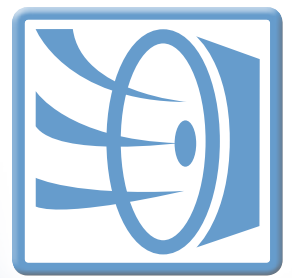


Protect your air – Worldwide

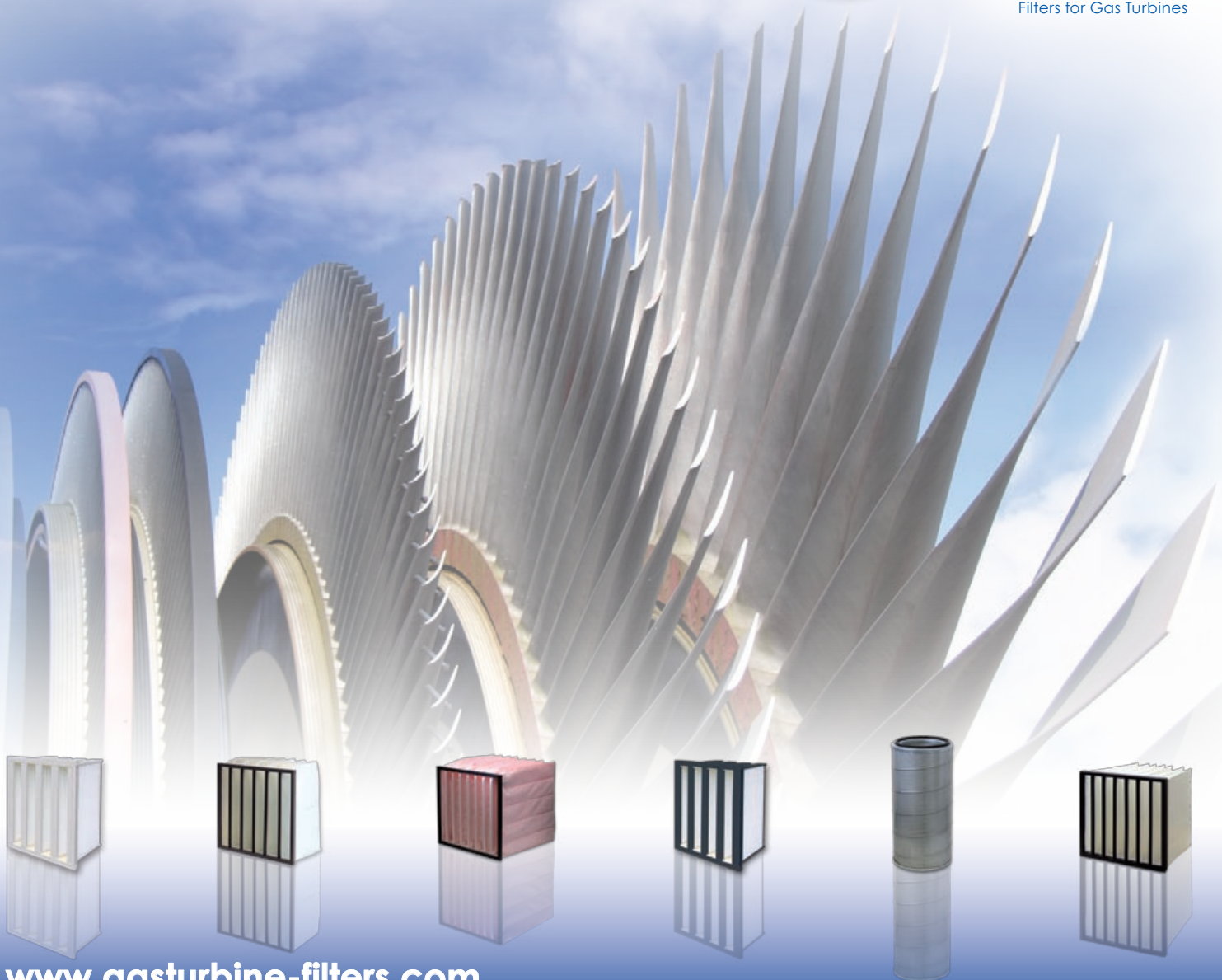


Filters for Gas Turbines

Product brochure



Filters for Gas Turbines



www.gasturbine-filters.com

Portrait

VOLZ Luftfilter GmbH & Co. KG

Facts and figures:

2009

Volume of sales:	approx. 45 Mio. Euro
Employees:	500 employees
Production area:	60,000 m ² and 8 plants (7 plants in Germany and 1 plant in UK)
Filter production:	more than 2.5 million filters
Variety of products:	more than 8,500 different products

VOLZ Luftfilter GmbH & Co. KG is developing, manufacturing and selling filter media and filter products for air conditioning and ventilation, painting and drying applications as well as turbomachinery. With this range, VOLZ Filters is one of the leading manufacturers and is internationally known for innovative products. From small to large quantities – there are many possibilities to fulfil our customers requirements. Quality control of our complete production with internal filter test equipment and modern quality management tools ensure high product quality. We supply all filter classes from G2 to H14 for every application.

Beside a range of high quality filter products, VOLZ Filters also offers a variety of different services, e.g.: technical consulting, training courses, filter management and particle measurement on site.

Our production in Horb is one of the most modern filter manufacturing plants in the world.

All production stages from manufacturing of nonwoven materials to assembly of final filters are carried out on site, which creates a fully transparent process.

From fibres to the final filters – perfect.



The owners: Rainer Volz and Manfred Volz



VOLZ Luftfilter GmbH & Co. KG

Plant II - VII
Gesslerstraße 3
D-72160 Horb am Neckar

Phone: +49-(0)7451-5516-0
Fax: +49-(0)7451-5516-120

www.volzfilters.com
info@volzfilters.com

Teams & Plants of VOLZ Filters

Sales Teams of VOLZ Filters

For your support we have professional teams who will give you best advise and help for your specific demands. So you can be sure that you get quick and competent answers on individual questions. Take a look at our teams.

Sales Export “North” International

Contact:

Phone: +49(0) 7451 / 55 16 919

Fax: +49(0) 7451 / 55 16 900

export-north@volzfilters.com

Sales Export “South” and Automotive Germany

Contact:

Phone: +49(0) 7451 / 55 16 909

Fax: +49(0) 7451 / 55 16 140

export-south@volzfilters.com

Sales Volz Filters UK Ltd. International

Contact:

Phone: +44(0) 161 / 743 4190

Fax: +44(0) 161 / 743 1390

sales@volzfilters.co.uk

VOLZ Plants in Europe

We are continuously looking to ensure the value and quality of our products with our German plants in central Europe and our plant in England. We are combining reliability with the flexibility of a global operating company with customer friendly benefits.



VOLZ-Plant II-VII (Production and logistics) in Horb-Heiligenfeld



VOLZ-Plant I (Sales) in Horb-Bildechingen



VOLZ-Plant UK (Production and sales) in Manchester

VOLZ Quality characteristics

Our demand for high quality regarding VOLZ-filter-products

With optimized production flows, in-house filter testing and modern quality management tools, VOLZ Filters is producing filter products with the commendation - Quality made by VOLZ.



- We are certified according to DIN EN ISO 9001:2008 and therefore we ensure coordination of our companies processes to meet our customer requirements.



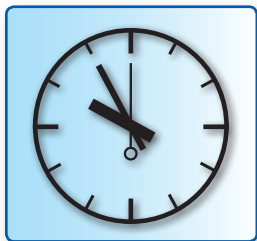
- Quality-filters "Made by VOLZ" from G2 to H14 according DIN EN 779 and DIN EN 1822
- Filter media and all components are produced by VOLZ Filters



- Öko-Tex Standard 100 - Our media is skin friendly and tested for harmful substances - a good feeling



- Environmentally friendly and easy disposal - VOLZ synthetic media's are fully incinerable



- Speed and flexibility - fast delivery times and an optimal customer orientation
- Flexible fabrication - small tailor-made lots sizes are as easy as large order quantities
- Flexibility and fast delivery is possible within 24 - 48h*



- Innovative in-house research and development department
- Quality control of the complete production with internal filter test equipment and modern quality-management-tools

In addition we offer:

- A product range, for more than 8,500 different products for several applications, air conditioning, painting and drying, rotary and gas turbine technology
- Modern equipment and robotics for maximum quality of filter components
- One of the world's most modern Paint-Stop plants
- Customer-specific labelling and packaging
- Services e.g. particle measurement, analysis of paint work damage, analysis of the painting process, rating of color spraying cabins and many more

* Additional cost and only available for standard filters and components in addition to batch size

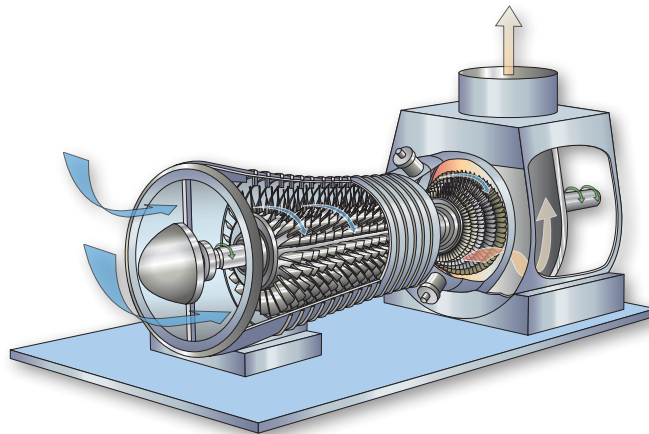
Filters for Gas Turbines – Information brochure

Turbomachinery

Gas turbine power plants are important in basic energy production, combined heat and electricity production and to level down consumption peaks.

Compressors are used in pipeline transport, air separation units, pneumatic equipment and many more.

The right combustion or compressor air filtration plays a very important role. Effective filters are used to prevent the most important and expensive parts of the power engine respectively compressor, to get dirt out and to avoid unnecessary erosion. Wrong filter systems will reduce the efficiency and performance of the turbomachinery and will reduce maintenance interval and increase down time.









Environment

Every location of a power station is different. Gas turbines are installed in a wide variety of environments such as

- Arctic areas
- Hot and desert areas
- Tropical areas
- Industrial areas

Subsequently there are different particles like natural or anthropogenic particles in the environment.

Influenced by different climate conditions particle load in the air intake of a turbomachinery is defined by dust concentration and particle size distribution.

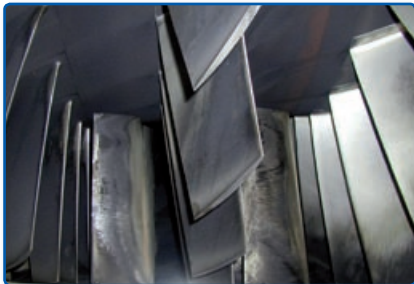
Dust-concentration influenced by different climate conditions							
							
Region		Rural	Industrial	Costal	Desert	Tropical	Arctic
Particle concentration	mg/m ³	0.02 - 0.2	0.02 - 0.5	0.01 - 0.3	0.01 - 700	0.02 - 10	0.1 - 1.0
Particle size range	µm	0.01 - 10	0.05 - 10	0.01 - 7	0.1 - 50	0.01 - 30	0.01 - 10
Possible damages		Erosion, Fouling	Fouling, Corrosion	Wet & hot, Gas path, Corrosion, Erosion	Erosion, Corrosion	Fouling, Corrosion	Wet, Corrosion, Icing, Fouling

Damage

VOLZ Filters will provide the correct selection of filtration products to meet specific requirements of manufacturers for their turbomachinery equipment.

This selection will prevent the operator to be faced with damage such as erosion, fouling or corrosion of the gas turbine.

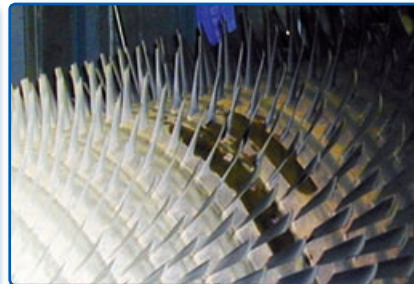
Erosion



Fouling



Corrosion and hot gas corrosion



Maintenance

Turbomachinery operators want to avoid damages, down times and problems in their daily operations.

The key words **economy**, **availability** and **reliability** are very closely linked to VOLZ Filters. VOLZ Filters show their reliability in thousands of different applications worldwide day by day. These filters were not only chosen due to their extraordinary economic behaviour but especially due to their extraordinary price – performance ratio.



Principal components of a filtration system

In practice there are typical components of a filtering system for gas turbines.

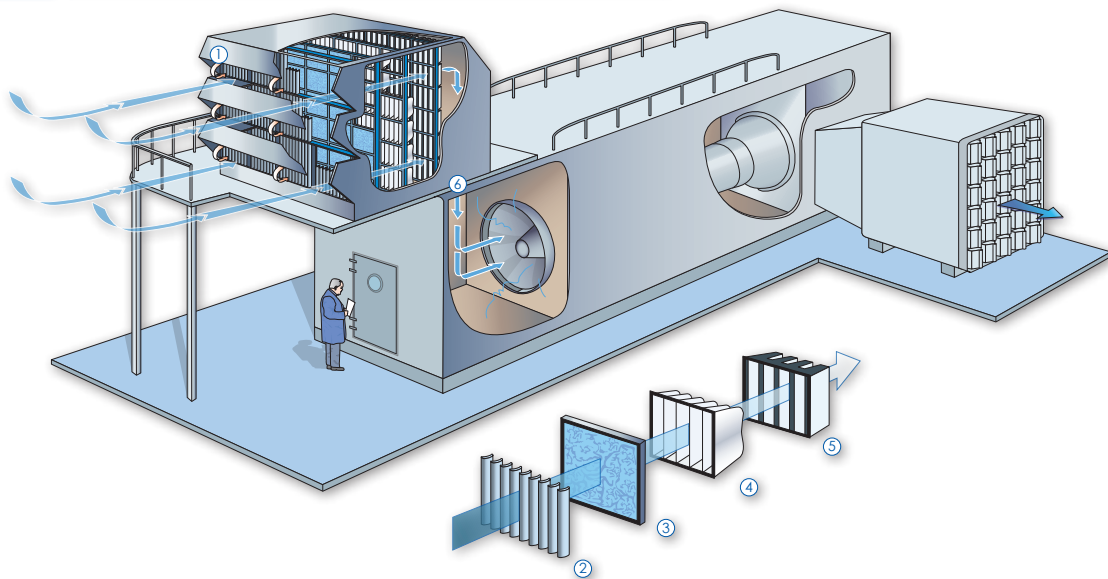
Depending on local weather and/or dust conditions the air has to pass first a weather hood, an anti-icing-system and weather louvres. These stages will be followed by a protective screen to keep small animals like birds out. After these barriers up to 3 filter stages will follow, depending on the desired filter lifetimes due to maintenance intervals.

Finally a transition piece together with by-pass flaps will follow the filter.



Gas turbines and rotary equipment (Static filter systems)

- | | | |
|--------------|-------------------|-------------------|
| ① Anti-icing | ② Weather louvres | ③ Coalescers |
| ④ Prefilters | ⑤ Finefilters | ⑥ Protection grid |

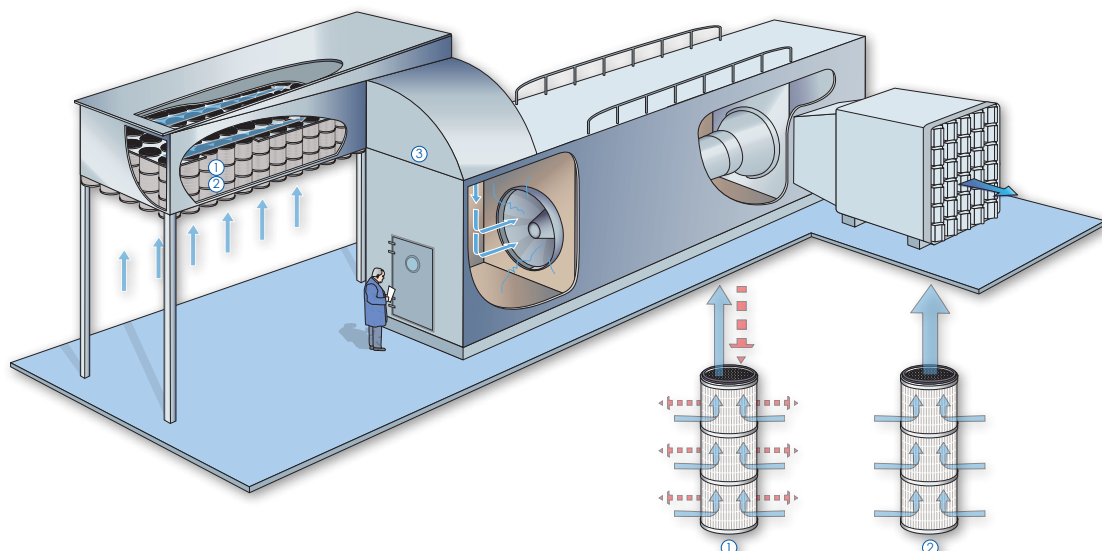


In areas with high dust concentrations and dry dusts, pulse-jet cartridges will be used. The elements are self-cleaning by an overpressure reverse flow to the air intake. In case of low dust concentrations, static filtering cartridges have advantages, as they operate at low pressure drop levels and have not to be pulsed cleaned.



Gas turbines and rotary equipment (Cartridges filter systems)

- | | |
|------------------------|---------------------|
| ① Pulse-jet cartridges | ② Static cartridges |
| ③ Protection grid | |

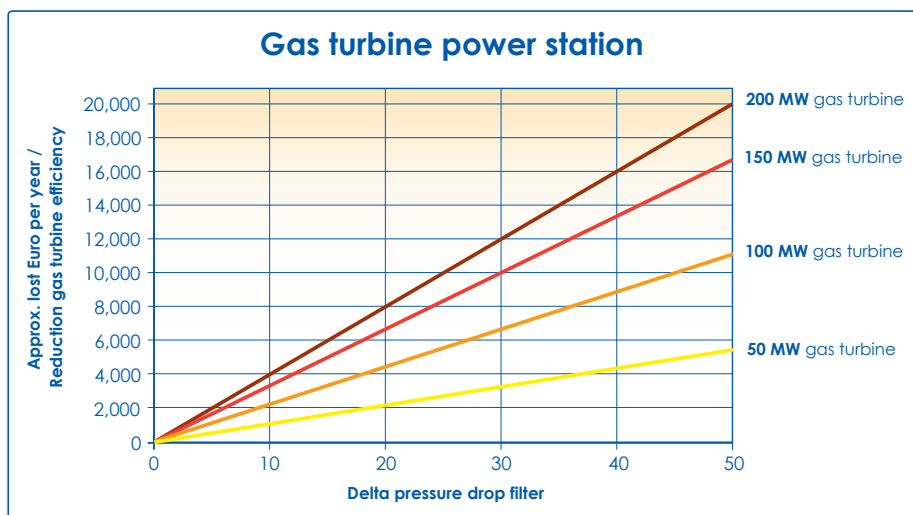


Goals of filtration

There are different approaches to achieve the best filtration solution. The main goal is to reach effective and efficient filtration. Besides these, turbomachinery owners are interested in the profitable use of their filtration systems.

It was determined that a 50 Pa loss in operating pressure drop at air intake system filters will increase the turbomachinery output by approximately 0.1%.

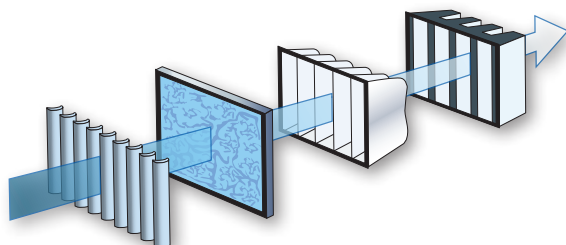
The graph below indicates calculated efficiency loss over pressure drop difference for some gas turbines with different power output. This loss, calculated in EURO, could be spent on higher performing systems from VOLZ Filters.



Selection of the right filters

VOLZ Filters has a long experience in providing filtration solutions for the power generation industry. Our technicians will assist you in finding the right filter solution by answering following questions:

- Dust concentration of intake air, amount of particles and their size distribution
- Type of dust (dry or hydrophobic)
- Location of plant and its influence to pollution (On-Shore, Off-Shore)
- Chemical components of dusts
- Humidity and its influence to dust behaviour (salt)



Due to necessity to know as much as possible about influence factors for the best performance of a filter system, VOLZ Filters offers the following different services (see next page).

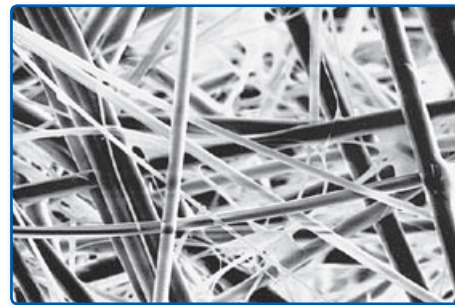
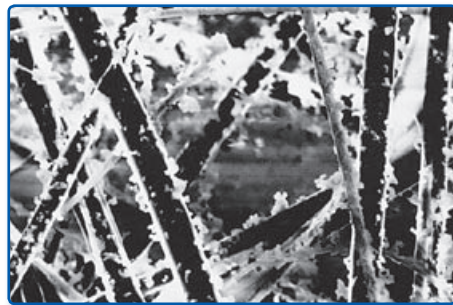
Services

The services of VOLZ Filters consists of analysis support to operators of turbomachinery as well as qualified and dedicated technical service support.

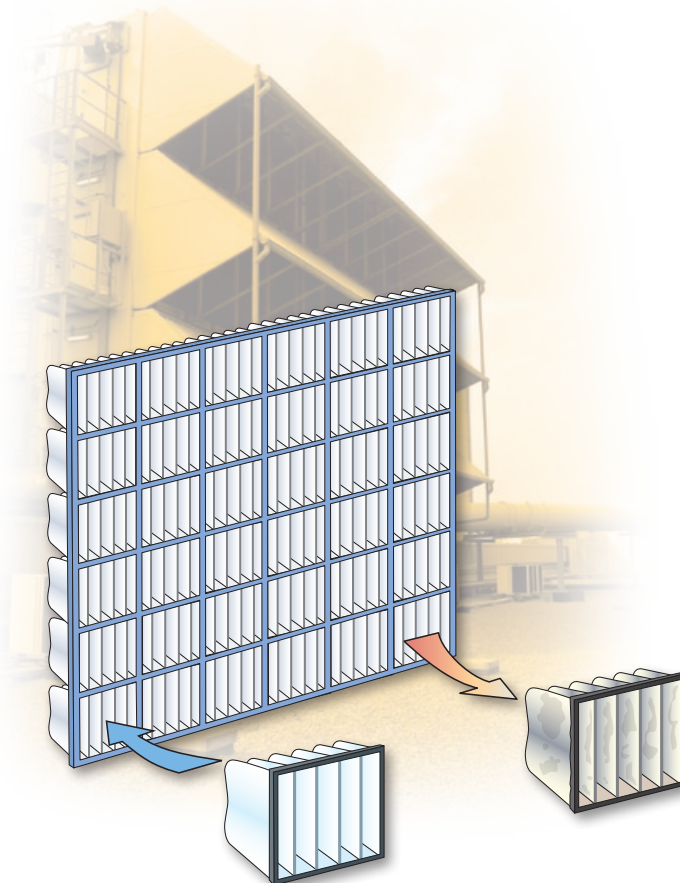
The laboratory of VOLZ Filters has a broad experience in technical questions. These services may be used by our technicians or our customers themselves to optimize filters in their systems.

Typical filter analysis services are:

- Location specific measurements (air flow, dust sampling, etc.)
- Light-microscopy
- SEM (scanning electron microscope)
- EDX (energy disperse x-ray analysis)
- Filter evaluation (EN779, MPPS)



VOLZ Filters is working with a lot of service companies in different locations which are specialised in servicing air intake systems with **filter replacement** and **installation** as well as cleaning and disposal services.










Filters for gas turbines – delivery programme

Coated Coalescer V80	 Rolls (Page 11)	 Precuts (Page 11)	 Changing frame (P. 11)
	 Rolls (Page 11)	 Precuts (Page 11)	 Changing frame (P. 11)

Prefilters/Finefilters GT-TP-series	 GT-TP-5 (Page 12)	 GT-TP-6 (Page 12)			
	 GT-TP-7 (Page 12)	 GT-TP-8 (Page 12)	 GT-TP-9 (Page 12)		

Finefilters GT-K-series	 GT-K-6 (Page 13)	 GT-K-7 (Page 13)	 GT-K-8 (Page 13)	 GT-K-9 (Page 13)	
	 GT-K-10 (Page 14)	 GT-K-11 (Page 14)	 GT-K-12 (Page 14)	 GT-K-13 (Page 14)	



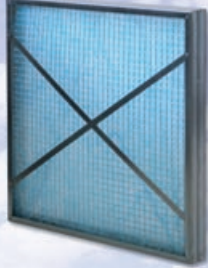
Please note: Each compact filter is available in a black or grey.

Finefilters GT-M-series	 GT-M-6F (Page 15)	 GT-M-8F (Page 15)	 GT-M-6FF (Page 15)	 GT-M-8FF (Page 15)	
	Cartridges GT-P-series	 GT-P-8 (Page 16)	 GT-P-9 (Page 16)	Cartridges GT-PC-series	 GT-PC-9 (Page 16)

Versions Coalescers






Coated Coalescer V80			
			
	Coalescer rolls (20 x 2m)	Coalescer precuts	Coalescer in changing frame
Depth	3" / 70 mm 4" / 100 mm	3" / 70 mm 4" / 100 mm	3" / 70 mm
Material	Glass fibre	Glass fibre	Glass fibre
Initial pressure drop*	35 Pa 50 Pa	35 Pa 50 Pa	55 Pa
Recommended final pressure drop	250 Pa	250 Pa	250 Pa
Nominal air flow rate*	3400 m³/h	3400 m³/h	3400 m³/h

*(610 x 610mm)

Demister Coalescer V81			
			
	Coalescer rolls (20 x 2m)	Coalescer precuts	Coalescer in changing frame
Depth	3" / 70 mm 4" / 100 mm	3" / 70 mm 4" / 100 mm	3" / 70 mm
Material	Glass fibre	Glass fibre	Glass fibre
Initial pressure drop*	25 Pa 30 Pa	25 Pa 30 Pa	35 Pa
Recommended final pressure drop	250 Pa	250 Pa	250 Pa
Nominal air flow rate*	3400 m³/h	3400 m³/h	3400 m³/h
Water droplets removal	97%	97%	97%

*(610 x 610mm)

Prefilters and Finefilters





Prefilters/Finefilters GT-TP-series					
					
	GT-TP-5	GT-TP-6	GT-TP-7	GT-TP-8	GT-TP-9
Advantages	Pocket-Fitting Cover sticks Welded pockets	Pocket-Fitting Cover sticks Welded pockets	Pocket-Fitting Cover sticks Welded pockets	Pocket-Fitting Cover sticks Welded pockets	Pocket-Fitting Cover sticks Welded pockets
Classification according to EN 779	F5	F6	F7	F8	F9
Dimension	592 x 592 x 600 mm	592 x 592 x 600 mm	592 x 592 x 600 mm	592 x 592 x 600 mm	592 x 592 x 600 mm
Filter area	5.9 m ²	5.9 m ²	6.8 m ²	6.8 m ²	6.8 m ²
Medium	Polyester	Polyester	Meltblown	Meltblown	Meltblown
Number of pockets	7	7	8	8	8
Initial pressure drop	50 Pa	60 Pa	100 Pa	120 Pa	170 Pa
Recommended pressure drop	450 Pa	450 Pa	450 Pa	450 Pa	450 Pa
Nominal air flow rate	3400 m ³ /h	3400 m ³ /h	3400 m ³ /h	3400 m ³ /h	3400 m ³ /h
Average efficiency (0,4 µm) / EN 779	40 - 60 %	60 - 80 %	80 - 90 %	90 - 95 %	≥ 95 %
Temperature-resistance	60 °C	60 °C	60 °C	60 °C	60 °C
Humidity-resistance	100 %	100 %	100 %	100%	100%

Finefilters

Finefilter GT-K-series				
				
	GT-K-6	GT-K-7	GT-K-8	GT-K-9
Advantages	Protection grid Fully potted Gasket	Protection grid Fully potted Gasket	Protection grid Fully potted Gasket	Protection grid Fully potted Gasket
Classification according to EN 779	F6	F7	F8	F9
Dimensions	592 x 592 x 292 mm	592 x 592 x 292 mm	592 x 592 x 292 mm	592 x 592 x 292 mm
Filter area	18 m ²	18 m ²	18 m ²	18 m ²
Medium	Micro glass fibre	Micro glass fibre	Micro glass fibre	Micro glass fibre
Initial pressure drop	100 Pa	115 Pa	125 Pa	155 Pa
Recommended final pressure drop	600 Pa	600 Pa	600 Pa	600 Pa
Nominal air flow rate	4250 m ³ /h	4250 m ³ /h	4250 m ³ /h	4250 m ³ /h
Average efficiency (0,4 µm) / EN 779	60 - 80 %	80 - 90 %	90 - 95 %	≥ 95 %
Temperature resistance	70 °C	70 °C	70 °C	70 °C
Humidity resistance	100 %	100 %	100 %	100 %

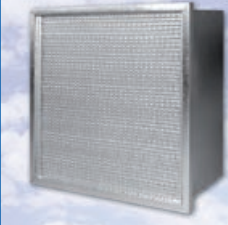
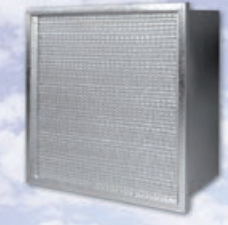


Please note: Each Compact filter is available in a black or a grey coloured version.

Finefilters

Finefilter GT-K-series				
				
	GT-K-10	GT-K-11	GT-K-12	GT-K-13
Advantages	Protection grid Fully potted Gasket	Protection grid Fully potted Gasket	Protection grid Fully potted Gasket	Protection grid Fully potted Gasket
Classification according to EN 779	H10	H11	H12	H13
Dimensions	592 x 592 x 292 mm	592 x 592 x 292 mm	592 x 592 x 292 mm	592 x 592 x 292 mm
Filter area	19 m ²	19 m ²	19 m ²	19 m ²
Medium	Micro glass fibre	Micro glass fibre	Micro glass fibre	Micro glass fibre
Initial pressure drop	170 Pa	200 Pa	250 Pa	280 Pa
Recommended final pressure drop	600 Pa	600 Pa	600 Pa	600 Pa
Nominal air flow rate	3400 m ³ /h	3400 m ³ /h	3400 m ³ /h	3400 m ³ /h
Average efficiency (0,4 µm) / EN 779	85 %	95 %	99,5 %	99,95 %
Temperature resistance	70 °C	70 °C	70 °C	70 °C
Humidity resistance	100 %	100 %	100 %	100 %

Please note: Each Compact filter is available in a black or a grey coloured version.

Finefilters

Finefilter GT-M-series				
				
	GT-M-6F	GT-M-8F	GT-M-6FF	GT-M-8FF
Classification according to EN 779	F6	F8	F6	F8
Dimensions	592 x 592 x 292 mm	592 x 592 x 292 mm	592 x 592 x 292 mm	592 x 592 x 292 mm
Filter area	14 m ²	14 m ²	14 m ²	14 m ²
Medium	Micro glass fibre	Micro glass fibre	Micro glass fibre	Micro glass fibre
Initial pressure drop	130 Pa	160 Pa	130 Pa	160 Pa
Nominal air flow rate	3400 m ³ /h	3400 m ³ /h	3400 m ³ /h	3400 m ³ /h
Efficiency	65 %	95 %	69 %	95 %

Cartridges

Cartridges GT-P-/GT-PC-series

			
	GT-P-8	GT-P-9	GT-PC-9
Classification according to EN 779	F8	F9	F9
Dimension	Outer diameter: 324 mm Inner diameter: 216 mm Length: 660 mm	Outer diameter: 324 mm Inner diameter: 216 mm Length: 660 mm	Outer diameter-1: 450 mm Inner diameter-1: 330 mm Outer diameter-2: 324 mm Inner diameter-2: 216 mm Length: 660 mm
Media	Cellulose and synthetic blend	Water repellent micro glass fibre	Water repellent micro glass fibre
Filter area	20 m ²	20 m ²	25 m ²
Nominal air flow rate	1100 m ³ /h	1100 m ³ /h	1500 m ³ /h
Initial pressure drop	190 Pa	180 Pa	190 Pa
Recommended final pressure drop	1500 Pa	1500 Pa	1500 Pa
Average Atmospheric dust spot efficiency	92%	98%	98%

Notes:

A large rectangular area filled with a light blue dot grid pattern, intended for taking notes.

General Terms and Conditions of Business – VOLZ Luffilter GmbH & Co. KG

Applicable in respect of:

1. a person who upon contract finalization engages in his/her commercial or self-employed activities (business person);
2. a legal entity under public law or a special fund under public law.

I. General

1. All deliveries and services will be subject to the present Terms and Conditions of Business and any other separately contracted arrangements. Even after acceptance of the order, any different terms of purchase of the Customer will not become integral components of the contract. Failing specific arrangements, a contract will become finalized with the written order confirmation of the Supplier.
2. The Supplier will retain title and copyright to all samples, quotations, drawings and similar information of physical and non-physical nature, also in electronic form; these will not be rendered accessible to any third party. The Supplier undertakes only to allow third-party access to information and documents designated as classified by the Customer subject to the consent of said Customer.
3. The costs of samples and drafts produced at the request of the Customer will be refunded to the Supplier. If a delivery is based on samples, no guarantee will be given for 100% conformity therewith.
4. The description of goods in prospectuses or other documentation will not embody any guarantee as defined in Section 443 (1) BGB [German Civil Code].

II. Price and Payment

1. The prices will be subject to change and failing specific arrangement will apply ex works (ex works, Incoterms 2000) including packaging and loading at the works, yet excluding unloading. Sales tax in the respective amount required by law will be added to the prices.
2. Failing specific arrangement, payment will be immediate upon the receipt of the goods without any deduction to the account of the Supplier. The Supplier will also be entitled to deliver only in return for advance payment. Representatives of the Supplier will not be entitled to receive payments. The right is retained to accept cheques or bills. With the deposit of bills, all disbursements and interest will be charged to the Customer.
3. The Customer will only be entitled to retain or offset payment against counterclaims to the extent its counterclaims are undisputed or have been established by declaratory judgment.
4. Should the Customer default in payment, the Supplier will be entitled to call for the immediate payment of all amounts not yet due and the amounts owed. Should we be entitled by law or by contract to the payment of interest, an interest rate of 4% in excess of the respective basic banking rate of the European Central Bank will apply, subject to further claims to compensation.

III. Timeframe and Scope of Delivery

1. The delivery deadline will be specified in the agreements between the Contracting Parties. Compliance of the Supplier therewith will depend on the clarification of all commercial and technical issues between the Contracting Parties and the satisfaction of all duties for which the Customer is responsible, such as, for example, the procurement of the required official certificates or permits or the rendering of a down-payment. Failing this situation, the delivery deadline will be deferred accordingly. This will not apply if the Supplier is responsible for the delay.
2. Compliance with the delivery period will depend on accurate and timely supplies to the Supplier. The Supplier will give notification of any indication of delay as soon as possible.
3. Compliance with the delivery period will be deemed given when the item to be delivered has left the Supplier's works by the lapse of the delivery period or notification of its readiness for despatch has been made.
4. If the despatch and/or acceptance of the item to be delivered are delayed for reasons for which the Customer is responsible, the Customer will bear all costs generated by the delay starting 2 days after notification of the item's readiness for despatch or for the acceptance procedure.
5. Should failure to comply with the delivery period be attributable to force majeure, industrial strife or other incidents outside the scope of influence of the Supplier, the delivery period will be lengthened accordingly. The Supplier will inform the Customer as soon as possible of the beginning and end of such circumstances.
6. Without setting any specific period of grace, the Customer will be entitled to rescind the contract if the delivery in full becomes ultimately impossible before the transfer of risk. The Customer will also be entitled to rescind the contract if it becomes impossible to carry out one part of the delivery ordered and the Customer has a justified interest in rejecting the partial delivery. Should this not be the case, the Customer will pay the price contracted for the part of the delivery in question. The same will apply in the event of incapacity of the Supplier. In other respects Section VII.2 will apply. Should the impossibility or incapacity evolve during the course of default of acceptance or if the Customer is solely or largely responsible for these circumstances, the Customer will still be bound to render payment.
7. If the Supplier defaults so that the Customer incurs damages, the Customer will be entitled to call for an inclusive indemnity for the delay. For each full week of the delay, this will amount to 0.5% in whole, but 5% at the most of the value of the part of the entire delivery that cannot be used on time or as contracted as a result of the delay. Should after due date the Customer set the Supplier an appropriate period of grace for performance – in the light of the exceptions set down by the law – the Customer will be entitled to rescind the contract subject to the provisions of the law. Farther-reaching claims derived from the default of delivery will be exclusively subject to Section VII.2 of the present Terms and Conditions of Business.

IV. Transfer of Risk, Acceptance Procedure

1. The risk will pass to the Customer once the item to be delivered has left the works of the Supplier, even if delivery is carried out in instalments or the Supplier is providing other services, such as payment of the despatch costs or delivery and installation. Where an acceptance procedure is due, this will be determinant for the transfer of risk. This will take place immediately with the acceptance procedure or alternatively after notification from the Supplier of readiness for acceptance. The Customer will not refuse acceptance in the event an insignificant defect is established. Complaints will be lodged inside one week.
2. If despatch and/or the acceptance procedure is delayed or not carried out owing to circumstances that are not attributable to the Supplier, the risk will pass to the Customer on the day readiness for despatch or the acceptance procedure are notified. The Supplier undertakes to ensure insurance cover at the expense of the Customer, as the Customer requires.
3. Delivery in instalments and excess or short deliveries for specifically manufactured items (up to 10%; for volumes below 100 pieces per type even more) will be admissible, where it is reasonable to expect the Customer to accept them.

V. Retention of Title

1. The Supplier will retain title to the delivered item until all payments from the delivery contract have been received. Should the Customer fail to meet its contractual duties, in particular in the event of default of payment, we will be entitled to rescind the contract and to call for the surrender of the delivered item; the Customer undertakes to surrender the item. The costs of fetching the item back will be borne by the Customer.
2. The Customer will notify the Supplier immediately of any attachments or confiscation or other third-party disposals of the item.
3. Given the retention of title, the Supplier will only be able to call for the surrender of the delivered item if the Supplier has rescinded the contract.
4. The application for the instigation of insolvency proceedings will allow the Supplier to rescind the contract and to call for the immediate return of the delivered item.
5. The Customer will be entitled to resell the delivered item during the course of normal business practice. The Customer herewith now assigns to us all claims to payment to which it is entitled from the resale to a third party to the amount of our invoice value or the value of the delivered item to which we retain title. We herewith accept the assignment. After said assignment, the Customer will be entitled to collect its claims to payment. We will retain the right to collect payment ourselves the moment the Customer fails to comply with its duties to payment or fails to do so properly and defaults in payment.

- The handling and processing of the delivered item will always be in our name and on our behalf. If the item is processed together with items not belonging to us, we will acquire co-ownership to the new item to the value of the item we delivered in proportion to the newly processed items. The same will apply if the delivered item is compounded with other items not belonging to us.

VI. Claims to Defects

In respect of material defects of the delivered item and deficiencies in title, the Supplier will guarantee as follows to the exclusion of any further claims - subject to Section VII:

Material Defects:

- The Supplier will choose between providing remedy or a replacement delivery, free of charge, for all parts that prove to be deficient as a result of circumstances prior to the transfer of risk. The Supplier will be informed immediately in written form when such defects are established. Replaced parts will be the property of the Supplier.
- After coordination with the Supplier, the Customer will allow the necessary time and opportunity to carry out the remedies and replacement deliveries that seem necessary to the Supplier; otherwise the Supplier will be released from any liability for the outcome. Only in cases of urgency, where operational safety is endangered or in order to avert disproportionately serious damages will the Customer be entitled to eliminate the defect itself or have it eliminated by others and to call for the refund of the necessary disbursements from the Supplier.
- Of the costs of the remedy or replacement delivery directly incurred, the Supplier will - providing the complaint proves to be justified - bear the costs of the replaced piece including despatch. The Supplier will also bear the costs of dismantling and fitting as well as the costs of providing fitters and auxiliary personnel that might be required including their costs of travel, unless this encumbers the Supplier unreasonably.
- Subject to the provisions of the law, the Customer will be entitled to rescind the contract if the Supplier - in the light of the exceptions specified by law - grants an appropriate period of time to provide remedy or replacement of a material defect that lapses fruitlessly. In the event the defect is insignificant, the Customer will only be entitled to a reduction of the contracted price. The right to a reduction of the contracted price will otherwise be ruled out. Further claims will be subject to Section VII.2 of the present Terms and Conditions of Business.
- Specifically no guarantee will be granted in the following cases:
Unsuitable or unprofessional use, faulty assembly and start-up carried out by the Customer or third parties, natural wear-and-tear, faulty or negligent treatment, unprofessional maintenance work, unsuitable operating resources, chemical, electrochemical or electric influences, unless these are attributable to the Supplier.
- If the Customer or a third party provides an unprofessional remedy, the Supplier will bear no liability for the outcome thereof. The same will apply to any amendments carried out on the delivered item without the prior consent of the Supplier.

Deficiencies in Title:

- If the use of the delivered item culminates in a breach of industrial proprietary rights or copyrights, the Supplier will, at its own expense, procure the Customer the right to further use of the item or will so modify the delivered item in a reasonable manner for the Customer that the breach of rights no longer prevails. Should this not be possible at financially appropriate terms or within an appropriate period of time, the Customer will be entitled to rescind the contract. Under the specified conditions the Supplier will also be entitled to rescind the contract. Furthermore the Supplier will hold the Customer harmless from undisputed claims or claims that have been established by declaratory judgment asserted by the holder of the proprietary rights in question.
- The duties of the Supplier specified in Section VI. 7 will be conclusive, subject to Section VII.2 for the breach of industrial property rights or copyrights. They will only exist if
 - the Customer informs the Supplier immediately of any asserted breaches of proprietary rights or copyrights,
 - the Customer provides an adequate amount of support to the Supplier in its defence against the claims asserted and/or enables the Supplier to carry out the modification measures defined in Section VI.7,
 - the Supplier retains the right to effect all defence measures including settlements out-of-court,
 - the deficiency in title cannot be attributed to instructions from the Customer and
 - the breach of rights was not attributable to any unauthorized changes made by the Customer to the delivered item or to use of the item in a manner that was not contracted.

VII. Liability

- If the delivered item cannot be used as contracted by the Customer owing to the Supplier's failure or errors in carrying out the proposals and advice given before or after finalization of contract or owing to the breach of other contractual ancillary duties - in particular the instructions for use and maintenance of the delivered item - the rulings of Sections VI and VII.2 will apply correspondingly to the exclusion of any other claims asserted by the Customer.
- The Supplier will only be liable for damages incurred not on the delivered item itself - irrespective of the legal grounds - in cases of
 - willful intent,
 - gross negligence on the part of the owner/ management bodies or executive employees,
 - causing injury to life and limb,
 - maliciously concealed defects or defects guaranteed not to exist,
 - defects of the delivered item when liability will be subject to the Product Liability Act for injury to persons or damages to privately used items. In the event of
 - breach of major contractual duties for which the Supplier is responsible, the Supplier will also be liable in cases of gross negligence on the part of non-executive employees and slight negligence, said latter case being restricted to reasonably foreseeable damages typical for the contract. Any other claims will be ruled out.

VIII. Limitation Period

All claims of the Customer, on whatever legal grounds, will become statute-barred in 12 (twelve) months. For claims to damages as defined in Section VII.2 a - e, the periods of time stipulated by law will apply. They will also apply to defects in a construction piece or in delivered items that were used in the customary manner for a construction piece and caused the deficiency thereof.

IX. Applicable Law, Place of Jurisdiction

- For all legal relations between the Supplier and the Customer, the laws of the Federal Republic of Germany governing legal relations between inland parties will apply exclusively to the exclusion of the laws and rulings applicable only to cross-border deliveries such as the UN Convention on Contracts for the International Sale of Goods or EKG and EAG - standardized laws governing the purchase of movables and international contracts).
- Place of jurisdiction will be the court of law responsible at the registered seat of the Supplier. The Supplier will, however, be entitled to file action at the registered seat of the Customer.

X. Severability

Should individual provisions of the present Terms and Conditions of Business prove to be inoperative or unfeasible in whole or in part or become inoperative or unfeasible owing to amendments in the law following finalization of contract, the remaining terms and conditions and the validity of the contract as a whole will be unaffected hereby. In place of the inoperative or unfeasible provision will be an effective and feasible provision that comes as close as possible to the sense and purpose of the void provision. Should an omission transpire, the provisions will be deemed agreed upon that correspond to the sense and purpose of the contract and would have been agreed upon had they been considered.

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VOLZ Luftfilter GmbH & Co. KG

Plant I

Robert-Bosch-Straße 25
D-72160 Horb am Neckar

Phone: +49 - (0)7451 - 5516 - 0

Fax: +49 - (0)7451 - 5516 - 120

Plant II-VII

Gesslerstraße 3
D-72160 Horb am Neckar

www.volzfilters.com

info@volzfilters.com

Volz Filters UK Limited

Plant Manchester

Agecroft Commerce Park,
Unit 1 Canary Way, Swinton
Manchester M27 8AW

Phone: +44 - (0)161 - 743 - 4190

Fax: +44 - (0)161 - 743 - 1390

www.volzfilters.com

sales@volzfilters.co.uk

