



**LESLIE**  
CONTROLS, INC.

A subsidiary of CIRCOR International, Inc.

# MULTI ORIFICE LANCER DESUPERHEATER



FOR MEDIUM AND HIGH  
PRESSURE, ADVANCED  
MULTI ORIFICE LANCER  
DESUPERHEATERS DESIGNED  
IN APPLICATIONS IN RATINGS  
ANSI 300-2500 LBS.

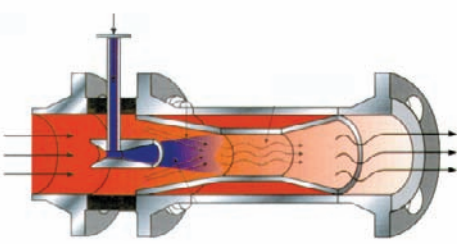




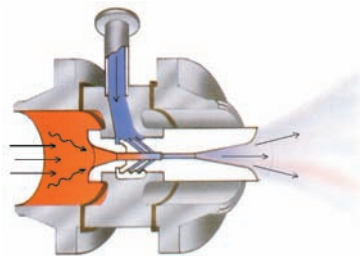
The principle function of any desuperheater is to accelerate the phenomenon of absorption of the spray water by the steam so that steady conditions of steam temperature are reached within a short distance from the outlet at all loads. This ensures that poor quality of steam or water droplets are not carried downstream in the steam pipeline. The purpose therefore, is to develop methods by which heat transfer between steam and water can be hastened. The main purpose is to break spray water droplets into very fine particles at all loads to ensure increased surface area for water to come in contact with the steam is available, thereby increasing the rate of evaporation. It is very clear that the size of the water droplets should be smallest, utmost surface area available, absorption will be almost instantaneous and true temperature will be measured within the shortest distance.

In all instances for desuperheating, the nature of the downstream steam and the avoidance of large spray water droplets that can be propelled at high speed to damage elbows, valve seats, heat exchanger tubes, or process material are very important factors while designing desuperheating system and equipment selection.

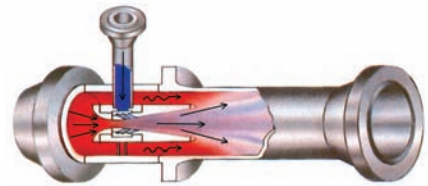
Details of other Desuperheater models that can also be supplied based on various requirements:



Double Venturi Desuperheater



Atomizer Desuperheater



Venturi Desuperheater

## Quality

Increasingly quality control procedures are regularly being met throughout the production process. Leslie has established a quality control system. This organization has, written in a quality control manual, the quality expected and proved at each stage of manufacturing, stocking, machining, assembly, inspection and testing, so that the level of quality required is achieved.

Tailor-made quality assurance programs are applied in deliveries to nuclear plants and special applications and other highly demanding services.





The Leslie multi orifice lancer desuperheater systems provide the most convenient, accurate and economical means of reducing the superheated steam or other vapors to temperatures nearing saturation.

A pioneer in India in the field of desuperheating systems Leslie presents its latest generation of lancer Desuperheaters Mark - 1 and they offer more advantages than the competition yet are competitively priced.

The Leslie multi orifice lancer desuperheater regulates the amount of injected water by varying the number of orifices during operation. This ensures that the spray water pressure remains constant at all loads and an excellent and almost uniform spray quality is achieved over the full operating range, thereby minimizing the tendency of spray water to accumulate in the line. Opening of the orifices is regulated by the positioning of a piston operated actuator directly mounted on the desuperheater. This compact and simple design ensures no separate spray water injection control valve is required.

#### **APPLICATIONS:**

Leslie multi orifice lancer desuperheaters are used for the precise temperature control of:

- *Process steam*
- *Power plants*
- *Boiler superheaters*
- *Exhaust and extraction steam of turbines*
- *Cogeneration facilities*

#### **PRINCIPLE OF OPERATION:**

Steam temperature is controlled by the positioning of the perforated plug within the nozzle head. A signal from the temperature control loop to the actuator positions the perforated plug to open or close the required nozzles. As the perforated plug is lifted from the seat, water flowing through the hollow plug exits from the exposed orifices in the nozzle block. Full water / steam pressure differential is maintained at all loads for optimum efficiency and the water flow is controlled at the point of injection into the steam.

The special design of the spray orifice ensures the formation of a hollow cone shaped misty spray which is readily absorbed into the superheated steam. Differential pressures of 60 to 1700 psi (4.2 to 120 kg/cm<sup>2</sup>) between the coolant and steam can be accommodated by the unit.

#### **No other Desuperheater offers the combination of Leslie features:**

##### **HEAVY DUTY:**

Bodies are machined from solid forged bar thereby eliminating casting deformity and flaws.

##### **UNIQUE DESIGN:**

The cooling water enters through a perforated plug which slides into nozzle block and adjusts the quantity of injected water proportional to the steam quantity and thus cares for a good control behavior.

Revolutionary multi orifice atomizer and feed forward design assures soft misty spray and precise spray water regulation for uniform and instantaneous temperature control over full range of steam flow.

##### **COMPACT CONFIGURATION:**

Double stem guiding with over size stem diameter to maximize desuperheater life, two point guiding that assures rigidity and control throughout the stroke.

##### **NO DRIPPING:**

The unique design on internal sealing eliminates dripping.

##### **TREATED STEM:**

The desuperheater stem is machined, ground and surface is plasma nitrided for the required hardness of 800 - 1000 Vickers. Friction on account of packing is reduced and greatly improves sealing tightness.

##### **UNIQUE ARRANGEMENT OF ORIFICES:**

Multi orifices of varying sizes aim at equal/linear/modified characteristics

and the fineness of droplet size allows application at steam velocities as low as 2000 ft/min. Temperature control within 10 deg f of saturation is possible and the steam temperature can be held within 5 deg f of set point.

##### **TURNDOWN:**

A high turndown of 20:1 is offered as standard. Higher turndowns can be accommodated on request.

##### **NO STEAM SIDE PRESSURE DROP:**

Almost no steam side pressure drop is encountered and is the most preferred choice for applications where steam side pressure drop is limited.

##### **PISTON CYLINDER ACTUATOR AND 4 WAY VALVE POSITIONER:**

The desuperheater is supplied with high performance, advanced, compact, light weight actuator coupled with positioner for high speed response and rigidity. In addition it provides very high thrusts and precise positioning accuracy. Maintenance is simplified owing to compact, light weight, easy accessibility and interchangeability.

##### **SIZING:**

By energy balance the quantity of spray water can be calculated :

$$Q = S \times \frac{H_1 - H_2}{H_2 - H_W}$$

Where,

Q = Quantity of spray water in KGs/hr.

S = Quantity of superheated steam in KGs/hr.

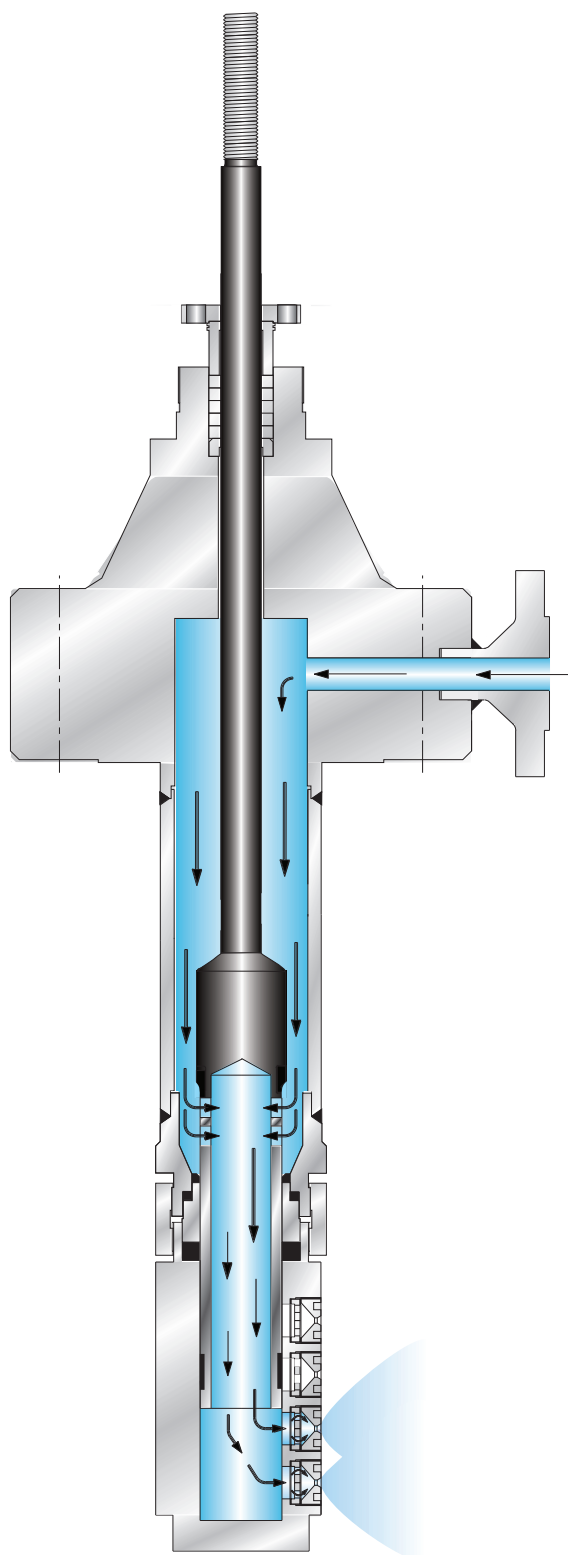
H<sub>1</sub> = Enthalpy of inlet steam in kJ/kg.

H<sub>2</sub> = Enthalpy of outlet steam in kJ/kg.

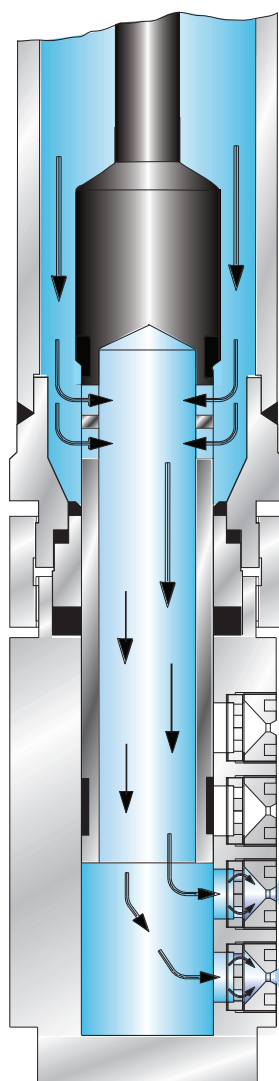
H<sub>W</sub> = Enthalpy of water in kJ/kg.

##### **NOTE:**

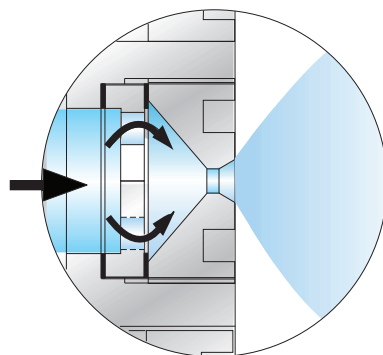
For applications where the main steam line velocity drops below 2000 ft/min, consult factory as possibility for the installation of thermal sleeves, catch pockets, steam traps etc. have to be carefully considered.



OPEN CONDITION



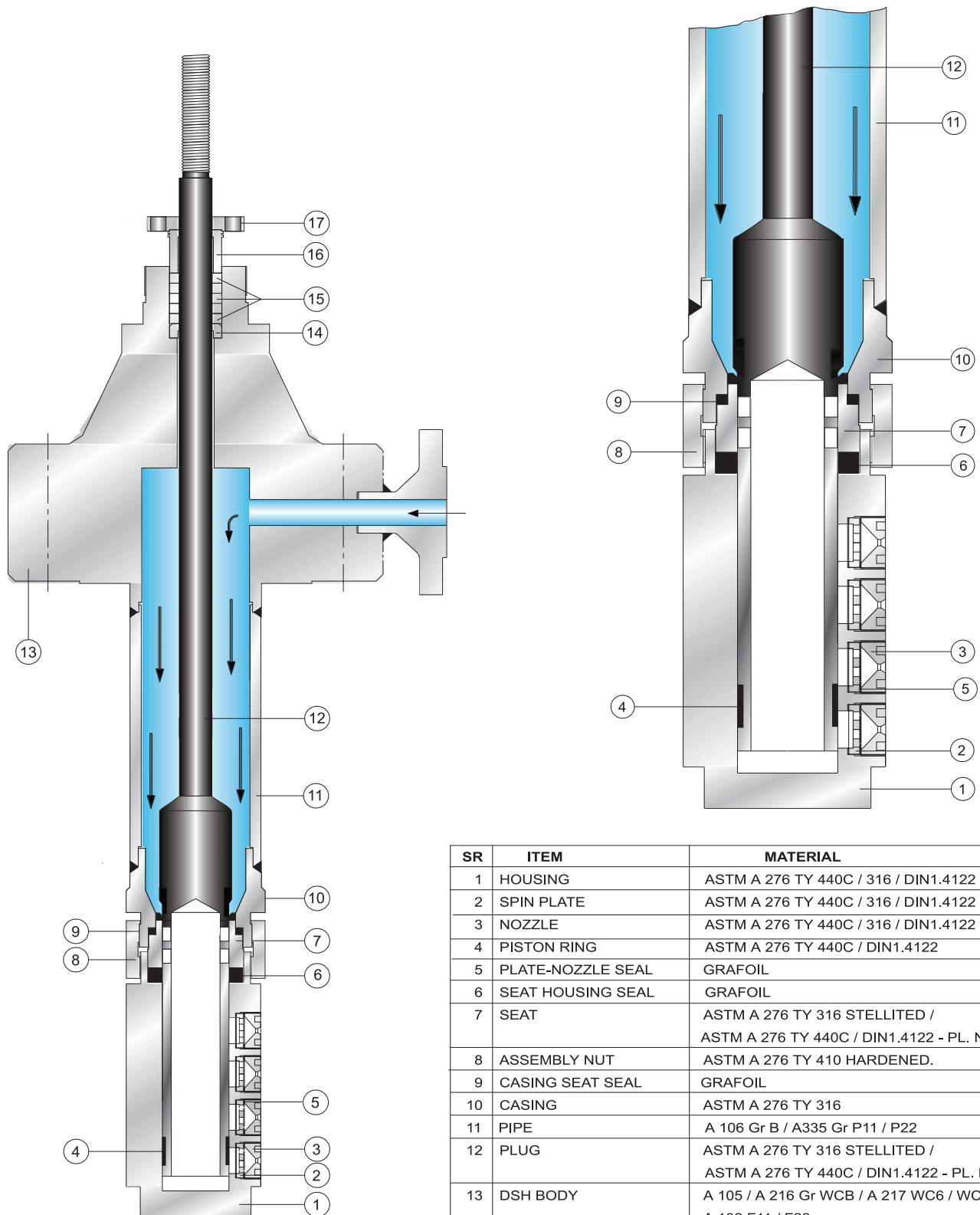
DETAIL-A



DETAIL-B

**NOTE:**

For continuous improvement of the product, Leslie Controls, Inc. reserves the right to change / modify the dimensions, designs and materials without any notice.



## CLOSE CONDITION

SR	ITEM	MATERIAL
1	HOUSING	ASTM A 276 TY 440C / 316 / DIN1.4122
2	SPIN PLATE	ASTM A 276 TY 440C / 316 / DIN1.4122
3	NOZZLE	ASTM A 276 TY 440C / 316 / DIN1.4122
4	PISTON RING	ASTM A 276 TY 440C / DIN1.4122
5	PLATE-NOZZLE SEAL	GRAFOIL
6	SEAT HOUSING SEAL	GRAFOIL
7	SEAT	ASTM A 276 TY 316 STELLITED / ASTM A 276 TY 440C / DIN1.4122 - PL. NI.
8	ASSEMBLY NUT	ASTM A 276 TY 410 HARDENED.
9	CASING SEAT SEAL	GRAFOIL
10	CASING	ASTM A 276 TY 316
11	PIPE	A 106 Gr B / A335 Gr P11 / P22
12	PLUG	ASTM A 276 TY 316 STELLITED / ASTM A 276 TY 440C / DIN1.4122 - PL. NI.
13	DSH BODY	A 105 / A 216 Gr WCB / A 217 WC6 / WC9 A 182 F11 / F22
14	BOTTOM GUIDE	ASTM A 276 TY 316 STELLITED
15	PACKING RING	GRAFOIL
16	TOP GUIDE	ASTM A 276 TY 316 STELLITED
17	PACKING FLANGE	ASTM A 276 TY 316
18	COOLANT FLANGE	A 105 / A 182 F11 / A182 F22

NOTE : PL. NI - Plasma Nitrided



## Dimensions:

The basic dimension which will vary is the mounting / stub length E which is either in 3" or 4" size. This dimension varies since the main steam pipe line differs according to the requirements and the unit has to be installed such that orifices / nozzles remain in the center portion of the steam pipe line.

This dimension can be calculated based on the following formula:

$$E = \frac{C - D}{2}$$

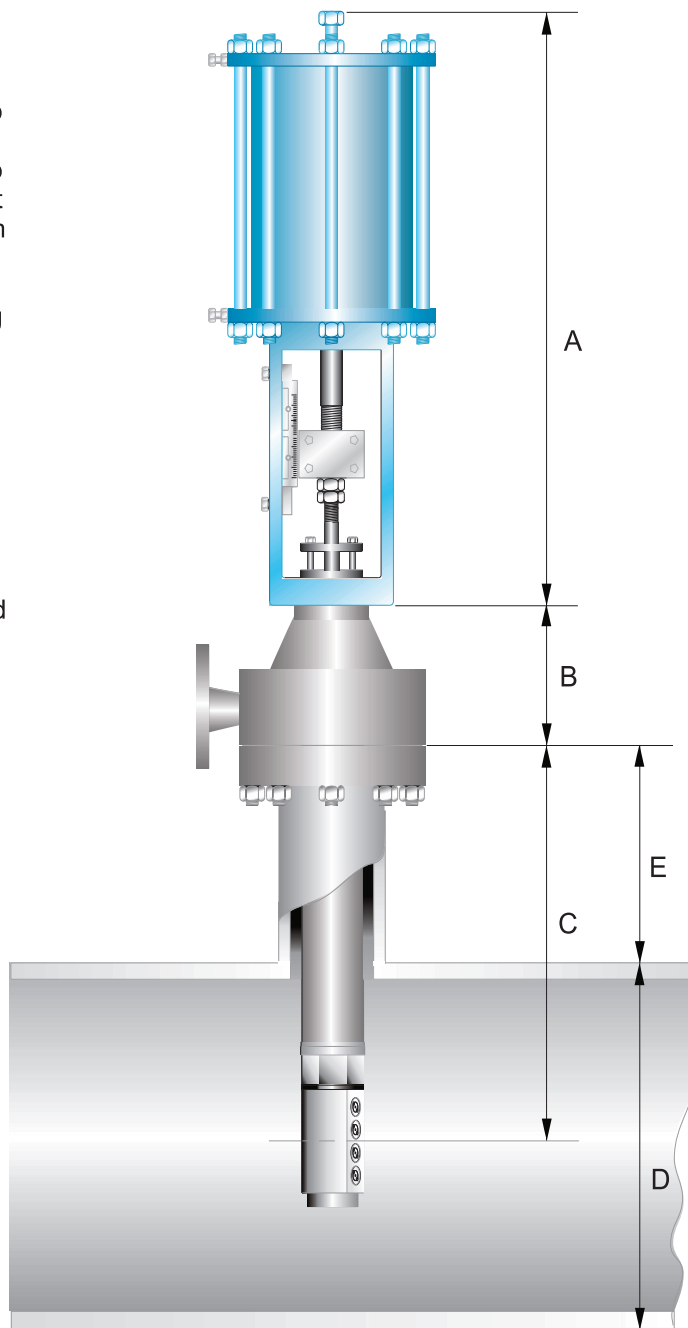
- \* Top mounted handwheel provided as per requirement.
- \* For steam pipe line sizes greater than 30", please refer to Factory for dimensions.
- \* For ease during maintenance, please leave undisturbed length of 300 mm at the top.

SR.NO.	DIMENSIONS in (mm)
A	800
B	175
C	515

A view of trim components incorporated in the unit.



View of spin plates, gaskets and nozzles.



## SIZING FORMULA :

$$C_v = 1.17 \times Q \times \frac{SP.GR}{\Delta P}$$

WHERE

Q = Flow rate in M3/hr.

SP.GR = Specific Gravity

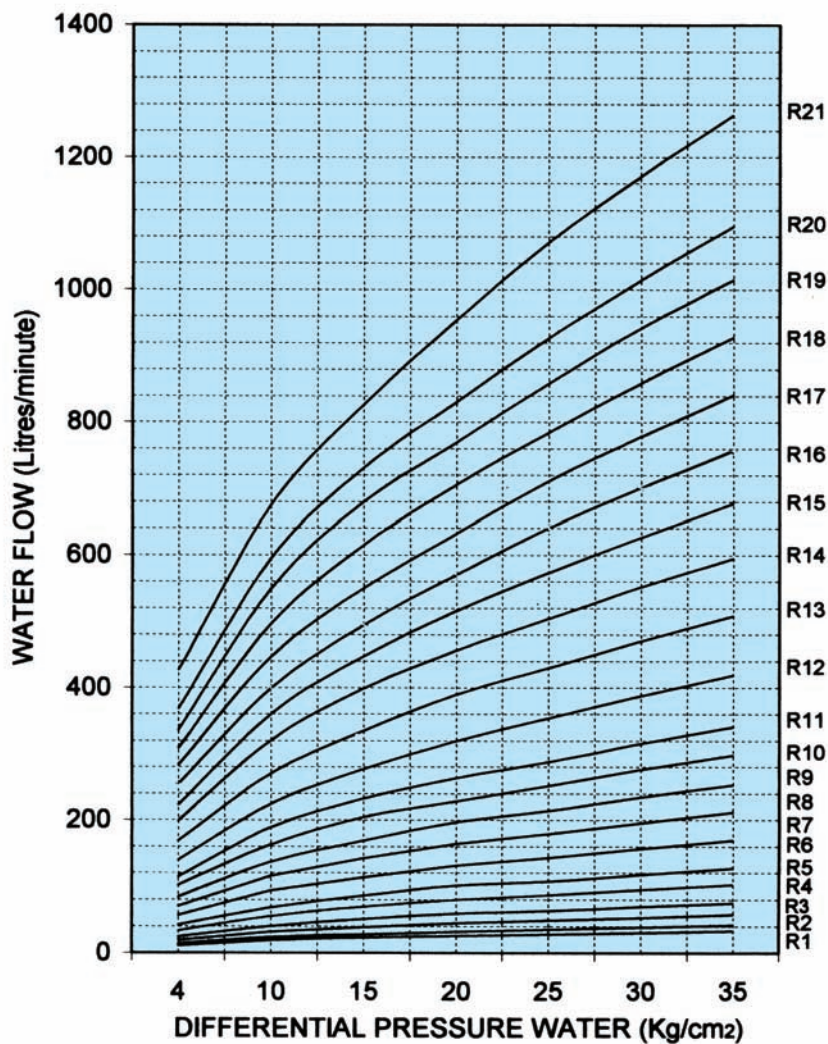
$\Delta P$  = Kg/cm<sup>2</sup>

## CAPACITY TABLE

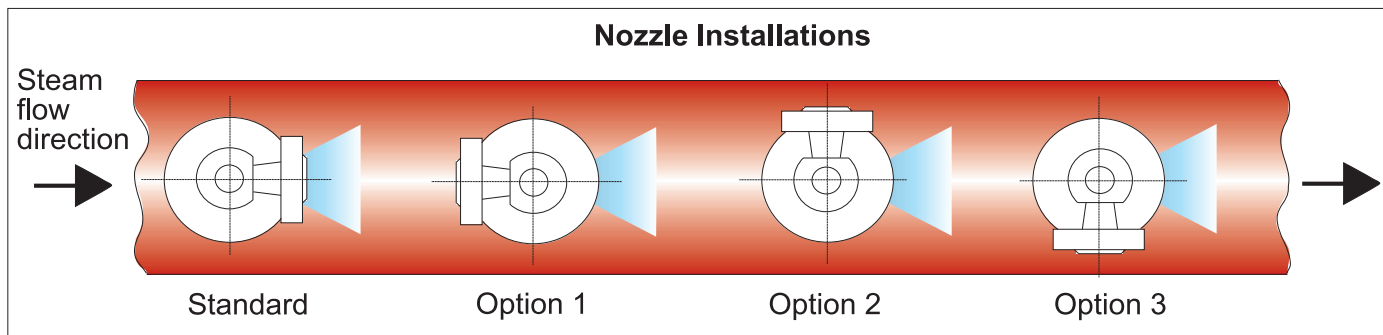
MODEL - MUL 3	
NOZZLE DESIGNATION	Cv
R1	0.4
R2	0.5
R3	0.7
R4	0.9
R5	1.2
R6	1.5
R7	2
R8	2.5

MODEL - MUL 4	
NOZZLE DESIGNATION	Cv
R9	3
R10	3.5
R11	4.0
R12	5.0
R13	6.0
R14	7.0
R15	8.0
R16	9.0
R17	10.0
R18	11.0
R19	12.0
R20	13.0
R21	14.0

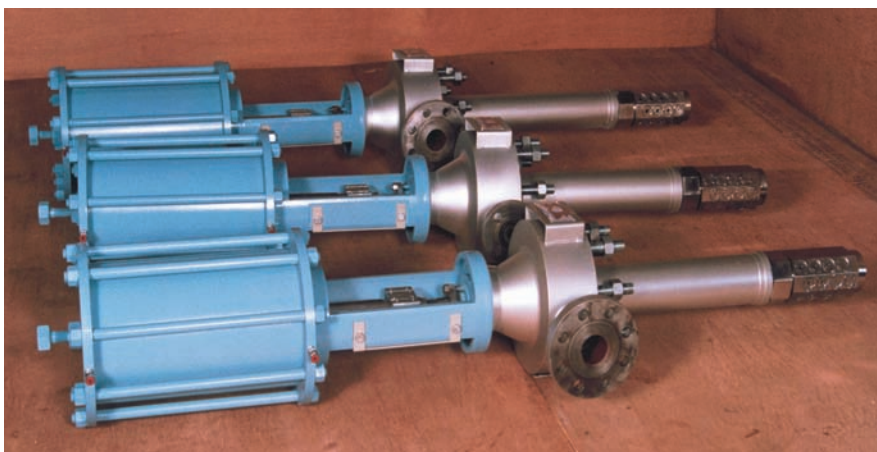
## SELECTION CURVES



Note: Apart from the standard Cvs indicated above, lower



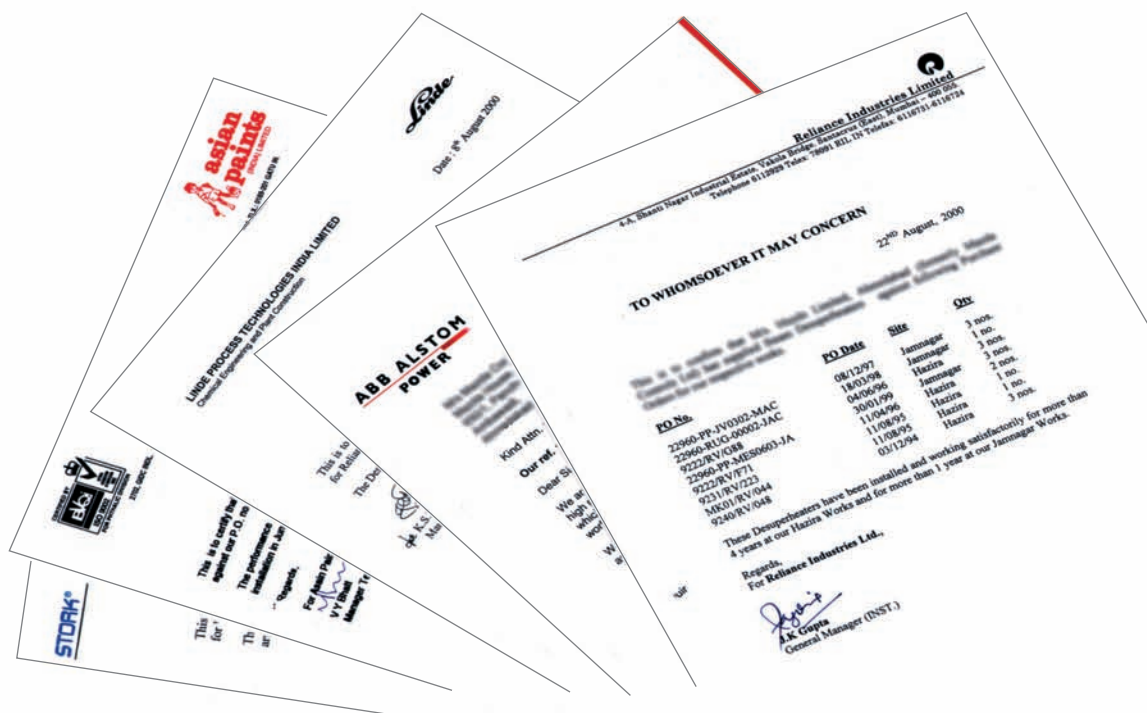
As per the requirements of spray water connection, as indicated above different nozzle installations are available with respect to spray water connection.



- \* Battery of Desuperheaters awaiting dispatch. Total 16 units were supplied to BASF- Petronas, Malaysia.
- \* **Consultants:** Bechtel - Singapore.
- \* **Inspection Agency:** Moody International.



Detail view of Multinozzles in assembled condition.



Since LESLIE CONTROLS was founded in 1900, we have been an industry leader in quality fluid control equipment. We have developed a full line of engineered products to suit your requirements, including diaphragm control valves, control instrumentation, pressure and temperature regulators and steam water heaters.