



**COPES-VULCAN**  
An SPX Process Equipment Operation

**SPX** Process Equipment

# MA-II/MA-IIU Mechanical Atomizing Desuperheater



## Application

The MA-II/MA-IIU is a mechanical atomizing desuperheater that is generally used for applications which feature steady loads. It is particularly designed for rugged service and can maintain final temperature to within 20°F (11°C) of saturation. In addition to steady load service, it is often used for attempting applications, and performs equally well for both.

Maximum cooling liquid capacity is 175,000 lb/hr (80,000 kg/hr) at a nozzle differential pressure of 400 psi (2760 kPa) when using 100°F (38°C) water.

## Two Mounting Options

This model is available in two mounting options. The MA-II is designed for welding to the pipe line and the MA-IIU is flange mounted. The MA-IIU also offers mounting commonality with other 'U'-series desuperheaters (MA-IU, MNSD-V and SAMN-U).

## Features

The MA-II /MA-IIU can be installed in pipe headers, elbows, tees, and similar fittings. It can be installed directly into the header without the need of flanges, and the main line suffers no appreciable pressure loss due to its restriction. No special supports are required for installation.

The higher the main fluid velocity the better the desuperheating, since with higher velocity, a shorter distance is required to achieve mixing. The temperature sensing element should be located approximately 40' (12m) downstream from the desuperheater.

## Principle of Operation

The Copes-Vulcan MA Desuperheaters reduce steam or gas temperatures by introducing cooling liquids directly into the hot fluid. Temperature reduction is essentially a matter of heat transfer, where the cooling liquid is placed in direct contact with the hot fluid and receives the necessary heat for evaporation. After sufficient time, all of the liquid is vaporized, resulting in final fluid flow at the desired lower temperature.

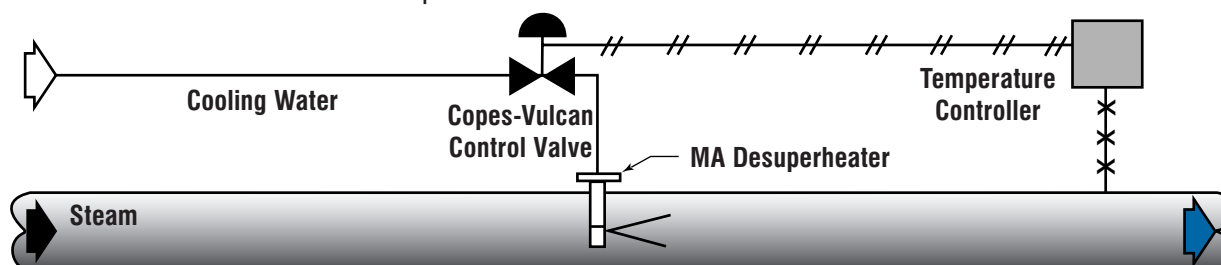
The operation is quite simple. A Copes-Vulcan control valve, SD-Severe Duty or GS-General Service valves, controls the cooling liquid flow. This valve responds to changes received from the temperature controller or temperature control system. This liquid then passes through the main tube of the desuperheater to the spray nozzle and discharges into the header as a fine spray. By controlling the flow through the spray nozzle and maintaining proper header velocities, good reliable temperature control is obtained. Speed of response is optimized by:

- (1) Proper range selection of the temperature controller
- (2) Placement of controller as close to the valve as possible
- (3) Use of a valve positioner
- (4) Precise throttling of cooling liquid valve

## Function

The cross section of the MA's tube is designed to minimize problems of mechanical vibration associated with compressible fluid flow. For example, as the main fluid flows past the desuperheater, vortices are formed and dissipated at a frequency dependent on the velocity, viscosity, and diameter of pipe. The desuperheater has been designed to minimize problems associated with vibration so that tube failure will not occur.

Each nozzle is tailored to meet a specific set of operating conditions. In addition, the nozzle design optimizes the cooling liquid particle size so that quick evaporation can take place. If the liquid was merely pumped into the line without a spray, control problems and liquid fall-out might occur. If liquid falls out of the main fluid and settles on the pipe, thermal stress and cracking might occur. The MA Desuperheaters produce rapid absorption of the liquid by mechanically producing fine droplets. The surface area per unit volume of liquid exposed to the hot fluid is large, thereby producing quick evaporation.



Temperature Controller sends signal to cooling water control valve, which in turn regulates flow of water to mechanical atomizing desuperheater.

## Specifications

The MA-II desuperheaters are available in forged F-11 and F-22 steel in accordance with ANSI codes. Materials are of the highest quality and selected to minimize the effects of erosion and corrosion.

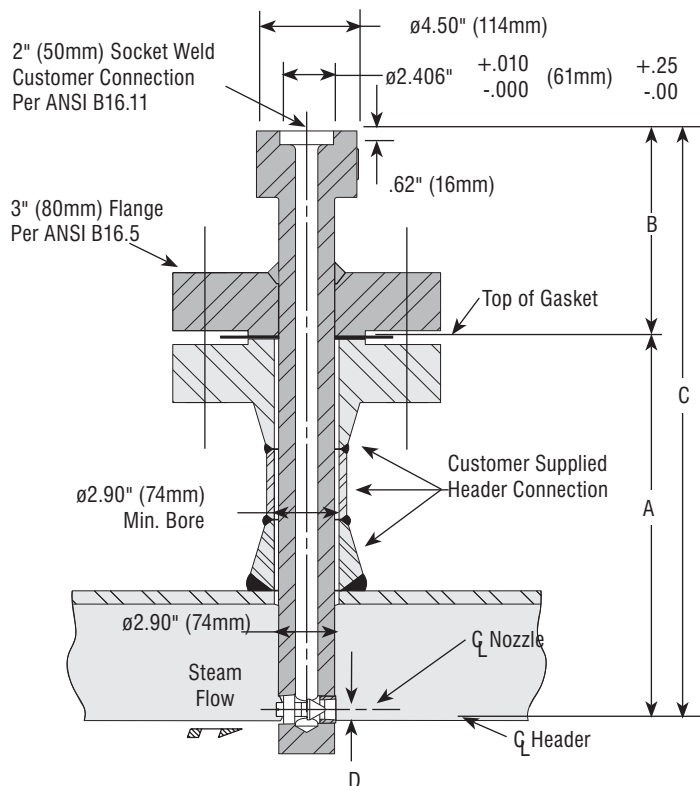
## Desuperheating Station

A simple mechanical atomizing desuperheating station consists of a temperature controller, a cooling liquid control valve and the desuperheater. The desired temperature is obtained by the temperature controller fixing the amount of cooling liquid flow through the valve and desuperheater. The nozzle of the desuperheater provides the desired pressure drop to ensure that liquid particle size is sufficiently small for quick evaporation.

This simple type of desuperheating station is normally used for steady load applications and as a result, no atomizing fluid is required. However, this can be used when flow turndown requirements are not too high, in the order of 2 or 2.5 to one. The low limit of flow should be when the main fluid header velocity is 5,000 feet per minute (1525m per minute) or higher.

## Dimensions

### MA-IIU\*



\* Low temperature configuration.

## 150 Pressure Class MA-IIU

Header Size	A	B	C	D
8"	13.06	5.56	18.62	—
200mm	332	141	473	—
10"	14.12	5.56	19.69	—
250mm	359	141	500	—
12"	15.12	5.56	20.69	.56
300mm	384	141	526	14
14"	15.75	5.56	21.31	—
350mm	400	141	541	—
16"	16.75	5.56	22.31	.1
400mm	425	141	567	25
18"	17.75	5.56	23.31	.38
450mm	451	141	592	10
20"	18.75	5.56	24.31	.62
500mm	476	141	618	16
22"	19.75	5.56	25.31	.5
550mm	502	141	643	13
24"	20.75	5.56	26.31	.12
600mm	527	141	666	3
30"	23.75	5.56	29.21	.12
750mm	603	141	745	3

## 300 Pressure Class MA-IIU

Header Size	A	B	C	D
8"	13.06	5.94	19	.38
200mm	332	151	483	10
10"	14.12	5.94	20.31	.62
250mm	359	151	516	16
12"	15.12	5.94	21.06	.94
300mm	384	151	535	24
14"	15.75	5.94	21.69	.38
350mm	400	151	551	10
16"	16.75	5.94	22.69	1.38
400mm	425	151	576	35
18"	17.75	5.94	23.69	—
450mm	451	151	602	—
20"	18.75	5.94	24.69	.1
500mm	476	151	627	25
22"	19.75	5.94	25.69	.88
550mm	502	151	653	22
24"	20.75	5.94	26.69	.25
600mm	527	151	678	6
30"	23.75	5.94	29.69	.25
750mm	604	151	754	6

## 600 Pressure Class MA-IIU

Header Size	A	B	C	D
8"	13.06	6.31	19.38	.75
200mm	332	160	492	19
10"	14.12	6.31	20.44	.75
250mm	359	160	519	19
12"	15.12	6.31	21.44	1.31
300mm	384	160	545	33
14"	15.75	6.31	22.06	.75
350mm	400	160	560	19
16"	16.75	6.31	23.06	1.75
400mm	425	160	586	44
18"	17.75	6.31	24.06	.38
450mm	451	160	611	10
20"	18.75	6.31	25.06	1.38
500mm	476	160	637	35
22"	19.75	6.31	26.06	1.25
550mm	502	160	662	32
24"	20.75	6.31	27.06	.62
600mm	527	160	687	16
30"	23.75	6.31	30.06	.62
750mm	603	160	763	16

All dimensions are  $\frac{1}{16}$  Inch  
Millimeter

### 900 Pressure Class MA-IIU

Header Size	A	B	C	D
8" 200mm	13.06 332	7.06 179	20.12 511	—
10" 250mm	14.12 359	7.06 179	21.19 538	.12 3
12" 300mm	15.12 384	7.06 179	22.19 564	.88 22
14" 350mm	15.75 400	7.06 179	22.81 579	.06 2
16" 400mm	16.75 425	7.06 179	23.81 605	.12 3
18" 450mm	17.75 451	7.06 179	24.81 630	—
20" 500mm	18.75 476	7.06 179	25.81 656	1 25
22" 550mm	19.75 502	7.06 179	26.81 681	.38 10
24" 600mm	20.75 527	7.06 179	27.81 706	1.38 35
30" 750mm	23.75 603	7.06 179	30.81 783	1.38 35

### 1500 Pressure Class MA-IIU

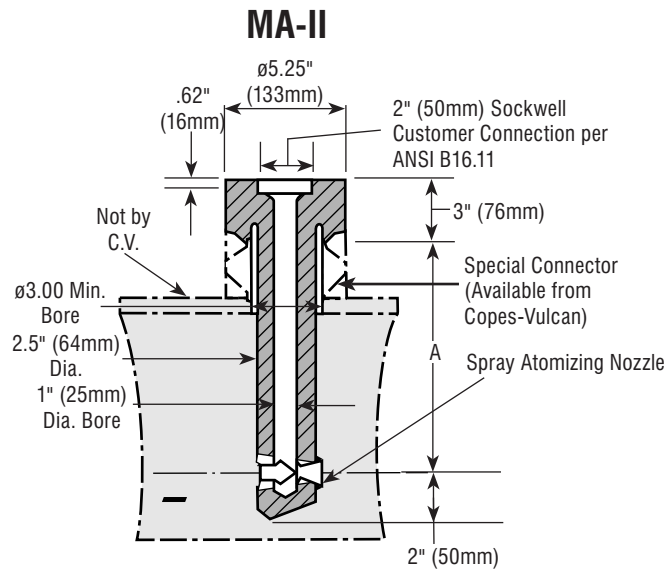
Header Size	A	B	C	D
8" 200mm	13.06 332	7.69 195	20.75 527	.62 16
10" 250mm	14.12 359	7.69 195	21.81 554	.5 13
12" 300mm	15.12 384	7.69 195	22.81 579	1.5 38
14" 350mm	15.75 400	7.69 195	23.44 595	.69 18
16" 400mm	16.75 425	7.69 195	24.44 621	.75 19
18" 450mm	17.75 451	7.69 195	25.44 646	.62 16
20" 500mm	18.75 476	7.69 195	26.44 672	1.62 41
22" 550mm	19.75 502	7.69 195	27.44 697	1 25
24" 600mm	20.75 527	7.69 195	28.44 722	.2 51
30" 750mm	23.75 603	7.69 195	31.44 799	.2 51

### 2500 Pressure Class MA-IIU

Header Size	A	B	C	D
8" 200mm	13.06 332	9.69 246	22.75 578	—
10" 250mm	14.12 359	9.69 246	23.81 605	1.06 27
12" 300mm	15.12 384	9.69 246	24.81 630	—
14" 350mm	15.75 400	9.69 246	25.44 646	.62 16
16" 400mm	16.75 425	9.69 246	26.44 672	1.62 41
18" 450mm	17.75 451	—	—	—
20" 500mm	18.75 476	—	—	—
22" 550mm	19.75 502	—	—	—
24" 600mm	20.75 527	—	—	—
30" 750mm	23.75 603	—	—	—

### MA-II and MA-IIU Nozzle Sizes

Orifice Diameter	Code Letter	Gage Wire Diameter
.5	A	.046
.5	B	.089
.875	C	.063
.875	D	.089
.875	E	.116
.875	F	.140
.875	H	.180
.875	J	.290
.875	K	.375



### MA-II

Header Size	A
8-14"	10
200-350mm	250
16-20"	13
400-500mm	330
22-30"	18
550-750mm	450

All dimensions are  $\frac{\text{Inch}}{\text{Millimeter}}$

Copes-Vulcan holds the following certifications: ASME Section III-"N" stamp and "NPT" stamp, ASME Section 1-"S" Stamp, ISO 9001:2000, and PED 97/23/EC Certification.

For more information about our worldwide locations, approvals, certifications, and local representatives, please visit our web site.

**Web Site:** [www.spxprocessequipment.com](http://www.spxprocessequipment.com)

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SPX Process Equipment reserves the right to incorporate our latest design and material changes without notice or obligation.

Design features, materials of construction and dimensional data, as described in this bulletin, are provided for your information only and should not be relied upon unless confirmed in writing. Certified drawings are available upon request.

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