

ORIFICE STEAM TRAPS

Nicholson is an industry leader in orifice technology for condensate removal. The Nicholson technology (developed in conjunction with the US Navy in the 1970's) has provided nuclear and conventional vessels with safe, efficient condensate removal for more than a quarter century. This technology, adapted to commercial and industrial applications, provides consistent condensate removal via virtually maintenance free devices. These products, with life spans exceeding 10 years, further the Nicholson reputation for providing high performance products at competitive prices.

TYPE DFA DRAIN ORIFICE STEAM TRAP

Pressures To 2500 PSIG (172 barg)
Temperatures to 750°F (400°C)

Applications

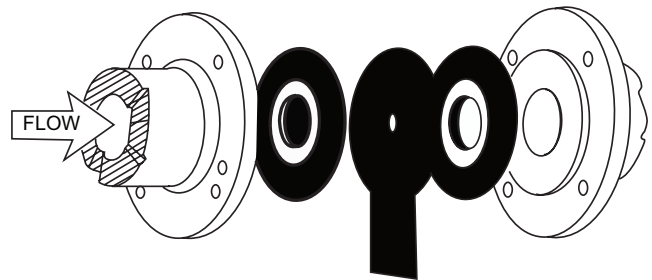
- Pressure Reduction
- Ratio of Flow-mixing two or more fluids at fixed ratio
- Fixed Flow-i.e. gland seal recirculation of cooling water on pumps, compressors, process analyzers, etc.
- Intermittent Drainage-i.e. air tools, air storage tanks, cleaning fixtures, air vents, etc.
- Cryogenic Storage Venting
- Low Pressure Blanking
- Sampling of process fluids at a fixed flow rate for use with Instrument Analyzers

Energy Saving Benefits

- Design factor results in reduced initial steam loss.
- Fuel savings up to 50% achieved in applications during past 10 years.
- Maintains low rate of steam loss over entire service life.
- Cannot fail open, eliminating large steam losses.

MODELS

- **DFA**–Drain Orifice Trap with gaskets and inlet screen.
- **DFR**–Replacement gasket kit including inlet screen.



Operating Benefits

- Accommodates varying condensate loads created by modulating pressures.
- Freeze proof when mounted in vertical piping.
- Resists thermal and hydraulic shock.
- Reduces make-up water to boiler and water chemical treatment costs.
- Maintains constant pressure to condensate return systems.
- Meets dimensional requirements of MS 18301
- Specifications.

Canadian Registration # OE0591.9

Operation

The Nicholson Drain Orifice Trap is an engineered, continuous flow device. The controlling element in the Drain Orifice Assembly is a flat S.S. plate, 1/4" thick. Drain Orifices discharge air, condensate and all other non-condensable gases with minimal live steam loss. The fixed orifice size is calculated, for a given application, to discharge the condensate load at a maximum thermal efficiency. Approximately 10-25% of discharging hot condensate flashes to steam at the downstream side of the orifice, at a constant pressure drop. This flashing effect further restricts the flow of saturated steam. In actual conditions, a minimum percentage of steam, by weight,

is discharged with condensate, since the specific volume of steam is large compared to that of the condensate. The velocity through the orifice is highly turbulent. The initial calculated steam loss can be expected to remain relatively constant over the expected 10+ years trap life. The major factor for energy efficient performance is based on initial orifice sizing for the application. Properly sized, thermal efficiencies of 98%+ can be attained. The Drain Orifice Trap is ideally suited for use on high pressure steam (saturated or superheated) from 600 PSIG to 2500 PSIG with minimum steam loss, zero maintenance and long service life.

TYPE DFA DRAIN

ORIFICE STEAM TRAP

SPECIFICATION

Orifice Drain shall comply with dimensional requirements of MIL SPEC MS 18301 and consist of 1/4" 304 stainless orifice plate fixed between user supplied flanges. It shall be sealed by spiral wound gaskets. Inlet gasket shall be modified with a stainless steel mesh strainer affixed across the inside diameter. Orifice shall be sized for the application to a minimum of 0.020".

Maximum operating conditions

PMO: Max. Operating Pressure	2500 psig	(172 barg)
TMO: Max. Operating Temperature	750°F	(400°C)
PMA: Max. Allowable Pressure	2500 psig	(172 barg)
TMA: Max. Allowable Temperature	750°F	(400°C)

Materials of construction

- Inlet Gasket*Spiral-wound 347 S.S./Graphite
w/S.S. 60 mesh dome strainer insert
- Orifice Plate304 S.S., 1/4" thick
- Outlet Gasket*Spiral-wound 347 S.S./Graphite
- Customer to supply ANSI B16.5 flanges.

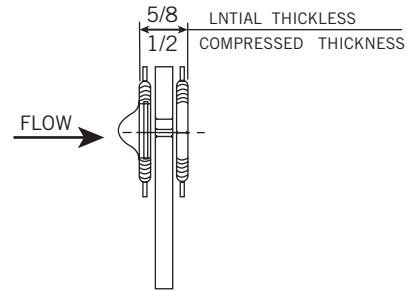
*Note: Other materials available

Sizing*

Consult Factory—required information:

- Condensate Load _____
- Inlet Pressure _____
- Outlet Pressure _____
- Elevation of return line over trap (if any) _____

* Specify orifice size when ordering



Connections: 1/2" – 2" Wafer Style
ANSI 150#, 600#, 1500# & 2500#

Dimensions		
Pipe Size NPT	Min. Pipe Bore (in.)*	Min. Orifice
1/2"	9/16	.020
3/4"	3/4	.020
1"	7/8	.020
1 1/4"	N/A	.020
1 1/2"	N/A	.020
2"	N/A	.020

*Dome strainer used for sizes up to 1". Flat strainer used for larger sizes.

TYPE DUA

ORIFICE UNION ASSEMBLY

Pressures To 3000 PSIG (207 barg)
Temperatures to 850°F (454°C)

Reliable Operation - High reliability labyrinth-type seal: leak tight seal is maintained when subjected to expansion or contraction due to temperature or pressure changes in the line. Positive, leak-tight seal eliminates loss of product.

Ease of Installation - No danger of damaging seats or losing seal by overtorquing during installation. Requires normal torque to obtain a leak-tight seal. Welding repairs reduced; no need to replace union components welded to pipe.

Low Cost Maintenance - Downtime, labor and material costs drastically reduced. Service is required only when the union is disassembled, then only a change of gaskets is required to put it back in service. Eliminates the need to replace the union housing.

Flexibility - Orifice easily replaced where a different orifice size is required for a specific application. Orifice can be redrilled to a larger size, if necessary, eliminating need to replace the entire assembly. Large range of orifice sizes available from a minimum 0.020" diameter.



MODELS

- **DUA**—Orifice Union
- **RUA**—Orifice Kit includes 2 gaskets, orifice plate and inlet screen.
- **DUR**—Gasket Kit includes 2 gaskets and inlet screen.

Applications

- Condensate Removal
- Pressure Reduction
- Ratio of Flow-mixing two or more fluids at fixed ratio
- Fixed Flow-i.e. gland seal recirculation of cooling water on pumps, compressors, process analyzers, etc.
- Intermittent Drainage-i.e. air tools, air storage tanks, cleaning fixtures, air vents, etc.
- Cryogenic Storage Venting
- Low Pressure Blanking
- Sampling of process fluids at a fixed flow rate for use with Instrument Analyzers

Options

- SW - Socketweld

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Operation

The Nicholson Drain Orifice Trap is an engineered, continuous flow device. The controlling element in the Drain Orifice Assembly is a flat S.S. plate, 1/4" thick. Drain Orifices discharge air, condensate and all other non-condensable gases with minimal live steam loss. The fixed orifice size is calculated, for a given application, to discharge the condensate load at a maximum thermal efficiency. Approximately 10-25% of discharging hot condensate flashes to steam at the downstream side of the orifice, at a constant pressure drop. This flashing effect further restricts the flow of saturated steam. In actual conditions, a minimum percentage of steam, by weight,

is discharged with condensate, since the specific volume of steam is large compared to that of the condensate. The velocity through the orifice is highly turbulent. The initial calculated steam loss can be expected to remain relatively constant over the expected 10+ years trap life. The major factor for energy efficient performance is based on initial orifice sizing for the application. Properly sized, thermal efficiencies of 98%+ can be attained. The Drain Orifice Trap is ideally suited for use on high pressure steam (saturated or superheated) from 300 PSIG to 3000 PSIG with minimum steam loss, zero maintenance and long service life.

TYPE DUA

ORIFICE UNION ASSEMBLY

SPECIFICATION

Orifice Union shall consist of 1/4" 304 stainless steel plate fixed inside a gasketed union housing. Seal shall be provided by spiral wound gaskets whose inlet shall be modified with a stainless steel dome mesh strainer fixed across the inside diameter. Orifice shall be sized for the application to a minimum of 0.020 inches.

Maximum operating conditions _____

PMO: Max. Operating Pressure see chart
 TMO: Max. Operating Temperature see chart

Materials of construction _____

Body:Forged Carbon Steel
 Inlet Gasket*:Spiral-wound S.S./Graphite w/S.S. 60 mesh dome strainer insert
 Orifice Plate:304 S.S., 1/4" thick
 Outlet Gasket*:Spiral-wound S.S./Graphite

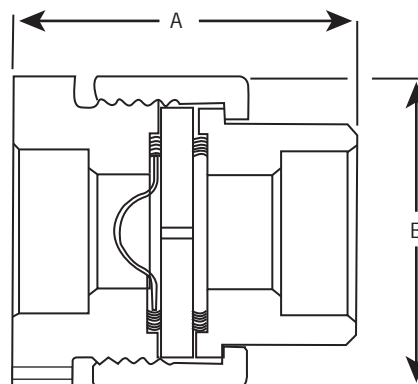
* Note: Other materials available

SIZING* _____

Consult Factory—required information:

Condensate Load _____
 Inlet Pressure _____
 Outlet Pressure _____
 Elevation of return line over trap (if any) _____

* Specify orifice size when ordering



DUA
 Connections: 1/2" – 1" NPT

Temperature/Pressure Ratings	
Temperature* °F	Pressure (PSIG) Carbon Steel 3000
100	3000
200	2735
300	2655
400	2565
500	2425
600	2220
700	2155

*Minimum recommended temperature is -20°F.

Dimensions			
Pipe Size NPT	Inches		Weight Lbs.*
	A	B	
1/2	2.42	1.8	1.2
3/4	2.73	2.20	1.8
1	2.94	2.57	2.6

*Average weight-actual weights may vary slightly.

