

## WHAT ARE THE DIFFERENT TYPES OF RESPIRATORS?

Respirators are categorized into three main categories based on their capabilities and limitations: 1) a Self-Contained Breathing Apparatus (SCBA), 2) an Air-Supplying Respirator, and 3) an Air-Purifying Respirator. The selection of the appropriate respirator will depend on the atmospheric hazard present, the measured or expected airborne concentration in the workplace, the physical demands of the tasks, and the capabilities and limitations of the respirator chosen.

### 1) Self-Contained Breathing Apparatus (SCBA)

A Self-Contained Breathing Apparatus (SCBA) will provide respiratory protection against gases, vapours, mists, particles and an oxygen deficient atmosphere. SCBA's provide a breathing gas to the worker allowing them to breathe independent air and not rely of surrounding atmosphere. SCBA's may be used in situations when there is the potential for immediately dangerous to life and health (IDLH) or oxygen deficient atmospheric conditions.



### 2) Air-Supplying Respirators



Similar to SCBA's mentioned above; air-supplying respirators provide atmospheric air to the user completely independent from the ambient air. An uncontaminated air source is provided to the worker via a hose connected to the user's facepiece or head enclosure. It is important to note that these devices may only be used in non-IDLH situations where the worker can escape without the use of the respirator. As such, in these situations, if the air-supplying respirator fails, the worker may remove the respirator and escape from the work area.

### 3) Air-Purifying Respirators

Contrary to SCBA's and air-supplying respirators, air-purifying respirators clean the contaminated air. The contaminated air passes through an air purifying element which will be a filter or a material that absorbs the contaminant of concern (gases, vapours, aerosols or a combination of contaminants) and reduces the amount of contaminant in the users breathing air. These respirators may be provided in "quarter"-face, half-face, full-face masks, a helmet or hood manner. In addition, the respirator may be a powered or non powered device.

Air-purifying respirators are broken down into three main categories:

1. Particulate (aerosol) removing respirator
2. Gas/vapour removing respirator
3. A combination of aerosol and gas/vapour removing respirator

The particulate respirator is the simplest, least expensive, and least protective of the respirator types available. These respirators only protect against particles. They do not protect against chemicals, gases, or vapors, and are intended only for low hazard levels. The commonly known "N-95" filtering facepiece respirator is one type of particulate respirator, often used in hospital to protect against infectious agents. Particulate respirators are "air-purifying respirators" because they clean particles out of the air as you breathe. It is very important to realize that even if you can't see the particles, there may be too many in the air for this respirator to provide adequate protection.





Gas/vapour cartridge respirators are also known as "air-purifying respirators" because they filter or clean chemical gases and possibly particles out of the air as you breathe. This respirator includes a facepiece or mask, and a filter/cartridge (if the filter is in a metal shell it is called a "canister"). It is important to note that there are also air-purifying respirators that not only provides protection against gases and vapours but also other biological or chemical aerosols that may be encountered in the workplace (i.e., mists, fumes etc.).

### **WHEN SHOULD I USE A RESPIRATOR?**

When used appropriately, respirators are there to protect individuals from breathing contaminated air. Some respirators (e.g. self contained breathing apparatus) will additionally supply breathing air in an oxygen-deficient atmosphere. Respirators should be used for protection only when engineering controls have been shown to be infeasible for the control of the hazard or during the interim period when engineering controls are being installed.

### **ARE THERE LIMITATIONS TO A RESPIRATOR?**

Respirators come in several varieties, each with its own set of cautions, limitations, and restrictions of use. Some respirators require testing to ensure a tight fit to the face, and may not be used with facial hair. Other models do not require a tight fit. Some prevent particulates from passing, while others remove chemicals as well as particulates

It is important to understand that each respirator has specific capabilities. If you do not use a respirator correctly, it is very likely that it will not protect you—and may even hurt you.

Due to the limitations of each type of respirator, a risk assessment needs to be completed to ensure that the correct respirator type is chosen for the work performed. Where respirators are to be used as a hazard control method, EHS will evaluate the risk(s) for the hazard(s) present and determine what respirator type is appropriate for the work performed.

### **HOW MUCH PROTECTION WILL MY RESPIRATOR PROVIDE?**

Air-purifying respirators reduce the exposure to the hazard, but if the exposure is such that it goes beyond what the filter is capable of handling (either because the amount of toxic gas or particles is more than what the filter is designed to handle, or because the exposure lasts longer than what the filter is designed to handle), the filter may not be effective in providing required protection. Also, there may be a small amount of leakage even if the fit of the respirator has been tested. Therefore, as the name indicates, these respirators "purify" the air but do not "eliminate" the contaminant from the air you breathe.

To account for this limitation, each type of respirator is given an assigned protection factor (APF). A given APF for a respirator is the pre-calculated protection level a respirator will be able to provide based on simulated work and work studies.

Please refer to Table 1 provided below to see a complete list of accepted APFs for each type of respirator.

**Table 1: Assigned Protection Factors based on Type of Respirator Used**

Type of Respirator	Half Mask	Full Facepiece	Helmet/Hood	Loose-fitting Facepiece
Air Purifying Respirator	10	100 <sup>a,b</sup>	N/A	N/A
Powered Air-Purifying Respirator	50	1000	1000 <sup>c</sup>	25
Supplied-Air Respirator (Demand)	10	100 <sup>b</sup>	N/A	N/A
Supplied-Air Respirator (Pressure Demand)	50	1000	N/A	N/A
Self-Contained Breathing Apparatus (Continuous Flow)	50	1000	1000	25
Self-Contained Breathing Apparatus (Demand)	10	100 <sup>b</sup>	N/A	N/A
Self-Contained Breathing Apparatus (Pressure Demand)	N/A	10,000 <sup>d</sup>	10,000 <sup>d</sup>	N/A

Note: All assigned protection factors (APFs) as outlined in CSA Z94.4-02: Selection, Use and Care of Respirators.

- The U.S. OSHA states a full facepiece respirator has an APF of 50.
- As indicated in the CSA Z94.4-02 Guidance document, a full facepiece respirator has an APF of 10 if a qualitatively fit tested.
- U.S. OSHA indicates that an untested hood has an APF of 25.
- Pressure demand SCBA's will provide the highest level of protection. That being said, limited Simulated Work Protection Factors (SWPF) provided in studies indicated that all users may not be able to achieve this assigned protection factor.

### CAN ANYONE WEAR A RESPIRATOR?

Breathing through a respirator is harder than breathing in open air. People with lung diseases such as asthma or emphysema, elderly people, and others may have trouble breathing. Some people with claustrophobia may not be able to wear a mask or hooded respirator. Some people with vision problems may have trouble seeing while wearing a mask or hood (there are special masks for people who need glasses).

### CAN ANY RESPIRATOR BE USED OR ARE THERE SPECIFIC TYPES?

No, all respirators shall be selected on the basis of hazards to be encountered in the workplace (i.e. particulates, vapors, mists, Oxygen-deficient atmospheres, or a combination). There are different respirators based on the hazard.

### WHAT DO THE DIFFERENT PARTICULATE RESPIRATOR CLASSIFICATIONS MEAN?

NIOSH will certify three classes of filters, N-, R-, and P-series, with three levels of filter efficiency, 95%, 99%, and 99.97%, in each class. The selection of N-, R-, and P-series filters depends on the presence or absence of oil particles. If no oil particles are present in the work environment, use a filter of any series (i.e., N-, R-, or P-series). If oil particles (e.g., lubricants, cutting fluids, glycerine, etc.) are present, use an R- or P-series filter. N-series filters cannot be used if oil particles are present. It is important to note that if oil particles are present and the filter is to be used for more than work shift, use only a P-series filter.

To help you remember the filter series, use the following guide:

- N for **Not** resistant to oil
- R for **Resistant** to oil
- P for oil-**Proof**

## **WILL MY CARTRIDGE/FILTER AND RESPIRATOR PROTECT ME FOREVER?**

Cartridges, filters, and masks get old. Cartridges can have a limited life. If the filter cartridges that attach to the mask are outdated, have been open to the air or are damaged, you are not protected. Cartridges that contain charcoal or other chemicals for filtering the air should be in air-tight packages. If cartridges are open or not packed in air-tight packaging, they should not be used. Even cartridges in original packaging have expiration dates that should be checked before use. Also, over time your mask can get old and break down. Keep your mask in a clean, dry place, away from extreme heat or cold. Inspect it according to the manufacturer's instructions.

## **HOW IS THE PROPER RESPIRATOR SIZE DETERMINED?**

Proper respirator size is determined through a fit test. Employees using negative or positive pressure tight-fitting facepiece respirators must pass an appropriate fit test.

## **WHEN DOES RESPIRATOR FIT TESTING NEED TO BE COMPLETED?**

Fit testing of all negative or positive pressure tight-fitting facepiece respirators is required prior to initial use, whenever a different respirator facepiece is used, and periodically thereafter in accordance with Carleton University's Respiratory Protection program. An additional fit test is required whenever there are changes in the user's physical condition that could affect respirator fit (e.g., facial scarring, dental changes, cosmetic surgery, or an obvious change in body weight).

You must be fit tested with the same make, model, style, and size of respirator that you will use during work.

## **CAN I BE FIT TESTED IF I HAVE A BEARD OR MOUSTACHE?**

It is important to have a good seal when using a respirator. Therefore, a qualitative respirator fit test will not be performed on individuals with facial hair that interferes with the seal of the respirator. If the facial hair sits inside the respirator, and the seal is against the skin, a fit test is feasible. Respirators that do not rely on a tight face seal, such as hoods or helmets, may be used by bearded/moustached individuals.

## **CAN I CHECK THE FIT OF MY RESPIRATOR?**

Yes. Employees using tight-fitting facepiece respirators are required to perform a user *seal check* each time they put on the respirator. A *user seal check* is a method to check to see if the user has correctly put on the respirator and adjusted it to fit properly by performing positive and negative pressure checks. This fit-check does not replace a fit test.

## **CAN A RESPIRATOR BE USED BY MORE THAN ONE PERSON? HOW OFTEN SHOULD I CLEAN AND DISINFECT THE RESPIRATOR?**

Disposable respirators cannot be disinfected, and are therefore assigned to only one person. Disposable respirators must be discarded if they are soiled, physically damaged, or reach the end of their service life. Replaceable filter respirators may be shared, but must be thoroughly cleaned and disinfected after each use before being worn by a different person.

## **HOW LONG CAN I USE MY PARTICULATE RESPIRATOR BEFORE IT NEEDS TO BE DISCARDED?**

Respirators with replaceable filters are reusable, and a respirator classified as disposable may be reused by the same worker as long as it functions properly. All filters must be replaced whenever they are damaged, soiled, or causing noticeably increased breathing resistance (e.g., causing discomfort to the wearer). Before each use, the outside of the filter material should be inspected. If the filter material is

physically damaged or soiled, the filter should be changed (in the case of respirators with replaceable filters) or the respirator discarded (in the case of disposable respirators).

Always follow the respirator filter manufacturer's service-time-limit recommendations.

### **WHAT IS THE PROPER WAY TO STORE MY RESPIRATOR?**

Respirators must be stored to protect them from damage, contamination, dust, sunlight, extreme temperatures, excessive moisture, and damaging chemicals. They must also be packed or stored to prevent deformation of the facepiece and exhalation valve.

A good method is to place them in individual storage bins. Keep in mind that respirator facepieces will become distorted and the straps will lose their elasticity if hung on a peg for a long time. Check for these problems before each use.

Storing the respirator in a plastic sealable bag after use is not considered a good practice. The respirator may be damp after use and sealing prevents drying and encourages microbial growth. If plastic bags are used, respirators must be allowed to dry before storage.

### **CAN I WEAR MY GLASSES (SAFETY OR NON-SAFETY) WHILE WEARING A RESPIRATOR?**

Yes, but the corrective glasses or goggles and other personal protective equipment, must be worn in a manner that does not interfere with the seal of the facepiece to the face of the user. Furthermore, all glasses or other equipment that may be used while the respirator is worn must be worn during the fit testing process to ensure that the equipment does not interfere with the seal around the face.