

# RESPIRATORY PROTECTION

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## INTRODUCTION

There is no substitute for a good ventilation system in protecting your manufacturing plant employees who are exposed to airborne contaminants generated from sanding, grinding, painting or other operations. However, where ventilation cannot adequately control the hazard due to large items being processed or where workers are continually mobile along an assembly line, then properly used respirators can protect the worker.

The use of respiratory protection devices can often help reduce occupational diseases and injuries that result from harmful dust, fumes, mist, gases, or vapors. Under some circumstances, airborne contaminants can be mitigated through engineering controls such as substitution and ventilation, coupled with administrative measures like staff

rotation and shift scheduling. However, when such controls are not practical or effective, respiratory devices should be used either as the primary means of direct protection or as a supplement to other controls.

Proper use of respirators is not as easy as giving an employee a respirator and hoping for the best! The OSHA standard 1910.134 mandates that a Respiratory Protection Program is necessary where respirators are necessary to protect the health of the employee or whenever respirators are required by the employer. You may review a video on respiratory Protection in General Industry developed by OSHA at this link: [https://www.osha.gov/video/respiratory\\_protection/general\\_industry.html](https://www.osha.gov/video/respiratory_protection/general_industry.html).

## RESPIRATOR PROGRAMS

The **basic** requirements for a respirator program are as follows:

- The program is administered by a qualified trained individual.
- The program is in writing and include standard operating procedures.
- A hazard assessment is conducted in the selection of respirators.
- Only NIOSH certified respirators are used.
- Employee medical evaluations are made and records are maintained for each employee who wears a respirator.
- Employee fit tests are conducted by a qualified person or company. Employees can only use the type of respirator that they were fit tested for.
- The program includes employee training addressing: inspections, cleaning and care, seal tests, maintenance schedules, and communication issues.
- Annual program audit including plant work assessments to ensure the written program is functioning as intended, and to modify the program based on any operation changes that may have occurred.
- Supervisors and managers should be evaluated based on the effectiveness of the program as determined by the annual audit.

**NOTE:** Many additional controls and safeguards must be incorporated into the respirator program if there are special work atmospheres that are oxygen deficient or require an outside air supply source.

## DEFINITION AND CLASSIFICATION

A respirator is a device worn over the mouth and nose to protect the worker from airborne contaminants. Due to the increasing number of contaminants in the workplace today, a variety of protection devices are now available to deal with very specific conditions. As such, choosing the right equipment has become a complicated issue.

The National Institute for Occupational Safety and Health (NIOSH) and Occupational Safety and Health Administration (OSHA) have published useful information on classifications, training, and standards to help employers and workers gain a clearer understanding of the specific purpose of each type of protection device. Their websites are listed at the end of this article.

Below are highlights of two classifications of devices: "air purifying devices" that help remove contaminants before they can be breathed; and "atmosphere supplying devices" that provide a separate source of air when the oxygen level is low.

## AIR PURIFYING RESPIRATORS

### FOR USE ONLY WITH ADEQUATE OXYGEN

- Particulate removing (mechanical filter) type
- Gas and vapor removing (chemical cartridge) type
- Combination of the above
- Gas masks

### ADDITIONAL AIR PURIFYING STYLE RESPIRATORS

- Single use, maintenance-free respirators. Usually called "disposable" or "dust masks."
- Designed for protection against dusts, fumes and mists below certain levels.
- Half mask and full face respirators made of durable and washable material. They can be fitted with cartridges that offer protection against a variety of contaminants and, if needed, may be used in combination. However, these units are not designed to protect against extremely high levels of contaminants that reach IDLH levels (Immediately Dangerous to Life and Health).
- Hoods with or without powered air-purifying respirators units.

## ATMOSPHERE-SUPPLYING RESPIRATORS

### HOSE EQUIPPED ATMOSPHERE-SUPPLYING RESPIRATORS

- Hose mask
- Airline respirator (continuous flow, demand, or pressure demand)

### SELF CONTAINED BREATHING APPARATUS

- This type of respirator generally consists of a full face mask connected by valves and regulators to either a fixed airline or a portable air supply (cylinders, self-generation units).

## SELECTION AND USE

Choose the respiratory protective equipment based on the conditions under which it will be used. A careful analysis of the contaminants present in the workplace will help determine the specific type and classification of protection device that should be used. Before selecting equipment, ask the following questions:

- What types of substance will the worker be exposed to on the job?
- What are the physical properties and hazards of each substance?
- What are the conditions of exposure and what is the expected concentration of air contamination?
- Will there will be adequate oxygen in the air (>19.5%)? Note that some contaminants can significantly displace oxygen.
- What are the physical limitations that could impact the safety of workers (e.g., restriction of movement)?
- Has adequate training been provided to workers regarding the use and fit of a respirator?
- Do you have a formal safety program in place?

**Special note:** Workers using respirators in oxygen deficient atmospheres (< 19.5%), or where high concentrations of toxic contaminants exist, should be provided with an independent source of clean air. The separate supply of air must meet strict requirements (Type 1, Class D air - ANSI/CGA) and should be routinely checked for oxygen content, as well as for levels of carbon monoxide, oil mist, and carbon dioxide.

For less hazardous conditions, respirators equipped with dust filters or chemical cartridges may be sufficient. Chemical contaminants (organic vapors, acid gases, and ammonia, among others) require a specific cartridge for each condition. Keep in mind that dust filters provide NO protection against gases and vapors. When these contaminants are present (as in spray painting), it is advisable to apply a combination of filters for added protection.

All chemical cartridges should have an end-of-life indicator or calculated change-out schedule established.

## TRAINING AND EDUCATION

Training should assist workers in the proper selection and maintenance of respirator devices, and include instructions on how to use them intelligently, confidently, and safely.

To assure that respirators are properly used, conduct periodic refreshers. The following points should be covered in any training program:

- The nature of potential hazards, whether acute and/or chronic, with an appraisal of the consequences of failing to use a respirator.
- An explanation of why engineering or other controls may not be feasible.
- Clarification of the purpose of the selected unit and an explanation of its intended purpose.
- Details of the capabilities and limitations of the equipment.

Training should also include hands-on experience with the device – have it fitted properly, test the seal for proper fit, wear it in normal air environment to become familiar with its operation, and wear it in a live test atmosphere. Workers should feel comfortable using the device and be confident that they are using it correctly and safely.

## MAINTENANCE AND CARE

For maximum effectiveness, all safety equipment should be properly maintained on a regularly scheduled basis. Institute a maintenance and care program that is based on your type of plant, working conditions, and hazards. Keep the following points in mind when developing your maintenance program:

- Conduct regular inspections and check for equipment defects, including leaks.
- Establish procedures for cleaning and disinfecting equipment after each use.
- Assign trained personnel to make needed repairs when required.
- Provide proper storage of all equipment when not in use.

## INSPECTIONS

Qualified and dedicated personnel should conduct frequent and random inspections of all safety equipment. Respirators should be properly selected, used, cleaned, and maintained.

While qualified individuals should conduct safety inspections, it is incumbent upon the actual user of any respiratory device to inspect the unit each and every time it is used. Users should not rely solely on someone else to determine the viability of any piece of safety equipment.

## MEDICAL SUPERVISION

Employees should never operate respiratory protection devices without first demonstrating that they have the physical capabilities to operate the equipment on the job. OSHA standard 29CFR1910.134 (and state equivalents) provides for a health questionnaire and subsequent medical clearance of all workers assigned to jobs requiring the use of respiratory devices. Some medical and physical limitations may prevent an individual from wearing and using a respirator.

## RESPIRATORY PROTECTION PROGRAM (RPP)

Federal and state regulatory agencies have established requirements for respiratory protection programs (RPP). Your RPP should adhere to the following guidelines:

- All procedures should be in writing.
- Procedures for making appropriate respirator selection.
- Conduct medical evaluation of respirator users.
- Test for face seal fit at least annually.
- Procedures for routine and emergency use.
- Provide for respirator cleaning and disinfecting, storage, inspection, maintenance and repair.
- Supply appropriate oxygen sources for air-supplied devices.
- Conduct annual employee training program.
- Examine the entire program periodically.
- Designate specific person in charge of the RPP.

## FOR FURTHER ASSISTANCE

Occupational Safety and Health Administration (OSHA)

[https://www.osha.gov/SLTC/etools/respiratory/respirator\\_basics.html](https://www.osha.gov/SLTC/etools/respiratory/respirator_basics.html)

National Institute for Occupational Safety and Health (NIOSH)

<https://www.cdc.gov/niosh/topics/respirators/>

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