

CSSEP

Clean Steam Moisture Separator

Description

Even in the cleanest and best designed clean steam system entrained moisture can still occur, resulting in an unacceptably low dryness fraction, non-compliance of critical sterilisation standards, damage to control valves/instrumentation and a generally low efficiency of the system.

The Forbes Marshall Clean Steam Moisture Separator, CSSEP, has been designed in full accordance with the ASME BPE guide to overcome the issues of removing entrained moisture from clean and pure steam systems. The CSSEP has a removable baffle plate, allowing the unit to be fully inspected prior to installation and to ease periodic cleaning and derouging.

Sizes and Pipe Connections

Size	DN 15, 20, 25, 40, 50, 80 and 100
Inlet and Outlet Pipe	Sanitary clamp ASME BPE (Tri-clamp) [®] or extended tube weld ends (ETO) ASME BPE
Drain	1" ASME BPE for DN15-50 and 2" ASME BPE for DN 80 and 100 (Tri-clamp) [®]
Vent	½" for DN 15-50 and ¾" for DN 80 and 100 ASME BPE (Tri clamp) [®]

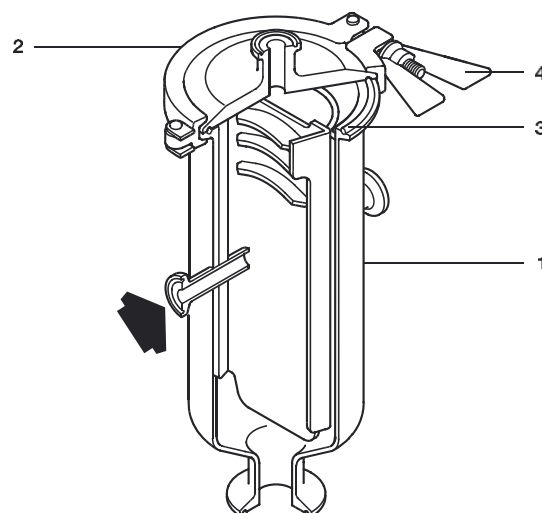
Surface Finish

Internal 0.5µm (20 micro-inch) maximum as outlined in ASME BPE, with all welds ground and polished

External 1.6µm (63 micro-inch) Ra maximum, with a glass bead blast finish

Limiting Conditions

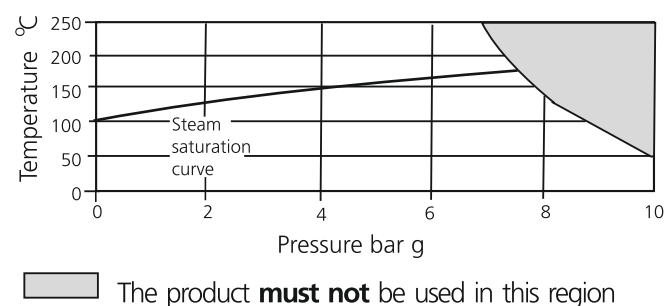
Body design conditions	PN10
PMA Maximum allowable pressure	10 bar (g) @ 50°C
Maximum allowable temperature	250°C
Minimum allowable temperature	-10°C
Maximum operating pressure for saturated steam service	7.6 bar (g)
TMO Maximum operating temperature	250°C @ 6.8 bar (g)
Minimum operating temperature	0°C
Designed for a maximum cold hydraulic test pressure of	15 bar (g)



Material

No	Part	Material	Standard
1	Body	Fabricated Stainless Steel	ASTM A 312 316 L ASTM A240 316 L
2	Cover + Baffle	Fabricated Stainless Steel	ASTM A 240 316L ASTM A 240 316L
3	Seal	Viton	
4	Clamp	Stainless Steel	AISI 316

Operating Range



Note: For hygienic/sanitary clamp ends the maximum pressure/temperature may be restricted by the gasket or sanitary clamp used. Please consult Forbes Marshall.

Standards

This product has been designed in accordance with the ASME BPE guide. It also complies with the requirements of the European Pressure Equipment Directive 97/23/EC. All polymers used comply with FDA regulation CFR 21 part 177 section 2600.

Certification

This product is available with the following certifications

- EN 10204 3.1 material certifications on request
- Certificate of conformity for internal surface finish
- Certificate of polymers FDA

Note: All certification/ inspection requirements must be stated at the time of order placement.

Packaging

Packaging for this product is conducted in a clean environment, segregated from other non stainless steel products and in accordance with ASME BPE for optimum protection and cleanliness. Connections of the product are fitted with protective cap before being sealed in a plastic bag.

Steam Sizing Example

1. Plot point A where the steam pressure and flow rate cross, e.g. 6 bar g/ 500kg/h: Draw a horizontal line.
2. Select line size. Any separator curve that is bisected by this line within the shaded area will operate at near 100% efficiency, e.g. 1½" (DN40), point B
3. Ascertain velocity. Line velocity for any size can be determined by dropping a vertical line from this intersection. From point B this line crosses the velocity axis at 23 m/s.

Note : A velocity correction factor needs to be applied. Please refer to the correction factor table below:

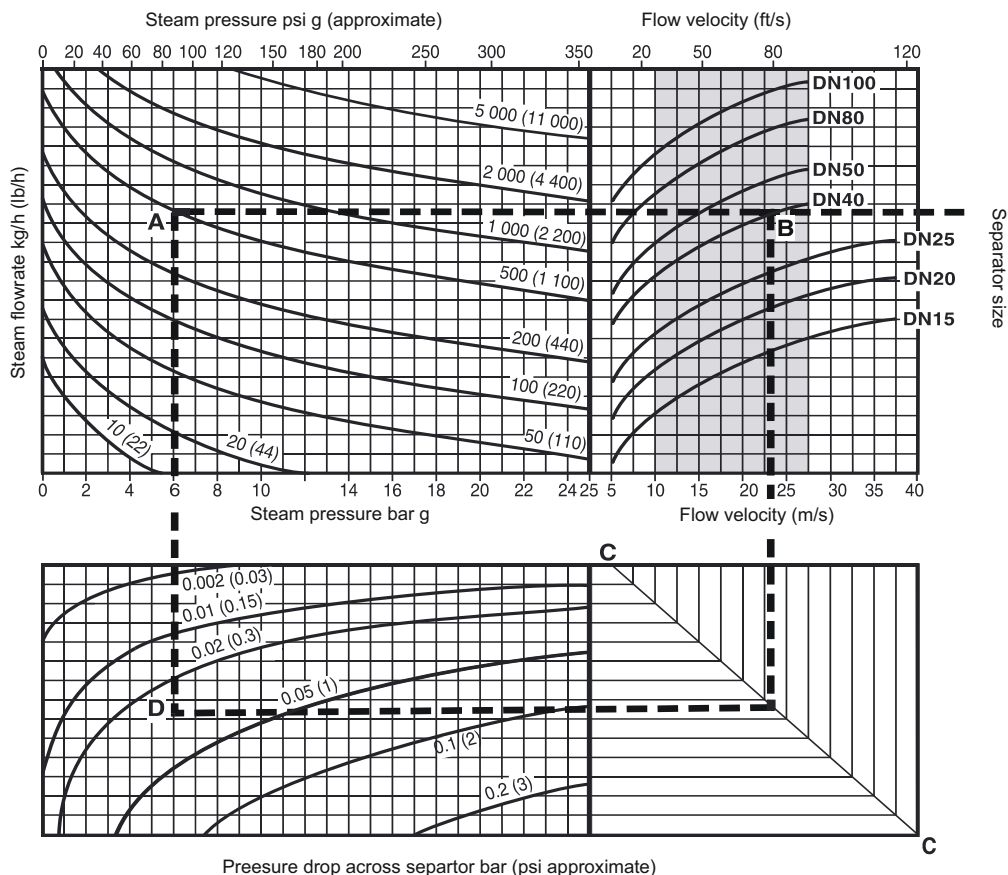
For this example the velocity correction factor is 1.38 for a 1-1/2" imperial O/D tube therefore the velocity in this example would be 31.74 m/s.

4. Pressure drop. Where the line extended from point B crosses the line C-C, plot a horizontal line. Now drop a vertical line from point A. The point of intersection, D, is the pressure drop across the separator,

i.e. about 0.035 bar

5. Separators should be selected on the basis of the best compromise between line size, velocity and pressure drop for each application.

Note : For larger sizes and alternative, metals and pressure and temperatures that exceed these operating conditions.



Velocity correction factor table

Separator size (DN)		15	20	25	40	50	80	100
Imperial O/D tubing	I/D (mm)	9.40	15.75	22.10	34.80	47.50	72.90	97.40
	Factor	2.83	1.78	1.45	1.38	1.22	1.14	1.10

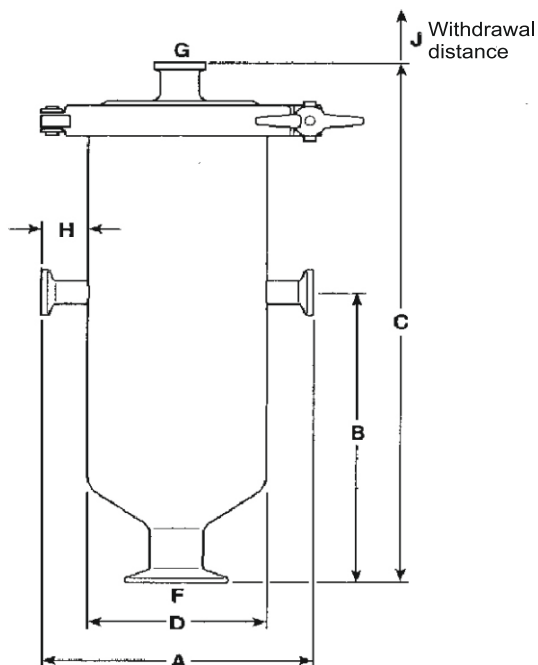


Fig 1

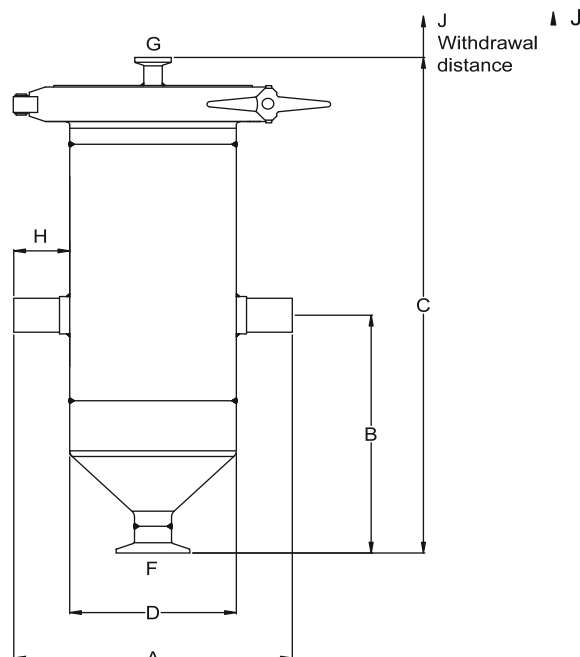


Fig 2

Dimensions, weight and volume (approximate) mm, kg and liters

Sanitary Clamp End (Refer fig 1)

Steam inlet	A	B	C	D	F(drain)	G(vent)	H	J	Weight	Volume/ outlet size
DN 15	135	158	287	88.9	1"	½"	23	215	3.0	1.2
DN 20	160	177	370	114.3	1"	½"	23	290	5.0	2.5
DN 25	160	177	370	114.3	1"	½"	23	290	5.0	2.5
DN 40	195	210	482	141.3	1"	½"	27	400	9.2	5.5
DN 50	195	210	532	141.3	1"	½"	27	450	10.0	6.3
DN 80	350	305	710	273	2"	¾"	38	570	34	30
DN 100	350	305	855	273	2"	¾"	38	720	40	40

Extended Tube Weld Ends (Refer fig 2)

Steam inlet	A	B	C	D	F(drain)	G(vent)	H	J	Weight	Volume/ outlet size
DN 15	165	158	287	88.9	1"	½"	38.1	215	3.5	1.2
DN 20	191	177	370	114.3	1"	½"	38.1	290	5.5	2.5
DN 25	191	177	370	114.3	1"	½"	38.1	290	5.5	2.5
DN 40	218	210	482	141.3	1"	½"	38.1	400	10	5.5
DN 50	218	210	532	141.3	1"	½"	38.1	450	10.5	6.3
DN 80	362	305	710	273	2"	¾"	44.5	570	34.5	30
DN 100	375	305	855	273	2"	¾"	51	720	41	40

Safety information, installation and maintenance

For full details see the user manual supplied with the product.

Installation Note

The CSSEP designed for installation in horizontal lines. Check arrow for correct orientation.

Note: The body and internals must be handled carefully to ensure that the surfaces finishes are not damaged.

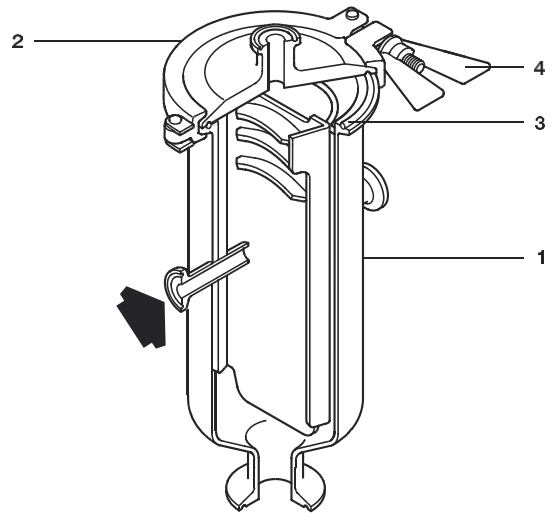
How to Order

Example: 1 no. DN 50 stainless steel Clean Steam Moisture Separator CSSEP with removable baffle plate. Sanitary clamp connections to ASME BPE, internal surface finish of 0.5µm complete with material to EN 10204 3.1

How to Order Spares

Always order spares by using the description given in the column headed "Available spare" and state the size of separator.

Example: 1 of seal for a DN 15 CSSEP stainless steel clean steam moisture separator.



Available Spares(Refer cross section view above)

seal	3
Clamp	4



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Forbes Marshall Arca
Codel International
Forbes Solar
Forbes Vyncke
Forbes Marshall Steam Systems

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