Clean air solutions for turbo machinery
Our organization specializes in the field of Air Filtration Solutions. We are focused on research and development, state-of-the-art manufacturing, and marketing of air filtration products and services on a global basis. The Camfil group of companies is the world’s largest designer and manufacturer of air filters for many applications with 24 manufacturing facilities around the globe. We offer the strength and expertise of the group. As well as the advantage of local presence.

For the past forty years, we have supplied filtration solutions and services to a large number of gas turbine installations around the world.

Camfil takes great pride in the fact that our products and systems offer superior engine protection while minimizing degradation due to fouling and erosion. Our products offer high efficiency, extended service life, low pressure drop and high quality thus providing our customers with the lowest possible operating and maintenance costs.

As an international leader in the field of air filtration, Camfil offers its customers the security of long-term partnership, backed by the documented capability to analyze needs and supply total air filtration solutions.
Our efforts have been focused on the ability to offer our clients an extensive range of products and services which cater to a broad range of requirements, whether based on technical or commercial criteria.

With our broad range of products, we have delivered systems to all types of turbine installations: industrial, desert, offshore, arctic and marine. Our expertise in system design for various environments is an asset that all our customers can benefit from.

STATIC FILTER SYSTEMS
Air filtration for power generation, industrial and Oil & Gas installations in a large part of land-based environments.

PULSEJET FILTER SYSTEMS
Air filtration for power generation, industrial and Oil & Gas installations with highly polluted environments.

OFFSHORE FILTER SYSTEMS
Air filtration for installations on drilling and production platforms and FPSOs exposed to marine and industrial environment.

ACOUSTIC SYSTEMS
Enclosures, Inlet and Exhaust Silencers for stationary and mobile turbomachinery.

Camfil Power Systems design and manufacture complete gas turbine air intake and acoustic packages for all types of applications and environments.

As illustrated on the map, our gas turbine business units, located in Sweden, Belgium, Canada, the US, Germany, the UAE, India and China, span the globe. Information on our gas turbine filtration solutions can be obtained from any of these locations or via any of the other direct sales offices or authorized representatives.
**MORE POWER**
**GREATER EFFICIENCY**

Camfil has a long history of supplying systems to the gas turbine industry. Our engineers work closely with the gas turbine OEM’s to develop optimum solutions in terms of performance, reliability and economy.

**User benefits**
The prime function of the inlet filter system is to protect the gas turbine from pollutants in the inlet air. Particles entering the gas turbine can cause erosion or fouling of the turbine internals. Erosion is mainly caused to relatively coarse particles above 5 µm in size. Smaller particles in the sub micron size, cause fouling of turbine blades and cooling holes which rapidly reduces performance and becomes a serious threat to the turbine.

Hot corrosion is an accelerated corrosion of metal surfaces that results from the combined effect of oxidation and reactions with sulfur compounds and other contaminants such as chlorides. Effective capture of small particulate and airborne salt is therefore of vital importance for long and efficient operation.

A properly designed filter system gives the user:

**Performance**
Low pressure drop provides high power output and high dust holding capacity increases filter service life, which reduces maintenance costs.

**Reliability**
The engine will be protected from risk of damage from erosion, fouling and hot corrosion.

**Economy**
High filtration efficiency results in less fouling and less degradation, which is the key to maintaining maximum efficiency and power.

End customers are requesting more and more that filter systems to be optimized, not only in terms of price but also with regard to the total cost for the intake system, including filters usage, compressor cleaning, CO2-emission costs, energy costs and other factors. The LCC programme developed by Camfil for gas turbine inlet systems takes into account such factors as engine sensibility, energy cost, running time, filter price, cleaning cost, different environments and filter characteristics.

It is a well-known fact amongst gas turbine operators that high efficiency filters in combination with low pressure drop results in low operating and maintenance cost while ensuring high power output from the turbine.

**For example:**
100 Pa less operating pressure drop at the intake system will increase the turbine output by approximately 0.2% and reduce the fuel consumption by approximately 0.1%. Camfil can run calculations to determine the optimum combination of filters needed for the lowest totalcost over a given time period. Camfil’s calculations are based on real life testing data from a large number of sites.
EXTENSIVE TESTING CAPABILITY

With air filters it is difficult to judge the performance just by looking at them. The particles they should catch are very often not visible to the human eye. Since filters typically last for a very long time, laboratory testing is used to compare filters. For laboratory testing to be fair, industry standards has been established to define the method of testing. Currently in Europe and North America, there are different laboratory filter test standards utilized for determining how an air filter should be measured.

The present standards are:
- EN 779:2012 (Europe)
- EN1822:2009 (Europe)
- Eurovent 4/9 (Europe)
- ANSI/ASHRAE Standard 52.2-1999 (North America)

EN 779:2012
This standard classifies a filter’s performance by the average efficiency at 0.4 μm. In addition, this standard requires tests including filter efficiency when all electrostatic charge has been eliminated, to give a true minimum efficiency value.

EN1822:2009
Testing per EN 1822 is normally done with an aerosol probe which can be moved over the entire surface of the filter. Filter testing includes pressure drop at nominal air flow, overall collection efficiency at most penetrating particle size (MPPS) and local collection efficiencies at MPPS. The filter class description are:
- EPA 10 - 12: Efficiency Particulate Air Filters
- HEPA 13 - 14: High Efficiency Particulate Air Filters
- ULPA 15 - 17: Ultra Low Penetration Air Filters

ASHRAE 52.2.1999
This standard reports a filter’s performance across a range of particle sizes for 0.3 μm to 10.0 μm. The minimum measured efficiency during the test is reported, but this standard does not require discharging to give a true minimum efficiency. Particle size efficiency will be the new test method “world wide”.

Several test rigs around the world
We were the first company to our own Eurovent 4/9 / EN 779 test rigs. The rigs have been tested so that they give the same results as independent test labs. By having a number of our own test rigs, we can test new and used filters from the field to build up our own database how filters work and perform in real life.
**GAS TURBINE AIR FILTRATION PRODUCTS**

**CAMVANE**

A high efficiency droplet separator using vertical separation vanes. Ideal when high droplet separation efficiency is required in combination with low operating pressure drop.

Typical applications include air intake filtration for turbo machinery and ventilation intakes which experience high humidity and/or heavy rainfall. The droplet separator profiles are available in black polypropylene, extruded marine grade aluminum or stainless steel.

**30/30 GT**

An extended area pleated filter which has long been established as the industry standard prefilter for gasturbines. Its favorable efficiency ratings, low initial pressure drop and extended service life have made the 30/30 GT the prefilter of choice for those seeking both economy and proven performance.

The 30/30 GT is rated as a medium efficiency, totally disposable filter offering extended service life to final filters. Unique “radial pleat” design assures total usage of the filter media, maximum dust holding capacity and extended service life.

**Filter classes:** G4 per CEN EN 779:2012 and a MERV 7 filter according to ASHRAE 52.2.

**CAMCLOSE**

The Camfil CamClose is specially design to be fitted directly – close coupled to Camfil final filters, such as the different CamGTs. Its major strength is that it is possible to add an extra filter stage to the filter system without the need for an extra filter bank. The CamClose’s structural integrity is maintained by the use of a high strength ABS frame. A built-in distance between media pack and downstream filter, provides good air distribution and long service life. Downstream pleat separators are used to ensure optimum operation. Integrated clips facilitates easy snap-on mounting. Separate clips also available.

**Filter classes:** G4 and M6 per CEN EN 779:2012.

**R30/30 WR**

A filter that has been specifically developed for wet conditions. When subjected to water testing at a feed rate equivalent to 11 inches (280 mm) per hour of rain – the R30/30 WR test filters allowed no water penetration on the downstream side. The filter combines high efficiency removal of water and mist with medium removal of airborne particulate.

**Filter classes:** G4 filter per CEN EN 779:2012 and a MERV 7 filter according to ASHRAE 52.2.
**HI-CAP GT**

A pocket filter made of synthetic media. It has a large filter area, high dust holding capacity and is widely used as a prefilter and coalescer in 2 and 3 stage systems offering extended service life to final filters.

*Filter classes:* G4 per CEN EN 779:2012 and MERV 6 according to ASHRAE 52.2. The filter is also available with plastic frames.

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**CAMFLO XLGT**

The Cam-Flo XLGT filter is a cost-effective bag filter, recommended in areas where considerations for high humidity and/or turbulence is important. The filter has an improved synthetic fibre media with unique properties, effectively removing harmful particles from the air. Self-supporting bags and a unique design make this filter an excellent pre-filter and coalescer choice for turbomachinery applications.

*Filter classes:* M6 per CEN EN 779:2012 and MERV 12, 13, 15 according to ASHRAE 52.2.

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**CAMFLO XMG T**

The Cam-Flo filter is the first and only synthetic filter on the market that keeps its efficiency stable over its entire lifetime according to EN779:2012. Self-supporting bags and a unique design make this filter an excellent pre-filter and coalescer choice for turbomachinery applications. The Cam-Flo filter is a robust filter suitable for all environments such as industrial urban areas, rural areas and applications in high humidity areas like off-shore. Available in a galvanized steel frame, XMGT, and a plastic ABS frame, XLGT.

*Filter classes:* M6, F7, F9 per CEN EN 779:2012 and MERV 12, 13, 15 according to ASHRAE 52.2.

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**TURBOPAC**

TurboPac is a box type filter designed to withstand the high pressures and surging airflows associated with gas turbine operation. The filter casing consists of a galvanized steel frame with either flanges/headers on one side or both. Media pack with vertical pleats protected by face guards on air entering and air leaving sides.

*Filter classes:* M6, F7 and F8 per CEN EN 779:2012 and MERV 11, 13 and 14 per ASHRAE 52.2. Also available in XL-version.
The market leader and state of art, high-capacity filter for turbo machinery. Its unique design with vertical pleats assures that performance is maintained in humid or wet conditions, guaranteeing a long service life and an economical filtration solution. The CamGT has a solid, airtight frame and a new technique for fixing the media to the frame; the double-sealing design.

Each filter grade is aerodynamically optimized in order to provide the lowest possible pressure drop and longest available life. Combined with its sturdy and heavy duty design, the filter withstands a continuous pressure drop of over 6250 Pa, the Cam GT’s high efficiency and low pressure drop guarantee optimum protection and engine performance under the most demanding operating conditions.

The Cam GT is suitable for both onshore and offshore installations where it’s exceptional performance is maintained during periods of high humidity and extensive fog. A gas turbine filter is sometimes exposed to extreme peaks in pressure drop, and so to prevent the media packs from bulging or bursting aerodynamic grids are added to the air exit sides.

**CamGT 3-V600:** The design features a 600 mm-deep frame fitting almost 50 square metres of media in one single cartridge. The unparalleled filtration area offers the lowest pressure drop in the industry for this type of filter. A longer replacement cycle also reduces installation, removal and disposal costs significantly.

**CamGT 4-V300:** The standard 300 mm-deep frame available in an XL version with +26% filtration area, and Reverse Airflow configuration in order to allow any kind of filter fitting.

**Filter classes:** F7, F8 and F9 per CEN EN 779:2012. E10, E11, E12 and H13 per EN 1822:2009

The CamPGT offers a cost effective solution in areas with dry environments and where considerations for high humidity and hygroscopic dust are less important. The compact filter is designed with horizontal pleats and is, just as the other CamGTs, fully incinerable.

To ensure no risk of filter damaging during handling and installation, external exposed pleated packs are equipped with protective integrated sealed mesh.


Based on the same unique filter pleat design as the standard CamGT, the box type version is set into a rigid enclosing plastic frame. It is therefore very suitable for upgrading existing filter systems from older box type filters to a modern high performance filter product. Just as the standard CamGT, its performance is maintained in humid or wet conditions, making it suitable for operation also in salty environments.

Combined with its sturdy and heavy duty design, the CamGT’s high efficiency and low pressure drop guarantee optimum protection and engine performance under the most demanding operating conditions.

**Filter classes:** F7, F8 and F9 per CEN EN 779:2012. E10 per EN 1822:2009. Also available in XL-version.
CAMPULSE

Pulse filter elements used in automatic, self-cleaning air filter systems providing high performance in a single stage of filtration. Each set consists of two conical elements. Top and bottom caps are made of pressed or spun galvanized steel. A rigid expanded metal inner core supports the media pack and prevents the element from collapsing under conditions of extreme differential pressure. An outer expanded metal wrap protects the media from damage during handling and from large foreign objects during operation.

CamPulse GT is available in four different media options fully compliant with gas turbine manufacturers’ performance specifications. Replacement upgrade available for non-Camfil inlet air systems: conical and cylindrical elements, flange top and twist lock.


FARR TENKAY

Vertically hung self-cleaning air filter cartridge providing high performance in a single stage of filtration. Camfil’s HemiPleat® pleat design ensures uniform pleat spacing and maximum utilization of the filtration media. Offering leak-free performance, the filter media is factory bonded to a closed steel bottom pan and to a top clamping plate. A triple helical cord is bonded to the outer surface to prevent media distortion during back flushing. A wide variety of models are available with header, gasket and media options to meet your particular needs.

The Farr Tenkay is available with the same media configuration as the CamPulse cartridge filters.

MEDIA OPTIONS

For all environments

GTC Synthetic: The combination of depth-loading coarse fibre media and a nano fiber core is the ideal solution for removing hygroscopic particles in areas of high humidity, such as coastal and wet tropical environments. A non-discharging synthetic media with unique properties, giving the filter a high level of efficiency over its entire lifetime.

For dry and arid

GTD Synthetic: Pure surface-loading with a high dust-loading capacity media ideal for desert and dry/arid environments. A layer of nanofibres over the synthetic substrate significantly increases particle removal efficiency.

Blended media

Polytech: Our own blend of fibres with a moisture resistant silicone treatment for the improved dust release and long filter life in most environments.

EPA/HEPA Filtration

CamBrane: A perfectly balanced multi-layer synthetic media including a sub micron particle membrane. A hydrophobic pre-filter layer with high dust loading capacity guarantees high performance in both dry and humid conditions.

HemiPleat™ open pleat technology

Camfil’s state-of-the-art in pleating technology is the key to the superior performance in operating and maintenance for pulse cleaning cartridges. Synthetic beads hold the pleats more open and the wider spacing in the HemiPleat® design gives greater media utilization and more effective filtration providing enhanced performance.
At Camfil, we are deeply committed to R&D and quality control, performing rigorous laboratory testing and field trials under controlled conditions. We design, develop and build our own production equipment to maximize our control over the quality and performance of the filtration products that we manufacture.

Always at the forefront of emerging technologies, Camfil is a recognized filtration leader and is continuously developing new materials to optimize clean air solutions. We work closely with media suppliers to obtain products that meet our very high quality standards.

Climate chamber
One of Camfil’s latest investments is our full scale test rig used to evaluate filtration needs under difficult circumstances. By using this method, we can modify all of the important parameters such as air flow, relative humidity, temperature and salt content. The rig can be used with air or other gases and will allow rapid prototyping, product validation, evaluation of competitive products and for research and development testing.

Mobile test rig
Another new investment is Camfil’s mobile approach to filter tests consists of a mobile test rig installed in a standard 20-foot container. Tests can be performed on eight different filters simultaneously in four different air ducts.

The mobile test laboratory documents the actual performance of filters in the application they are intended for, with complete control over the operating parameters. Customers see, right on their site, what the most cost-efficient and effective filtration solution will be for their gas turbine system, building or process. Customers can also participate in monitoring the results.

Accelerated tests are also possible to test filters at a higher air flow, with the exact same dust load, to shorten the test period and simulate a long-term test.

Air audit service
The air audit service of Camfil have as main objective to verify, maintain or improve the quality of filtration of your installation. Sampling of air is made before and after the filter house or individual filter stages and a qualitative and/or quantitative analysis of the air will be reported.

Camfil report will include recommendations and advise on possible solutions to reduce operating cost by improving the efficiency and reliability of your installation.

Camfil has the world’s biggest fleet of mobile labs with capabilities to set up tests in Europe, America and Asia.
CAMFIL – a global leader in air filters and clean air solutions

Camfil is a global leader in the air filtration industry with more than half a century of experience in developing and manufacturing sustainable clean air solutions that protect people, processes and the environment against harmful airborne particles, gases and emissions. These solutions are used globally to benefit human health, increase performance and reduce energy consumption in a wide range of air filtration applications.

Our 26 manufacturing plants, six R&D sites, local sales offices and 3,800 employees provide service and support to our customers around the world. Camfil is headquartered in Stockholm, Sweden. Group sales total more than SEK 6 billion per year.