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## PPE

### Overview

#### Introduction

OSHA requires employers to protect their employees from workplace hazards such as machines, work procedures, and hazardous substances that can cause injury. The preferred way to do this is through engineering controls or work practice and administrative controls, but when these controls are not feasible or do not provide sufficient protection, an alternative or supplementary method of protection is to provide workers with personal protective equipment (PPE) and the know-how to use it properly.

#### Definition: personal protective equipment

Personal protective equipment, or PPE, includes a variety of devices and garments to protect workers from injuries. PPE is designed to protect these body parts:

- Eyes
- Face
- Head
- Ears
- Feet
- Hands and arms

These are PPE items:

- Goggles
- Face shields
- Safety glasses
- Hard hats
- Safety shoes
- Gloves
- Vests
- Earplugs
- Earmuffs



Safety gear should be used and never, ever be refused.

## The PPE Program

### Introduction

The OSHA standards requiring PPE are found at 29 CFR Part 1910.132. This standard requires employers to establish general procedures, called a PPE program, to give employees necessary protective equipment and to train them to use it properly. This program sets out procedures for selecting, providing, and using PPE as part of your routine operation.

### Supervisor responsibilities

Supervisors are not responsible for establishing the written PPE Program; however, supervisors are responsible for the following:

- Ensuring working conditions are assessed for hazards
- Providing PPE to employees at DLA expense
- Training employees on proper care and use of PPE

### Providing PPE

DLAI 6055.1 states that employees will be provided the necessary PPE to protect against workplace hazards. The PPE is provided at DLA expense.

OSHA has interpreted its general PPE standard to require employers to provide and to pay for personal protective equipment required for the worker to do his or her job safely and in compliance with OSHA standards. Where equipment is very personal in nature and is usable by workers off the job, the matter of payment may be left to labor-management negotiations. Examples of PPE that is personal in nature and often used away from the worksite include non-specialty safety glasses, and safety shoes. However, shoes subject to contamination by carcinogens or other toxic or hazardous substances, which cannot be safely worn off-site, must be paid for by the employer. Failure of the employer to pay for PPE that is not personal and not used away from the job is a violation.

### Average allowance

The "average allowance" for safety shoes (or other PPE) should be used for budget planning. The cost of the shoes (and other PPE) should be based on each employee's need.

An Example: Two employees work in the SAME working environment. One employee purchases a pair from the shoe store for less than \$80.00. Another employee has to "special order" a unique size for \$350.00. Given this situation, consider these questions:

- Is the person who is required to "special order" PPE financially penalized for having a physical attribute that can not be easily fitted?
- If the same employee has to pay extra for their physical attribute would there be a grievance filed?

If the answer is yes to either question the employee should be reimbursed for the purchase. Contact your local SOHO and labor management office to determine local policies, practices, and allowances for purchasing PPE.

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## **The PPE Program, Continued**

### **Training requirement**

Before doing work requiring the use of PPE, employees must be trained to know the following:

- When PPE is necessary
- What type is necessary
- How to properly put on, take off, adjust, and wear the PPE
- What its limitations are
- Proper care, maintenance, useful life, and disposal

Employers must certify in writing that training has been carried out and that employees understand it. Each written certification shall

- contain the name of each employee trained
- identify the date(s) of training, and
- identify the subject certified.

## Hazard Assessment

### Introduction

The goal of a hazard assessment is to identify potential hazards in the workplace. Supervisors can identify some of the more obvious hazards. In most cases, however, they do not have the technical background to identify all potential hazards. Hazard assessments should be conducted with the assistance of the safety and health office.

### Hazard identification

Begin with a survey of your workplace to identify hazards. Observe the environment in which your employees work. Ask employees how they perform their tasks. Look for sources of potential injury such as the following:

- Objects that might fall from above
- Exposed pipes or beams at work level
- Exposed liquid chemicals
- Sources of heat, intense light, noise, or dust
- Equipment or materials that could produce flying particles

The checklist in appendix B will help you with these decisions.

### Controls

If you find any potential hazards, determine if there are feasible engineering and work practice controls that could be used to avoid hazards. Enlist the technical expertise of your local safety and health office, facilities office, public works, etc.

Engineering controls: You can physically change the machine or work environment to prevent employee exposure to the potential hazard, e.g., adding a guard to the machine or building a barrier in the room between employees and the hazard.

Work practice/administrative controls: You can remove your employees from exposure to the potential hazard by changing the way they do their jobs.

Employers should institute all feasible engineering, work practice, and administrative controls to eliminate or reduce hazards before using PPE to protect employees against hazards.

**Check Your Knowledge**

**PPE**

Answer the following questions concerning the PPE Program and Hazard Assessments.

1. It is the SOHO's responsibility to ensure working conditions are assessed for hazards.

a. True

b. False

2. List the two categories of hazard controls, in precedence, which should be taken prior to using PPE.

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## Eye and Face Protection



### OSHA requirement

29 CFR 1910.133 requires employers to provide eye and face protection for employees whenever they are exposed to potential eye injuries during their work, if work practice or engineering controls do not eliminate the risk of injury.

### The hazards

Some of the things that might cause eye and face injuries include the following:

- Dust and other flying particles, such as metal shavings or wool fibers
- Molten metal that might splash
- Acids and other caustic liquid chemicals that might splash
- Blood and other potentially infectious body fluids that might splash, spray, or splatter
- Intense light such as that created by welding arcs and lasers

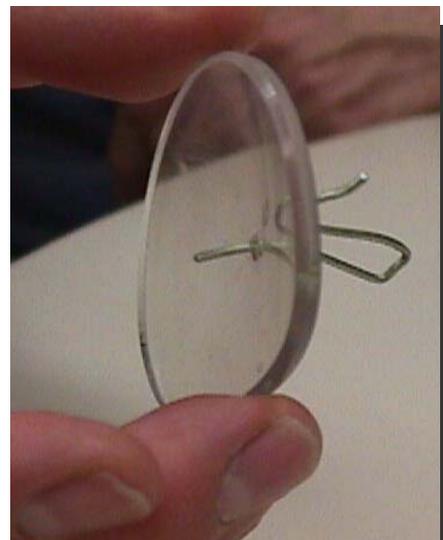
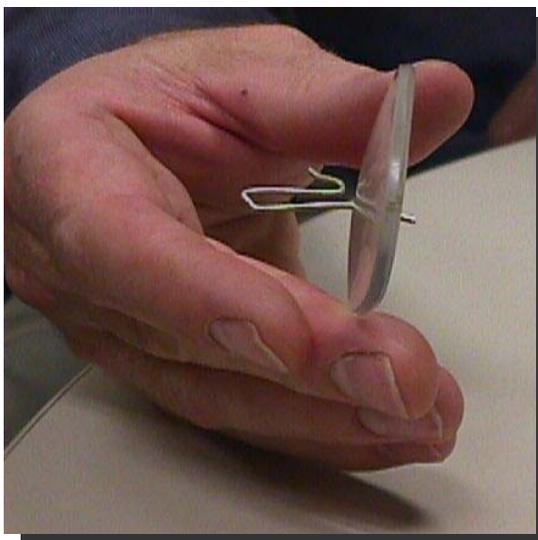
### Eyewear criteria

Begin with the following criteria to select the proper protective eyewear for employees. Eye protection must

- protect against the specific hazard(s) encountered in the workplace
- be reasonably comfortable to wear
- not restrict vision or movement
- be durable and easy to clean and disinfect, and
- not interfere with the function of other required PPE.

In addition, the American National Standards Institute, Inc. (ANSI) has issued standard requirements for the design, construction, testing, and use of protective devices for eyes and face.

OSHA requires that all protective eyewear you purchase for your employees meet the requirements of ANSI Z87.1–1989 for devices purchased after July 5, 1994, and ANSI Z87.1–1968 for devices purchased before that date.



## Eye and Face Protection, Continued

### Types of eye and face protection

The table below describes and illustrates various types of eye and face protection.

Type of Protection	Example
<p><b>Safety spectacles.</b> These protective eyeglasses are made with safety frames constructed of metal and/or plastic and are fitted with either corrective or plano impact-resistant lenses. They come with and without side shields, but most workplace operations will require side shields.</p>	
<p><b>Side shields.</b> These protect against particles that might enter the eyes from the side. Side shields are made of wire mesh or plastic. Eyecup type side shields provide the best protection</p>	
<p><b>Goggles.</b> You may choose from many different types of goggles, each designed for specific hazards. Generally, goggles protect eyes, eye sockets, and the facial area immediately surrounding the eyes from impact, dust, and splashes. Some goggles fit over corrective lenses.</p>	
<p><b>Welding shields.</b> Constructed of vulcanized fiber or fiber glass and fitted with a filtered lens, these protective devices are designed for the specific hazards associated with welding. Welding shields protect your employees' eyes from burns caused by infrared or intense radiant light, and they protect face and eyes from flying sparks, metal spatter, and slag chips produced during welding, brazing, soldering, and cutting.</p>	
<p><b>Face shields.</b> These transparent sheets of plastic extend from the brow to below the chin across the entire width of the employee's head. Some are polarized for glare protection. Choose face shields to protect your employees' faces from nuisance dusts and potential splashes or sprays of hazardous liquids.</p>	

## **Eye and Face Protection, Continued**

### **Use and care of eye and face protection**

Train your employees to know the following:

- Why eye protection is necessary, e.g., the workplace hazards that threaten their eyes
- How the eye protection will protect them
- The limitations of the eye protection
- When they must wear the eye protectors
- How to put the protective eyewear on properly
- How to adjust straps and other parts for a comfortable and effective fit
- How the protective eyewear fits over or contains an employee's corrective lenses
- How to identify signs of wear, such as
  - chipped, scratched, or scraped lenses, and
  - loss of elasticity or fraying of head bands
- How to clean and disinfect the safety eyewear

### **Keeping eyewear clean and effective**

Train your employees how to clean the eye protectors. Allow them time at the end of their shifts to do the following:

- Disassemble goggles or spectacles.
- Thoroughly clean all parts with soap and warm water.
- Carefully rinse off all traces of soap.
- Replace all defective parts.

### **Disinfecting eyewear**

Occasionally, you must disinfect the protective eyewear. To do so, after cleaning you can do the following:

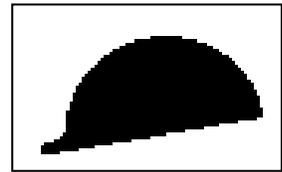
- Immerse and swab all parts for 10 minutes in a germicidal solution.
- Remove all parts from the solution and hang in a clean place to air dry at room temperature or with heated air.
- Do not rinse the parts after submerging them in the disinfectant. Rinsing will remove the germicidal residue that remains after drying.
- You may also use ultraviolet disinfecting and spray-type disinfecting solutions after washing.

## Head Protection

### Head hazards

You must provide head protection for your employees if these conditions exist:

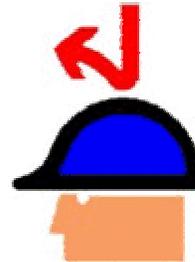
- Objects might fall from above and strike them on the head.
- They might bump their heads against fixed objects, such as exposed pipes or beams.
- They work near exposed electrical conductors.



### Head gear criteria

In general, protective helmets, or hard hats, should

- resist penetration by objects
- absorb the shock of a blow
- be water resistant and slow burning, and
- come with instructions explaining proper use.



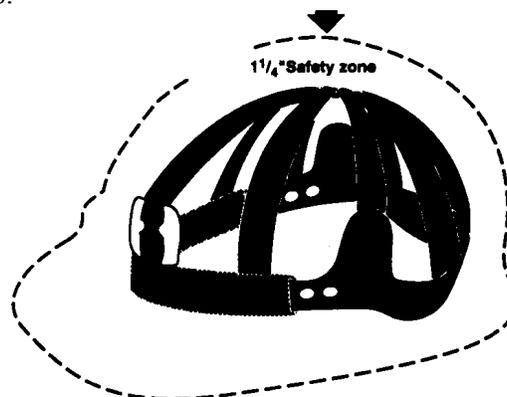
Hard hats require a hard outer shell and a shock absorbing lining. The lining should incorporate headband and straps that suspend the shell from 1 to 1 1/4 inches away from the user's head. This design provides shock absorption during impact and ventilation during wear.

### Types of hard hats

Hard hats are divided into three industrial classes:

- **Class A.** These helmets are for general service. They provide good impact protection but limited voltage protection.
- **Class B.** Choose Class B helmets if your employees are engaged in electrical work. They protect against falling objects and high-voltage shock and burns.
- **Class C.** Designed for comfort, these lightweight helmets offer limited protection. They protect workers from bumping against fixed objects but do not protect against falling objects or electric shock.

Look at the inside of any protective helmet and you should see a label showing the manufacturer's name, the ANSI standard it meets, and its class. The picture below shows the basic design of hard hats.



## Head Protection, Continued

### Maintenance of hard hats

You must make sure that the hard hats continue to provide sufficient protection to your employees. Do this by training your employees in the proper use and maintenance of hard hats including daily inspection of them. If your employees identify any of the following defects, remove the hard hats from service.

- The suspension system shows signs of deterioration such as
  - cracking
  - tearing, or
  - fraying.
- The suspension system no longer holds the shell from 1 inch to 1 1/4 inches (2.54cm to 3.18cm) away from the employee's head.
- The brim or shell is cracked, perforated, or deformed.
- The brim or shell shows signs of exposure to heat, chemicals, ultraviolet light, or other radiation. These are the signs:
  - Loss of surface gloss
  - Chalking
  - Flaking (a sign of advanced deterioration)

### Use and care of hard hats

Train your employees to know the following:

- Why head protection is necessary (the workplace hazards threatening their heads)
- How the head protection will protect them
- The limitations of the head protection
- When they must wear the head protection
- How to wear the protective head gear properly
- How to adjust straps and other parts for a comfortable and effective fit
- How to identify signs of wear, such as
  - cracked, torn, frayed, or otherwise deteriorated suspension systems
  - deformed, cracked, or perforated brims or shells, and
  - flaking, chalking, or loss of surface gloss
- How to clean and disinfect the hard hats you provide for them

## Foot Protection



### Foot hazards

You must provide foot and leg protection if your workplace hazard assessment reveals potential dangers to these parts of the body. Some of the potential hazards you might identify include the following:

- Heavy objects such as barrels or tools that might roll onto or fall on employees' feet
- Sharp objects such as nails or spikes that might pierce the soles or uppers of ordinary shoes
- Molten metal that might splash on feet or legs
- Hot or wet surfaces
- Slippery surfaces

### Types of foot protection

The type of foot protection you provide your employees will depend upon the specific workplace hazards you identify and the specific parts of the feet exposed to potential injury. Safety footwear must meet minimum compression and impact performance standards and testing requirements established by ANSI. Protective footwear purchased after July 5, 1994, must meet the requirements of ANSI Z41–1991. Protective footwear bought before that date must comply with ANSI Z41–1967. Foot and leg protection choices includes the following:

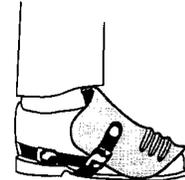
#### Type of Protection

#### Examples

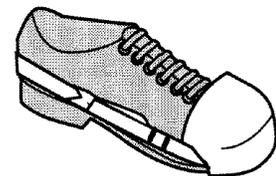
**Leggings.** Use these to protect the lower legs and feet from heat hazards, like molten metal or welding sparks. Safety snaps allow leggings to be removed quickly.



**Metatarsal guards.** Made of aluminum, steel, fiber, or plastic, these guards may be strapped to the outside of shoes to protect the instep area from impact and compression



**Toe guards.** Toe guards may be made of steel, aluminum, or plastic. They fit over the toes of regular shoes. These guards protect only the toes from impact and compression hazards.



**Combination foot and shin guards.** These guards may be used in combination with toe guards when greater protection is needed.



**Safety shoes.** These sturdy shoes have impact resistant toes and heat-resistant soles that protect against hot work surfaces common in roofing, paving, and hot metal industries. The metal insoles of some safety shoes protect against puncture wounds.



**Foot Protection, Continued****Use and care of foot protective devices**

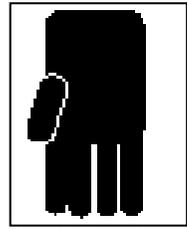
Train your employees to know the following:

- Why foot protection is necessary (the workplace hazards that threaten feet or legs)
- How the equipment you provide will protect your employees
- The limitations of the foot protection
- When employees must wear the protective leggings, guards, or shoes
- How to properly put on the protective equipment
- How to adjust straps, laces, and other parts for a comfortable and effective fit
- How to clean and maintain the leg and foot protection you provide
- How to identify signs of wear, such as
  - scuffed, cracked, or lacerated uppers
  - signs of separation between soles and uppers
  - holes or cracks in soles or heel, and
  - metal embedded in heels or soles of electrical hazard, safety-toe shoes

## Hand Protection

### The hazards

If your workplace hazard assessment reveals that your employees risk injury to their hands and arms, and engineering and work practice controls do not eliminate the hazards, you must provide your employees with appropriate protection. The injuries you may need to guard against in your workplace include the following:



- Burns
- Bruises
- Abrasions
- Cuts
- Punctures
- Fractures
- Amputations
- Chemical exposures

### Types of protective gloves

Gloves made from a wide variety of materials are designed for virtually every workplace hazard. In general, however, they may be divided into four groups:

- Durable work gloves made of metal mesh, leather, or canvas
- Fabric and coated fabric gloves
- Chemical and liquid resistant gloves
- Insulating rubber gloves.

The table below provides a brief description of the most commonly used gloves.

#### Type of Glove

#### Example

**Leather:** Protect against sparks, moderate heat, blows, chips, and rough objects. Welders in particular need the durability of higher-quality leather gloves.



**Fabric:** Made of cotton or other fabric to provide varying degrees of protection. These gloves can protect against dirt, slivers, chafing, and abrasion. These gloves do not provide sufficient protection, however, to be used with rough, sharp, or heavy materials.



**Chemical:** Made of rubber (latex, nitrile, or butyl), plastic, or synthetic rubber-like material such as neoprene to protect workers from burns, irritation, and dermatitis caused by contact with oils, greases, solvents, and other chemicals.



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## Hand Protection, Continued

### Use and care of hand protection

Train your employees to know the following:

- Why hand protection is necessary (the hazards that threaten hands)
- How the protective gloves and sleeves will protect them
- The limitation of the protective equipment you've supplied
- When they must wear the gloves
- How to wear the protective gloves properly
- How to ensure a comfortable and effective fit
- How to clean and disinfect the non-disposable protective gloves and
- How to identify signs of wear:
  - Cracks, scrapes, or lacerations
  - Thinning or discoloration
  - Break through to the skin

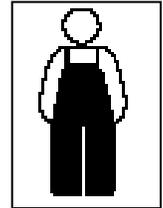
## Body Protection

### The hazards

You must provide body protection for employees if they are threatened with bodily injury of one kind or another while performing their jobs, and if engineering, work practice, and administrative controls have failed to eliminate these hazards.

Workplace hazards that could cause bodily injury include the following:

- Intense heat
- Splashes of hot metals and other hot liquids
- Impacts from tools, machinery, and materials
- Cuts
- Hazardous chemicals
- Contact with potentially infectious materials, like blood
- Radiation



### Types of protection

As with all protective equipment, protective clothing is available to protect against specific hazards. You need to provide personal protective equipment only for the parts of the body exposed to possible injury. Depending upon hazards in your workplace, you may need to provide your employees with one or more of the following:

- Vests
- Jackets
- Aprons
- Coveralls
- Surgical gowns
- Full body suits

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## Body Protection, Continued

### Materials used in protective clothing

Protective clothing comes in a variety of materials, each suited to particular hazards. Conduct your hazard assessment. Identify the sources of any possible bodily injury. Install any feasible engineering controls, and institute work practice controls to eliminate the hazards. If the possibility of bodily injury still exists, provide protective clothing constructed of material that will protect against the specific hazards in your workplace. Materials for protective clothing include the following:

- **Paperlike fiber**—Disposable suits made of this material provide protection against dust and splashes.
- **Treated wool and cotton**—Protective clothing made from treated wool and cotton adapts well to changing workplace temperatures and is comfortable as well as fire resistant. Treated cotton and wool clothing protects against dust, abrasions, and rough and irritating surfaces.
- **Duck**—This closely woven cotton fabric protects employees against cuts and bruises while they handle heavy, sharp, or rough materials.
- **Leather**—Leather protective clothing is often used against dry heat and flame.
- **Rubber, rubberized fabrics, neoprene, and plastics**—Protective clothing made from these materials protects against certain acids and other chemicals.

Be aware that different materials will protect against different chemical and physical hazards. When chemical or physical hazards are present, check with the clothing manufacturer to make sure that the material selected will provide protection from the specific chemical or physical hazards in your workplace.

### Use and care of body protection

Train your employees to know the following:

- Why protective clothing is necessary, i.e., the workplace hazards that threaten their bodies
- How the protective clothing will protect them
- The limitation of the body protection
- When they must wear the protective clothing
- How to put on the protective clothing properly
- How to adjust parts for a comfortable and effective fit
- How to clean and disinfect the protective clothing
- How to identify signs of wear:
  - Rips, tears, scuffs
  - Loss of elasticity in tight-fitting parts

## Hearing Protection

### Hazard identification

Determining the need to provide hearing protection can be tricky. Employee exposure to excessive noise depends upon a number of factors:

- How loud is the noise as measured in decibels (dBA)?
- What is the duration of each employee's exposure to the noise?
- Do employees move between separate work areas with different noise levels?
- Is noise generated from one source or multiple sources?

Generally, the louder the noise, the shorter the exposure time before you must provide hearing protection. DLA requirements for noise reduction, including hearing protection, begin when noise exposures are at or above 85dBA time-weighted average, or impulse noise sound pressure levels of 140 decibels peak.

### Controls

Plain cotton does not effectively protect against occupational noise. You may, however, choose from several products that are effective at protecting your employees' hearing.



#### Type of Protection

#### Example

**Single-use earplugs.** Made of waxed cotton, foam, or fiberglass wool, these earplugs are self-forming and, when properly inserted, work as well as most molded earplugs.



**Earmuffs.** Earmuffs require a perfect seal around the ear. Glasses, long sideburns, long hair, and facial movements such as chewing may reduce the protective value of earmuffs. Special earmuffs designed for use with eyeglasses or beards are available.



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## Hearing Protection, Continued

### Use and care of hearing protection

Train your employees to know the following:

- Why hearing protection is necessary (the workplace hazards that threaten their hearing)
- How the earplugs or earmuffs will protect them
- The limitations of the hearing protection
- When they must insert or wear the hearing protectors
- How to adjust earmuff parts for a comfortable and effective fit, or form the earplugs to fit their ears
- How special earmuffs fit over an employee's corrective lenses
- How to clean and disinfect the hearing protection

### How do I know that it is really protecting their hearing?

If your employees are exposed to occupational noise at or above 85 dBA averaged over an 8-hour period, then you must institute a hearing conservation program that includes regular testing of employees' hearing by qualified professionals. DLAI 6055.1, Enclosure 3 Hearing Conservation, sets forth the requirements for a hearing conservation program.

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## Respiratory Protection



### Introduction

Respiratory protective equipment is required in operations where air is contaminated with hazardous or toxic materials. Guidelines for respirator use are found in 29 CFR 1910.134. A written respiratory program is required by OSHA and is discussed in unit 8, Programs Requiring Written Plans.

### Respiratory hazards

There are two main types of respiratory hazards—oxygen deficiency and airborne contaminants. Airborne contaminants include the following:

- Dusts: particles, released during work operations such as grinding and sawing
- Mists: particles of liquid, released during operations such as spray painting
- Vapors: gaseous forms of a liquid, such as paint solvents
- Fumes: vaporized condensed metals, as present in welding operations
- Gases: such as nitrogen, methane, and carbon monoxide



### Air purifying respirators

Air purifiers remove contaminants from air through chemical or mechanical means. Because the users of air purifiers still breathe the surrounding air, these devices can only be used in atmospheres containing enough oxygen (19.5 percent by volume) and when the respirator matches the contaminant.

### Atmosphere supplying respirators

The two types of atmosphere supplying equipment are self-contained breathing apparatuses (SCBAs) and air line equipment. SCBAs provide a limited supply of compressed air in a cylinder carried by the user. Air line equipment provides air through an air line connected to a remote source of air (a tank or compressor).

### Air purifiers

Mechanical filter respirators can provide protection from dusts, fumes, mists, and smoke. The filters allow air to pass through the openings, but trap contaminants. Obviously this type of equipment cannot be used in toxic or oxygen deficient (less than 19.5 percent by volume) atmospheres.

### Respirator advantages and disadvantages

Respirators have advantages and disadvantages. Extreme care should be taken to use a respirator in the condition for which it was designed. Use of any type, in conditions for which it was not designed, may be more dangerous than use of no equipment at all.

### Permissible practice

Preventing atmospheric contamination is the objective for controlling occupational diseases caused by air contaminated with harmful dusts, fogs, fumes, mists, gases, sprays, or vapors. This is accomplished by accepted engineering control measures. When engineering controls are not feasible, or while they are being instituted, appropriate respirators should be used.

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## Respiratory Protection, Continued

### Employer provides respirators

Respirators are provided by the employer when it is necessary to protect the health of the employee (29 CFR 1910.134(a)(2)). The respirators will be applicable and suitable for the intended purpose.

### Selection of respiratory protection

29 CFR 1910.134(d) requires employers to evaluate the respiratory hazards in the workplace. The employer will select and provide an appropriate respirator based on the hazard, the workplace, and user factors. Employees shall wear only respirators that have been selected, fit tested, and approved for use for the respiratory hazards.

Respirators are selected based on the respiratory hazards the employee is exposed to, the workplace, and user factors that affect performance. Please note the following:

- Use only NIOSH approved respirators.
- Single strap disposable comfort masks are not approved respirators.
- Respirator selection is employee specific.
- When making selection, consider concentration, route, physical form, and chemical state of the contaminant.
- Air purifying respirators will not be used in an oxygen deficient atmosphere.

### Medical evaluation

Not everyone can wear a respirator or get a good respirator fit. First, a medical evaluation should be conducted to determine who could use a respirator. A physician or other licensed health care professional conducts this evaluation. Generally, a respirator cannot be worn if the user:

- Wears contact lenses
- Wears glasses with temple pieces
- Has a beard, a moustache, or long sideburns
- Has breathing problems, such as asthma
- Has a heart condition
- Has claustrophobia (fear of confined spaces)
- Is sensitive to heat

The supervisor must obtain a written recommendation from the health care professional on whether or not the employee is medically able to use the respirator. The recommendation shall include the following information:

- Limitations on use
- Need for follow-up medical examination
- Statement that the health care professional has provided the employee with a copy of the recommendation

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## Respiratory Protection, Continued

### Maintenance and care of respirators

29 CFR 1910.134(h) dictates the maintenance and care of respirators. The program provides the means for cleaning and disinfecting, storage, inspection, and repairs. In addition, 1910.134(j) requires identification of filters, cartridges, and canisters by use of a label color-coded with the appropriate NIOSH approval label. These are the four requirements for respirators:

#### 1. Cleaning and disinfecting

- Provided respirators will be clean, sanitary and in good working order.
- Respirators will be cleaned using established OSHA procedures.
- Shared respirators must be cleaned and sanitized prior to use.

#### 2. Storage

Store respirators to protect from damage, contamination, dust, sunlight, extreme temperatures, excessive moisture, and damaging chemicals.

#### 3. Inspection

- Inspection before and after each use.
- Monthly inspection for SCBA.
- Record of inspection dates and findings for respirators maintained for emergency use.

#### 4. Repairs

- Respirators that fail inspection or are defective will be removed from service.
- Only persons appropriately trained to do so may make repairs to respirators.
- Repairs will be made according to the manufacturer's recommendations.

### Fitting the respirator

The "fit" of the face piece to face seal of a respirator is extremely important. A secure fit means the difference between life and death. Since each face piece fits only a certain percentage of people, it is important that face pieces be tested on each potential user. Facial features such as beards, hollow temples, prominent cheekbones, dentures or missing teeth, and the chewing of gum and tobacco may interfere with the respirator-to-face seal.

### Initial test fitting of respirators

It is imperative to "fit test" respirators before use. Two types of fit test are *qualitative* and *quantitative*. In both, a test agent, a harmless vapor, smoke, gas, or aerosol, is put into a small enclosure where the respirator is used. In a qualitative test, the user determines whether he or she can sense the test agent. In a quantitative test, special instruments detect the agent.

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## Respiratory Protection, Continued

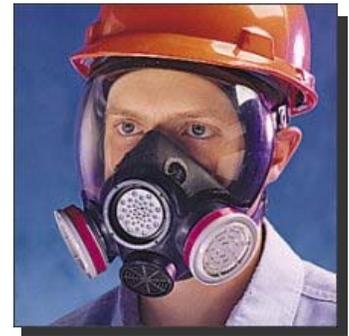
### Fit test before each use

Other fit tests are positive and negative pressure.

- Positive pressure test: With the respirator's exhalation valves closed, the user breathes into the face piece. The face piece should bulge a little, but if no air leaks out, the fit is good.
- Negative pressure test: With the respirator's inhalation valves closed, the user breathes in gently and holds his or her breath for 10 seconds. The face piece should collapse against the face and stay collapsed, which indicates that no air leaks in and the respirator fits.

### Summary

You must consider many factors when selecting PPE to protect your employees from workplace hazards. With all of the types of operations that can present hazards and all of the types of PPE available to protect the different parts of a worker's body from specific types of hazards, this selection process can be confusing and at times overwhelming. Because of this, OSHA requires that you implement a PPE program to help you systematically assess the hazards in the workplace and select the appropriate PPE that will protect your workers from those hazards. As part of this PPE program, you must do the following:



- Assess the workplace to identify equipment, operations, chemicals, and other workplace components that could harm your employees.
- Implement engineering controls and work practices to control or eliminate these hazards to the extent feasible.
- Select the appropriate types of PPE to protect your employees from hazards that cannot be eliminated or controlled through engineering controls and work practices.
- Inform your employees why the PPE is necessary and when it must be worn.
- Train your employees how to use and care for the selected PPE and how to recognize PPE deterioration and failure.
- Require your employees to wear the selected PPE in the workplace.

The basic information presented here attempts to establish and illustrate a logical, structured approach to hazard assessment and PPE selection and application for you to use as a starting point for your PPE program.

## Check Your Knowledge

### Exercise: PPE

Mark each potential hazard below with the letter of the appropriate PPE used to control the hazard. Some PPE items will be used more than once.

#### PPE Listing

- A. Safety shoes with metal insoles
- B. Welding shield
- C. Face shield and chemical goggles
- D. Chemical gloves
- E. Hardhat, class B
- F. Respirators
- G. Leather glove
- H. Safety glasses and/or goggles
- I. Safety shoes with metatarsal guard
- J. Fabric glove
- K. Hardhat
- L. Earplugs or muffs
- M. Safety shoes

Hazard	PPE
1. Molten metal that might splash on face	
2. Dusts, mists, vapors, fumes, or gases	
3. Acids and other caustic liquid chemicals that might splash on face.	
4. Intense light such as that created by welding arcs and lasers.	
5. Manually working with rough, sharp or heavy objects. Sparks, moderate heat, blows, and chips	
6. Objects might fall from above and strike them on the head.	
7. Hand exposure to potential burns, irritation, dermatitis from working with chemicals	
8. They might bump their heads against fixed objects, such as exposed pipes or beams.	
9. Work near exposed electrical conductors.	
10. Heavy objects such as barrels or tools that might roll onto or fall on employees' feet	
11. Sharp objects such as nails or spikes that might pierce the soles or uppers of ordinary shoes	
12. Dust and other flying particles, such as metal shavings or wool fibers.	
13. Molten metal that might splash on feet	
14. Hand exposure to dirt, slivers, chafing and abrasion	
15. Excessive noise	