thermostat Installation and Operation Manual.
	Thermostat not turned on.	Refer to Thermostat Installation and Operation Manual.
	Cable not connected to thermostat.	Refer to Thermostat Installation and Operation Manual.
	Floor temperature sensor not connected.	Refer to Thermostat Installation and Operation Manual.
	Faulty sensor.	Contact Arta Ceramic.
Floor warm all the time	Clock not set correctly.	Refer to Thermostat Installation and Operation Manual.
Floor not warm enough	Thermostat setting not set correctly.	Refer to Thermostat Installation and Operation Manual.
Installation instructions not available		Download the latest version of the Floor Heating System Installation Manual from artaceramic.com