



Environmental Technology, Inc.
Online Information Network!

Newsletter/ETI Interface
September, 1996

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National Electric Code Considerations

If you are planning/installing a fixed electric snow melting or deicing system operating from a grounded alternating current source and your jurisdiction has adopted the 1996 NEC as the standard of acceptable installation practice, ground-fault protection of equipment must be included for compliance with Section 426-28.

Article 100 of the NEC defines ground-fault protection of equipment as, "A system intended to provide protection of equipment from damaging line-to-ground fault currents by operating to cause a disconnecting means to open all ungrounded conductors of the faulted circuit. This protection is provided at current levels less than those required to protect conductors from damage through the operation of a supply circuit overcurrent device." Very simply, ground-fault currents sufficient in magnitude to cause fire or permanent damage to equipment and/or supply conductors may not be sensed by the branch circuit overcurrent device (fuses, instantaneous or thermal magnetic circuit breakers).

Having Mandated this protection, the Code is moot regarding the maximum permissible ground leakage current. This is defined by a compilation of Underwrites Laboratories Standards UL1053 and UL943 as being limited to the range above 6mA to 50mA. (6mA being the maximum allowable line-to-ground current for devices Listed as Class A Ground-Fault Circuit-Interrupter Protection for Personnel.) Commonly available protection devices produced in the U.S. have a 30mA ground-fault detection/interruption leakage current threshold. (Those currently manufactured for Certification under CSA Standard C22.2 and for use in Canada typically employ a value of 100mA.)

Small, one or two branch circuit systems operating at 240V and below may, often, be best served by individual UL Listed GFEP molded case branch circuit breakers readily available from numerous manufactures for installation in loadcenters or panelboards, as required, or as individual enclosed units. Larger, more extensive systems or those operating at 277V require thoughtful analysis to reconcile technical and economic considerations.

As UL Listed 277V GFEP branch circuit breakers are currently produced by a very limited number of manufacturers for installation only in their respective panelboards, both availability and compatibility must be verified for snow/ice melting systems contemplated at existing facilities. Likewise, specifications for panelboards intended to serve 277V systems in new construction should be restricted to those manufacturers presently producing UL Listed GFEP equipment of the desired continuous current rating.

Irrespective of operating voltage, individual GFEP protection of branch circuits comprising either extensive systems or systems with multiple target areas in a campus topology may become economically prohibitive. Alternatively, such designs could employ a dedicated snow/ice melting branch circuit panel(s) with UL Listed Ground-Fault Sensing and Relay Equipment arranged to operate a disconnecting means (contactor, etc.) To open all phase conductors of the panel feeder. (UL advises this arrangement meets the spirit of NEC 426-28, however the authority having jurisdiction in your area who is, ultimately, responsible for such Code interpretations should be consulted.) However, this arrangement is non-selective: a line-to-ground fault on any individual branch circuit will render the entire snow/ice melting system inoperative pending identification and either isolation or repair of the "offending circuit" circuit. As electric snow/ice melting cables typically exhibit leakage current value greater than insulated building wire and will likely be in intimate contact with the ground (earth), prudent investigation should be conducted to ensure the cumulative leakage current of all energized branch circuits is not excessive for proper operation of the single-point monitor.

Floorstat®

Lineup

Broadened

With the recent addition of 208V and 277V relay modules, both the FWT™- 1ER and FWT™- 2ER radiant floor warming thermostats may now

Operating Tip

The calendar has heralded the Autumn season and, in advance of Winter's inevitable snow and cold, we encourage all users of our various snow/ice sensors to perform a once-a-year tune-up to optimize their

Coming Attraction

In our next issue mechanical consultant, Richard E. White, P.E., will begin a multi-part narrative on hydronic snow/ice melting systems: design, application, codes, installation, controls,

be applied in residential, commercial and institutional applications employing these utilization voltages. Like its 120V and 240V counterparts, the 208V unit will switch 25 ampere heater loads; the 277V model will switch 22 ampere loads. In conjunction with these additions, we have bundled Floorstat and relay modules together: two companion units, one Order Number, one identical price (irrespective of voltage). Verify the proper voltage before ordering. Several recent urban multifamily residential Floorstats were, unfortunately, ordered as 240V when the building electric service was 120/208V. Revised data sheets fully describing these Floorstats are included with this mailing.

performance. To remove road film or adhered residue from pavement mounted sensors, clean the exposed surface with a Scotch Brite Pad or fine to medium grit sandpaper. (Caution: avoid the use of metallic or coarse abrasives.) The moisture sensing grid of all aerial sensors should be wiped with a lint-free soft cloth saturated with liquid glass cleaner.

the whole enchilada. Those interested in extra curricular preparation should review Chapter 46 of the ASHRAE Handbook, HVAC Applications.