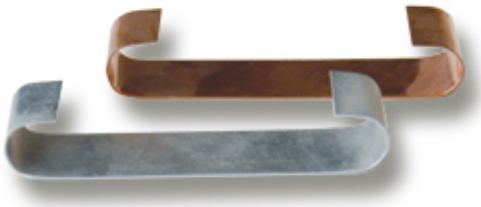
Heating of roof applications

As at certain geographical latitudes ice accumulates in the gutters and downpipes of a large number of buildings in the winter period, anti-freeze protection systems which use heating cables are applications which are in demand. Ice formation is caused by two influences:

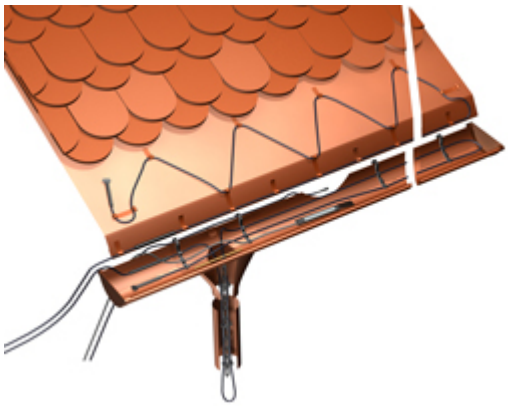
- after the exposure of a roof to the sun, the snow on it starts melting and the water which is flowing away accumulates in the gutters, where it gradually freezes
- if loft rooms aren't insulated perfectly, the escaping heat warms the roof structure – again, the snow melts on the roof and the water gradually freezes in the gutters

When the water outlet freezes completely, an ice layer starts to accumulate in the gutters and subsequently the water flowing over the edge of the gutters starts to form icicles. This can often create such a weight that the gutters will become irreversibly deformed. The trapped water can also get under the roof covering or leak onto the façade, where it will freeze and can cause great damage.

An ideal protective measure is to provide the heating of eaves troughs and the heating of downpipes with the help of electric heating cables. Because of the price, mainly resistance heating cables are used, but it is also possible to use self-regulating cables. The shortest length of resistance heating cable is approximately 8m, and therefore if a shorter cable is needed, self-regulating heating cables may also be more suitable. Be careful, even self-regulating cables need to be controlled by regulation - see **Regulation of ECOFLOOR heating systems**. For typical eaves troughs and downpipes (up to a diameter of 150 mm), a heating wattage of 30-40 W/m is installed; at higher altitudes approaching 1000 m above sea level 60 W/m and more is used (after the assessment of local conditions). It is more advantageous to use a cable with a lower wattage and install it into the eaves trough or downpipe twice or even three times (a larger surface is thus covered) rather than use a higher output cable and install only one core. Plastic grips or steel cables with grips are used for the attachment of the cable in eaves troughs and downpipes.



It is also possible to protect roofs – roof valleys, edges of roofs etc. Here, the cable is usually installed in a so-called "saw-tooth configuration" with such a spacing that the surface wattage is ca. 200 W/m², and at least 250 W/m² at altitudes approaching 1000 m.



The attachment of the cable on roofs is relatively problematic. Generally, it isn't possible to make openings, solder or weld the coverings as doing this might damage the insulation boards under the covering. This problem is thus solved individually for each application – e.g. with the help of steel wires.

An interesting alternative is the attachment of the fixation elements (C type roof grips, plastic rails) using a double-sided adhesive tape from 3M. It is an acrylic foam tape of the 4611F type (width 19mm, 3 m reel):

- It is first necessary to remove dirt and grease from metal elements (the sheet metal panelling of the roofs, troughs, valleys, C type roof grips) using industrial spirit or Acetone thinner (benzene isn't suitable as it leaves particles on the metal parts which reduce the adhesive properties of acrylic tape), plastic elements (attachment rails, plastic troughs) also need to be coated with one layer of PRIMER self-etching adhesive at the places where the acrylic tape is attached.

As in the case with the heating of open spaces, a suitable regulation system which not only monitors the temperature but also the presence of humidity is extremely important for roof applications. If the heating cable is controlled manually by the user and is brought into operation at a time when a thick layer of ice is already present, the cable will melt a cavity (tunnel) in the ice and thus create an air shell which behaves in the same way as thermal insulation. Even though the cable is in operation, the ice doesn't melt and the application is basically non-functional.

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