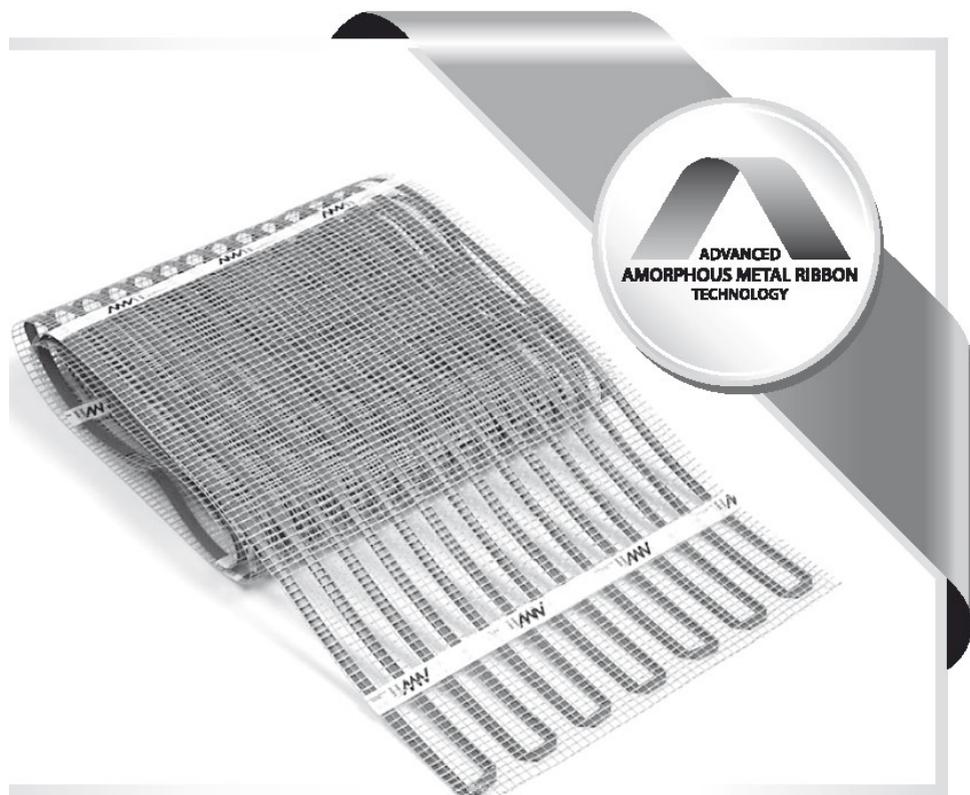


Installation Guide



ADVANCED HEATING
TECHNOLOGIES

for your **AHT**
Underfloor Heating System



Dear AHT Customer,

Thank you for choosing the AHT underfloor heating system.

It is designed to be simple to install and cost efficient to operate.

This guide provides the information you need for a successful installation. Please follow all instructions carefully for the best possible installation results and for long-term effectiveness of the product.

Please make sure that children are not allowed to play with any part of the installed heating system at any time. Before getting started please read carefully the caution notes below.

We wish you years of safe, comfortable, cost-efficient heating!

Caution A: Supervision & Instruction

This appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety. Children should be supervised to ensure that they do not play with the appliance.

Caution B: Avoid Thermal Blocking

In cases where heating mats are placed under floating floors (carpets, laminates or parquet) **DO NOT** place furniture or any other object of which the base fully rests directly on the floor! Doing so can cause damage!

AHT will not be held liable for any damage caused due to thermal blocking.

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Important!

- Do not!** cut parts (Ribbon) of the AHT heating mats in order to change the mat size. Especially DO NOT cut meter-wide mats in two pieces.
- Do not!** overlap heating mats.
- Do not!** fold or wrinkle AHT heating mats.
- Do not!** place heavy/sharp tools (or any other potentially damaging objects) on top of the heating mats.
- Do not!** walk unnecessarily on the heating mats.
- Do not!** install electrical cables or pipes under the floor together with the heating mats.
- Do not!** use cellulose insulation.
- Do not!** install mats when the room temperature is below -5°C (23°F).
- Do not!** install underfloor heating mats anywhere except inside buildings.
- Do not!** install mats under walls or partitions, or in areas under heavy cabinets, closets, or fixtures (toilets, sinks, tubs, etc.).
- Do not!** install mats within 3 cm of any heat conductive building part, such as cold water pipes
- Do not!** install mats within 5 cm of one another (ribbon to ribbon), 10 cm of any wall, or 15 cm of a fireplace or hot water pipe
- Do not!** connect any other electrical appliance on the same electric fused spur or RCD unit of the heating system
- Do not!** install heating mats under wooden floor, if the wooden floor is thicker than 18 mm.
- Do not!** put acoustic material between the heating mats and the wooden floor, when installing wooden type floor, with R-value of the acoustic material greater than $0.014 \text{ m}^2 \text{ C/W}$ ($0.08 \text{ ft}^2 \text{ h F/Btu}$).
- Do not!** use carpet underlay with thermal resistance greater than 0.8 Tog
- Do not!** install under carpet with thermal resistance greater than 2.0 Tog



Always:

- Always!** cover mats with grounding net in wet areas. Wet areas include saunas, bathrooms, and kitchen areas within 50 cm of sinks or any metallic kitchen appliance.
- Always!** ensure that the electric circuit that supplies electricity to the AHT heating system is equipped with a 30 mA residual current device (RCD).
- Always!** connect all cold wire leads from the AHT heating mats in parallel inside an electrical junction box or boxes.
- Always!** ensure that the total current needed for all mats connected in parallel is not more than 80% of the listed amperage capacity of the electrical junction box and its power supply line and breaker.
- Always!** provide each room with an AHT heating system with its own electrical junction box and control thermostat. Each AHT thermostat has a maximum capacity of 16Amps. If the amount of Amps in the room is greater than 16Amps, divide the amperage over several thermostats, or add a contactor between the mats and the thermostats. (To calculate the amount of Amps in the room see tables in page 14).
- Always!** use insulation under the mats to reduce running costs and warm-up time. Check with your installer to determine the R value of the sub floor insulation layer. If there is no insulation, or if the R value of the insulation layer is lower than $0.1 \text{ m}^2 \text{ }^{\circ}\text{C/W}$ or 1Tog ($0.57 \text{ ft}^2 \text{ h}^{\circ}\text{F/Btu}$), please read the insulation instructions on page 5 and act accordingly.
- Always!** wait for thin set/grout to dry properly before operating the system. The drying period is generally 2-14 days depending on manufacturer's instructions.

- | | |
|--------------|--|
| Note: | If you are installing soft type of floor covering (vinyl or linoleum), cover the mats with at least 6mm self-leveling flooring cement or latex compound. |
| Note: | All electrical connections must be performed by a fully qualified electrician. |
| Note: | The installer must verify the conformance to all applicable codes or standards. |

Getting Started

Before installing your new AHT underfloor heating mats, be sure you have the following additional parts:

- **ELECTRICAL JUNCTION BOX**
used as the connecting junction for the cold leads of the heating mats.
- **GROUNDING NET**
needed only when installing heating mats in wet areas such as bathrooms, kitchens, saunas, etc.
- **CONTROL THERMOSTAT**
allows you to control the temperature of the room.
Control thermostats have one or both of the following sensors:
 - Ambient air temperature safety sensor.
 - Floor temperature safety sensor.

In bathrooms, use thermostat with only floor temperature sensor. You can use the same kind of thermostat for other wet areas such as kitchen, but it is not a must. Use thermostat with air and floor temperature sensors for all other installations.

Note: For all installations where the thermostat is NOT located within the room to be heated (bathroom, en-suite etc), use a thermostat with a floor temperature setting. In all other installations use a thermostat with air & floor sensor setting.

- **GROUND FAULT CIRCUIT INTERRUPTER OR RESIDUAL CURRENT DEVICE**
Consult your local dealer regarding the applicable GFCI or RCD. Feel free to contact your AHT representative for additional details regarding the appropriate controls.
- **HARD INSULATION MATERIALS**
used as heat insulator under the heating mats with tile, vinyl and all floor coverings requiring the use of adhesive. The material comes in plates, usually made from foamed Polyurethane or Polystyrene and should have
Compressive strength of more than 2 Kg/cm² (28 PSQ).
The R value of the material should be in the range of 0.1 - 0.3 m²*°C/J or 1 - 3 Tog (0.57 - 1.7 ft²*h*°F/Btu). (See page 14 for a list of recommended hard insulation materials.) (*) See also remark below.

- **SOFT INSULATION MATERIAL**

used as heat insulator under the heating mats with a carpet wood or laminate floor finish. The material comes in rolls and should have Compressive strength of more than 0.02 Kg/cm (0.28 PSI)². The R value of the material should be in the range of 0.1 - 0.3 m²*°C/W or 1 - 3 Tog (0.57 - 1.7 ft²*h*°F/Btu).

(*) See also remark below.

(*) Remark: It is common to find insulation materials that are at least 6mm in thickness and have Thermal Conductivity of 0.02-0.06 W/m*°C (0.035-0.1Btu/h*ft*°F), but you can use other thickness and Thermal conductivity as long as the R Value of the material is in the range of 0.1 - 0.3 m²*°C/W or 1 - 3 Tog (0.57 - 1.7 ft²*h*°F/Btu).

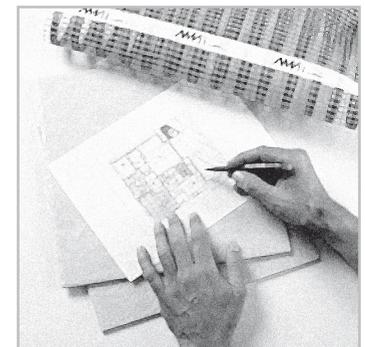


When installing insulation material under carpeting, always make sure that the R-value of the insulation is at least the same or greater than the R-value of the carpet.

Step: 1 Planning Your Installation

Before installing, draw an installation plan showing the placement of the mats, floor sensor, and junction box or boxes. The AHT heating mats should cover approximately 80% of the floor area of your room to be used as a primary heat source; the more coverage, the less time needed to heat the area. The heating mats are available in several convenient sizes. Choose the combination of heating mats that best enables you to cover the recommended 80% of your room. Plan to use the larger heating mats as much as possible and to use smaller mats only as gap fillers.

Note: The mats are supplied with 5 meters of electrical cold leads. If this is insufficient, ask your electrician to extend the cold leads using a crimp.

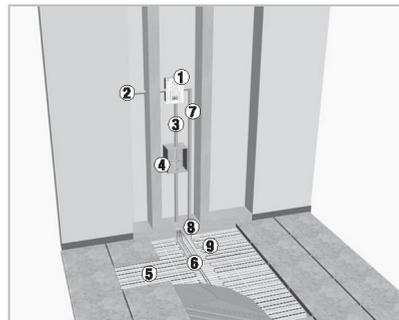


Step: 2

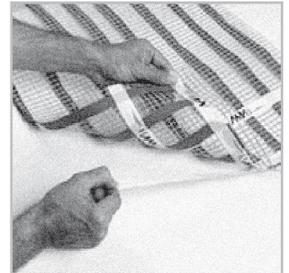
Laying Out Your Heating Mats

- 1 Clean all debris from the floor base.
- 2 If installing heating mats under:
 - **TILES, VINYL & ALL FLOOR COVERINGS REQUIRING THE USE OF ADHESIVE**
Use a flexible tile adhesive to secure a hard insulation material on top of the floor base.
 - **ALL OTHER FLOORING TYPES**
Use a soft insulating material which can simply be placed on the floor or secured with tape or carpet adhesive.
- 3 Clean all debris from the surface of the grout or insulating material.
- 4 Roll out heating mats on top of the insulating material with the heating ribbon facing down and the fiberglass net facing up. It is recommended to leave a gap of about 10 cm from the wall to the heating mats, and a gap of about 5 cm between each mat (ribbon to ribbon). Ensure that each heating mat is completely flat. Make sure that the cold leads of the mats are on the side of the mat that is closest to the location of the electrical junction box
(See step 3 - Making the Electrical Connection).

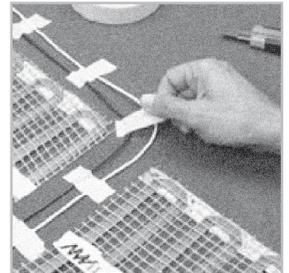
- (1) Thermostat
- (2) Power supply
- (3) Electrical wire installed in an electric conduit
- (4) Junction box
- (5) Floor heating mat
- (6) Heating mats Cold leads
- (7) Floor sensor installed in an electric conduit
- (8) Bottom plates holes
- (9) Floor sensor installed in floor
(equal distance between heating ribbons)



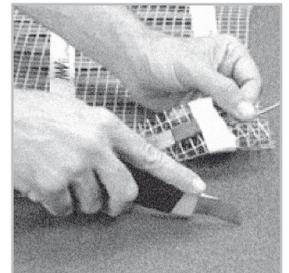
- 5 Stretch the mats and secure the mats to the floor with tape.



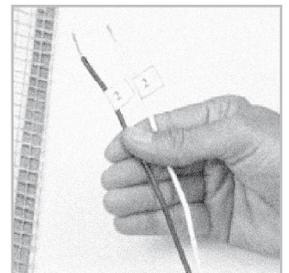
- 6 Place the cold leads of the mats between the mats toward the junction box. Try to place the cold leads so that they do not cross each other.



- 7 Since the cold lead connector is slightly thicker than the rest of the mat, create a slight groove in the insulation board under the connector to ensure that the heating mat lays flat. If any cold leads cross, create a groove for the cold leads at the point at which they cross.



- 8 Mark each pair of cold leads coming from the same mat with a number. Place a small sticker with the number of each pair of leads close to the end of the lead.



Step: 3 Making the Electrical Connections

Note: All electrical connections must be performed by a fully qualified electrician.

Important!

Ensure that the cold leads of the mats do not cross over the mats.

1 Install the electrical junction box or boxes above floor level according to local safety and building regulations and codes. Place the following label on the electrical junction box or boxes indicating that an underfloor heating system is installed in the room.

2 Install the control thermostat as far as possible from any heat sources or heat sinks such as fireplaces, direct sunlight, windows, doors, or anything that could possibly affect proper temperature readings. The suggested placement is 1.2 m above floor level

Note: For all installations where the thermostat is NOT located within the room to be heated (bathroom, en-suite etc), use a thermostat with a floor temperature setting. In all other installations use a thermostat with air & floor sensor setting.

3 Install an electric conduit to the junction box and thermostat as in the following diagram.

CAUTION
Radiant Floor Heating System
Warning-Risk of electric shock
Electric wiring and heating panels contained below the floor.
Do not penetrate floor with nails, screws, or similar devices.



4 Connect the floor temperature safety sensor to the thermostat through a conduit, and install between two heating ribbons, at least 50 cm from the wall.

Note: Make sure that the sensor does not touch any of the heating ribbons.

5 Measure the resistance of the heating system and record the value. Verify that the values you measure are in line with the resistance value that is printed on the specific mat nameplate.

6 Measure the insulation values with a Megger tester and record the value. Make sure there is no insulation problem.

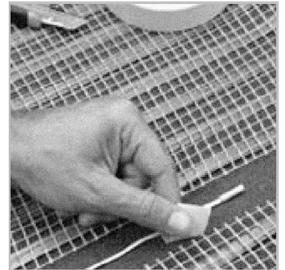
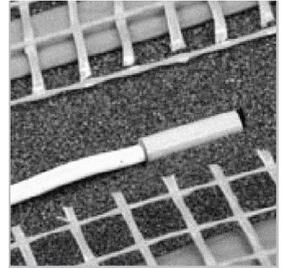
7 If you are installing the heating mats in wet areas (wet areas include saunas bathrooms, and kitchen areas within 50 cm of sinks or any metallic kitchen appliance):

a Spread the grounding net on top of the heating mat. The electrical wire of the grounding net should coincide with the heating mat cold lead. If necessary, tape the grounding net to the heating mats to ensure that the net does not move.

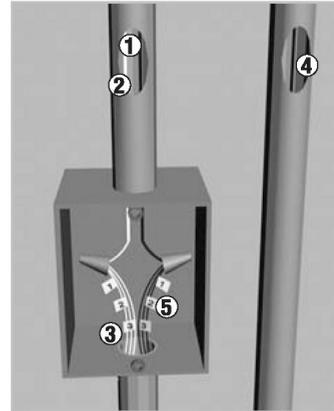
b Route the electrical wire of the grounding net to the same electrical junction box as the cold leads of the heating mats.

e In the electrical junction box, connect the electrical wires of the grounding to the ground lead (green/yellow) of the power supply of the house

8 In parallel, feed the cold leads of each mat to the electrical junction box. Make sure that you can see the sticker with the numbers of the leads. If necessary, shorten the leads, but make sure the sticker with the leads' numbers are affixed to the shortened lead.



- 9 Expose the conductor in each lead.
- 10 Connect all leads of the same colour.
- 11 Insert each coloured lead to one connector in the junction box.
- 12 Connect the same colour cold lead between the thermostat and the connector in the junction box.



- (1) Blue wire coming from the thermostat in an electric conduit
- (2) Brown wire coming from the thermostat in an electric conduit
- (3) Brown cold leads coming from the heating mats
- (4) Floor sensor wire coming from the thermostat in an electric conduit
- (5) Blue cold leads coming from the heating mats

13 Connect the wires to the control thermostat according to the Typical Wiring Diagram on page 12.

14 Switch on the heating system (see the directions in your thermostat manual) for half an hour to ensure that the system is working properly. It is important to check each entire system to ensure each mat is heating.

15 Switch off the heating system (see the directions in your thermostat manual).

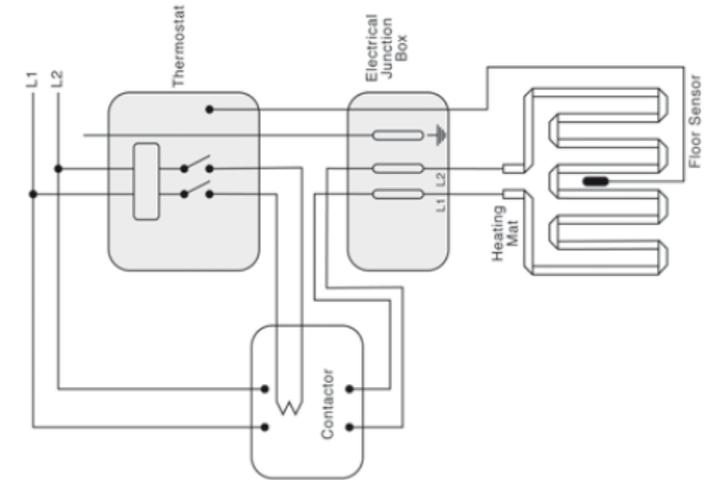
16 When the mats are cool, lay down your floor covering. If you are installing a glued type of floor covering (carpet, wood, vinyl or linoleum), first cover the mats with at least 6mm self leveling flooring cement. (or Latex based self leveling compound). Consult your local construction material dealer regarding the right material for your type of floor.



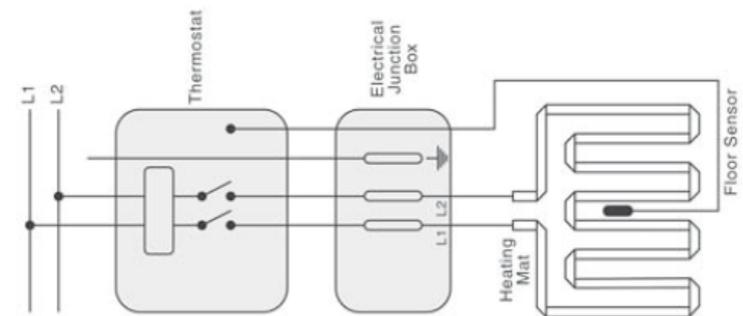
If you are installing a glued type of floor covering, or using grout or tile adhesive, do not switch on the heating system again until the glue, or grout or tile adhesive is dry. Consult the manufacturer of the material used to determine the amount of drying time needed.

Typical Wiring Diagram

Option B - For circuits more than 16 amps



Option A - for circuits less than 16 amps



List of Recommended Materials

Recommended Thermostats

All AHT thermostats are programmable and have an internal air sensor and a floor probe sensor. This allows specific control of the floor temperature as well as the ambient air temperature. This allows the user a choice of temperature control options.



- **AIR & FLOOR** users can control/specify **BOTH** the ambient (air) temperature as well as the maximum floor temperature (this is the default setting).
- **FLOOR ONLY** this option should be used when the thermostat is not located within the room to be heated (bathroom, WC, En-suite etc.) and will control the floor temperature only.
- **WIFI THERMOSTATS** our recommended Wi-Fi thermostats provide all the flexibility described above along with the added convenience of controlling your heating from anywhere in the world via an app on your smartphone or tablet

Recommended Hard Insulation Material

When hard insulation material needed, you can use Polyurethane foam panels.

The Compressive strength and Thermal conductivity of this material are in line with the recommendations for hard insulation material. You can also use at least 6 mm thick Marmox® or similar construction boards.

For other insulation material please consult with your local construction material dealer.

Recommended Soft Insulation Material

When soft insulation material needed, you can use plastic foam layer.

The Compressive strength and Thermal conductivity of this material are in line with the recommendations for soft insulation material.

(See page 5 for soft insulation material recommendation). For other insulation material please consult with your local construction material dealer.

Standard sizes of heating mats and their values

220-240V Volts, 150 watts per sqm family:

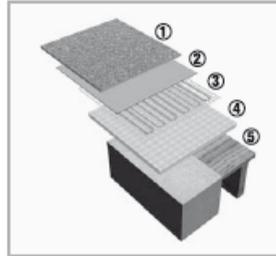
Catalog number	Width (m)	Length (m)	Area (sqm)	Nominal power (watts / Mat)	Nominal current (Amp/Mat)	Resistance Range (Ohm/mat)
AT101E0 1131205	0.5	1.2	0.60	99	0.43	516-619
AT101E0 1131505	0.5	1.5	0.75	113	0.49	422-516
AT101E1 1132005	0.5	2.0	1.00	148	0.64	321-393
AT101E2 1132505	0.5	2.5	1.25	189	0.81	253-309
AT101E3 1133005	0.5	3.0	1.50	241	1.04	199-241
AT101E4 1133505	0.5	3.5	1.75	259	1.12	187-225
AT101E4 1134005	0.5	4.0	2.00	318	1.38	154-183
AT101E5 1134505	0.5	4.5	2.25	339	1.47	146-172
AT101E5 1135005	0.5	5.0	2.50	383	1.66	131-153
AT101E6 1135505	0.5	5.5	2.75	385	1.67	130-151
AT101E6 1136005	0.5	6.0	3.00	471	2.04	107-124
AT101E7 1136505	0.5	6.5	3.25	542	2.37	92-107
AT101E7 1137005	0.5	7.0	3.50	504	2.19	100-115
AT101E1 1131010	1.0	1.0	1.00	148	0.64	321-393
AT101E3 1131510	1.0	1.5	1.50	242	1.05	207-241
AT101E4 1132010	1.0	2.0	2.00	318	1.38	155-183
AT101E5 1132510	1.0	2.5	2.50	383	1.66	131-153
AT101E6 1133010	1.0	3.0	3.00	471	2.04	107-124
AT101E7 1133510	1.0	3.5	3.50	504	2.19	100-115

Note: Power is calculated based on an average 230 Volts

Installation Examples

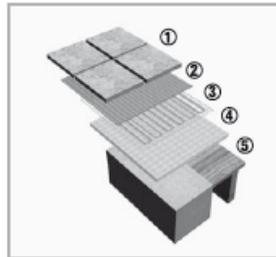
Under glued type carpet wood, vinyl or linoleum in dry surroundings (**)

- (1) Carpet, wood, vinyl or linoleum (with adhesive)
- (2) Flexible leveling flooring cement or latex compound of at least 6mm thickness
- (3) Heating mat
- (4) Hard insulation material secured with flexible tile adhesive
- (5) Floor slab (wood or concrete)



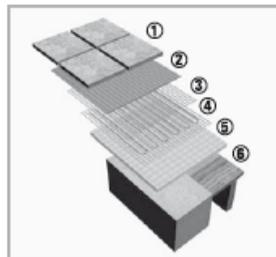
Under Tiles in dry surroundings

- (1) Tiles
- (2) Grout/ Tile adhesive
- (3) Heating mat
- (4) Hard insulation material secured with flexible tile adhesive
- (5) Floor slab (wood or concrete)



Under tiles in wet surroundings

- (1) Tiles
- (2) Grout/ Tile adhesive
- (3) Heating mat
- (4) Hard insulation material secured with flexible tile adhesive
- (5) Floor slab (wood or concrete)



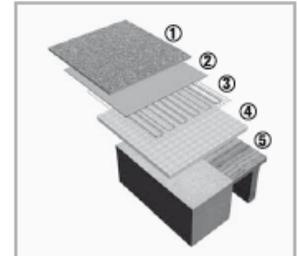
REMARKS!

- (*) In wet surroundings, ensure the heating mat has a grounding net installed directly above it.
- (**) Please check local building codes and regulations and act accordingly to them if they contradict the instructions above.
- (**) Do not use carpet underlay with more than 0.8 Tog
- (**) Use a Hessian backed carpet with a value lower than 2.0 Tog.
Always ensure that the Tog value of the insulation is at least the same as the carpet.

Installation Examples

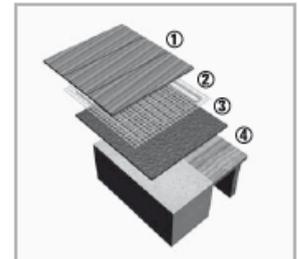
Under non-glued type carpet (without adhesive) (**)

- (1) Carpet (without adhesive) no greater than 2.0 Tog
- (2) Underlay no greater than 0.8 Tog
- (3) Heating mat
- (4) Soft insulation material
- (5) Floor slab (wood or concrete)



Under floating type wood, laminate, parquet flooring in dry surroundings (*)

- (1) Wood, laminate, parquet (without adhesive)
- (2) Heating mat
- (3) Soft insulation material
- (4) Floor slab (wood or concrete)





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