

## ISO 10121-3

### FIRST CLASSIFICATION SYSTEM FOR MOLECULAR FILTERS USED IN GENERAL VENTILATION

Clean air solutions

A photograph of a modern office interior. The space is bright and airy, with large windows on the left side. In the foreground, there are several silver and black stanchions. In the middle ground, there are blue armchairs and a large potted plant. The ceiling is a complex, white, grid-like structure with recessed lighting. The floor is a light-colored wood or laminate. The overall atmosphere is clean and professional.



# ISO 10121-3 SIMPLIFYING THE CHOICE OF MOLECULAR FILTERS FOR GENERAL VENTILATION

Air pollution is a growing health concern worldwide. The WHO published an update to its air quality guidelines in September 2021, classifying several common gases in outdoor air as hazardous to health in addition to particulate matter (PM2,5 & PM10). Safe concentration limits for these gases have also been endorsed in the guidelines.

The ISO 10121 series of standards provides test methods to define the filtration efficiency of molecular air filters and filter media against various gases. ISO 10121-3, published in October 2022, is the first classification

system for molecular air filters for general ventilation. It contains comprehensive filter classes for the most common air pollutants in outdoor air. This significantly aids in selecting the appropriate molecular filter based on the local outdoor air quality.

**Easier selection of molecular filters**  
Just as ISO 16890 facilitates the selection of suitable particulate filters, the comprehensive filter classes of ISO 10121-3 enable quick and easy selection of the most appropriate molecular air filter for specific supply air applications.

## REFERENCE GASES

**Ozone**  
Ozone (O<sub>3</sub>) is formed in our atmosphere by the interaction of UV light with gases produced by various combustion processes. Ozone poses a respiratory hazard. The air quality guidelines by WHO set a maximum mean exposure concentration of 60 µg/m<sup>3</sup> for a period of 8 hours during peak season.

**Nitrogen dioxide**  
Nitrogen dioxide (NO<sub>2</sub>) is formed as a direct result of combustion processes. NO<sub>2</sub> is not only responsible for haze and acid rain, but is also harmful to our lungs by aggravating asthma symptoms and increasing susceptibility to infections. The air quality guidelines by WHO set a maximum mean annual exposure concentration of 10 µg/m<sup>3</sup>.

**Sulphur dioxide**  
Most sulphur dioxide (SO<sub>2</sub>) is released from the burning of fossil fuels in power plants and industrial processes. Volcanoes are another known source of SO<sub>2</sub>. The health effects of SO<sub>2</sub> are similar to those of O<sub>3</sub> and NO<sub>2</sub>. The WHO air quality guidelines set a maximum daily exposure concentration of 40 µg/m<sup>3</sup>.

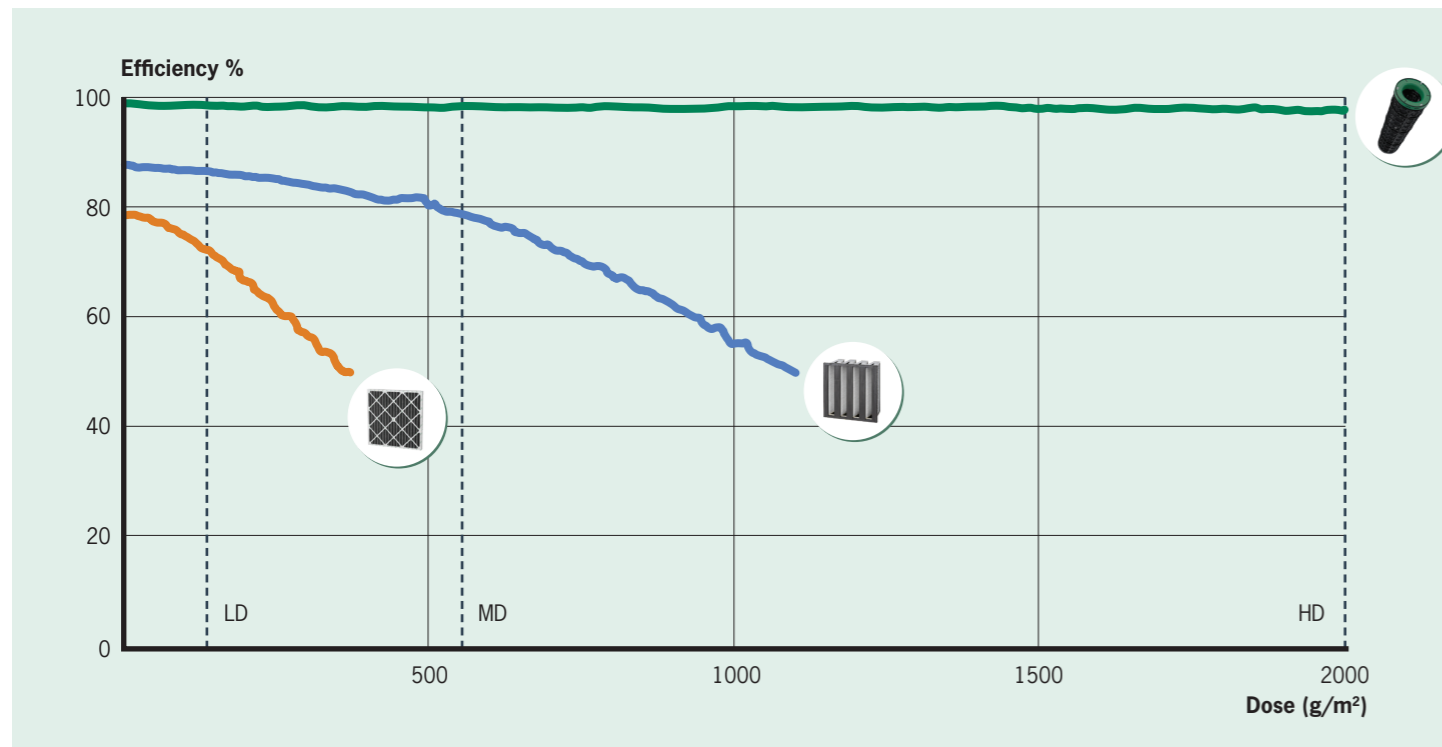
**Toluene**  
Toluene (C<sub>7</sub>H<sub>8</sub>) is an organic molecule used by the standard to represent the very large group of Volatile Organic Compounds (VOC). The number of sources of VOC is endless and can be found both indoors and outdoors: These include solvents, paints, building materials, combustion processes, oil and gas, etc. Due to their chemical properties, the effects of VOC can range from an unpleasant but harmless odour to a lethal effect when inhaled.



**TEST METHOD OVERVIEW**  
GPACD (gas phase air cleaning devices) can be tested with all 4 reference gases.

1. Measurement of the initial efficiency for the respective gas
2. Measurement of the efficiency versus dose for the respective gas
3. As soon as the efficiency falls below 50% the test is stopped
4. Classification for each reference gas in classes from Light Duty (LD) to Heavy Duty (HD)
5. GPACD that cannot qualify as Light Duty (LD) are classified as very Light Duty (vLD)
6. Calculation of the integral efficiency (rounded down to 5% increments)
7. Each GPACD has 4 classes in total (one class per reference gas)

## PRODUCT PERFORMANCE EXAMPLES FOR TOLUENE



## ISO 10121-3 CLASSES FOR SELECTED “CITY” AND “CAMCARB” PRODUCTS

Product Depth	City-Flo XL 520 mm	CityPleat 200 44 mm	City-Flo 534 mm	CityCarb I 292 mm	CamCarb XG VOC_03_NO2_SO2 452 mm / 595 mm
Reference gas					
Ozone	vLD 20	LD 55	HD 85	HD 80	HD 95
SO <sub>2</sub>	vLD 10	vLD 30	MD 55	MD 50	HD 85
NO <sub>2</sub>	vLD 20	vLD 50	LD 85	LD 70	HD 70
Toluene	vLD 30	LD 75	MD 80	MD 80	HD 95

**Doses LD, MD, HD predict the lifetime of the filter**  
(vLD (very Light Duty) are filters that do not qualify as LD)

- LD (Light Duty) = relatively short lifetime / low capacity
- MD (Medium Duty) = **4 times higher lifetime\*** / capacity
- HD (Heavy Duty) = **16 times higher lifetime\*** / capacity

\*compared to LD

**%- value indicates the average efficiency**

- LD 60 = 60% average efficiency over short lifetime
- MD 60 = 60% average efficiency over medium lifetime
- HD 60 = 60% average efficiency over very long lifetime

## 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 29 manufacturing sites, six R&D centres, local sales offices in 35+ countries, and about 5,700 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, visit us at [www.camfil.com](http://www.camfil.com).

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