

**TechNotes Issue # 418**  
**April 24, 2019**

**Listed Heat Trace for Fire Protection System Piping**

As we leave the cold temperatures of winter behind us and look forward to warm summer days, we must not forget that the sprinkler systems being installed currently must be able to function at all conditions throughout the year. The use of listed antifreeze solutions was discussed heavily in a three part "Winter Special" issue of TechNotes, and a task group of NFSA's Engineering and Standards Committee has been working tirelessly on producing a whitepaper on the use of insulation to protect pipe from freezing (and overheating). This issue will discuss the use of heat tracing systems listed specifically for fire sprinkler systems. It has been prepared by Kevin Hall, P.E., NFSA's Manager of Engineering Research.

Within the enforceable body of the standard, NFPA 13, Standard for the Installation of Sprinkler Systems, 2019 Edition (NFPA 13-2019), references the use of listed heat tracing systems in above-ground piping in section 16.4.1.4:

**16.4.1.4** *Listed heat-tracing systems shall be permitted in accordance with 16.4.1.4.1 and 16.4.1.4.2.*

**16.4.1.4.1** *Where used to protect branch lines, the heat-tracing system shall be specifically listed for use on branch lines.*

**16.4.1.4.2** *Electric supervision of the heat-tracing system shall provide positive confirmation that the circuit is energized.*

Per Chapter 7 Requirements for System Components and Hardware:

**7.1.1\* Listing.**

**7.1.1.1** *Materials or devices not specifically designated by this standard shall be used in accordance with all conditions, requirements, and limitations of their special listing.*

**7.1.1.1.1** *All special listing requirements shall be included and identified in the product submittal literature and installation instructions.*

This is the crux of the issue at hand as heat tracing systems for use on mains have been listed and available, but a listed heat trace option for branch line piping was lacking. As seen in the excerpt from NFPA 13-2019 at the beginning of the article,

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section 16.4.1.4.1 explicitly calls out the requirement for heat trace on branch lines be specifically listed for that purpose.

Much like the use of insulation to protect pipe from freezing, the standard provides no installation guidance and only points to the use of the listed system with supervision per section 16.4.1.4.2 and the following performance objectives:

**16.4.1.3** *Where above-ground water-filled supply pipes, risers, system risers, or feed mains pass through open areas, cold rooms, passageways, or other areas exposed to temperatures below 40°F (4°C), the pipe shall be permitted to be protected against freezing by insulating coverings, frost-proof casings, or other means of maintaining a minimum temperature between 40°F and 120°F (4°C and 49°C).*

**16.4.1.5** *Water-filled piping shall be permitted to be installed in areas where the temperature is less than 40°F (4°C) when heat loss calculations performed by a professional engineer verify that the system will not freeze.*

It is important to note, that while pipe may be installed in areas below 40°F, the system may not be subject to freezing conditions and a professional engineer is permitted to perform heat loss calculations per section 16.4.1.5 to alleviate some of the requirements for protection of piping against freezing.

Kerry Bell, Corporate Fellow and Principal Engineer at UL for fire sprinkler and pump equipment, has written an article featured in the National Fire Sprinkler Magazine's 2019 Buyer's Guide on this subject. In his article, Bell discusses changes to heat-tracing listing requirements and expresses the concerns that even though heat tracing equipment has been used in other building systems, life safety systems provide unique concerns that dictate a unique listing. To accomplish this goal, UL developed UL 515A, Outline of Investigation for Electrical Resistance Trace Heating and Associated Controls for Use in Sprinkler and Standpipe Systems.

Using this outline of investigation and the input of several stakeholders, the outline was used to certify the first heat trace system specifically for use on fire sprinkler system branch lines. Chromalox, Inc. manufactures this newly certified product, and it is listed for use on supply piping and sprinkler branch lines to a minimum ambient temperature of -40°F. UL distinguishes heat trace systems by categorizing them under the title "Heating-Cable Systems for Use on Fire Protection System Piping" and a UL category designation of VGNJ/VGNJ7. Other heat trace systems that were accredited by the 2005 edition of IEEE Std. 515.1, IEEE Standard for the Testing, Design, Installation, and Maintenance of Electrical Resistance Heat Tracing for Commercial Applications are cautioned as the testing was generic in nature and did not include specific requirements for the use of heat tracing equipment on fire sprinkler systems.

In the end, it is important to recognize that not all listed products can be used in every application, and in the case of



life safety systems this issue becomes increasingly significant. Products must be specifically listed for their application of use and the listing instructions must be followed during installation. One final thought if you are scratching your head about the UL Certification and Outline of Investigation thinking it is not a "listing"- it is! See our TechNotes #411 issued on New Year's 2019 which discussed UL's process on rebranding their certification process and language.

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**Round 1: 12:30 p.m.**

**Round 2: 1:00 p.m.**

Round 3: 1:30 p.m.  
Round 4: 2:00 p.m.  
Round 5: 2:30 p.m.  
Round 6: 3:00 p.m.

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Round 1: 1:00 p.m.  
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**Final Round at  
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