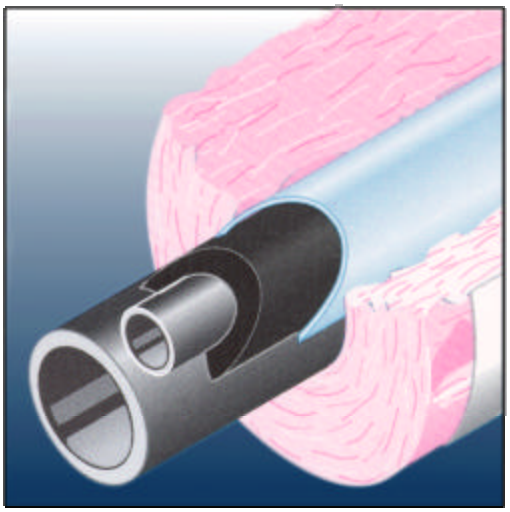
ThermoTips

HEAT TRANSFER COMPOUNDS



TRACER WITH HEAT TRANSFER COMPOUND AND "STRAP-ON" STEEL JACKETS

4 KM (13K FT.) OF 12-INCH SULFUR PIPING
COURTESY CARGILL INC.

What are heat transfer compounds?

Heat transfer compounds are highly conductive materials used to enhance the heat transfer rate for steam (fluid) tracers that are attached to process piping, valves, pumps, or other equipment. These materials come in several different forms and consistencies. Some of the compounds are extruded "rubbery-like" materials that soften and adhere to the substrate upon which they are applied when heated above 95 °C (approx. 200°F). Some are mastic materials that never harden but provide a tacky adhesive bond to the heated surface, while others bond to a rock-like hardness when cured.

Why were heat transfer compounds developed?

Heat transfer compounds were first developed to improve the efficiency of externally installed bare steam tracing systems, and to offset the high cost of steam jacketing. Heat transfer compounds may be used wherever expensive multiple bare tracers and steam jacketing are ordinarily employed. Literally millions of meters (feet) of steam and liquid tracing systems using heat transfer compounds have successfully heated pipes, tanks and equipment in process facilities around the world over the past 50 years.

How do heat transfer compounds work?

By filling the voids between the steam tracer and the wall of the process pipe or other equipment, these conductive compounds create and uninterrupted thermal connection between the two. Tracers using heat transfer compound provide heat to the surface of the process pipe or other equipment primarily by conduction directly into the metal and are often referred to as “conduction tracers.” Tracers with no heat transfer compound (bare tracers) are often referred to as “convection tracers” because they provide heat to the various surfaces primarily by air convection currents in the annular space between the thermal insulation envelop and the heated surface.

What are the results of using heat transfer compounds?

In systems using heat transfer compounds highly predictable heat transfer rates are obtained. The thermal connection provided by Thermon heat transfer compounds increases heat output by 700% to 1300% over bare tracers. One steam tracer with heat transfer compound can maintain pipe temperatures equivalent to 3 to 6 bare steam tracers.

Where are Thermon heat transfer compounds used?

Heat transfer compounds can be used on steam, liquid or electric tracers attached to various types of equipment or for tracers heating process lines transporting such materials such as sulfur, petroleum residues, asphaltic materials, fuel oil, phthalic anhydride, malic anhydride, candy, glue, syrups and many other substances.

Steam tracers installed with heat transfer compound provide heating advantages similar to a steam jacketed system but at a fraction of the installation cost of jacketing. Further, conduction traced lines do not have the disadvantage of potential product cross contamination caused by erosion or corrosion failure at the core pipe as often experienced in a jacketed system. Failures in the core pipe due to erosion caused by high velocity steam, frequently result in product leakage into the steam jacket. Pipe plugging as a result of product cross contamination usually results in costly repairs. Quite often complete sections of jacketed lines and equipment must be replaced, since cleaning is virtually impossible.

One or two tracers with heat transfer compound (conduction tracers) can hold process temperatures that would normally require 4 to 8 or more bare tracers. The conduction tracers not only eliminate the capital cost of the multiple bare tracer tubes and fittings but also the many manifolds and trap stations necessary to service the large number of tracers. Certainly, installation labor costs and future maintenance costs are also drastically reduced.

The Types of Thermon Heat Transfer Compounds and where they are Normally Used

Standard T-3: A material used for temperatures up to 371°C (700°F). It is generally applied on straight runs of piping where the steam or product temperature exceeds 208°C (406°F). Standard T-3 is not waterproof but it is water-resistant when cured. However, it is primarily installed by trowelling it into a 1.2 m long (4 ft) "U" shaped galvanized steel jackets, which are then placed over the steam tracer. The steel jacket is secured to the pipe with stainless steel straps and tightened with a force of 4,448 Newtons (1000 pounds) which holds the tracer permanently against the pipe providing a waterproof barrier which eliminates any thermal bond separation. Standard T-3 is also frequently applied to tracers that are wrapped around valves, pumps, and similar equipment.

T-63: For high temperature applications up to 677°C (1250°F). This material is similar to Standard T-3 except for the higher temperature rating. T-63 is often used on high temperature electrical resistance heating elements to dissipate the heat away from the heater and into the equipment, or on high temperature thermal fluid tracing systems for temperatures above 371°C (700°F).

T-80: For application in cold weather at ambient temperatures from minus 12°C (+10°F) and up. T-80 has a maximum temperature rating of 163°C (325°F). It is suitable for use in areas of extreme moisture and corrosive environments. This material is used on traced piping systems and is particularly suited for use on tracers wrapped around valves, pumps and other equipment.

T-85: For application at ambient temperatures from + 21°C (70°F) and up. T-85 has a maximum temperature rating of 190°C (375°F). It is suitable for use in areas of extreme moisture and in corrosive environments. This material is used on traced piping systems and is particularly suited for use on tracers wrapped around valves, pumps and other equipment.

T-802: A two-part resin based material that is mixed at the time of application. The material is used where heat is not available for curing and will cure in 2 to 4 hours depending on ambient temperature. T-802 is excellent for use in moist and corrosive environments. This material has an upper temperature limit of 135°C (275°F).

SnapTrace®: A preformed flexible waterproof heat transfer compound that is installed 50% to 80% faster than other types of heat transfer compound. It is designed for rapid, consistent installation. SnapTrace is covered with 1.2 m long (4 ft) "U" shaped galvanized steel jackets on straight piping runs of 40 mm (1-1/2 in) and larger. The steel jackets are secured to the pipe with stainless steel straps and tightened with a force of 4,448 Newtons (1000 pounds) which holds the tracer permanently against the pipe providing a strong protective barrier. SnapTrace is non-soluble in most liquids and no special curing is

required when the heating medium is above 93°C (200°F). SnapTrace has an upper temperature limit of 208°C (406°F).

NH (Nonhardening): A mastic heat transfer compound that is commonly used between plate type coils and process vessels. It is also used on equipment that requires periodic disassembly. Because of its high viscosity, NH must be heated to a temperature above 93°C (200°F) for installation. It is non-soluble in most liquids and is used in applications up to 190°C (375°F).

EFS™-1: A flexible preformed sheet of heat transfer compound designed for use between plate-type heating coils and process vessels. This material is the same as the SnapTrace material listed above but is provided in sheets and is used at temperatures up to 208°C (406°F).