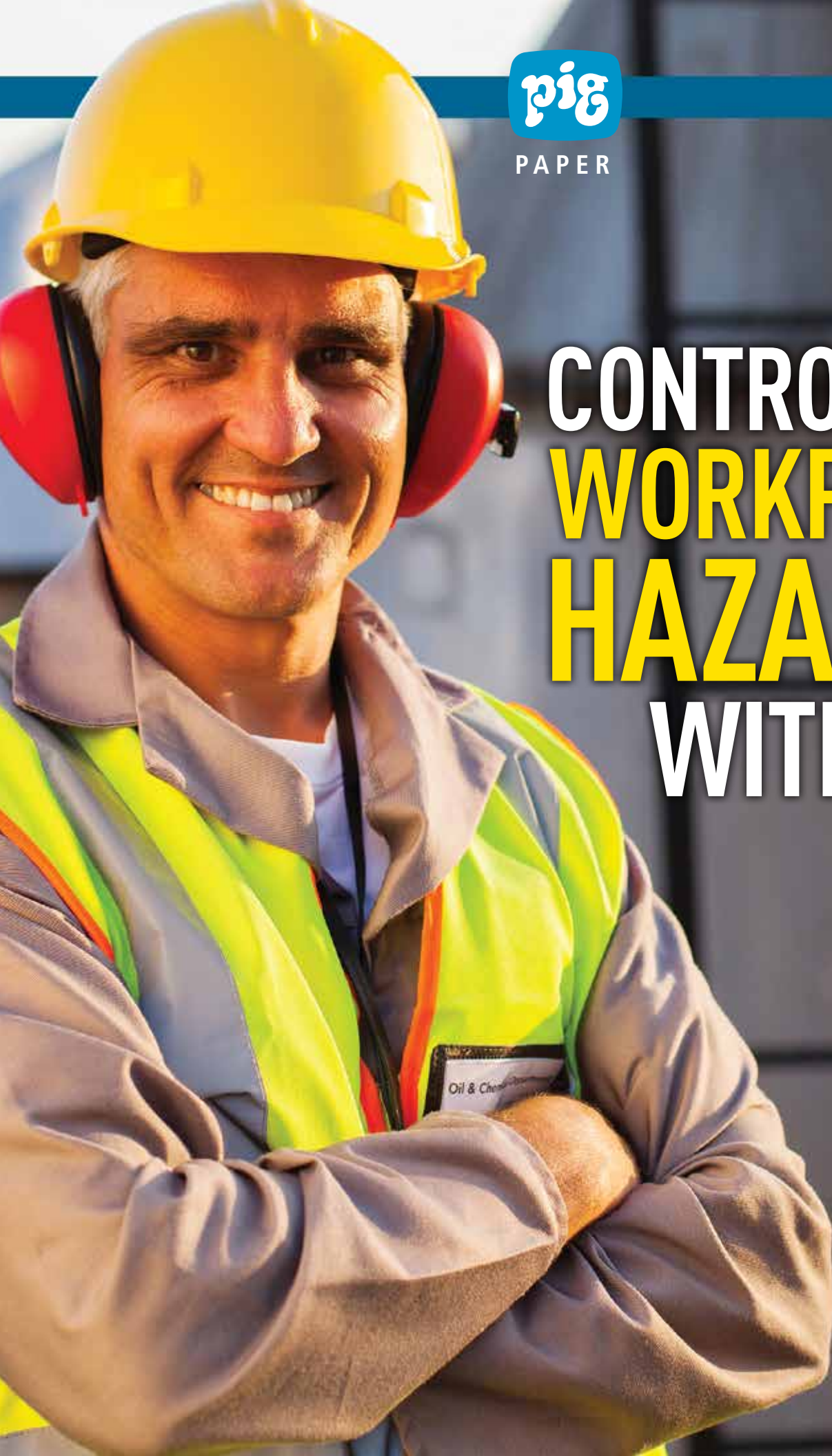




PAPER

CONTROLLING WORKPLACE HAZARDS WITH PPE



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Cave drawings and historical artifacts show us that even hundreds of years ago, humans looked for ways to protect themselves from harm. The earliest forms of personal protective equipment (PPE) were various pieces of clothing made from animal skins or woven plants that provided protection from sunburn in warm months and warmth in cold months. As time moved on, protection advanced.

PPE has come a long way from its primitive beginnings. Today, not only are multiple designs available for nearly every type of protection, advances in design, science and technology help ensure that when employees do need to wear PPE, it's as comfortable as possible, fits well and provides a verifiable level of protection.

Since 1970, the Occupational Safety and Health Administration (OSHA) has tasked employers with the responsibility of providing their employees with a workplace that is free of recognized hazards. This



includes not only finding workplace hazards, but also putting plans, programs and procedures in place to protect employees and minimize the risk of injury and illness.

Providing PPE is one means of preventing injuries and illness, but should not be the only method used to protect employees. A comprehensive safety plan also incorporates engineering and administrative controls that provide higher levels of worker protection. In this PIG Paper, we'll review:

- ▶ How to find and assess hazards in your workplace
- ▶ When to use PPE to protect employees against hazards
- ▶ How to choose the right PPE for the hazards in your workplace

Hazard Assessments

OSHA requires employers to perform hazard assessments to determine what physical and health hazards are present in the workplace. In some cases, these assessments must be documented.

Some of the physical hazards that may be present include:

- ▶ Working in temperature extremes or near hot or cold objects
- ▶ Moving, rolling or pinching objects
- ▶ High intensity lighting or other forms of radiation
- ▶ Sharp objects or edges
- ▶ High sound levels
- ▶ Working around electrical dangers
- ▶ Impact, compression or penetration

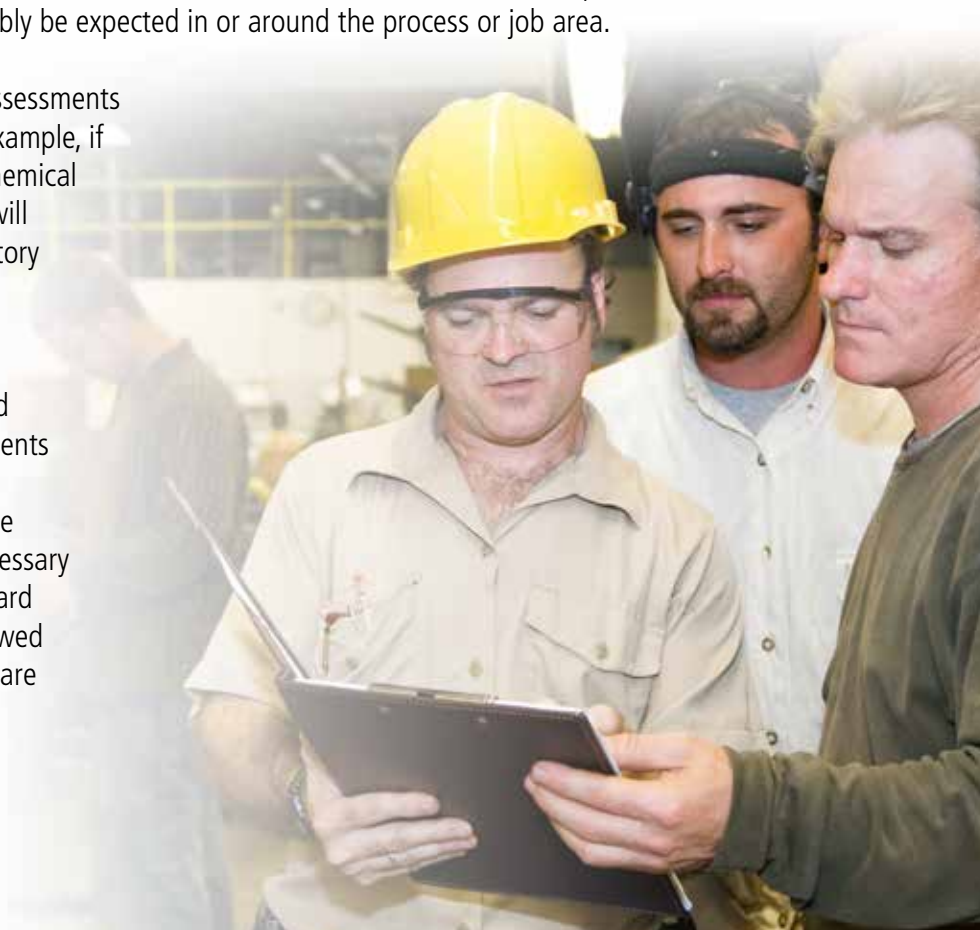
Health hazards may include exposure to:

- ▶ Chemicals
- ▶ Dust
- ▶ Radiation
- ▶ Biological hazards
- ▶ Sensitizers

Hazard assessments identify each job and task that employees will perform and the hazards associated with each of those jobs and tasks. The assessment should account for normal operations, as well as other scenarios that could reasonably be expected in or around the process or job area.

When appropriate, hazard assessments should include testing. For example, if employees are exposed to chemical vapors, air monitoring data will verify whether or not respiratory protection or other controls are necessary.

Use the information gathered during these hazard assessments to select engineering and administrative controls, create plans and select the PPE necessary to keep employees safe. Hazard assessments should be reviewed annually to ensure that they are up to date and effective.



Hierarchy of Controls

When it comes to addressing hazards, OSHA requires employers to use a hierarchy of controls. Under this hierarchy, employers must first seek to eliminate hazards, look for substitutions and then consider engineering controls. If these three types of controls are not effective, administrative controls should be considered next. OSHA considers having employees wear PPE a last line of defense that should be utilized only after all other avenues have been explored.

The hierarchy of controls, in order from highest to least preferred, is:

- 1. Elimination:** Removing the hazard from the workplace.
- 2. Substitution:** Swap out hazardous chemicals and other harmful practices and products with safer alternatives.
- 3. Engineering controls:** Make physical changes to a process or machine to create a physical barrier. They can include isolating or enclosing a process, using fume hoods or dust collection devices or minimizing contact with harmful chemicals.
- 4. Administrative controls:** Change how or when an employee does a job and require the employer or employee to do — or not do — something. They include work practices such as adjusting schedules to prevent overexposure or rotating job assignments. Conducting training is also an administrative control.
- 5. Personal protective equipment:** Require the employee to wear something to protect themselves from physical harm or unhealthful conditions.

The rationale behind this hierarchy is that if hazards can be eliminated, they can't harm employees. If the hazard can be engineered out of a procedure, they also will not be harmful. Neither of these solutions relies on a person to make them work, which is why they are preferred to administrative controls and PPE.



When the decision is made to require the use of PPE, employers need to establish a PPE program that clearly addresses what hazards are present. It must also detail how PPE has been selected to protect them from workplace hazards, how and when PPE is to be used, how it is to be worn and maintained and what to do when it needs to be replaced. This program must be communicated to employees and must include appropriate training.

Selecting and Purchasing PPE

Accurate hazard assessments form a cornerstone for selecting the correct engineering and administrative controls, as well as the most appropriate PPE to eliminate or minimize safety risks.

This sometimes means providing a variety of similar items. For example, if air purifying respirators are worn in the workplace, it's very likely that several different sizes and perhaps even different brands may be necessary to ensure there's a respirator that fits well and provides the proper level of protection for each employee.

Standards That Require Employers to Provide PPE
1910.28 Safety requirements for scaffolds
1910.66 Powered platforms for building maintenance
1910.67 Vehicle-mounted elevating and rotating work platforms
1910.94 Ventilation
1910.119 Process safety management of highly hazardous chemicals
1910.120 Hazardous waste operations and emergency response
1910.132 General requirements (personal protective equipment)
1910.133 Eye and face protection
1910.135 Occupational head protection
1910.136 Occupational foot protection
1910.137 Electrical protective devices
1910.138 Hand protection
1910.139 Respiratory protection for M. tuberculosis
1910.157 Portable fire extinguishers
1910.160 Fixed extinguishing systems, general
1910.183 Helicopters
1910.218 Forging machines
1910.242 Hand and portable powered tools and equipment, general
1910.243 Guarding of portable power tools
1910.252 General requirements (welding, cutting and brazing)
1910.261 Pulp, paper and paperboard mills
1910.262 Textiles
1910.268 Telecommunications
1910.269 Electric power generation, transmission and distribution
1910.333 Selection and use of work practices
1910.335 Safeguards for personnel protection
1910.1000 Air contaminants
1910.1003 13 carcinogens, etc.
1910.1017 Vinyl chloride
1910.1029 Coke oven emissions
1910.1043 Cotton dust
1910.1096 Ionizing radiation

OSHA requires employers to pay for most PPE that workers are required to wear because they believe that if PPE is provided, employees will be more likely to wear it. Some of the exceptions include:

- ▶ Most steel-toed shoes or boots
- ▶ Logging boots
- ▶ Everyday clothing and street shoes
- ▶ Skin creams and sunscreen
- ▶ Non-essential rain gear
- ▶ Back support belts

These items were exempted because they can be worn or used offsite. All types of specialty PPE and any PPE that may only be worn at the workplace must be provided at no cost to employees. PPE must be replaced when it becomes damaged or when it wears out.

Although damaged and worn PPE must be replaced, if PPE is intentionally damaged, lost or destroyed by an employee, the employer is not required to pay for replacement items.

Standards That Require Employers to Provide PPE at No Cost to Employees
1910.95 Occupational noise exposure
1910.134 Respiratory protection
1910.146 Permit-required confined spaces
1910.156 Fire brigades
1910.266 Logging operations
1910.1001 Asbestos
1910.1018 Inorganic arsenic
1910.1025 Lead
1910.1027 Cadmium
1910.1028 Benzene
1910.1030 Bloodborne pathogens
1910.1044 1,2-dibromo-3-chloropropane
1910.1045 Acrylonitrile
1910.1047 Ethylene oxide
1910.1048 Formaldehyde
1910.1050 Methylenedianiline
1910.1051 1,3-Butadiene
1910.1052 Methylene chloride
1910.1450 Occupational exposure to chemicals in laboratories

Types of PPE

It is important to determine how an employee may be harmed and to provide the specific type of protection that will prevent injury or illness. While the easy answer may seem to be to provide extreme levels of protection from head to toe, that isn't practical. Providing too much protection can limit mobility, decrease stamina and cause additional hazards.

See the chart (right) for examples of hazards that affect certain areas of the body and what PPE you could use to keep employees safe.



Body Part Affected	Examples of Hazards	Examples of PPE
Head	<ul style="list-style-type: none"> • Impact • Electric shock • Heat • Cold 	<ul style="list-style-type: none"> • Hard hats • Thermal hoods • Cooling headwraps • Bandanas
Face	<ul style="list-style-type: none"> • Cuts • Impact • Chemicals 	<ul style="list-style-type: none"> • Face shields • Face masks
Eyes	<ul style="list-style-type: none"> • Flying particles • Chemical liquids, gases or vapors • Light radiation • Molten metals 	<ul style="list-style-type: none"> • Glasses • Goggles
Ears	<ul style="list-style-type: none"> • High noise levels 	<ul style="list-style-type: none"> • Plugs • Muffs
Body	<ul style="list-style-type: none"> • Heat • Cold • Chemicals • Sparks • Cuts • Burns • Electrical shock 	<ul style="list-style-type: none"> • Suits • Leggings • Aprons
Hands and Arms	<ul style="list-style-type: none"> • Heat • Cold • Chemicals • Sparks • Cuts • Burns • Electrical shock 	<ul style="list-style-type: none"> • Gloves • Sleeves
Feet	<ul style="list-style-type: none"> • Impact • Rolling objects • Sharp objects • Hot liquids • Slippery surfaces 	<ul style="list-style-type: none"> • Steel-toed shoes and boots • Metatarsal protection • Slip-resistant soles • Ice cleats
Lungs	<ul style="list-style-type: none"> • Harmful vapors • Mists • Dusts, gases, smoke, sprays, fog 	<ul style="list-style-type: none"> • Respirators • Hoods
Fall Protection	<ul style="list-style-type: none"> • Working at heights 	<ul style="list-style-type: none"> • Harnesses • Anchors

Note: When selecting PPE, it is important to be aware of any applicable consensus standards, such as ANSI or ASTM standards, that the chosen PPE must meet. For example, safety glasses must pass the test criteria established in the ANSI Z87.1 Standard.

Human Factors

PPE is specifically designed to protect employees from specific types of harm. Although some of it may not be as comfortable as a pair of pajamas or bedroom slippers, most modern forms of PPE are designed to be as comfortable as possible.

The more comfortable and the better PPE fits, the more likely it will be for workers to wear it correctly and consistently. Although it is not required, purchasing higher quality products encourages use. Selecting items with sports team or other recognized logos can also encourage employees to wear PPE consistently.

In addition to providing appropriate PPE, it is important to establish a safety culture that encourages everyone to wear required PPE. Training is essential, but peer pressure — either for or against wearing PPE — can be a big factor in whether or not workers remember it consistently. Teaching managers and supervisors to reinforce safe behaviors and to help each employee understand the need for PPE can help ensure proper use.

Limitations

Under OSHA's hierarchy of controls, PPE is the last line of defense that a worker has against a hazard. But it doesn't make workers invincible. Even the best PPE that money can buy or that technology can produce still has limitations.

For some employers, especially those who are not well versed in doing hazard assessments, it can be tempting to overprotect their workers, requiring any and every possible form of PPE that can be found. This can actually cause more problems than it solves.

Think for a moment of emergency hazmat responders in fully encapsulated suits with self-contained breathing apparatus. They have the highest level of respiratory and skin protection available. But any person who has ever put on one of those suits will tell you that it doesn't make them invincible. They can also list a number of hazards that wearing them presents.

Some types of PPE limit mobility. Some can also subject the person wearing it to heat stress or other health problems. In fact, some forms of PPE, such as respirators, often require a medical evaluation before they can be worn to ensure that the worker will be physically able to wear the PPE without introducing new health problems.

Maintenance is another limiting factor for PPE. Even if it's kept clean and well-maintained, PPE will eventually need to be replaced. Understanding the life expectancy of each product, its recommended care instructions and specific workplace factors that could affect PPE worn by workers helps to ensure that sufficient money is budgeted for replacements when they are needed.



Training

Stocking safety glasses and earplugs at each entrance and posting a sign that says “Eye and Hearing Protection Required” isn’t enough to satisfy OSHA’s training requirements for employees who need to wear PPE. To be effective, each employee should be able to properly demonstrate how to correctly wear and care for any PPE that they have been issued and be able to explain:

- ▶ When PPE is necessary
- ▶ What types of PPE are required
- ▶ How to wear it properly (donning, doffing, adjusting)
- ▶ Limitations of the PPE
- ▶ Proper care and maintenance
- ▶ When and how to replace PPE that is no longer serviceable

Employees should be retrained when conditions that affect the use of PPE change in the workplace, when new job duties are assigned or when new types of PPE are introduced. In addition to formal trainings, weekly toolbox talks, signage and reinforcement from supervisors and management are all forms of training that can be used to remind everyone to correctly wear any items that are required.

Hazard-Free Workplaces

While there really is no such thing as a hazard-free workplace, employers who perform hazard assessments and apply the elements in OSHA’s hierarchy of controls — including the use of PPE when it is appropriate — are doing their part to help ensure the workplace is safe for their employees. Providing appropriate PPE and teaching each employee how and why to wear it can help prevent injuries, illnesses and workplace deaths.



Keep workers protected with these PPE solutions.



GLS500

[StarLite® Original Safety Glasses](#)

Stylish, lightweight glasses designed for all-day comfort are light on your budget, too.



GLS806

[Proximity® Safety Glasses](#)

H2X anti-fog protection blocks out fog, mist, sweat and steam for clearer vision.



RSP304

[3M 6000 Series Full-Face Respirator](#)

Reusable respirator offers affordable protection from airborne contaminants.



RSP300

[3M 6000 Series Half-Mask Respirator](#)

Lightweight respirator accepts a variety of filters and cartridges for airborne contaminants.



PLS1014

[Bloodborne Pathogen Protection Kit](#)

Specialized kit is packed with essential tools and materials to help shield workers from pathogens.



PLS2004

[Emergency Preparedness Kit](#)

141-piece kit provides first aid, emergency food and water supplies for 24 people.



WPL854

[Tychem® TK Level A Suit](#)

Field-proven, high level chemical protection for hazmat first responders.



WPL137

[Chemtex Level C Coverall with Hood](#)

Reliable Level C protection from chemical splashes, particles and more.



LCK222

[Group Lockout Kit](#)

Includes the most common lockout (LOTO) designs used to prevent machine activation.