NICHOLSON STEAM TRAP

Nicholson Steam Trap was founded in 1883 by W. H. Nicholson, Sr. He, along with his sons William, George and Samuel produced a variety of steam specialty products at their facility in Wilkes-Barre, Pennsylvania. Trap manufacturing was begun early in the twentieth century with the precursor to our current weight operated series traps. In the 1930's, a wide range of bellows-activated thermostatic traps were developed, the descendants of which are still built today in a modern facility at Walden, New York which manufactures a wide range of products from safety valves to control valves and, of course, steam traps.

The Nicholson Steam Trap product line is focused on the industrial marketplace and features traps ranging from highly polished stainless steel sanitary traps to innovative free float F&T traps. Nicholson thermostatic traps are known throughout the industry for their value and durability. Equally respected in naval yards are Nicholson orifice traps, offering long life and easy maintenance. A recent product introduction is the Condensate Commander Pump; a steam powered pump available in several sizes including prefabricated skid mounted systems. These continue the Nicholson tradition of providing high performance, value-oriented products to the industrial marketplace.

Nicholson Steam Trap, located in Walden, New York, has been producing a full line of steam specialties including steam traps, condensate pumps, sanitary steam traps, air traps and drain orifice unions since 1883. Nicholson Steam Trap is a Division of Spence Engineering Company, Inc.

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Technical Reference

Application Drawings

The Nicholson Advantage is Service

Local Technical Support

Nicholson Steam Trap has a network of technically trained Representatives around the world. These Representatives can direct you to local inventory of our products for fast, fast service. They can also help you in the selection and sizing of Steam Traps, Air Traps, Condensate Pumps and other Steam Specialties.

Technical Training

We offer a regular schedule of workshops covering various technical issues in our state of the art Valve Technology Training Center. We can also schedule customized training sessions to suit your particular needs.

ENGINEERING SEMINARS. These seminars provide the engineer with the skills of steam trap selection and sizing.

DISTRIBUTOR SEMINARS. This seminar will provide you with all the information you need to serve your customers.

MAINTENANCE SEMINARS. Maintenance personnel will receive hands-on training in selection, installation, operation, maintenance and troubleshooting.

Nicholson Guarantee

Nicholson Steam Trap warrants that the products we manufacture will be free from any defects in material or workmanship for a period of one year (or longer, when specified in product literature) from receipt by purchaser.

International Sales

Nicholson is well equipped to provide product to our customers around the world. We regularly ship our products to all parts of the world. Our experienced international sales group can meet the transport and documentation requirements of our international customers with ease. Our network of International Technical Sales Representatives will also be able to provide you with product from local inventory.

Canadian Sales

Nicholson maintains a technical sales representative network throughout the Canadian provinces. Nicholson products are registered with Canadian federal and provincial authorities. Canadian Registration Numbers are available. Please consult factory for a particular product CRN.

How to Use this Handbook

If you already know the product that you want information on, find the product page in the Table of Contents. Detailed product information on materials, ratings, dimensions, weights and applications are found in the Products Sections. General application and design information is in the Primer Section.

If you are not sure of what you need, collect all the following information. You will need it to select the right product for your needs.

Service (i.e.: Steam, Compressed Air, Water, etc.)

Inlet Pressure

Flow Rate (or Capacities)

Outlet or Condensate Return Pressure

Application (i.e.: Condensate Removal, Pump, Pipe Couplings, etc.)

Application data is listed on all Product Pages. If you identify the nature of the installation, it will assist you selecting the proper equipment.

What Kind of Trap is needed?

Bucket? F&T? Disc? Steam Pump? First the objective must be defined - then a trap must be chosen. If pumping is required then a condensate commander must be selected. Once the requirements for condensate removal have been defined, the primer section may be consulted to best match product characteristics to the application at hand. Following the primer section the trap selection guide should help refine the search. For those who possess a basic understanding of traps and the Nicholson product line, starting with the trap selection guide may be appropriate.

Once the application parameters have been defined (e.g. condensate removal from a 70 psi steam system, drip leg application, continuous duty, 180 lb/hr condensate flow) and a design of trap decided upon (e.g. thermostatic, carbon or stainless steel construction, 200 psi minimum operating pressure, integral strainer) the product section should be consulted to determine the range of traps available. Often several traps may meet the need. General preferences such as repairable design versus sealed, maintenance free designs, size and piping configuration, and cost are a few considerations that will help select a specific type trap.

Economical, Long life, or Best suited for the Application

Unfortunately, the best trap for an application may not necessarily be the least expensive or have the longest life span. Typically, other considerations such as ease of maintenance, initial cost, piping considerations, etc. may influence trap selection. The product section will list all pertinent specifications including overall length and features that may influence trap selection.

Steam Trap Selection

Types of Steam Traps

Type	Thermostatic		Mechanical	Thermodynamic		Orifice
	Bellows	Bimetal	F & T	Bucket	Disc	Orifice
Condensate Discharge	Intermittent	Intermittent	Continuous	Intermittent	Intermittent	Continuous

- The optimum application of a trap is dependent upon the characteristics of the process and equipment with which it is used and its pattern of condensate discharge.
- The discharge capacity of a trap is determined by the pressure differential (trap inlet pressure minus outlet pressure) and the size of the orifice. Thermodynamic and Thermostatic traps (radiator and temperature modulating) have a fixed orifice size.
- Mechanical traps differ from the other types in that their orifice (discharge opening) must be selected to accommodate the maximum operating differential pressure.

Caution Failure to select the proper orifice may result in insufficient discharge capacity, waterlogging or locking of the trap.

Selecting a Steam Trap

It is important to select a product with the optimum capacity from the many types which are available. Use the following procedure to make sure the correct product is selected.

1 **Application** — Define the application and the type of service in which it will be used.

The conditions under which a trap must operate will differ according to where it it installed.

→ **Steam Trap Application Guide**

2 **Confirmation of Operating Conditions** — Check the maximum operating pressure, temperature, discharge rate and other conditions.

Do not oversize the trap. Select the smallest capacity trap, yet avoid undersizing and ensure safe, accurate operation given the conditions of inlet pressure, temperature and pressure differential under which it will operate.

→ **Check List for Confirming Operating Conditions**

→ **Discharge Rate Tables for Each Model**

3 **Maintenance Preference** — Confirm whether inline repair feature or maintenance free technology is desirable.

→ **Specification Tables for Each Model**

Check List for Confirming Operating Conditions

(A) Confirmation of Conditions

1.	What is the application?	
2.	Which trap is appropriate for the application?*1	
3.	What is the trap inlet pressure?*2	psig
4.	What is the outlet pressure?*2	psig
5.	What is the condensate load?	lb/Hr

(B) Selection

1. The required discharge capacity of the trap is ___ times*3 the amount of condensate generated.
2. Inlet pressure – Outlet pressure = Pressure differential.
3. Select a trap with a maximum operating pressure equal to or slightly above the inlet pressure to the trap.
4. Select a discharge rate for the pressure differential from the discharge capacity chart.

	Discharge	Product name	Pressure differential	Required discharge capacity
❑			psig	lb/Hr
❑				
❑				

5. The trap with the smallest discharge capacity greater than that required is the optimum trap.
6. Connection size ____ in
7. Connection Type

■ Screwed ■ Flanged (flange standard_____) ❑ Socketweld

*1. See tables for selection of a steam trap by application.

*2. If unknown, is condensate recovered?..... ■ Yes ■ No...(back pressure = 0 psig)

If condensate is recovered

① How many feet does the trap outlet rise?	ft.	x 0.5 =	psig
② What is the total pipe length from the trap to the recovery tank?	ft.	x 0.01 =	psig
③ What is the pressure of the condensate recovery tank?			psig
④ Add ①, ② and ③ .....{This is the outlet pressure (back pressure).} ① + ② + ③ =			psig

*3. Safety Factor
The margin of safety which is determined by the operating characteristics of each piece of equipment is referred to as the "safety factor." The safety factor required will differ according to the type of trap (type of condensate discharge). The discharge rate table for each model shows the values for condensate discharge when the trap is fully open, and the maximum rated condensate load on the equipment should correspond to the value obtained by dividing this discharge rate by the safety factor (see Steam Trap Application Guide on opposite page).

Steam Trap Application Guide

This guide is designed to direct the user to a General Steam Trap Technology section. Once a technology is selected, additional details, regarding specific steam traps, can be found in the catalog under the Technology Selection tab.
These choices, in the Guide, are based on many years of steam trap manufacturing experience. The choices, however are not limited to these alone. Variations in individual systems (superheat, water hammer, insulation, etc.), as well as personal preference, should be taken into consideration.

Application		Thermo-static	Thermo-dynamic	Free Float	Inverted Bucket	Float & Thermostatic	Orifice	Minimum Safety Factor
Drip & Tracing								
Main Drip	to 30 PSIG	1		2	3	2	4	1.5:1
	to 300 PSIG	1	2	3	2	3	3	1.5:1
	to 650 PSIG	1	2			3	2	1.5:1
	to 2500 PSIG						1	1.5:1
Steam Tracing		1	2	2	2	2	3	1.5:1
Process								
Heat Exchanger	to 20 PSIG	2		1	2	1		2:1
	to 150 PSIG	1		1	2	1		2:1
	to 300 PSIG	1		1	2	1		2:1
	to 600 PSIG			1				2:1
Cooker/Reactor	to 15 PSIG	2		1	3	1		3:1
	to 60 PSIG	1		1	3	1		3:1
	to 150 PSIG	1		1	3	1		3:1
	to 600 PSIG	2		1				3:1
Pressing	to 100 PSIG	1		1	2	1		3:1
	to 300 PSIG	1	2	2	2			3:1
Reboiler		2		1	3	1		2:1
Rotating Cylinders		2*		1*	2		3	3:1
Sterilizer		1		2		2		2:1
Tank Heating	Storage	1		2		2		1.5:1
	Line Heater	1		2		2		3:1
Evaporator				1	2	2		2:1
HVAC								
Air Heating Coils	to 15 PSIG	2		1	3	1		2:1
	to 60 PSIG	2		1	2	1		2:1
	to 250 PSIG	2		1				3:1
Radiator		1					4	2:1
Unit Heater		1		1	2	1		2:1
Absorption Chiller		2		1	2	1		2:1

*Requires Steam Lock Release

KEY Blank = not recommended
1 = First Choice 3 = Third Choice
2 = Second Choice 4 = Fourth Choice

Steam Trap Selection Criteria Matrix

FUNCTION	Thermostatic	Thermodynamic	Mechanical		Orifice	Free Float
			F & T	IB		
Response to Load Changes	Moderate	Slow	Fast	Moderate	Very Slow	Fast
Air Venting	High	Low	Med/High	Low	Low	High
Thermal Efficiency	High	Medium	Med/High	Medium	High†	Med/High
Applications	Drip Legs Tracing Process Eqpt.	Drip Legs Tracing	Drip Legs Process Eqpt.	Drip Legs Process Eqpt.	Drip Legs	Drip Legs Process Eqpt.
Affected By Ambient Temperatures	No (unless insulated)	Yes	No (susceptible to freezing)		No	No (may freeze)
Relative Cost	Low	Low	Meduim	Med/Low	Low	Meduim
Capacity	Medium	Low	High		Low	High
Pressure Range	to 650 psi	10 to 600 psi	to 650 psi	to 250 psi	to 2500 psi	to 650 psi
Size vs. Capacity	Small	Medium	Large		Small	Large
Life Expectancy	Moderate	Moderate	Moderate	Moderate	Long	Long
Ease of Maintenance	Very Easy	Very Easy	Moderate		Very Easy	Moderate
Orientation Limits	No	No	Yes		No	Yes

† Within narrow load range.

Nicholson Steam Trap Options

Steam Lock Release (SLR) Orifice

Specify where immediate elimination of condensate and improved sensitivity is desired. This option may also improve performance in applications where condensate must be lifted upstream from the trap. Allows continuous discharge of condensate. Trap will nominally pass 50 lb/hr of condensate at 50 psi within 2°F of saturated temperature.

Skirted Seat Trim

Recommended for higher pressure service, often over 300 psi. Minimizes erosion by dispersing trap discharge.

Sterilizer Trim

Specify where immediate elimination of condensate and improved sensitivity is desired. Shorter seat opens more quickly in presence of condensate. Hotter discharge temperature.

Internal Strainer

Recommended where steam may be contaminated with pipe scale or other particulate matter. Screen reduces deposits on valve and seat.

Blowdown Valve

Specify to clean strainer area and remove debris trapped before strainer. Also used to determine whether steam or water is present before the steam trap.

ISO Filled Actuator

Specify to reduce flash steam, provide highest thermal efficiency and/or air vent operation is desired. This option will subcool condensate by approximately 40°F. For use in applications above 500 psig and/or for superheated steam.

Welded Actuator

Specify where long service life and/or fail open operation is desired.

Continuous Bleed Air Vent

Replaces thermostatic air vent with a 1/32 inch orifice.