

## RESPIRATOR TRAINING PROGRAM

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# FILTERS

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### ALL ABOUT FILTERS

#### Gas and particle filters

There are two major types of filters: gas filters and particle filters.

Gas filters protect ONLY against gas or vapour.

Particle filters protect ONLY against particles, such as dust, smoke, aerosols, mould, bacteria and so on.

If the atmosphere contains both gas and dust, both types must be used.

### WHY?

A particle filter is a very fine fibre mesh which captures dust particles while letting clean air through. But it will not stop gas or vapour from getting through.

A gas filter contains activated carbon, which works like blotting paper: it absorbs the gas molecules and binds them to the carbon before it can reach your lungs. However, the carbon is not an effective barrier to fine dust particles.



## FILTER TYPES

Whereas high efficiency particle filters provide protection against all types of particles, there are different gas filters for different gases.

The most common applications that require different gas filters are organic vapour (solvents); ammonia; acid gas; and sulphur dioxide.

The various filters can be recognised by their colour and their type identification. Here is a list of the most common filters:

Colour Code	Filter ID	Type
White	P	Particles
Brown	A	Organic vapour
Green	K	Ammonia
Grey	B	Acid gas
Yellow	E	Sulphur dioxide

If a filter has two or more codes, it is designed to give protection against more than one type of chemical

## FILTER CLASSES

Filters often come in different classes, usually expressed as a number after the Filter ID.

Particle filters are classified according to their efficiency: for instance, a P3 filter is capable of catching much smaller particles than a P1 or P2 filter.

In gas filters, the classification signifies the capacity of the filter, not the efficiency. For example, an A1 filter absorbs gas just as efficiently as an A2 filter, but does not last as long.

## OIL MIST

Most industrial atmospheres contain oil mist. The reason is that if compressed air is used to operate tools or machinery, those tools and machines are greased with oil, which escapes into the atmosphere. If you work underground, drilling equipment is also greased with oil which is exhausted out in the working atmosphere.

Particle filters work on either of two major principles: mechanical impact or electrostatic capture. If the filter mechanism is in any way reliant on electrostatic capture, there is a limit to how long you can use it in atmospheres containing oil mist, as oil degrades that type of filter. Some manufacturers recommend change at least every 40 hours of use or after 30 days, whichever occurs first, in atmospheres that contain oil aerosols.

Filters of the impact type do not rely on electrostatic charge. Such filters should be replaced every 160-240 hours in atmospheres containing any type of air borne particulates, or if the filter becomes too hard to breathe through, or if it is mechanically damaged.

## WHEN IS A FILTER "FINISHED"?

A particle filter should be replaced as soon as it 'clogs up' and becomes hard to breathe through. A gas filter should be replaced when the carbon cannot absorb any more gas. When this happens, the cartridge simply stops working, and harmful gas is let through. There is no significant increase in breathing resistance: that is why a gas cartridge must be replaced according to a change-over schedule. This schedule must take into account the concentration of gas, the temperature and humidity of the atmosphere, as well as the workload of the respirator users. The workload expresses how hard the person has to breathe in order to perform the task he or she is doing. (For more detailed information, see the Fact Box below).

By workload we mean how many litres/min (minute volume or MV) of air the person has to breathe to be able to perform the task he or she is doing. Below is an example. Note that speaking or shouting will significantly increase the speed at which the air is breathed in.

**At rest:** 6-13 Minute Volume (MV) with a Peak Inspiratory Air Flow (PIAF) of 25-53 litres without speech. If shouting is introduced, PIAF increases to 82-170 litres/min.

**Light work** (picking up an article from the floor and placing it on a bench): 10-22 MV with a PIAF of 55-95 litres without speech. If shouting is introduced, PIAF increases to 61-170 litres/min.

**Medium work** (walking on a treadmill at 6.5 kph at 0 degree incline): 17-48 MV with a PIAF of 124-153 litres without speech. If shouting is introduced, PIAF increases to 125-355 litres/min.

**Hard work** (walking on a treadmill at 6.5 kph at 5 degree slope uphill): 27-65 MV with a PIAF of 72-315 litres without speech. If shouting is introduced, PIAF increases to 147-430 litres/min.



## PRE-FILTER

The pre-filter is designed to filter out all coarse particles before the air hits the main filter. It extends the life of both gas and particle filters.

The pre-filter is a disposable item, which should be exchanged at least every day.

## SPECIAL FILTERS AND COMBINATION FILTERS

If you need protection from both dust and gas, you have two solutions:

### Special filters

Special filters already have two or several filter types in-built into a single filter. The colour marking and the type ID indicate where the filter can be used.

### COMBINATION FILTERS

A particle filter can be attached to a gas filter simply by pressing the two together with both hands, using even pressure until the filter and filter lock together with a sharp snap.

Attach the combination filter as per the manufacturer's instructions.

The particle filter may be separated from the gas filter with a coin or similar.

## HOW OFTEN SHOULD I CHANGE FILTERS?

The pre-filter should be replaced every day the mask is used.

Particle filters should be replaced as soon as you notice an increased breathing resistance, or if mechanical damage to the filter has occurred.

There is no precise gauge as to how long a particle filter will last, but a guideline is 4-6 weeks (160-240 hours), provided you use pre-filters.

Gas filters should be replaced according to a carefully documented change-over schedule, based on the concentration of contaminant, temperature, humidity and work load.

**Remember:** an exhausted gas filter lets hazardous vapour through without any decrease in breathing resistance. You must change filters regularly.

## FILTER STORAGE

Gas filters continue to absorb contaminants in the air even when you are not wearing the mask.

It is important to store the filter in an air-tight bag or container. Don't open sealed packaging until you need the new filter.

## SUMMARY

- Gas filters protect only against gas.
- Particle filters protect only against particles.
- Use a pre-filter.
- Exchange pre-filter daily.
- If you need protection from dust AND gas, you must use a special filter or a filter/filter combination.
- Store gas filters in a sealed bag or container.
- Always replace gas filters according to schedule, or if you can smell chemicals through the filter.

*Always make sure that you know how to use your respirator and how to check that it is working. Remember why you are wearing respiratory protection: not just to comply with safety regulations... but to maintain a healthy body and a healthy life, both for you and your family and friends. After all, there IS life after work!*

There is  
**LIFE**  
after  
**WORK!**



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