

**TECHNICAL UPDATE - TU-4015**

**SUBJECT: Spacing Between Bundles in Cable Trays**

It is extremely important when installing multiple runs of preinsulated and / or traced tubing bundles to provide the proper spacing between bundles.

These bundles dissipate heat through the outer jacket like any insulated pipe or tube. When properly spaced, multiple bundles will perform as if they were a single bundle in the tray.

Reducing the spacing retards the heat dissipation, increasing the outer jacket temperature and the temperature of every layer beneath. Over a period of time, the outer jacket temperature will approach the operating temperature of the tube.

There is nothing surprising about this, as it is the same physical property used by the industry to design steam and electric traced bundles and pipes.

The effect of the increase in jacket temperature depends upon the outer jacket material. Most PVC jacket compounds will become brittle over time and crack. This is due to the loss of plasticizers used in flexible PVC compounds. The amount of time necessary to become brittle will depend upon the compound and the installation.

Urethane compounds react differently. Non-halogenated polyurethane compounds used in traced jackets have a property called the Vicat Softening Temperature. This is a measure of how the material reacts to high temperatures. Once the material exceeds its Vicat Temperature, it loses much of its mechanical integrity and becomes susceptible to mechanical damage, cut through, and punctures.

A check of commercially available compounds shows that Vicat Temperatures are in the range of 150°F to 200°F for non-flame retardant or compounds with a halogen-free flame retardant.

There are some compounds available with higher Vicat Temperatures, but these compounds either have halogenated flame retardants, or have poor low temperature flexibility, or both.

Bundles operating at low temperatures, for example at 240°F seen when transporting steam at 40 psig, can still exceed the Vicat Softening Temperature of the jacket material if the bundles are not properly spaced.

Exceeding the Vicat Temperature can lead to:

- jacket cuts and punctures due to sharp projections or burrs on bundle clamps;
- cuts resulting from movement of the bundle due to thermal expansion during operation;
- cut-through from wire or cable ties used to secure the bundle.

The next question is how much spacing is sufficient.

Dekorun-Unitherm recommends clearance of at least 1/2 inch around the bundle. This provides the necessary clearance to allow air to move through by free convection.

Closing the distance between bundles makes it increasingly difficult to diffuse heat through free convection. In other words, air must now be forced between the bundles to cool them so they are not damaged.

Bundles installed with minimal or no clearance are also more susceptible to overheating when installed close to the stack wall or other hot surface. In this instance the jacket temperature may rise well above any expected or calculated value due to the combination of the hot surface and the loss of cooling.

Vertical runs will be more likely to sustain damage because of chimney effect. In this case the heat is remaining close to the bundle for the entire length of the run, not being moved away from the bundle by air flow.

**Last Update 7/21/04**

**page 1**

© Copyright 2007 Dekorun/Unitherm, Inc. All rights reserved

