camfil

ENERGY CLASSIFICATION FOR GENERAL VENTILATION AIR FILTERS

based on EN ISO 16890 standard

SAVE ENERGY, MONEY AND THE PLANET

Using the right air filter will not only help you save money, but also maintain healthy indoor air quality. With the implementation of Eurovent´s updated and objective system for classifying energy efficiency, it will be easier for you to find the right air filter for the lowest energy usage and highest indoor air quality.

All air filters can be graded from A+ to E. Grade A+ stands for the lowest energy consumption and E for the highest. The classification, based on the filter test method **EN ISO16890:2016**, will give you a better understanding of annual energy consumption, average efficiency and minimum efficicency.

The energy consumption of air filters in general ventilation systems has become the focus of attention as energy prices increase, and as demands to reduce CO_2 emissions get tougher.

Classifying the air filters based on the new test standard will be more precise. Deciding the filter efficiency based on the indoor requirements is the first step in choosing the best energy efficient filter.

WHY A NEW ENERGY CLASSIFICATION?

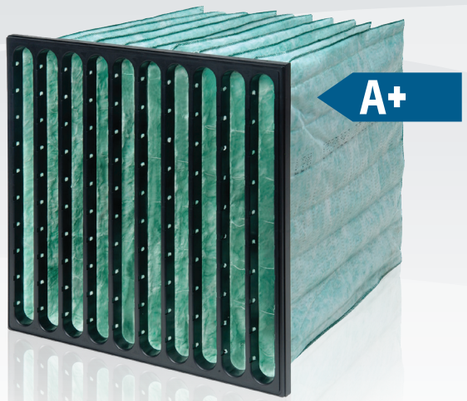
The Eurovent energy classification was established 2011. There were a couple of upgrades during the past year including the grades A+ to E introduced in January 2015.

Air filter energy calculations were based on the EN779:2012 test reports. By introducing the global **ISO16890:2016**, an upgraded calculation method was needed.

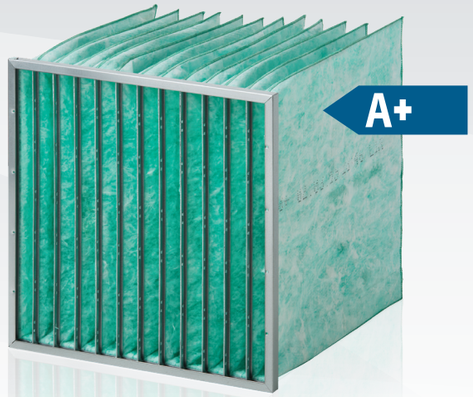
During 2018, ISO16890:2016 became the only valid test standard in Europe. Beginning the 1st January, 2019, the energy classification for filters will be based on this standard.

ALL AIR FILTERS REQUIRE A FULL TEST REPORT

More and more suppliers test their filters properly making it possible for customers to compare filter brands. By introducing the **2019 EUROVENT ENERGY CLASSIFICATION**, all participants of Eurovent Certita Certification are obliged to supply a full **EN ISO16890:2016 TEST REPORT,** as a base to energy calculation, for every air filter sold in the market and published on Eurovent web site.



HI-FLO II XLT7/670 - ePM1 60% A+



HI-FLO M7 ES – ISO ePM1 60% A+

OPAKFIL ES7 – ISO ePM1 60% A+

WHY DOES THE ISO16890 CHANGE EVERYTHING?

THERE ARE CERTAIN MAIN DIFFERENCES BETWEEN EN779:2012 AND EN ISO16890:2016.

EN779:2012

- Efficiency based on one particle size, 0,4 µm
- Dust feeding and particle efficiency measure in steps up to 450 Pa final pressure drop gives average efficiency ex. 85%
- Discharging of a piece of filtermedia in IPA-liquid (Isopropanol), class F7 – F9
- Minimum Efficiency (ME) defines the filter in classes F7 – F9 Ex.: ≥ 35% is class F7
- Test dust: ASHRAE
- Air flow rate: 3400 m^3/h (0.944 m^3/s)
- No relation to real environment.

EN ISO16890:2016

- ePM_x – efficiency of particle fraction with a diameter ≥ 0,3 µm and x µm

Efficiency	Size range µm
ePM_{10}	$0,3 \leq x \leq 10$
$ePM_{2.5}$	$0,3 \leq x \leq 2,5$
ePM_1	$0,3 \leq x \leq 1$

- Average efficiency = average value of initial efficiency and discharged (conditioned) efficiency.
- Final pressure drop: 200 Pa (Coarse), and 300Pa (ePm_x)
- Discharge of a complete filter in IPA-vapor
- Test dust: ISO A2/AC Fine (≈ double dust holding in grams)
- Air flow rate: 3400 m^3/h (0.944 m^3/s)
- More equal to real environment.

THE NEW STANDARD AND A DIFFERENT TEST DUST WILL BOTH HAVE A SLIGHT IMPACT RESULTING IN A NEW AVERAGE PRESSURE DROP, WHICH LEADS TO SOME MINOR CHANGES IN THE AIR FILTER ENERGY USE IN KWH/ANNUM AND THE ENERGY CLASS A+ TO E.

CALCULATION AND ENERGY CLASSIFICATION

THE ENERGY USE IN KWH/ANNUM IS CALCULATED DUE TO THE FORMULA IN EUROVENT REC 4/21-2018.

Where we define q_v = 0.944 m^3/s, t = 6000 h/a and η = 0.5

$$W = \frac{q_V \cdot \overline{\Delta p} \cdot t}{\eta \,.\, 1000}$$

ANNUAL ENERGY USE FOR FILTER CLASSES

EUROVENT CERTITA RULES ALLOW ONLY 1% A+, 5% A, 15% B, AND 30% C CLASS FILTERS IN EUROPE. UPDATE OF EUROVENT ENERGY RATING EVERY 3 YEARS.

M_x = 200 g (AC Fine)	AEC in kWh/y FOR ePM_1 (ePM_1 and $ePM_{1,min}$ ≥ 50%)					
	A+	A	B	C	D	E
50 & 55%	800	900	1050	1400	2000	>2000
60 & 65%	850	950	1100	1450	2050	>2050
70 & 75%	950	1100	1250	1550	2150	>2150
80 % 85%	1050	1250	1450	1800	2400	>2400
> 90%	1200	1400	1550	1900	2500	>2500

M_x = 250 g (AC Fine)	AEC in kWh/y FOR $ePM_{2.5}$ ($ePM_{2.5}$ and $ePM_{2.5,min}$ ≥ 50%)					
	A+	A	B	C	D	E
50 & 55%	700	800	950	1300	1900	>1900
60 & 65%	750	850	1000	1350	1950	>1950
70 & 75%	800	900	1050	1400	2000	>2000
80 % 85%	900	1000	1200	1500	2100	>2100
> 90%	1000	1100	1300	1600	2200	>2200

M_x = 400 g (AC Fine)	AEC in kWh/y FOR ePM_{10} (ePM_{10} ≥ 50%)					
	A+	A	B	C	D	E
50 & 55%	450	550	650	750	1100	>1100
60 & 65%	500	600	700	850	1200	>1200
70 & 75%	600	700	800	900	1300	>1300
80 % 85%	700	800	900	1000	1400	>1400
> 90%	800	900	1050	1400	1500	>1500

LABEL FOR ENERGY EFFICIENCY

THE LABEL SYSTEM IS PUBLISHED ON ALL FULL SIZE AND ”FAMILY SIZES” FILTER BOXES. THERE ARE TWO WAYS TO SHOW THE LABEL.

FULL SIZE 592 X 592 MM, ACCORDING TO EN 15805:2010

- Nominal airflow, 3400m³/h
- Efficiency, (average of initial and discharged)
- Minimum efficiency (discharged)
- Annual energy use, kWh/annum
- Energy class
- Values available at **www.eurovent-certification.com**

OTHER ”FAMILY SIZES” ACCORDING TO: EN 15805-2010, *EUROVENT OM -11-2019 AND RS 4/C/001-2019

- Energy class only, as 592 x 592 certified dimension

Sizes, width x height mm:

- 490 x 592
- 287 x 592
- 592 x 287
- 490 x 287
- 287 x 287

- 592 x 490*
- 490 x 490*
- 592 x 892*
- 490 x 892*
- 287 x 892*

PM1 – WHAT IS HAPPENING INSIDE THE BODY?

The particles with the greatest capacity for reaching the outermost areas of our respiratory system are very small, approximately **0.01–1 µm in size – PM1.** The ability of different particles to form deposits (the degree to which they can become trapped in the body) depends on their size and whether they can pass through the walls of our airways, for example.

YOUR LUNGS AND CLEAN AIR

The function of the lungs depends on clean air even in the outermost of the seven million air sacs (alveoli) where the gas exchange with the capillaries takes place.

The blood flows through the capillaries and gives off the carbon dioxide (CO_2) that has formed during the metabolic process. At the same time, it takes in oxygen (O_2) via the alveoli. The oxygen is transported from the alveoli to the muscles and other organs. The carbon dioxide and other impurities leave our bodies when we breathe out.

Nanoparticles, which are no larger than a virus, can become deposited (trapped) in the cell membranes (walls) of the alveoli. These have a total surface area of around 70 m² and are highly sensitive to particles and harmful substances. If these substances remain in the respiratory system, they can contribute to the development of emphysema, oedema and other serious illnesses, as well as premature deaths.

Humans eat 1 kg food/day

Humans drink 2 kg fluids/day

WE BREATHE UP TO 15 KG AIR PER DAY!

Humans eat 1 kg of food each day, drink 2 kg of fluids and breathe up to 15 kg of air per day. We take care about the food we eat and the water we drink but rarely do we consider the air we breathe.

Source: Professor Sven Erik Dahlén, Karolinska Institute, Institute of Environmental Medicine (IMM)

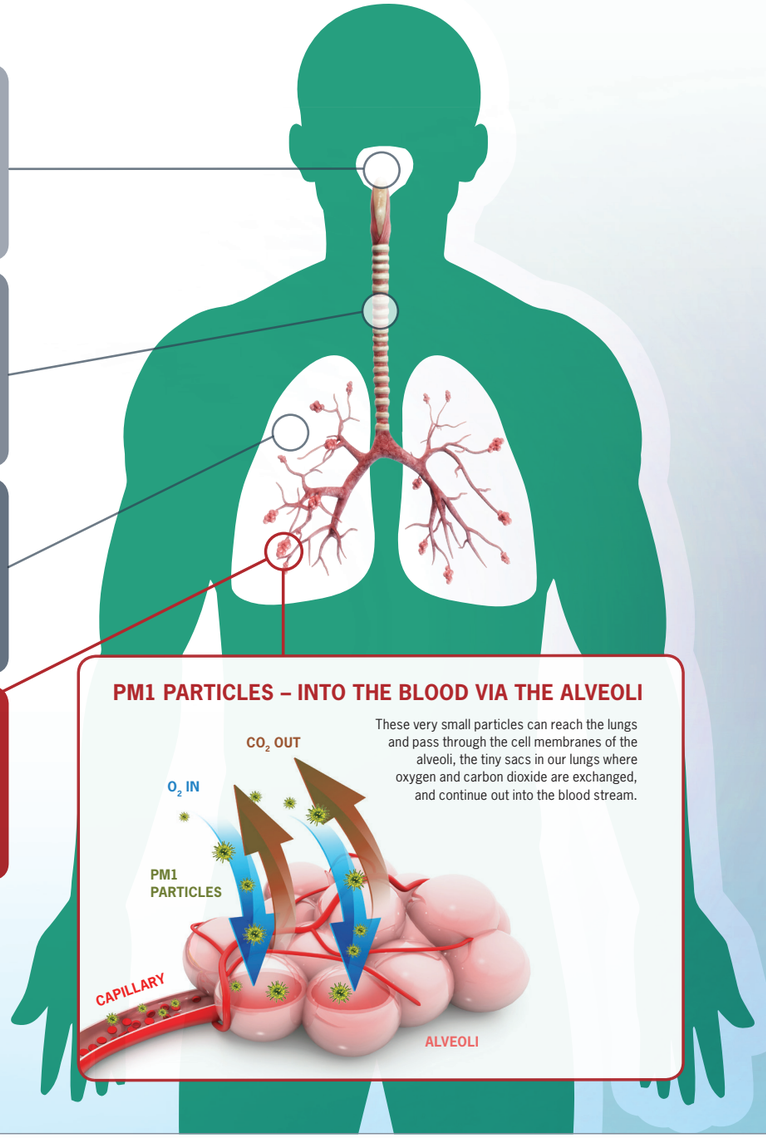
Humans breathe 15 kg air/day

COARSE DUST
Particles 10 µm in diameter and larger. The human body is able to "filter" these particles in the nose via the nose hairs and mucous membranes. Limited health impact.

PM10
Particles 10 µm in diameter or smaller that can reach the respiratory ducts and potentially cause decreased lung function.

PM2.5
Particles 2.5 µm in diameter or smaller that can penetrate the lungs and cause decreased lung function, skin and eye problems, etc.

PM1
Particles 1 µm in diameter or smaller. A significant part of these particles are tiny enough to enter the blood stream and lead to tumours, cardiovascular diseases, dementia, etc.



THE BEST PROTECTION AGAINST PM1 – CHOOSE THE RIGHT AIR FILTERS!

INDOOR AIR

The basic idea behind ventilation is to mix indoor air with outdoor air. But because the outdoor air is now so polluted, as a result of different types of combustion processes and diesel exhaust gases among other things, several stages of purification are needed.

If the air is not cleaned, there is a risk that indoor air will contain a very large quantity of harmful particulates which will find their way into people's respiratory tracts and circulation systems. Effective filters in the ventilation system can prevent the majority of particles (and gases) in the outdoor air from making their way indoors.

The diagram (furthest to the right) shows the size of particles and gas molecules in µm from 0.0001-1000 µm. **PM1** particles are marked with red.

USING THE RIGHT FILTER

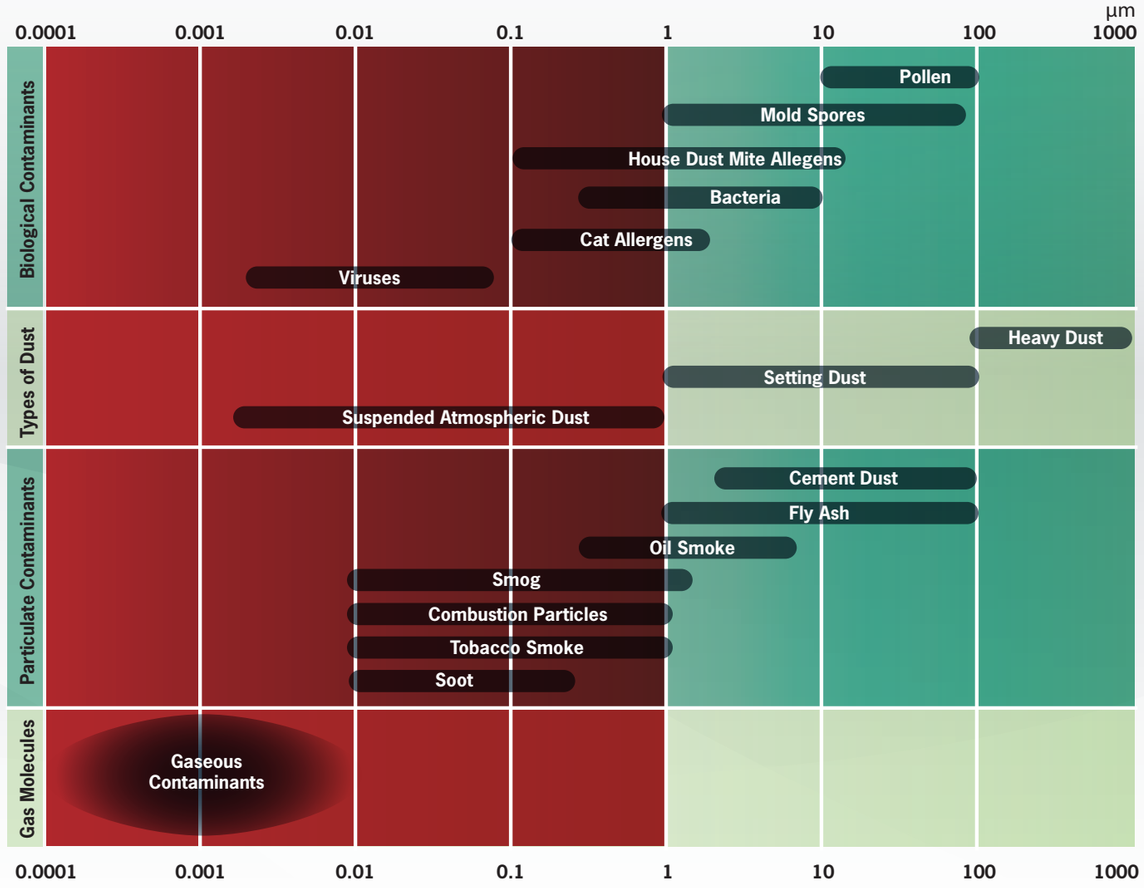
Using the right air filter will not only help you to maintain healthy indoor air quality. It will also help you to save energy and money With Eurovent's new and objective system for classifying energy efficiency, it will now be easier for you to find the right air filter for the lowest energy usage and highest indoor air quality.

Today, all air filters can be graded from A+ to E. Grade A+ stands for the lowest energy consumption and E for the highest. The classification, based on EN ISO16890, will give you a better understanding of a filter's annual energy consumption, initial efficiency and minimum efficiency.

TYPICAL EFFICIENCIES OF AIR FILTERS AGAINST PM1 AND OTHER FINE DUST MASS CONCENTRATIONS

EN779:2012 / EN ISO 16890	ISO ePM_1	ISO $ePM_{2.5}$	ISO ePM_{10}
M5			≥50%
M6		≥50%	≥60%
F7	≥50%	≥70%	≥80%
F8	≥70%	≥80%	≥90%
F9	≥80%	≥90%	≥95%

TYPICAL PARTICLE SIZES OF MOST COMMON CONTAMINANTS



Camfil – a global leader in air filters and clean air solutions

For more than half a century, Camfil has been helping people breathe cleaner air. As a leading manufacturer of premium clean air solutions, we provide commercial and industrial systems for air filtration and air pollution control that improve worker and equipment productivity, minimize energy use, and benefit human health and the environment.

We firmly believe that the best solutions for our customers are the best solutions for our planet, too. That's why every step of the way – from design to delivery and across the product life cycle – we consider the impact of what we do on people and on the world around us. Through a fresh approach to problem-solving, innovative design, precise process control and a strong customer focus we aim to conserve more, use less and find better ways – so we can all breathe easier.

The Camfil Group is headquartered in Stockholm, Sweden, and has 30 manufacturing sites, five R&D centres, local sales offices in 26 countries, and 4,180 employees and growing. We proudly serve and support customers in a wide variety of industries and in communities across the world. To discover how Camfil can help you to protect people, processes and the environment.

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