

**TECHNICAL UPDATE - TU-5008**

**SUBJECT: CPD Heater Reliability**

History has shown that Dekoron/Unitherm CPD Electric Traced bundles provide many years of reliable service. Failure of a CPD heater due to product design or fabrication is extremely rare. CPD heater failures during installation are usually caused by installers cutting through the bus wire and/or electrical insulation. The rugged outer jacket of the tubing bundle and simple handling precautions prevent most of these failures. Premature heater failure after installation and initial start-up, although extremely rare, is usually due to fracturing of the small resistance wire.

Factors that contribute to this fracture include incorrect or incomplete specifications, improper installation and improper operation or control. These factors can result in ***elevated heater temperatures*** and or extreme or accelerated ***thermal cycling***.

Elevated heater temperatures can be produced by internal factors such as inletting process fluids at a temperature above the design limits, by applying voltage above product ratings, and by incorrect placement of bundle temperature sensors. Elevated temperatures can also be produced by external factors such as ambient temperature being above design limit, incorrect routing, and inadequate bundle clearance. The effect of elevated temperatures is time dependent. Short duration exposures will have relatively little effect whereas longer duration exposures will have a substantially greater effect on resistance wire life.

Thermal cycling refers to repeated heating and cooling of the resistance wire. Thermal cycling is influenced by temperature sensor location, controller type and settings, process fluid temperature fluctuations, ambient temperature fluctuations, and voltage fluctuations.

We design our products to help minimize the effects of elevated temperatures and excessive thermal cycling. Uniformity in heaters, insulation materials, jacketing materials and special consideration of geometry assures that temperatures throughout the bundle remain relatively consistent along the bundle and constant over time.

Dekoron/Unitherm strives to improve the service life of its CPD Electric Traced Tubing Bundles through continuous improvement of the heating element. This involves analyzing customer problems. Over the years these investigations have led to several design improvements including incorporation of a soldered bus-to-nichrome connection, replacement of the three piece inner core with an extruded profile and a nichrome wire application technique which reduces flex failures. These changes have been documented to show improved service life.

More recently, we have investigated the effect of resistance wire size on heater life. Laboratory results show a significant increase in cycles to failure with increasing wire size. Unfortunately, increasing wire size generally requires increasing zone lengths which increases the maximum possible size of cold ends when the heater is cut. This is just one example of the many ideas we continue to investigate.

Our investigations show that most field problems are due to incorrect installation or operation of the bundle. Furon's Unitherm product standards for design, selection, installation and operation have been developed over many years in order to maximize heater life. We continually incorporate the results of our research and field investigations into these standards. An understanding of bundle operation and "conditions to avoid" will help assure maximum life.

If you have questions about proper selection, installation or use of Dekoron/Unitherm CPD Electric Traced Tubing Bundles, please call our customer service department at (800) 633-5015. Our goal is to provide products with the highest possible level of performance and reliability to ensure our customers achieve their goals.

