



filters that deliver what they promise

Camfil Farr

Revised EN 779:2002

New test method for air filters

Camfil Farr – clean air solutions



At last, a new standard that makes filter selection easier for customers



A new test method that is accurate

Until now, separating the good air filters from the bad ones has been difficult since test methods have not produced clear results. During the past 20 years two test methods have been applied: Eurovent 4/5 and EN 779:1993.

These methods were the best available to determine filter performance but were never truly correct. Now they are definitely antiquated.

The European air filtration industry has now reached an agreement to revise tests and an improved test method, Revised EN 779:2002, is being applied as of 2003.

Filters in reality

Despite their simple appearance, air filters are actually a complex product. Without providing an unnecessarily high amount of resistance, filters must let a

sufficiently large flow of air through their media while simultaneously removing harmful airborne particles that might cause problems for both people and HVAC plants. Testing in accordance with a particular norm, called Revised EN 779:2002, now reveals how a filter will later perform in an actual ventilation plant, as the test procedure simulates "real-life" conditions in the laboratory.

Positive consequences of the method

Revised EN 779:2002 provides more knowledge about the performance of filters and makes it possible to:

- evaluate filter performance properties in relation to Indoor Air Quality (IAQ) requirements and process demands.
- find better agreement with lab test results and actual installations.
- obtain a faster, simpler method that is easier to understand.



Test rig at VTT in Finland for testing filters in accordance with REVISED EN 779:2002.

Ask for the Revised EN 779:2002 test report!

New test report describes a filters real-life quality

The main purpose of the new test method is to provide better information about filter performance so that purchasers of air filters will have better documentation to base their decisions on, enabling them to choose the right filter for the right filtration task. When selecting filters, you should therefore ask for the new test report based on the Revised EN 779:2002 norm.

This report will indicate the actual performance properties of the filter in a clear and easy-to-understand manner. Each filter manufacturer can ask to have their filters tested again. However, re-requesting a test report based on the new norm is in all respects a very reasonable demand from purchasers and end users.

Electrostatically charged filters deteriorate quickly

The new test method shows that air filters with a high electrostatic charge will initially function like a particle magnet but will quickly discharge, and their performance will deteriorate drastically as a result. The test method gives a clearer picture of the actual expected performance of filters in real operating conditions.

There are examples of electrostatic filters with initial efficiencies of 70 percent that drop sharply to only 5 percent after a few weeks of use. This deterioration is not noticeable on the filter but in the air that people breathe and dirty AHU. The filter simply does not perform as it should.

Life-long function with guaranteed efficiency

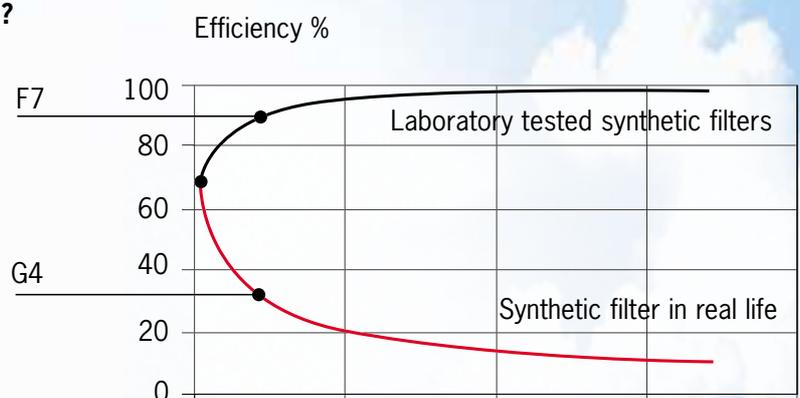
Camfil Farr has been an active and driving force behind efforts to establish a better test method and we are naturally very pleased that Revised EN 779:2002 has become the new standard for Europe. In the new test procedure, Camfil Farr air filters are compared accurately with others and their true performance properties and high quality are therefore clearly demonstrated and documented.

Demands

As customer you now have the possibility to demand new protocols in accordance with Revised EN 779:2002. You don't have to accept filters that deteriorate!

Which filter would you choose?

Glass-fibre filters (with no electrostatic charge) retain their high quality throughout their service life and their filtration properties actually improve over time. The filter protects people and technical equipment by removing harmful airborne particles effectively. Synthetic filters with electrostatically charged media show good results in laboratory tests but quickly lose their ability to trap particles and in real life people and equipment perform more poorly as a result. People who breathe improperly filtered air can become tired and work inefficiently.



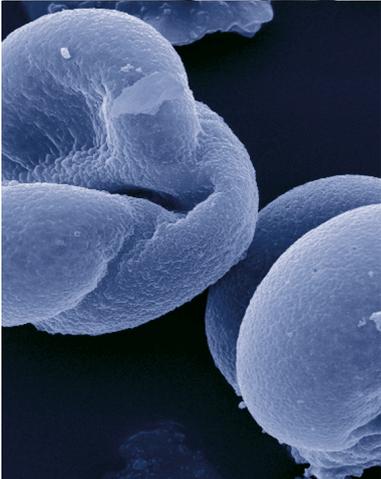
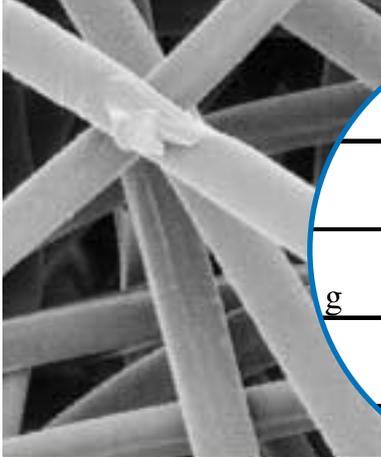
Many synthetic filters don't live up to standards

Synthetic filters are revealed

The test reports for a few common synthetic filters are shown below. They have the same properties as most synthetic filters and have coarse fibres and a small area.

Due to their electrostatic charges, the filters will initially have a high efficiency and will therefore be classed as an F7 filter. However, as can be seen in the test reports, under "Untreated/discharged efficiency of filter material", these filters quickly lose their efficiency, which drops to 10 percent – the rating of a class G4 or F5 filter.

The purchase price should therefore be compared with the filter class

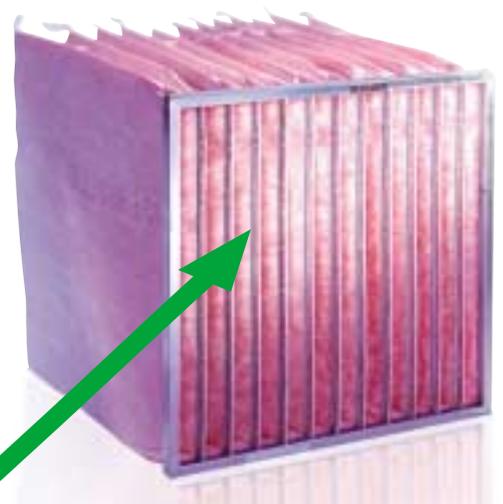


Loading dust	
ASHRAE	
g	Untreated / discharged efficiency of filter material (0.4 µm)
	80 / 10 %

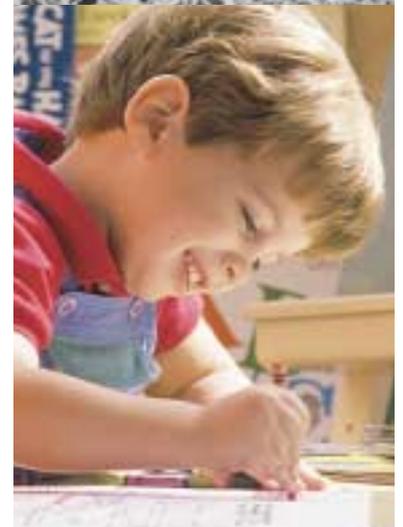
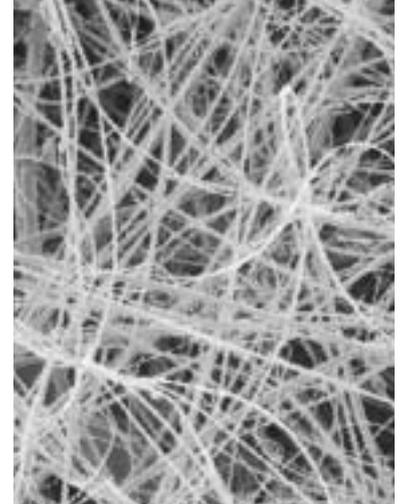
Loading dust	
ASHRAE	
	Untreated / discharged efficiency of filter material (0.4 µm)
	39 / 16 %

The most important box in the report! These reports show some of the most common synthetic filters on the market with coarse fibres and a high initial electrostatic charge and efficiency. The performance properties are similar for all filters of this type. Filters are classed as F7 (80% efficiency), but as indicated by the test report, the filter's discharged performance properties are far worse – in fact, they are class G4 or F5 during most of their service life.

The most efficient filters on the market in their classes



The following test report is for a Camfil Farr Hi-Flo F7 with glass-fibre media, a large filter area and no electrostatic charge. As documented in the report, the efficiency of this filter remains constantly high during its entire life.



TEST REPORT NO. RTE961/03 Appendix 1 1 (1)

ELECTRONIC COPY

EN 779:2003 AIR FILTER TEST RESULTS

GENERAL

Test no.:	031681	Date of test:	25.2. - 3.3.2003	Supervisor:	RHo
Test requested by:	Camfil AB	Device receiving date:	24.2.2003		
Device delivered by:	Camfil KG				

DEVICE TESTED

Model	Manufacturer	Construction
HI-FLO P7	Camfil KG	10 pockets
Type of media	Net effective filtering area	Filter dimensions (width x height x depth)
Glass Fiber	6.3 m ²	592 mm x 592 mm x 534 mm

TEST DATA

Test air flow rate	Test air temperature	Test air relative humidity	Test aerosol	Loading dust
0.944m / s	21 - 23 °C	17 - 24 %	DEHS	ASHRAE

RESULTS

Initial pressure drop	Initial arestance	Initial efficiency (0,4 µm)	Dust holding capacity	Untreated / discharged efficiency of filter material (0,4 µm)
101 Pa	98 %	67 %	297 / 374 / 425 g	68 / 63 %
Final pressure drop	Average arestance	Average efficiency (0,4 µm)	Filter class (450 Pa)	
250 / 350 / 450 Pa	>99 / >99 / >99 %	87±1 / 89±1 / 90±1 %	F7 / F8	

Remarks: -

NOTE: The performance results cannot by themselves be quantitatively applied to predict filter performance in service. The results relate only to the tested item.

Efficiency (0.4 µm), %

Dust fed, g

Curve 4
Arrestance as a function of dust fed at the test air flow rate.

Curve 3
Efficiency (0.4 µm) as a function of dust fed at the test air flow rate.

Pressure drop, Pa

Air flow rate, m³/s

Curve 2
Pressure drop as a function of dust fed at the test air flow rate.

Curve 1
Pressure drop as a function of the air flow rate (clean device).

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A few more facts about Revised EN 779:2002



The VTT testing institute in Finland. Discharging an electrostatic filter with isopropanol.



Camfil Farr's proprietary rig for generating diesel fumes during the testing of air filters in accordance with Revised EN 779:2002.

Normalising simulates real conditions

Several test institutes have concluded that discharging gives the best agreement between the uncharged test result and the filter's performance when cleaning ordinary outdoor air.

Different methods are used to neutralise the electrostatic effects of the filter material. The method that discharges the material completely, without destroying the media, is the one that is selected. *Isopropanol* or *diesel fumes* are both suitable for discharging the electrostatic mechanism.

Isopropanol

Isopropanol is not present in outdoor air, but years of testing have produced the same results as those achieved when the filter is exposed to outdoor air for a period of several weeks.

Diesel fumes are present everywhere

Diesel fumes are present everywhere in ordinary outdoor air. By supplying diesel fumes during a test, an uncharged test result can be accelerated some hours in time. This method can be suited for determining the performance properties of a filter in real operating circumstances.

Classification still not perfect

Revised EN 779:2002 is a major step towards establishing a test method that better reflects the real-life performance of filters but still needs to be improved in certain respects.

The part of the norm testing the dust loading capacity has not been changed and filter classification is based on tests of untreated filters, which can give misleading results. However, with the new information about the discharged performance of electrostatically charged filters, purchasers will know what the efficiency of a filter will be when it performs in real operating circumstances.

Laboratory dust tells you nothing about a filter's expected life

The dust holding capacity for very large particles provides no information about a filter's expected life.

LCC cost indicates the best overall filter economy

High efficiency and low pressure drop will be most economical in the long run

A Life Cycle Cost (LCC) analysis will show that the biggest cost associated with air filters is for its operation (power consumption). The filter's purchase price represents only 6 percent of its total cost. The filter's pressure drop affects the power consumption of the ventilation plant. Thus, the pressure drop is the most important factor when comparing the overall economy of different filters.

The best filters have a large filter area and low pressure drop

Low power consumption will cut costs considerably for a ventilation plant while the purchase price of a filter, in relation to its overall cost, is only of marginal importance.

Camfil Farr filters have the largest filtration area on the market in relation to their front surface. A large filter area will mean a higher efficiency and a lower pressure drop and a lower increase of the pressure drop in operation.

This gives lower power consumption of the plant and the filter's ability to keep the ducting and fans cleaner.



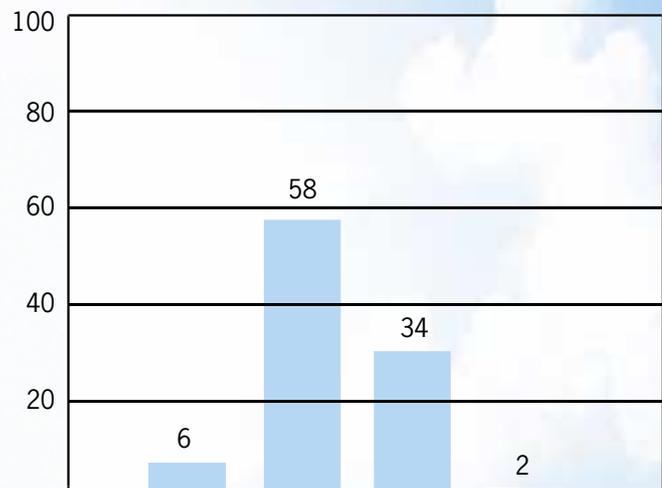
Camfil Farr's Cam-Flo, a P-labelled synthetic filter with fine fibres whose performance stays constant. This is the first well-functioning synthetic filter on the market. After discharging, it will have an efficiency of 50% and the filter will still be correctly classed as F7.

Example showing the total cost of a filter installation with low filter class, F5 or lower

The diagram shows that:

- 6 % of a filter's cost is related to its purchase price
- 58 % to the energy cost
- 34 % to the cleaning of ducting
- 2 % to disposal

Filters in class F5 or lower have low efficiency. This will in the future lead to important costs for cleaning. To avoid cleaning of the AHU at least filter class F7 is needed. Filter that doesn't deteriorate.



On world standards...

...Camfil Farr is the leader in clean air technology and air filter production.

Camfil Farr has its own product development, R&D and world wide local representation.

Our overall quality goal is to develop, produce and market products and services of such a quality that we aim to exceed our customers expectations.

We see our activities and products as an expression of our quality.

To reach a level of total quality it is necessary to establish an internal work environment where all Camfil Farr employees can succeed together.

This means an environment characterised by openness, confidence and good business understanding.

www.camfilfarr.com

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