

# Personal Protective Equipment

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University of Arizona  
Risk Management & Safety  
**Health and Safety Instruction**  
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## INTRODUCTION

### Purpose

The purpose of this Health and Safety Instruction (HSI) is to protect employees from hazards in the workplace by using personal protective equipment to supplement other primary hazard controls.

### Background

Hazards exist in every workplace in many different forms: sharp edges, falling objects, flying sparks, chemicals, noise and a myriad of other potentially dangerous situations. Controlling hazards with engineering and administrative controls is the best way to protect employees. When these controls are not feasible or do not provide sufficient protection, personal protective equipment (PPE) must be used. In line with this rationale for controlling or eliminating workplace hazards, the Occupational Safety and Health Administration (OSHA) issued the Personal Protective Equipment standard, also known as "The PPE Standard." Under this standard, the **University** is required to:

- Conduct hazard assessments to determine if PPE is necessary to protect employees and certify in writing that assessments have been performed.
- Select appropriate PPE, where necessary.
- Provide employees training on proper care, use and limitations of the selected PPE.
- Ensure the PPE is properly used.

This HSI, developed by **Risk Management & Safety** outlines the minimum requirements to protect employees from hazards in the workplace by using personal protective equipment to supplement other primary hazard controls. It also outlines the minimum requirements for achieving compliance with OSHA's Personal Protective Equipment Standard.

**Who's Covered?**

**Employees** are covered by this HSI if they are exposed to workplace hazards that are not adequately controlled by engineering and/or administrative controls.

**Explanation of Key Terms**

**Engineering Hazard Controls:** "Engineering hazard controls" may be defined as an installation of equipment, or other physical facilities including, if necessary, the selection and arrangement of experimental equipment. Engineering controls remove the hazard, either by initial design specifications or by applying methods of substitution, minimization, isolation or ventilation.

**Administrative Hazard Controls:** "Administrative hazard controls" consist of managerial efforts to reduce hazards through planning, information and training (e.g. hazard communication), written policies and procedures, safe work practices, and environmental and medical surveillance (e.g. work place inspections, equipment preventive maintenance, and exposure monitoring).

**Personal Protective Equipment:** "Personal protective equipment" (PPE) includes a wide variety of items worn by an individual to isolate the person from chemical hazards. PPE includes articles to protect the eyes, skin, and the respiratory tract (e.g. goggles, face shields, coats, gloves, aprons, respirators).

## HOW IT WORKS

### Hazard Assessment

**First-line supervisors** must conduct a walk-through survey the workplace to determine if hazards are present or likely to be present. The objective is to prepare for an analysis of the hazards in the work environment to enable proper selection of protective equipment. To organize the hazard assessment data, the “Hazard Type(s)” and “Exposed Body Part” sections of the PPE Hazard Assessment/Training Certification Form in Appendix A can be used to conduct and document the survey for each job/task. Consideration should be given to the basic hazard categories:

- Impact
- Penetration
- Compression (roll-over)
- Chemical
- Heat
- Harmful dust
- Light (optical) radiation

During the walk-through survey, **First-line supervisors** should observe:

- Sources of motion (i.e., machinery or processes where any movement of tools, machine elements or particles could exist, or movement of personnel that could result in collision with stationary objects);
- Sources of high temperatures that could result in burns, eye injury or ignition of protective equipment, etc.;
- Types of chemical exposures;
- Sources of harmful dust;
- Sources of light radiation (i.e., welding, brazing, cutting, furnaces, heat treating, high intensity lights, etc.);
- Sources of falling objects or potential for dropping objects;
- Sources of sharp objects which might pierce the feet or cut the hands;
- Sources of rolling or pinching objects which could crush the feet;
- Layout of workplace and location of co-workers; and
- Any electrical hazards.

In addition, **First-line supervisors** should review injury/accident data to help identify problem areas.

**RM&S** can provide assistance (621-1790).

## Hazard Control

**First-line supervisors** must adequately control the identified hazards with engineering and administrative controls, if possible.

If not possible, **First-line supervisors** must select, and have each affected employee use the type(s) of PPE that will protect them from the identified hazard(s). The PPE Hazard Assessment/Training Certification Form in Appendix A and the Personal Protective Equipment (PPE) Selection Guidelines in Appendix B can be used to select appropriate PPE for the identified hazards that cannot be adequately control with engineering and administrative controls.

**First-line supervisors** must contact Risk Management & Safety before considering respiratory or hearing protection (621-1570). In these cases, **RM&S** will conduct a hazard assessment and recommend appropriate controls for respiratory or hearing protection.

**First-line supervisors** must select PPE that properly fits each affect employee and communicate the PPE selection to each employee.

**First-line supervisors** must ensure that damaged or defective PPE is not used.

**RM&S** can provide assistance with regard to other hazard controls (621-1790).

It is the responsibility of **First-line supervisors** to reassess the workplace hazard situation as necessary, by identifying and evaluating new equipment and processes, reviewing accident records, and reevaluating the suitability of previously selected PPE.

## Training

**First-line supervisors** must ensure each employee who is required to use PPE is trained:

- Before being allowed to perform work requiring the use of PPE;
- When changes in the workplace or PPE render previous training obsolete, and
- When there is reason to believe procedures are not followed and/or inadequacies in employee knowledge exist.

### Training must include:

- When PPE is necessary to be worn;
- What PPE is necessary;
- How to properly don, doff, adjust, and wear PPE;
- The limitations of PPE, and
- The proper care, maintenance, useful life and disposal of PPE.

**Employees** must demonstrate an understanding of the training and the ability to use PPE

**RM&S** will provide training with regards to respiratory and hearing protection and can provide assistance with regards to other training (621-1790).

### **Documentation**

**First-line supervisors** must verify that the hazard assessment has been performed and that each affected employee has received and understood the training through a written certification. The PPE Hazard Assessment/Training Certification Form in Appendix A.

**APPENDIX A**

**PPE HAZARD ASSESSMENT/TRAINING CERTIFICATION FORM**

PPE HAZARD ASSESSMENT/TRAINING CERTIFICATION FORM  
November 2005, version 1.2

Work Area(s): \_\_\_\_\_ Job/Task(s): \_\_\_\_\_  
(Use a separate sheet for each task)

| Exposed Body Part                          | Hazard Type(s)  | Personal Protective Equipment (PPE) Required  |
|--|---|---|
| <input type="checkbox"/> Eye/Face          | <input type="checkbox"/> Falling/Flying Objects<br><input type="checkbox"/> Harmful Dusts<br><input type="checkbox"/> Extreme Heat/Cold (burns, frostbite)<br><input type="checkbox"/> Chemical (irritation, burns, exposures)<br><input type="checkbox"/> Optical (light) Radiation<br><input type="checkbox"/> Biological (exposures to mucus membranes)  | Can hazard(s) be adequately controlled with engineering and administrative controls? <input type="checkbox"/> Yes <input type="checkbox"/> No If no, specify PPE:<br>1° Protection 2° Protection<br><input type="checkbox"/> Safety Glasses (w/ 1° Protection)<br><input type="checkbox"/> Goggles <input type="checkbox"/> Face Shield<br><input type="checkbox"/> Filter Lenses - shade: _____ (2-14) <input type="checkbox"/> Welding Helmet<br><input type="checkbox"/> Laser Goggles - OD: _____ (5-8)                       |
| <input type="checkbox"/> Hand/Arm          | <input type="checkbox"/> Chemical (irritation, burns, exposures)<br><input type="checkbox"/> Scrapes/Cuts/Punctures<br><input type="checkbox"/> Extreme Heat/Cold (burns, frostbite)<br><input type="checkbox"/> Electrical Shock/Burn<br><input type="checkbox"/> Biological (exposures to damaged skin)<br><input type="checkbox"/> Radiological  | Can hazard(s) be adequately controlled with engineering and administrative controls? <input type="checkbox"/> Yes <input type="checkbox"/> No If no, specify PPE:<br><input type="checkbox"/> Chemical/Liquid Resistant Gloves<br><input type="checkbox"/> Temperature Resistant Gloves<br><input type="checkbox"/> Abrasion/Cut/Puncture Resistant Gloves<br><input type="checkbox"/> Slip Resistant Gloves<br><input type="checkbox"/> Non-Conductive Gloves  |
| <input type="checkbox"/> Respiratory Tract | <input type="checkbox"/> Chemical<br><input type="checkbox"/> Harmful Dusts<br><input type="checkbox"/> Biological<br><input type="checkbox"/> Radiological   | Can hazard(s) be adequately controlled with engineering and administrative controls? <input type="checkbox"/> Yes <input type="checkbox"/> No If no, Contact RM&S @ 621-1570 regarding Respiratory Protection Program.  |
| <input type="checkbox"/> Hearing           | <input type="checkbox"/> Excessive Noise (consider if you must raise voice to communicate @ 3 feet)<br><input type="checkbox"/> Chemical (affecting auditory nerve)   | Can hazard(s) be adequately controlled with engineering and administrative controls? <input type="checkbox"/> Yes <input type="checkbox"/> No If no, Contact RM&S @ 621-1570 regarding Hearing Conservation Program and specify PPE:<br><input type="checkbox"/> Ear Plugs type _____ NRR <input type="checkbox"/> Ear Muffs type _____ NRR   |
| <input type="checkbox"/> Head              | <input type="checkbox"/> Falling Objects<br><input type="checkbox"/> Electrical Shock/Burn<br><input type="checkbox"/> Bumping Against Fixed Objects  | Can hazard(s) be adequately controlled with engineering and administrative controls? <input type="checkbox"/> Yes <input type="checkbox"/> No If no, specify PPE:<br><input type="checkbox"/> Hard Hat - type _____ (A - low voltage, B - high voltage, or C)<br><input type="checkbox"/> Bump Hat (not for falling/flying objects - not ANSI approved)   |
| <input type="checkbox"/> Foot/Leg          | <input type="checkbox"/> Falling/Rolling Objects<br><input type="checkbox"/> Punctures<br><input type="checkbox"/> Chemical<br><input type="checkbox"/> Extreme Heat/Cold (burns, frostbite)<br><input type="checkbox"/> Electrical Shock/Burn (contact w/electrical hazards)   | Can hazard(s) be adequately controlled with engineering and administrative controls? <input type="checkbox"/> Yes <input type="checkbox"/> No If no, specify PPE:<br><input type="checkbox"/> Safety Shoes <input type="checkbox"/> Toe/Metatarsal Guards Specify:<br><input type="checkbox"/> Leggings <input type="checkbox"/> Combo. Foot/Shin Guards<br><input type="checkbox"/> Shoe Covers <input type="checkbox"/> Conductive Shoes<br><input type="checkbox"/> Other <input type="checkbox"/> Non-Conductive Safety Shoes |
| <input type="checkbox"/> Body              | <input type="checkbox"/> Chemical<br><input type="checkbox"/> Harmful Dusts<br><input type="checkbox"/> Extreme Heat/Cold (burns, frostbite, heat/cold stress)<br><input type="checkbox"/> Electrical Shock/Burn<br><input type="checkbox"/> Radiological<br><input type="checkbox"/> Biological (exposures to damaged skin)<br><input type="checkbox"/> Falls (consider when working 4 feet above lower surface) | Can hazard(s) be adequately controlled with engineering and administrative controls? <input type="checkbox"/> Yes <input type="checkbox"/> No If no, specify PPE:<br><input type="checkbox"/> Apron <input type="checkbox"/> Lab Coat Specify:<br><input type="checkbox"/> Coverall <input type="checkbox"/> Gown<br><input type="checkbox"/> Vest <input type="checkbox"/> Full-Body Suit<br><input type="checkbox"/> Jacket <input type="checkbox"/> Personal Fall Arrest System<br><input type="checkbox"/> Other              |

**Personal Protective Equipment (PPE) Training**

(check)

When the PPE specified on the opposite page is necessary.

What PPE is necessary for the task specified on the opposite page.

How to properly don, doff, adjust, and wear the PPE specified on the opposite page.

The limitations of the PPE

The proper care, maintenance, useful life and disposal of the PPE.

**I have provided the following employees training on the above information and they demonstrate an understanding of the training.**

Supervisor's Name: \_\_\_\_\_ Supervisor's Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Employee's Name: \_\_\_\_\_ Employee's Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Employee's Name: \_\_\_\_\_ Employee's Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Employee's Name: \_\_\_\_\_ Employee's Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Employee's Name: \_\_\_\_\_ Employee's Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Employee's Name: \_\_\_\_\_ Employee's Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Employee's Name: \_\_\_\_\_ Employee's Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Employee's Name: \_\_\_\_\_ Employee's Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Employee's Name: \_\_\_\_\_ Employee's Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Employee's Name: \_\_\_\_\_ Employee's Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Employee's Name: \_\_\_\_\_ Employee's Signature: \_\_\_\_\_ Date: \_\_\_\_\_

## APPENDIX B

### PERSONAL PROTECTIVE EQUIPMENT (PPE) GUIDELINES

It is very important that end users be made aware of all warning labels for and limitations of their PPE.

**Fitting the device:** Careful consideration must be given to comfort and fit. PPE that fits poorly will not afford the necessary protection. Continued wearing of the device is more likely if it fits the wearer comfortably. Protective devices are generally available in a variety of sizes. Care should be taken to ensure that the right size is selected.

**Devices with adjustable features:** Adjustments should be made on an individual basis for a comfortable fit that will maintain the protective device in the proper position. Particular care should be taken in fitting devices for eye protection against dust and chemical splash to ensure that the devices are sealed to the face. In addition, proper fitting of helmets is important to ensure that it will not fall off during work operations. In some cases a chin strap may be necessary to keep the helmet on an employee's head. (Chin straps should break at a reasonably low force, however, so as to prevent a strangulation hazard). Where manufacturer's instructions are available, they should be followed carefully.

**Selection chart guidelines for eye and face protection:** Some occupations (not a complete list) for which eye protection should be routinely considered are: carpenters, electricians, machinists, mechanics and repairers, millwrights, plumbers and pipe fitters, sheet metal workers and tinsmiths, assemblers, sanders, grinding machine operators, lathe and milling machine operators, sawyers, welders, laborers, chemical process operators and handlers, and timber cutting and logging workers. The following chart provides general guidance for the proper selection of eye and face protection to protect against hazards associated with the listed hazard "source" operations.

Eye and Face Protection Selection Chart

| Source   | Assessment of Hazard  | Protection   |
|--|---|--|
| IMPACT - Chipping, grinding machining, masonry work, woodworking, sawing, drilling, chiseling, powered fastening, riveting, and sanding. | Flying fragments, objects, large chips, particles sand, dirt, etc. .. | Spectacles with side protection, goggles, face shields. See notes (1), (3), (5), (6), (10). For severe exposure, use faceshield. |
| HEAT-Furnace operations, pouring, casting, hot dipping, and welding.   | Hot sparks .....  | Faceshields, goggles, spectacles with side protection. For severe exposure use faceshield.                                       |



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 Eye and Face Protection Selection Chart (con't.)
 

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| Source   | Assessment of Hazard           | Protection   |
|--|--------------------------------|--|
|  |                                | See notes (1), (2), (3).   |
|  | Splash from molten metals..... | Faceshields worn over goggles. See notes (1), (2), (3).  |
|  | High temperature exposure..... | Screen face shields, reflective face shields. See notes (1), (2), (3).   |
| CHEMICALS-Acid and chemicals handling, degreasing plating. | Splash .....                   | Goggles, eyecup and cover types. For severe exposure, use face shield. See notes (3), (11).                      |
|  | Irritating mists ..            | Special-purpose goggles.   |
| DUST - Woodworking, buffing, general dusty conditions.     | Nuisance dust .....            | Goggles, eyecup and cover types. See note (8).   |
| LIGHT and/or RADIATION -<br>Welding: Electric arc          | Optical radiation .            | Welding helmets or welding shields. Typical shades: 10-14. See notes (9), (12).                                  |
| Welding: Gas   | Optical radiation .            | Welding goggles or welding face shield. Typical shades: gas welding 4-8, cutting 3-6, brazing 3-4. See note (9). |
| Cutting, Torch brazing, Torch soldering                    | Optical radiation ..           | Spectacles or welding face-shield. Typical shades, 1.5-3. See notes (3), (9).                                    |
| Glare  | Poor vision .....              | Spectacles with shaded or special-purpose lenses, as suitable. See notes (9), (10).                              |

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Notes to Eye and Face Protection Selection Chart:

(1) Care should be taken to recognize the possibility of multiple and simultaneous exposure to a variety of hazards. Adequate protection against the highest level of each of the hazards should be provided. Protective devices do not provide unlimited protection.

(2) Operations involving heat may also involve light radiation. As required by the standard, protection from both hazards must be provided.

(3) Faceshields should only be worn over primary eye protection (spectacles or goggles).

(4) As required by the standard, filter lenses must meet the requirements for shade designations in 1910.133(a)(5). Tinted and shaded lenses are not filter lenses unless they are marked or identified as such.

(5) As required by the standard, persons whose vision requires the use of prescription (Rx) lenses must wear either protective devices fitted with prescription (Rx) lenses or protective devices designed to be worn over regular prescription (Rx) eyewear.

(6) Wearers of contact lenses must also wear appropriate eye and face protection devices in a hazardous environment. It should be recognized that dusty and/or chemical environments may represent an additional hazard to contact lens wearers.

(7) Caution should be exercised in the use of metal frame protective devices in electrical hazard areas.

(8) Atmospheric conditions and the restricted ventilation of the protector can cause lenses to fog. Frequent cleansing may be necessary.

(9) Welding helmets or faceshields should be used only over primary eye protection (spectacles or goggles).

(10) Non-sideshield spectacles are available for frontal protection only, but are not acceptable eye protection for the sources and operations listed for "impact."

(11) Ventilation should be adequate, but well protected from splash entry. Eye and face protection should be designed and used so that it provides both adequate ventilation and protects the wearer from splash entry.

(12) Protection from light radiation is directly related to filter lens density. See note (4) . Select the darkest shade that allows task performance.

**Selection guidelines for head protection:** All head protection (helmets) is designed to provide protection from impact and penetration hazards caused by falling objects. Head protection is also available which provides protection from electric shock and burn. When selecting head protection, knowledge of potential electrical hazards is important. Class A helmets, in addition to impact and penetration resistance, provide electrical protection from low-voltage conductors (they are proof tested to 2,200 volts). Class B helmets, in addition to impact and penetration resistance, provide electrical protection from high-voltage conductors (they are proof tested to 20,000 volts). Class C helmets provide impact and penetration resistance (they are usually made of aluminum which conducts electricity), and should not be used around electrical hazards.

Where falling object hazards are present, helmets must be worn. Some examples include: working below other workers who are using tools and materials which could fall; working around or under conveyor belts which are carrying parts or materials; working below machinery or processes which might cause material or objects to fall; and working on exposed energized conductors. Some examples of occupations for which head protection should be routinely considered are: carpenters, electricians, linemen, mechanics and repairers, plumbers and pipe fitters, assemblers, packers, wrappers, sawyers, welders, laborers, freight handlers, timber cutting and logging, stock handlers, and warehouse laborers.

**Selection guidelines for foot protection:** Safety shoes and boots which meet the ANSI Z41-1991 Standard provide both impact and compression protection. Where necessary, safety shoes can be obtained which provide puncture protection. In some work situations, metatarsal protection should be provided, and in other special situations electrical conductive or insulating safety shoes would be appropriate.

Safety shoes or boots with impact protection would be required for carrying or handling materials such as packages, objects, parts or heavy tools, which could be dropped; and, for other activities where objects might fall onto the feet. Safety shoes or boots with compression protection would be required for work activities involving skid trucks (manual material handling carts) around bulk rolls (such as paper rolls) and around heavy pipes, all of which could potentially roll over an employee's feet. Safety shoes or boots with puncture protection would be required where sharp objects such as nails, wire, tacks, screws, large staples, scrap metal etc., could be stepped on by employees causing a foot injury.

Some occupations (not a complete list) for which foot protection should be routinely considered are: shipping and receiving clerks, stock clerks, carpenters, electricians, machinists, mechanics and repairers, plumbers and pipe fitters, structural metal workers, assemblers, drywall installers and lathers, packers, wrappers, craters, punch and stamping press operators, sawyers, welders, laborers, freight handlers, gardeners and grounds-keepers, timber cutting and logging workers, stock handlers and warehouse laborers.

**Selection guidelines for hand protection:** Gloves are often relied upon to prevent cuts, abrasions, burns, and skin contact with chemicals that are capable of causing local or systemic effects following dermal exposure. OSHA is unaware of any gloves that provide protection against all potential hand hazards, and commonly available glove materials provide only limited protection against many chemicals. Therefore, it is important to select the most appropriate glove for a particular application and to determine how long it can be worn, and whether it can be reused.

It is also important to know the performance characteristics of gloves relative to the specific hazard anticipated; e.g., chemical hazards, cut hazards, flame hazards, etc. These performance characteristics should be assessed by using standard test procedures. Before purchasing gloves, the employer should request documentation from the manufacturer that the gloves meet the appropriate test standard(s) for the hazard(s) anticipated. Other factors to be considered for glove selection in general include:

(A) As long as the performance characteristics are acceptable, in certain circumstances, it may be more cost effective to regularly change cheaper gloves than to reuse more expensive types; and,

(B) The work activities of the employee should be studied to determine the degree of dexterity required, the duration, frequency, and degree of exposure of the hazard, and the physical stresses that will be applied.

With respect to selection of gloves for protection against chemical hazards:

(A) The toxic properties of the chemical(s) must be determined; in particular, the ability of the chemical to cause local effects on the skin and/or to pass through the skin and cause systemic effects;

(B) Generally, any "chemical resistant" glove can be used for dry powders;

(C) For mixtures and formulated products (unless specific test data are available), a glove should be selected on the basis of the chemical component with the shortest breakthrough time, since it is possible for solvents to carry active ingredients through polymeric materials; and,

(D) Employees must be able to remove the gloves in such a manner as to prevent skin contamination.

**Cleaning and maintenance:** It is important that all PPE be kept clean and properly maintained. Cleaning is particularly important for eye and face protection where dirty or fogged lenses could impair vision.

PPE should be inspected, cleaned, and maintained at regular intervals so that the PPE provides the requisite protection. It is also important to ensure that contaminated PPE which cannot be decontaminated is disposed of in a manner that protects employees from exposure to hazards.