

Chapter 19: [Personal Protective Equipment](#)

PPE Requirements

Product ID: [525](#) | Revision ID: 2198 | Date published: 7 May 2021 | Date effective: 7 May 2021

URL: <https://www-group.slac.stanford.edu/esh/eshmanual/references/PPEReq.pdf>

1 Purpose

The purpose of these requirements is to ensure the proper selection and use of *personal protective equipment (PPE)*. They cover determining, acquiring, using, inspecting, maintaining, and posting for common types of PPE. (Hazard-specific PPE requirements, such as laser safety glasses, dust masks, and hearing protection, are listed in each appropriate ESH Manual chapter.) They apply to workers, supervisors, field construction and service managers and points of contact, subcontractors, and user institutions.

2 Requirements

2.1 Determination

PPE requirements are determined as part of the routine work authorization process described in [Chapter 2, “Work Planning and Control”](#). Minimally any part of the body at risk from the following types of personal hazards needs to be protected:

- | | |
|---|----------------------------|
| ▪ Flying particles, objects | ▪ Crushing hazards |
| ▪ Excessive noise | ▪ Electric shock/arc flash |
| ▪ Temperature extremes | ▪ Cuts and abrasions |
| ▪ Chemical splashes | ▪ Soldering spatter |
| ▪ Chemical contamination of skin and clothing | |

Consult with your [ESH coordinator](#) or the appropriate [ESH program manager](#) if assistance is needed in selecting appropriate PPE.

Important Engineering and administrative controls should already be in place; PPE must not be used to replace these primary hazard control methods.

2.2 Acquisition

SLAC is responsible for providing PPE to its employees and students of Stanford University assigned to work at SLAC. (For the full SLAC policy on reimbursing employees, see [Personal Protective Equipment \(PPE\) Reimbursement](#).)

For temporary agency and job shop employees, SLAC either provides the PPE or reimburses the employers for PPE they provide, which will be the case for more specialized PPE such as half-faced or full-faced air purifying respirators, protective footwear, and prescription safety glasses.

Subcontractors, independent contractors, and user institutions are responsible for providing PPE to their employees.

- Only PPE that meets applicable safety standards can be approved for purchase.
- Many organizations maintain and provide the PPE their employees need.
- The appropriate [ESH program manager](#) should be consulted before purchasing some hazard-specific PPE (for example, for laser glasses, contact the laser safety officer, for electrical PPE, the electrical safety officer, for respiratory protection, the respiratory protection program manager)
- Prescription safety glasses (meeting [ANSI Z87.1](#)) and protective footwear meeting the appropriate standard (for example [ASTM F2413](#) for safety-toe footwear) are purchased and reimbursed following [Personal Protective Equipment: Safety Glasses and Protective Footwear Purchasing Procedures](#). Note reimbursement limits are established by the Office of the Chief Financial Officer.
- Other PPE types such as protective clothing involve an individual purchase order.

2.3 Inspection and Maintenance

PPE must be inspected for wear and defects before and after each use, maintained following the manufacturer's recommendations, and removed from use immediately if damaged or defective.

2.4 Posting

Areas in which specific hazards can be anticipated because of work performed or having known hazards or chemicals are posted as described in the hazard-specific chapter. Entrants must obey all PPE postings. Example posting:

CAUTION – EYE HAZARD AREA – DO NOT ENTER WITHOUT EYE PROTECTION

2.5 Use

This section is organized by specific body area. For additional guidance, see [Personal Protective Equipment: PPE Guidelines for Common Tasks](#) or contact the PPE program manager.

2.5.1 Head

Head protection includes helmets and *hard hats* as well as *bump caps* that protect from abrasion and hats that provide shade and ultraviolet protection.

- Hard hats must be worn whenever high-impact force or penetration by a flying or falling object is a possibility, such as when working below scaffolding, in a crane service area, or at a *construction site*¹.

1 A *construction site* is an area in which any combination of the following activities takes place: erection, installation, assembly, demolition, or fabrication to create a new facility, or to alter, add to,

Warning Bump caps/skull guards only protect against scalp lacerations and cannot be substituted in conditions that call for a hard hat.

2.5.2 Eyes and Face

Workers must wear eye protection when performing any task that presents such eye-injury hazards as impact, chemical exposure, foreign bodies, intense light or heat, flame, or electrical arc. Certain operations require face protection in addition to eye protection, but a face shield is not to be worn in lieu of safety eyewear. (Welding shields is one notable exception as described below.)

- Single-lens goggles may be worn in combination with spectacles or corrective lenses to ensure protection along with proper vision.
- *Welder's goggles* provide protection from sparking, scaling, or splashing metals and harmful light rays. Lenses are impact resistant and are available in graduated shades of filtration.
- *Welding shields* protect workers' eyes and face from infrared or radiant light burns, flying sparks, metal splatter, and slag chips encountered during welding, brazing, soldering, resistance welding, bare or shielded electric arc welding and oxyacetylene welding and cutting operations.
- *Chipper's goggles* provide eye protection from flying particles. The dual protective eye cups house impact resistant clear lenses with individual cover plates.

Operations that pose a potential eye hazard include those that

- Produce flying particles, such as those created by machining equipment or portable power tools
- Involve handling hazardous liquids that may splash (chemicals, liquid hazardous waste, plating bath, epoxy, cryogenics)
- Involve exposure to intense light, such as working with ultraviolet or lasers (the system laser safety officer determines protective eyewear for working with a laser)
- Produce molten metal by welding or brazing
- Produce an electric arc, such as by grounding a charged capacitor
- Could expose workers to electrical arc flash
- Use pressurized systems such as compressed air or hydraulic systems

All eye and face protection must meet [ANSI Z87.1](#). The PPE program manager and the Occupational Health Clinic are available to assist in defining eye-hazard operations and in selecting appropriate eye protection.

2.5.3 Body

2.5.3.1 High-visibility Safety Apparel

A high-visibility safety vest or jacket must be worn by anyone who performs tasks on or near moving vehicles or equipment, such as when working in or near roadways or on a construction site. Workers must be visible to vehicle operators in all work lighting conditions. The required clothing must be Class 2 or Class 3 fluorescent yellow-green (preferred) or fluorescent orange-red per [ANSI/ISEA 107](#).

rehabilitate, dismantle, or remove an existing facility. It also includes any area in which construction and excavation activities are conducted as part of environmental remediation efforts.

2.5.3.2 Protective Clothing

Protective clothing must be worn when working with hazardous chemicals and physical agents. Examples include

- Coveralls to protect against chemicals, hazardous dust, and heavy lubricants
- Flame-retardant apron, coveralls, and gloves to protect against fire
- Rubber apron to protect against chemical liquids
- Special flame-resistant overalls to protect from electrical flash burns
- Apron to protect against burns while welding
- Hat to provide shade and protect against the sun's ultraviolet rays

2.5.4 Hand

Suitable gloves must be worn when the following hazards are present: chemical; thermal (extreme heat or cold); radiological; electrical; bio-hazard; possibility of abrasion, puncture, or contamination. Padded gloves should be used to improve ergonomics, as needed.

Warning Do not use gloves when operating rotating equipment such as a lathe, drill, or drill press.

Select the glove type that addresses the specific hazard(s) as illustrated by these examples:

- Abrasion-resistant gloves for handling sharp or rough objects
- Electrical lineman gloves for both low- and high-voltage electrical hazards
- Chemically resistant gloves for use with the specific chemical(s) to be handled
- Flame-retardant and heat-resistant gloves for working with extremely hot materials
- Cold-resistant gloves for working with cryogenics
- Rubber or other suitable gloves for handling contaminants
- Padded gloves to relieve ergonomic stress

2.5.5 Foot

Foot protection is required in the following instances (not an exhaustive list):

- Safety-toe (steel, composite, or ceramic) boots are required at all construction sites.
- Protective footwear must be worn where there is a potential for electrical hazards; special electrical hazard footwear are designed with no conductive materials other than the steel toe (if safety-toe footwear), which is insulated. Safety-toe electrical hazard footwear is also available with a composite or ceramic toe box and no steel.
- Protective footwear with impact protection must be worn in work areas where carrying or handling materials such as packages, objects, parts or heavy tools, which if dropped, could injure the feet.
- Protective footwear with compression protection (safety-toe) must be worn for work activities in which materials or equipment could potentially roll over a foot.

- Protective footwear with puncture protection are required where sharp objects such as nails, wire, tacks, screws, large staples, scrap metal, could be stepped on.
- Neoprene or nitrile boots may be required while working with corrosives, caustics, cutting oils, and petroleum products.

Other hazards may necessitate the protective footwear described above or footwear with other protective features such as metatarsal protection, static dissipation, and slip resistance.

These requirements commonly apply to construction workers, riggers, machinists, mechanics, carpenters, electricians, store keepers, shipping/receiving personnel, technicians, and laborers. All protective footwear must meet appropriate performance standards, for example, [ASTM F2413](#) for safety-toe footwear or [ASTM F2892](#) for soft-toe footwear, and be tested by the manufacturer using [ASTM F2412](#) or equivalent methods. The PPE program manager is available to make recommendations to ensure applicable standards are met.

3 Forms

The following forms and systems are required by these requirements:

- None

4 Recordkeeping

The following recordkeeping requirements apply for these requirements:

- None

5 References

[SLAC Environment, Safety, and Health Manual](#) (SLAC-I-720-0A29Z-001)

- [Chapter 19, “Personal Protective Equipment”](#)
 - [Personal Protective Equipment: PPE Guidelines for Common Tasks](#) (SLAC-I-730-0A21T-015)
 - [Personal Protective Equipment: Safety Glasses and Protective Footwear Purchasing Procedures](#) (SLAC-I-730-0A21C-034)
 - [Personal Protective Equipment \(PPE\) Program Site](#) (SharePoint)
- [Chapter 2, “Work Planning and Control”](#)

Other SLAC Documents

- [Personal Protective Equipment \(PPE\) Reimbursement](#) (BTS-2018-012)
- [ESH Coordinators](#)
- [Programs and Program Managers List](#)

Other Documents

- American National Standards Institute (ANSI) Z87.1, “Practice for Occupational and Educational Eye and Face Protection” ([ANSI Z87.1](#))
- American National Standards Institute (ANSI)/International Safety Equipment Association (ISEA) 107, “High Visibility Safety Apparel” ([ANSI/ISEA 107](#))
- ASTM International (ASTM) F2412, “Standard Test Methods for Foot Protection” ([ASTM F2412](#))
- ASTM International (ASTM) F2413, “Standard Specification for Performance Requirements for Foot Protection” ([ASTM F2413](#))
- ASTM International (ASTM) F2892, “Performance Requirements for Soft Toe Protective Footwear (Non-safety / Non-protective Toe)” ([ASTM F2892](#))