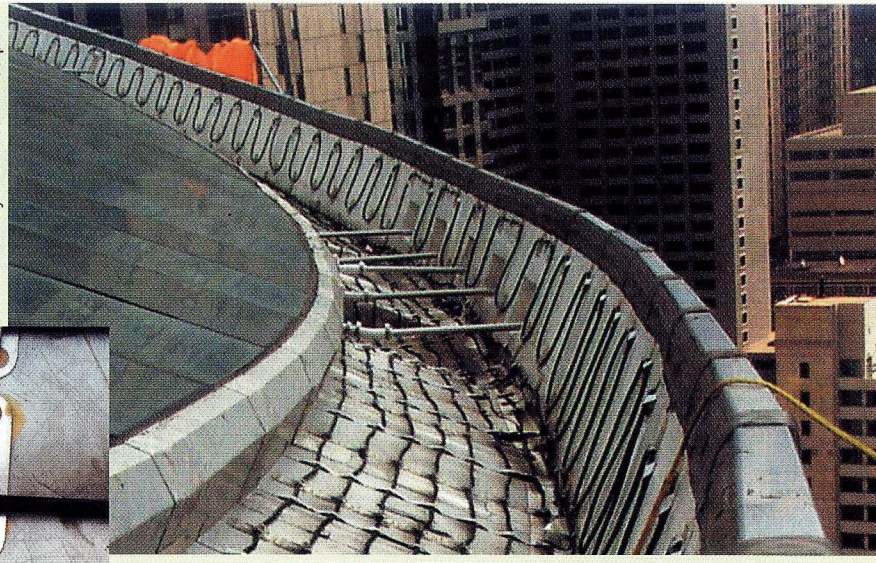
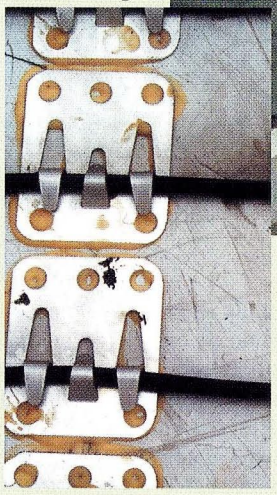
UP ON THE ROOF

Photos courtesy of Delta-Therm Corp.





Customized cable clips are part of the electric roof and gutter de-icing system on the State of Illinois Building in Chicago. Electric roof and gutter de-icing cable systems use radiant heat to create a path for melt water drainage.

Every year as the snow flies, the distinctive State of Illinois Building/James R. Thompson Center in downtown Chicago had experienced avalanching at the main entrance as well as leaks inside the facility due to ice damming. Every year, that is, until 2001.

Ice damming is a problem that can occur in any building. When snow accumulates on a roof and then thaws, the resulting water requires a path to leave the roof. A typical path runs from the roof to the gutters and downspouts. If the provided path isn't capable of draining the roof, the melt water will find a path down the interior walls of the building as well as possibly re-freeze on the roof when the temperature drops. Icicles along a roof edge indicate lack of a proper drainage path.

The 17-story, circular Thompson Center's roof pitches extremely toward the main entrance. During heavy snowfall and lake-effect winds, this roof slope created dangerous conditions on the ground for pedestrians. The immediate solution was to erect barriers or simply close the building entrance.

An international architectural firm was contracted to review the design criteria and recommend a solution. The architects determined that the slope of the roof in conjunction with a shallow gutter and low exterior gutter wall were factors to the ice damming and avalanching. The architects recommended to deepen the gutter, raise the exterior gutter wall (up to 18 inches in the center), and to call a company that manufactures automated roof and gutter de-icing systems. Electric roof and gutter de-icing cable systems use radiant heat to create a path for melt water drainage.

Tom Duszynski, who works for the electrical manufacturer, assisted in the system selection based on the 1999 ASHRAE Chapter 49, current National Electrical Code, and his own professional experience.

"The center of the Thompson Center project is a roof of glass; the membrane of the new deeper gutter and higher exterior wall had a maximum sheath temperature of 160 degrees Fahrenheit," Duszynski says. "Therefore, I had to ensure that the cable did not exceed this temperature and yet make sure it would melt the snow and heat the exterior gutter wall to prevent what's known in the industry as 'iglooing.'"

A mineral-insulated heating cable with high-density polyethylene jacket along with a roof and gutter de-icing controller with 30 Ma GFPE protection was the final selection. The MI cable was selected for its constant heat output, durability, nondegradation, and nonflammable properties as well as design versatility. Duszynski designed a heating cable system with a low heat output at close spacing.

Typical roof de-icing system designs require a snow/ice sensor along with an ambient temperature sensor to automate the system. With most buildings, there is usually a north side and south side, which require separate controllers due to weather conditions including sun fall patterns.

Bob Esposito, project manager for MG Electric, was faced with ensuring that no roof membrane penetration occurred during installation. The system manufacturer provided customized cable clips for this purpose. The clips were adhered to the roof with two-part epoxy, and then the cable was laid.