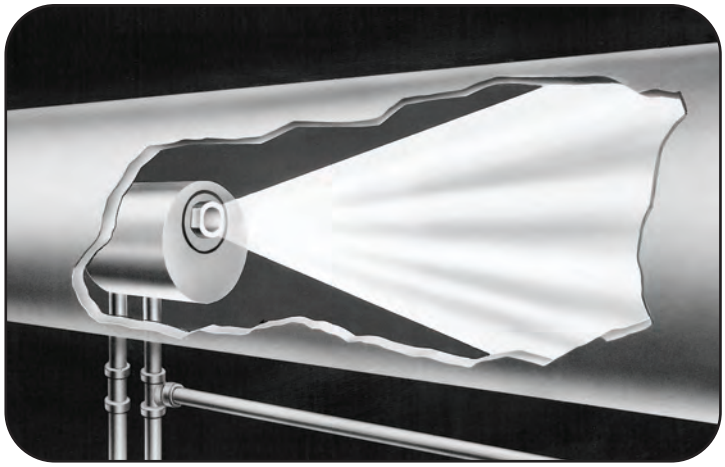
Schutte & Koerting

Steam Desuperheaters

INTRODUCTION

In 1923 Schutte & Koerting introduced its first mechanical spray desuperheater, and three years later the company introduced a surface absorption unit. In 1939 the venturi desuperheater was developed and successfully marketed to satisfy a wide range of applications. An ejector, atomizing type unit, introduced in the mid 1950's, lead to numerous variations and larger capacities. This was followed by a mechanical dump-type unit for critical power plant needs. The newest unit is the annular venturi desuperheater which compares favorably with competitive spray nozzle designs.



APPLICATION

Although requirements for desuperheaters cover a wide range of applications, the great majority fall into the following standard installations:

- Power plant requirements for desuperheated steam supplying units having limited operating temperatures such as auxiliaries, heating systems, heat exchangers and, more recently, dump stations.
- To improve heat transfer of surface-type heat exchangers.
- Reduction and control of superheated steam, where excess temperatures will harm the product.
- Use on boilers, either between superheater stages or at boiler exit, to control superheat temperatures at partial loads.
- Use as bypass of bleeder or back pressure turbines to maintain balance between process steam and power requirements.
- Miscellaneous applications where balancing or make-up steam is required in reduced pressure systems in refineries and process plants.

OPERATION

S&K desuperheaters reduce the temperature of superheated steam to produce lower temperatures (normally 10ºF above saturation, although Type 6910 is capable of producing saturated steam). The majority of S&K units (except Types 6905 and 6910) require water at line pressure. Water is syphoned into the water box/combining tube assembly, where it is heated, and then mixed with a percentage of steam through the throat region and introduced into the steam line as a finely atomized mist. Water entrainment, shearing and mixture, all within S&K internal construction, produces extremely small water particles and alleviates requirements of thermal liners and impingement shields. For Type 6905, where water is injected at high pressure and internal construction consists of a water nozzle, S&K supplies or recommends thermal liners.

MATERIALS OF CONSTRUCTION

S&K desuperheaters are manufactured from a variety of metals. Standard construction is carbon steel below 800°F, chrome molybdenum steel above 800°F (both with stainless steel Type 304 internals); however, S&K can manufacture in any metal or alloy requested.

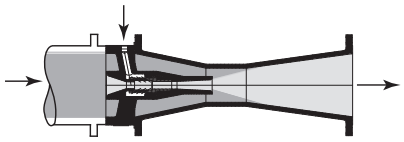
QUALITY CONTROL

S&K products are subjected to extensive tests required by stringent quality control policies. Equipment can be manufactured to various ASME or ANSI codes and/or provided with special non-destructive testing. Details on facilities and techniques will be supplied upon request.

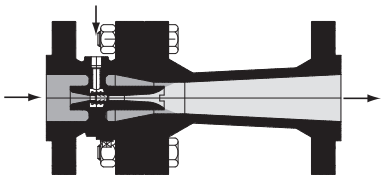
PERFORMANCE

Data for sizing, determining pressure drop, straight run requirements, bulb placements, etc. can be found in the Engineering Data Supplement to Bulletin 6D.

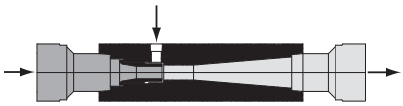
VENTURI DESUPERHEATERS *(Refer to Bulletin 6D-V)*



Type 6950 Desuperheater
A venturi-type, steam atomizing unit with no separate or high pressure steam supply required. Suitable for use under a wide range of conditions, including steady or variable flows. Inlet water pressure need only equal steam pressure. Small pressure drop across unit. Used with or without controls.

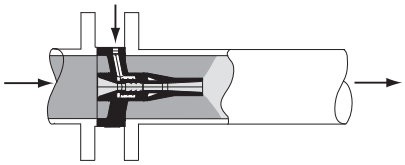


Type 6940 Desuperheater
Also a venturi-type similar to Type 6950, but with an integral steam inlet flange connection. Performance is similar to Type 6950.

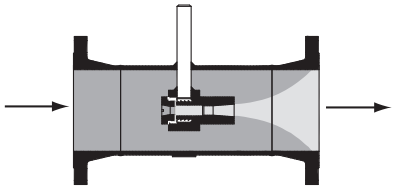


Type 6940M Desuperheater
"Mini" venturi in sizes 1/2" to 1 1/2". Used in extremely low flow applications such as found in heating and air conditioning services. Available with flanges, threaded or socket weld connections.

ATTEMPERATOR
(Refer to Bulletin 6D-A)

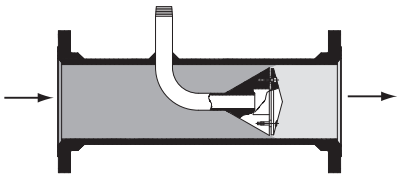


Type 6952 Desuperheater
A modification of Type 6950 in which the tail piece is omitted and the atomized water discharges directly into the pipeline. Suitable for use where lower pressure drop is required and little flow variation is encouraged.



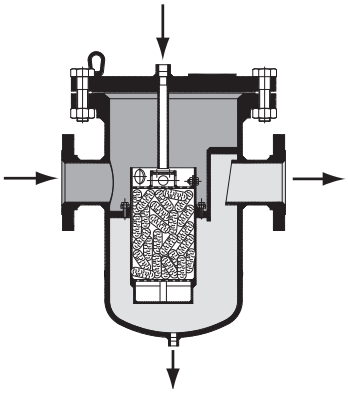
Type 6953 Desuperheater
A version of Type 6952 with the same operating characteristics. Flanged or butt-welded ends.

ANNULAR VENTURI
(Refer to Bulletin 6D-VC)



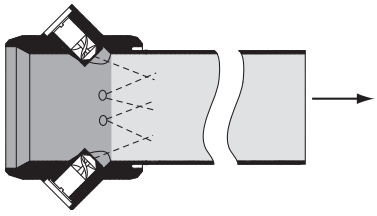
Type 6985 Desuperheater
Lower cost venturi-type capable of high turndown ratios. Suitable for use under wide range of conditions, including steady and variable flows. Low pressure drop. Inlet water pressure need only equal steam pressure.

SURFACE ABSORPTION
(Refer to Bulletin 6D-SA)



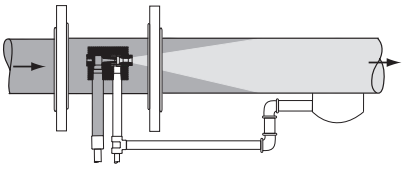
Type 6910 Desuperheater
Surface absorption type wherein steam contacts wetted reaction rings. High pressure drop. Unit can be used with controls and flow can vary almost infinitely with no downsteam piping requirements. Can achieve saturation.

MECHANICAL ATOMIZING
(Refer to Bulletin 6D-SB)

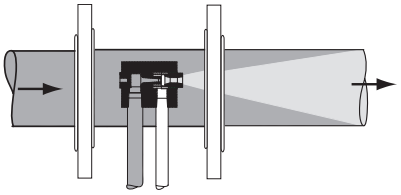


Type 6905 Desuperheater
Uses one or more spray nozzles mounted on the periphery for injection of water into the steamline. A thermal shield downstream of unit is recommended.

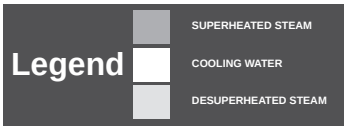
EJECTOR ATOMIZING
(Refer to Bulletin 6D-E)



Type 6970 Desuperheater
A steam ejector, atomizing unit with water re-cycle arrangement. For applications where combined reducing-desuperheating station is required and flows vary widely. Steam flow range can be as high as 50 to 1 and greater, depending on operating conditions. Minimum atomizing steam pressure required is about 1.4 times inlet steam pressure, with low pressure drop across unit in most cases.



Type 6972 Desuperheater
Same as Type 6970, but without the recycling system. Gives reduced flow variation and costs less to install.



ISO 9001 Certified

Schutte & Koerting

Attemperator Desuperheaters

APPLICATION

Attemperator Desuperheaters reduce steam temperature by bringing superheated steam into direct contact with water. The steam is cooled through the evaporation of the water.

Attemperators can be mounted either horizontally or vertically and are normally used for relatively steady load conditions where pressure losses must be minimized. These desuperheaters are a modification of the venturi-type unit, without the venturi tail, and offer increased turndown when mounted vertically up.

OPERATION

Water enters the attemperator and is preheated in the circulatory chamber around the water diffuser tube. It is then introduced in many small jets to assist final atomization by the steam flow through the center of the throat. After leaving the throat, the mixture of steam and water enters the main steam flow in a fog-like condition where final heat transfer is achieved without contacting the sidewalls - providing maximum desuperheating effectiveness with minimum of pipe wear. Water pressure into the attemperator should equal steam line pressure.

PERFORMANCE

While it is less costly and has negligible pressure losses, it normally does not have the rangeability of the venturi-type unit. Actual turndown ratio is dependent upon a wide variety of factors, such as installation, amount of residual superheat downstream, piping, etc. Normal flow variation is 75% to 15% of flow.

CONSTRUCTION, SIZES AND RATINGS

Type 6952 - 2” through 24” cast carbon or alloy steel construction in ratings up to 600 lb., stainless steel internals. Type 6953 - 3” through 24” fabricated carbon or alloy steel construction with pipe, forgings, flanges, etc. in ratings up to 1500 lb., stainless steel internals. For sizing information refer to engineering data supplement.

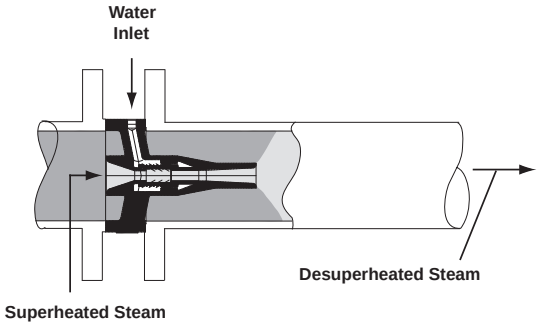


Fig. 1 - Type 6952 is clamped and bolted between customer’s standard raised face flanges.

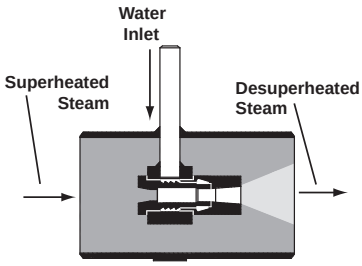


Fig. 2 - Type 6953-A fabricated attemperator is welded into and supported by customer’s piping.

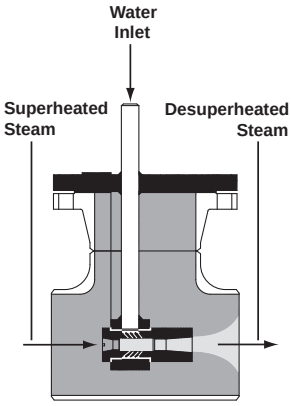


Fig. 3 - Type 6953-D fabricated attemperator is mounted on a blind flange for insertion through customer’s flanged connection.

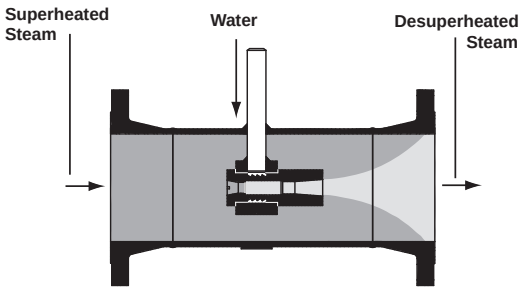


Fig. 4 - Type 6953-C fabricated attemperator is flanged and supported by customer’s piping.

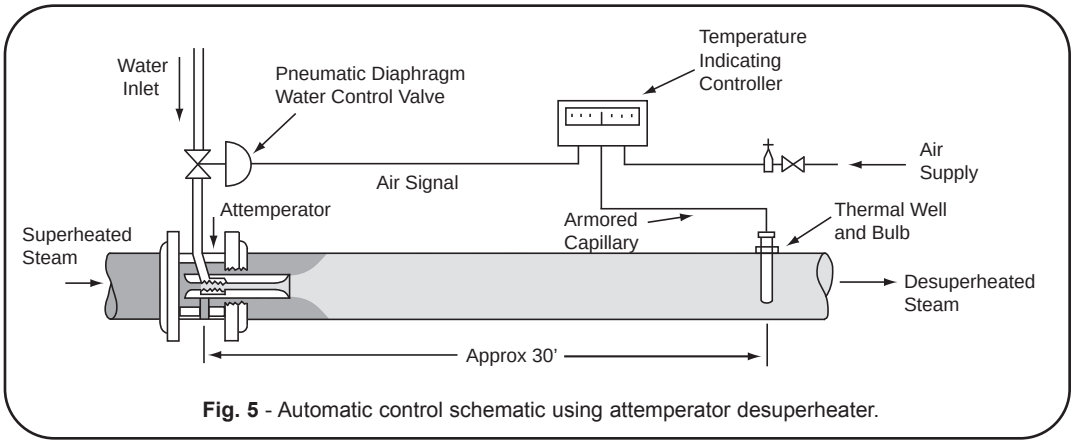
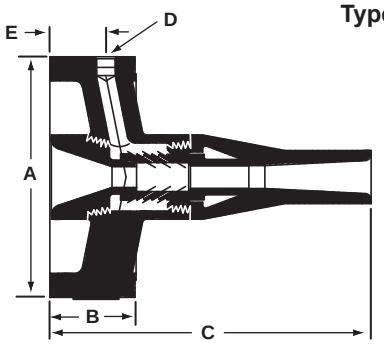


Fig. 5 - Automatic control schematic using attemperator desuperheater.

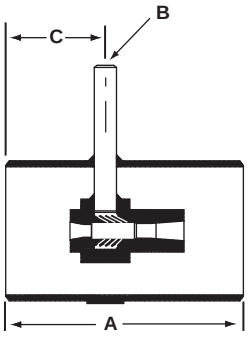
Type 6952



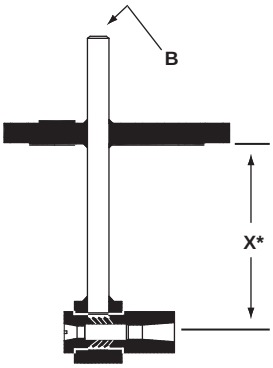
DIMENSIONS

Size (inches)		2	3	4	6	8	10	12	14	16	18
Body O.D.	A	3 5/8	5	6 3/16	8 1/2	10 5/8	12 3/4	15	16 1/4	18 1/2	21
Body Thickness	B	2 1/16	2 11/16	2 3/16	3 9/16	2 13/16	3 11/16	5 7/16	5 11/16	6 1/16	6 9/16
Overall Length	C	4	5 9/16	6 5/8	9 7/8	14 3/16	16 3/16	20	22 1/4	25 5/16	25 13/16
Water Inlet (N.P.T.)	D	1/4	1/4	3/8	3/4	3/4	3/4	1	1 1/4	1 1/2	2
Body Face to Water Inlet ℄	E	1 7/64	1 3/8	7/8	1 9/16	1 7/16	1 5/8	3 1/2	2 3/4	2 11/16	3 1/4

Type 6953-A



Type 6953-D

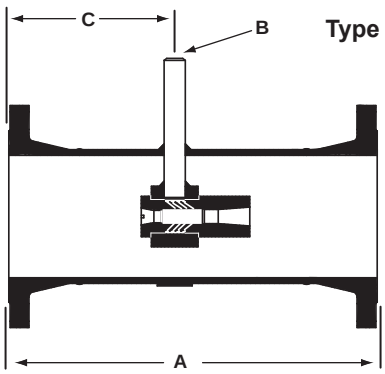


DIMENSIONS

Size (inches)		4	6	8	10	12	14	16	18	20	24
Overall Length	A	11	11	16	18	21	23	26	29	33	35
Water Inlet	B	1/2	3/4	3/4	3/4	1	1 1/4	1 1/2	2	3	3
Inlet to Water Inlet ℄	C	3	3	4	5	5	6	6	7	7 3/4	7 3/4

*To be supplied by customer

Type 6953-C



DIMENSIONS

Size (inches)		4	6	8	10	12	14	16	18	20	24
Overall Length (300# Flanges)	A	17 3/4	18 3/4	24 3/4	27 1/4	31 1/4	34 1/4	37 1/2	41 1/2	45 3/4	48 1/4
Water Inlet	B	1/2	3/4	3/4	3/4	1	1 1/4	1 1/2	2	3	3
Inlet to Water Inlet ℄	C	6 3/8	6 7/8	8 3/8	9 5/8	10 1/8	11 5/8	11 3/4	13 1/4	14 1/4	14 3/8

ISO 9001 Certified

Schutte & Koerting • 2510 Metropolitan Drive • Trevose, PA 19053 • USA • tel: (215) 639-0900 • fax: (215) 639-1597 • www.s-k.com • sales@s-k.com

Schutte & Koerting

Annular Venturi Orifice Desuperheater

- **Eliminates accumulation of unvaporized water in the pipeline**
- **Virtually maintenance-free**

Application

Fig. 6980 Annular Venturi Orifice Desuperheaters desuperheat steam by bringing it into direct contact with cooling water at a restricted point in the pipeline where high turbulence is created. These units have no moving parts of any kind and pressure drop is low. Steam can be desuperheated down to 10°F. above saturation over an amazing range of flow varying from 100% down to 2% of rated capacity - a 50 to 1 turndown. This high turndown ratio is accomplished at water pressures no higher than the pressure of main steam flow entering the desuperheater. No auxiliary source of high pressure steam is required.

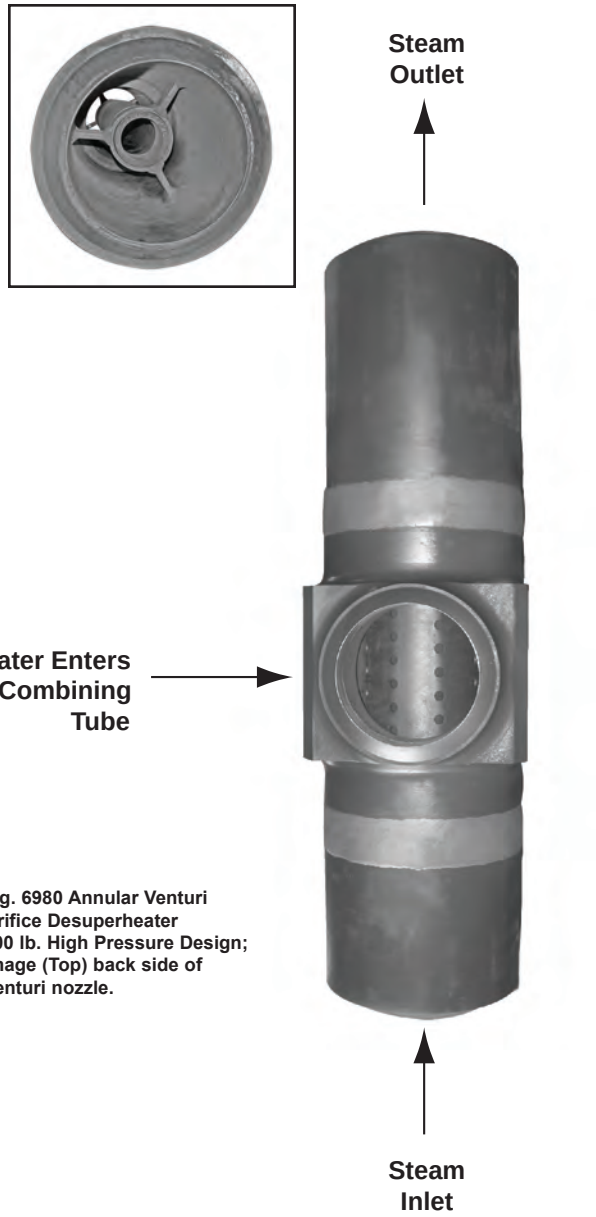


Fig. 6980 Annular Venturi Orifice Desuperheater 900 lb. High Pressure Design; Image (Top) back side of Venturi nozzle.

Construction

Fig. 6980 Annular Venturi Orifice Desuperheaters are constructed as shown in Fig. 1. Sizes (based on pipe OD) and approximate overall lengths (measured from face to face of flanges) are as follows:

Unit Size (in inches)	Length (in inches)
3	47
4	48
6	64
8	81
10	98
12	106
16	145

Operation

Desuperheaters of this type have an elongated annular insert which forces the steam to flow around it. Midway up the insert at the point of greatest restriction, there is an annular orifice. Cooling water is injected, making contact with the steam at the point of greatest turbulence. Steam and water are thus thoroughly mixed. There is even distribution of the water throughout the stream of steam, and the contact between steam and water is maintained over a long enough period to completely vaporize the water.

The Fig. 6980 Annular Venturi Orifice Desuperheater design overcomes the most common problem of desuperheating - the accumulation of unvaporized water in the pipeline. This efficiency-destroying phenomenon cannot happen in the Fig. 6980 Desuperheater because any water droplet that fails to vaporize immediately after injection must fall back into the high-velocity throat region of the desuperheater where is comes into contact with the steam again and again until it is completely vaporized.

Refer to Bulletin 6D Supplement for performance data on these desuperheaters.

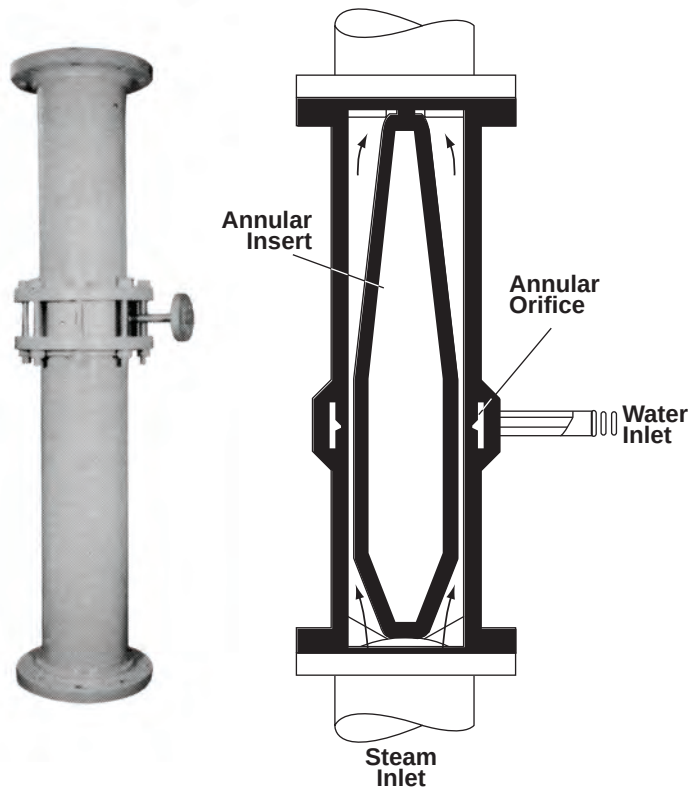


Fig. 1 - Fig. 6980 AVO Desuperheater.
Unit operates in a vertical position with flow moving upward.

Schutte & Koerting

Steam Ejector, Atomizing Desuperheaters

APPLICATION

Type 6970 Desuperheaters serve a wide range of applications. In a combined pressure reducing, desuperheating station where flow rates vary widely, this unit, with adequate controls, provides dependable operation with turndown ratios as high as 50 to 1 and greater, depending on exact operating conditions.

Type 6970 Desuperheaters are recommended for use where sufficient high pressure steam is available to provide the atomizing steam supply. The most frequent application would be in combination reducing-desuperheating stations. The minimum atomizing steam pressure ratio required is 1.4 times the absolute steam pressure through the desuperheater with a minimum atomizing steam pressure of 50 psig. The amount required is constant. (See Table 2 on reverse side for the exact rate.)

CONSTRUCTION

In the Type 6970, the water preheating and distributing device is installed in a short pipe section with weld neck flanged ends (Type C) or butt weld ends (Type A). This unit can also be mounted on a blind flange for insertion through a nozzle connection (Type D). The various mounting arrangements are shown on the reverse side. It is recommended that the unit be mounted so that the atomizing steam and water inlet pipes enter the unit from the bottom as shown.

This desuperheater uses a steam atomizing device, operating on the jet principle, to entrain cooling water, preheat, and discharge the atomized water into the superheated steam flow.

Fig. 1. Type 6970 Steam Ejector, Atomizing Desuperheater

OPERATION

Ejector-type steam atomizing desuperheaters utilize steam at higher than line pressure to atomize water. In the Type 6970, the ejector action is used to entrain condensate from the pipeline. This is an important S&K innovation and a feature of this type unit.

Few problems are encountered in operating desuperheaters at normal pipeline velocities. However, S&K research has proved conclusively that at low pipeline velocities encountered at 1/50 up to 1/4 of normal flow, unvaporized liquid will “settle out” of a horizontal stream. When it is desired to approach saturation temperature within 10°F, it becomes impossible to completely vaporize the liquid. Thus, while superheated steam is flowing through the pipeline, water accumulates in the bottom of the line. Since this keeps temperature from being reached, a control valve will continue to supply or “pump” excess water into the line while attempting to maintain the control temperature.

Type S&K 6970 overcomes these complications by recycling excess water back into the atomizing device. The water added through the control valve is therefore limited to the amount required for desuperheating. As indicated in Fig. 2, high pressure steam enters through the ejector steam nozzle which is precisely designed for each application. This steam entrains the mixture of fresh and excess cooling water through the water inlet line and atomizes this water, which is discharged into the superheated steam line at saturation temperature. The preheating reduces the time required to evaporate the liquid, and the consequent small particle size and turbulent stream improves heat transfer. At low flows the return line entrains excess water. At high flows, where no excess water is required, the unit operates as a steam atomizing desuperheater.

S&K TYPE 6972 STEAM EJECTOR, ATOMIZING DESUPERHEATERS

The 6972 Desuperheater is a 6970 unit without the recycle arrangement. It will not provide as high turn-down ratios as Type 6970, but costs less to install and is competitive in cost with other steam atomizing types. Water can be varied over wide flow ranges without affecting atomization. Since spray angle is narrow, there is less impact on piping than with other type nozzles. This unit has negligible pressure drop. Steam is required at a minimum of about 1.4 times the desuperheater absolute pressure with a minimum of 50 psig. For typical controls on Type 6970 and 6972, see Fig. 3.

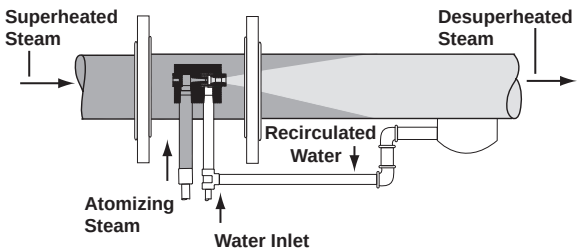
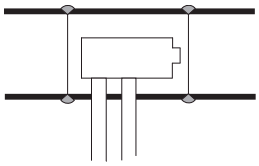
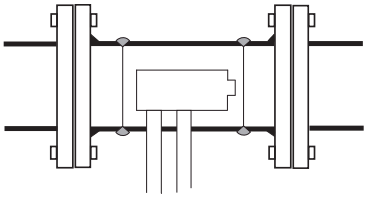


Fig. 2. The Type 6970 Desuperheater is equipped with an arrangement for recycling any water not evaporated.

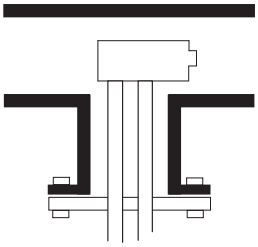
MOUNTING METHODS FOR TYPES 6970 AND 6972 DESUPERHEATERS



Type A
Using welded connections



Type C
Using welded neck flanges



Type D
Using a nozzle connection
(pipe tee supplied by customer)

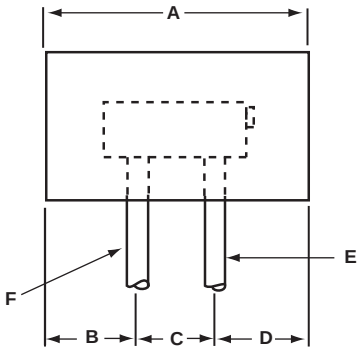
Table 1. Pipe Diameters (Schedule 40 Pipe)

Unit Size No.	Ring Size Type A & C in Inches	Nozzle Size Type D in Inches
1/2	3 thru 42	3 thru 42
1	4 thru 42	6 thru 42
2	6 thru 42	8 thru 42
3	6 thru 42	12 thru 42
4	8 thru 42	16 thru 42
5	14 thru 42	20 thru 42
6	20 thru 42	24 thru 42
7	CONTACT FACTORY	

Table 2. Sizes, Dimensions and Water Capacities of Type 6970 and 6972 Desuperheaters

Unit Size No.	Dimensions, in inches						Max. Water Capacity pph	Atomizing Steam Required pph
	A*	B	C	D	E	F		
1/2	12 1/2	5 11/16	1 3/16	5 5/8	1/4	3/8	500	45
1	12 1/2	5 5/16	1 13/16	5 3/8	3/4	3/4	1,000 3,000	90 270
2	12 1/2	4 15/16	2 3/16	5 3/8	1	1	6,000	550
3	12 1/2	3 7/8	3 1/4	5 3/8	1 1/2	1 1/2	12,000	1,100
4	15 1/2	4 5/8	3 7/8	7	2	2	24,000	2,200
5	19	4 1/4	5 3/4	9	2 1/2	2 1/2	50,000	4,500
6	26	5	6 3/8	14 5/8	3	3	100,000	9,000
7	CONTACT FACTORY						200,000	18,000

**Length suitable for butt weld connections only. For flanged unit, add length of welding neck flanges.*



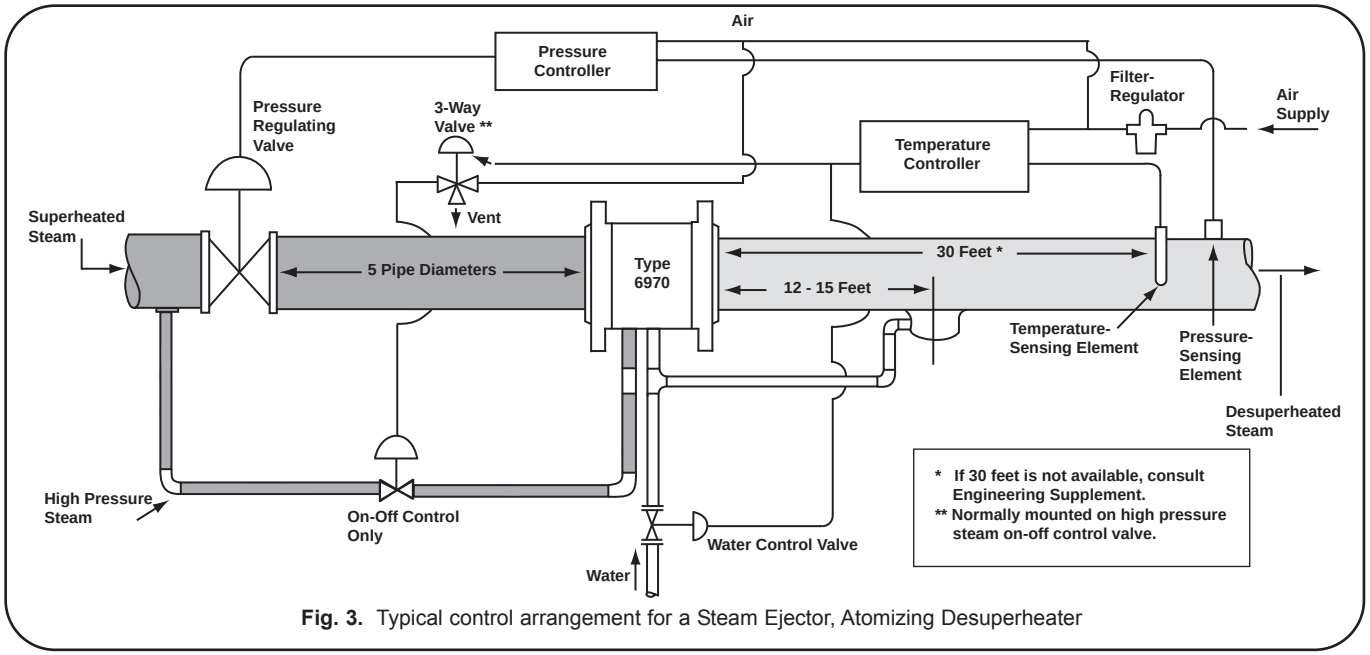


Fig. 3. Typical control arrangement for a Steam Ejector, Atomizing Desuperheater

ISO 9001 Certified

Schutte & Koerting • 2510 Metropolitan Drive • Trevose, PA 19053 • USA • tel: (215) 639-0900 • fax: (215) 639-1597 • www.s-k.com • sales@s-k.com

Schutte & Koerting

Type 6910 Surface Absorption Desuperheater

PERFORMANCE

S&K Type 6910 units desuperheat steam by forcing it to come in contact with wetted metal reaction rings. These desuperheaters can be used where steam flow varies with consequent changes in water flow being required for close control. Water pressure need be not more than 10 pounds above steam pressure. Automatic controls can be used and in general the temperature control bulb can be located nearer (5' minimum) the discharge of the desuperheater than with other types. Saturation temperature or % wet steam is possible with this type unit.

CONSTRUCTION

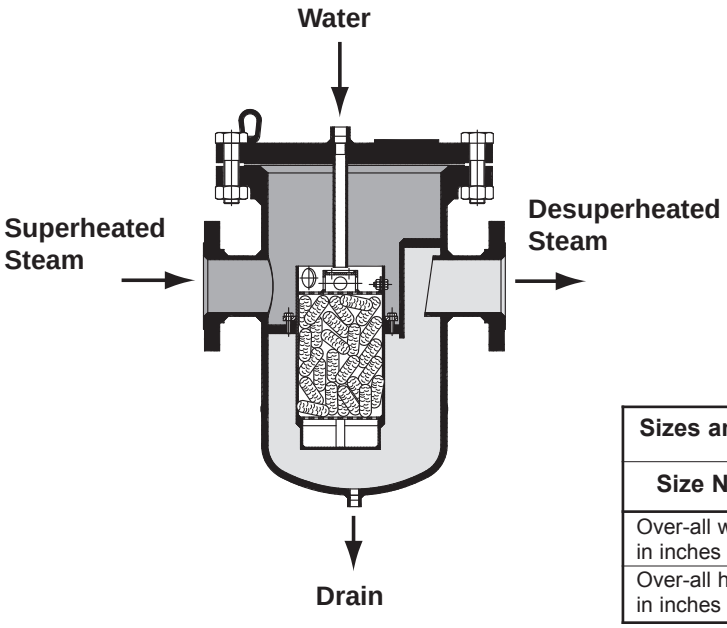
Body and cover are normally cast carbon or alloy steel with internal basket, reaction rings and deflector plate of 304 stainless steel. Available in ratings to 900 psi.

OPERATION

Water, entering as indicated, flows on a splash plate and is distributed over a perforated plate in the top of the basket containing the reaction rings. The water flows over these metal rings, wetting them thoroughly and providing ample surface for contacting the steam. The high temperature steam flows through the reaction ring section and is desuperheated by contacting the wetted rings. It flows out through the plate at the bottom of the basket and passes through a water deflector and separator into the desuperheater outlet. Excess water drains to the bottom and should be removed through a trap.

APPLICATION

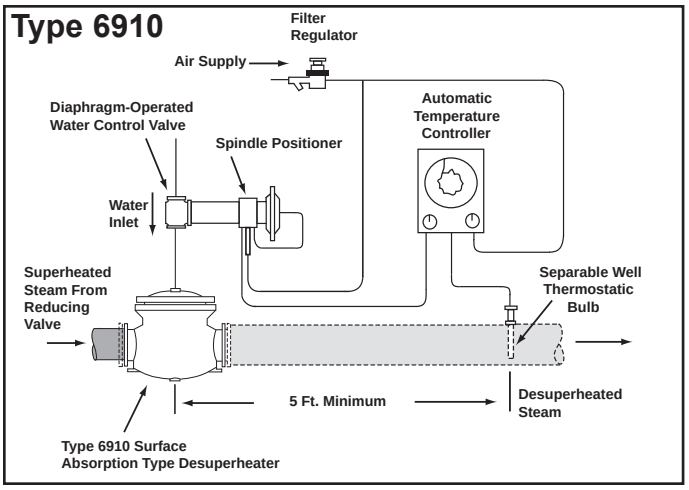
The surface absorption type unit is generally used where space limitations and requirements of minimum water carryover are stipulated. Normally used in the marine, food processing and drying industries. Units have been in operation for over 40 years with minimum service required. See reverse side for control schematic.



Sizes and Approximate Dimensions of Type 6910 Desuperheaters

Size No.	2	3	4	5	6	8	10	12
Over-all width in inches	17	17 1/2	20	22 7/8	26 7/8	31 3/8	39 3/4	44
Over-all height in inches	16 1/2	16 5/16	17 3/4	22 1/4	24 3/4	29 1/4	35 1/2	41 3/4

CONTROL SCHEMATICS



DESUPERHEATER CONTROL SYSTEMS

A desuperheater is not a single piece of equipment that succeeds or fails on its own, but is only one of several distinct system components. For a successful application, system engineering is a must. Neglect of any one component may result in system failure, no matter how excellent the design and engineering application of the other components. Therefore, all of the control components must be carefully selected for the specific application to be handled.

SYSTEM VALVES AND CONTROLS

Steam Pressure Reducing Valve - This valve must have a turndown somewhat greater than that of the system; it must respond to plus and minus control signals even at maximum and minimum flow rates. These valves are selected for a useful control range of 20 to 80% of maximum flow. They are normally an equal-percentage type or have equal-percentage characteristics. This type of valve has the best inherent flow characteristic and range needed for proportional control.

Water Control Valve - This valve must have sufficient rangeability to meet the application. Two valves in parallel may be needed to get this range - one large and one small. Where a large water pressure differential is encountered, be careful of possible cavitation. Consider using a pressure control valve upstream of the main flow valve.

Temperature Controller - Must have an adjustable proportional control band wide enough to match response characteristics of the entire desuperheater system. Automatic reset prevents drift in control point. Rate action is seldom needed, but if it is provided, complete cutoff should be possible.

Pressure Controller - Must prevent large pressure variations which might interfere with temperature control; therefore, it needs an adjustable throttling range and automatic reset.

Control Valve Actuators - Pneumatically operated control valve actuators are the most popular type in use, but electric, hydraulic and manual actuators are also used. The spring-and-diaphragm pneumatic actuator is most commonly specified due to its dependability and simplicity of design. Pneumatically operated piston actuators provide an integral positioner capability and high steam force output for demanding service conditions.

Temperature Switches - They are used in connection with alarm systems for high and low temperatures. The temperature sensor uses the expansion principle in which the fluid or element in the sensing bulb reacts to the line temperature.

Pressure Switches - These switches, as above, are generally used in connection with alarm systems for high and low pressures. The alarm can be either audio or visual. Pressure applied to the sensor actuates a mechanism and its movement is then used to control the operation of an electrical snap acting switch, or other actuating medium.

WARNING: A control system cannot successfully hold a temperature that is no higher above saturation than the controller's degree of sensitivity and deadband.

ISO 9001 Certified

Schutte & Koerting • 2510 Metropolitan Drive • Trevose, PA 19053 • USA • tel: (215) 639-0900 • fax: (215) 639-1597 • www.s-k.com • sales@s-k.com

Schutte & Koerting

Type 6905 Mechanical Atomizing Dump Desuperheater

PERFORMANCE

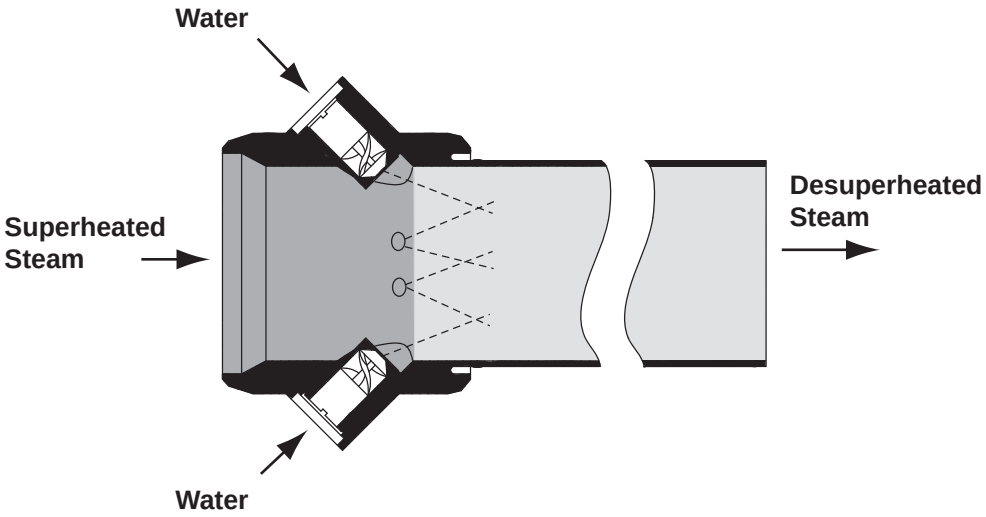
S&K Type 6905 units employ one or more special spray nozzles to atomize the water droplets and produce the heat transfer contact area necessary for cooling the steam and evaporating the droplets. Because droplets are relatively coarse and the steam temperature entering the unit is normally above 800ºF, S&K recommends and supplies a thermal sleeve welded to the unit which extends approximately 1 foot downstream in the customer's piping. Water pressure to this type unit differs from all other S&K types in that it is required at a minimum of 25 psi above line pressure.

APPLICATION

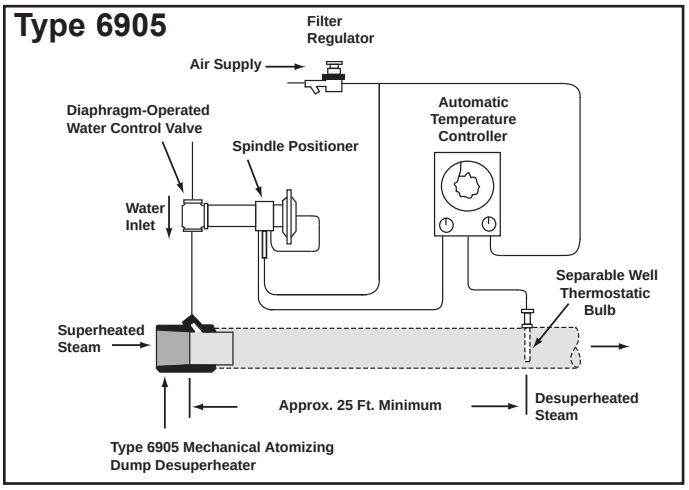
The mechanical atomizing type desuperheater was developed for economically desuperheating high steam flows in large steam lines, i.e. 20", 24", 30", 36", etc. Initial applications were for periodic usage on emergency dump to condenser systems in power stations where precise desuperheating was not necessary and excess water flows were common. These units are also used on controlled over-pressure dump and bypass systems.

CONSTRUCTION

S&K Type 6905 consists of only three basic components: body, spray shield, and nozzle assembly. Bodies are normally cast carbon, alloy or stainless steel with weld ends. Stainless steel nozzles are removable from body nozzle bosses. Spray shield is stainless steel pipe or rolled plate. See reverse side for control schematic.



CONTROL SCHEMATICS



DESUPERHEATER CONTROL SYSTEMS

A desuperheater is not a single piece of equipment that succeeds or fails on its own, but is only one of several distinct system components. For a successful application, system engineering is a must. Neglect of any one component may result in system failure, no matter how excellent the design and engineering application of the other components. Therefore, all of the control components must be carefully selected for the specific application to be handled.

SYSTEM VALVES AND CONTROLS

Steam Pressure Reducing Valve - This valve must have a turndown somewhat greater than that of the system; it must respond to plus and minus control signals even at maximum and minimum flow rates. These valves are selected for a useful control range of 20 to 80% of maximum flow. They are normally an equal-percentage type or have equal-percentage characteristics. This type of valve has the best inherent flow characteristic and range needed for proportional control.

Water Control Valve - This valve must have sufficient rangeability to meet the application. Two valves in parallel may be needed to get this range - one large and one small. Where a large water pressure differential is encountered, be careful of possible cavitation. Consider using a pressure control valve upstream of the main flow valve.

Temperature Controller - Must have an adjustable proportional control band wide enough to match response characteristics of the entire desuperheater system. Automatic reset prevents drift in control point. Rate action is seldom needed, but if it is provided, complete cutoff should be possible.

Pressure Controller - Must prevent large pressure variations which might interfere with temperature control; therefore, it needs an adjustable throttling range and automatic reset.

Control Valve Actuators - Pneumatically operated control valve actuators are the most popular type in use, but electric, hydraulic and manual actuators are also used. The spring-and-diaphragm pneumatic actuator is most commonly specified due to its dependability and simplicity of design. Pneumatically operated piston actuators provide an integral positioner capability and high steam force output for demanding service conditions.

Temperature Switches - They are used in connection with alarm systems for high and low temperatures. The temperature sensor uses the expansion principle in which the fluid or element in the sensing bulb reacts to the line temperature.

Pressure Switches - These switches, as above, are generally used in connection with alarm systems for high and low pressures. The alarm can be either audio or visual. Pressure applied to the sensor actuates a mechanism and its movement is then used to control the operation of an electrical snap acting switch, or other actuating medium.

WARNING: A control system cannot successfully hold a temperature that is no higher above saturation than the controller's degree of sensitivity and deadband.

ISO 9001 Certified

Schutte & Koerting

Venturi Desuperheaters

APPLICATION

Venturi desuperheaters reduce steam temperature by bringing superheated steam into direct contact with water. The steam is cooled through the evaporation of the water. These desuperheaters are recommended for use under a wide range of conditions, including steady and variable flows. They can be installed horizontally or vertically up. When installed vertically up, turndown ratios can be increased substantially.

OPERATION

Water entering the desuperheaters is preheated in the circulatory chamber around the water diffuser tube and is introduced in many small jets to assist final atomization by the steam flow through the center of the throat. When leaving the throat, the mixture of steam and water enters the venturi section for turbulent mixing prior to entering the main steam line in a fog-like condition without contacting the sidewalls - providing maximum desuperheating effectiveness and a minimum of wear in the discharge piping. The water pressure required should equal the operating steam pressure.

PERFORMANCE

Venturi desuperheaters are normally used in areas where atomizing steam is not available. Turndown ratio is dependent upon a wide variety of factors, such as installation (horizontal or vertical), amount of residual superheat, and piping. Depending on exact flow conditions, units are capable of 50% to 5% flow variation. Pressure drop varies between 2 psi and 10 psi.

CONSTRUCTION, SIZES, AND RATINGS

Type 6950 - 2" - 6" cast carbon or alloy steel in ratings to 900 lb.; 8" and up cast body with fabricated tail in ratings to 900 lb. (cast bodies and tails stocked in carbon steel 150 lb. and 300 lb. up to 6").

Type 6940 - 2" - 16" cast carbon or alloy steel in ratings to 2500 lb.; 18" and above fabricated carbon or alloy steel in ratings to 1500 lb.

Type 6940M - 1/2" - 1 1/2" carbon, alloy or stainless steel barstock construction up to 600 lb. rating with NPT, socket weld or flanged connections.

For sizing information, refer to engineering data supplement.

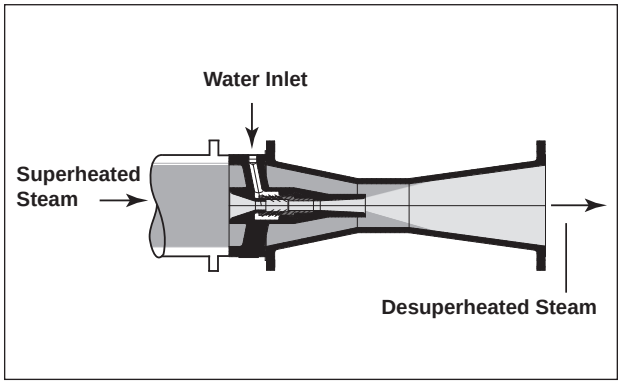


Fig. 1. Type 6950 Desuperheaters are mounted in and supported by the pipeline.

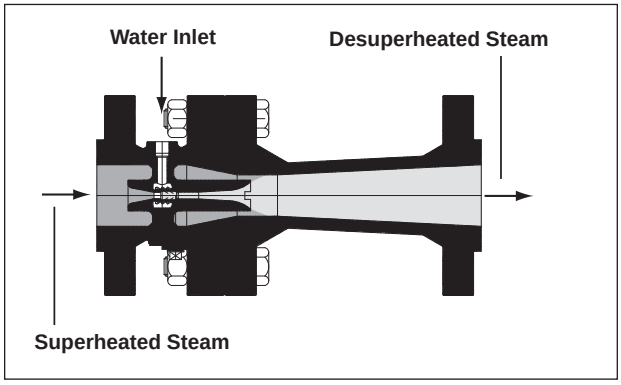


Fig. 2. The Type 6940 Desuperheater, like the 6950, is mounted directly in the pipeline.

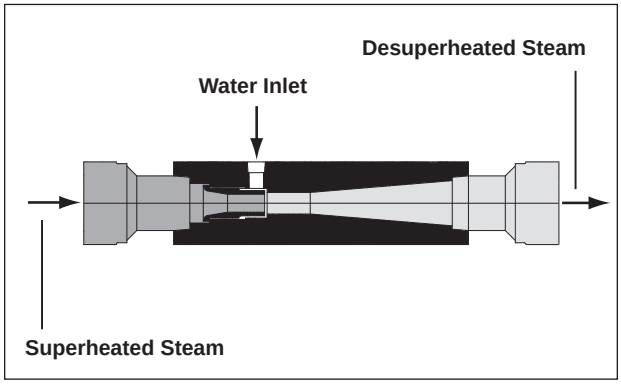
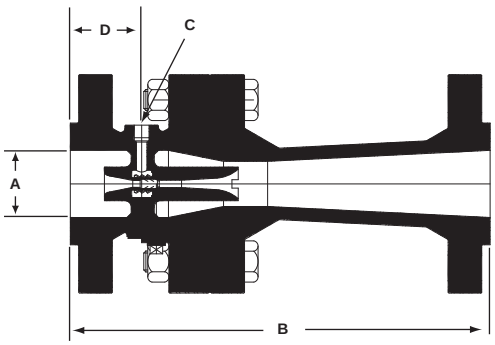


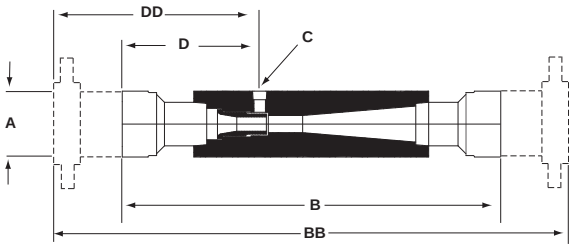
Fig. 3. The Type 6940M Desuperheater is a miniature version of the Type 6940.



TYPE 6940 Dimensions (in inches)

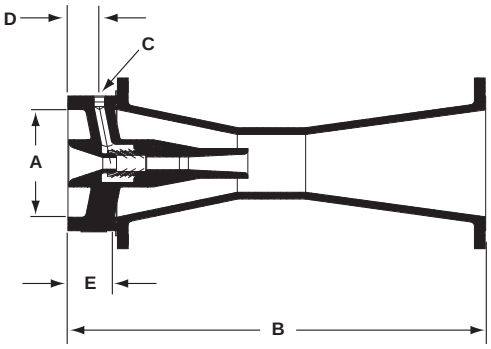
Size* & Connection		A	2	3	4	5	6	8	10	12	14	16
Overall Length	150 lb	B	11 1/2	15 5/16	20	24 1/8	30 1/16	41	49 1/2	59 15/16	72	81 3/4
	300 lb		11 3/4	16 5/16	20 1/16	25	30	41	50 3/4	59 15/16	72	81 3/4
	600 lb		12 1/2	16 13/16	20 1/16	25 13/16	31 7/16	41	49 5/8	62 9/16	73 3/8	81 3/4
Water Inlet (NPT)		C	1/4	1/4	3/8	1/2	3/4	3/4	3/4	1	1 1/4	1 1/2
Flange Face to Water Inlet C/L		D	2	2 1/2	2 1/2	3	4	5 1/4	7	8 1/2	9	10 1/2

**For other sizes and ratings, contact factory.*



TYPE 6940M Dimensions (in inches)

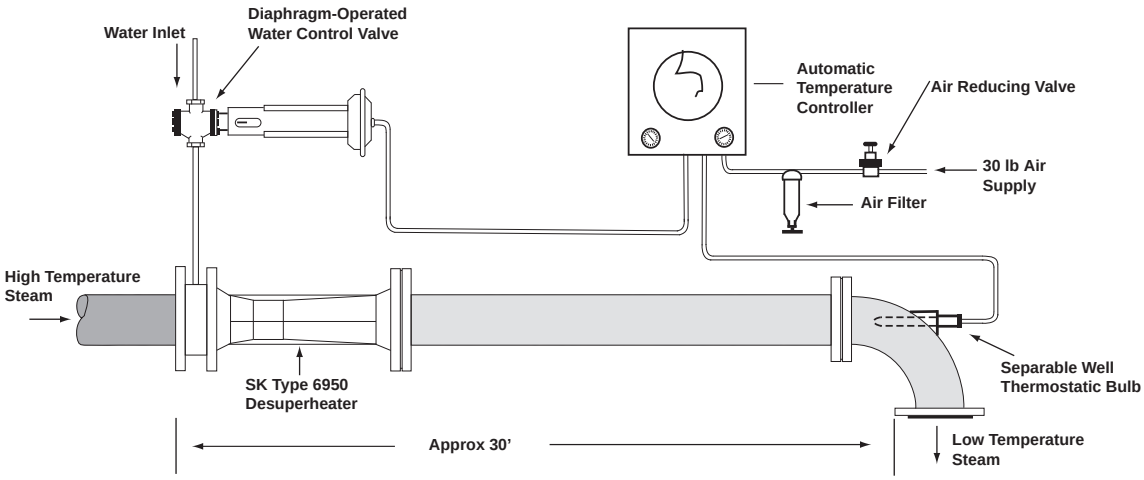
Size & Connection	A	1/2	3/4	1	1 1/2
Length	B	4 7/8	6	7 3/8	10 3/16
Overall Length 150, 300 & 600 lb flanged	BB	9 1/2	10 1/2	12	15
Water Inlet (NPT)	C	1/8	1/8	1/4	1/4
Inlet Face to Water Inlet C/L	D	2	2	2 1/4	2 5/8
Flange Face to Water Inlet C/L	DD	4 5/16	4 1/4	4 9/16	5 1/32



TYPE 6950 Dimensions (in inches)

Size & Connection	A	2	3	4	6	8	10	12	14	16
Overall Length 150, 300 & 600 lb flanged	B	11 7/8	15 9/16	19 7/16	28 13/16	40 3/8	47 13/16	57 15/16	69 1/16	77 13/16
Water Inlet (NPT)	C	1/4	1/4	3/8	3/4	3/4	3/4	1	1 1/4	1 1/2
Inlet Face to Water Inlet C/L	D	1 7/64	1 3/8	7/8	1 9/16	1 7/16	1 5/8	3 1/2	2 3/4	2 11/16
Body Thickness	E	2 1/16	2 11/16	2 3/16	3 1/2	2 15/16	3 11/16	5 7/16	5 11/16	6 1/16

Fig. 4. Automatically controlled venturi-type desuperheater system.



ISO 9001 Certified

Schutte & Koerting

Annular Venturi Desuperheaters

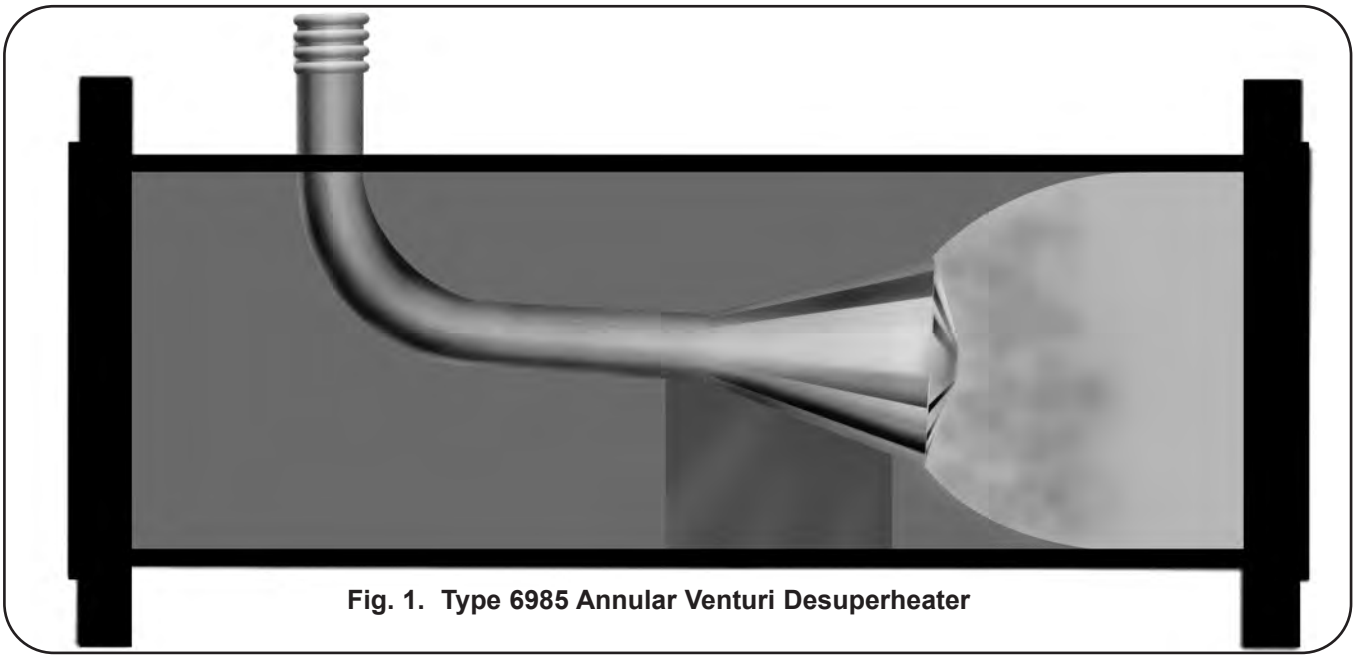


Fig. 1. Type 6985 Annular Venturi Desuperheater

APPLICATION

Annular Venturi desuperheaters reduce steam temperature by bringing superheated steam into direct contact with water. The steam is cooled through the evaporation of the water. These desuperheaters are recommended for use under a wide range of conditions, including steady and variable flows. They can be installed horizontally or vertically up. When installed vertically up, turndown ratio can be increased substantially.

OPERATION

Superheated steam is directed by the cone into the annular area between the cone and pipe wall, increasing both velocity and turbulence. Cooling water is introduced through a narrow slot (or small jets in the 1" and 1 ½" sizes) in the cone at the point of maximum velocity. The combination of velocity and turbulence improves atomization and produces maximum desuperheater effectiveness. The water pressure required should equal the operating steam pressure.

PERFORMANCE

Annular Venturi desuperheaters are normally used in areas where atomizing steam is not available. Turndown ratio is dependent upon a wide variety of factors, such as installation (horizontal or vertical), amount or residual superheat, and piping. Depending on exact flow conditions, units are capable of 20% to 2% flow variation. Pressure drop normally varies between 2 psi and 10 psi.

CONSTRUCTION, SIZES AND RATINGS

Sizes 1" through 4", all stainless steel. Flanged units have 150 or 300 lb. stainless steel R.F. flanges.

Sizes 6" through 16", carbon steel with stainless steel water pipe and venturi cone. Flanged units have 150 or 300 lb. R.F. flanges. Stainless steel units have all stainless steel wetted parts and carbon steel lap joint flanges.

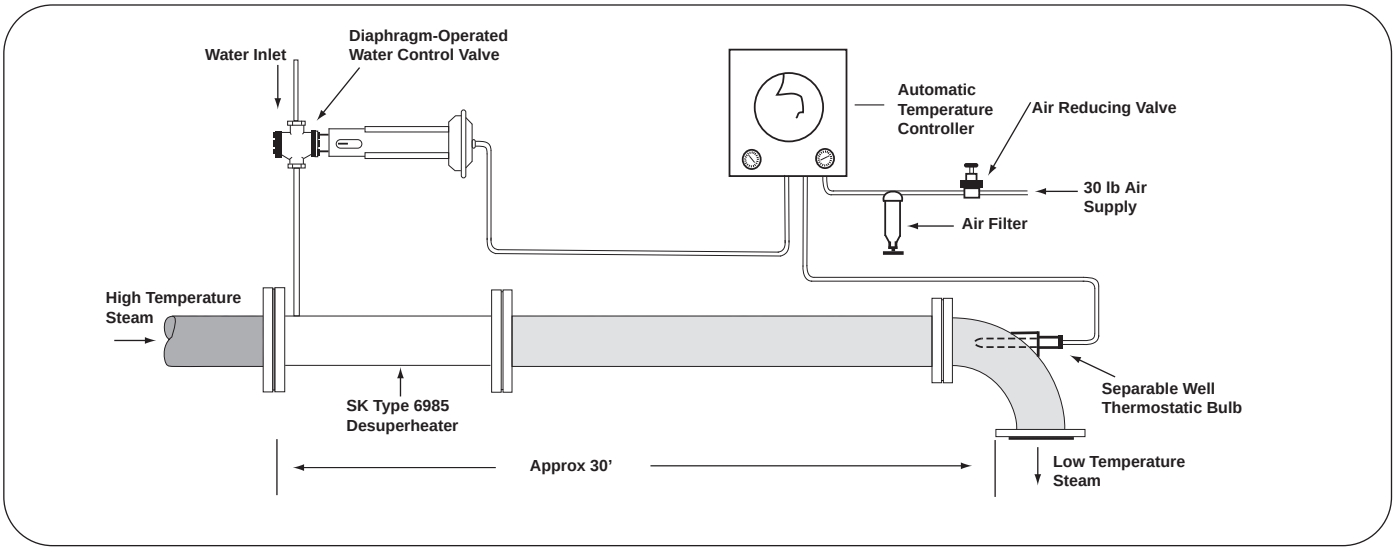
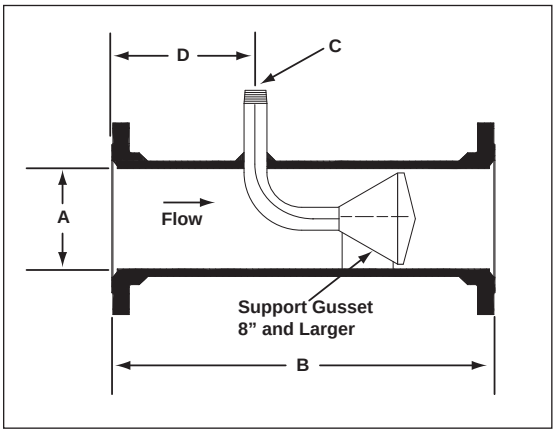
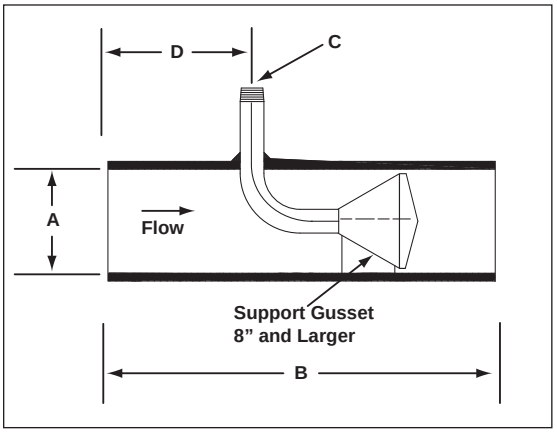


Fig. 2. Automatically controlled annular venturi desuperheater system



TYPE 6985-C DIMENSIONS

Size (inches)		A	1	1 1/2	2	2 1/2	3	4	6	8	10	12	14	16
Overall Length	150 lb	B	8	10	12	14	16	18	22	24	28	30	30	32
	300 lb		8	10	12	14	16	20	24	26	30	32	32	34
Water Inlet (NPT)		C	1/8	1/4	1/4	1/4	1/2	1/2	1	1	1 1/2	1 1/2	2	2
Flange Face To	150 lb	D	4 3/4	4 1/2	6	7 7/8	8 1/4	9	8 1/4	8	6	6	6	7
Water Inlet C/L	300 lb		4 3/4	4 1/2	6	7 7/8	8 1/4	11	10 1/4	10	6	6	6	7



TYPE 6985-A DIMENSIONS

Size (inches)	A	1	1 1/2	2	2 1/2	3	4	6	8	10	12	14	16
Overall Length	B	8	10	12	14	16	18	22	24	28	30	30	32
Water Inlet (NPT)	C	1/8	1/4	1/4	1/4	1/2	1/2	1	1	1 1/2	1 1/2	2	2
Flange Face To Water Inlet C/L	D	4 3/4	4 1/2	6	7 7/8	8 1/4	9	8 1/4	8	4	4	4	5

ISO 9001 Certified