



# THE CAMFIL GROUP

Clean Air Solutions for People, Process and  
the Environment

by Jayant Kaushal, Vice President – Business Development (APME)

CLEAN AIR SOLUTIONS



# Topics

- Air Pollution Affecting Health
- Overview of ISO 16890 standard
- Benefits of good IAQ
- How Air Filters are related to Energy
- Air Cleaners

# CLEAN AIR SOLUTIONS FOR PEOPLE, PROCESS AND THE ENVIRONMENT

## FILTRATION SOLUTIONS (HVAC)

Air Handling Units & Filter Supplies

- Comfort
- Cleanrooms
- Industrial
- Containment



## AIR POLLUTION CONTROL

Industrial Dust, Fume & Mist Collection

- Dust
- Fume
- Mist



## POWER SYSTEMS

Air Filters for Acoustics & Turbo Machinery

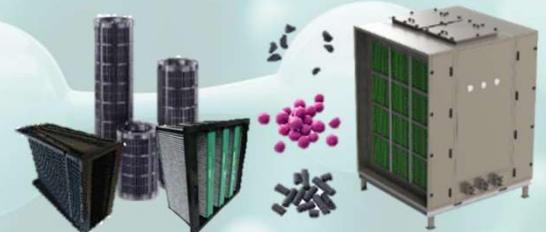
- Power Generation
- Compressors
- Oil & Gas



## MOLECULAR CONTAMINATION CONTROL

Air Filters for Harmful Gases & Odours

- Gases
- Odours
- Corrosion control



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In 1999, the World Health Organisation (WHO) warned:

Indoor air can be up to  
1000 times more dangerous  
than the outdoor air.



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# We breathe up to 15 kg air/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 that we drink but rarely do we consider the air we breathe.

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



Humans eat 1 kg food/day



Humans drink 2 kg fluids/day

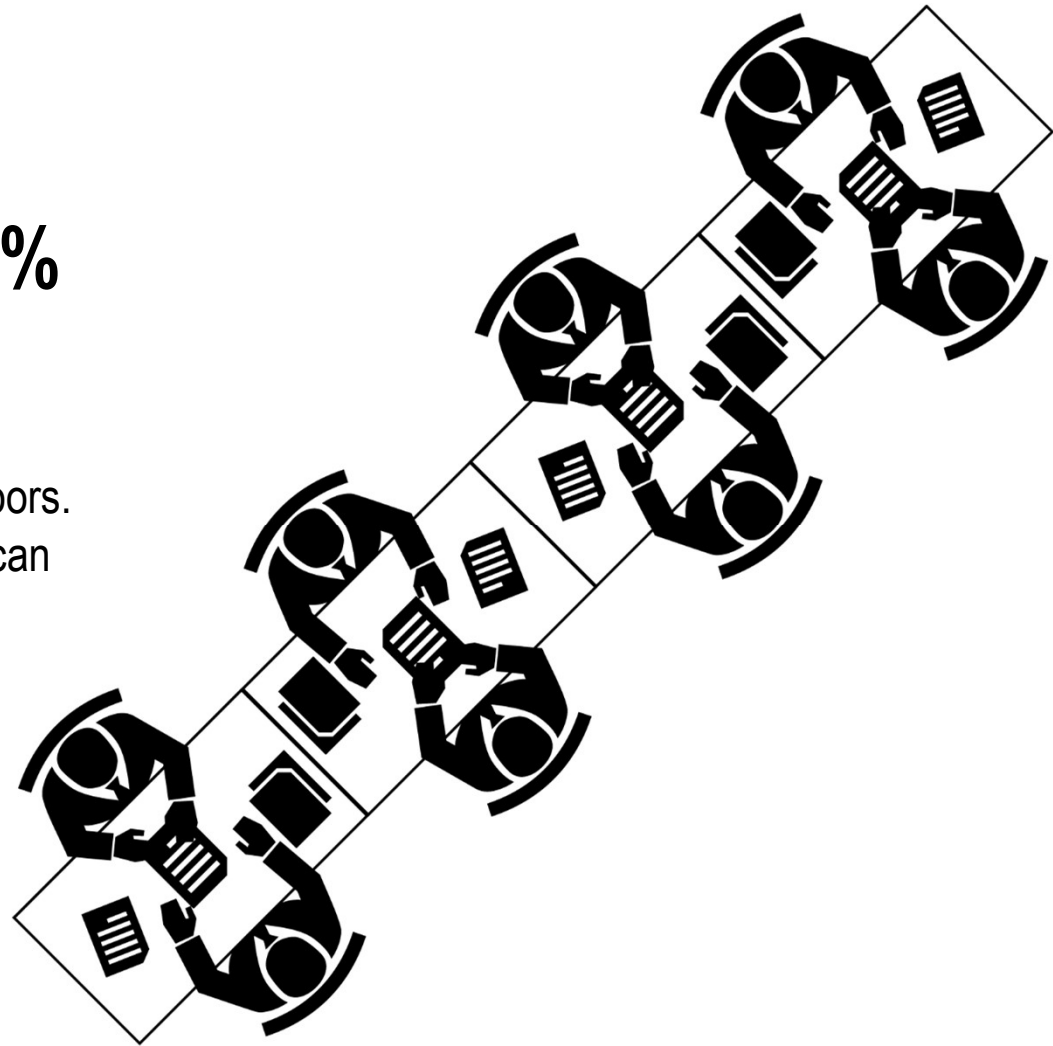


Humans breathe 15 kg air/day

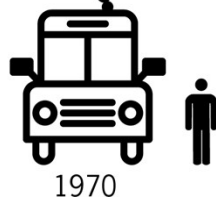
# We spend up to 90% of our life indoors

We spend up to 90% of our life indoors.  
This means that indoor air pollution can  
substantially influence our health.

Source: European Union - ECA report no23 Ventilation,  
Good Indoor Air Quality and Rational Use of Energy



**Diesel exhausts that  
used to be black,  
sooty smoke...**



1970

**...are today mostly  
invisible but still  
contain billions of very  
fine harmful particles**



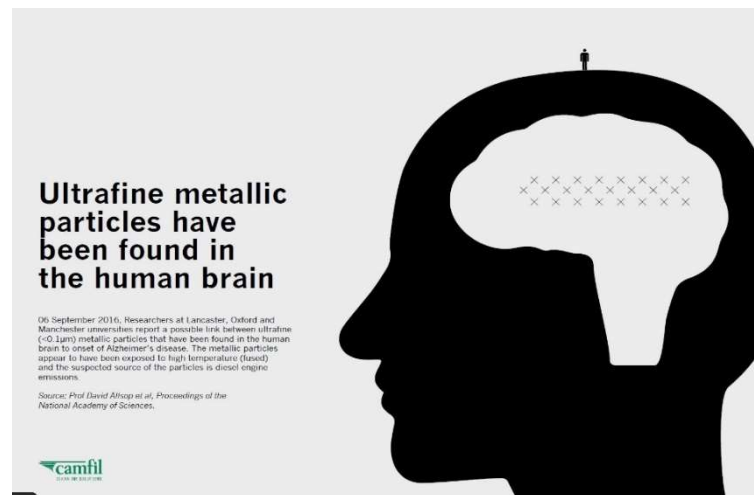
2016

Emissions from diesel exhausts have changed, some years ago diesel exhaust was characterised by black sooty smoke. Today, major advances in engine technology mean that emissions from diesel engines appear to be considerably cleaner than they used to be, to the point of being virtually undetectable. In reality however, the “clean air” contains billions of harmful ultrafine and nano-particles, all of which are totally invisible.

# PM1 and HUMAN HEALTH

- A 2016 study linked fine metallic particles in the brain and early onset of Alzheimer's Disease.
- Ultrafine magnetite pollution particles found in the human brain
- Typical size < 0.2 micron (PM1)
- *The metallic particles appear to have been exposed to high temperature (fused).*
- *The suspected source of the particles is diesel engine emissions.*

*Prof David Allsop et al, Proceedings of the National Academy of Sciences, Sept 2016.*



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# HEALTH EFFECT OF POLLUTION

## In China, a link between happiness and air quality

January 21, 2019, Massachusetts Institute of Technology



04/01/2019 Fri 09:59 in All markets by Aditi Sharma Kalra

**NUS: Employee productivity takes a hit when air pollution is consistently high**

**Air pollution linked to “huge” reduction in intelligence**



**Blame pollution? Delhi non-smoker gets lung cancer**

**INDIA  
TODAY**

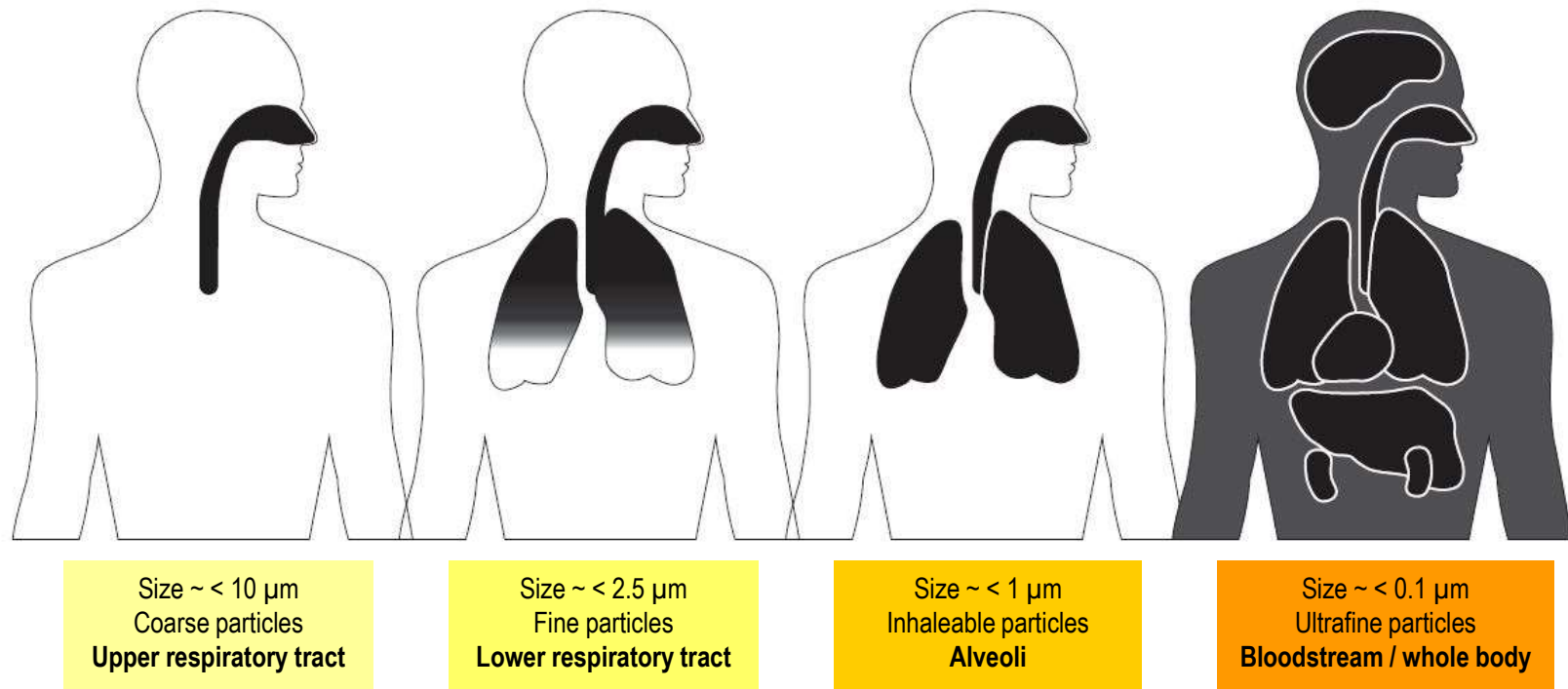
**Air pollution in India caused 1.2 million deaths last year**

By Olivia Goldhill • December 9, 2018

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# Penetration of Particles into the Body



# Topics

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- Benefits of good IAQ
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## Air Filters for General Ventilation

ISO 16890 (all parts) refers to particulate air filter elements for general ventilation having an ePM1 efficiency less than or equal to 99% when tested per the procedures defined within parts 1-4 of ISO 16890.

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# Introduction

- The air filter industry has a reputation for being resistant to change.

- Current situation



- A significant harmonisation for the air filtration industry has been adopted in recent past.
- A new standard for filter testing and classification with global coverage.  
*ISO16890 “Air Filters for General Ventilation”*
- The final voting result was 100% approval.



# Why develop a new global test standard?

*What are the customer benefits?*



Recognition

—

Air filters positively influence  
air quality and human health



More intuitive

—

Filter efficiency and  
classification aligned with  
real world air pollution



Global applicability

—

Eliminate confusion

## ISO16890 Test Rig @ Camfil

Clean air solutions



# Filter Classification

Efficiency values will be measured and correlated into four efficiency ranges

ePM 1	ePM 2.5	ePM 10	ISO Coarse
0,3 – 1 $\mu\text{m}$	0,3 – 3 $\mu\text{m}$	0,3 – 10 $\mu\text{m}$	ISO Fine Dust Initial arrestance
Corresponding to <b>E1</b> ASHRAE 52.2	Corresponding to <b>E2</b> ASHRAE 52.2	Corresponding to <b>E3</b> ASHRAE 52.2	Filters with <b>ePM10 &lt; 50%</b>

For ePM1 and ePM2.5, measurements will be made  
before and after discharge of filter

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# GOOD IAQ CAN REDUCE SICK LEAVE AND SAVE MONEY

**Polaroid managed to reduce sick leave by 35% by upgrading the HVAC system. The result was \$400 net saving per year per employee**

***Total annual savings = 1 488 000\$***



Donald K. Milton, P. Mark Glencross, And Michael D. Walters Risk of Sick Leave  
Associated with Outdoor Air Supply Rate, Humidification, and  
Occupant Complaints – Indoor Air 2000 10: 212-22



# GOOD IAQ CAN INCREASE PRODUCTIVITY IN OFFICE BUILDING

**A study at a call centre showed a  
10% increase in operators  
productivity by replacing old filters  
with new at a higher outdoor air  
supply rate**



Wargocki, Improving Indoor air Quality improves the performance of office work and schoolwork, INIVE International Network for Information on Ventilation and Energy Performance [www.inive.org](http://www.inive.org)

# STUDENT HEALTH AND ACADEMIC PERFORMANCE



*“Our district implemented an IAQ management plan that led to unprecedented academic success for our students. Since 2005, we have seen an increase of **17.3 percent** on test scores and an increase in the average daily attendance rate to 97 percent, allowing students to have more classroom time.”*

– Frank DiNella, Keller Independent School District

*A Norwegian study showed that reaction times were **5.4%** faster with a ventilation rate 12 l/s per person, compared to 4 l/s per person*

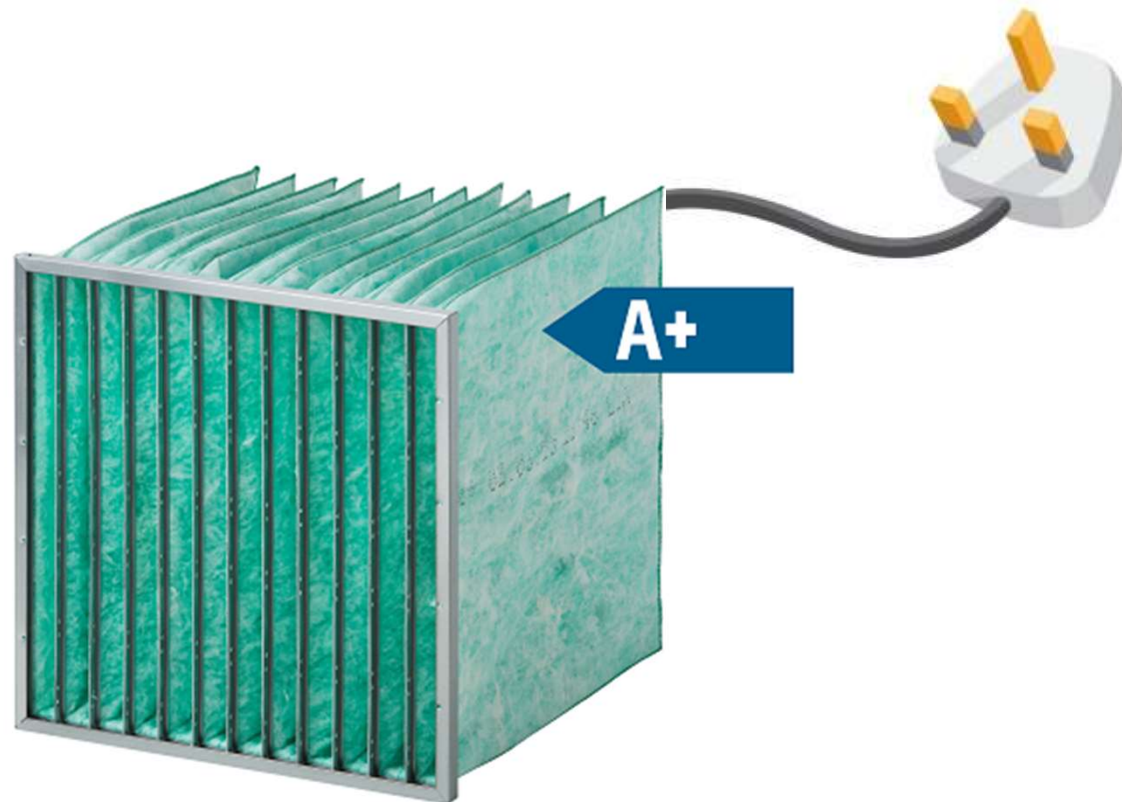


Source: 1. EPA: STUDENT HEALTH AND ACADEMIC PERFORMANCE Reference guide Quick Reference Guide. 2. Myhrvold, A. and E. Olesen, Pupil's health and performance due to renovation of schools, in Healthy Buildings/IAQ 1997. 1997. p. 81-86

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# HOW AIR FILTERS ARE RELATED TO ENERGY

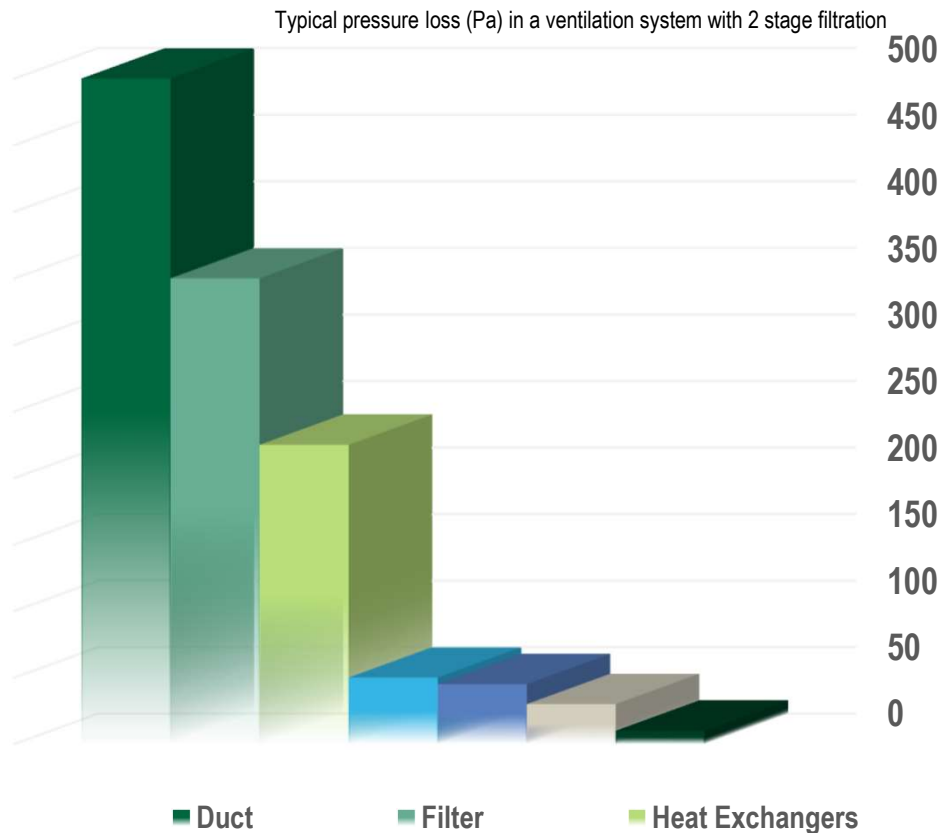


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# ENERGY SAVING POTENTIAL WITH FILTERS

- Filters are the 2<sup>nd</sup> largest contributor of Pressure drop in a HVAC air side
- Rule of thumb says that 70% of the energy bill comes from HVAC air treatment side
- Energy consumption is in direct proportion to the filter's average pressure loss



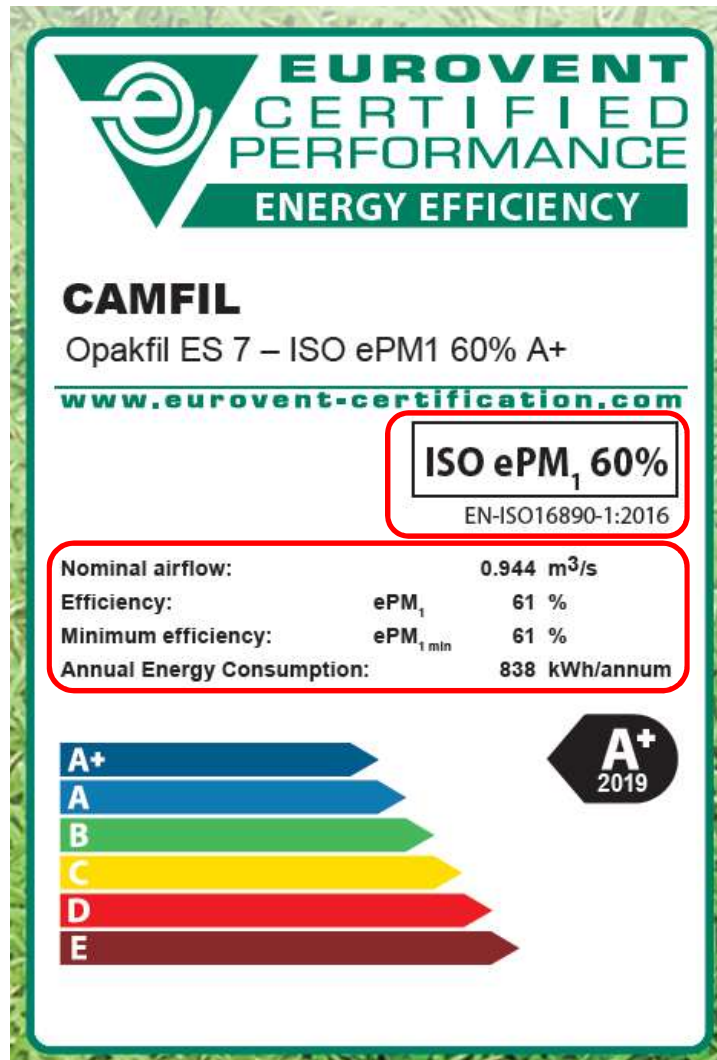


# ENERGY CLASSIFICATION

For General Ventilation

**AIR FILTERS** – based on EN ISO 16890 standard





## FULL SIZE 592 X 592 X 296 MM, ACCORDING TO EN 15805:2010

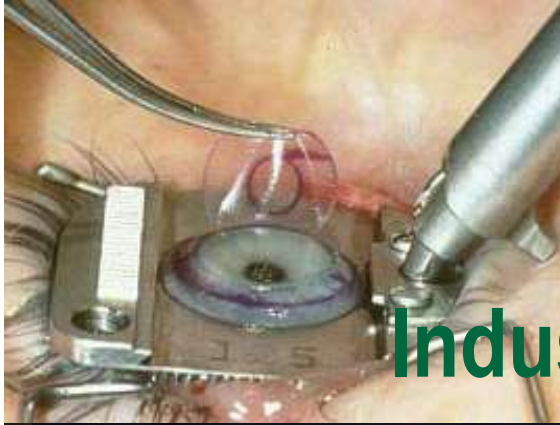
- Nominal airflow, 3400m<sup>3</sup>/h
- Efficiency, (average of initial and discharged)
- Minimum efficiency (discharged)
- Annual energy use, kWh/annum
- Energy class
- Values available at [www.eurovent-certification.com](http://www.eurovent-certification.com)

All independently tested by third party certified labs.

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# INDUSTRIAL AIR PURIFIERS / CLEANERS RANGE



Air Purifier  
City M



Concealed 300  
100m<sup>2</sup>



CC 1700  
300 m<sup>2</sup>



CC 2100  
400 m<sup>2</sup>

CC 6000  
6000 CMH  
1000m<sup>2</sup>



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## Why would I need a Camfil Air Cleaner?

For a healthier, happier & more productive workforce



To reduce maintenance & repair time on plant & machinery



To solve an odour or chemical problem in a specific area



### Benefits:

50-80% Cleaner Indoor Air

20-30% Lower Energy Consumption

30% Lower Maintenance Costs

Healthier Employees (Less Sick Leave)

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 camfil

THANK YOU!



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