

**TECHNICAL UPDATE - TU-3003**

**SUBJECT: What type temperature controller should be used for Dekoron Unitherm bundles with a CPD heater.**

There has been controversy regarding which type controller to use with CPD heater as long as there has been CPD heater. The prevailing thought was that any controller that cycled the heater between full on (100% of rated voltage) and full off (0 voltage) would cause premature failure of the heater. In 1996, Dekoron-Unitherm began a project to determine what the effect was of different controller types on the service life of bundles with CPD heaters. We built five identical bundles using the Dekoron-Unitherm 11.5 watt/ft, 208 Volt CPD heating element. The heated length was ten feet, comprising five full heater zones. The samples were insulated with 1/2" fiberglass pipe insulation, and connected to a single power source delivering 208 VAC.

The tube temperature on each sample bundle was controlled using a different type temperature controller. Controller types were selected to cover the most popular control types used with these bundles.

The controller model and control modes used were as follows:

1. Dekoron-Unitherm Model 1660-13A12 Line Sensing Thermostat, on-off control with standard deadband;
2. Dekoron-Unitherm Model 60 Time Proportional Controller, proportional only, 2% proportional band, manual reset;
3. On-Off control with  $\pm 10^{\circ}\text{F}$  deadband (mimics control used on some popular stack gas analyzer systems);
4. Dekoron-Unitherm Model 70 Time Proportional Controller, PID control, rapid cycle option;
5. Dekoron-Unitherm Model 1660-46202 Voltage Proportional Controller.

All bundles were set to operate at 275°F. Heater resistance, current draw and maintenance temperature were periodically monitored to check for heater failure.

The bundles operated continuously from March 24, 1996, until the test was concluded on October 28, 2003.

At the end of the test we found no reduction in heat output of any of the heated bundles. Resistance and current draw values were constant throughout the test period.

The conclusion of this test is that the five control methods used have no effect on the service life of the CPD heaters used in Dekoron Unitherm Electric Traced Tubing Bundles.