**Installation guide for Ø6 mm heating cable** **UK / 02000088_4**

Product identification

Which products are covered in this guide?

- Ø6 mm red heating cable for 10, 14, 18 or 20 watt per metre (W/m). Screened cold supply line, black, PVC.

Areas of application, indoor, floor heating

- Ø6 mm 10 W/m cables in wooden floors on joists. The floor heating is placed on wire netting between the insulation and the wooden floor. The installation takes up at least 50 mm.
- Ø6 mm 10 and 14 W/m, primary for low-built floor heating. The floor heating is constructed in a min. 10 mm mould layer onto an existing, stable floor.
- Ø6 mm 18 and 20 W/m are used for embedment in a self-supported concrete layer or concrete deck with or without wire reinforcement in a min. 30 mm thick mould layer.

Important general information!

- The heating cable must not be shortened or cross itself.
- The joints must not be exposed to pulling or pressure. As an example, the cable ties must not be too tight around joints or the cable itself.
- The joints on the heating cable must not be bend and a minimum of 20 cm of cable on each side of a joint must be placed in a straight line without bends. The joint and the end are to be considered part of the heating cable.
- The concrete mass/compound must have a dry density of concrete min. 2200 kg/$m^3$ / compound min. 1500 kg/$m^3$. Air holes and insulation parts in the concrete/compound must be avoided. The heating cable and all joints must be fully covered.
- Heat must be able to escape from the heating cable and therefore the cable should not be placed below partitions, walls and inventory that is not lifted at least 6 cm from the floor. The cable must not come into contact with the insulation material.
- Heating cables must not be placed closer than 30 mm from warm objects such as hot water pipes or other parts of the heating cable as this might overheat the cable.
- The cable must not be placed closer than 10 cm from drains and similar places that carry a higher risk of moisture and water to be present around the cable.
- Do not place the joint or the end of the heating cable close to a drain.
- Do not connect the heating cable directly to the mains. It must be controlled by means of a thermostat.
- Heating cables must not be connected in series. All cold supply lines must be run parallel to the connection box. Two or more heating cables may be installed in the same room but installing just one heating cable in two or more rooms is not allowed. All heating cables used in one and the same room must have the same heat rating (W/$m^2$), unless they are connected to separate floor sensors and thermostats.
- Remember vapour barriers if relevant.
- Measure the resistance between the heating wires and the insulation resistance to earth. Measure at least twice on the cable. In this way, you ensure that you do not continue to work with a faulty cable. Write down the measuring result and keep it along with the other documentation. The insulation resistance must be >20 MΩ after one minute at a minimum of 500 VDC. If the ohm resistance and the insulation resistance are not in line with the product label, the element must be exchanged.
  - Measure the resistance and the insulation resistance before starting cable installation.
  - Measure the resistance and the insulation resistance once the cable has been placed.
  - Measure the resistance and the insulation resistance once the installation has been completed.
- Avoid thermic blockage. Thermic resistance (flooring + carpets etc.) between heating cables and the room must not exceed approximately 0.125 m²K/W.
  Typical insulation values:
  - Thin floorings, e.g. quarry tiles or vinyl: 0.035 m²K/W
  - Medium-thick floorings, e.g. linoleum, vinyl: 0.040 m²K/W
  - Wood and parquet flooring: 0.125 m²K/W
  - Thick floorings of wood fibres and carpets 0.175 m²K/W. Installation: Low-built underneath wooden floors.
- Installation connection and approval must be carried out by an authorised electrician.

- Cold supply lines may be shortened or extended as needed. An extension must be carried out by an authorised electrician.
- Local requirements, rules and this guide must be adhered to.
- The installation requires earthing and a 30 mA fault current system such as HFI or PHFI.
- A visible sign, e.g. mounted by the electric panel, must be provided to inform that electric heating is installed.

Technical data

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|---|---|
| Voltage | 230 V ~ 50 Hz |
| Outer cap | PVC |
| Cable type | 2 conductors + ground screen |
| Screen | Tinned copper |
| Insulating inner conductors | Teflon (heat conductor), FEP (return system) |
| Cable diameter | Ø6 - Ø6.3 mm |
| Cable length, tolerance | +/- 2% |
| Resistance, tolerance | - 5% / +10 % |
| Max. temp. allowed on cable | 90˚C |
| Min. construction height | 10 mm for 10 and 14 W/m |
| | 30 mm for 18 and 20 W/m |
| Min. bending radius | 6 x cable diameter = 36 mm |
| Cable temp. upon installation | Min. 5ºC |
| Warranty | Fully embeddet 25 years |
| Norm | EN60335-2-96 / EN60800 M1 |
| Approval | CE |

General preparations

Select the right cable.

1. Identify the area that needs floor heating.
2. Define the wattage requirement. See ill. 1 if needed.
   - Define the total wattage requirement by multiplying the area with the defined wattage requirement per W/m$^2$.
3. Select watt per metre on the cable. See "Areas of application, indoor, floor heating" on page 1.
4. In the product overview, for the selected cable 10, 14, 18 or 20 W/m, now select a cable with a wattage close to the total wattage requirement.

*Ill. 1. Examples of areas of application and wattage requirements in common, new buildings.*

| Area of application | | Cable | Normal wattage requirement *) | Max. wattage |
|---|---|---|---|---|
| Floor heating | In wooden floors with joists | 10 W/m | 60-80 W/m$^2$ | 80 W/m$^2$ |
| | Low-built under wooden floor | 10, 14 W/m | 80-100 W/m$^2$ | 150 W/m$^2$ |
| | Low-build underneath tiles or similar | 10, 14 W/m | 100-150 W/m$^2$ | 200 W/m$^2$ |
| | Covered in concrete | 10, 14, 18, 20 W/m | 100-150 W/m$^2$ | 225 W/m$^2$ |
| | Covered in concrete, heat storage | 10, 14, 18, 20 W/m | 150-200 W/m$^2$ | 225 W/m$^2$ |

**) The wattage requirement of buildings and office/facilities can vary from average requirements.*
*Be aware of factors that might significantly influence the wattage requirement.*
*Examples of such factors: Exceptionally high or low insulation level. Large window areas. High ceiling height. Houses exposed to strong winds. If the energy consumption of the house is already known, use it as a reference to define the wattage requirement.*
*Remember that if you select a wattage that is too low, the floor will not be able to heat up the room sufficiently.*

Plan, document and verify.

1. Define the following and consider drawing up an outline with the most important details.
   - Area with floor heating.
   - Connection point for thermostat and location of floor sensors.
   - Heat sources, e.g. hot water pipes.
     - Heating cables must not be placed closer than 30 mm from warm objects such as hot water pipes as they might overheat the cable.
   - Mark the fixed objects that will be placed in the room.
     - Do not install floor heating underneath fixed objects such as close-fitting cupboards, partitions and similar elements because they insulate the floor which might cause cables to overheat. If an object is lifted min. 6 cm from the floor, it may be placed on the floor with floor heating.
   - Mark drains and similar objects.
   - The cable must not be placed closer than 10 cm from drains and similar places that carry a higher risk of moisture and water to be present around the cable.
   - Cables that are placed in the upper part of the concrete layer have a shorter reaction time and heat up the floor quicker.
   - Decide whether to install vapour barriers and if yes, where.
   - Make a detailed plan of the location of the heating cable and calculate the C-C distance. See ill. 2.

Store the outline along with pictures of the installation and information on the resistance measures.
This documentation will also provide you with an overview if the room purpose or layout is changed later on, and it assists you in identifying system errors.

If you are not an electrician yourself, speak to the electrician who will be installing the heating cable about the installation.

Ill.: 2 Calculating the C-C distance. (C-C is the centre distance between the individual cable windings.)

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**Method 1:**

$$\boldsymbol{C-C = \frac{\text{Area with floor heating}}{Cable\ length}}$$

Ex. Method 1: Area with floor heating = 7,9 m$^2$.
Cable length = 84 m

$$C-C = \frac{7{,}9}{84} = 0.094\ m$$

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**Method 2:**

$$\boldsymbol{C-C = \frac{\text{W/ m cable}}{W/square\ metre}}$$

Ex. Method 2: W/m cable = 14 W/m.
W/square metre = 150 W/m$^2$

$$C-C = \frac{14}{150} = 0.093\ m$$

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Installation guides

**Installation – In wooden floors on joists.** (10 W/m cable and max. 80 W/m$^2$)

The heating is placed on wire netting in a floor cavity. The wire netting is hanging in the air above the insulation and below the flooring.

Read the section "Important general information!".

Read the section "General preparations".

The installation

1. Plan the installation.
2. Calculate the C-C distance.
3. Carry out a resistance measurement on the heating cable.
4. Prepare the place of installation.
   - Remove all old installations if relevant.
   - Make sure that the installation is even, stable, smooth, dry and clean.
   - Make sure that there are no sharp edges, leaves, dirt or foreign objects.
5. Mill a cavity in the wall where the cold supply line runs to the thermostat. You can also use a cable pan.
6. Mount the heating cable on the wire netting or a similar, not-flammable material which has been stretched out between the joists.
7. The wire netting must be placed at a minimum of 30 mm below the undersurface of the floor and at least 10 mm above the insulation.
   - The heating cable must not touch the insulation or any other flammable material.
8. Cut a slit in the joist in places where the heating cable crosses it. Cover the slit with a piece of metal to avoid direct contact between the heating cable and any flammable material. The metal must be protected against corrosion.
9. Use cable ties to fixate the heating cable on the wire netting. Cable ties are used to prevent the cable from moving because cables must never move or cross each other.
   - Do not fasten the cable ties too tight onto the cable as this can lead to deformation and damage to the cable. Instead, use many loosely installed cable ties to keep the cable in place.
   - The joints on the heating cable must not be bend and a minimum of 20 cm of cable on each side of a joint must be placed in a straight line without bends. The joints must not be exposed to pulling or pressure.
10. Install floor sensors between two heating cables and approximately 0.5 m out onto the heating area. Fixate the floor sensors with cable ties. The sensor is the end of the floor sensor, not the cable itself.

Floor installation above the cables.

11. Carry out a resistance measurement.
12. Install the rest of the top flooring.
    - Be careful not to damage heating cables, floor sensors etc. when you fixate the flooring.
    - If you place a wooden floor onto the joists, follow the instructions provided by the floor manufacturer.

Connection and operation

13. Carry out a resistance measurement.
    - Always use a thermostat with the temperature limiting system set at a maximum of 27 ˚C if wooden floor is used as top flooring.
14. Connection and approval.
    - Installation must be carried out by an authorised electrician.
    - Local requirements, rules and this guide must be adhered to.
    - The heating cable requires earthing and a 30 mA fault current system such as HFI or PHFI.
    - Do not connect the heating cable directly to the mains. It must be controlled by means of a thermostat.
    - A visible sign, e.g. mounted by the electric panel, must be provided to inform that electric heating is installed.

**Installation – Low-built in Compound min. 1500 kg/m$^3$**. (10 or 14 W/m cable. Max. 150 W/m$^2$ underneath wooden flooring. Max. 200W/m$^2$ underneath tiles)

The heating cable is placed onto an existing floor. The cable is fixated to the floor and is covered with liquid filler.

Read the section "Important general information!".
Read the section "General preparations".

The installation

1. Plan the installation.
2. Calculate the C-C distance.
3. Carry out a resistance measurement on the heating cable.
4. Prepare the place of installation.
   - Remove all old installations if relevant.
   - Make sure that the installation is even, stable, smooth, dry and clean.
   - If necessary fill up any cavities around hoses or drains, or along walls.
   - Make sure that there are no sharp edges, leaves, dirt or foreign objects.
5. Fixate the cable to a stable floor to prevent it from moving during the moulding procedure. Cable and joints must be covered and the mould layer must be at least 10 mm thick.
   - The floor must be stable. If you are moulding on top of wooden flooring, you might need to reinforce or support it to prevent the compound with the heating cable inside from cracking due to the floor underneath moving. If the compound cracks, those cracks are going to "cut" into the cable and ruin it in the long run.
     You can support wooden flooring by halving the distance between the joists from e.g. 60 cm to 30 cm or by screwing or gluing a support plate onto the existing flooring. As an alternative you can add a thicker layer of compound to make it "self-supporting".
6. Mill a cavity in the wall to allow a cold supply line to run to the thermostat. You can also use a cable pan.
7. Mill a cavity with a length of at least 0.5 m to the floor sensors and/or sensor pipes if needed in accordance with the total construction height.
8. You will also want to mill cavities for the cable joints if needed in accordance with the total construction height.
   - Please consider that the cable should not be bend in or close to the joints. It has to be possible to cover joints and heating cables completely with compound.
9. Add primer to the floor and allow it to dry.
10. Install the floor sensor and also the sensor pipe if relevant. Do not fixate it until the final location of the sensor has been identified according to the location of the heating cables. (Only the end of the sensor is sensitive.)
11. Roll out and fixate the cable e.g. with double adhesive tape or installation ties.
    - Place tape or installation ties at a distance of max. 40 cm perpendicular to the cable direction.
    - Now fixate the cable properly with masking tape. Press the tape thoroughly onto the cable to prevent air holes from forming during the embedding procedure. If you use installation ties, the cables are locked into place with the ties.
12. Carry out a resistance measurement.
13. Pour the compound over the heating cable.
    - The grouting must not contain any sharp objects.
    - The compound must be sufficiently wet, even and free of air holes.
    - Pour at a moderate speed to prevent the heating cable from moving.
    - Make sure that you do not damage the cable with your tools.
    - The heating element must be completely covered with at least 5 mm of compound.
    - Allow the compound to harden for 28 days before connecting the cable to the mains.

Connection and operation

14. Carry out a resistance measurement.
    - Always use a thermostat with the temperature limiting system set at a maximum of 27 ˚C if wooden floor is used as top flooring.
15. Connection and approval.
    - Installation must be carried out by an authorised electrician.
    - Local requirements, rules and this guide must be adhered to.
    - The heating cable requires earthing and a 30 mA fault current system such as HFI or PHFI.
    - Do not connect the heating cable directly to the mains. It must be controlled by means of a thermostat.
    - A visible sign, e.g. mounted by the electric panel, must be provided to inform that electric heating is installed.

**Installation – Cast into concrete. Concrete min. 2200 kg/m$^3$.** (10, 14, 18 or 20 W/m cable. Max. 150 W/m$^2$ underneath wooden flooring.
Max. 225W/m$^2$ underneath tiles)

The heating cable is placed in a self-supporting layer of concrete, e.g. through fixation onto the metal sheathing or through the use of installation ties. The cable is covered along with the concrete casting.

Read the section "Important general information!".

Read the section "General preparations".

The installation

1. Plan the installation.
2. Calculate the C-C distance.
3. Carry out a resistance measurement on the heating cable.
4. Prepare the place of installation.
   - Remove all old installations if relevant.
   - Make sure that the installation is even, stable, smooth, dry and clean.
   - If necessary fill up any cavities around hoses or drains, or along walls.
   - Make sure that there are no sharp edges, leaves, dirt or foreign objects.
5. Mill a cavity in the wall to allow the cold supply line to run to the thermostat. You can also use a cable pan.
6. Roll out and fixate the heating cables.
   - Please consider that the cable should not be bend in or close to the joints. It has to be possible to cover joints and heating cables completely in compound.
   - The joints must not be exposed to pulling or pressure.
   - A minimum of 20 cm of cable on each side of a joint must be placed in a straight line without bends.
   - The heating cable must not touch the insulation or any other flammable material.
   - Do not place the cables up against any insulation materials but lift the cable away from the insulation.
   - Cable ties are used to prevent the cable from moving because cables must never touch or cross each other.
   - Do not fasten the cable ties too tight onto the cable as this can lead to deformation and damage to the cable. Instead, use many loosely installed cable ties to keep the cable in place.
7. Install the floor sensor and also the sensor pipe if relevant. Do not fixate it until the final location of the sensor has been identified according to the location of the heating cables. (Only the end of the sensor is sensitive.)
   - Install floor sensors between two heating cables and approximately 0.5 m out onto the heating area. Fixate the floor sensors with cable ties so that they are fixated quite tightly. The sensor is the end of the floor sensor, not the cable itself.
8. Carry out a resistance measurement.
9. Embed the cable.
   - The grouting must not contain any sharp objects.
   - The compound must be sufficiently wet, even and free of air holes.
   - Pour at a moderate speed to prevent the heating cable from moving.
   - Make sure that you do not damage the cable with your tools.
   - The heating element must be completely covered with at least 5 mm of compound.
   - Allow the compound to cure for 28 days before connecting the cable to the mains.

Connection and operation

10. Carry out a resistance measurement.
    - Always use a thermostat with the temperature limiting system set at a maximum of 27˚C if wooden floor is used as top flooring.
11. Connection and approval.
    - Installation must be carried out by an authorised electrician.
    - Local requirements, rules and this guide must be adhered to.
    - The heating cable requires earthing and a 30 mA fault current system such as HFI or PHFI.
    - Do not connect the heating cable directly to the mains. It must be controlled by means of a thermostat.
    - A visible sign, e.g. mounted by the electric panel, must be provided to inform that electric heating is installed.