



Donaldson®
Filtration Solutions

PROCESS FILTRATION

Culinary & Process Steam



when **PURITYCOUNTS**... Count on Donaldson®

Donaldson Process Filtration has been providing quality filtration products to process industries around the world since 1972. During that time, and continuing today, we have enhanced our offering with an ever-broadening product portfolio covering sterile air, liquid and steam filtration needs. Donaldson P-GS sintered stainless steel steam filter elements, housed in our P-EG standard grade and PG-EG sanitary grade stainless steel filter housings, are among our most highly regarded products.

ABOUT STEAM

Like compressed air, steam is often thought of as another utility—both are often generated at a central location and then distributed to various points-of-use throughout the facility, and both are often used to transfer energy. The similarities don't end there. Depending on the intended use, and whether or not they come into contact with the final product itself, both will have to be filtered to a greater or lesser extent. The intended use though is what drives the choice between these two utilities. When it comes to the transfer of energy, steam provides some unique characteristics which include, but are not limited to, the following:

Steam

- ...can be efficiently and economically generated at a central location from which controllable amounts of energy can be distributed to various points-of-use throughout the plant.
- ...has the ability to hold a great deal of energy, stored as heat, in a given volume.
- ...gives up its heat energy at a constant temperature, eliminating heat gradients associated with other forms of energy transfer.
- ...has a high rate of heat transfer, allowing for smaller heat transfer surface areas.

Due to these and many other desirable attributes, steam can be found in use within a multitude of industries and applications.

Industries

- Food & Beverage
- Pharmaceutical
- Chemicals
- Metal Processing
- Pulp & Paper
- Power Generation
- Rubber & Plastics
- Automotive

Applications

- Sterilizing
- Cooking
- Cleaning
- Drying
- Curing
- Temperature Control



STEAM TERMINOLOGY

Process Steam General term for steam used in process applications as a source of energy for process heating, pressure control and mechanical drives among others. Process steam does not generally come into contact with the final product.

Culinary Steam

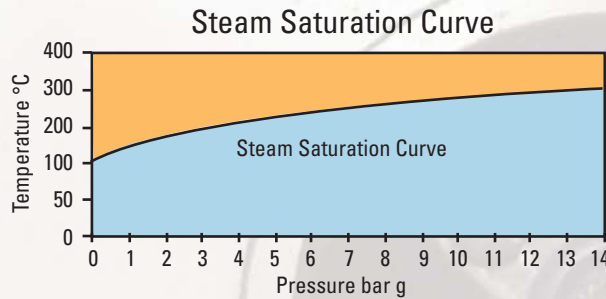
Refers specifically to steam used in food processing, often required to meet 3-A Sanitary Standards and 3-A Accepted Practices for dairy and food processing.

Culinary steam can, and often does, come into direct contact with the final product.

Dry Steam Steam that consists of 100% water vapor—no water droplets.

Saturated Steam Steam is said to be “saturated” with energy at a given and constant pressure when the addition of more heat to the generation system results in more steam, but no rise in steam temperature. In this state, the steam cannot hold more heat energy in a given volume unless pressure is allowed to rise.

Dry Saturated Steam Achieving the above states of dry and saturated steam simultaneously is possible in theory. It is nearly impossible in practice when systems are optimized for generating saturated steam. The actual level achieved is measured as the “dryness fraction.”



Superheated Steam

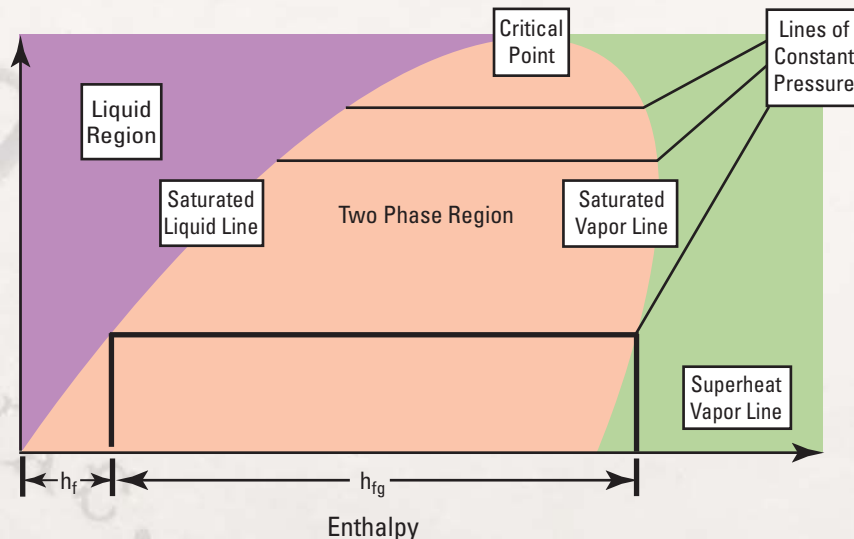
When more heat energy is added to steam that has reached saturation, and no liquid water is present to consume that energy through evaporation, the

temperature of the steam will rise. In this condition, steam is said to be “superheated.”

CIP (Clean In Place) is the process of cleaning equipment where it is installed as opposed to taking it out of service and to a remote location.

SIP (Sterilize In Place) is similar to CIP, but with the goal of sterilizing the hardware where it is installed without disassembly.

Temperature Enthalpy Phase Diagram



**STEAM
FILTRATION**



FILTERELEMENTS

P-GS Element

At the heart of our steam filtration system is the widely-used Donaldson Ultrex® P-GS sintered stainless steel filter element. P-GS elements can be regenerated numerous times, allowing for long filter life and reduced operating costs. Utilizing P-GS elements to assure high quality steam protects the equipment and processes that rely on that steam for efficient, clean and/or sterile operation.



The Ultrex P-GS features:

- 98% retention rate at 1, 5 and 25 micron
- Exceeds 3-A Accepted Practice in both efficiency and particle size removal for culinary steam
- Weldless sintered 316L SS media tube
- 304 SS end caps
- Double o-ring seal to eliminate cross-flow of unfiltered steam
- High porosity level for low pressure drop and high dirt-holding capacity
- 13 models for optimized sizing to specific applications

P-SM Element for Prefiltration

In certain installations it can be beneficial to install a prefilter in front of the final P-GS steam filter. The Donaldson Ultramesh® P-SM stainless steel mesh filter element is ideally suited for this application. P-SM elements are constructed entirely of stainless steel and can be regenerated numerous times, allowing for long filter life and reduced operating costs. Utilizing P-SM elements as a prefilter will protect the final P-GS filter from excessive contamination and allow for longer filter life and reduced operating expenses over time.

The Ultramesh P-SM features:

- Absolute particle retention rates from 5 to 250 micron
- Multi-layered stainless steel mesh media
- Can be regenerated via back-flush or ultrasonic bath
- Heavy-duty construction assures long life
- 13 models for optimized sizing to specific application



FILTERHOUSINGS

P-EG NPT Steam Filter Housing

Along with P-GS filter elements, Donaldson P-EG filter housings are widely used in steam filtration applications. Equipped with either NPT or ANSI flange connections, P-EG housings are designed to yield low differential pressure at high flow rates.

- Constructed of 304 SS (316L SS available)
- 18 sizes available for optimal performance in any given application
- Electropolished surface finish on models 0006 through 0288
- Bead blast surface finish on models 0432 through 1920
- Designed to accept the UF 2" push-in filter element with double o-ring seal
- Optional inlet/outlet connection styles available



PG-EG Sanitary Grade Filter Housing

Donaldson PG-EG sanitary grade filter housings are 3-A certified to assure that their design meets the rigid sanitary requirements of the food, beverage and dairy industries. PG-EG housings are equipped with either Tri-Clamp or ANSI flange connections and offer very low differential pressure at high flow rates.



- Available in either 304 or 316L SS
- 14 sizes available for optimal performance in any given application
- Electropolished inner and outer surface finishes on all models
- Sanitary pharma-style vents/drains
- Designed to accept the UF 2" push-in filter element with double o-ring seal
- Optional inlet/outlet connection styles available



**STEAM
FILTRATION**



SIZING/SELECTION GUIDELINES

Proper sizing and component selection of a steam filtration system is essential to assuring that your application is operating as effectively and efficiently as possible. The following are some general guidelines, but additional sizing and selection tools are available to better optimize product selection to your specific needs.

Housings

Donaldson P-EG NPT housings in 304 SS are suitable for most process steam filtration applications. In applications or installations where chemical corrosion is a concern, selection of 316L SS as the material of construction could be advisable.

For culinary steam, food contact and other sanitary applications, PG-EG Sanitary Grade, 3-A certified housings should be used. 304 SS is also suitable for most applications, but 316L is often selected due to its higher resistance to corrosion.

Elements

The Donaldson P-GS steam filter element is available in a number of different micron filtration ratings. For culinary steam applications, the element rated at 5 microns and 98% efficiency exceeds the 3-A requirement of 2 micron at 95% efficiency. The micron rating selection for other applications will depend on both the challenge, or size of particles to be

filtered, and the purity requirements of the downstream process using the filtered steam.

If the challenge is high in terms of particle count and/or size, use of a P-SM prefilter is advised. Both the P-SM and P-GS elements can be regenerated, and a combination of both as prefilter and after-filter will assure the most reliable and economic installation.

Sizing

Properly sizing a steam filter system will depend on a number of variables, which include:

- Flow rate (lbs./hr.)
- Pressure
- Element micron rating
- Acceptable pressure drop across filtration system.

HOUSING CAPACITIES*

Model	Lb/Hr	Housing P-EG	Lb/Hr	Model	Lb/Hr	Housing PG-EG	Lb/Hr
P-EG 0006	55	P-EG 0144	905	PG-EG 0006	55	PG-EG 0006	1400
P-EG 0009	80	P-EG 0192	1220	PG-EG 0018	90	PG-EG 0018	2580
P-EG 0012	90	P-EG 0288	1355	PG-EG 0032	215	PG-EG 0032	3485
P-EG 0018	120	P-EG 0432	2580	PG-EG 0048	325	PG-EG 0048	5275
P-EG 0027	155	P-EG 05766	3485	PG-EG 0072	440	PG-EG 0072	7155
P-EG 0036	230	P-EG 0768	5275	PG-EG 0108	650	PG-EG 0108	9015
P-EG 0048	325	P-EG1152	7155	PG-EG 0144	975	PG-EG 0144	10,500
P-EG 0072	445	P-EG 1536	9015				
P-EG 0108	630	P-EG1920	10,500				

* Capacities based on: Pressure: 15 psig (250°F steam)
Element: P-GS, 5 micron rating
Pressure Drop: not to exceed 2 psig

REGENERATION GUIDELINES

Both Donaldson P-GS and P-SM filter elements can be regenerated using a number of different techniques. In general, the more frequently an element is cleaned, the better the regeneration. The following is some general background on methods of filter regeneration.

Counter-Flow

The filter media can be washed with either clean liquid or clean gas in a reverse, or counter-flow, cycle. Pulsing the flow to loosen attached particles can enhance cleaning. This method is excellent where retained particles are on the surface of the media as opposed to having penetrated deeper into the media pores. Use of a wire or nylon brush can also enhance this method of cleaning.

Solvent Cleaning

In some cases, oil and other contaminants in the steam cause particles to be retained on or within the filter media. Detergents and/or solvent cleaning might be required in these instances, not only to remove the oil or oil-like contaminants, but to allow particles to be released as well.

Ultrasonic Cleaning

The most thorough regeneration can be achieved using ultrasonic cleaning. In this method, filter elements are immersed in a solvent or water bath in which ultrasonic vibration loosens and removes particles embedded in the media. Regeneration is nearly total, leaving elements close to their original state.



**STEAM
FILTRATION**



CLEANSTEAM

In many applications steam comes into contact with the product itself. For example, direct injection of steam into large vats of processed foods is one method used to cook those foods. In other cases, steam is used to clean or sterilize surfaces, tools and containers used in processing and packaging various products such as pharmaceuticals. In all cases, steam is being generated and distributed in piping systems, and these often end in small orifices or nozzles that can be easily fouled by contaminants in the steam.

Filtration of steam is essential to avoid product contamination and equipment downtime. Particulate contaminants found in steam can include rust, scale, dirt and sediments carried over from the water source.



when _____
PURITY COUNTS...



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