



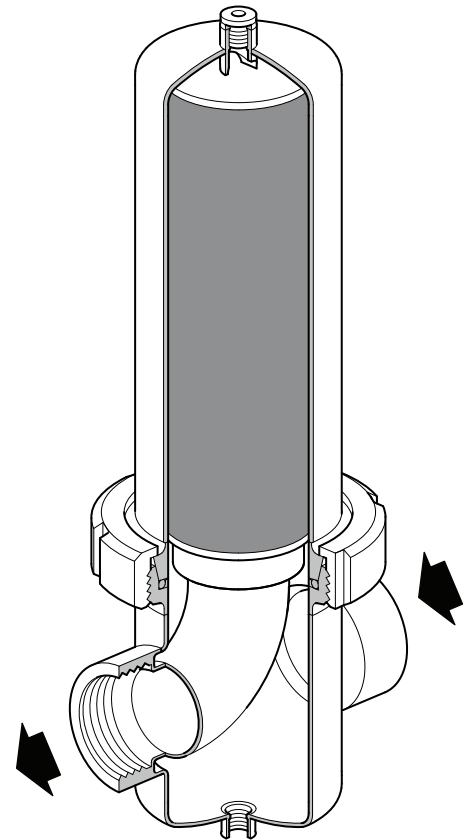
CSF16 and CSF16T Stainless Steel Steam Filters

Description

The CSF16 and CSF16T are horizontal, in-line, high efficiency separators and are designed and manufactured to remove particulate contamination from steam systems. This product complies with EC1935:2004 Food Contact Materials. It also complies with regulation EC2023:2006 on good manufacturing practice for materials and articles intended to come into contact with food.

Industry	Steam In CSF16/CSF16T	Steam Out CSF16/CSF16T
Pharmaceutical	Plant Steam	Filtered Plant Steam
Healthcare		
Other industries		
Food and Beverage		Culinary Steam* *when 5µm filter element or finer is selected

The filter housings are available in a choice of austenitic stainless steel and the material grades are defined in the table below. Also referenced is the surface finish.



Filter Housing model	Sizes	Material of Filter Housing (Bowl and Head)	Connection type (Bowl and Head)	Internal surface finish	External surface finish
CSF16, CF16L*, CSF16H*	DN8 (1/4") to DN80 (3")	1.4301 (304 stainless steel)	Food industry fitting to DIN 11851	Etched, Passivated and Polished Ra 0.8µm	Etched, Passivated and Polished Ra 1.6µm
CSF16T, CF16LT*, CSF16HT*	DN8 (1/4") to DN80 (3")	1.4404 (316L stainless steel)	Food industry fitting to DIN 11851	Etched, Passivated and Polished Ra 0.8µm	Etched, Passivated and Polished Ra 1.6µm

*In some pipe sizes the housing is available in a choice of low capacity designated 'L' and high capacity designated 'H'.

Replaceable elements in sintered austenitic stainless steel are available with either 1, 5 or 25 micron absolute rating. These are ordered separately to the Filter Housing.

Standards

These products fully comply with the requirements of the EU Pressure Equipment Directive/UK Pressure Equipment (Safety) Regulations and carry the  mark when so required.

The CSF16/CSF16T steam filters also comply with other country specific approvals:

When fitted with a 5 micron filter element, they are capable of removing 95% of particles 2 microns and larger in size, in accordance with the requirements for the production of culinary steam to 3A accepted practice number 609-03 (accepted in the US). This is subject to the installation being in accordance with 3A best practice guidelines (See installation section in IM-P180-48).

Department of Agriculture for use in federally inspected meat and poultry plants. All materials meet the requirements as stipulated by the US FDA Title 21 of Code of Federal Regulations.

All constituent materials and the finished product comply with EC1935:2004 and EC2023:2006

The complete product and component parts are, manufactured, assembled, tested and packaged in a facility verified and approved by an accredited registered body to ISO 9001:2015.

Certification

The CSF16/CSF16T can be supplied with material certification as per the table below.

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

Housing PED Category (SEP, Category I, Category II)	EN10204 Inspection Documents
SEP	No certification supplied
Cat. I	No certification supplied
Cat. II	Type 3.1 (Inspection Certificate)

If type 3.1 certification is required for SEP or Cat. I Filter Housings, this must be ordered separately.

If type 3.1 certification is required for the filter elements, this must be ordered separately.

Filter Housings options matrix

CSF16 and CSF16T Filter Housing Options, PED Classification and Design Reference (PT Curve)

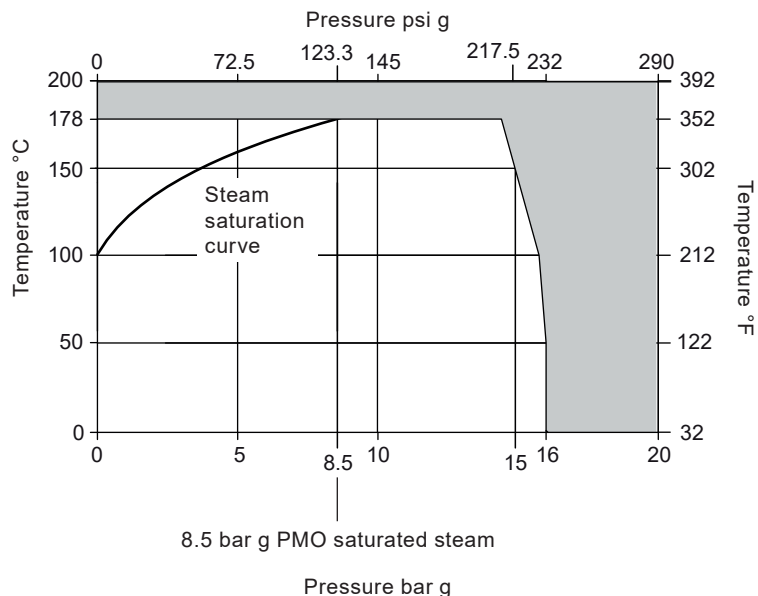
		Filter Housing Seal Material	Screwed Filter Housings (Design reference/ PED Category)	Flanged Filter Housings (Design reference/ PED Category)
Filter Housing Size	Filter Housing code		NPT	EN 1735-1 Class 150
DN8 (¼")	CSF16/CSF16T	EPM	Design Ref. A/SEP	Not available
DN10 (⅜")	CSF16/CSF16T		Design Ref. A/SEP	Not available
DN15 (½")	CSF16/CSF16T		Design Ref. A/SEP	Design Ref. A/SEP
DN20 (¾")	CSF16/CSF16T		Design Ref. A/SEP	Design Ref. A/SEP
DN25 (1")	CSF16/CSF16T		Design Ref. A/SEP	Design Ref. A/SEP
DN32 (1¼")	CSF16/CSF16T		Design Ref. A/SEP	Design Ref. A/SEP
DN40 (1½")	CSF16/CSF16T		Design Ref. A/SEP	Design Ref. A/SEP
DN50 (2")	CSF16L/CSF16LT		Design Ref. A/Cat. I	Design Ref. A/Cat. I
	CSF16H/CSF16HT		Design Ref. A1/Cat. I	Design Ref. A/Cat. I
DN65 (2½")	CSF16/CSF16T		Design Ref. A/Cat. I	Design Ref. A/Cat. I
DN80 (3")	CSF16L/CSF16LT		Design Ref. A/Cat. II	Design Ref. A/Cat. II
	CSF16H/CSF16HT		Design Ref. B/Cat. II	Design Ref. B/Cat. II

Pressure/temperature limits

CSF16/CSF16T

Product Design Reference A

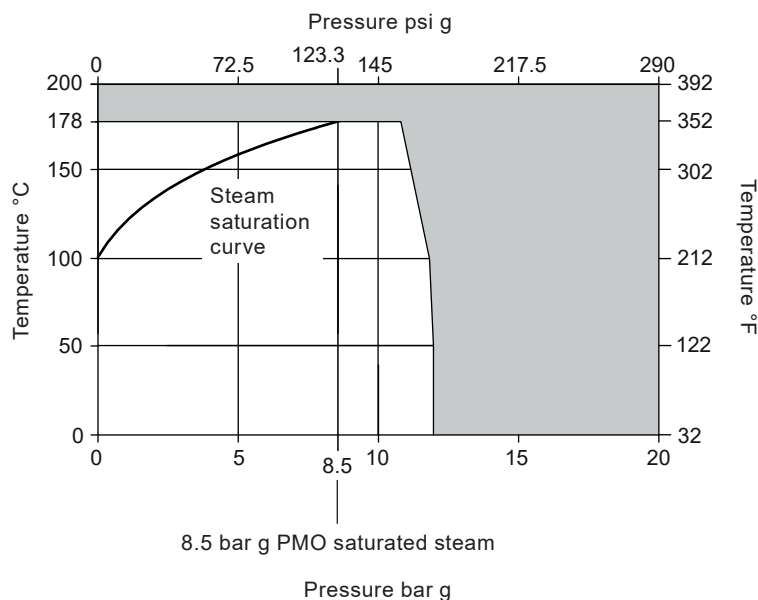
PMA	Maximum allowable pressure	16 bar g	232 psi g
TMA	Maximum allowable temperature	178 °C	352 °F
PMO	Maximum operating pressure for saturated steam service	8.5 bar g	123.3 psi g
TMO	Maximum operating temperature for saturated steam service	178 °C	352 °F
	Minimum allowable temperature	-5 °C	23 °F
	Minimum operating temperature	0 °C	32 °F
	Cold hydraulic test pressure	27.5 bar g	399 psi g



The product **must not** be used in this region.

Product Design Reference B

PMA	Maximum allowable pressure	12 bar g	174 psi g
TMA	Maximum allowable temperature	178 °C	352 °F
PMO	Maximum operating pressure for saturated steam service	8.5 bar g	123.3 psi g
TMO	Maximum operating temperature for saturated steam service	178 °C	352 °F
	Minimum allowable temperature	-5 °C	23 °F
	Minimum operating temperature	0 °C	32 °F
	Cold hydraulic test pressure	20.6 bar g	299 psi g



CSF16 and CSF16T filter housing options and corresponding filter elements

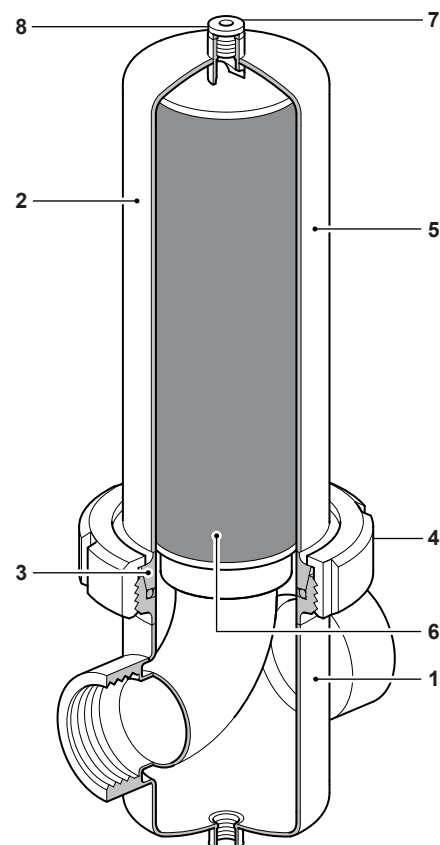
Filter housing			Filter Element		
Filter Housing Size	Filter Housing code	Filter Housing Seal Material	1µm/ 5µm/ 25µm O-ring seal type	Filter element code	No. of elements per housing
DN8 (¼")	CSF16/ CSF16T	EPM	EPM	CSF16-SE 03/10	1
DN10 (⅝")	CSF16/ CSF16T			CSF16-SE 04/10	1
DN15 (½")	CSF16/ CSF16T			CSF16-SE 04/20	1
DN20 (¾")	CSF16/ CSF16T			CSF16-SE 05/20	1
DN25 (1")	CSF16/ CSF16T			CSF16-SE 05/25	1
DN32 (1¼")	CSF16/ CSF16T			CSF16-SE 07/25	1
DN40 (1½")	CSF16/ CSF16T			CSF16-SE 07/30	1
DN50 (2")	CSF16L/ CSF16LT			CSF16-SE 10/30	1
	CSF16H/ CSF16HT			CSF16-SE 15/30	1
DN65 (2½")	CSF16/ CSF16T			CSF16-SE 20/30	1
DN80 (3")	CSF16L/ CSF16LT			CSF16-SE 30/30	1
	CSF16H/ CSF16HT			CSF16-SE 30/50	1

Materials

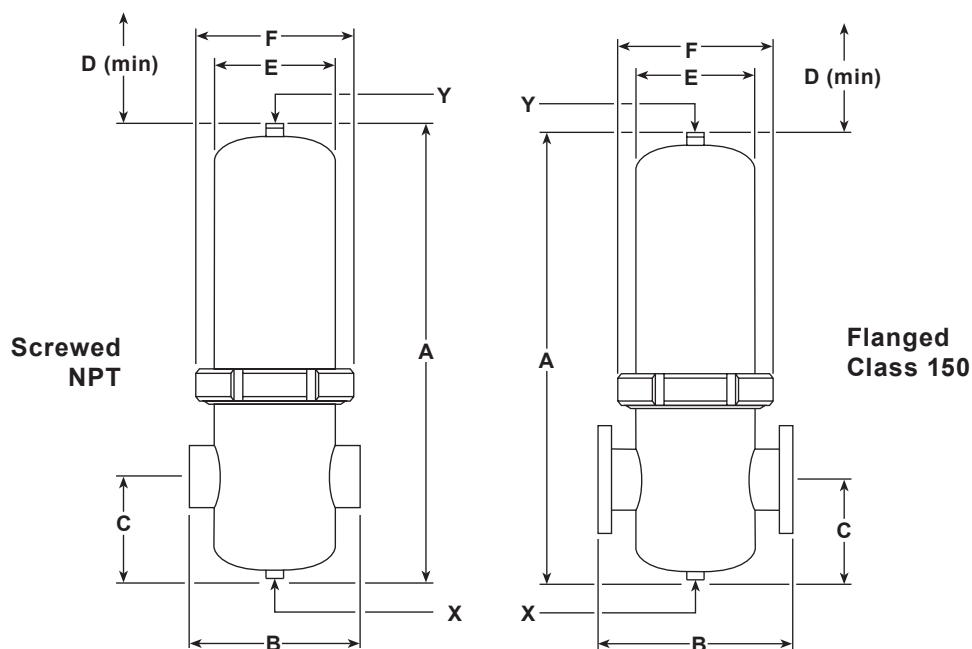
No.	Part	Materials	
1	Filter housing bowl	Stainless steel	CSF16 1.4301*
			CSF16T 1.4404**
2	Filter housing head	Stainless steel	CSF16 1.4301*
			CSF16T 1.4404**
3	Housing seal	EPM	EP380
4	Housing lockring	Stainless steel	CSF16 1.4301*
			CSF16T 1.4404**
5	CSF16-S filter element	Stainless steel	Outer core 1.4404
			End cap 1.4301
			Weld filler 1.4576
6	Filter element seal (2 off per element)	EPM	EP380
7	Plug	Stainless steel	A4 - 70
8	Gasket	Stainless steel	1.4571
9	Flange (not shown)	Stainless steel	CSF16 1.4541
			CSF16T 1.4571

*1.4301 - Material may also include grades 1.4307, 1.4404, 1.4432, 1.4435, 1.4571 for manufacturing purposes. Weld filler will be 1.4430.

** 1.4404 - Material may also include grades 1.4432, 1.4435 and 1.4571 for manufacturing purposes. Weld filler will be 1.4430.



Dimensions/volume and weights (approximate) in mm, litres and kg



Filter	Size		Dimensions							Thread X	Thread Y
			A	B Screwed NPT	B Flanged Class 150	C	D	E Ø	F Ø		
CSF16 and CSF16T	¼"	DN8	217	108		54	90	70	112	¼" NPT	G¼"
	⅜"	DN10	245	108		54	120	70	112		
	½"	DN15	245	108	203	54	120	70	112		
	¾"	DN20	269	125	230	54	150	70	112		
	1"	DN25	295	125	247	73	150	85	127		
	1¼"	DN32	347	140	254	73	200	85	127		
	1½"	DN40	386	170	294	92	200	104	148		
	2½"	DN65	737	216	356	106	580	129	178		
CSF16L and CSF16LT	2"	DN50	460	170	297	92	280	104	148		
	3"	DN80	999	220	356	110	850	129	178		
CSF16H and CSF16HT	2"	DN50	587	170	297	92	450	104	148		
	3"	DN80	1024	240	380	113	850	154	210		

Note : No plug is fitted at the bottom of the filter housing

Volume and weights (approximate) in litres and kg

Filter			Vol.		Weight (kg) without element	
	Size		Litres		Screwed NPT	Flanged Class 150
			Screwed NPT	Flanged Class 150	Screwed NPT	Flanged Class 150
CSF16 and CSF16T	¼"	DN8	0.6		2.0	
	⅜"	DN10	0.7		2.1	
	½"	DN15	0.7	0.7	2.2	3.6
	¾"	DN20	0.8	0.85	2.4	4.4
	1"	DN25	1.3	1.4	3.2	5.7
	1¼"	DN32	1.6	1.8	3.7	7.2
	1½"	DN40	2.8	3	5.2	8.9
	2½"	DN65	9	9.4	8.1	15.9
CSF16L and CSF16LT	2"	DN50	3.2	3.75	5.2	10.6
	3"	DN80	12.6	13	9.6	19.2
CSF16H and CSF16HT	2"	DN50	4.5	4.7	5.8	11.2
	3"	DN80	17.8	18.3	13.2	22.2

Steam filter elements (weight in kg)

Filter housing size	Filter housing code	Filter element code (EPM)	Number of elements per housing	Filter element (individual)
DN8 (¼")	CSF16/CSF16T	CSF16-SE 03/10	1	0.2
DN10 (⅜")	CSF16/CSF16T	CSF16-SE 04/10	1	0.26
DN15 (½")	CSF16/CSF16T	CSF16-SE 04/20	1	0.37
DN20 (¾")	CSF16/CSF16T	CSF16-SE 05/20	1	0.45
DN25 (1")	CSF16/CSF16T	CSF16-SE 05/25	1	0.47
DN32 (1¼")	CSF16/CSF16T	CSF16-SE 07/25	1	0.57
DN40 (1½")	CSF16/CSF16T	CSF16-SE 07/30	1	1.27
DN50 (2")	CSF16L/CSF16LT	CSF16-SE 10/30	1	1.6
DN50 (2")	CSF16H/CSF16HT	CSF16-SE 15/30	1	2.25
DN65 (2½")	CSF16/CSF16T	CSF16-SE 20/30	1	2.77
DN80 (3")	CSF16L/CSF16LT	CSF16-SE 30/30	1	3.81
DN80 (3")	CSF16H/CSF16HT	CSF16-SE 30/50	1	4.98

Capacities

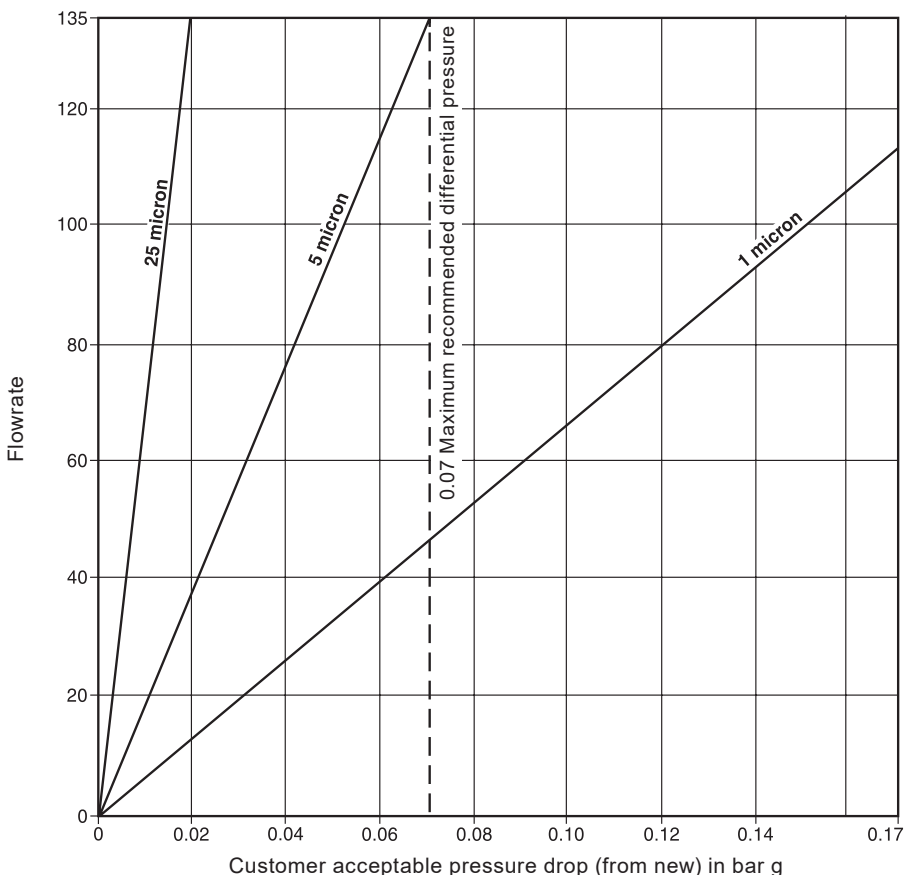
Saturated steam 1.0 bar g; DN50 CSF16 and CSF16T

Note: This sizing method will estimate the housing size for a given set of conditions. Contact Spirax Sarco for more accurate sizing if required.

25 micron element Flowrate look-up table*

Customer acceptable pressure drop in bar g	Flowrate value (Selection sizing step 2)
0.02	135
0.03	203
0.04	270
0.05	338
0.06	405
0.07	473

*where not visible on the chart



Capacity correction factors for steam pressure

A minimum of 1 bar g positive pressure across the filter must be available.

Steam pressure bar g	1	2	3	4	5	6	7	8	8.5
Correction factor	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	4.75

Element size correction factors for filter element

	DN8	DN10	DN15	DN20	DN25	DN32	DN40	DN50L	DN50H	DN65	DN80L	DN80H
Size of unit	¼"	⅜"	½"	¾"	1"	1¼"	1½"	2"L	2"H	2½"	3"L	3"H
Capacity correction factor	0.08	0.13	0.17	0.25	0.39	0.50	0.67	1.00	1.50	2.00	2.70	4.00

Selection example

Select a steam filter for a flowrate of 850 kg/h with saturated steam pressure at 4 bar g.

A 5 micron rating is required with maximum 0.05 bar pressure drop allowed.

- Step 1:** Divide the flowrate required by the capacity correction factor for the operating steam pressure. In this case, 850 kg/h is divided by 2.5 for a flowrate value of 340.
- Step 2:** From the capacity graph, select the micron rating required. Note where this line intersects the maximum pressure drop and go horizontally to read off the flowrate. In this case, the 5 micron line meets the 0.05 bar pressure drop allowed at a flowrate of 100. Note: For higher pressure drops when selecting a 25 micron filter element, use the flowrate lookup table above.
- Step 3:** Divide the equivalent flow calculated in step (1) by the maximum flowrate in step (2). Hence in this example, we have $340/100 = 3.4$ factor.
- Step 4:** From the element size correction factor table, select the nearest suitable conversion factor obtained in step (3) and select the appropriate element size. In the example DN80H CSF16 and CSF16T has a factor of 4.00. Note that if pressure drop must be minimized, always select the element based on a higher correction factor than that calculated.

Filter element

In steam/gas service, 100% of particles larger than the pore size chosen will be retained by the element. Note that the 1 micron element has an efficiency of 99.7% based on 0.2 micron particles. Selecting a pore size smaller than required will result in reduced service life and higher pressure drop.

Steam filter element life service guidelines

Filter Element type	Application	Service life	Additional notes
CSF16-SE	Steam	Replace when 0.7 barg pressure drop is measured across the filter housing Alternatively, where pressure drop cannot be accurately measured: after 12 months from installation (lowest risk) up to a maximum of 36 months*	Filter Housings should be Installed, Commissioned and Operated in accordance with Sections 3, 4 and 5 of the Installation and Maintenance Instruction document IM-P180-48. Clean Steam Filter Housings and Filter elements are manufactured in accordance with EC1935:2004 (Materials and articles intended to come into contact with food). Therefore, it is recommended that Filter elements are replaced to maintain this compliance, and not cleaned. Cleaning of Filter Elements is not recommended because of the increased risk of introducing contamination to the process. Cleaning will only provide a short-term improvement in dirt holding capacity and will never return to 'as new' condition.

*Service life durations are based upon Steam Systems being regularly maintained and best practice followed.

Safety information, installation and maintenance

For full details see the Installation and Maintenance Instructions (IM-P180-48) which is supplied with the product.

Warning

The steam filter elements CSF16 -SE must never be subjected to more than 5 bar g differential pressure.

How to order

The following information must be specified when ordering a Spirax Sarco CSF filter:

Maximum steam flowrate	kg/h
Maximum steam pressure	bar g
Customer allowable pressure drop in bar g (from new)	0.07 bar g maximum recommended
Housing material	1.4301 or 1.4404
Size *	DN or NPS (") and 'H' or 'L' where applicable
Pipe connections	Class 150 or NPT
Element rating	1, 5 or 25 micron
3.1 Certification for SEP and Category I filter housings	Yes/No
3.1 Certification for filter element(s)	Yes/No

* Note: For DN50 and DN80 the high capacity version is denoted by 'H' and low capacity by 'L'. For a 1.4404 housing version, the suffix 'T' must be added to the nomenclature e.g. CSF16T.

Supply

The CSF16 and CSF16T filter housings are supplied separately to the filter elements.

- 1. The filter housing head and bowl with housing seal are packed in one carton, complete with EN 10204 3.1 certification where applicable documentation and installation and maintenance instructions.
- 2. The filter element complete with two seals.

Note: The purpose of the filter is to remove (and retain) unwanted contamination. In time, the filter element will become saturated. To ensure a minimum downtime, we recommend that a spare filter element set is ordered at the same time as the CSF16 and CSF16T filter housing.

Example:

- 1 off Spirax Sarco DN20 CSF16 to pass 100 kg/h saturated steam at 9.0 bar g. Housing to be 1.4301 having NPT connections.
- 1 off CSF16-SE 15/20 filter element having a 5 micron rating.
- 1 off CSF16-SE 15/20 spare filter element set having a 5 micron rating.
- 1 off 3.1 Certification (for filter housing)

Spare parts

The spare parts available are shown in solid outline. Parts drawn in a grey line are not supplied as spares.

Available spares

CSF16-SE filter element kit	5, 6 (2 off)
Seal kit	3, 6 (please see table below for quantities)

Seal kit contents

Unit size	Housing seal (Part number 3)	Element seals (Part number 6)
DN8 - DN80	1	2

How to order spares

Always order spares by using the description given in the column headed 'Available spares' and state the size and type of filter housing, filter element rating and housing/filter element seal material required.

Example: 1 off 5 micron CSF16 SE filter element kit for a Spirax Sarco DN25 CSF16 clean steam filter.

Table 1 Recommended tightening torque

Item	 or mm		N m
4	use C spanner		As required
7	6 mm Hex	G¼"	55

