



PPE Guide

(Personal Protective Gear)

Proper use of PPE for improving
the safety of workers in your facility.



Introduction

There may be a variety of hazards present in the workplace. When these hazards cannot be eliminated or reduced, the last line of defense for workers is personal protective equipment (PPE) such as hard hats, high-visibility clothing, and respirators.

OSHA's standards for personal protective equipment can be found in 29 CFR 1910 Subpart I. Occupational risks that require the use of PPE include environmental, electrical, chemical, physical, mechanical, and radiological hazards. These hazards may cause injury or impairment through physical contact, inhalation, or absorption.

With an effective PPE program in your workplace, you can establish this last line of defense and make sure that workers are protected if a dangerous situation occurs. Protective equipment should be provided, used, and maintained in a reliable condition for all employees.

General Requirements

OSHA 1910.132 establishes general requirements for the establishment and use of personal protective equipment in the workplace. Employers must conduct a risk assessment and determine whether hazards that require the use of PPE are indeed present. If hazards are, the employer is responsible for selecting and maintaining appropriate PPE. Workers are required to undergo training, be properly fit for the PPE, and use the selected PPE correctly. Employees may voluntarily provide their own PPE, however in these cases, the employer needs to inspect the equipment and ensure adequacy, proper maintenance, and sanitation.

As of May 15, 2008, OSHA requires employers to pay for personal protective equipment that is used in the workplace to comply with safety standards. They cannot require workers to provide their own PPE. For example, in cases where hard hats, hearing protection, face shields, and welding PPE are required, the employee is not responsible for acquiring and understanding how to use the proper PPE on their own. If the employee might wear the PPE outside of the worksite (as often in the case of steel-toed shoes), the employer is not required to pay for the equipment.

Employers are required to:

- ▶ Assess the workplace to determine whether hazards that require the use of PPE are present
- ▶ Select the proper PPE to address those hazards
- ▶ Maintain the selected PPE, including replacing worn or damaged equipment
- ▶ Provide training on how to use the selected PPE properly
- ▶ Periodically evaluate and update their PPE program and its effectiveness

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Employees are required to:

- ▶ Attend training sessions on appropriate PPE
- ▶ Demonstrate correct use of this PPE
- ▶ Wear PPE properly (as intended and well-fit)
- ▶ Inform a supervisor when PPE needs to be repaired or replaced

PPE Training

Once hazards have been determined in the workplace and employers have selected appropriate PPE, employees must demonstrate their understanding and ability to use PPE properly. Each employee who is required to wear personal protective equipment must receive training on how to do the following:

- ▶ Understand exactly when PPE is necessary, and what type, given the situation
- ▶ How to properly don, doff, utilize, and adjust PPE
- ▶ Understand the limitations of PPE when it comes to complete protection from injury
- ▶ How to properly maintain, sanitize, and dispose of PPE

Retraining on PPE may be required in situations where changes in the workplace or changes in the types of equipment to be used render the previous training obsolete. In the case of respirators, training must take place annually.



Eye & Face Protection

Eye protection is especially important in the workplace. If the eyes come into contact with foreign objects such as flying debris, or light radiation, this can cause long-term damage and even blindness.

Under OSHA standard 1910.133, employers must assure that employees receive and use eye or face protection when they are exposed to hazards such as flying particles, chemical vapors or gases, molten metal, caustic or acid liquids, liquid chemicals, or potentially injurious light radiation. Side protection must be included if there is a hazard from flying objects. Side protectors that are detachable (are clip-on or slide-on) are acceptable. If an employee wears prescription lenses, their eye protection must incorporate the prescription, or be able to be worn over the prescription lenses, so they may perform operations safely.

Welding requires specialized masks that protect eyes from the bright light that is produced by a torch. These masks have filter lenses that are shaded according to a specific number which indicates the minimum protective shade and is appropriate for operations concerning injurious light radiation.

Examples of PPE for the eyes and face include:

- Safety glasses
- Chemical splash goggles
- Dust goggles
- Welder's mask
- Face shield
- Sunglasses



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Respiratory Protection

Many occupational diseases are caused by breathing air that is contaminated by harmful gases, sprays, vapors, smoke, mist, fumes, or dust. OSHA standard 1910.134 dictates that when primary engineering control measures are not feasible for preventing atmospheric contamination, employers must provide suitable respirators to each employee. Employers are additionally responsible for implementing a respiratory protection program that incorporates worksite-specific procedures, and are responsible for the maintenance of respirators, including cleaning and disinfecting.

As an essential aspect to PPE in a variety of industries, respirators provide protection in two different ways. The first type of respirator removes contaminants from the air. These include particulate respirators and gas masks, which filter out airborne particles, chemicals, and gases. The second type supplies clean air either from its own supply or from a remote source. These include self-contained breathing apparatus (SCBA) and airline respirators, and are especially important for atmospheres that are Immediately Dangerous to Life or Health (IDLH).



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Examples of respiratory PPE include:

- Basic facemask
- Self-contained breathing apparatus (SCBA)
- Filtering facepiece (dust mask)
- Powered air-purifying respirator (PAPR)

Using a respirator can place a physiological burden on employees. OSHA 1910.134(e) mandates that prior to the actual use of this PPE, employers must conduct a medical evaluation to determine an employee's ability to use a respirator.

Head Protection

Personal protective equipment for the head prevents cuts, bruises, electrical shock and burns, and more. Under OSHA standard 1910.135, employers shall ensure that employees wear protective helmets in two situations: when they work in areas that present a potential for falling objects to injure the head (impact and penetration hazard), and when they work near exposed electrical conductors that might possibly come in contact with the head. In the second situation, the protective helmet should be designed to reduce electrical shock hazard.

In addition, head protection must comply with the consensus standards of ANSI Z89.1-2009, ANSI Z89.1-2003, or ANSI Z89.1-1997. These establish the American standard for industrial head protection.

Examples of PPE for the head include:

- Bump caps
- Hard hats, divided into two types and three industrial classes:
 - Type I, which reduce the force of impact from a blow to the top of the head only
 - Type II, which reduce the force of impact from a blow to the head in any direction
- Class G (formerly known as Class A), intended for electrical work with protection against low voltage up to 2,200 volts
- Class E (formerly known as Class B), intended for electrical work with protection against high voltage up to 20,000 volts
- Class C, which do not provide any electrical protection and actually are electrically conductive



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Foot Protection

Under OSHA 1910.136, employers must ensure that employees have and use protective footwear in areas where there may be a danger of foot injuries due to rolling or falling objects or objects that can potentially pierce the sole. In many cases, safety footwear also provides support and is designed to help alleviate the discomfort that impacts many workers who need to stand for a long period of time.

Steel-toed boots are perhaps the most common type of foot PPE. Shoes that have been reinforced with a steel toe are meant to protect you from hundreds of pounds of falling pressure due to dropped objects. They also prevent punctures, burns, and lacerations.

Protective footwear is also an important, yet sometimes overlooked, aspect to electrical PPE. Certain shoes have been designed to protect employees from electrical hazards such as electric shock or a static discharge event. In this case, it is important to regularly inspect shoes for holes. If there are any holes, even small ones, the shoes must be replaced.



Examples of PPE for the feet include:

- Steel-toed boots
- Foot guards
- Safety shoes
- Knee boots
- Protective footwear for electrical hazards:
 - Dielectric rated
 - Electrical Hazard (EH) rated

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Hand Protection

OSHA 1910.138 states that employers must select appropriate hand protection and require employees to use it in situations where employees' hands are exposed to hazards such as:

- ▶ Potential skin absorption of harmful substances
- ▶ Severe lacerations or cuts
- ▶ Punctures
- ▶ Severe abrasions
- ▶ Extreme temperatures
- ▶ Thermal burns
- ▶ Chemical burns



Whichever hand protection is selected should not impeded a worker's ability to perform their tasks. OSHA requires that employers base their selection on the characteristics of the task to be performed, duration of use, present conditions, and the identified hazards. Although the only type of hand PPE available are gloves, there are a variety of kinds of gloves (for example, plastic gloves that protect against chemicals, and gloves designed with special grips) and the type of glove to be used must be carefully considered.

Examples of PPE for the hands include:

- Plastic/latex gloves
- Cut-resistant gloves
- Hi-vis gloves
- Anti-impact grip gloves
- Insulated gloves



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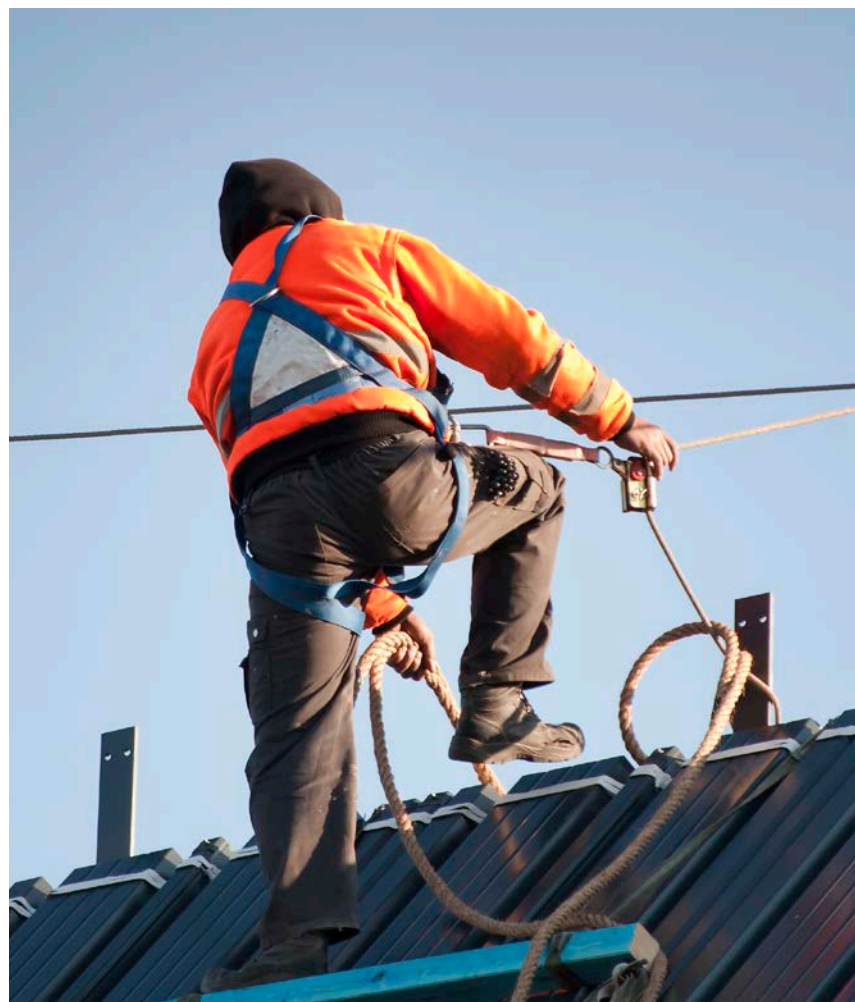
Personal Fall Protection Systems

A fall from any distance, even a short one, can result in injuries that are fatal or debilitating for the long term. Personal fall arrest systems (PFAS) are systems used to stop an employee from impacting the ground if they fall from a walking-working surface. A personal fall arrest system is required for workers who are exposed to vertical drops of six feet or more. The system is comprised of three main components: a body harness, anchorage, and connector.

While PFAS were designed to prevent injuries and fatalities after the fall has occurred, there are some systems that employers can put in place to prevent falls in the first place, such as travel restraint systems, which eliminate the possibility of a worker going over the edge of a walk-working surface. OSHA's standards for the performance, care, and use of all these systems, which are an important aspect to personal protective equipment, are outlined in 1910.140.

Aspects to personal fall protection systems include:

- Safety harness or body harness
- Body belt
- Lifeline
- Anchorage
- Connectors such as D-rings
- Travel restraint system





Other Bodily Injury Protection

In certain situations, workers may need to shield almost all of their body or their entire body against workplace hazards. This includes exposure to heat (especially in the case of fire fighters and other first responders), radiation, hot metals, hazardous materials or hazardous waste, body fluids, scalding liquids, and others. Liquid-resistant aprons are common in chemical processing or laboratory settings. Workers also need to use full-body protective suits in infectious biohazard areas. This full-body personal protective equipment is typically made from fire-retardant wool or cotton, and other materials may include leather, plastic, synthetics, and rubber.

An important piece of equipment in this category is high-visibility clothing. People who work in environments that are heavily trafficked or who perform operations during low-light settings need this type of clothing, which features bright colors and reflective tape material. Hi-vis vests, jackets, and pants help prevent “struck-by” hazards.

Examples of PPE for the whole body include:

- Safety suits
- Fire-retardant clothing
- Hi-vis vests
- Laboratory aprons
- Biohazard protective suits

Hearing Protection

Since there is no way to eliminate dangerous levels of noise in many facilities, it is essential to protect workers' hearing. Some industries involve the use of loud machinery (such as in construction), or the sound of vehicles and machinery may be amplified in confined spaces (such as in mining). Exposure to high noise levels, and even consistent exposure to mild noise levels over time, can cause hearing loss or impairment that is irreversible.

Earmuffs and earplugs are the most effective types of PPE to help prevent this damage to workers' hearing. An important aspect to earmuffs and earplugs is to make sure they fit properly; if they don't fit, hearing damage may still occur. Earplugs that are made from wool, waxed cotton, foam, or rubber are self-forming, however professionals can fit individuals for molded earplugs.

OSHA's standards in this situation fall under 1910.95, occupational noise exposure. ANSI S3.19 additionally ensures that hearing protection must sufficiently reduce the amount of noise that enters workers' ears. In order to comply with standards, hearing protection is tested and sold with NRR (Noise Reduction Rating) labeling.

Examples of PPE for hearing include:

- Earmuffs, which either fit around the head or clip on to hard hats; this includes electronic earmuffs
- Earplugs



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Arc Flash PPE

When employers conduct a hazard assessment of their facility, one of the most important risks to determine are electrical ones. Electrical hazards can lead to arc flash events. An arc flash is a part of an arc fault, an electrical issue where electricity is discharged from its normal path. Arc flashes are extremely dangerous; they occur quickly and powerfully, and may cause injury or even death in a fraction of a second.

It is impossible to react to an arc flash or take cover since they happen so quickly, and personal protective equipment is one of the most effective safety systems that facilities can put in place to minimize injuries. This PPE can be the difference between suffering minor injuries during an arc flash event, or a fatal accident. Many facilities follow the standards set by NFPA 70E to determine the specific PPE that is required when working with electrical equipment.

To protect against arc flash, PPE is separated into four category levels that address varying voltages:

Arc Flash PPE			
Category 1	Category 2	Category 3	Category 4
PPE that is arc rated, fire resistant, and designed for energy levels up to 4 cal/cm ² . Includes:	PPE that is arc rated, fire resistant, and rated for energy levels up to 8 cal/cm ² . Includes:	PPE that is arc rated, fire resistant, and rated for energy levels up to 25 cal/cm ² . Includes:	PPE that is arc rated, fire resistant, and rated for energy levels at 40 cal/cm ² . Includes:
<ul style="list-style-type: none"> • Leather shoes • Leather gloves/insulating gloves • Safety goggles or glasses • Hearing protection • Hard hat with arc-rated face shield • A coverall or long-sleeved shirt and pants that are arc-rated 	<ul style="list-style-type: none"> • All PPE in category 1 • A balaclava 	<ul style="list-style-type: none"> • All PPE in category 2 • Multiple layers of fire-resistant clothing including undergarments • Arc flash suit jacket, suit pants, and suit hood rated at 25 cal/cm² or above 	<ul style="list-style-type: none"> • All PPE in category 3, rated at 40 cal/cm² rather than 25

Both employees and employers should implement clear guidelines for determining which arc flash PPE is needed in any situation. In the event of an emergency or if you are unsure which level of PPE is required, a good rule of thumb is to put on the highest level.

GHS PPE

Many work environments involve the presence or transportation of dangerous chemicals. To make sure that these chemicals can be used safely, hazard communications have been universally standardized under the GHS, Globally Harmonized System of Classification and Labeling of Chemicals. The GHS helps facilities avoid miscommunications and accidents, and importantly enhances the understanding of what types of PPE should be used for specific chemicals through the use of Safety Data Sheets (SDS).

There are 16 sections to these sheets, which communicate hazards that are related to chemical products. Two of the sections provide directions on personal protective equipment:

- ▶ **Section 6: Accidental Release Measures, for PPE in the event of a spill or leak**
- ▶ **Section 8: Exposure Controls & Personal Protection, for normal usage conditions**

SDS information is meant to be a starting point for employers selecting PPE. Employers should contact their hazardous materials and PPE suppliers to fully understand how to select and use the appropriate PPE, and additionally consult safety experts. A variety of safety checks should be performed before a worker uses a piece of equipment while handling hazardous chemicals.



Common PPE for managing chemicals include:

- Safety glasses/goggles
- Face shield
- Laboratory coat or apron
- Chemical-resistant gloves (typically made from PVC, neoprene, or nitrile rubber material)
- Self-contained breathing apparatus (SCBA)



Visual Tools to Enforce PPE Requirements

It is important to continually remind workers of their responsibilities concerning PPE. Some facilities operate with ever-present hazards—for example, construction workers must always wear hard hats on site. However, PPE is only occasionally required in many workplaces. To further complicate things, there are some situations in which PPE is simply recommended, not required.

Visual communication is an important aspect to using PPE correctly and safely. By using signs, floor tape, and symbols, you can warn workers that they are entering an area where lab coats are required at all times, or post a notice that eye protection is required beyond a certain point. With these visual cues, workers will understand where they're supposed to have PPE, and what type of equipment they need.

PPE Signs

These types of signs help facilities implement both PPE requirements and safety best practices. The signal words and headings are OSHA compliant, and they have easy-to-read lettering that easily catches attention. PPE wall and floor signs should be put up in all areas where personal protective equipment is required and state the type of PPE to be worn. Overall, both floor and wall signs work as reminders for employees about the facility's PPE expectations.



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KEEP CLEAR

PPE Inline Tape

With inline floor tape, you can take things a step further and mark out entire areas that have special PPE requirements. Use this tape to outline a certain space in your facility where safety shoes are required, or outline a workstation where workers need safety glasses as they handle hazardous chemicals. Inline tape is fully customizable, so you'll be able to address your facility's PPE needs no matter how unique the situation is.

Remember that symbols and signage simply serve as reminders and notices for personal protective equipment. Employees must be trained on the proper use, limitations, maintenance, and fit of PPE and be trained for hazards that may occur within their particular workplace.



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Creating an Effective PPE Program

Although personal protective equipment is regarded as the last line of defense against workplace hazards, its impact cannot be understated. The importance and proper use of PPE should be a core aspect to a facility's safety culture. However, for PPE to do its job, it must be used correctly and consistently.

Both employers and employees need to play their part. Follow these steps to ensure that PPE is an integral component to safety in your workplace:

- ▶ **Implement risk assessment methods to identify physical and health hazards. Since many facilities involve an ever-changing environment, these assessments should take place on a consistent basis.**
- ▶ **Encourage proper use of PPE across all levels of operations. Sometimes, employees are hesitant to use personal protective equipment or believe they don't really need it. Managers and supervisors can be exemplary of correct PPE use.**
- ▶ **Use signs, floor tapes, and other visual reminders so employees understand what type of PPE is required in which areas, at all times.**
- ▶ **Centralize SDSs and other essential safety information in an area that is easy to access. Make sure every employee understands where this information is and how it can help, especially when it comes to determining appropriate PPE.**
- ▶ **Regularly conduct audits. Even if your company has a strong safety record, there are always ways to find and implement improvement.**
- ▶ **Stay up to date on developments in PPE technology and other safety practices. Each day brings advancements that make PPE more efficient, and keep workers even safer.**

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