static filter systems

Camfil Farr Power Systems	Application brochure
Power Systems	
Camfil Farr - clean air solutions for turbomachinery	

Static filter systems – suitable for most land-based environments

Air is vital to all combustion processes. Poorly filtered air can impair or damage essential parts in turbomachinery. Air containing solid particles, salt and other aggressive contaminants and aerosols can cause blockage and fouling, resulting in reduced performance, higher operating costs and expensive downtime. Contaminated process air can also lead to corrosion and erosion, causing damage to critical operational components and necessitating major repairs.

Static filter systems are designed to clean inlet combustion- and ventilation air in installations with gas turbines, diesel engines and compressors in rural, urban and industrial environments. Highly efficient air filters help ensure the efficiency, the operating economy and the reliability of the process.

Filter elements

Our filter elements are specially developed for rotating machines. They are resistant to moisture, vibration and pressure surges. We have filter elements in many different filtration efficiency classes to provide the degree of protection required, combined with high dust-holding capacity and low pressure drop. The air filter's life depends on the air dust concentration in relation to the effective filter material used.

To protect high-performance, sensitive machines and prolong both operating periods and accessibility, HEPA systems are often recommended.

Low pressure drop in filters and other components saves fuel and cuts operating costs, thereby raising the installation's total efficiency.

As a simple rule of thumb, if the filter area is increased by 50%, the filter's life increases by 100%.

System features

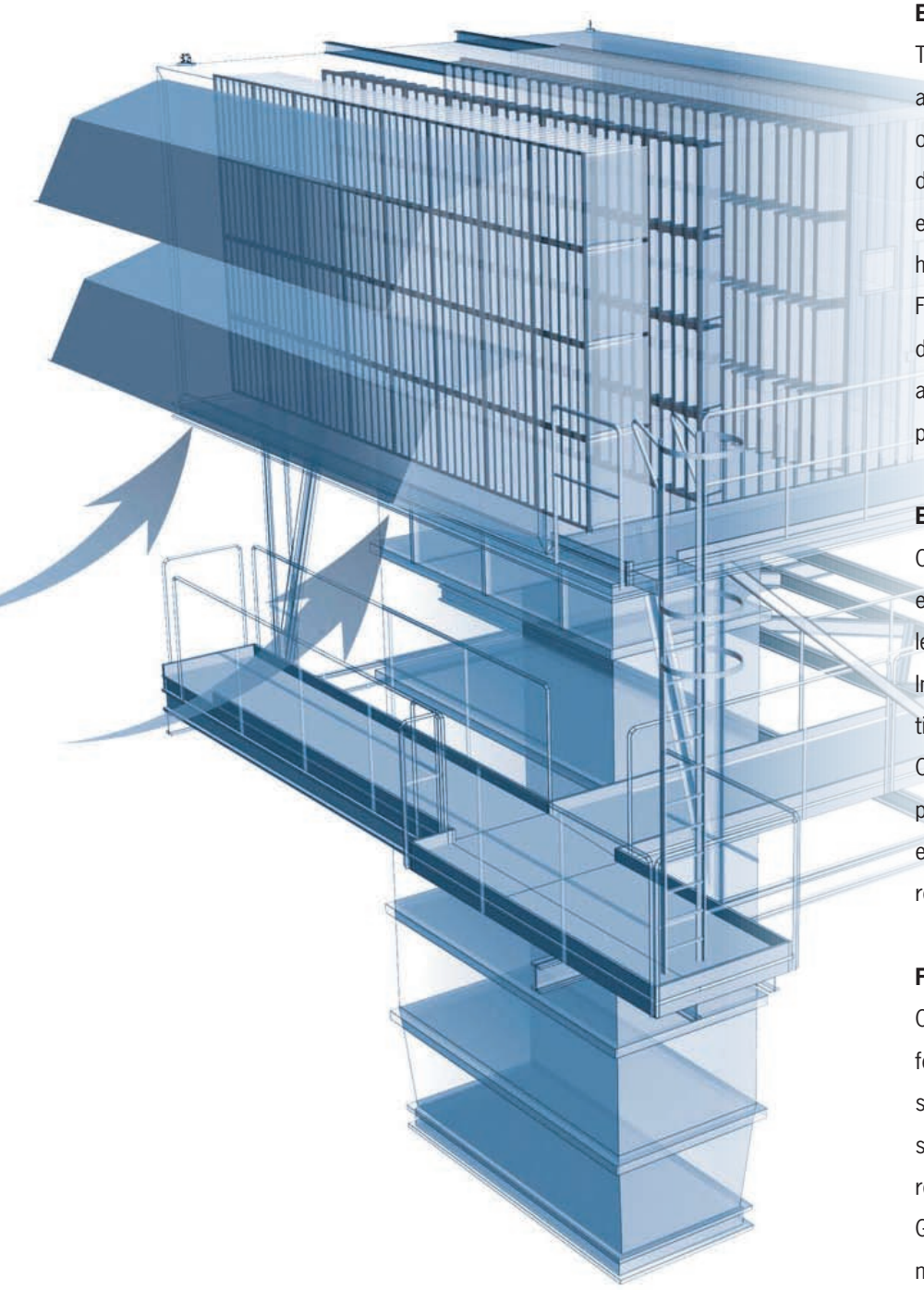
In addition to an optimized filter combination, the inlet system must be fitted with

- A suitable weather protection system.
- In some cases an anti-icing system and insect protection.
- Inlet air cooling is used to raise engine output in installations with high ambient temperatures.

Note: A well designed air inlet system allows the turbomachinery to perform at its best.

Clean air – essential for people and machines

The Camfil Filter System increases efficiency and improves overall economy



Economy

There are many benefits of using an efficient air intake system. One main benefit is reliable operation with no unnecessary and costly downtime. Another is maintained high engine efficiency even in harsh environments with high dust load and fluctating humidity levels. Filters with a large surface, provides high dust loading capacity resulting in a low average pressure drop. This gives you the best possible operating economy.

Environment

Cleaner inlet air results in more efficient operation and lower fuel consumption, in turn leading to reduced carbon dioxide emissions. In addition, most of our filters are combustible. The filters are manufactured at the Camfil Farr Group's environmentally certified production facilities. Also our global presence puts us close to our customers, which reduces transport to site installations.

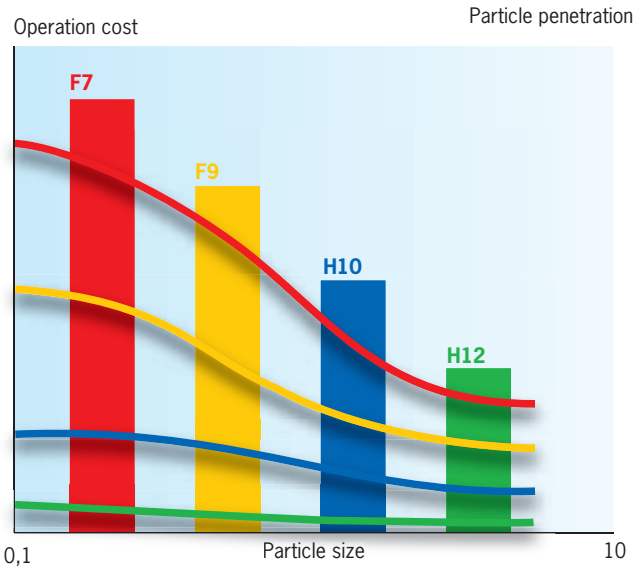
Flexibility

Camfil Farr Power Systems offers cost-effective, operationally reliable, highly flexible systems that can be fully customized to suit different environments and customer requirements. As part of the Camfil Farr Group, the world's largest developer and manufacturer of filters and clean air solutions, we offer a wide variety of products.

The cost of fouling

When electricity is generated by gas turbines, the fuel cost typically represents 60% of the electricity selling price. Meanwhile, environmental requirements continue to increase. This is why many operators are now looking for better filtration systems to avoid fouling and keeping fuel consumption at a minimum.

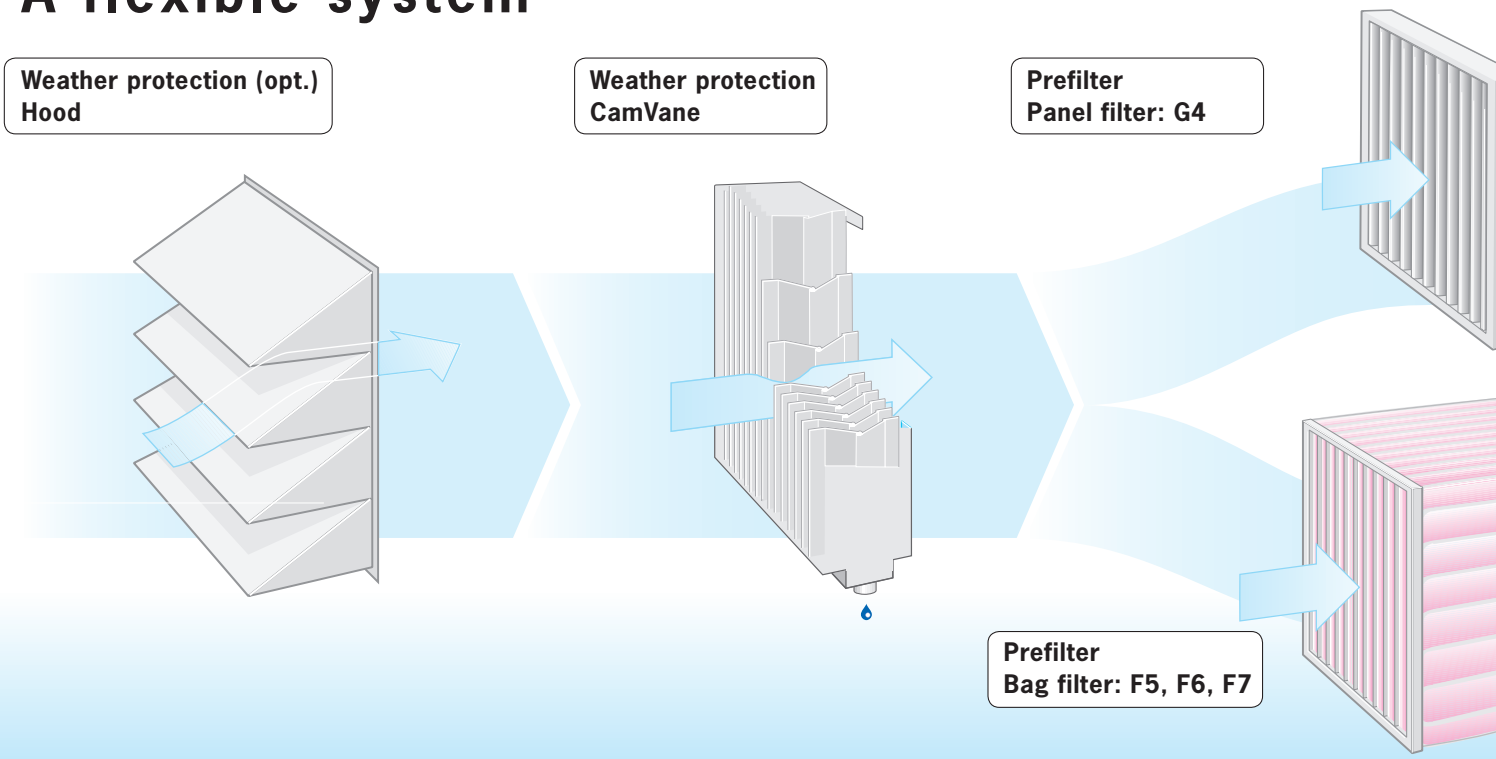
Axial compressor fouling is primarily caused by airborne submicron particles. Fouling changes the shape of both rotating and stationary vanes and results in a reduction of both mass flow and pressure ratio generated by the compressor. The net result of fouling is a reduction of power output and an increase in heat rate for a given combustor outlet temperature. Conversely, if an engine is not running at its temperature limit, a fouled engine has to run hotter to produce a given output.
A secondary effect of fouling is an increase in airfoil temperatures in the high pressure turbine, as fouling in the internal vane and blade cooling passages reduces heat transfer effectiveness and ultimately reduces the life of the hot section. The costs of fouling far exceed the cost of eliminating it, but since capital costs tend to weigh heavily in equipment purchase decisions, many gas turbines are equipped with inadequate inlet air filtration and the operator ends up paying many times more in extra operating costs.



Many operators are now looking at possibilities to operate their gas turbines for longer periods of 2-3 years without shutdowns. Keeping the engine clean by preventing small particles from entering the air inlet system is one important step towards achieving this target. It means taking gas turbine filtration systems from the now typical medium efficiency technology to clean room technology or HEPA filtration. By going from the typical F8 grade to H12, penetration is dramatically reduced. For example, penetration on 0.4 micron particles is reduced from typically 25% for a F8 filter to less than 0.5% in a H12 filter – a huge improvement which cuts fouling dramatically.

In conclusion: the cost of clean air is not the cost of replacement filters – it is how much energy the filters use during their working life at the desired efficiency.

A flexible system

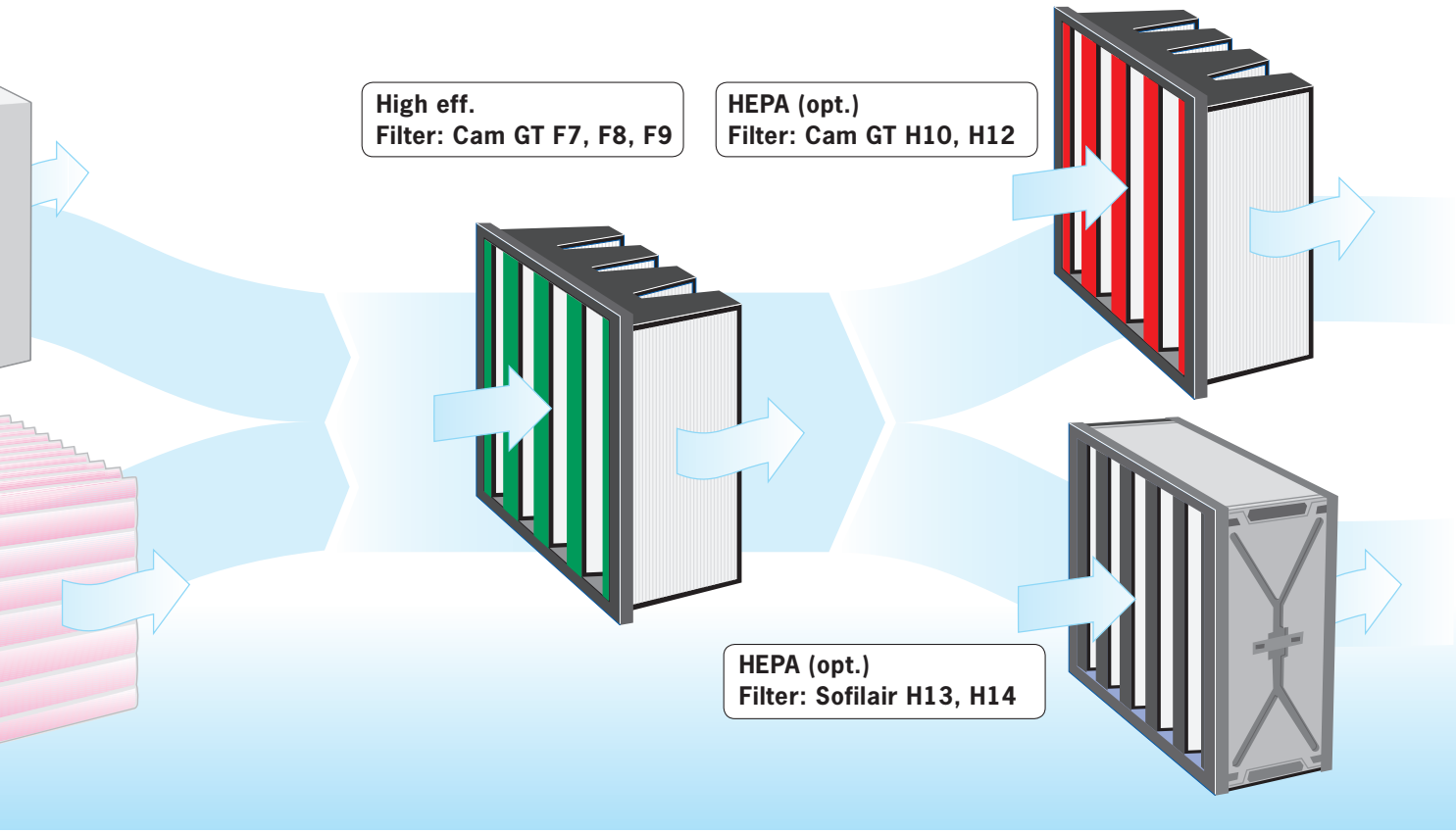


Selection guide

The table provides recommendations for filters adapted to each environment. Filter combinations should be chosen according to the operating conditions at each facility. For detailed technical information, see separate data sheets.

	Rural countryside	Large cities	Industrial areas	Coastal areas	Tropical areas	Artic areas
Air Inlet Protection						
Weather hood	●	●	●	●	●	●
Snow hood	●	●	●	●	●	●
Bird/Trash screen	●	●	●	●	●	●
Insect/Bug screen	●	●	●	●	●	●
CamVane Droplet separator	●	●	●	●	●	●
Inlet air coolers	●	●	●	●	●	●
Anti-icing systems	●	●	●	●	●	●
Prefilter/Coalescer						
Hi-Cap G4	●	●	●	●	●	●
CamClose G4	●	●	●	●	●	●
R 30/30 GT G4	●	●	●	●	●	●
Cam-Flo / Hi-Flo F5-F7	●	●	●	●	●	●
Fine filters						
CamGT F7	●	●	●	●	●	●
CamGT F8	●	●	●	●	●	●
CamGT F9	●	●	●	●	●	●
Hepa filters						
CamGT H10	●	●	●	●	●	●
CamGT H12	●	●	●	●	●	●
Sofilair GT H10-H14	●	●	●	●	●	●

● = recommended ● = optional ● = not recommended/applicable



Filter performance

A higher filter class means:

- **A higher degree of separation.**
- **A cleaner engine.**
- **Longer service intervals.**
- **Higher availability.**
- **Lower operating costs.**

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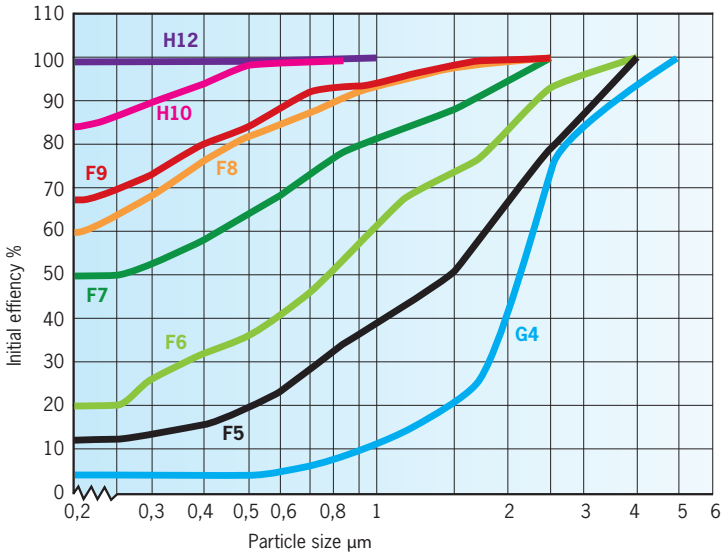
Typical particle arrestance for clean filters during tests in accordance with EN779–2002 and EN 1822. The diagram shows the degree of separation for different particle sizes.



On world standards...

...Camfil Farr is the leader in clean air technology and air filter production.
Camfil Farr conducts its own product development and R&D, and has worldwide local representation.
Our overall quality goal is to develop, produce and market top-quality products and services that always exceed our customers´ expectations.
We see our activities and products as an expression of our quality.

To achieve overall high quality, it is necessary to establish an internal work environment where all Camfil Farr's employees can succeed together. This means an environment characterised by openness, confidence and always doing what's right for our customers.

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www.camfilfarr.com
info.gt@camfilfarr.com

Camfil Farr Power Systems

Europe:
Borås, Sweden tel: +46 33 17 85 00
Bremen, Germany tel: +49 421 47886 0
Kreuzau, Germany tel: +49 2421 22 49 80
Brussels, Belgium tel: +32 2 68 80 520

Americas:
Laval, Canada tel: +1 450 629 30 30
tel: +1 800 976 93 82

Middle East:
Dubai tel: +971 4 887 1796

Asia:
India tel: +91 124 43 24 100
Japan tel: +81 6361 38 36 (Tominaga & CO Ltd)