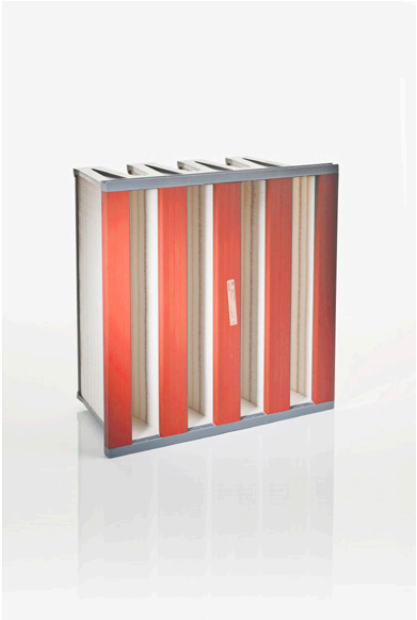
VOKES AIR

Taking small steps together, always ahead, towards a better world

Compatex TMPE

EPA protection for gas turbines



Compatex TMPE

EPA protection for gas turbines

APPLICATIONS

- Clean Air
- **Power Generation**
- Clean Room
- Industrial

KEY FACTS

- **Comprehensive, fully tested range**
  For assured performance
- **Available in classes E10 – E12**
  For the effective removal of submicron particulate
- **Large filter surface - up to 30 m²**
  Provides extremely low pressure drop
- **Fully-sealed and weather resistant**
  Suitable for offshore and coastal application
- **Low energy version**
  For the highest levels of turbine performance
- **Fits all commonly used filter frames**
  For ease of installation
- **Robust hollow profile plastic frame**
  Provides industry-leading burst resistance
- **Fully incinerable with recyclable materials**
  For simple, environmentally friendly disposal
- **High-density, micro-glass fibre media**
  Provides high efficiencies at low pressure drops
- **Foamed one-piece PU-gasket with closed surface**
  Ensures optimum performance with effectively zero particle bypass

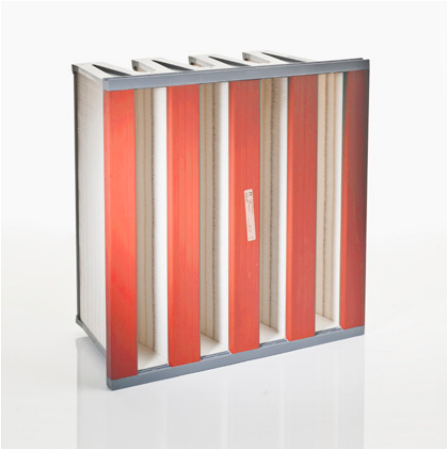
Designed to address the need for increased engine availability in high performance gas turbine power stations, Compatex TMPE provides defence against sub-micron particles, eliminating fouling of the compressor blades.

Combining industry-leading pressure drop with unrivalled burst resistance, Compatex TMPE provides unbeatable performance for gas turbine final filtration.

Providing enhanced protection against the smallest of particulate, Compatex TMPE reduces machine degradation, extends service intervals and removes the need to conduct costly engine washes.

Available in classes E10 – E12, Compatex TMPE brings cleanroom levels of filtration to gas turbine air intakes.

▼ Compatex TMPE

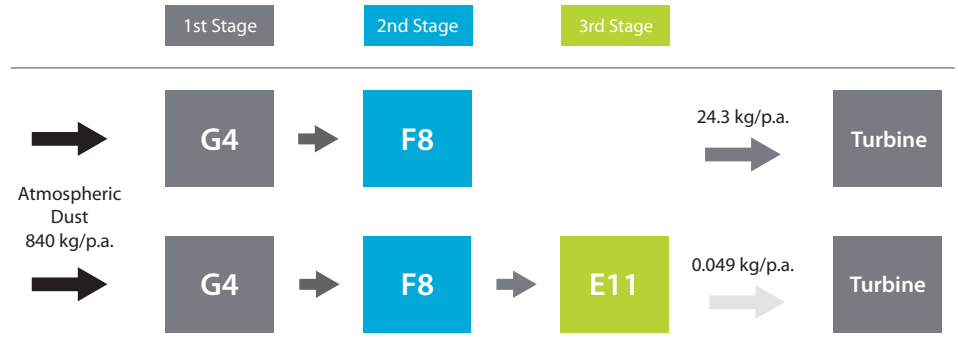


EPA Filtration – the answer to compressor blade fouling

Traditionallly, F8 or F9 filters have been employed in the final stage of a compressor air intake. Long regarded as the optimum balance between pressure drop and filtration efficiency, an F8 filter provides an average efficiency of between 90 – 95% @ 0.4 µm. This, whilst good, cannot prevent smaller particles reaching the compressor blades causing fouling and a subsequent fall in power output.

On and offline engine washes may restore compressor performance, but bring with them costly servicing and even costlier downtime, along with gallons of dirty washing agent to dispose of. An EPA (efficient particulate air) filtration stage avoids this by capturing the sub-micron particles and ensuring that only the cleanest of air is entering the turbine.

The effect of filter class upon contaminant entering a turbine (example configuration)



Air flow rate: 3700 m³/h per filter element | Filter elements per stage: 517 pcs. | Atmospheric dust concentration: 50 µg/m³

In the example above, adding an EPA stage reduces the level of contaminant entering the engine by nearly 99.8%. This huge decrease eliminates the need to conduct both on- and offline washes, eradicating downtime in the process.

However, adding an additional stage increases the pressure loss across the system, impacting turbine performance and output. Fortunately, Compatex TMPE has been developed specifically to minimise this issue, with a low-energy version reducing this pressure loss by 20–25% compared with competing products.

Engine Damage from Particulate

Damage caused by ingesting particulate typically falls into one of three categories:

Erosion

Caused by particles greater than 10 µm in diameter, erosion affects both the edge and thickness of the blades, compromising performance.

Corrosion

Salts and moisture entering the turbine cause an electrolytic reaction which damages the blade structure and scales metal alloys.

Fouling

A thin layer of soot and dirt deposited on the compressor blades altering their profile, fouling inhibits compression rates and shaft power output.

Unsurpassed Performance for Gas Turbines

Whilst the primary purpose of a gas turbine filter is to remove harmful particulate from the intake air, its effect upon the overall performance of the engine is far greater than this.

An air intake filter can be judged according to the three key elements detailed below. Fortunately, Compatex TMPE provides industry-leading performance for each of these aspects.

01 Pressure Drop

By reducing the resistance to the air flow entering the turbine, a filter with a lower pressure drop improves engine efficiency. Because of this, specifying such filters is probably the simplest and most cost effective way of boosting engine performance. It is generally agreed that reducing intake pressure drop by 50 Pa causes an increase in electrical power output of around 0.1%.

Thanks to its unique design and media construction, Compatex TMPE provides unrivalled pressure drop performance without compromising filtration efficiency. In fact, the low-energy version provides pressure drops 20–25% lower than the leading competitors. So, installing Compatex TMPE will improve overall turbine efficiency with no retrofit and minimal downtime.

02 Burst Resistance

An air intake filter retains all kinds of particulate harmful to the delicate inner components of a gas turbine. So, it is no surprise that a burst filter can cause untold damage to an engine as such particulate, along with any remnants of the filter, are released into the air flow.

Combining an extremely strong media and rigid frame, Compatex TMPE offers burst resistance in excess of 5000 Pa – an unmatched level of safety that eliminates concerns of filter failure and associated damage, disruption and downtime.

03 Filtration Efficiency

Fouling of the turbine is caused by fine contaminants depositing upon the surface of the compressor blades. Such particulate can also block air cooling holes, increasing overall system temperature. EPA filters contain such issues, but must be produced under strictly-controlled quality standards to ensure no particle bypass. This is all the more challenging as, unsurprisingly, the smaller the particulate the more technologically-advanced the filter design must be.

Compatex TMPE is tested fully in accordance with Part 5 of EN 1822:2009, with the media also tested according to Part 3 of the same standard. The filter classification is based upon the measured integral efficiency or penetration at the MPPS (Most Penetrating Particle Size). In fact, Compatex TMPE filtration efficiency has been demonstrated down to 108 nanometres – well below the typical range for a micro-glass filter of between 120–250 nanometres.

Compatex TMPE E30 has a filter surface 480 times the area of this page.

Filter Surface Area

Whilst a filter's external dimensions follow a uniform structure, Compatex TMPE packs much more into its frame.

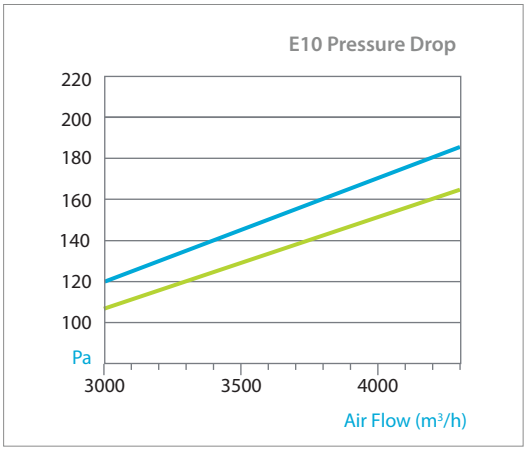
Thanks to the latest developments in high-density glass fibre media and an innovative pleating technique, the latest generation of Compatex TMPE filters boast up to 30 m^2 of filter media – nearly 40% more than its predecessor. This level of filter surface area ensures an extremely low pressure drop with excellent particle separation performance.

Conversely, not all applications or customers will require such low pressure drops from their intake filters. It is for this reason that Compatex TMPE is available with smaller filter areas to suit applications with differing levels of atmospheric particulate and reduced budget size.

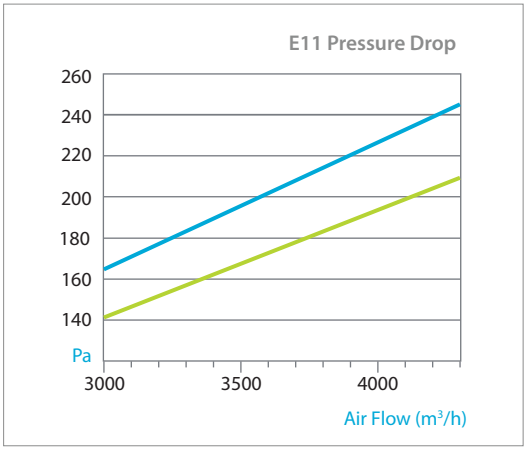
Type	Filter Class	Filter Area	Application
E22	E11 – E12	22 m^2	Suitable for 'normal' applications where budget is the primary concern
E24	E10	24 m^2	Suitable for 'normal' applications where budget is the primary concern
E30	E10 – E12	30 m^2	Low-energy version for applications requiring extremely low pressure drops

Technical Data

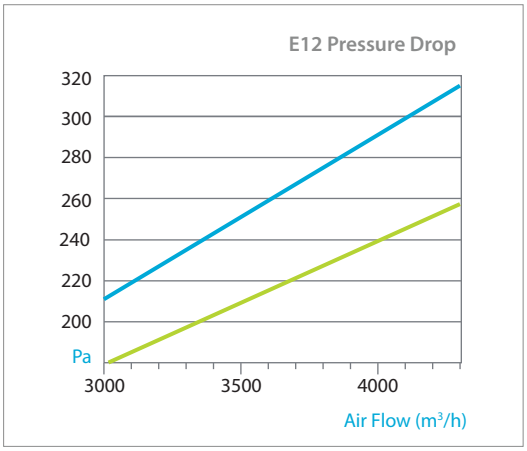
Filter Class – E10		E24	E30
Air Flow Rate V_N (nominal service life)	m^3/h	3400	3400
Initial pressure drop at V_N*	Pa	140	125
Air Flow Rate V_L (long service life)	m^3/h	3000	3000
Initial pressure drop at V_L*	Pa	120	108
Filter Class (EN 1822)	–	E10	E10
Initial Efficiency EN 1822 (MPPS-DEHS)	%	≥ 85	≥ 85
Filter Media Area (installed)	m^2	24	30
Recommended Prefilter* (EN 779)	-	F7	F7



Filter Class – E11		E22	E30
Air Flow Rate V_N (nominal service life)	m^3/h	3400	3400
Initial pressure drop at V_N*	Pa	191	162
Air Flow Rate V_L (long service life)	m^3/h	3000	3000
Initial pressure drop at V_L*	Pa	166	140
Filter Class (EN 1822)	–	E11	E11
Initial Efficiency EN 1822 (MPPS-DEHS)	%	≥ 95	≥ 95
Filter Media Area (installed)	m^2	22	30
Recommended Prefilter* (EN 779)	g	F8	F8



Filter Class – E12		E22	E30
Air Flow Rate V_N (nominal service life)	m^3/h	3400	3400
Initial pressure drop at V_N*	Pa	245	204
Air Flow Rate V_L (long service life)	m^3/h	3000	3000
Initial pressure drop at V_L*	Pa	213	176
Filter Class (EN 1822)	–	E12	E12
Initial Efficiency EN 1822 (MPPS-DEHS)	%	≥ 99.5	≥ 99.5
Filter Media Area (installed)	m^2	22	30
Recommended Prefilter* (EN 779)	g	F9	F9



E22 / E24 E30

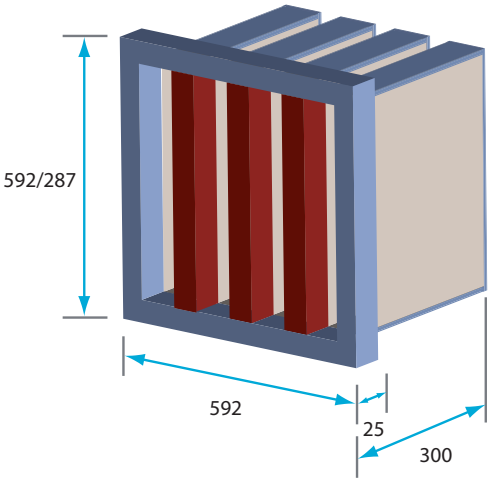
All values for Compatex TMPE type 610

* Tolerance ± 10%

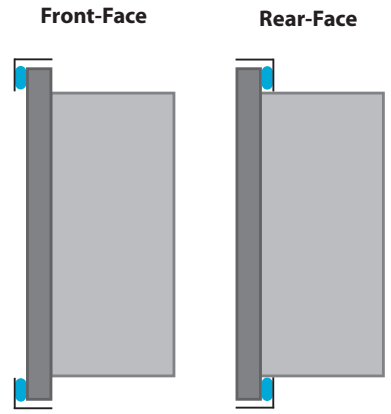
Maximum permitted torque per mounting point along the plastic frame is 1.4 Nm

Compatex TMPE-E30 types use an improved hotmelt separator technology together with a strong backing screen attached to the media packs.

Minimum prefiltration class required – F7



▲ Dimensions (mm)



▲ Gasket Options

Application Parameters	
Recommended Final Pressure Drop	600 Pa
Maximum Final Pressure Drop	800 Pa
Static Burst Pressure (new filter)	5000 Pa
Dynamic Burst Pressure (new filter)	5000 Pa
Continuous Operating Temperature	< 70°C
Admissible Relative Humidity	≤ 100%
Recommended Max. Nominal Air Flow	E10: 4250 m^3/h | E11: 3800 m^3/h | E12: 3800 m^3/h

Materials Specification	
Filter Media	Micro glass-fibre bonded to paper
Filter Frame	Incinerable, halogen-free, recycled polystrol
Flammability Class (standard)	DIN 53438- K2/F2
Flammability Class (upon request)	DIN 53438- K1/F1; DIN 4102- B2; UL 900, Class 2
Sealant	Two-component polyurethane
Gasket	Polyurethane – foamed in one piece with closed surface

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