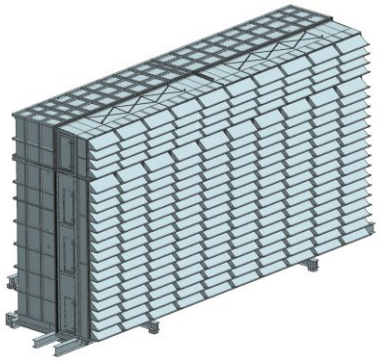
ФОЛТЕР

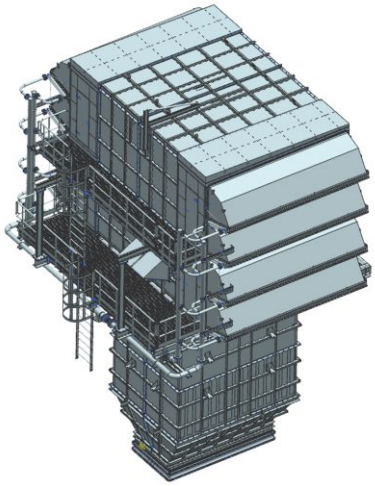
Air Inlet Filtration Systems® for gas turbines

DESIGNING OF NEW AND RECONSTRUCTION OF EXISTING FILTER HOUSES OF GAS TURBINE

Project of reconstruction of FILTER HOUSE GAS TURBINE 160 MW.

- reduction of pressure drop filter system;
- Increasing the efficiency of the turbine;
- reconstruction of anti-icing system;
- reconstruction of the automation system.



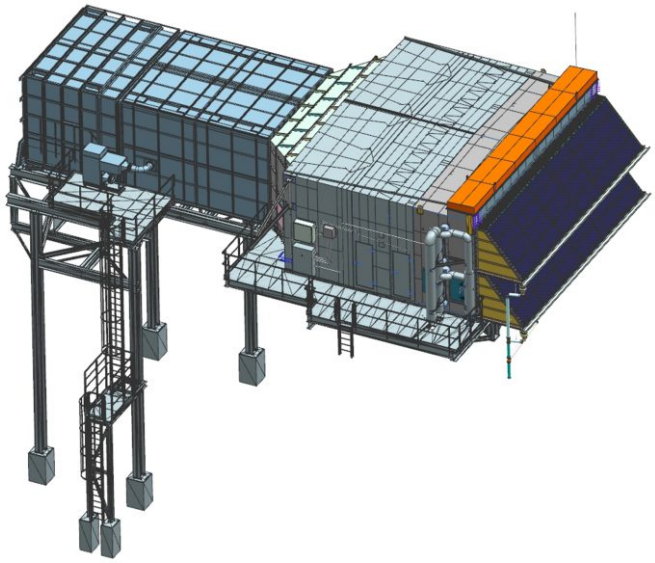


The project Filter House with a 2-sided inlet, for GT-75-80 MW.

- filtration system with 3 or 4 steps;
- the possibility of final air purification by filters of class E10-H13;
- anti-icing system;
- sound attenuation to the required standards.

Filter House for GT 77 MW

- compact 3-stage static filtration system;
- anti-icing system.



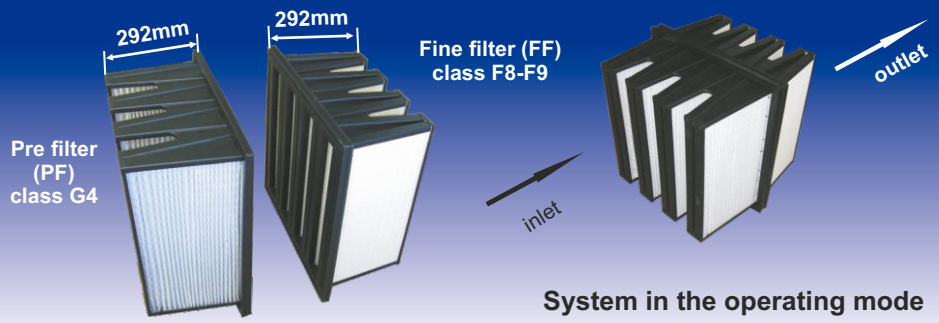
Filter system® for gas turbines
What gives this systems?

- Reducing the dimensions of the new design of the filter houses;
- Reduce the presser drop of existing systems;
- Increase the efficiency of gas turbines;
- Longer sirvice life of air filter systems;
- Reduced operating costs.

Standard System of 2-Steps Filtration

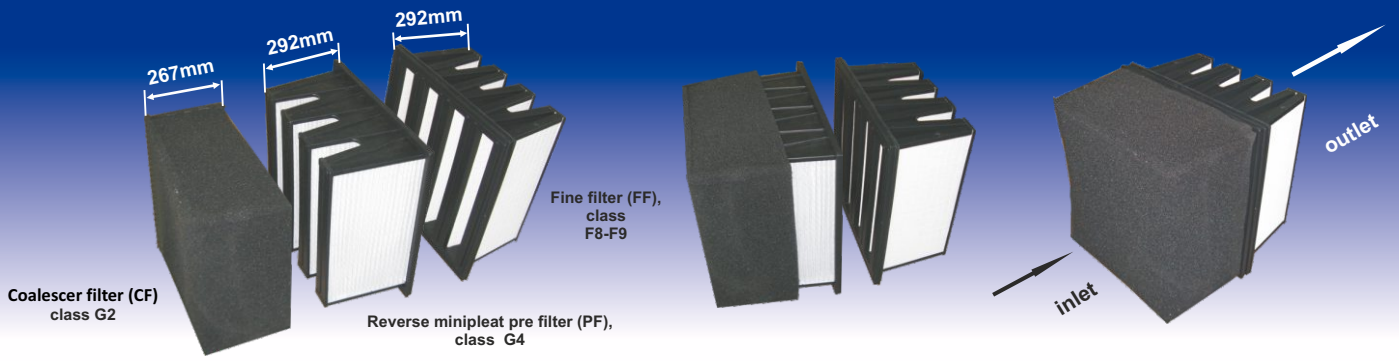
292+292=584mm

Q = 3400-4200 m³/h



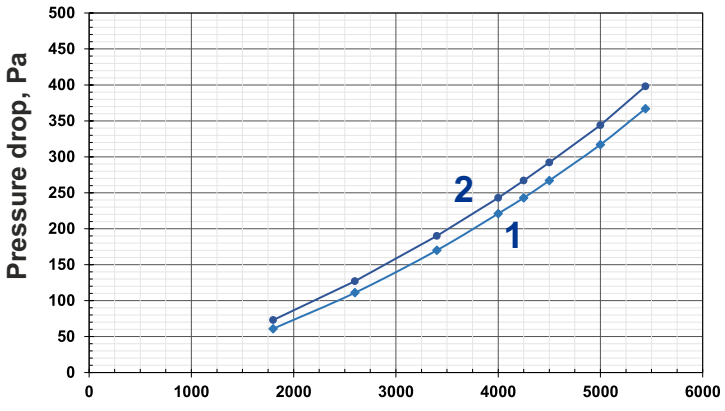
System in the operating mode

Standard System of 3-Steps Filtration



System in the operating mode

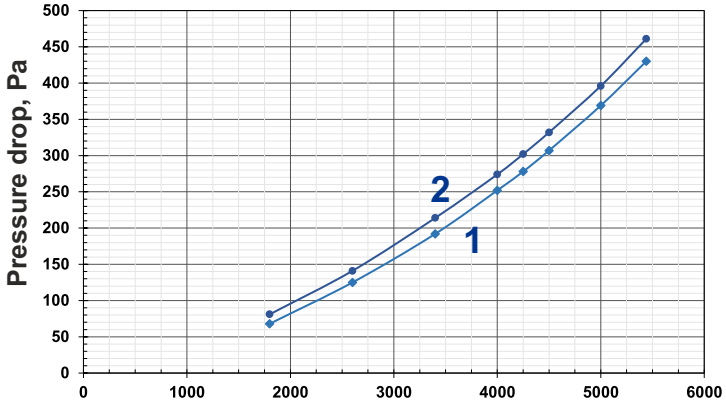
Standard System of 2-Steps Filtration



Air flow, m³/h

1 - PF (G4) + FF (F8)
2 - PF (G4) + FF (F9)

Standard System of 3-Steps Filtration



Air flow, m³/h

1 - CF (G2) + PF (G4) + FF (F8)
2 - CF (G2) + PF (G4) + FF (F9)

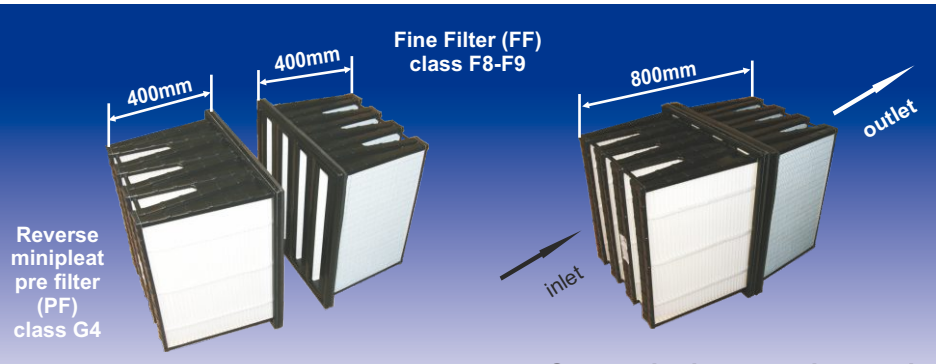
High Flow Filter System of 2-Steps Filtration

Increase airflow PF+FF on 20%

Filtration system 400+400=800mm

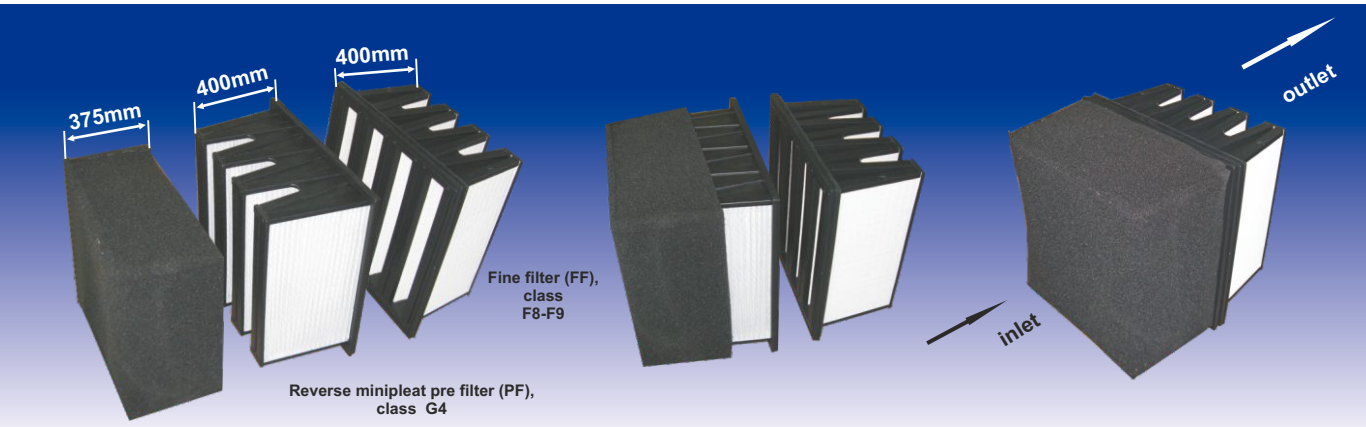
Live time is up to 1,5 - 2 times

Q= 4200-4500 m³/h



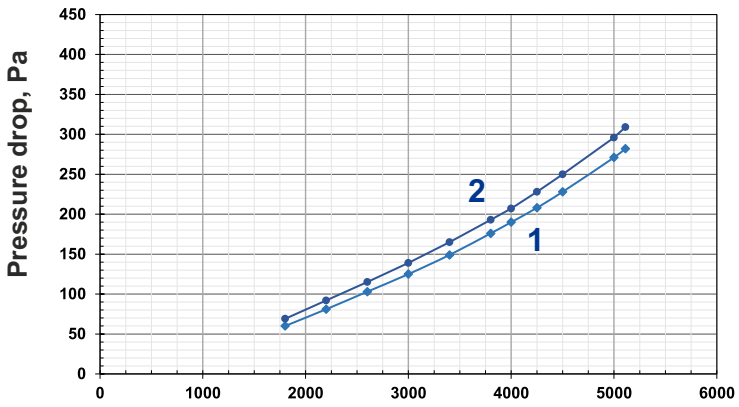
System in the operating mode

High Flow Filter System of 3-Steps Filtration



System in the operating mode

High Flow Filter System of 2-Steps Filtration

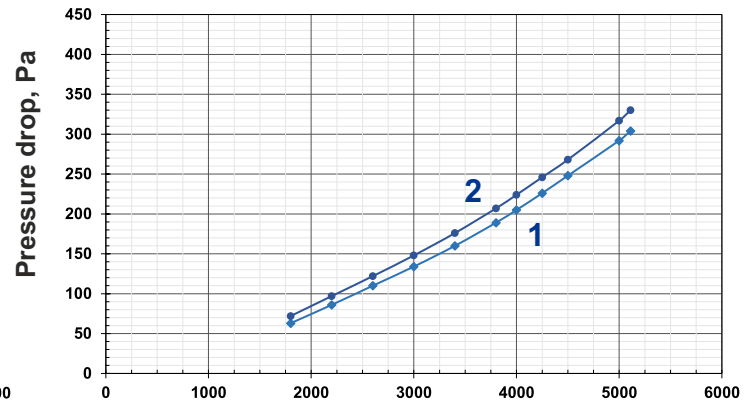


Air flow, m³/h

1 - PF (G4) + FF (F8)

2- PF (G4) + FF (F9)

High Flow Filter System of 3-Steps Filtration



Air flow, m³/h

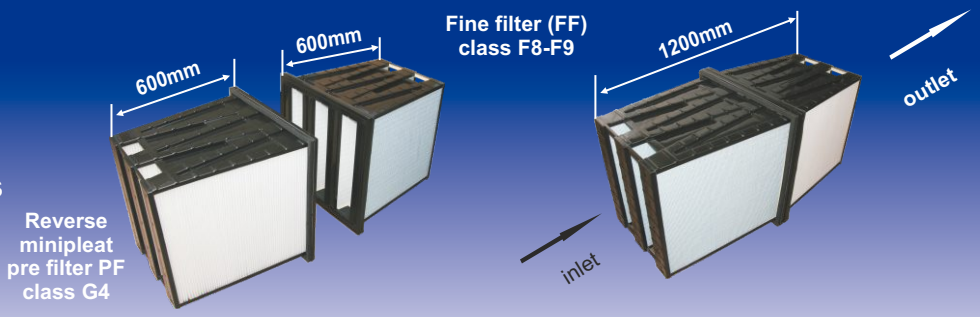
1 - CF (G2) + PF (G4) + FF (F8)

2- CF (G2) + PF (G4) + FF (F9)

Super Flow Filter System of 2-Steps Filtration

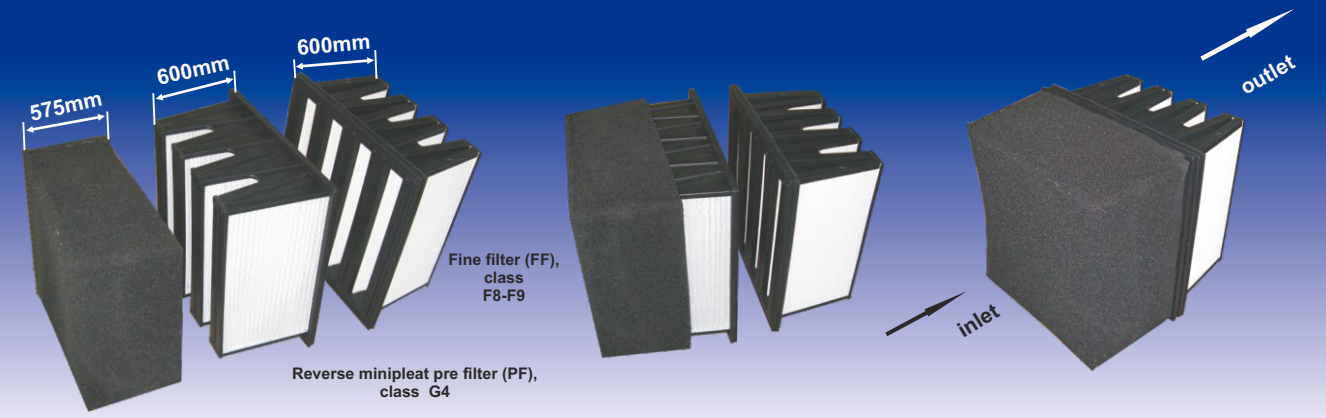
Increase airflow
PF+FF on 30%
Filtration system
600+600=1200mm
Live time is up to 2-3 times

Q= 5000-5200 m³/h



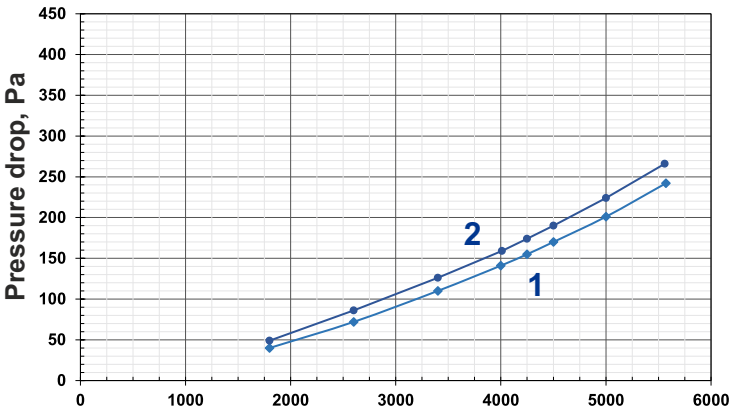
System in the operating mode

Super Flow Filter System of 3-Steps Filtration



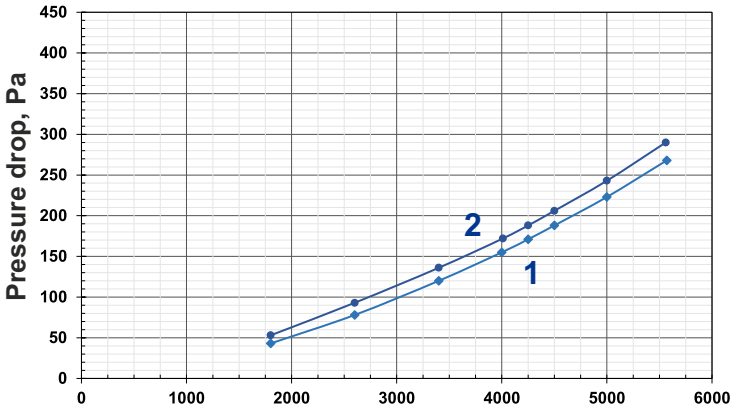
System in the operating mode

Super Flow Filter System of 2-Steps Filtration



Air flow, m³/h
1 - PF (G4) + FF (F8)
2- PF (G4) + FF (F9)

Super Flow Filter System of 3-Steps Filtration



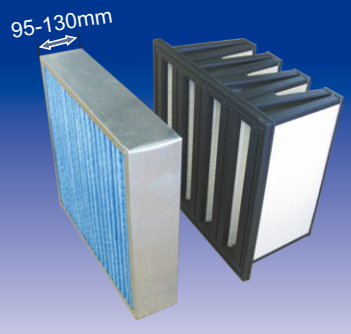
Air flow, m³/h
1 - CF (G2) + PF (G4) + FF (F8)
2- CF (G2) + PF (G4) + FF (F9)

Air Intake Filtration System®
for gas turbines

Existing types of air intake systems

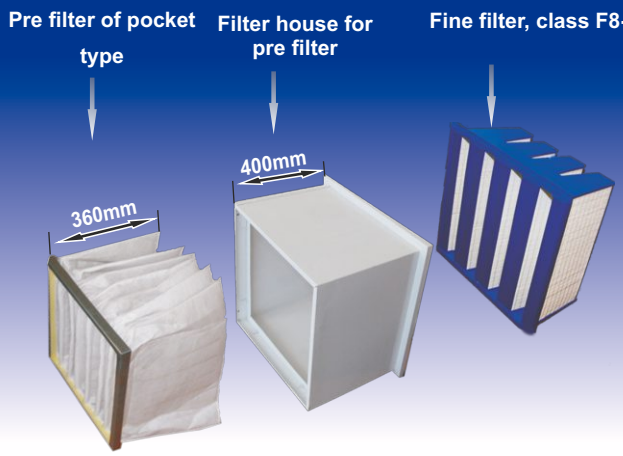
Variant # 1

II Step
Pre filter (Z line), class G4
Filter area is 2-2.5 sqm

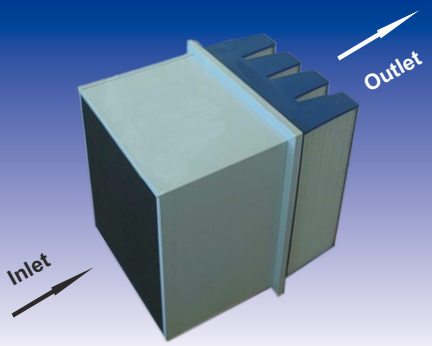


III Step
Fine filter, class F8-F9

Variant # 2



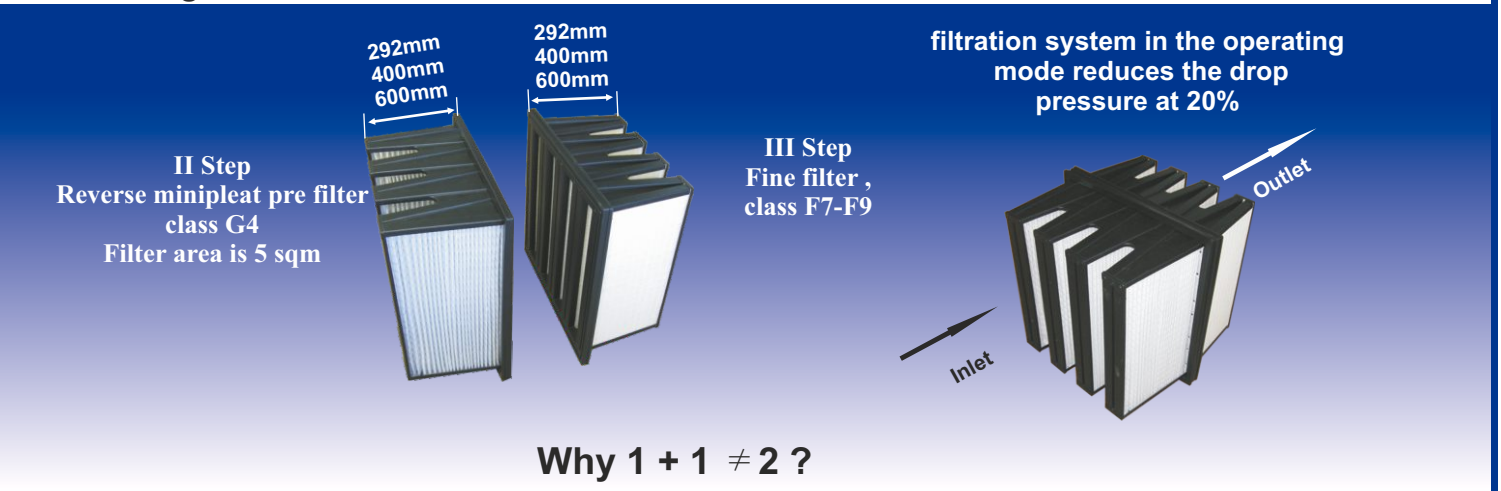
System in the operating mode



Filter area of pre filter class G4 is 2.5 sqm.

System of 2-Steps Filtration (the fine cleaning)

At the 1st step of filtration is used standard coalescer filters are using, and at the 2nd and 3rd steps is used pre filters and fine-filters as shown on the scheme below are using.



Why 1 + 1 ≠ 2 ?

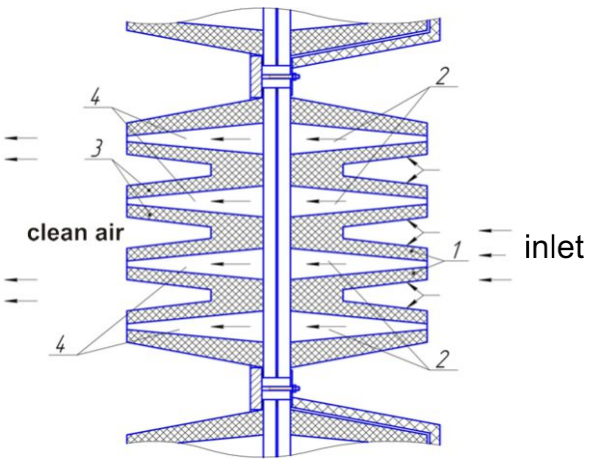
Thus, the pressure drop for both of the filter could be calculated as:

$\Delta PF = \Delta PIn + \Delta PFPack$

where are:
ΔPF – the pressure drop of the filter;
ΔPIn – the pressure drop of the airflow at the intake of Air Filter;
ΔPFPack – the pressure drop of the airflow is flowing through the minipleat filter package.

As shown on the picture below, both the reverse pre filter and fine filter are mounted to each other so, that the output channels of pre filter are the continuation of the input channels of fine filter.
Thus, it eliminates the input pressure drop at the input of the filter, which is 40 Pa at the airflow of 3400 m^3/h.

The pressure drop for both filters are mounted separately is equal the pressure drop to each of them, but new filtration system eliminates the pressure drop at the intake of the fine filter. Thus, the pressure drop for both filters are mounted accordance with the new scheme is less than the pressure drop for two filters are mounted separately.

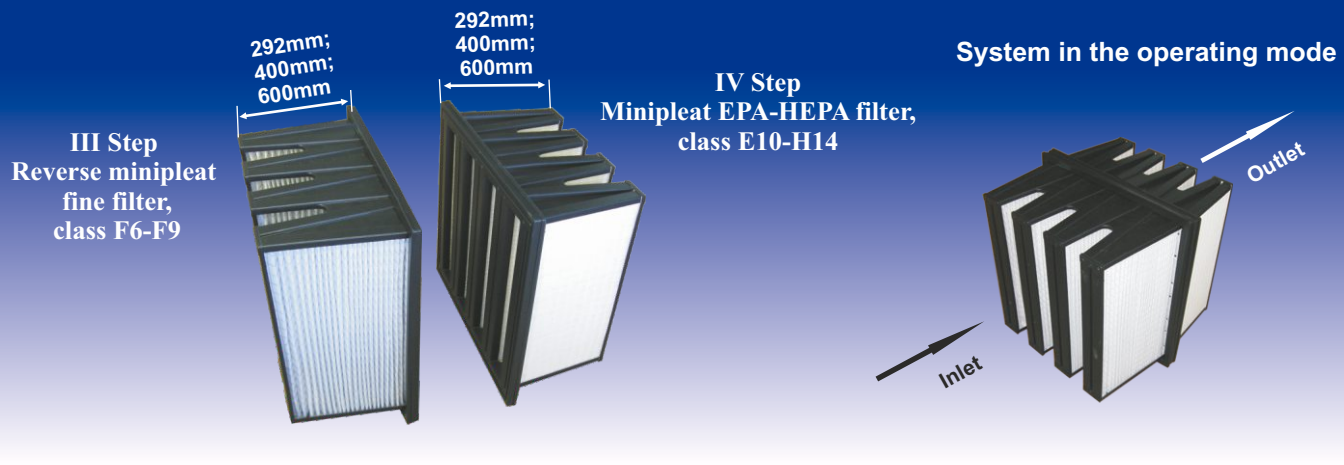


Scheme of 2-Step Filtration.

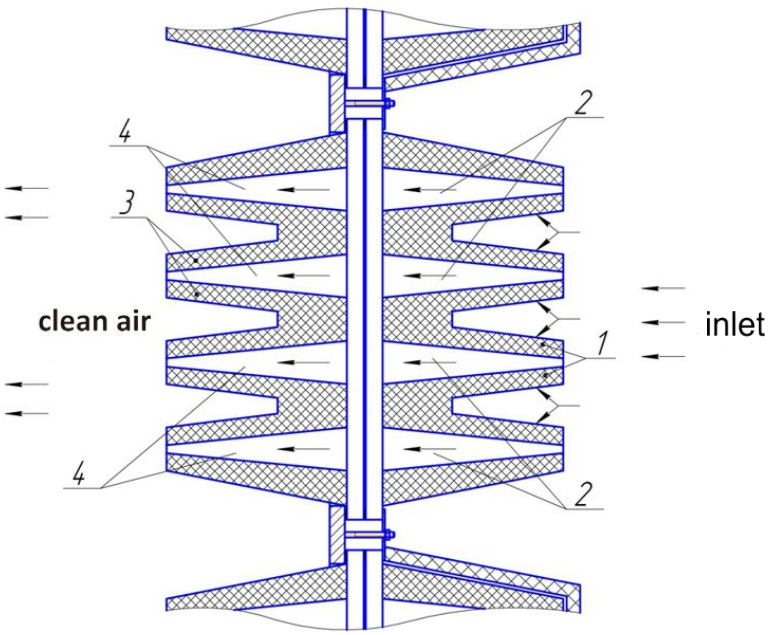
1 – the minipleat filter packages of reverse pre filter, class G4; 2 – the output channels of reverse pre filter;
3 – the minipleat filter packages of fine filter, class F7-F9; 4 – the input channels of fine filter

New System of 4-Steps Filtration (the finish cleaning, class E10-H14)

At the 1st Step of filtration is used standard coalescer filters, and pre-filters of class G4 at the next step. The scheme of 3rd and 4th Steps is shown below.

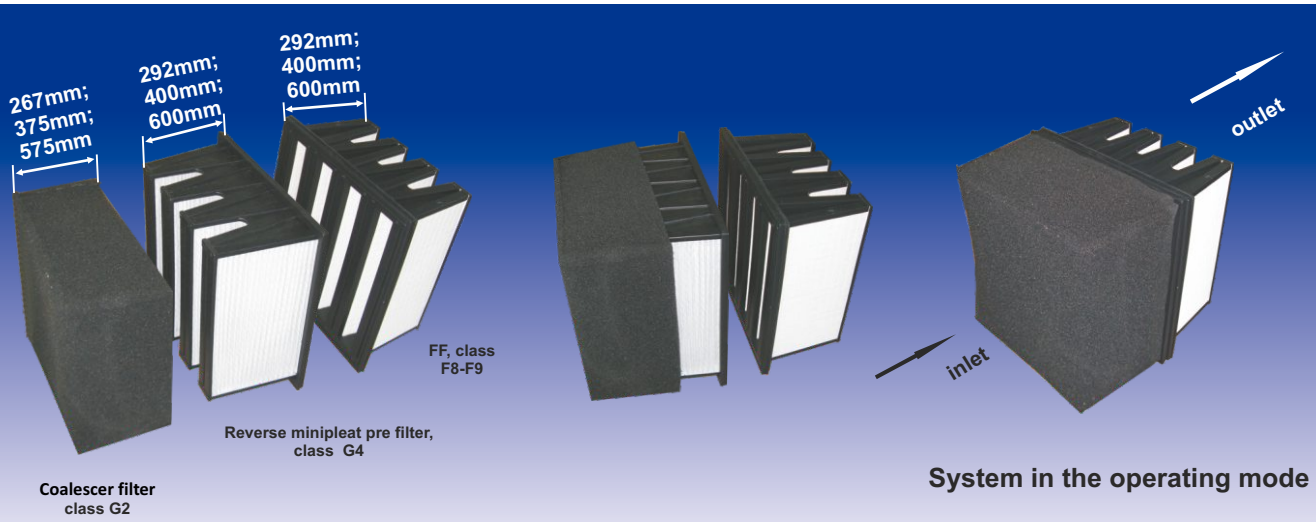


Reducing the pressure drop at 40-80 Pa
1 + 1 ≠2

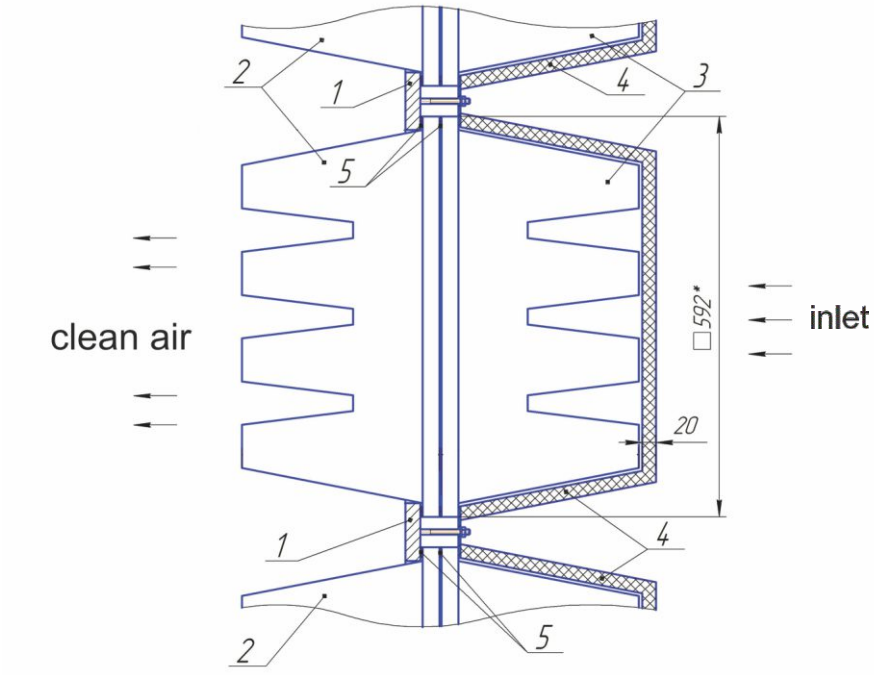


Scheme of 4-Stage Filtration
1 – the minipleat filter packages of reverse fine filter, class F6-F9; 2 – the output channels of reverse fine filter; 3 – the minipleat filter packages of EPA-HEPA filter, class E10-H14; 4 – the input channels of EPA-HEPA filter.

3-steps Compact Air Intake Filtration System for gas turbines



System in the operating mode



Scheme of Compact Filtration System

1 – the supporting wall of the filter chamber of the Air Intake System;
2 – the fine filter; 3 – the reverse minipleat pre filter; 4 – the coalescer filter; 5 – the gasket

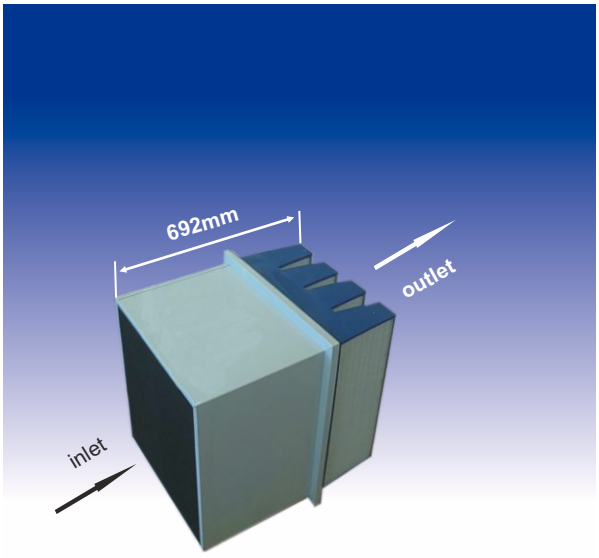
Comparison of two filter systems

140 - 160 Pa as a gift!

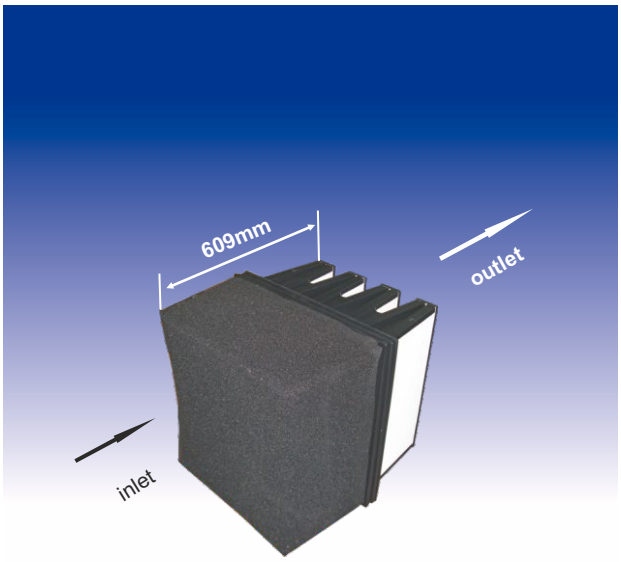
The benefits of filtration system

- increase the area of filtration of coalescer and pre filters;
- reduced pressure drop at 160ПА;
- increase the efficiency of a gas turbine;
- reduction of gas consumption of gas turbines.

Standard system
coalescer filter (G2) + pre filter(G4)
+ fine filter (F8)



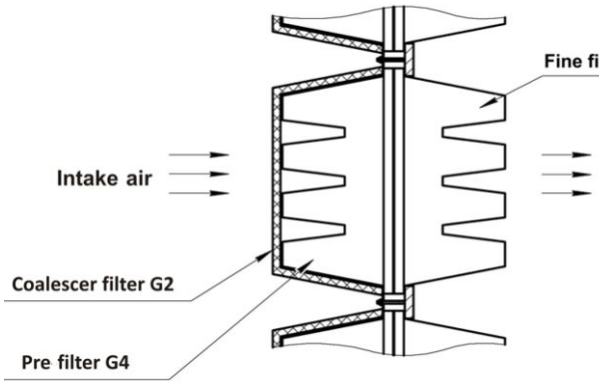
New system
coalescer filter (G2) + pre filter(G4)
+ fine filter (F8)



	Dimensions, mm		Filtration area, m2		Pressure drop, Pa
	Entrance area	Length	Pre filter PF G4	Coalescer filter CF, class G2	Air flow 3400 m3/h
Standard system	596x596	692	2,5	0,29	329
New standard system	592x592	609	4,8	0,75	190
New high flow system	592x592	825	10,0	1,1	160

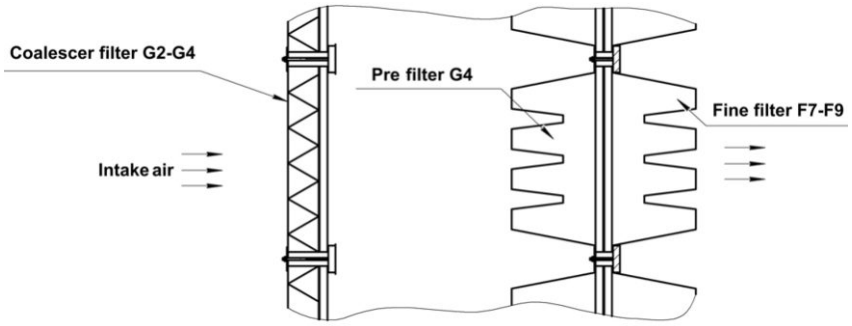
Different types placement of filters in air inlet filter housing of gas turbines

3-Steps Filtration

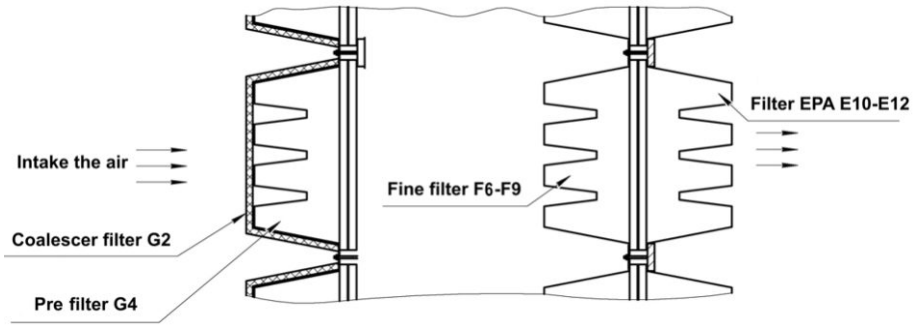


Variant # 1

Variant # 2

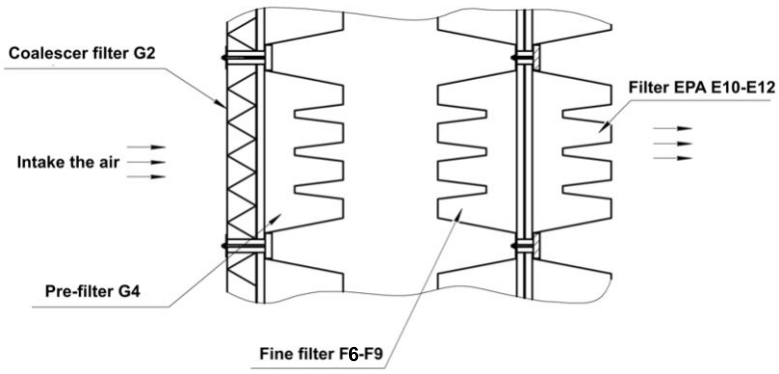


4-Steps Filtration



Variant # 1

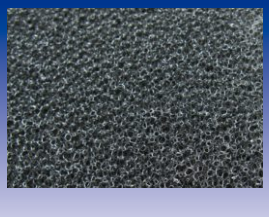
Variant # 2



Air filters for gas turbines

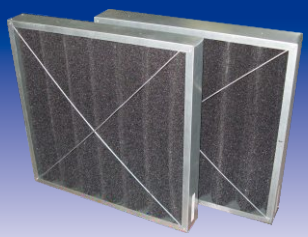
1st stage of air filtration

Coalescers



Flat polyurethane foam

Strainer



Z-line polyurethane foam

2nd stage of air filtration

Pre filters

Pre filter Z-line class G4

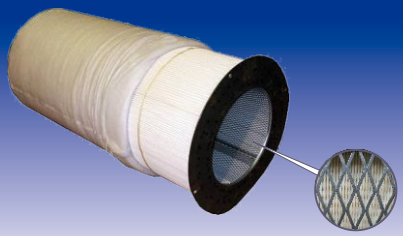
Reversible filter
class G4

Pocket filter type class G4

Cartridge Filters for Gas Turbines

Cartridge filter with a prefilter

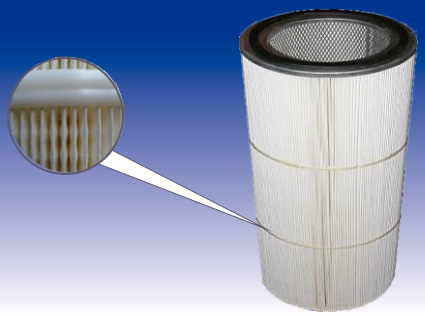
Cartridge filter conical type



Cartridge filter with a prefilter from the outside

Self-cleaning filter cartridges

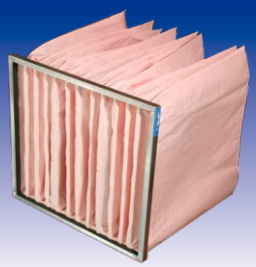
Cartridge filter conical-cylindrical type



Cartridge filter cylindrical type

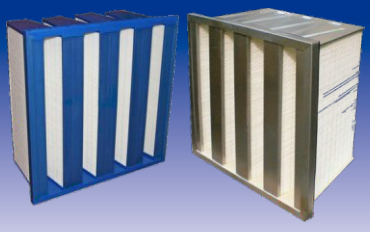
3rd stage of air filtration

Fine Filters

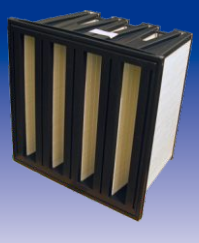


Pocket filter
Class F6-F9

Filter Class F6-F9



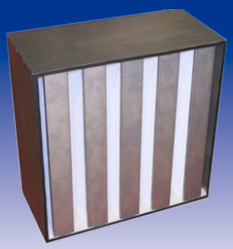
Compact filter (depth of 292mm)
class F7-F9



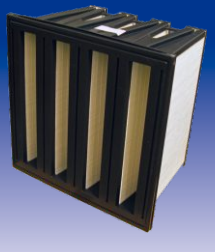
Compact filter (depth of 400mm)
class F7-F9

Compact filter (depth of 600mm)
class F7-F9

4th stage of air filtration
Effective and High Effective filters



Minipleat filter
class E10-H14



Compact filter (depth of 400mm)
class E10-H14

Compact filter (depth of 600mm)
class E10-H14

Contacts

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