Spence N450 SeriesThermostatic Steam Traps

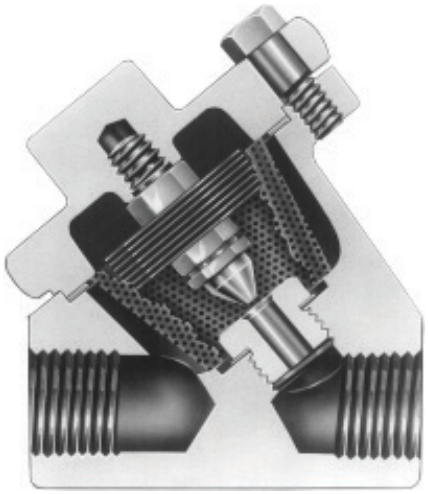

Figure 1. *N450 SeriesThermostatic Steam Traps*

Features

- **Compact –** Easy to install.
- **Inexpensive –** Low initial cost.
- **Improved Energy Savings –** High efficiency-maximum elimination of air and non-condensibles.
- **Temperature Sensitive Actuators –** One moving part. Stainless Steel, fail open, welded actuator for maximum corrosion, thermal and hydraulic shock resistance.
- **Hardened Stainless Steel Valve and Seat –** Long life. Lapped as a matched set for water tight seal.
- **Easily Maintained –** Can be inspected and serviced without breaking pipe connections.
- **Freeze Proof –** Self draining when installed vertically.
- **For Superheated Steam Applications –** Because the trap closes at saturated steam temperature, superheated steam cannot reach trap.
- **Air Vent –** Efficient steam service air vent when equipped with ISO filled Actuator and installed in air vent location.

Introduction

A steam trap is a mechanical valve which discharges condensate, undesirable air and non-condensibles from a system while trapping or holding in, steam. Thermostatic steam traps operate in direct response to the temperature within the trap.

N450 Series steam trap is a balanced pressure design with stainless steel welded actuator capable of discharging condensate within 10°F / -12°C of saturated temperature.

For greater sensitivity, SLR orifice and sterilizer trim are available to allow condensate evacuation at or near saturated temperatures. If subcooling of condensate is desired, alternate thermostatic actuator is available to allow condensate evacuation at or near 40°F/ 4.4°C below saturated temperatures.

Thermostatic actuator has a conical valve lapped in matched sets with the seat ring assuring tight shut off. A minimum of three orifice sizes is available allowing for custom capacity sizing. Trap is forged carbon steel-bodied suitable for pressures through 450 psig / 31 bar and available in NPS 1/2 and 3/4 / DN 15 and 20 in NPT end connection.

Specifications

This section lists the specifications for the N450 Series. Factory specifications are stamped on the nameplate fastened on the steam trap at the factory.

Available Configuration[1]
- **Type N451-FO:** Low capacity, fail open only
- **Type N452:** Reduced capacity
- **Type N453:** Standard capacity
- **Type N454:** High capacity

Body Size
NPS 1/2 and 3/4 / DN 15 and 20

End Connection
NPT and Socket Weld

Maximum Operating Pressure[2][3]
450 psig / 31 bar g

Maximum Allowable Pressure[2][3]
450 psig / 31 bar g

Maximum Operating Temperature[2]
600°F / 316°C

Maximum Allowable Temperature[2]
750°F / 399°C

Capacity Information
See Table 1

Materials of Construction
- **Body:** Steel
- **Cover:** Stainless steel
- **Cover Gasket:** Stainless steel with graphite fill

Materials of Construction (continued)
- **Actuator:** Welded Stainless Steel
- **Valve and Seat:** Hardened 416 Stainless Steel

Applications
- Unit Heaters
- Air Vents
- Steam Tracing
- Drip Legs
- Platen Presses
- Plating Tanks
- Sterilizers
- Tire Presses
- Cooking Equipment
- Laundry Equipment
- Other Process Equipment

Options
- **SK:** Skirted Seat[4]
- **SLR:** SLR Orifice
- **ISO:** ISO Filled Actuator[4]
- **ST:** Sterilizer Trim

Approximate Weight
3 lbs / 1.4 kg

1. Add (-FC) for fail closed or (-FO) for fail open to end of type number.
2. The pressure/temperature limits in this Bulletin and any applicable standard or code limitation should not be exceeded.
3. Consult factory for pressures greater than 300 psi / 20.7 bar.
4. Not available on Type N451.

Principle of Operation

Thermal actuator is filled at its free length with a liquid having a lower boiling point than water. On start-up, valve is normally open. When steam enters trap, thermal actuator fill vaporizes to a pressure higher than line pressure. This forces valve into seat orifice to prevent any further flow. As condensate collects, it takes heat from thermal actuator, lowering internal pressure. Line pressure will then compress thermal actuator to open valve and discharge condensate. Valve opening automatically adjusts to load conditions from minimum on very light loads to full lift at maximum load. Restricted orifice in Type N451 seat (small opening at bottom of valve seat) prevents trap from discharging continuously on light loads such as are encountered on tracer lines.

Installation

1. Before installing trap, blow all dirt and scale from apparatus and piping.
2. Install trap with arrow on body in flow line as close as possible to apparatus with strainer and valve upstream of trap.
3. Pitch all drain lines toward trap.

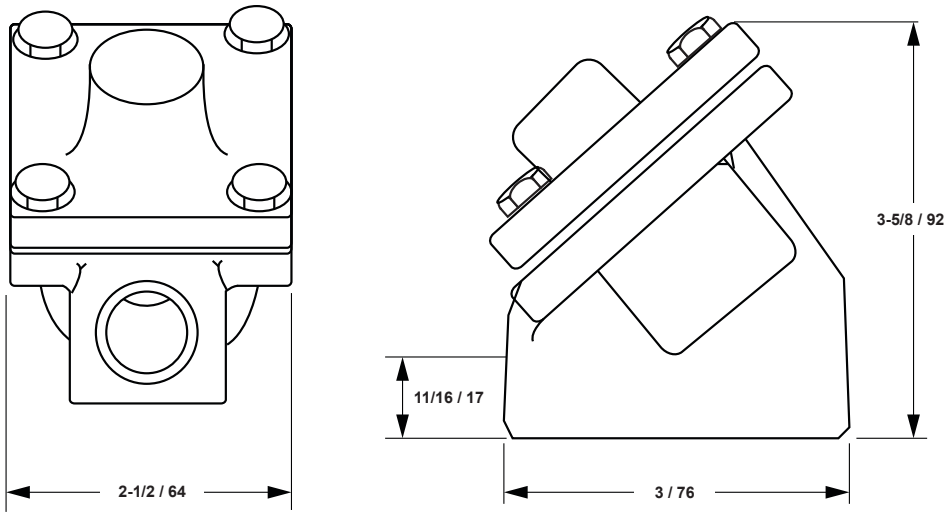

Figure 2. *N450 Series Dimension*

Table 1. *Maximum Capacity - lbs/hr 10°F Below Saturation / Kg/hr 5°C Below Saturation*

TYPE	ORIFICE, IN. / mm	DIFFERENTIAL PSIG / bar g												
		5 / 0.34	10 / 0.7	20 / 1.4	50 3.4	100 / 6.7	125 / 8.4	150 / 10.1	200 / 13.4	250 / 16.8	300(1) / 20.1	350(1) / 24.1	400(1) / 27.6	450(1) / 31.0
		lbs/hr / kg/hr												
N451	5/64 / 2	84 / 38	119 / 54	168 / 76	265 / 120	348 / 158	375 / 170	398 / 181	439 / 199	472 / 214	502 / 228	529/ 240	553/ 251	575/ 261
N452	1/8/ 3	216 / 98	265 / 120	375 / 170	592 / 269	778 / 354	838 / 381	890 / 405	980 / 445	1055 / 480	1121 / 510	1180 / 536	1235 / 561	1284 / 584
N453	1/4/ 6	550 / 249	825 / 374	1210 / 549	1975 / 896	2825 / 1281	3140 / 1424	3425 / 1554	3650 / 1656	3960 / 1796	4100 / 1860	4230 / 1919	4420 / 2005	4600 / 2086
N454	5/16 / 8	860 / 390	1220 / 554	1725 / 783	2725 / 1237	3575 / 1623	3850 / 1748	4090 / 1857	4505 / 2045	4850 / 2202	5155 / 2340	5425 / 2463	5675 / 2576	5900 / 2679

1. Emerson Process Management Regulator Technologies, Inc. (Emerson) recommends skirted seat above 300 psig / 20.7 bar. Emerson recommends ISO filled Actuator for superheated steam.

Note

Approved practice is to install separate traps on each piece of apparatus to be drained. Steam supplied to inlets of several units may be of uniform pressure, but invariably there is a differential at the outlets. Although this differential may be small, unit discharging highest pressure will control the action of trap, while other units become air-bound and water logged. Piping upstream and downstream of trap should be at least equal to or one size larger than trap connection.

4. Record the location of the trap for maintenance accessibility.

Capacity Information

Capacity information for every type of N450 Series is shown in Table 1.

Ordering Information

When ordering, complete the ordering guide on this page. Refer to the Specifications section on page 2.

Review the description to the right of each specification and the information in each referenced table or figure. Specify your choice whenever a selection is offered.

N450 Series

Ordering Guide

Type (Select One)
- ☐ Type N451-FO
- ☐ Type N452
- ☐ Type N453
- ☐ Type N454

Body Size (Select One)
- ☐ NPS 1/2 / DN 15
- ☐ NPS 3/4 / DN 20

End Connection (Select One)
- ☐ NPT

Options (Select One)
- ☐ SK - Skirted Seat[1]
- ☐ SLR - SLR Orifice
- ☐ ISO - ISO Filled Actuator[1]
- ☐ ST- Sterilizer Trim

1. Not available on Type N451.

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