Instructions for installation of Ø7 mm in Gutters, Downpipes and on Roof Surfaces. UK / 02000120_1

Product identification

To which products do these instructions apply?

- Ø7 mm black heating cable
- 20, 25 or 30 watts per metre (W/m).
- Cold lead PVC. (Ø7mm in "Outdoor" design is supplied with extended cold cable H07RN-F 3G1.5 and reinforced shrink sleeves).

Scopes of application: Ice and snow melting in Gutters, Downpipes and on Roof Surfaces

The intention of the product is to prevent ice in gutters and downpipes or reduce snow and snow loads on roof surfaces.

Typically, 200-350 W/m^2 are needed, depending on geographic location and the specific installation requirements.

Important general information!

- Read all instructions.
- The heating cable must not be shortened
- The heating cable must at all times keep a distance of 3 cm to the heating cable it selves. This is essential to avoid destructive temperature rise.
- The heating cable must not cross it selves or cross other heat sources.
- Protect joints against high tensile or pressure loads.
- Cable fixation must be loose. If too tight they will over time deform the cable and reduce lifetime.
- The joint and the end of the heating cable must never be bent. Min. 25 cm either side the joint/end must be placed in a straight line.
- The joint and the end are also heating.
- Heat generated by the cable must be able to dissipate in the full cable length to avoid destructive overheating.
- The cable must not come in contact with insulation materials.
- Do not locate heating cables closer than 3 cm to hot objects such as hot water pipes or other parts of the heating cable as this may cause the cable to become overheated.
- Do not connect the heating cable directly to mains. It must be controlled by a thermostat.
- Heating cables must not be connected in series. All cold leads must be routed parallel to the connection box. Two or more heating cables can be installed in the same area, but do not install a single heating cable in two or more areas with different heat dissipation conditions. The thermal output (W/m^2) of the cables in an area must be the same. For each thermal output (W/m^2) a bespoke sensor and thermostat must be installed.
- Measure the resistance between the heating cords and the insulation resistance to ground. Carry out these measurements at least three times. Before the product is installed, before the cable is fixed and after the installation has been done. This shall tell if the cable has been damaged or is defective. Write down the results and keep them as documentation. The insulation resistance must be >20 MΩ after one minute at min. 500 VDC. If the ohm resistance and the insulation resistance do not match the indications on the product label, the item must be replaced.
    - **Measure resistance and insulation resistance before starting the cable installation.**
    - **Measure resistance and insulation resistance when the cable has been fixed.**
    - **Measure resistance and insulation resistance when the installation is complete.**
- Avoid thermal blocking.
- The installation must be carried out and approved by an authorised electrician.
- Cold leads can be shortened or extended if required. However, an extension must be carried out by an authorised electrician.
- Local rules and requirements and these instructions must be observed.
- The installation must be connected to ground and to a 30 mA fault current relay such as HFI or PHFI.
- A note in a visible place – on the control cabinet, for instance – must announce that electric heating is installed.
- On tared roofs heating cable max. 20W/m is allowed to install. This limits the W/m^2 to max. 240W/m^2.

Technical data

Voltage	230 V ~ 50 Hz
Outer cover	PVC
Cable type	2 conductors + ground shield
Shield	Tinned copper
Insulation, inner conductors	Silicone (heat conductor), PVC (return conductor)
Cable diameter	Ø7 – Ø7.5 mm
Cable length tolerance	+/- 2%
Resistance tolerance	- 5% / +10%
Max. cable temp. allowed	70˚C / briefly 90˚C
Min. bending radius	6 x cable diameter = 42 mm. Min. bending diameter is 84 mm.
Cable temp. during installation	Min. 5°C
Cold cable	PVC or H07RN-F3G1.5 on “Outdoor” design products
“Outdoor” design with	Reinforced shrink sleeves on joints
Standard	IEC60800 M1
Approval	CE

General preparations

Choose the right cable

1. Determine the area to be heated.
2. Determine the power requirement.
    - Find the total power requirement by multiplying the area with the established power requirement, W/m^2, to get the total output.
3. Choose watts per meter for the cable.

Plan, document and check

1. Determine the following and, preferably, draw a sketch with essential details.
    - Area with heat.
    - Connecting point for thermostat and location of sensor(s).
    - Other heating sources such as hot water pipes.
        - Do not locate heating cables closer than 10 cm to hot objects such as hot water pipes, as this will cause the cable to be overheated.
    - Sketch in drain pipes and the like.
    - Plan the location of the heating cable in detail and calculate the C-C distance. Se Fig. 1.

Save the sketch together with any photos, you may have taken during the installation as well as resistance measurements.

Fig.: 1 Calculation of the C-C distance. (C-C is the centre-to-centre distance between the individual cable loops)

Method 1:

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

Ex. Method 1: Area with heating = 7.9 m^2.
Cable length = 84 m

$$C-C = \frac{7.9}{84} = 0.094\ m$$

Method 2:

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

Ex. Method 2: W/m cable = 25 W/m
W/square metre = 250 W/m^2

$$C - C = \frac{25}{250} = 0.100\ m$$

Installation instructions

Installation – Frost protection Gutters and Downpipes.

Install heating cable to ensure melting water can find its way to the drain. This is to avoid ice pics building from Gutters and melting water running unintended into building structures.

Installation

Plan the installation.

Heating cable

- Typically, 30-40W/m is installed.
- In more than 10 cm wide gutters, 300W/m^2 is needed. In very cold environment, more power can be needed.
- For wider Gutters, more cable runs must be installed to obtain i.e. 300 W/m^2. Calculate the C-C distance.
- Find the cable lengths needed both for Gutters and downpipes. Heating cable must extend out of the downpipe to avoid ice blocking the end of the downpipe. Typically 10 cm will suffice.
- Keep in mind it is not allowed to shorten the heating cable. Also the heating cable must never cross and at all times keep min. 3 cm distance to other parts of the cable.

Fixing method.

- Choose a fixing method suitably to the specific installation. Choose one for the Gutters and one for downpipes. If downpipes is deeper that 10 m install chain to release the tensile strength in the cable. If two runs needs to be in the downpipe, make sure the cable never comes closer than 3 cm to each other.

Thermostat / Controls.

- Choose a thermostat intended for this use, not to waste energy and cost.
- System needs to heat only when running water can occur. In very low temperatures, the system can therefore be turned off. Typically heat is needed from approx. +5 / -15 degrees C.
- To avoid both overheating the cable and to safe energy and cost, do install thermostats according to the specific installation i.e. use more thermostats if one side of the installation is mostly in shadow and another part mostly in sun. Also other factors will require more thermostats to be installed.

Power / mains

- Plan according to availability of power supply.

Installation - Cable

1) Make sure all needed parts are available.
2) Measure the resistance of each heating cable. Record the measurement. If needed mark each cable and note the name/number.
3) Prepare the place of installation
   - Remove all remains of old installations, if any.
   - Make sure that the installation is stable, smooth, dry and clean.
   - Make sure sufficient power is available where needed.
4) Roll out and fix heating cables.
   - Keep in mind that the cable must: Not be bend in or close to the joints. Not cross or be placed close. Never be cut.
   - The joints must only be subjected to moderate tensile or pressure loads.
   - The heating cable must not come into contact with insulation material, flammable material or anything else that may prevent the heat from escaping from the cable.
   - Do not locate the cables against insulation materials, if any, but lift the cable clear of the insulation.
   - The cable straps prevent the cable from moving as the cables must never touch or cross each other.
   - Make sure that the cable straps do not sit too tightly around the cable as this may eventually deform and destroy the cable. Therefore, several loosely fitted cable straps should be used to keep the cable in place.
5) Measure the resistance of each heating cable after installation. Record the measurement.

Installation - Thermostat and sensor

1) Locate sensors where ice is expected to accumulate and remain the longest.
2) Connection and approval
    - The installation must be made by an authorised electrician.
    - Local rules and requirements and these instructions must be observed.
    - Connect the cable to ground and to a 30 mA fault current relay such as HFI or PHFI.
    - Do not connect the heating cable directly to the mains. The cable must be controlled by a thermostat.
    - A note in a visible place – on the control cabinet, for instance – must inform that electric heating is installed.

Use and maintenance

1) Monitor the installation first cold season and adjust thermostats according the observations made.
    - Once the installation runs fine, record the settings.
2) Inspect the installation regularly.
    - Make sure there is no physical damage to the installation
    - Make sure heating cable or loops remain at min. 3 cm distance. Alter if necessary.
    - Remove i.e. leaves or other items that will prevent heat to dissipate from the cables or prevent water to run freely.

Installation instructions

Installation – Ice and snow melting on Roof surfaces.

Install heating cable to ensure ice and snow loads are reduced and water do not run unintended into the building structures. Also install heating cables in gutters, drains and downpipes to ensure melted water can escape from the roof. See: Installation – Frost protection Gutters and Downpipes.

Installation

Plan the installation.

Heating cable

- Choose heating cable W/m to have approx. spacing of max. 10 cm.
- On tared roofs heating cable max. 20W/m is allowed to install. This limits the W/m^2 to max. 240W/m^2 due to min. cable bending radius.
  - 200 - 350W/m^2 are installed on the roof surface depending on climate and roof insulation.

Outdoor temperature [°C]	Roof [W/m^2]
0 to -5	200-250
-5 to -15	250-300
-16 to -25	300-350

  - Well insulated roof will not be heated by the room below need less power than a roof also receiving heat from below.
  - Keep in mind it is not allowed to shorten the heating cable. Also the heating cable must never cross and at all times keep min. 3 cm distance to other parts of the cable.

Fixing method.

- Choose a fixing method suitably to the specific installation.

Thermostat / Controls.

- Choose a thermostat intended for this use, not to waste energy and cost.
- Recommended thermostats can detect ice and snow and do heat only when needed. These thermostats are cost-efficient and use no more energy than needed.
- To avoid both overheating the cable and to safe energy and cost, do install thermostats according to the specific installation i.e. use more thermostats if one side of the installation is mostly in shadow and another part mostly in sun. Also other factors will require more thermostats to be installed.

Power / mains

- Plan according to availability of power supply.
- Heating on Roofs do require much energy. Therefore, include an electrical installer early in the planning.
- If power availability is limited, do install the correct W/m^2. It often work to reduce the power by running 2 heating zones.

Installation – Cable

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2) Measure the resistance of each heating cable. Record the measurement. If needed mark each cable and note the name/number.
3) Prepare the place of installation
   - Remove all remains of old installations, if any.
   - Make sure that the installation is stable, smooth, dry and clean.
   - Make sure sufficient power is available where needed.
4) Roll out and fix heating cables.
   - Keep in mind that the cable must: Not be bend in or close to the joints. Not cross or be placed close. Never be cut.

- The joints must only be subjected to moderate tensile or pressure loads.
- The heating cable must not come into contact with insulation material, flammable material or anything else that may prevent the heat from escaping from the cable.
- Do not locate the cables against insulation materials, if any, but lift the cable clear of the insulation.
- The cable straps prevent the cable from moving as the cables must never touch or cross each other.
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5) Measure the resistance of each heating cable after installation. Record the measurement.

Installation - Thermostat and sensor

1) Locate sensors where ice/snow is expected to accumulate and remain the longest.
2) Connection and approval
    - The installation must be made by an authorised electrician.
    - Local rules and requirements and these instructions must be observed.
    - Connect the cable to ground and to a 30 mA fault current relay such as HFI or PHFI.
    - Do not connect the heating cable directly to the mains. The cable must be controlled by a thermostat.
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