# Respiratory Protection




## WHAT’S AT STAKE?

Workplaces require millions of worker to wear respirators. Workers are protected against insufficient oxygen environments, harmful dusts, fogs, smokes, mists, gases, vapors and sprays by their use of respirators.

## WHAT’S THE DANGER?

Whenever engineering and work practice control measures are not adequate to prevent atmospheric contamination at the worksite, employees need to wear respirators. Enclosing or confining the contaminant – producing operation, exhausting the contaminant, or substituting with less toxic – materials are strategies for preventing atmospheric contamination.

## HOW TO PROTECT YOURSELF

Two basic ways respirators protect the user from removal

1. Respirators include particulate respirators which filter out airborne particles, and
2. Air-purifying respirators with cartridge canisters which filter out chemicals and gases.

Employees must use respirators while effective engineering controls, if they are feasible, are being installed. If engineering controls are not feasible, employers must provide respirators and employees must wear them when necessary to protect their health. The employee’s equipment must be properly selected, used, and maintained for a particular work environment and contaminant. In addition, employers must train employees in all aspects of the respiratory protection program.

## Effective Respiratory Protection Program

Objective exposure to air contaminated with harmful dusts, fogs, fumes, mists, gases, smokes, vapors, or sprays, and to prevent occupational illness.

## Program Administrator

- Must be responsible for the program.
- Must be knowledgeable about respirators to supervise the program properly.

## General

Larger plants or companies with industrial hygiene, in-house medical department, safety engineering, or fire prevention departments should administer the program in liaison with the program administrator. In smaller plants without specialists, an upper-level superintendent, foreman, or qualified person must serve as program administrator.

Any respirator program should stress thorough training of all respirator users. Employees must be aware that a respirator does not eliminate the hazard. If the respirator fails, the user will be overexposed to dangerous substances. To reduce the possibility of failure, the respirator must fit properly and be maintained in a clean and serviceable condition.

## The following factors must be addressed in any respiratory program

- Written worksite specific procedures
- Program evaluation
- Selection of an appropriate respirator approved by the National Institute for Occupational Safety and Health (NIOSH)
- Training
- Fit testing
- Inspection, cleaning, maintenance, and storage
- Medical evaluations
- Work area surveillance; and
- Air quality standards.

## Choose the Correct Respirator

It Involves:

- Determine what the hazard is and its extent,
- Consider factors that affect respirator performance and reliability, and
- Select an appropriate NIOSH-certified respirator.

## Selection Factors

- When selecting respirators, employers must consider the chemical and physical properties of the contaminant, as well as the toxicity and concentration of the hazardous material and the amount of oxygen present. Other selection factors are nature and extent of the hazard, work rate, area to be covered, mobility, work requirements and conditions, as well as the limitations and characteristics of the available respirators.
- **Air-purifying respirators** use filters or sorbents to remove harmful substances from the air. They range from simple disposable masks to sophisticated devices. They do not supply oxygen and must not be used in oxygen-deficient atmospheres or in other atmospheres that are immediately dangerous to life or health (IDLH).
- **Atmosphere-supplying respirators** are designed to provide breathable air from a clean air source other than the surrounding contaminated work

atmosphere. They include supplied-air respirators (SARs) and self-contained breathing apparatus (SCBA) units.

# INSPECTION CARE OF RESPIRATORS

## Attention to Wear and Tear

It is important to inspect all respirators for wear and tear before and after each use, giving special attention to rubber or plastic parts that can deteriorate or lose pliability. The facepiece, headband, valves, connecting tube, fittings, and cartridges, canisters or filters must be in good condition. A respirator inspection must include checking the tightness of the connections.

## Monthly Inspection

Users must inspect SCBAs at least monthly and ensure that air and oxygen cylinders are fully charged according to the manufacturer’s instructions. The inspection should include a check of regulator and warning devices to ensure their proper function. Employers must keep records of inspection dates and findings.

## Replacement Protocol

Users should replace chemical cartridges and gas mask canisters as necessary to provide complete protection, following the manufacturer’s recommendations. In addition, they should replace mechanical filters as necessary to avoid high resistance to breathing.

## Experienced Repair Service

Only an experienced person is permitted to make repairs, using parts specifically designed for the respirator. This person must consult the manufacturer’s instructions for any repair and no attempt should be made to repair or replace components or make adjustments or repairs beyond the manufacturer’s recommendations.

## Clean and Disinfect

The employer must ensure that respirators are cleaned and disinfected as often as necessary to keep them sanitary. In addition, the employer must ensure that emergency-use respirators are cleaned and disinfected immediately after each use.

## Sanitizers

Respirators should be washed in a detergent solution and then disinfected by immersing them in a sanitizing solution. Cleaner-sanitizers that effectively clean the respirator and contain a bactericidal agent are available commercially. The bactericidal agent frequently used is a quaternary ammonium compound. Strong cleaning and sanitizing agents and many solvents can damage rubber or plastic respirator parts. Use these materials with caution or after consultation with the respirator manufacturer.

### Respiratory Storage

Users must store respirators in a way that protects them against dust, sunlight, heat, extreme cold, excessive moisture, and damaging chemicals. When packed or stored, each respirator should be positioned to retain its natural configuration. Facepieces and exhalation valves should rest in a normal position to prevent the rubber or plastic from deforming.

## TWO KINDS OF RESPIRATORY PROTECTION

- Air-purifying respirators are used against particulates, gases and vapors. These are categorized as negative-pressure respirators that use chemical cartridges and/or filters; gas masks; and positive-pressure units such as powered air-purifying respirators (PAPRs).
- Air-supplied devices rely on a primary air source to deliver a steady flow of respirable air to the user’s facepiece. These consist of Self-Contained Breathing Apparatus (SCBA) and air-line devices.

### Air-Purifying Respirators

Air-Purifying Respirators (APRs) range from simple disposable cup masks to low-maintenance half-mask facepieces with cartridges and/or filters to the more complex PAPRs with full facepieces or hoods.

- APRs for particulates use filters to capture dusts, mists and fumes. Filters do not protect against gases or vapors, and generally become less effective as particles accumulate on the filter and plug spaces between the fibers. Filtering APRs require filter replacement when the user finds it difficult to breathe through them.
- **Gas and vapor APRs** employ chemical cartridges or canisters to remove hazardous gases or vapors from the air. They do not protect against airborne particles. Made to protect against specific gases or vapors, they provide protection only as long as the cartridge’s absorbing capacity is not depleted.
- **Combination APRs,** fitted with both particulate filters and gas/vapor cartridges, are worn in atmospheres that contain hazards of both particulates and gases.
- **PAPRs** provide a continuous filtered airflow with a battery-operated blower. Includes a facepiece, hood or helmet, breathing tube and a canister/cartridge/filter type assembly.

### Supplied-Air Respirators

Supplied-Air Respirators (SARs) comprise air-line respirators, SCBA and combination (supplied-air) respirators.

- **Air-line respirators** are used for extended periods in non-IDLH atmospheres. They use a hose (air-line) to deliver clean breathing air from a stationary source of compressed air for prolonged periods of time. Although comparatively lightweight, air-line respirators can limit users’ mobility.
- **Self-contained breathing apparatus (SCBA)** have an open-circuit design that provides air rated for 30 to 60 minutes. They consist of a wearable, clean-air supply and a tight-fitting facepiece, and are used for short-duration (30- to 60-minute rated) work shifts and entrance to or escape from

atmospheres that are or may be IDLH. They offer relatively unrestricted movement.
- **Combination SARs** are air-line devices used for extended work periods in atmospheres that are or may be IDLH. They have an auxiliary self-contained air cylinder that can be used if the primary air supply fails. The air cylinder can also be used for entry into or escape from IDLH atmospheres, such as confined spaces.

Employers are required to provide employees using SARs with breathing gases of high purity and ensure that compressed air, compressed oxygen, liquid air and liquid oxygen used for respiration is in accordance with the specifications of OSHA Standard 1910.134(i). Whether your inspection takes you inside a rail car to examine coatings or through a paint shop, make sure you’re wearing the appropriate respiratory protection.

## FINAL WORD

Respiratory protection can save a life, hazards in the workplace may not seem as serious to you but regular exposure to certain materials and particles can lead to chronic illnesses and can cause drastic damage to your lungs.