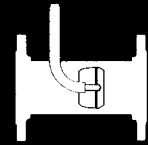


B800

DESUPERHEATERS



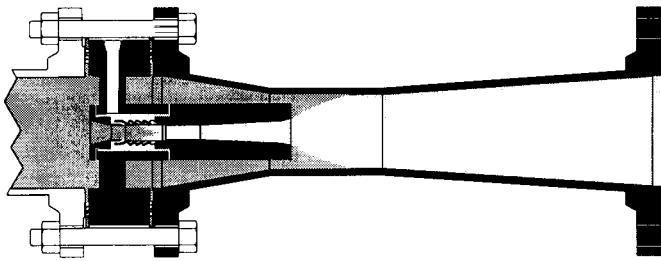
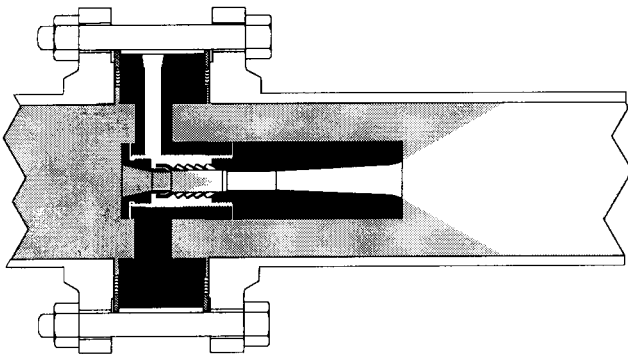
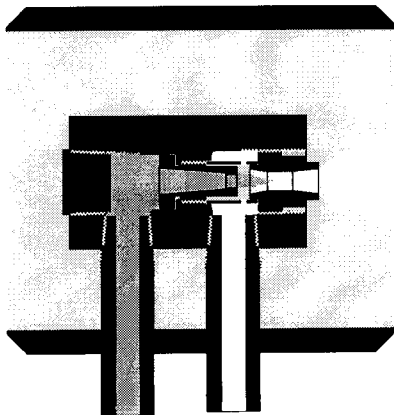
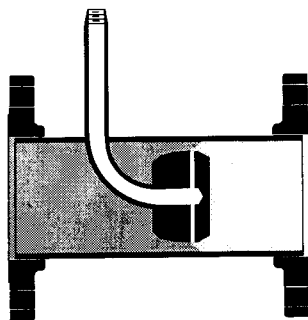
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**TYPE 850, 852, 870, AND TYPE 885
STEAM DESUPERHEATERS****Type 850 Venturi Desuperheater****Type 852 Partial Venturi Desuperheater****Type 870 Steam Atomizing Desuperheater****Type 885 Annular Venturi Desuperheater****OPERATION**

Desuperheaters lower the temperature of superheated steam by the evaporation of water injected directly into the steam. EST desuperheaters use uniquely effective methods to inject the water and maximize the surface contact area between the steam and water to increase the rate of water evaporation. Most EST desuperheaters inject water through several small holes into the path of the high velocity steam where the water is atomized into small water droplets and quickly evaporated into the steam. Thermal pipe liners are not normally required.

APPLICATION

Desuperheaters are used in power boiler heat recovery systems, for superheater interstage temperature control, paper dryer drum temperature control, steam kettle or cooker temperature control, and aircraft catapult machines.

Most desuperheaters can be installed horizontally or vertically. Desuperheaters are often supplied with steam and water control valves and controllers to provide an automatically controlled system. The controllers can be either pneumatic or electronic.

CONSTRUCTION

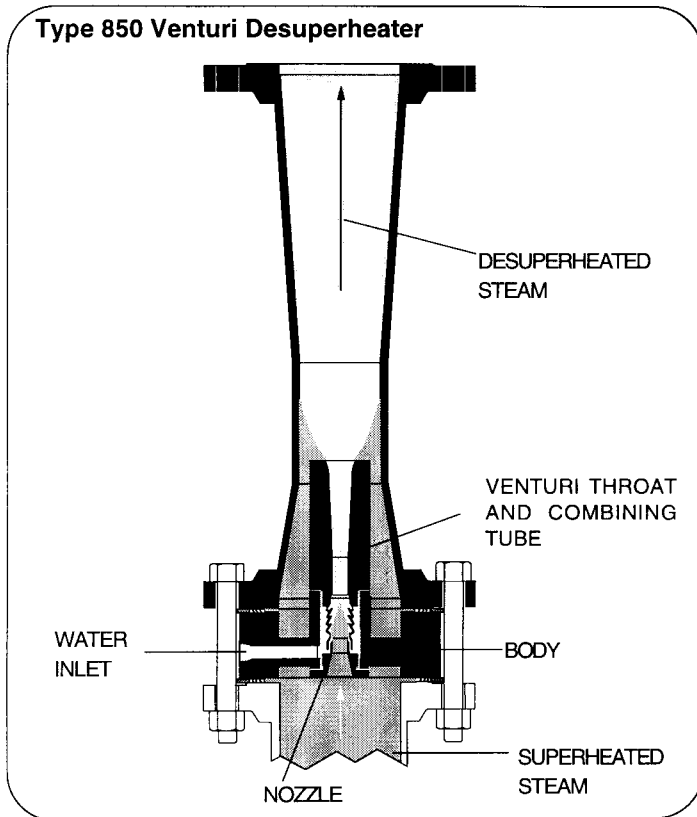
The construction material is normally carbon steel for the outer pipe or wall with 316 stainless steel for the wear parts. Other weldable / machinable metals may also be used. In some applications, fiberglass, Teflon, or other plastic may be a suitable fabrication material.

Desuperheaters can be used in other special applications. Contact EST for special situations including:

- ▶CHLORINE
- ▶AMMONIA
- ▶GAS COOLING

The following pages provide more detailed descriptions on the individual desuperheaters shown, including dimensions, installation methods, performance, and automatic control arrangements.

**TYPE 850
VENTURI DESUPERHEATER**



DESCRIPTION

Water injected into the Type 850 Desuperheater is atomized by the shearing action of high velocity steam that has been accelerated through a nozzle and two venturis. The water is introduced into the steam through holes in a combining tube. In the combining tube the water is sheared into droplets by the high velocity steam exiting the steam nozzle. The steam and water droplets are discharged out of the combining tube and venturi throat into the main venturi section where they are further atomized by contact with the main steam flow passing through the restricted flow area around the venturi throat.

An inlet steam line velocity in the range of 200 feet per second creates an intense mixing zone within the desuperheater.

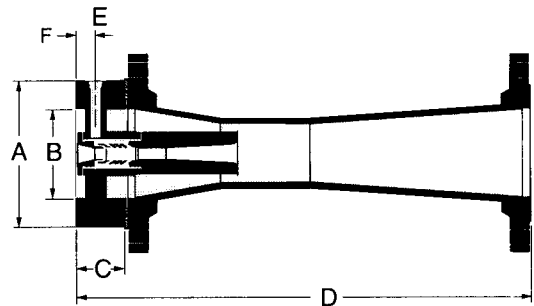
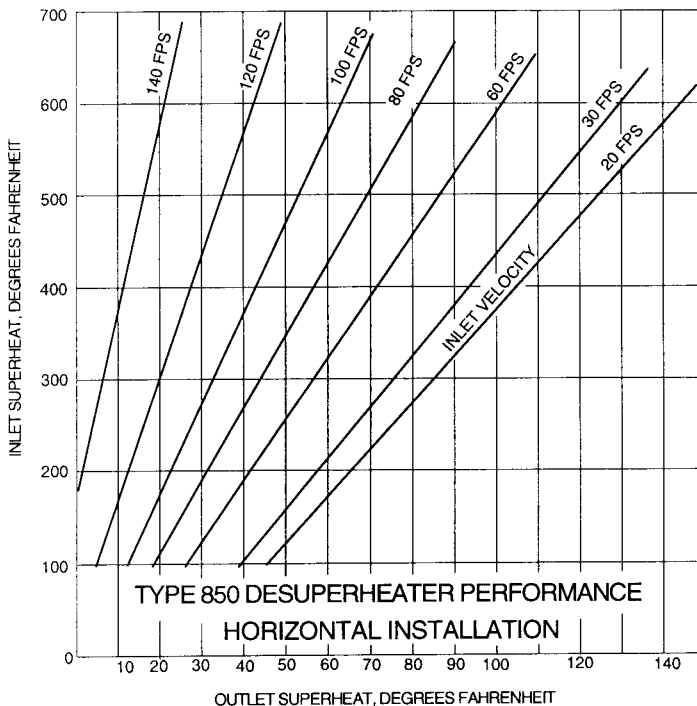
Type 850 Desuperheater performance for horizontal installation is shown in the performance chart below, which relates inlet and outlet superheat to a minimum steam inlet velocity. A turndown ratio* for the desuperheater can be determined by dividing the inlet steam velocity by the minimum steam velocity from the chart.

Vertical up installation is also acceptable. A turndown ratio in excess of 15 to 1 is possible in a vertical installation. Consult EST for performance in a vertical up installation.

* Turndown ratio is the maximum design steam flow rate divided by the minimum design steam flow rate.

PERFORMANCE

Inlet by Outlet Superheat vs. Minimum Steam Inlet Velocity.

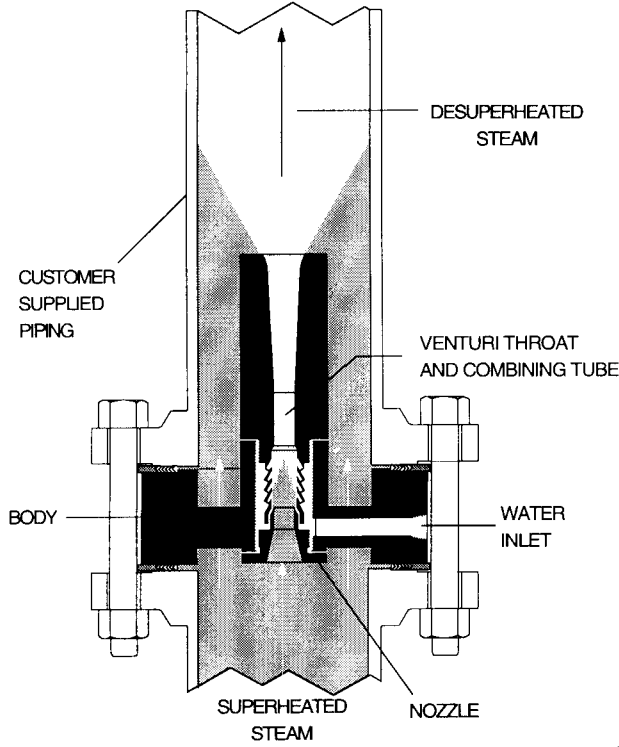


NOM. SIZE	DIMENSIONS, INCHES						MAX. NOM. STEAM FLOW-PPH SAT D		WT. LBS.
	A	B	C	D	E	F	50 psig	200 psig	
2	3-5/8	2	2-3/4	12	1/4	13/16	2,950	9,250	35
3	5	3	3	16-3/4	3/8	7/8	6,640	20,825	55
4	6-3/16	4	3-1/4	21-1/2	1/2	1	11,800	37,010	85
5	7-5/16	5	3-3/4	26-1/2	3/4	1-1/4	18,440	57,840	120
6	8-1/2	6	4	31-1/4	3/4	1-3/8	26,560	83,310	180
8	10-5/8	8	4-1/4	40-5/8	1	1-1/2	47,210	148,090	300
10	12-3/4	10	4-1/2	49-7/8	1	1-5/8	73,780	231,430	455
12	15	12	5-1/2	59-7/8	1-1/2	2	106,240	333,250	690

1. Flanges are ANSI B16.5 150# R.F. or 300# R.F.
2. Connection E is Female NPT.

**TYPE 852
PARTIAL VENTURI DESUPERHEATER**

Type 852 Partial Venturi Desuperheater



DESCRIPTION

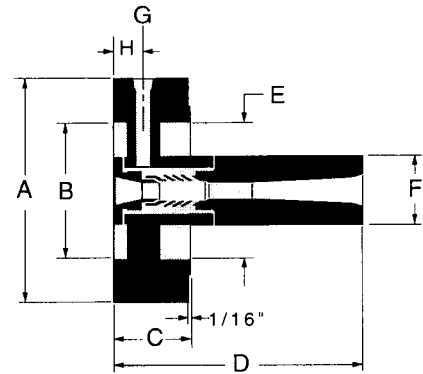
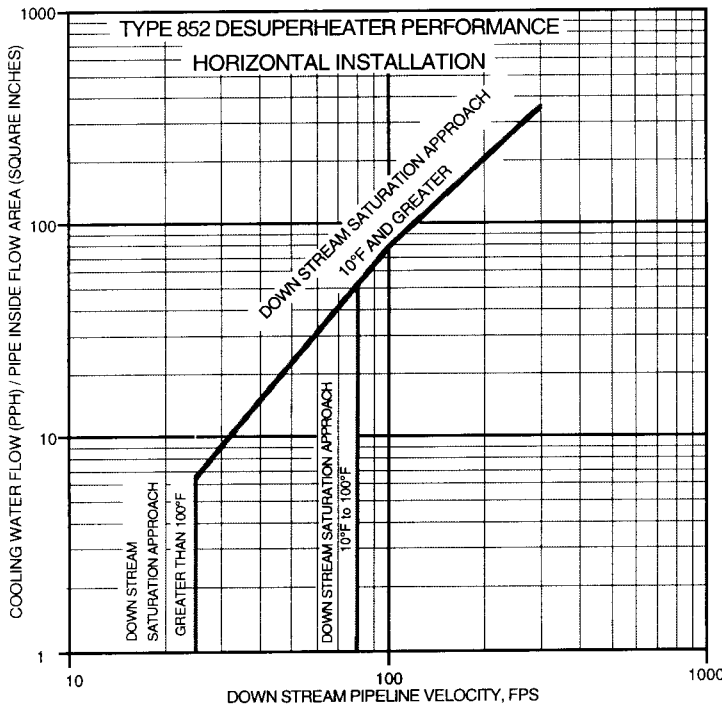
The Type 852 Partial Venturi Desuperheater is similar to the Type 850 Venturi Desuperheater, but it does not have the main venturi section. The steam is accelerated through the nozzle and venturi throat. The water entering through the combining tube is sheared into droplets by the high velocity steam passing through the nozzle and venturi throat. The atomized water leaving the venturi throat passes into the main steam flow where additional atomization, evaporation, and final mixing occurs. Greater atomization of the water increases the evaporation rate which results in cooling of the steam.

Horizontal or vertical up installation is acceptable. Vertical up installation increases the turndown ratio of the desuperheater.

The Partial Venturi Desuperheater is used as a low cost substitute for the Type 850 Desuperheater. In applications where a high steam velocity is available and where a close approach to saturation is not required, the Type 852 Desuperheater can provide an economical solution. The turndown ratio* depends on the mounting orientation (horizontal or vertical), steam inlet and outlet superheats, flow rates, and piping size. A turndown ratio of 15 to 1 is possible in a vertical up installation. Consult EST for performance in a vertical up installation.

* Turndown ratio is the maximum design steam flow rate divided by the minimum design steam flow rate.

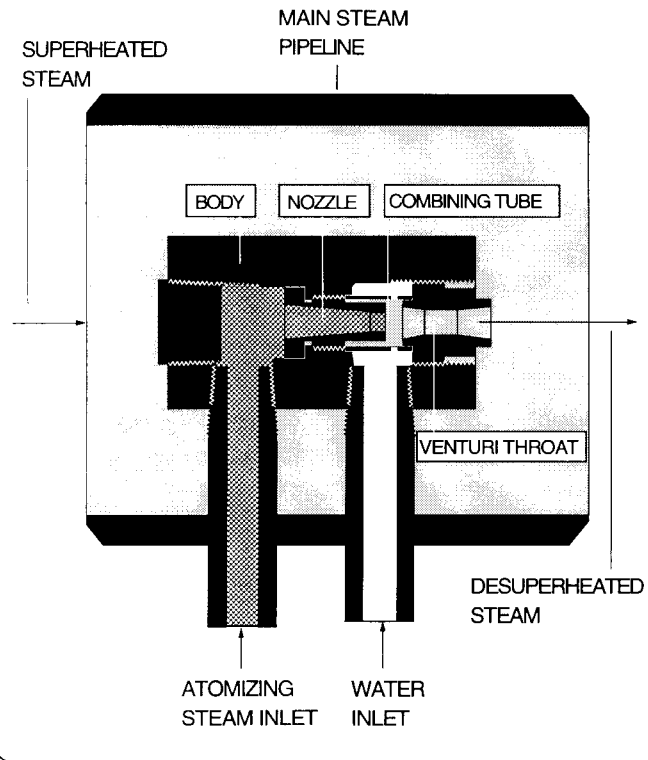
The chart below defines the acceptable region of performance in a horizontal installation. A point can be located on the chart after determining the cooling water flow rate in pounds per hour for each square inch of pipeline area and the downstream pipeline velocity in feet per second. Any point to the right of the limiting lines indicates acceptable performance.



NOM. SIZE	DIMENSIONS, INCHES								MAX. NOM. STEAM FLOW - PPH SAT D		WT. LBS.
	A	B	C	D	E	F	G	H	50 psig	200 psig	
2	3-5/8	2	2-3/4	3-3/4	2-11/16	1	1/4	13/16	3,540	11,100	8
3	5	3	3	5-5/8	3-15/16	1-1/2	3/8	7/8	7,970	24,990	18
4	6-3/16	4	3-1/4	7-5/16	4-15/16	2	1/2	1	14,160	44,410	28
5	7-5/16	5	3-3/4	9-1/8	6-1/16	2-1/2	3/4	1-1/4	22,130	69,410	45
6	8-1/2	6	4	10-3/4	7-1/8	3	3/4	1-3/8	31,875	99,970	65
8	10-5/8	8	4-1/4	14-1/4	9-1/8	4	1	1-1/2	56,650	177,710	115
10	12-3/4	10	4-1/2	17-3/4	11-1/4	5	1	1-5/8	88,535	277,715	190
12	15	12	5-1/2	20-1/2	13-5/16	6	1-1/2	2	127,490	399,900	310

1. Connection G is Female NPT.

Type 870 Steam Atomizing Desuperheater

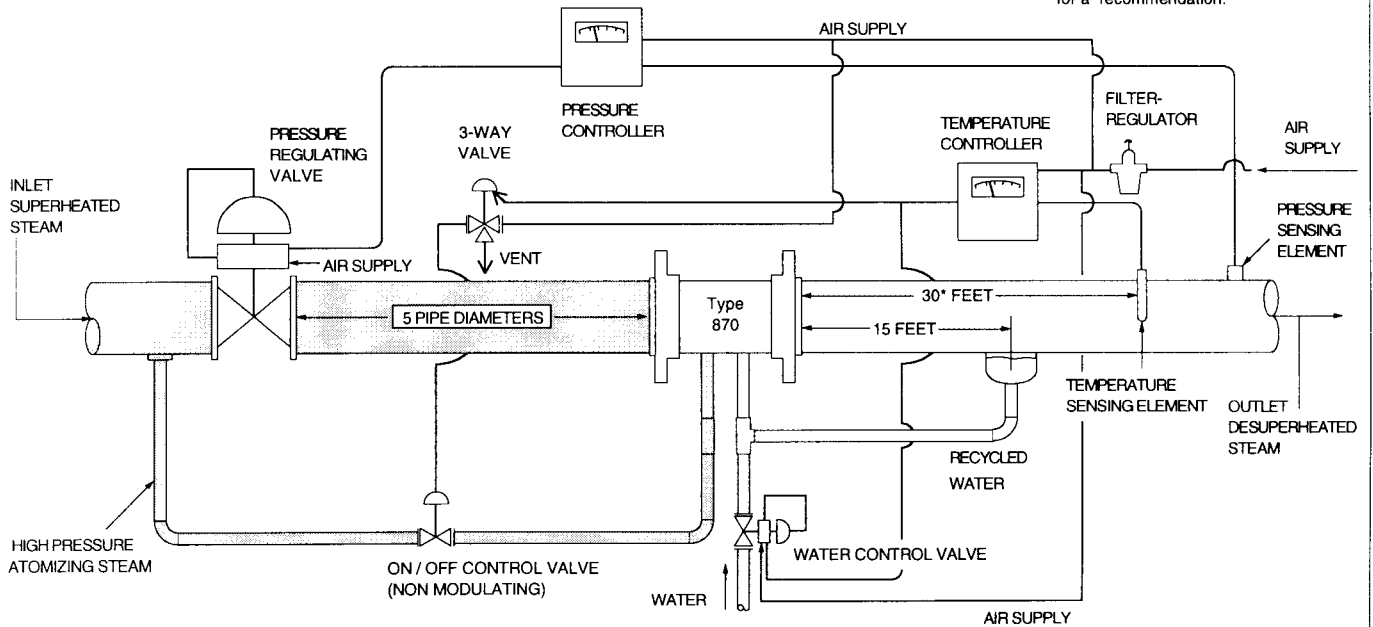


DESCRIPTION

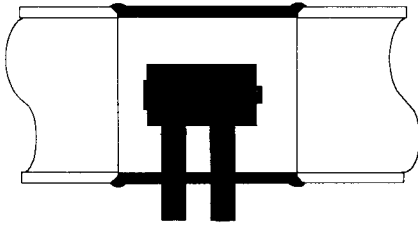
The Type 870 Steam Atomizing Desuperheater utilizes high pressure steam to entrain and initially atomize the water. This type of desuperheater is often capable of a turndown ratio* of 50 to 1 and greater. The atomizing steam absolute pressure must be at least 1.4 times the main steam line absolute pressure. The minimum atomizing steam pressure should be 50 psig, and the main steam line design velocity should not be less than 50 feet per second. If any of these limiting parameters are not met by existing conditions, consult EST for a possible special design. Line pressure drop is normally considered negligible for an atomizing desuperheater.

* Turndown ratio is the maximum design steam flow rate divided by the minimum design steam flow rate.

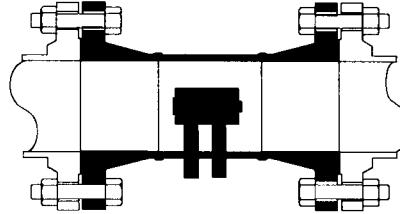
Typical control schematic for a Type 870 Steam Atomizing Desuperheater



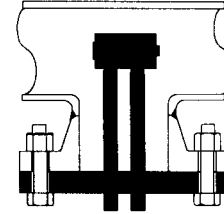
Mounting methods and dimensions for Type 870 Desuperheaters



Type 870-W Weld Mounting



Type 870-F Flanged Mounting



Type 870-T Tee Mounting

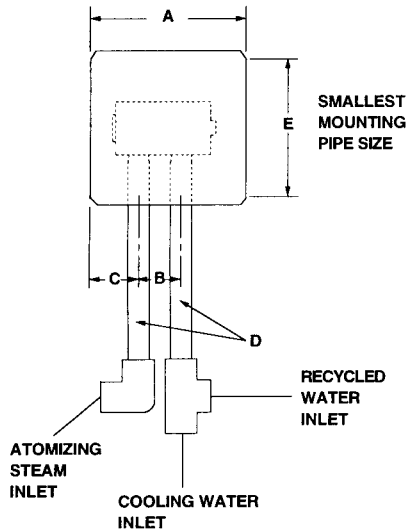


Table 2. Sizes, Dimensions, and Water Capacities

UNIT SIZE NO.	MAX. WATER CAP. PPH	ATOMIZING STEAM REQUIRED PPH	DIMENSIONS, INCHES					WT. LBS. **
			A *	B	C	D	E	
1	500	50	4	1-3/32	1-1/4	1/4	3	2
2	1000	100	5	1-7/16	1-3/4	3/8	3	5
4	2000	200	6-1/2	1-11/16	2-1/4	3/4	4	10
8	4000	400	7-1/2	1-11/16	2-3/4	3/4	4	15
12	6000	600	9-1/2	2-1/2	3-3/4	1	5	25
20	10,000	1000	11-1/2	3-1/4	4	1-1/2	6	45
40	20,000	2000	14	4	4-1/4	2	6	65

* Length A is for butt weld connections only. For flanged connections, add the length of welding neck flanges.

** The weight applies to atomizing heads and D pipes only. Add the main steam line and flange weights to the atomizing head weight to obtain a total weight.

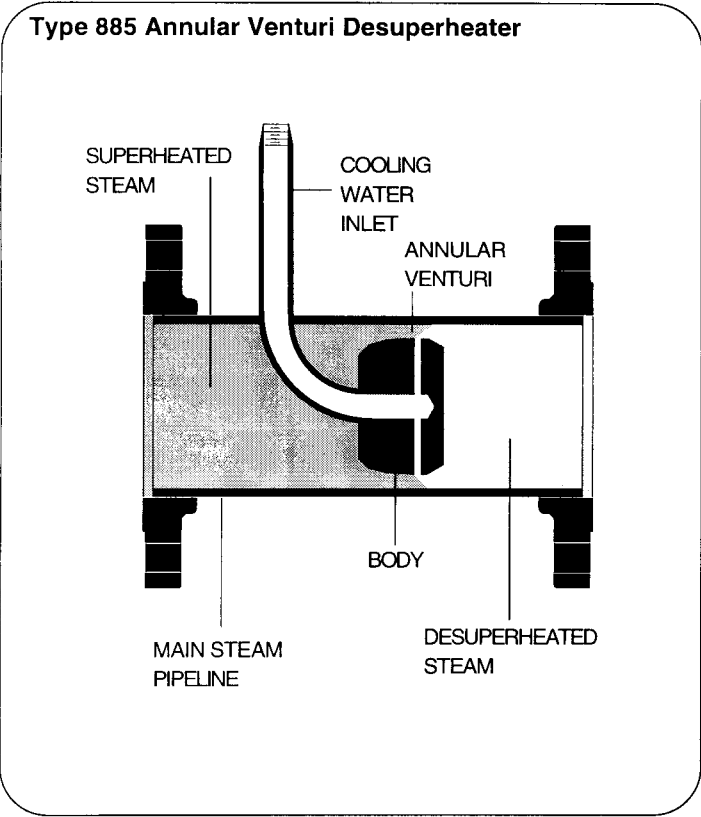
Table 1. Minimum Mounting Pipe Size

UNIT SIZE NO.	TYPE 870 W & F	TYPE 870-T
	PIPE SIZE, INCHES (Sch. XS)	NOZZLE CONNECTION SIZE, INCHES (Sch. XS)
1	3	3
2	3	4
4	4	5
8	4	6
12	5	8
20	6	10
40	6	12
80	8	18

Table 3. Maximum Nominal Steam Flow

NOM. PIPE SIZE	MAXIMUM NOMINAL STEAM FLOW PPH SATURATED	
	50 PSIG	200 PSIG
2	3,540	11,100
3	7,970	24,990
4	14,160	44,410
5	22,130	69,410
6	31,875	99,970
8	56,650	177,710
10	88,535	277,715
12	127,490	399,900
14	173,525	544,320
16	226,645	710,940
18	286,850	899,790
20	354,130	1,110,850
24	509,950	1,599,625

**TYPE 885
ANNULAR VENTURI DESUPERHEATER**



DESCRIPTION

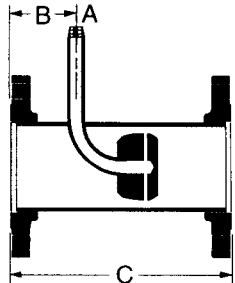
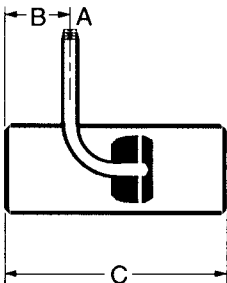
Water injected into the Type 885 Desuperheater is atomized by the shearing action of high velocity steam flowing through an annular venturi formed by the body and main steam pipeline. The water is introduced into the steam flow at the point of greatest restriction. The maximum possible flow velocity in the main steam line is about 225 feet per second. The Type 885 Desuperheater may be used for most desuperheating applications.

Performance for horizontal installation is shown in the chart below. Turndown ratio* can be determined by dividing the inlet steam velocity by the minimum steam velocity from the chart. If the desuperheater is installed in a vertical pipe with upward steam flow, the desuperheater is capable of significantly increased steam flow turndown. Consult the factory for turndowns in the vertical up mounting configuration.

* Turndown ratio is the maximum design steam flow rate divided by the minimum design steam flow rate.

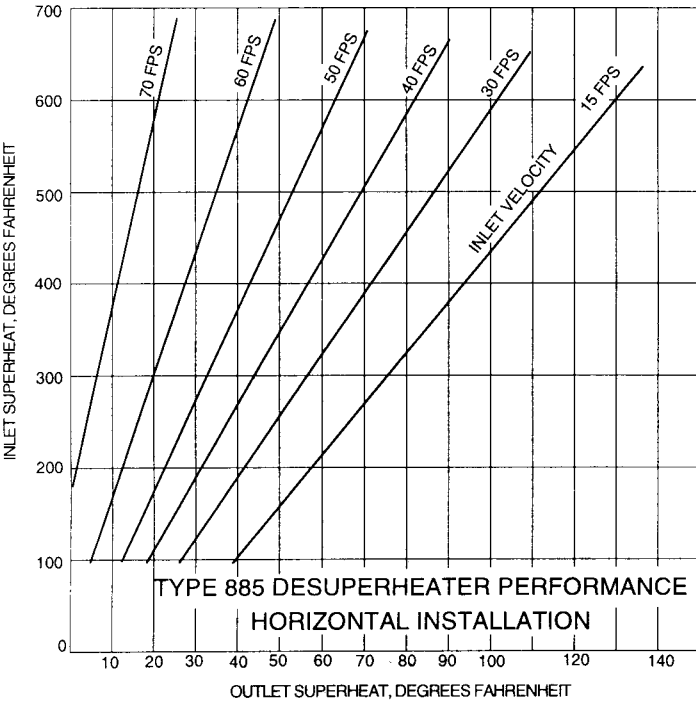
Type 885-W
Weld End Mounting

Type 885-F
Flanged End Mounting



PERFORMANCE

Inlet by Outlet Superheat vs. Minimum Steam Inlet Velocity.



NOM. SIZE	DIMENSIONS, INCHES					MAX. NOM. STEAM FLOW - PPH SAT D		WT. LBS.
	INLET A	TYPE 885-W		TYPE 885-F		50 psig / 200 psig		
		B	C	B**	C**			
1	1/4	3	6	3-1/4	6-1/2	738	2,312	2
1-1/2	1/4	3	7	3-1/4	7-1/2	1,660	5,205	3
2	1/4	3	7-1/2	3-5/16	8-1/8	2,950	9,250	4
2-1/2	1/4	3	8	3-3/8	8-3/4	4,610	14,455	7
3	1/2	3	8-1/4	3-3/8	9	6,640	20,825	10
4	1/2	3	11	3-3/8	11-3/4	11,800	37,010	18
5	3/4	3-1/2	13-1/2	3-7/8	14-1/4	18,440	57,840	25
6	1	4	16	4-7/16	16-7/8	26,560	83,310	35
8	1	4	20-1/2	4-1/2	21-1/2	47,210	148,090	55
10	1	4	23	4-1/2	24	73,780	231,430	85
12	1-1/2	4-1/2	26	5	27	106,240	333,250	95
14	1-1/2	4-1/2	29	5	30	144,605	453,600	125
16	2	5	32	5-1/2	33	188,870	592,450	155

** Dimensions apply to 150# and 300# ANSI B16.5 slip-on flanges.

† The weight applies to the Type 885-W only. Add the weight of 2 flanges for the Type 885-F.

Design improvements may be made without notice.

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