

Conditioning of steam and air

**STEAM & CONDENSATE
MANAGEMENT SOLUTIONS**



First for Steam Solutions

EXPERTISE | SOLUTIONS | SUSTAINABILITY

**spirax
sarco**

Unlock the full potential of your steam...

Spirax Sarco offer a broad range of effective conditioning equipment to ensure steam is delivered to the process in optimum condition.

Poor quality or wet steam can lead to reduced heat transfer and corrosion in the system. In turn these issues can affect processes and may even damage equipment resulting in product spoilage, plant downtime and costly repairs.

Our range of strainers, separators and filters are designed to safeguard against these problems by conditioning your steam supply, removing water particles and filtering debris such as scale and rust.

This ensures optimum steam system performance improving overall plant productivity and ultimately leading to energy and cost savings.



First for Steam Solutions



Separators

Maintaining high quality, dry steam

Wet steam can cause a number of problems in the system including a reduction in heat transfer efficiency, increased erosion and possible corrosion.

Entrained water flowing through control valves, flowmeters and rotating or reciprocating equipment significantly affects performance and can eventually lead to an inefficient system and plant downtime.

The primary purpose of a separator is to remove water which may be suspended in the steam supply. Installing separators at key points around the system helps keep the steam dry. This allows vital equipment to operate as productively as possible and helps to maintain optimum conditions throughout the entire system.

With a wide range of materials and sizes, we have a separator for almost any application or process. Their large internal volumes provide excellent moisture separation and very low pressure drop. Our separators are available in two types:

1) Available in cast iron and SG iron, the S1, S2, S3, S12 and S13 separators are offered for general purpose applications. Designed for simplicity, they are relatively compact yet efficient for non-critical applications.

2) The S5, S6, S7 and S8 series are high efficiency separators specifically designed to maintain separation over a wide range of pipeline velocities and pressures. These separators are available in both carbon steel and austenitic stainless steel for specialist process systems. They also offer an additional benefit of efficient air removal, which further improves productivity in the steam plant.

Insulation jackets for separators

Insulation plays an important role and delivers a number of key functions:

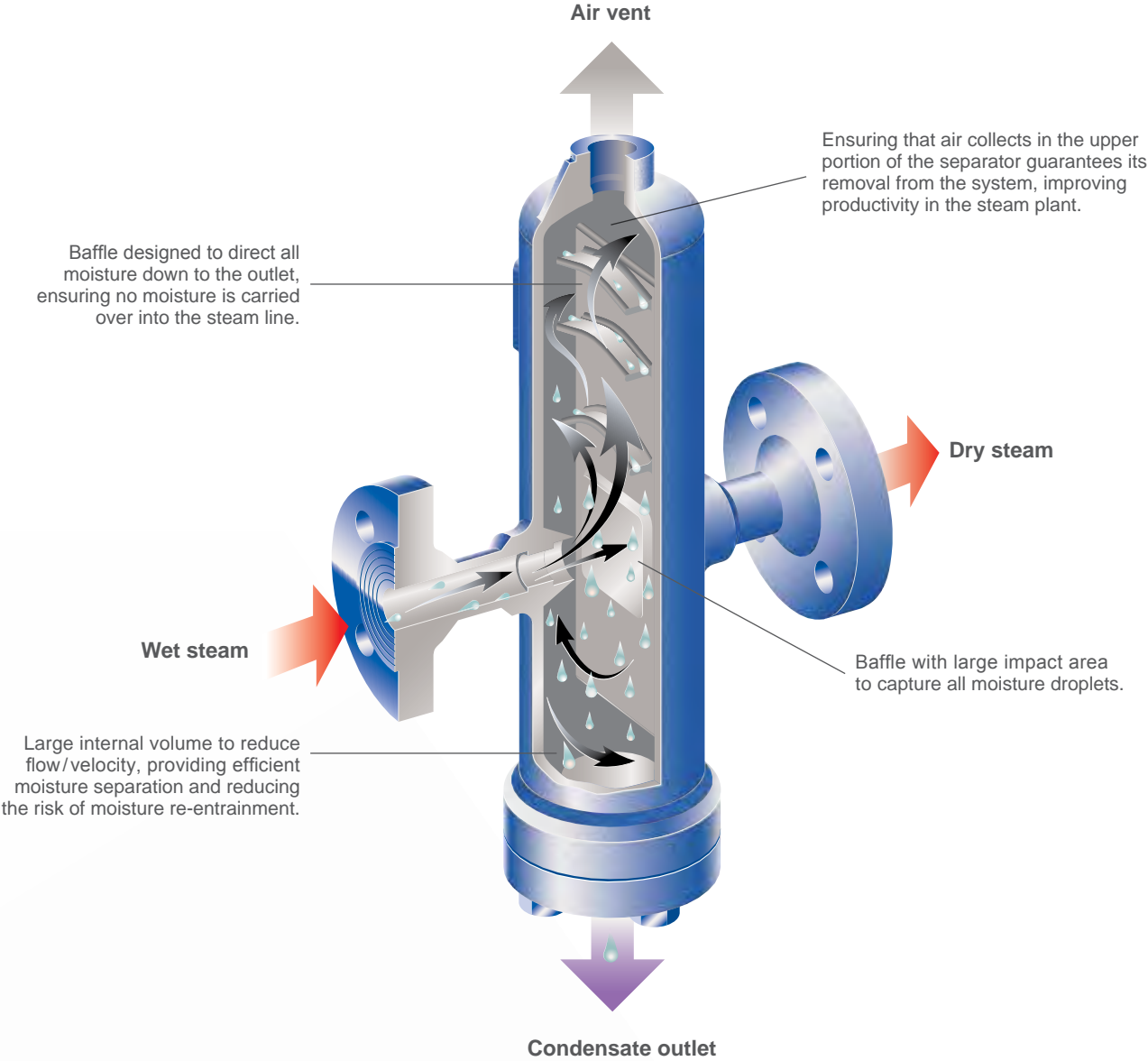
- Ensures that dryness fraction and efficiency is maintained
- Minimises heat loss
- Safety - protecting people from the possibility of injury from burns.

The Spirax Sarco range of insulation jackets are clean (no messy application techniques), user friendly and resistant to water and fire.



Benefits of installing separators

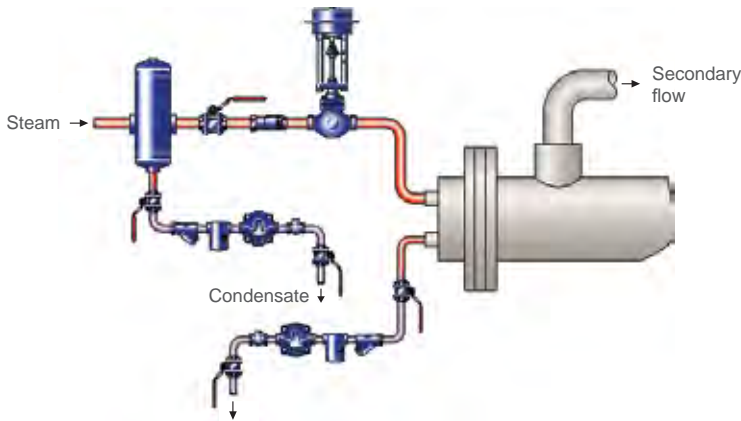
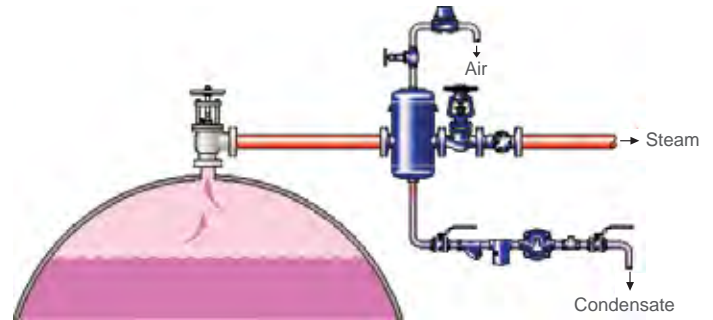
- Improves process plant productivity
- Improves product quality
- Reduces maintenance cost and downtime
- Equipment damage is minimised.



Typical separator applications

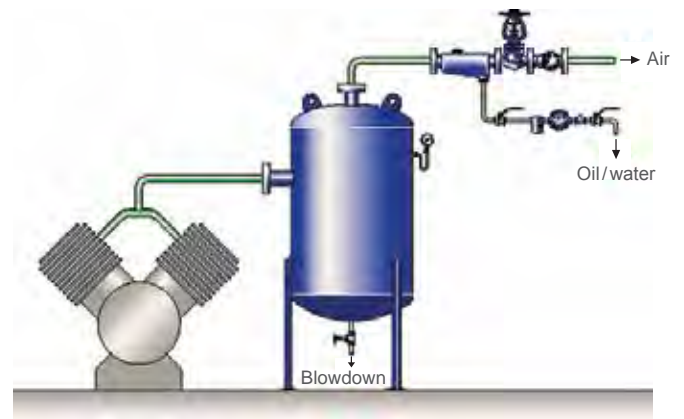
Steam distribution

Modern package boilers have limited steam space and evaporation surfaces which may give rise to very high steam take-off velocities and the production of wet steam under certain circumstances. When this happens the water carried over can contain impurities and water treatment chemicals all of which cause problems in the distribution system, control valves and process plant. The baffle separator removes moisture ensuring a dry steam supply to process whilst reducing scaling in valves and on heat transfer surfaces.



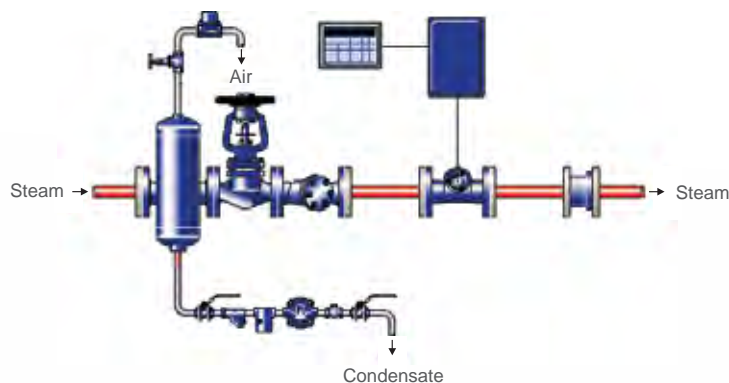
Compressed air distribution

The separator removes excess moisture from the air flow prior to distribution, reducing corrosion within the system and preventing possible waterhammer and freezing damage.



Heat transfer processes and valve protection

The separator conditions the steam prior to the control valve reducing the possibility of valve damage under low load conditions by 'wire drawing' when the valve cone may be working close to its seat. This improves heat transfer rates by limiting moisture film on heat transfer surfaces.

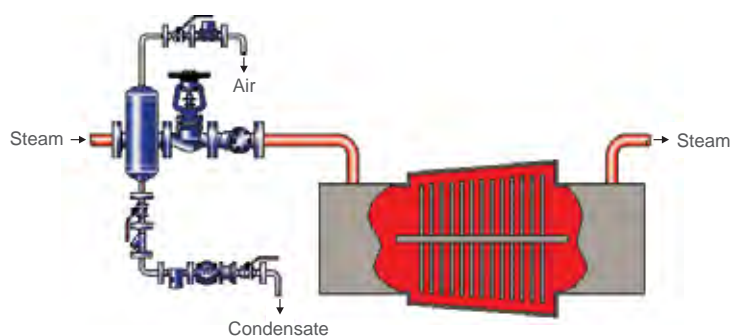


Steam flowmeters

The separator removes excess moisture prior to metering, ensuring metered figures reflect the flow of dry steam. Also reduces the risk of damage to metering components.

Capital equipment protection - steam turbines

By installing a separator to remove water particles, the turbine is supplied with dry steam, thus protecting the turbine blades and casing from expensive erosion and waterhammer damage.



Separator range and options

Material			Cast iron		SG iron			Carbon steel		Stainless steel		
Model			S2	S3	S1	S12	S13	S5	S7	S6	S8	
Body design rating			PN16	PN16	PN16	PN25	PN25	PN50/ASME 300	PN40	PN50/ASME 300	PN40	
Size	DN15	½"			•			•		•		
	DN20	¾"			•			•		•		
	DN25	1"			•			•		•		
	DN32	1¼"	•			•		•		•		
	DN40	1½"	•	•		•	•	•		•		
	DN50	2"	•	•		•	•	•		•		
	DN65	2½"		•			•		•		•	
	DN80	3"		•			•		•		•	
	DN100	4"		•			•		•		•	
	DN125	5"		•			•		•		•	
	DN150	6"		•			•		•		•	
	DN200	8"		•			•		•		•	
	DN250	10"							•		•	
	DN300	12"							•		•	
DN350	14"							•		•		
Pipeline connections	Screwed		•		•	•		•		•		
	Socket weld							•		•		
	Butt weld							•		•		
	Flanged	PN16			•			•		•		•
		PN25					•					
		PN40						•	•	•	•	•
		ASME 125/150			•			•	•	•	•	•
		ASME 300						•	•	•	•	•
JIS/KS 10				•			•	•	•	•	•	
JIS/KS 20						•	•	•	•	•		

Strainers

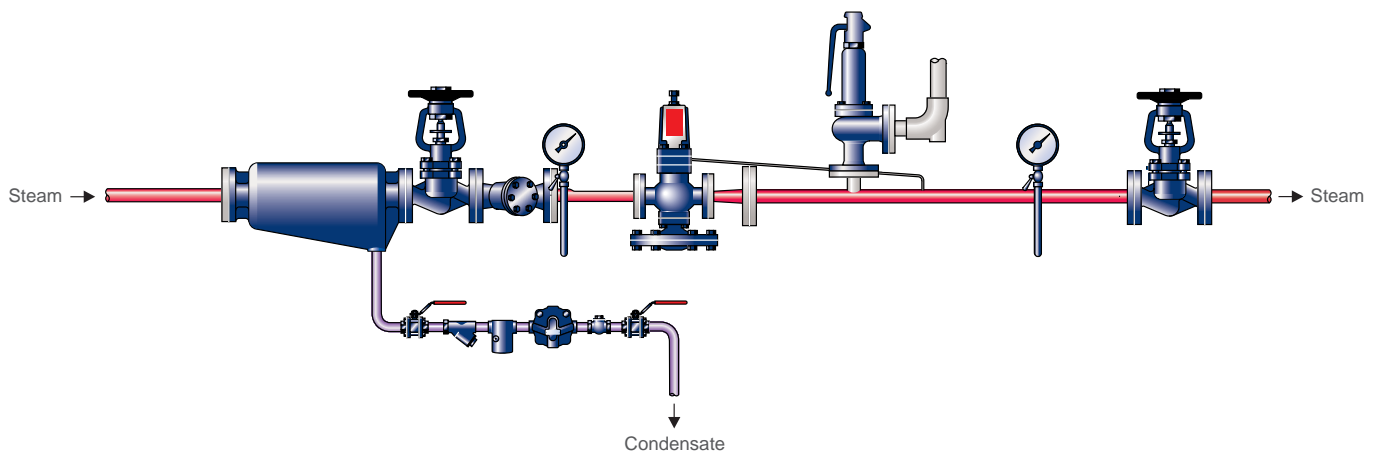
Protecting plant equipment from impurities

Pipeline debris such as scale, rust and weld metal is commonly found in all types of industry and can lead to damaged equipment and increased maintenance. Strainers are designed to capture these impurities, helping to protect equipment and avoid unnecessary downtime.

Our strainers are lightweight to reduce the stress on pipework, but still robust. Available in a wide range of materials and sizes, their high capacity designs and large screening areas deliver maximum performance with low pressure drop. Strainers can be fitted on liquid or steam/gas systems. When installed in a horizontal line on a steam/gas system the strainer pocket should be in a horizontal plane. On liquid systems the strainer should point downwards.

Typical application

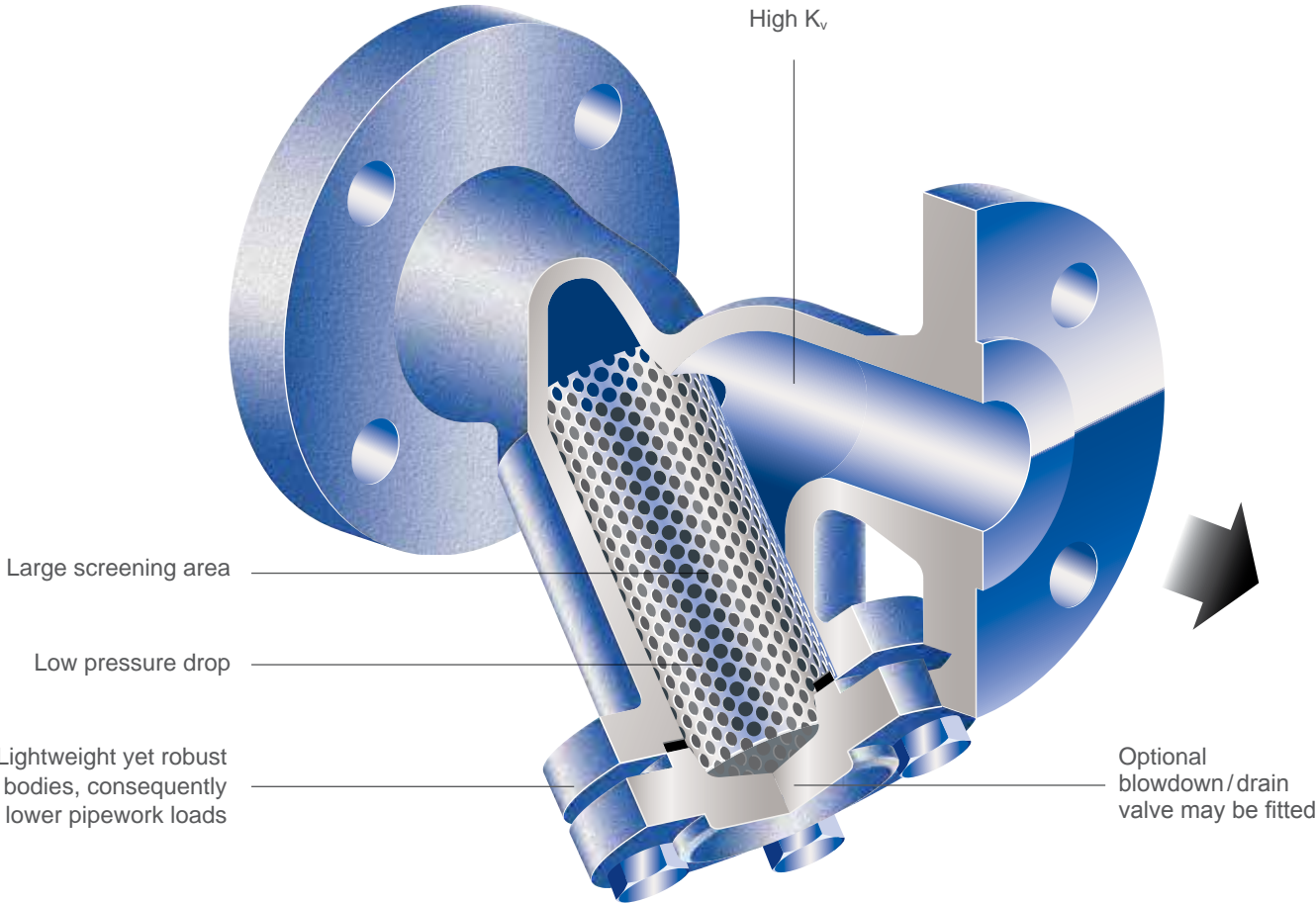
Strainer installed upstream of a pressure reducing valve station.



Benefits of installing strainers

- Safeguards plant by allowing equipment to operate correctly, providing peace of mind
- Reduces maintenance costs and downtime
- Equipment life increased as damage from unwanted solids is minimised.





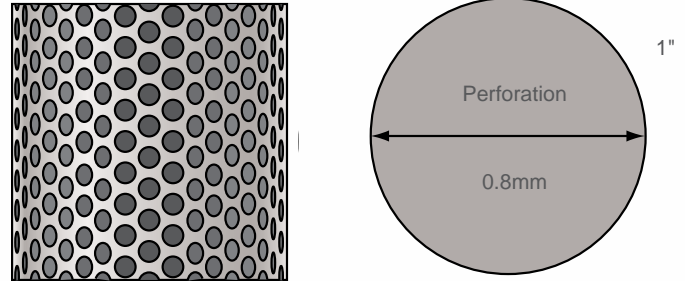
Screen types

To ensure the best solution for your application, our strainers are available in a choice of screens allowing you to select the appropriate level of protection for your system.

Perforated strainer screen:

These are relatively coarse strainer screens produced from sheet metal having multiple punched holes designed to remove general pipeline debris.

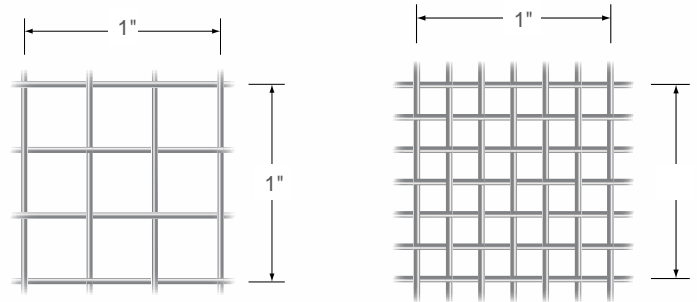
The term perforation indicates the diameter of each hole. Perforated strainer screens from Spirax Sarco are available in 0.8mm, 1.6mm and 3.0mm.



Perforated strainer screen

Mesh strainer screen:

These provide much finer screen protection for items such as control valves and pressure reducing valves where small orifices can become easily blocked.



3 mesh screen

6 mesh screen

Mesh options

Mesh	Opening	
	mm	micron
40	0.401	401
100	0.152	152
200	0.076	76



“Strainers are designed to capture impurities, helping to protect equipment and avoid unnecessary downtime.”

Material			Brass/Bronze		Cast iron	SG iron			Steel					
Model			Fig 12	Fig 4	Fig 33	Fig 12	Fig 3716	Fig 37	Fig 14HP	Fig 34 (ASTM)	Fig 34 (EN)	Fig 34HP	Fig B34	
Type			Y	Angled	Y	Y	Y	Y	Y	Y	Y	Y	Basket	
Body design rating			PN25	PN16	PN16	PN25	PN16	PN40	ASME 800	ASME 300	PN40	PN100	PN40	
Size	DN8	¼"							•					
	DN10	⅜"	•						•					
	DN15	½"	•	•	•	•	•	•	•	•	•	•		
	DN20	¾"	•	•	•	•	•	•	•	•	•	•		
	DN25	1"	•		•	•	•	•	•	•	•	•		
	DN32	1¼"	•		•	•	•	•	•	•	•	•		
	DN40	1½"	•		•	•	•	•	•	•	•	•	•	
	DN50	2"	•		•	•	•	•	•	•	•	•	•	
	DN65	2½"	•		•	•	•	•		•	•	•	•	
	DN80	3"			•	•	•	•		•	•	•	•	
	DN100	4"			•		•	•		•	•	•	•	
	DN125	5"			•		•	•		•	•	•	•	
	DN150	6"			•		•	•		•	•	•	•	
	DN200	8"			•		•	•		•	•	•	•	
	DN250	10"								•	•		•	
	DN300	12"								•	•		•	
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Pipeline Connections	Screwed		•	•		•			•					
	Socket weld								•					
	Butt weld											•		
	Flanged	PN10												
		PN16				•		•	•					•
		PN25							•					•
		PN40							•			•		•
		PN100											•	
		ASME 125/150				•		•	•		•			•
		ASME 300									•			•
		ASME 600											•	
JIS/KS 10				•		•	•					•		
JIS/KS 20							•		•			•		
BS10				•										

Clean steam conditioning for high purity applications

Food, beverage and dairy industries, as well as pharmaceutical and biopharmaceutical applications require solutions that are tailor-made to ensure high purity is maintained.

Spirax Sarco offer dedicated, solutions for steam, air and gas conditioning within the clean and pure environments.

Clean steam separator

CS10-1: An effective solution to ensure steam dryness for the clean steam industries

The CS10-1 is designed to remove contaminants, entrained moisture and condensate from clean and pure steam systems for critical applications. It ensures improved steam dryness which is key to successful sterilisation cycles and helps you achieve compliance with industry standards such as EN 285, HTM 2010 and AAMI-ST79.

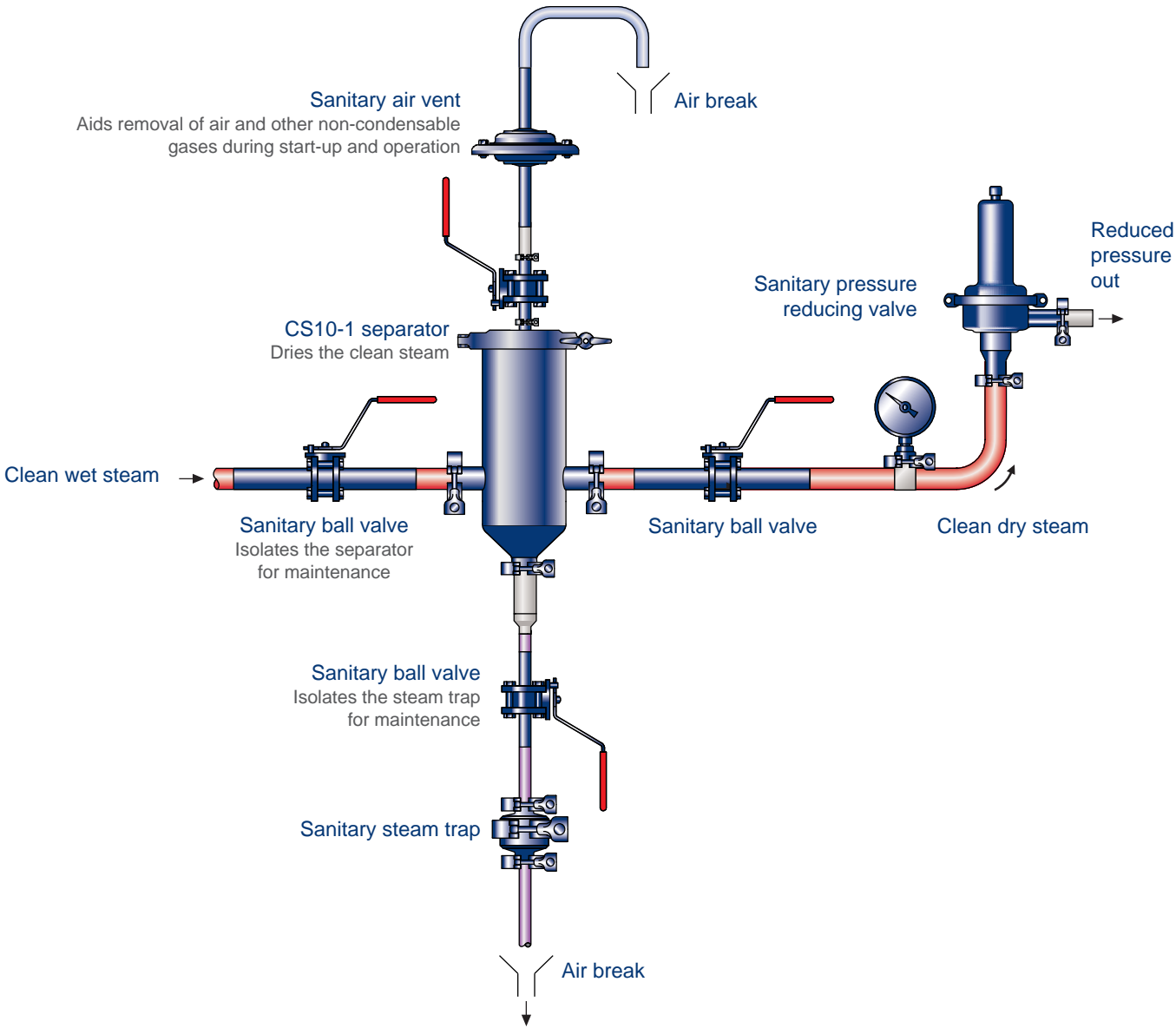
The CS10-1 has been developed to solve problems associated with wet steam, its impact on sterilization and autoclave processes as well as limiting damage to downstream control valves and equipment.

Benefits of CS10-1

- Designed to ensure high steam dryness
- Designed in accordance with the ASME BPE guide for the biopharmaceutical industry
- Protects and maintains service life of downstream pipeline equipment
- Unique removable baffle plate to facilitate internal inspection
- Minimal pressure drop
- Internal surface finish of 0.5 μm Ra electro-polished
- Traceable 316L stainless steel material
- FDA compliant seals.



Typical application



Model	Material	Body design rating	Connections	Sizes	Surface finish
CS10-1	Stainless steel	PN10	Sanitary clamp Tube weld ends	1/2" - 2"	Internal: 0.5 µm Ra electro-polished External: 1.6 µm Ra satin bleed blast

Clean service filter

CSF16: High performance filtration for improved steam, air and gas system quality

With Spirax Sarco's range of CSF16 clean service filters, you have the reassurance of knowing that our high efficiency point-of-use solutions for steam, air and gas applications will help ensure your process not only meets, but exceeds the required purity standard. You can reduce waste and costly batch spoilage, extend the shelf life of consumable products and minimise the risk of product recalls.

The CSF16 is available in a range of sizes and pipeline connections.

Model	Material	Body design rating	Connections/sizes
CSF16	Stainless steel (1.4301)	PN16	Screwed - sizes ¼" - 3"
CSF16T	Stainless steel (1.4404)		Flanged - sizes ¼" - 8"

CSF16-S high efficiency steam filter

All Spirax Sarco CSF16-S steam filters comply with US FDA and 3-A accepted practice No. 609-03 sanitary regulation for the production of 'culinary' steam where absolute filtration down to 1 micron is required to safeguard against the transfer of any potential contaminants to the product or process.

The CSF16-S is a stainless steel unit with a removable sintered stainless steel filter element which conforms to the high standards required in the food, beverage and pharmaceutical industries and is highly reliable even under extreme operating conditions. The sintered element is extremely robust and can be ultrasonically cleaned to extend its service life. When degradation of the element reaches an unacceptable level it can be quickly and easily replaced without the use of special tools or equipment.

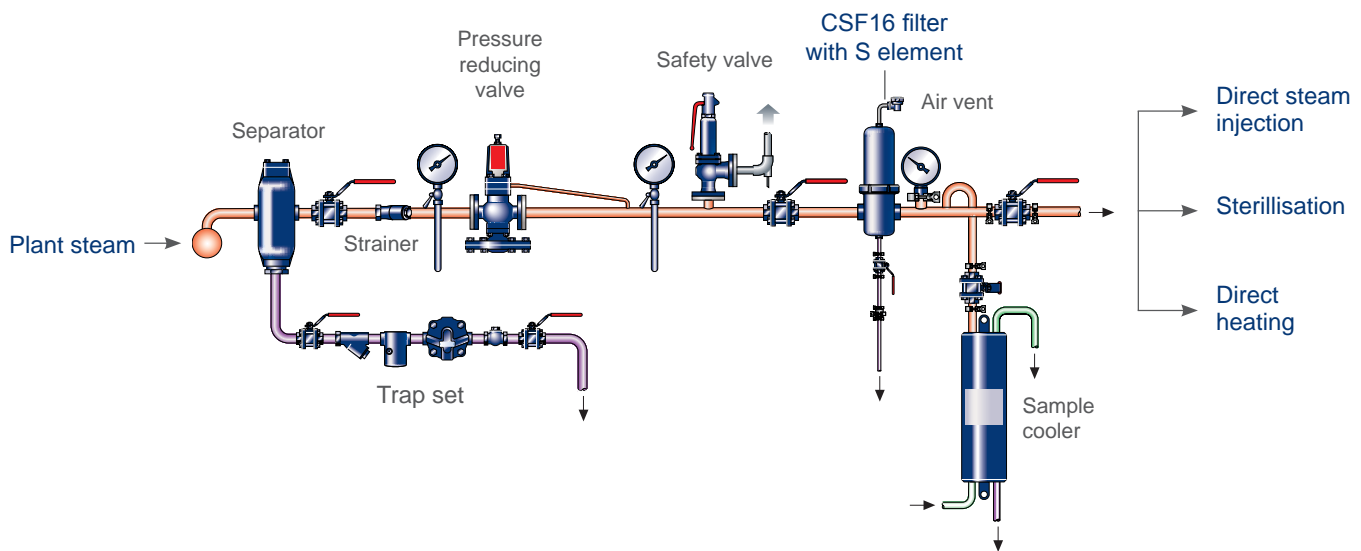
CSF16-S



Typical application using CSF16-S

The CSF16-S steam filter has been designed to reduce the risk of product or process contamination across many industries and applications, including:

- Culinary steam for direct cooking of food products and sterilisation of food and beverage containers
- Filtered steam for humidification of clean rooms in the pharmaceutical, biotechnology and electronic industries.



Available types

The CSF16-S steam filter element can be supplied with a 1, 5 or 25 micron absolute rated element.

While the standard 5 micron element will remove 95% of all particles larger than 2 microns, a 1 micron element will give a filtration efficiency of greater than 99% against 0.1 micron elements.

Steam filters

- Remove 100% of all visible particles and 99% of 0.01 micron particles
- Remove liquid condensate at the same efficiency as for solid particles
- Are fully compliant with: Applicable US FDA regulations and meet with 3-A accepted practices.

CSF16-A high efficiency sterile air filter

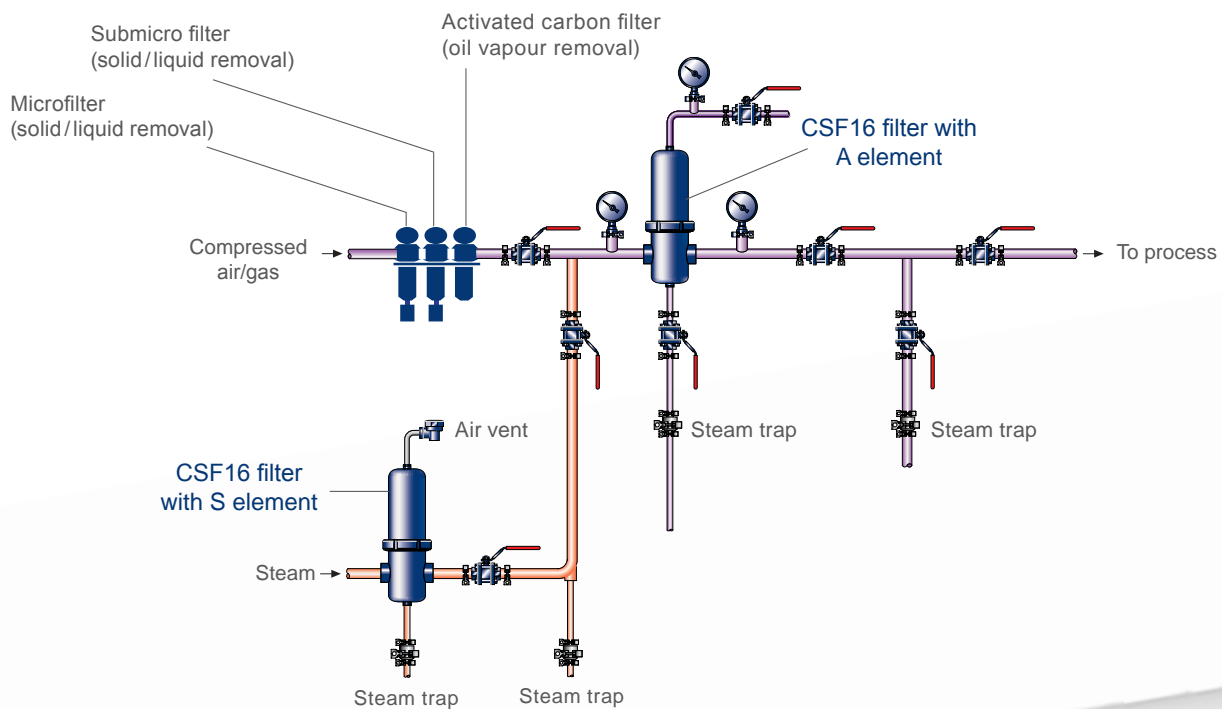
The Spirax Sarco CSF16-A sterile air filter is designed to provide high performance filtration of compressed air and other process gases, such as carbon dioxide, that come into direct contact with the product to control the levels of particulates and microbial contamination, supplying sterile air or gas.

All components comply with the US FDA regulations for contact with food and meet with 3-A accepted practices.

Typical application using CSF16-A air filter for sterile air/gas with forward 'sterilise-in-place' sterilisation using CSF16-S steam filter

The CSF16-A sterile air filter has been designed and developed for use in many applications, including:

- Aseptic processing and packaging
- Nitrogen blanketing/tank pressurisation.





Available types

The CSF16-A sterile air filter has an efficiency rating of >99.999998% of 0.01 micron pore size.

Sterile air filters

- Remove all viable organisms
- Delivers up to 100 steam sterilization cycles with no integrity loss
- Have a low pressure drop
- Have a high flowrate
- Are fully compliant with: Applicable US FDA regulations and meet with 3-A accepted practices.



CSF16-A

The benefit of steam conditioning

Using the right conditioning products such as separators, strainers and filters to improve steam quality can help your process equipment to deliver a better service, and last longer.

The example below demonstrates how one flowmeter installation was dramatically improved through the use of conditioning equipment, recommended, manufactured and installed by Spirax Sarco.

PROBLEM:

Build-up of scale within the steam system leading to a gradual reduction in the performance of the flowmeter.

RESULT:

Flowmeter failed after 6 months of installation.

SOLUTION:

Failed flowmeter was replaced and new supporting ancillary products were installed to improve the quality of the steam flowing through the meter. This included a separator, strainer, steam traps and check valves.

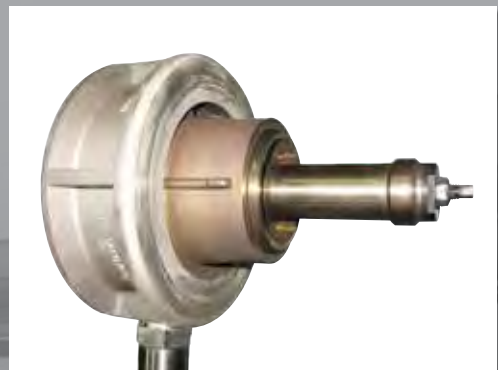
RESULT:

After 12 months the newly installed flowmeter had experienced no failures and when checked was found to have no scale build up. The conditioning equipment supplied had improved the quality of the steam, reducing the amount of air, water and foreign objects entrained in the steam. The flowmeter was able to maintain its calibrations and accuracy and its lifespan was significant increased.

Our steam conditioning equipment improves steam quality and dryness, and helps prevent secondary damage to flowmeters, and other system equipment.

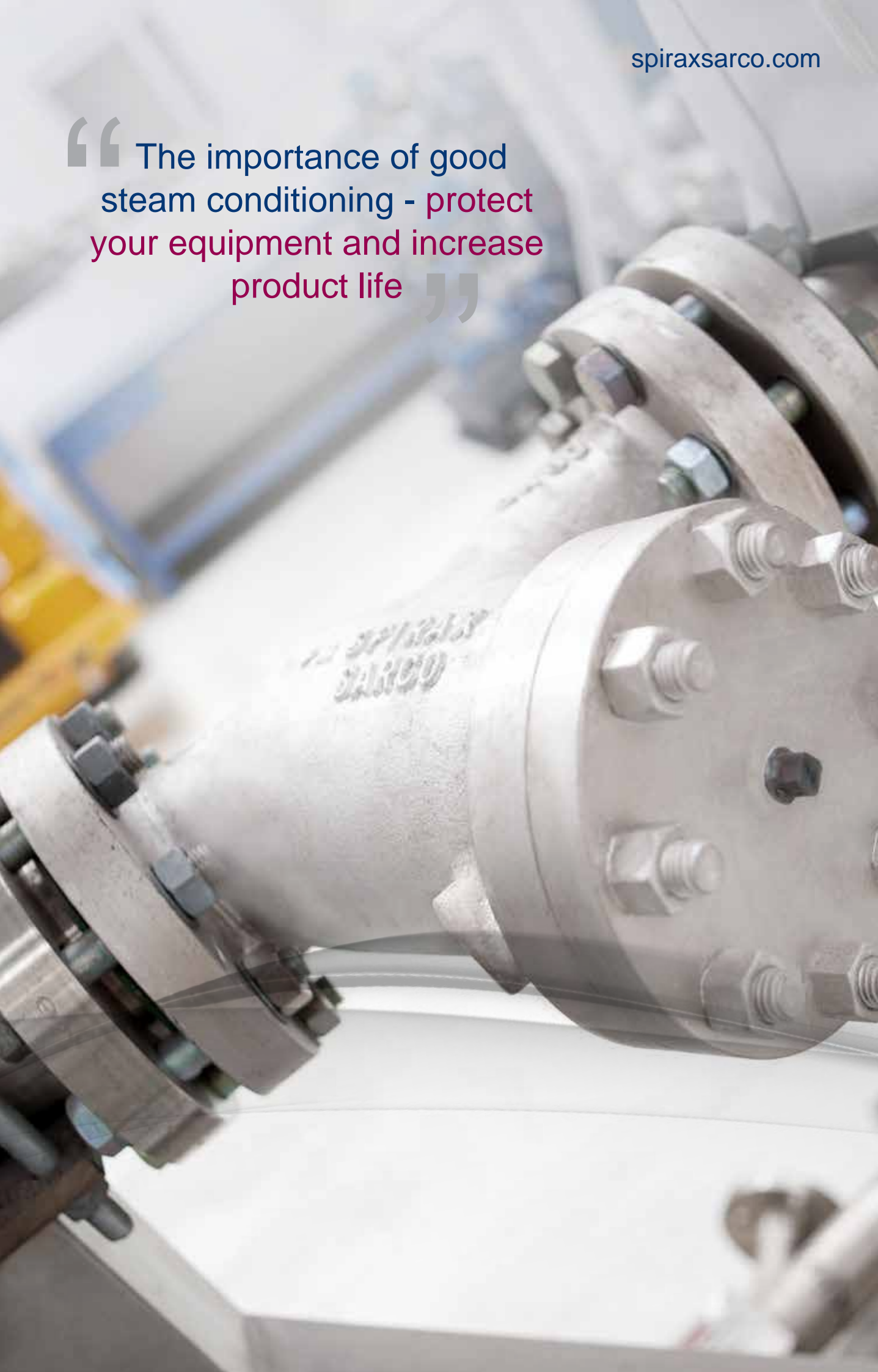


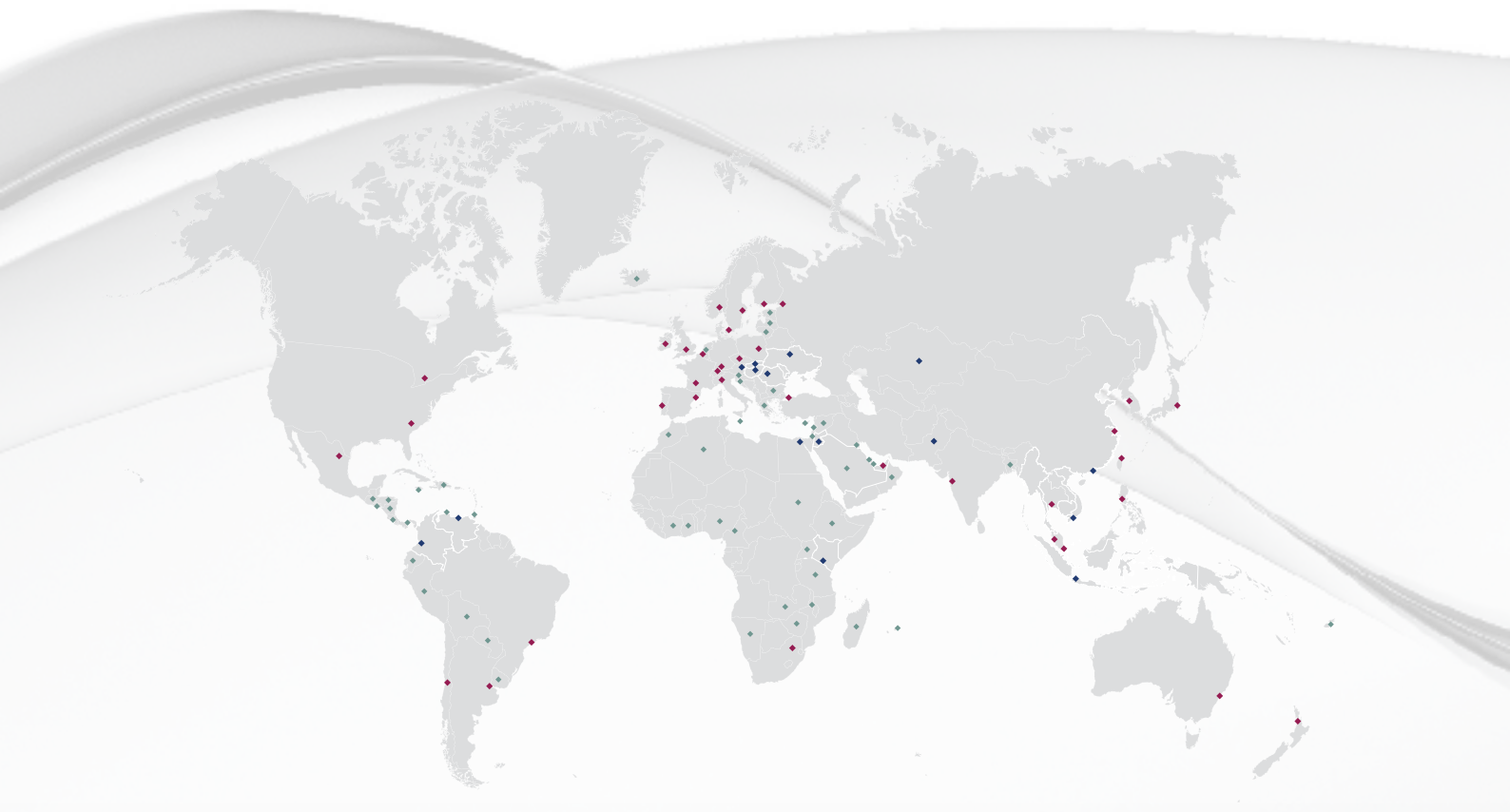
Before



After

“ The importance of good steam conditioning - protect your equipment and increase product life ”





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