

## General Respiratory Protection Guidance for Employers and Workers

The information in this bulletin will provide basic information to workers and employers who may find themselves using respiratory protection for the first time. The guidance provides information on what respirators are, how they work, and what is needed for a respirator to provide protection.

### What is a respirator?

A respirator is a device that protects you from inhaling dangerous substances, such as chemicals and infectious particles. Respirators are among the most important pieces of protective equipment for working in hazardous environments. Selecting the right respirator requires an assessment of all the workplace operations, processes or environments that may create a respiratory hazard. The identity of the hazard and its airborne concentrations need to be determined before choosing a respirator. This assessment should be done by experienced safety personnel or by an industrial hygienist. There are several different types of respirators, as described below.

### How do respirators work?

Respirators work by either filtering particles from the air, chemically cleaning (purifying) the air, or supplying clean air from an outside source.

**Particulate Respirators:** Particulate respirators are the simplest, least expensive, and least protective of the respirator types available. These respirators only protect against particles (e.g., dust). 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 or "dust mask" is one type of particulate respirator, often used in hospitals to protect against infectious agents. Particulate respirators are "air-purifying respirators" because they clean particles out of the air as you breathe.

### Particulate respirators:

- Filter out dusts, fumes and mists.
- Are usually disposable dust masks or respirators with disposable filters.
- Must be replaced when they become discolored, damaged, or clogged.
- Examples: filtering facepiece or elastomeric respirator.

**Chemical Cartridge/Gas Mask Respirator:** Gas masks are also known as "air-purifying respirators" because they filter or clean chemical gases out of the air as you breathe. This respirator includes a facepiece or mask, and a cartridge or canister. Straps secure the facepiece to the head. The cartridge may also have a filter to remove particles.

Gas masks are effective only if used with the correct cartridge or filter (these terms are often used interchangeably) for a particular biological or chemical substance. Selecting the proper filter can be a complicated process. There are cartridges available that protect against more than one hazard, but there is no "all-in-one" cartridge that protects against all substances. It is important to know what hazards you will face in order to be certain you are choosing the right filters/cartridges.

### Chemical Cartridge/Gas Mask respirator:

- Uses replaceable chemical cartridges or canisters to remove the contaminant.
- Are color-coded to help you select the right one.
- May require more than one cartridge to protect against multiple hazards.

**Powered Air-Purifying Respirator (PAPR):**

Powered air-purifying respirators use a fan to draw air through the filter to the user. They are easier to breathe through; however, they need a fully charged battery to work properly. They use the same type of filters/cartridges as other air-purifying respirators. It is important to know what the hazard is, and how much of it is in the air, in order to select the proper filters/cartridges.

**Self-Contained Breathing Apparatus (SCBA)** is the respirator commonly used by firefighters. These use their own air tank to supply clean air, so you don't need to worry about filters. They also protect against higher concentrations of dangerous chemicals. However, they are very heavy (30 pounds or more), and require very special training on how to use and to maintain them. Also, the air tanks typically last an hour or less depending upon their rating and your breathing rate (how hard you are breathing).

**Self-Contained Breathing Apparatus:**

- Provide clean air from a portable air tank when the air around you is simply too dangerous to breathe.

All of these respirators (except for the "dust masks" or filtering face pieces) are available in either half-mask or full-face pieces.

**What are respirators made from?**

Filtering facepiece (dust masks) are generally made directly from a cloth-like filter material. Chemical cartridge/gas mask respirators can be made from a variety of materials. The most popular facepiece materials are silicone, neoprene, and rubber. In general, rubber and neoprene are rigid, durable materials. Silicone is

usually preferred for its comfort, flexibility and ease in cleaning. Full-face respirators are available with strap harnesses or ratchet suspensions. The harness type can be worn under a hard hat, but ratchet suspensions are generally easier to adjust, making donning and doffing easier.

**What optional features are available for respirators?**

Various features are available to help you customize respirators to suit your employees and the specific hazards they encounter. For example, nose cups reduce lens fogging with full facepiece respirators and lens covers protect the lens from paint, minor chemical splash and scratches.

Spectacle kits are needed when using prescription corrective lenses. The frame mounts into full-face masks, and the prescription lenses are made by the users' optometrist. This allows the wearer to maintain a proper fit and still wear prescription lenses.

**How are particulate filters classified?**

There are nine classes of particulate filters which are broken down into three series: N, R, and P. Each series (N, R, and P) is available at three efficiency levels: 95%, 99%, and 99.97%. The N series filter is used in environments free of oil mists. The R series filters can be exposed to oil mists, but should only be worn for one work shift. The P filter can be exposed to oil mists for longer than one work shift.

**What is the color coding for gas mask chemical cartridges/canisters?**

All cartridges are assigned a color designating the type of contaminant they filter:

Contaminant	Color Coding on Cartridge/Canister
Acid gases	White
Hydrocyanic acid gas	White with 1/2 inch green stripe completely around the canister near the bottom.
Chlorine gas	White with 1/2 inch yellow stripe completely around the canister near the bottom.
Organic vapors	Black
Ammonia gas	Green
Acid gases and ammonia gas	Green with 1/2 inch white stripe completely around the canister near the bottom.

Carbon monoxide	Blue
Acid gases & organic vapors	Yellow
Hydrocyanic acid gas and chloropicrin vapor	Yellow with 1/2 inch blue stripe completely around the canister near the bottom.
Acid gases, organic vapors, and ammonia gases	Brown
Radioactive materials, except tritium & noble gases	Purple (magenta)
Pesticides	Organic vapor canister plus a particulate filter
Multi-Contaminant and CBRN agent	Olive
Any particulates - P100	Purple
Any particulates - P95, P99, R95, R99, R100	Orange
Any particulates free of oil - N95, N99, or N100	Teal

### Are there any cautions or limitations when using respirators?

Yes. Each type of respirator can come in several varieties, each with its own set of cautions, limitations, and restrictions of use. Tight fitting respirators require fit testing to ensure an adequate fit to the face, and cannot be used with facial hair. Certain escape respirators use a nose clip and mouthpiece, which is clenched between your teeth, similar to a snorkel. Some respirators prevent the user from talking while others have speaking diaphragms or electronic communication devices. Every respirator contaminated with hazardous chemicals should be cleaned and decontaminated or disposed of properly.

All respirators require training in order to be properly used. Sometimes you can practice using your own respirator. Some escape respirators come in a package that must remain sealed until use, so you need to be trained using a special "practice" version. Training is extremely important in regard to the storage, maintenance, use, and disposal of the respirator. This information is provided by the supplier of the respirator (i.e., seller, distributor, or manufacturer).

If you do not use a respirator correctly, it is very likely that it will not adequately protect you and may even hurt you.

### How well does a respirator need to fit me?

If your mask does not make a tight seal all the

way around your face when you inhale, you may breathe contaminated air that leaks around the edges of the face seal. Most respirators come in different styles and sizes, and fit different people differently because people's faces have different shapes. You also need training to know how to correctly put the mask on and wear it correctly. This information should be provided by the supplier of the respirator.

The only way to tell if a tight-fitting respirator fits you properly, and is capable of protecting you, is to fit test the respirator. Fit testing can be accomplished a number of different ways and should be done by a health and safety professional before workers wear a respirator in a hazardous environment. Respirators must be checked for proper fit each time they are donned to ensure they provide adequate protection.

### Can I wear a respirator if I have a beard?

Anything that prevents the face mask from fitting tightly against your face, such as a beard or long sideburns, may cause leakage. If your respirator requires a tight fit, you must trim back your beard so that it will not interfere with the face-facepiece seal. If your respirator is a loose-fitting (hooded) positive pressure respirator (e.g., a powered air-purifying respirator, PAPR) then you may have a beard.

### If I have the right cartridges/filters for a certain hazard, and my mask fits, will they always protect me against that hazard?

No. Gas masks and respirators reduce expo-

sure 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. If so, and if there is a large amount of a toxic chemical in the outside air, even that small leakage can be dangerous.

#### Can anyone wear a respirator?

No. Breathing through a respirator is more difficult than breathing in open air. People with lung diseases, such as asthma or emphysema, elderly people, and others may have trouble breathing. People with claustrophobia may not be able to wear a full facepiece or hooded respirator. People with vision problems may have trouble seeing while wearing a mask or hood (there are special masks for people who need glasses). Employees must be medically evaluated before assigned to use a respirator.

#### Will my cartridge/filter and respirator mask protect forever?

No. Cartridges, filters, and masks get old. If the filter cartridges are outdated, have been open to the air or are damaged, you may not be protected. Cartridges that contain charcoal or other chemicals for filtering the air should be kept in air-tight packages until use. 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 purchase and 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 before and after use according to the manufacturer's instructions. Cartridges also have a limited service life; they must be changed periodically during use.

#### Will a gas mask protect me if there is not enough oxygen in the air?

No. Air-purifying respirators do not provide oxygen. If used in an environment with low oxygen levels, such as in a fire or a confined space, you are in danger of asphyxiation.

#### Will a gas mask protect me if there is a fire?

Most will not. It's important to read the manufacturer's information if your main concern is to be able to escape from a smoke-filled building. Smoke particles can rapidly clog gas mask filters, and filters with special chemicals are needed to protect against carbon monoxide and other gases that may occur in a fire. Not all gas masks or escape respirators protect against these hazards. Some components, including hoods and facepieces, of many of the gas masks and escape respirators may melt if exposed to a fire.

#### Once I put on my gas mask, how long will it last?

That depends on how much filtering capacity the respirator has and the amount of hazard in the air – the more chemical or biological hazard in the air (higher concentration), the shorter the time your filter will last. There is no absolute time limit, and it will vary by each respirator model's capacities and the concentration of the hazard.

#### QUESTIONS TO CONSIDER REGARDING ANY RESPIRATOR YOU ARE CONSIDERING PURCHASING:

- What protection (which chemicals and particles, and at what levels) does the respirator provide?
- Is there more than one size?
- Which size should I use?
- How do I know if the gas mask or respirator will fit?
- What type of training do I need?
- Are there any special maintenance or storage conditions?
- Will I be able to talk while wearing the respirator?
- Does the hood restrict vision or head movement in any way?
- Can I carry the device in the trunk of my automobile?
- Is a training respirator available?

#### Additional Information

For more information on OSHA's rules and requirements related to respiratory protection, visit OSHA's website at [www.osha.gov/SLTC/respiratoryprotection/index.html](http://www.osha.gov/SLTC/respiratoryprotection/index.html)

**This is an informational bulletin, advisory in nature, and intended to further the safety and health of workers and employers. It does not impose any new compliance requirements. For a comprehensive list of compliance requirements of OSHA standards or regulations, refer to Title 29 of the Code of Federal Regulations. This information will be made available to sensory impaired individuals upon request. The voice phone is (202) 693-1999; teletypewriter (TTY) number: (877) 889-5627.**

For more complete information:



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