

**TECHNICAL UPDATE - TU-5014**

**SUBJECT: Condensate Return Line in Steam Traced Bundles**

We are always concerned when a customer wants us to design a steam traced bundle with a condensate return line built in. An uninformed customer or installer may experience difficulty using this type of bundle.

When a steam traced line is installed, care must be taken to insure that the bundle is sloped properly to allow the condensate to drain to the steam trap or traps. We recommend a slope of  $\frac{1}{4}$ " per foot for single tube and  $\frac{3}{4}$ " per foot for multi-tube steam traced bundles.

Most bundles are installed with a steam trap at the point furthest from the supply manifold. The bundle is then sloped towards the trap, allowing condensate to drain and be removed from the tracer line at the trap. If the bundle were sloped back to the manifold, the condensate could build up in the tracer and plug the line, eliminating any heat downstream of the plug.

Once the condensate exits the trap, it enters the condensate return line. This routes the condensate back to the main condensate return line or boiler. This line is sloped back to the boiler to allow condensate to drain. If this line is sloped towards the trap, it can degrade the effectiveness of the steam trap or cause it to not function. The tracer line would fill with condensate and lose its ability to heat or freeze protect the process tube.

The problem with installing a condensate return line in a traced bundle is simply one of slope. You cannot design a bundle where the tracer line slopes in one direction and the return line slopes in the other. The effectiveness of the bundle will be degraded, no matter how it is installed.

This is generally not a problem with short (less than 50 feet) lines if there is sufficient steam pressure to force the condensate out of the line. But, a low pressure condition, a low spot in the line, excessive vertical rise in the run, or other factors may result in the loss of tracing.

Another problem with this type of bundle is the heat load placed on the steam. In this bundle, the steam trace line is not only heating the process tube, it is attempting to turn the condensate back into steam. This causes steam usage to increase, condensate load to increase, and process temperature to decrease. The heating of the condensate return line may also cause increased back pressure on the steam trap, reducing its ability to operate. Again, the end result may be a condensate plug that effectively shuts down the tracer line.

Any customer requesting steam traced bundles with an integral condensate return line should be advised of the problems that may be associated with its installation and use.

We do not recommend this type construction, and cannot guarantee that bundles designed in this manner will function as requested.