ISO 16890
A guide to the new air filtration standard.

Leadership in Filtration

MANN+HUMMEL

ISO 16890
The new standard for classifying air filters.

Particulate comes in all different sizes—much of it invisible to the eye. The new ISO standard tests a filter's ability to capture particulate from across the range.

EN 779 has been the most widely-used method of classifying air filters for over 20 years. But from the beginning of 2017, a new standard comes into force that completely changes the way that filters are tested and categorised.

Most countries will have a transition period—typically 18 months—as EN 779 makes way for ISO 16890. But after this time, the familiar filter classes from G1 to F9 will no longer apply.

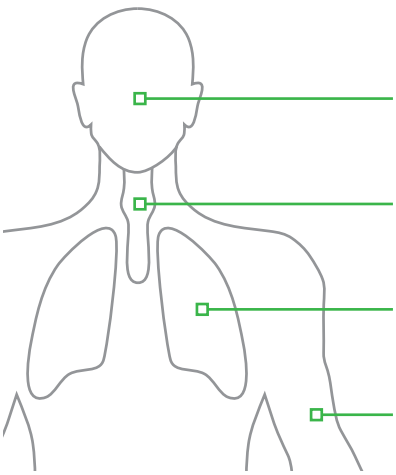
The good news is that ISO 16890 brings a number of benefits over the existing standard. It uses a number of new approaches and mechanisms that make the testing process more indicative of the conditions that the filter will operate within once installed. And the new rating system centres on the ultimate aim of an air filter—removing particulate matter—so it's easier to find a product that's matched to your needs.

As this is such a fundamental change to the air filtration industry, there's much to understand to ensure that you, as a filter buyer, know what to look for. This guide is intended to help you get up to speed with the new ISO 16890.

ISO 16890 is valid from the beginning of 2017, so now is the time to act.

PARTICULATE UNDER THE MICROSCOPE

When public bodies such as the World Health Organization discuss air pollution they typically talk in terms of PM10, PM2.5 and PM1—that is, particulate matter smaller than 10 µm, 2.5 µm and 1 µm respectively. And there's good reason for this. Humans are adept at stopping particles larger than 10 µm from entering our bodies, but particulate smaller than this gets past our defences—and how far it travels depends on its size.



HEALTH IMPACT OF PM

According to the World Health Organization, air pollution is the greatest environmental risk to human health—causing more than three million premature deaths across the world every year. And the list of health complaints attributed to PM is constantly growing—from cardiovascular and lung disease to cancer and childhood respiratory diseases.

Our bodies have built-in defences to protect against particulate matter larger than 10 µm. Below this, it's the job of filters to provide protection against the particles our bodies can't stop.

That's why the new ISO 16890 standard focuses on a filter's ability to capture particulate around or below 10 µm. It classifies a filter dependent on its ability to capture coarse dust (particulate larger than 10 µm), PM10, PM2.5 and PM1. And these make up the four filter groups under the new standard.

Real life in the lab. Making testing more realistic.

WHAT'S WRONG WITH EN 779?

Since its launch in 1993, EN 779 has done much for the air filtration industry. Chief among which was introducing a uniform way to classify air filters that helped to drive up quality standards and simplify the process of selecting a filter. Unfortunately, it's this uniformity that is also EN 779 greatest weakness.

The air we breathe is a cocktail of countless types of particulate—of all shapes and sizes, and from all manner of sources. But EN 779 is based entirely on a filter's ability to capture one size of particulate—0.4 µm. It doesn't take into account all the different particle sizes that are present in outside air. And that's why the testing procedure has been criticised for not reflecting the conditions in which a filter will be expected to operate. The results from the lab are not indicative of the real world.

ISO 16890 is different. Under testing in the new standard, a filter is challenged with a variety of different sized particulate—just as it would be if it was installed in your air handling unit. And this particulate stretches from 0.3 µm all the way up to 10 µm in a series of 12 tests.

EN 779 – Test particulate size	
Test 1	0.4 µm

ISO 16890 – Test particulate size	
Test 1	0.3 – 0.4 µm
2	0.4 – 0.55 µm
3	0.55 – 0.7 µm
4	0.70 – 1.0 µm
5	1.0 – 1.3 µm
6	1.3 – 1.6 µm
7	1.6 – 2.2 µm
8	2.2 – 3.0 µm
9	3.0 – 4.0 µm
10	4.0 – 5.5 µm
11	5.5 – 7.0 µm
12	7.0 – 10.0 µm

Testing to these different particle sizes needs all new equipment capable of splitting particulate into 12 channels dependent on its size. The latest test rigs do this with incredible accuracy—giving an even more detailed view of a filter's performance.

Four ISO filter groups. One aim—simplicity.

REPLACING G AND F CLASS

Four new filter groups are introduced under ISO 16890: Coarse, ePM10, ePM2.5 and ePM1. The 'e' prefix simply stands for efficiency. To fall into each category, a filter must be capable of capturing at least 50% of the particulate in that size range. Filters capturing less than 50% of PM10 dust go into the Coarse group.

ISO 16890 filter group efficiencies	
Coarse	< 50% of PM10
ePM10	≥ 50% of PM10
ePM2.5	≥ 50% of PM2.5
ePM1	≥ 50% of PM1

But not all products in a filter group will be the same. In product literature and test reports, the efficiency of the filter will be detailed alongside the group. So you are likely to see terms such as ePM2.5 60% or ePM1 95%. This simply means that the first filter provides 60% efficiency at PM2.5 and the second filter is 95% efficient at PM1.

The efficiency is rounded to the nearest 5%, so you should not come across any products listed as ePM10 89%, for example.

PARTICLE SIZE ILLUSTRATION

What does this mean for you?
Choosing an ISO filter.

MATCH YOUR NEEDS TO YOUR ENVIRONMENT

With such a fundamental change, the way you select and configure an air filter is going to be completely different under ISO 16890. But one of the main advantages of the new standard is that it makes it significantly easier to choose an air filter that will provide the protection you need. It's simply a case of matching a product to your desired level of air quality and your local environment.

DEFINE THE AIR QUALITY YOU NEED

The World Health Organization prescribe safe levels for PM10 and PM2.5 as 20 µg/m³ and 10 µg/m³ respectively, so we recommend using these figures as a baseline. PM1 filters are slightly different as they're typically employed to protect a particular process, so set the air quality level according to the needs of that application.

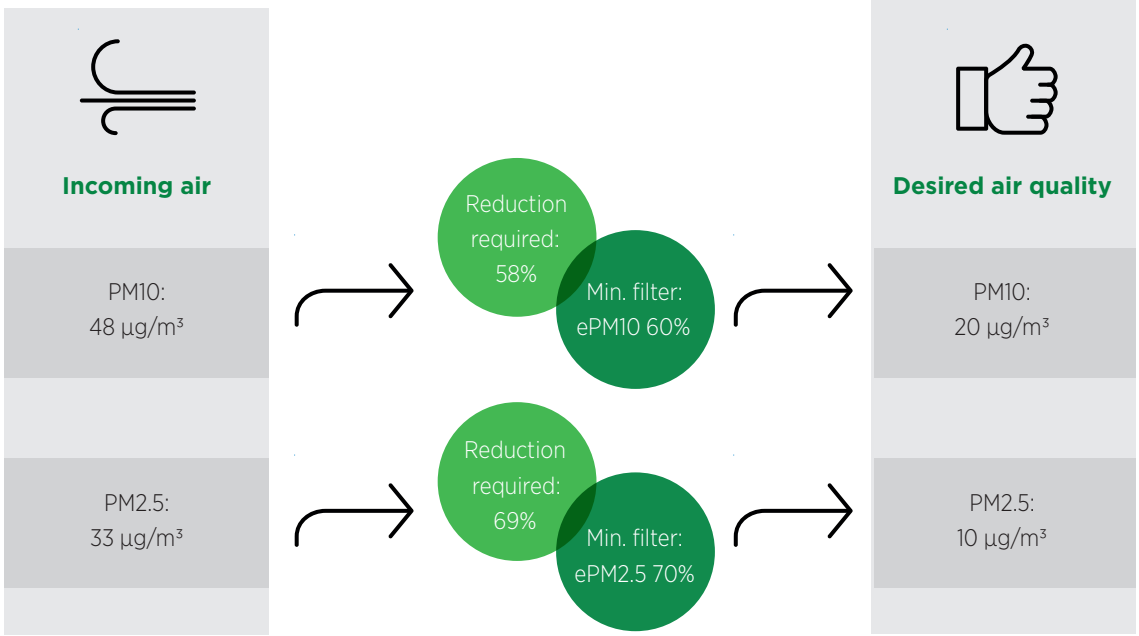
USE THE INFORMATION THAT'S OUT THERE

Most countries now make air quality levels within their borders readily available on the internet. That means with just a few clicks, you can view the current and historic PM levels in your local environment. Armed with this information, you can determine what level of filtration you require to achieve safe levels of particulate in your building.

DO SOME SIMPLE SUMS

For example, If the PM concentrations outside your building are 48 µg/m³ for PM10 and 33 µg/m³ for PM2.5. It's a straightforward calculation to determine what filtration efficiency you need...

CALCULATING YOUR FILTER REQUIREMENT



We have been involved in the development of ISO 16890 from the start. That's why we're ready with all new test equipment for the all new standard.

FINDING THE OPTIMUM FILTER SELECTION

We have been promoting outcome-based filtration for several years through our patented eco16 filter selection programme. ISO 16890 brings the main themes of this system to the wider industry, but air pollution can vary greatly across small distances depending on activities such as construction or industrial processes. What's more, PM data is not always complete and up to date in every location around the world.

With an eco16 survey, we measure and analyse the precise conditions at your facility, and then provide the exact filter specification that's best suited to your needs. Best of all, this filter configuration will guarantee a set level of air quality at the cheapest possible cost of ownership. Your energy costs will be minimised and air quality will be perfectly suited to your needs.

MANN+HUMMEL

airfiltration.mann-hummel.com