

Too Much Heat, Or Not Enough Heat?

July 2004

Steam tracing is simple in concept. Tubing can be easily bent around valves and flanges and attached to the process pipe. Steam tracing generally has no hazardous area classification restrictions and is often the preferred tracing choice. However, the ease of installing steam tracing is also a curse because it is often used indiscriminately without regard for its heat output and performance. In reality, there are at least three major categories of steam tracing methods that will be described herein.

Applications for steam tracing range from freeze protection to holding process pipes at temperatures near the steam temperature. Plant process and utility piping networks are maintain at specified temperatures by determining the heat loss through the thermal insulation and replacing that heat loss with steam tracing. If certain variables are not properly balanced as frequently happens, a tracer may supply more or less heat than necessary. A steam tracing design for temperature maintenance of plant piping or equipment involves six factors. Three factors are given and three are variable. The variable factors must be balanced to establish an appropriate design.

Given

- (1) Nominal pipe size
- (2) Desired pipe temperature
- (3) Low ambient temperature

Variable

- (4) Tracer type, size and number
- (5) Steam temperature
- (6) Insulation type and thickness

Tracer categories include: 1) **Isolated tracers** such as SafeTrace® DLS-IT or SLS-IT; 2) **Bare Tracers** such as SafeTrace® BTS or conventional Bare tracers; and 3) **Conduction Tracers** or tracers installed with heat transfer compound. These tracers provide a series of heat transfer rates to meet a range of temperatures from freeze protection to high process temperatures. See typical selections in Table 1.

Table 1
Typical Tracer Selections

Process Temperature Range - °F (°C)	Tracer Type
Low: 50°F to 100°F (10°C) to (37.8°C)	<ul style="list-style-type: none"> • DLS-IT or SLS-IT Isolated Tracers
Medium-Low: 101°F to 150°F (38.3°C) to (65.6°C)	<ul style="list-style-type: none"> • DLS-IT, SLS-IT Isolated Tracers • BTS or Bare Convection Tracers
Medium: 151°F to 200°F (66°C) to (93.3°C)	<ul style="list-style-type: none"> • DLS-IT, SLS-IT Isolated Tracers • BTS or Bare Convection Tracers • Conduction Tracers (HTC)
Medium-High: 201°F to 300°F (94°C) to (149°C)	<ul style="list-style-type: none"> • BTS or Bare Convection Tracers • Conduction Tracers (HTC)
High: 301°F to 400°F (149.4°C) to (204°C)	<ul style="list-style-type: none"> • Conduction Tracers (HTC)



- DLS-IT and SLS-IT isolated tracers may be used to advantage in the low, medium-low or medium temperature range to warm lines carrying air, water, gasses and other aqueous solutions. These tracers also provide for energy conservation over Bare convection tracers as well as protection for lines carrying sensitive materials such as caustics and acids.
- SafeTrace BTS tracers or Bare convection tracers are generally used in the medium-low, medium or medium-high temperature range for heating of water bearing process fluid streams, solvents and other such materials. BTS tracers and Bare tracers of the same diameter, provide substantially identical heat transfer rates.
- Conduction tracers are used for the medium, medium-high or high temperature range (depending upon pipe size) for temperature maintenance or heat-up requirements involving materials such as asphalt, benzoic acid, phthalic anhydride, sulfur and others.

When evaluating the production and consumption efficiencies of steam, the focus is generally on optimizing boiler performance and reducing energy losses due to steam leaks, steam trap failures, and non-insulated or poorly insulated systems. These are all very important areas of consideration, but a frequently overlooked energy consumer that can also be optimized for energy conservation is steam tracing. When viewed from the perspective of how much steam tracing exists in a typical refinery or chemical complex, the potential for reducing energy consumption and hydrocarbon pollutants can be startling. A typical chemical plant can have 180,000 feet of traced pipe or more and a typical refinery may have 2 to 4 times that much. Most Industrial facilities will carry steam in the pressures shown in Table 2.

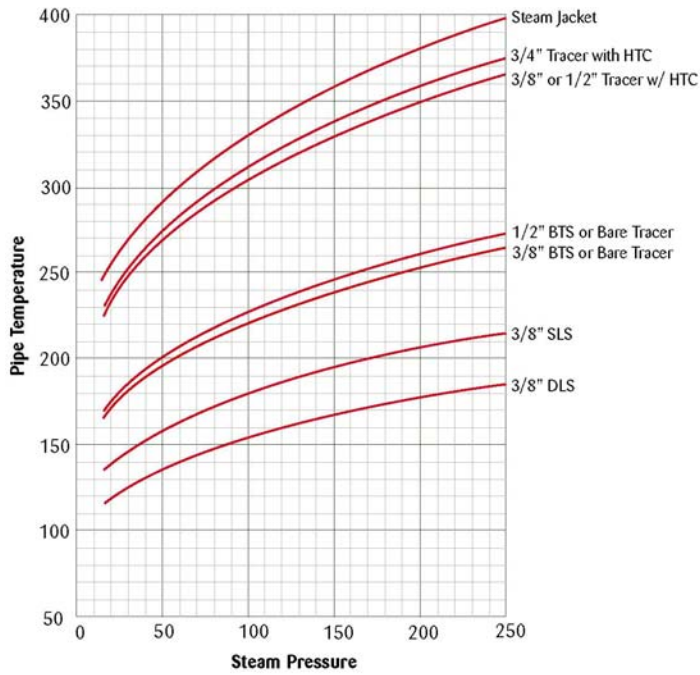
Table 2
Typical Steam Pressures

Low Pressure Steam	10 psig to 49psig (0.7 bar g to 3.4 bar g) 239°F to 297°F (115°C) to (147°C)
Medium Pressure Steam	50 psig to 249 psig (3.5 bar g to 17.2 bar g) 298°F (148°C) to 405° (207°C)
High Pressure Steam	250 psig to 600 psig (17.2 bar g to 41.4 bar g) 406°F (208°C) to 489°F (254°C)

The following set of steam tracing charts plot the process temperatures that can be maintained against the steam pressure for 4-inch (100mm) and 10-inch (250mm) pipes under the stated conditions. Individual curves are given for the installation of one through four parallel tracers. The charts illustrate how DLS-IT or SLS-IT Isolated tracers (providing soft heat) may take the place of a temperature controller when compared to the temperature that would be attained with BTS or Bare tracers. The illustrations also make it clear how Conduction tracers can often take the place of a Steam Jacket.

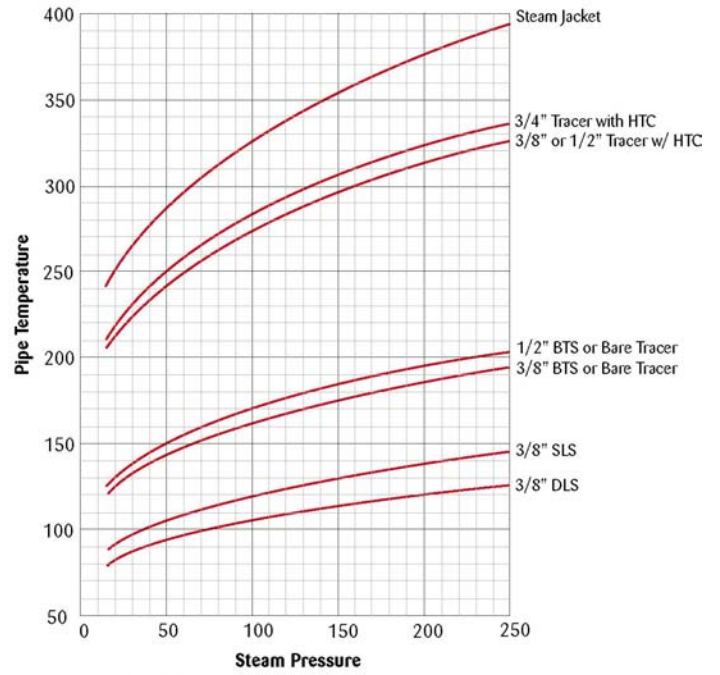


One Steam Tracer on 4" Process Pipe



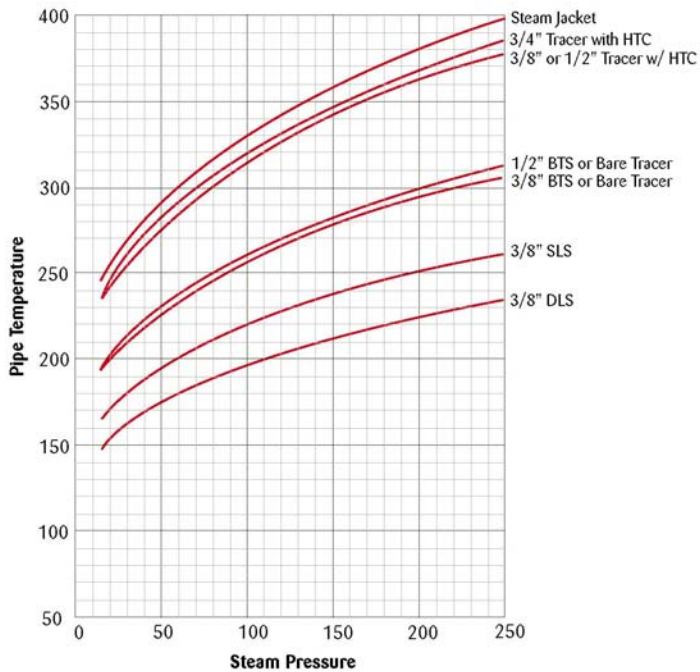
Insulation: 2" Mineral Wool
Ambient: 10° F
Wind Speed: 25 Mph

One Steam Tracer on 10" Process Pipe



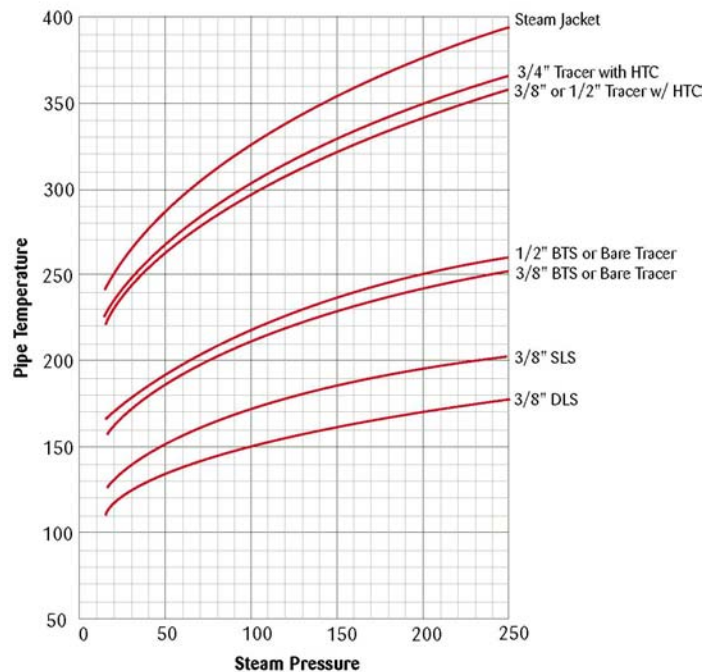
Insulation: 2" Mineral Wool
Ambient: 10° F
Wind Speed: 25 Mph

Two Steam Tracer on 4" Process Pipe



Insulation: 2" Mineral Wool
Ambient: 10° F
Wind Speed: 25 Mph

Two Steam Tracer on 10" Process Pipe

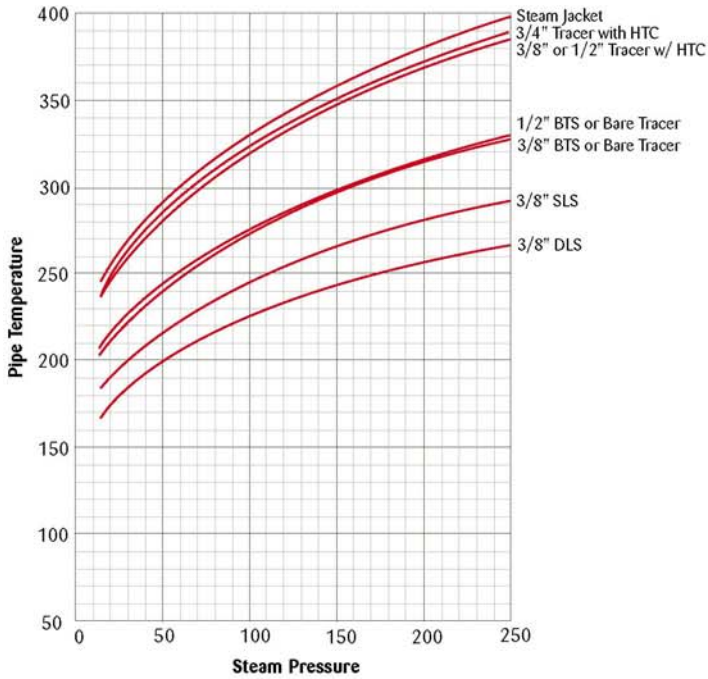


Insulation: 2" Mineral Wool
Ambient: 10° F
Wind Speed: 25 Mph



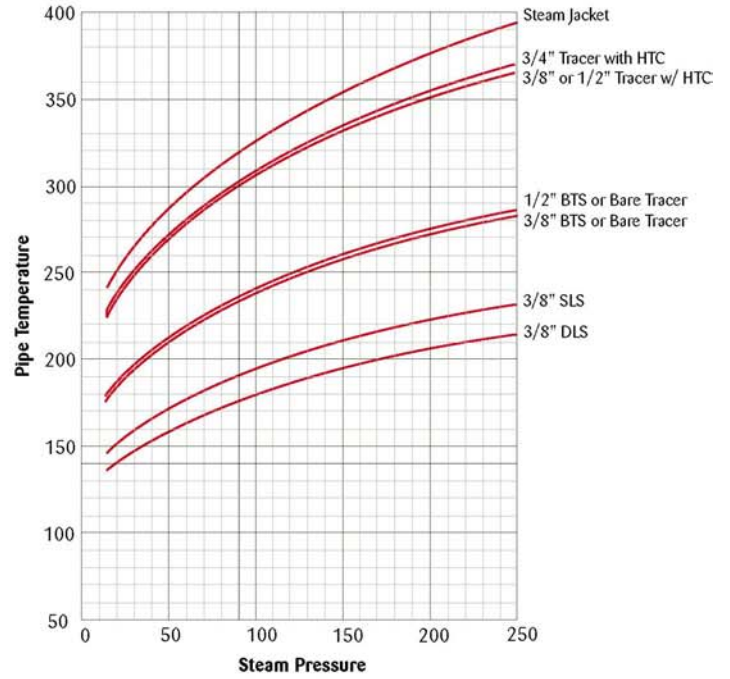
THERMOTips

Three Steam Tracer on 4" Process Pipe



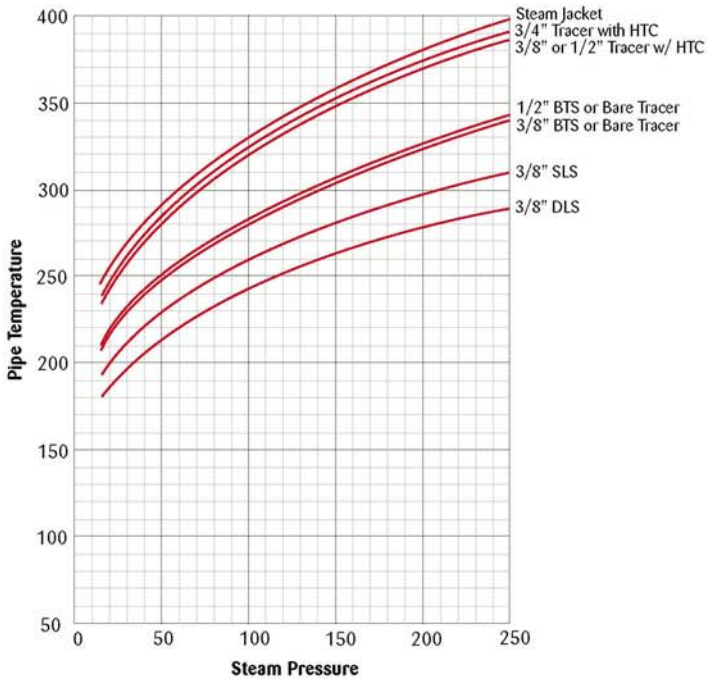
Insulation: 2" Mineral Wool
Ambient: 10° F
Wind Speed: 25 Mph

Three Steam Tracer on 10" Process Pipe



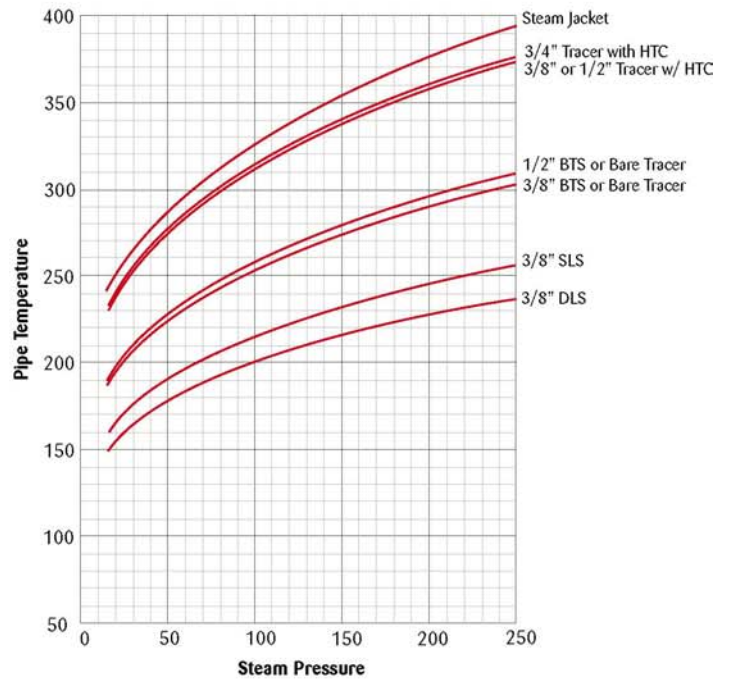
Insulation: 2" Mineral Wool
Ambient: 10° F
Wind Speed: 25 Mph

Four Steam Tracer on 4" Process Pipe



Insulation: 2" Mineral Wool
Ambient: 10° F
Wind Speed: 25 Mph

Four Steam Tracer on 10" Process Pipe



Insulation: 2" Mineral Wool
Ambient: 10° F
Wind Speed: 25 Mph



The Heat Tracing Specialists®