UOP LLC • 25 East Algonquin Road • Des Plaines, Illinois 60017-5017 • USA

STEAM HEAT TRACING

DATE	STATUS	APVD	AUTHD
11JUL05	Revised	JLS	RGP

1. GENERAL

1.1 Scope

a. This Standard Specification covers the general requirements for the design, construction, materials, and installation of external steam heat tracing.

b. Exceptions or variations shown in the UOP Project Specifications take precedence over requirements shown herein.

1.2 References

Unless noted below, use the edition and addenda of each referenced document current on the date of this Standard Specification. When a referenced document incorporates another document, use the edition of that document required by the reference document.

a. American Society for Testing and Materials (ASTM), A179, B68, B75, and B88.

b. National, state, and local governmental regulations and laws.

2. DESIGN

2.1 General

a. Steam tracing equipment for temperature maintenance or to prevent freezing shall be provided for the services specified in the UOP Piping and Instruments Diagrams and/or the UOP Project Specifications.

b. For piping and equipment which appear on the UOP Piping and Instrument Diagrams, the extent of protection shall be as shown on the UOP Piping and Instrument Diagrams.

c. The heat tracing objective temperature, which is the minimum temperature of piping, equipment and contents to be maintained by the heat tracing, is shown on the UOP Piping and Instrument Diagrams for each heat tracing application.

d. The winterizing temperature to be considered for heat tracing design is shown in the Basic Engineering Design Questionnaire, Section 4.1, “Winterizing Temperature”.

e. The applications where tracing methods other than steam heat tracing are mandatory are listed in UOP Project Specification, 000, “Instructions for the use of UOP Design Specification”.

f. Steam heat tracing shall be designed to maintain the traced piping and equipment at or above the specified heat tracing objective temperature when the ambient temperature is at the specified winterizing temperature.

g. Design of insulation and jacketing shall be per UOP Project Specification, - 907 Insulation and Weathershielding. Insulation thickness shall be based on the higher of steam and process temperature.

h. Insulation I.D. shall be one size larger than the nominal pipe size.

2.2 Piping

a. Determination of the number of parallel steam tracers for traced lines shall be the responsibility of the Contractor.
b. Tracer size shall be 3/8 inch OD tubing or 1/2 inch OD tubing for lines of 1 1/2 inch diameter and smaller.
c. Tracer size shall be 1/2 inch OD tubing for lines between 2 inch and 12 inch diameter, inclusive.
d. Tracer size shall be 1/2 inch OD tubing for lines 14 inch diameter and larger. The Contractor may, at their option and responsibility, use larger size tubing or 1/2 inch (or larger) steel pipe.
e. Contractor may, at their option and responsibility, use heat transfer cement to minimize the number of tracers. When heat transfer cement is used, the steam tracers shall be placed on the top of the pipe to effect an easier installation.

2.3 Equipment

Design of steam heat tracing for vessels, pumps, exchangers, etc. shall be the responsibility of the Contractor.

2.4 Instrumentation

a. Steam heat tracing shall not be permitted for displacement type level instruments, gauge glasses, pressure transmitters, and differential pressure transmitters. Steam heat tracing shall not be permitted for the piping and tubing connected to these instrument types.
b. Design of steam heat tracing for other instrumentation shall be the responsibility of the Contractor.

3. CONSTRUCTION AND INSTALLATION

3.1 Steam Tracing Details

Steam heat tracing systems shall be constructed and installed in accordance with the following criteria:

a. A single tracer on a horizontal line shall be installed under the pipe as per Figure 1(a). Multiple tracers on horizontal lines shall be installed per Figures 1(b) and 1(c).
b. Tracers shall be held in place with bands or 16 gauge (1.5 mm diameter) wire ties on 12 inch - 18 inch (300 mm - 450 mm) centers.
c. Each tracer shall have its own steam supply valve and steam trap.
d. Steam supply branch lines to tracers shall be steel pipe of the same nominal size as the tracer.
e. Tracers shall slope in the direction of condensate flow. Spiral tracing shall not be used except where it is continuously free draining.

f. The sum of tracer pocket heights, in feet, shall not exceed 15% of the inlet steam pressure, in psig. The sum of tracer pocket heights, in meters, shall not exceed 65% of the inlet steam pressure, in kg/cm2(g).

g. The maximum length of a tracer, between the supply valve and the steam trap, shall be 100 feet (30 meters) for 3/8 inch tubing. For 1/2 inch tubing, the maximum length shall be 100 feet (30 meters) if the steam pressure is less than or equal to 100 psig (7.0 $kg/cm^2(g)$) and 200 feet (60 meters) if the steam pressure is greater than 100 psig (7.0 $kg/cm^2(g)$).

h. Steam traps shall be installed with a gate valve in the inlet line. If condensate is collected, a gate valve shall be installed in the outlet line.

i. Contractor shall be responsible for selecting the type of steam trap.

j. When two or more tracers in series are required for a specific line, the untraced gap between the ends of the two tracers shall be less than 6 inches (150 mm).

k. Contractor shall be responsible for accommodation of thermal expansion.

l. Tracers shall contain a horizontal expansion bend for each 2 inch (50 mm) of thermal expansion or each 50 feet (15 meters) of length.

m. Steam tracers shall not be installed on pipes, equipment, or instrumentation until the pipe, equipment, or instrument has met all required inspections and tests. Supply equipment upstream of the steam supply valve, the steam supply valve, the steam trap, and equipment downstream of the steam trap may be installed prior to all inspections and tests being completed.

3.2 Winterize, Insulate, Steam Trace, Insulate (WISI)

Lines indicated WISI on the UOP Piping and Instrument Diagrams shall have the tracer insulated from the line using 1/2 inch thick x 2 inch long x 1 inch wide (13 mm x 50 mm x 25 mm) blocks of rigid insulating material at approximately 12 inch (300 mm) intervals (see Figure 1(d)). Spacer and tracer shall be banded to the pipe and the entire assembly insulated with an outer layer.

4. MATERIALS

4.1 Insulation

Insulation and jacketing materials shall be per UOP Project Specification, - 907 Insulation and Weathershielding.

4.2 Steam Tracers

a. Copper tubing shall be used for tracing where the maximum temperature of the tracing steam and of the traced line is 400°F (205°C) or below.

b. Steel tubing shall be used for tracing where the temperature of either the tracing steam or the traced line is between 400°F (205°C) and 700°F (370°C).

c. Contractor shall be responsible for selecting the tracer material where the temperature of the tracing steam or the traced line exceeds 700°F (370°C).

d. Copper tubing shall be ASTM B68, B75, or B88 (Type K only), UNS No. C12200, temper O60, soft annealed, seamless tubing. The 3/8 inch OD tubing shall have a minimum wall

thickness of 0.032 inch (0.81 mm) and 1/2 inch OD tubing shall have a minimum wall thickness of 0.035 inch (0.89 mm).

e. Copper tubing connectors shall be the brass compression type.

f. Steel tubing shall be ASTM A179 seamless tubing. The 3/8 inch OD tubing shall have a minimum wall thickness of 0.032 inch (0.81 mm) and 1/2 inch OD tubing shall have a minimum wall thickness of 0.035 inch (0.89 mm).

g. Steel tubing connectors shall be the steel compression type.

h. Steel bands or soft galvanized steel wire ties shall be used for steel tracers.

i. Copper bands or copper wire ties shall be used for copper tracers.

j. Contractor shall be responsible for selection of spacer material in WISI application as shown in Figure 1(d).

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STANDARD SPECIFICATION

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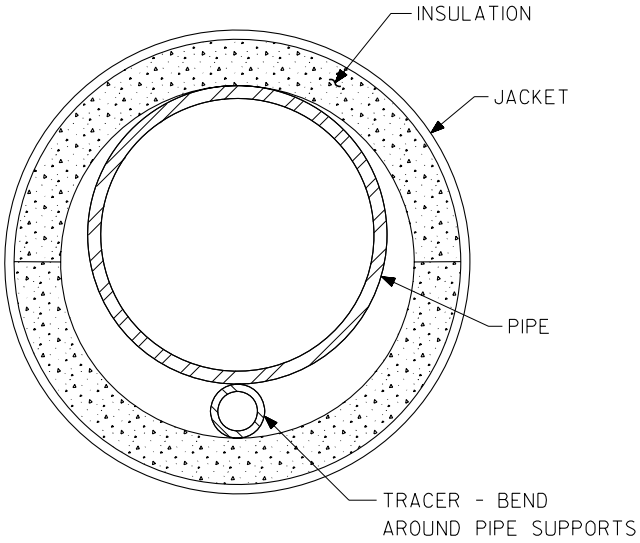

Figure 1(a)
Single Tracer

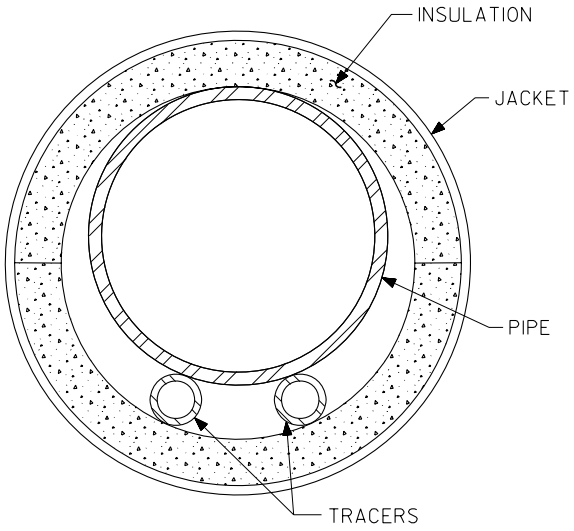

Figure 1(b)
Double Tracer

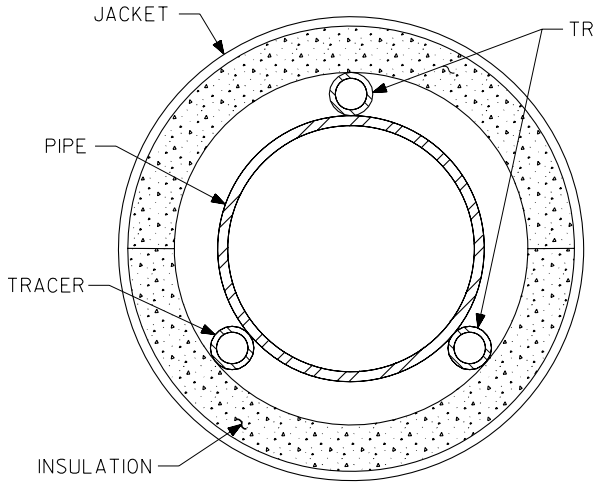

Figure 1(c)
3 or More Tracers
Equally Spaced

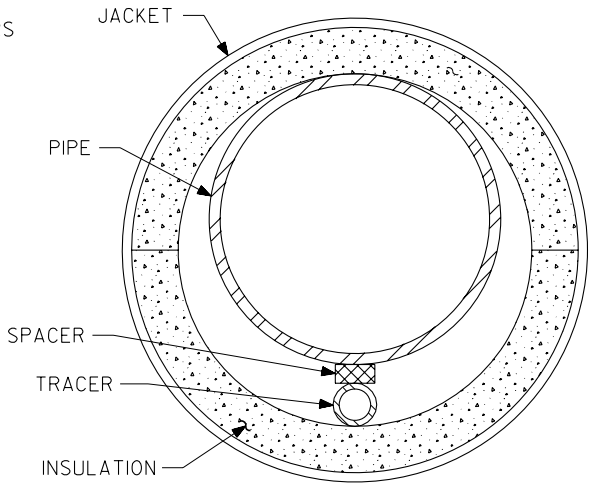

Figure 1(d)
WISI – Winterize, Insulate
Steam Trace, Insulate

Figure 1