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***Personal Protective  
Equipment Program***

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**DARTMOUTH**

## Contents

Section 1 - Purpose .....	4
Section 2 - Scope.....	4
Section 3 – Definitions .....	4
Section 4 – Roles and Responsibilities .....	5
Section 5 - Program Requirements .....	6
5.1 Hazard Assessments.....	6
5.2 PPE Selection and Standards.....	6
5.3 Training .....	6
5.4 Payment for Protective Equipment.....	7
Section 6 - Types of Personal Protective Equipment.....	7
6.1 Electrical Protection .....	7
6.2 Eye and Face Protection .....	7
Appendix C, General Guidance for PPE Selection .....	7
<b>6.2.1 Safety Glasses</b> .....	8
<b>6.2.2 Chemical Goggles</b> .....	8
<b>6.2.3 Face Shields</b> .....	8
<b>6.2.4 Eye and Face Protection for Welding, Cutting, Brazing, and Soldering</b> .....	8
6.3 Fall Protection .....	9
6.4 Foot and Leg Protection .....	9
Appendix D General Guidance for PPE Selection .....	9
6.5 Hand and Arm Protection .....	9
6.6 Head Protection.....	10
6.7 Hearing Protection.....	10
6.8 High Visibility Clothing .....	10
6.9 Respiratory Protection .....	11
6.10 Working Over or Near Water .....	11
<b>6.10.1 River and Lakes</b> .....	11
<b>6.10.2 Pools</b> .....	11
Appendix A: Definitions .....	12
Appendix B: Job Hazard Assessment .....	14
Appendix C: Eye and Face Protection.....	17
Appendix D: Footwear and Leg Protection .....	18
Appendix E: Hand and Arm Protection .....	20

<b>EHS Approved By:</b>	<i>Annette Chism, Sr. Director</i> <i>EHS</i>	<b>Revision date:</b>	June 2026
<b>Page #</b>	2	<b>Original date:</b>	October 1996

Appendix F: Head Protection .....24

Appendix G: Revision History.....27

<b>EHS Approved By:</b>	<i>Annette Chism, Sr. Director</i> <i>EHS</i>	<b>Revision date:</b>	June 2026
<b>Page #</b>	3	<b>Original date:</b>	October 1996

## Section 1 - Purpose

Personal Protective Equipment (PPE) may be required when engineering or work practice controls are insufficient to control the risk associated with the use or exposure to potentially hazardous materials, equipment, or energy. PPE represents a last line of defense in many situations and supplements engineering controls when they are inadequate or during their implementation.

## Section 2 - Scope

This Program applies to all Dartmouth College employees, including students who are employed by the College. This Program meets the intent of the Occupational Safety and Health Administration (OSHA) standards on Personal Protective Equipment, 29 CFR §1910.132 through §1910.140, and §1926.28. This Program applies to employees performing general industry and construction work, as defined by OSHA.

The areas specifically covered in the standard and in this Program include:

General requirements	§1910.132
Eye and face protection	§1910.133 and §1926.102
Head protection	§1910.135 and §1926.100
Foot protection	§1910.136 and §1926.96
Hand protection	§1910.138
Working over or near water	§1926.106
High Visibility Clothing	Occupational Safety and Health Act of 1970 5(a)(1)

Additional Dartmouth Safety Programs that may be referenced and required in the PPE Program:

Electrical Protective Equipment	§1910.137 and §1926.97
Fall Protection	§1910.140 and §1929.104-105
Hearing Conservation	§1910.95 and §1926.101
Respiratory Protection	§1910.134

## Section 3 – Definitions

Definitions are in **Appendix A**.

<b>EHS Approved By:</b>	<i>Annette Chism, Sr. Director EHS</i>	<b>Revision date:</b>	June 2026
<b>Page #</b>	4	<b>Original date:</b>	October 1996

## Section 4 – Roles and Responsibilities

### 4.1 Environmental Health and Safety (EHS)

- Develop, implement, and administer the PPE Program.
- Update the Program when requirements or procedures change.
- Provide guidance regarding the selection and purchase of PPE.
- Provide PPE Program training.
- Evaluate the effectiveness of PPE selection and use across campus.
- Assist with periodic workplace reassessments as requested by supervisors or as determined by EHS.
- Periodically audit existing Job Hazard Assessments (JHAs).
- Provide technical assistance regarding the proper use, care, and cleaning of approved PPE.
- Maintain Job Hazard Assessments for 30 years.

### 4.2 Managers/Supervisors/Principal Investigators

- Conduct JHAs to determine the presence of hazards that necessitate the use of PPE.
- Annually review JHAs with and provide site-specific PPE training to affected employees.
- Submit JHAs to EHS.
- Attend required PPE training.
- Select, purchase, provide, and require the use of PPE based on the results of the JHA.
- Notify EHS immediately when a JHA identifies the use of **respiratory** and/or **hearing protection**.
  - a. In those situations, employees will be required to participate in medical monitoring and be assigned additional training.
- Ensure employees are wearing and properly caring for their PPE.

### 4.3 Employees

- Attend required PPE training.
- Recognize hazards associated with specific tasks.
- Become familiar with the capabilities and limitations of assigned PPE.
- Maintain and inspect PPE before use.
  - a. Report to the supervisor any worn or damaged PPE for replacement.
- Wear assigned PPE as required.
- Request additional or replacement PPE when necessary.

### 4.4 Individual Departments

- Provide funding for PPE and support employees who wear PPE.

<b>EHS Approved By:</b>	<i>Annette Chism, Sr. Director</i> <i>EHS</i>	<b>Revision date:</b>	June 2026
<b>Page #</b>	5	<b>Original date:</b>	October 1996

## Section 5 - Program Requirements

### 5.1 Hazard Assessments

A documented **Job Hazard Assessment (JHA)** shall be conducted for each job title, job duty, or job task. The JHA is typically conducted by the employee's supervisor, with the employee's input. Assessments shall be updated before new processes are introduced or existing processes are modified.

The assessment must include:

- Description of the workplace/tasks,
- PPE required for the task(s),
- The assessor's name and title,
- The assessment date, and
- The assessor's signature.

Supervisors should first seek to eliminate, substitute, or install engineering controls or provide administrative controls to reduce or eliminate a hazard before relying on PPE. A general PPE Job Hazard Assessment template is provided in **Appendix B**.

Note: The laboratory-specific JHA template is located in Appendix Q of the Dartmouth Chemical Hygiene Plan.

The general JHA has been designed to aid in selecting appropriate PPE in work areas where known or potential hazards exist. Select an appropriate JHA format applicable to the workplace to be assessed: either laboratories or general workplaces.

JHA form(s) must be **completed and signed** (written or electronic signatures are acceptable) by the principal investigator/supervisor of the work area to comply with OSHA requirements.

Completed forms must be submitted to Environmental Health and Safety (EHS) (via email EHS@dartmouth.edu or by mail to HB 6216). A copy must remain readily accessible to employees in the work area. The principal investigator/supervisor must review the completed JHA form with each employee who has the same job or lab function.

### 5.2 PPE Selection and Standards

PPE will be selected based on the results of the JHA and shall meet ANSI or ASTM standards (e.g., ANSI Z87.1 refers to eye/face protection; ASTM F2413-05 / ANSI Z41 refers to footwear). EHS is available to assist with PPE selection.

### 5.3 Training

The supervisor provides site-specific and/or equipment-specific training on the selected PPE. Training must be provided before PPE is used.

<b>EHS Approved By:</b>	<i>Annette Chism, Sr. Director</i> <i>EHS</i>	<b>Revision date:</b>	June 2026
<b>Page #</b>	6	<b>Original date:</b>	October 1996

The training will cover the JHA results, and specifically the following topics:

- When PPE is required.
- What PPE is required.
- The limitations of PPE.
- How to properly wear PPE, including donning and doffing.
- Proper care, maintenance, useful life, and disposal of used PPE.

The supervisor is responsible for ensuring that the employee(s) can demonstrate an understanding of the PPE requirements and limitations before being allowed to perform work that requires PPE.

Retraining must be provided under the following circumstances:

- Changes in the workplace.
- Changes in the type of PPE used.
- Inadequacies in an employee's knowledge or use of assigned PPE indicate the employee has not retained the requisite understanding or skill.

#### **5.4 Payment for Protective Equipment**

Each division or department is responsible for funding and purchasing personal protective equipment for its employees. OSHA stipulates that, aside from the exceptions noted in 29 CFR 1910.132(h), the employer will provide required PPE at no cost to employees.

### **Section 6 - Types of Personal Protective Equipment**

Personal protective equipment is used in almost every work environment on campus. The following provides details on Dartmouth and OSHA requirements for the type of PPE to be used.

#### **6.1 Electrical Protection**

The College's Electrical Safe Work Practices Program covers the appropriate PPE used when employees are exposed to electrical hazards.

#### **6.2 Eye and Face Protection**

##### **Appendix C, General Guidance for PPE Selection**

Employees shall wear approved eye or face protection when exposed to hazards, including but not limited to flying particles, molten metal, liquid chemicals, acids or caustics, chemical gases or vapors, or potentially damaging light radiation.

Employees who wear prescription lenses while engaged in operations involving eye hazards must wear safety glasses that can be worn over the prescription lenses without disturbing the prescription lenses' proper position.

<b>EHS Approved By:</b>	<i>Annette Chism, Sr. Director</i> <i>EHS</i>	<b>Revision date:</b>	June 2026
<b>Page #</b>	7	<b>Original date:</b>	October 1996

### 6.2.1 Safety Glasses

- Approved safety eyewear meets the requirements of ANSI Z87.1 and has the ANSI designation imprinted on the lens and/or frame.
- Common sunglasses and prescription eyewear are not ANSI-compliant.
- Non-prescription safety eyewear complying with the ANSI Z87.1 shall be provided to employees who work in or visit areas where safety glasses are required.
- Contact lenses may be worn with safety glasses. In the event of eye exposure, contacts need to be removed as soon as possible for proper flushing.
- Temporary plastic slide-on side shields do not meet the ANSI Standard and are not permitted.
- Detachable clip-on or slide-on side shields that are ANSI-approved are acceptable.

### 6.2.2 Chemical Goggles

- Employees shall wear approved chemical goggles when the tasks they perform expose the eye to injury, where safety eyewear alone does not adequately protect the wearer.
- Examples of work requiring chemical goggles include but are not limited to: exposures to chemical splash, spray, mist, fine dust; or when chipping, grinding, or performing other work where there is exposure to high velocity impact.
- When there is an exposure to chemical splashes, chemical goggles shall be used in conjunction with a face shield. Chemical goggles shall conform to the ANSI Z87.1 standard and shall have the ANSI Z87.1 designation imprinted on the lens or frame.
- Chemical goggles must meet ANSI Z87.1 and may be substituted for safety eyewear.

### 6.2.3 Face Shields

- Face shields are required when personnel perform tasks that have a potential of chemical splash or impact to the face.
- Face shields shall conform to the ANSI Z87.1 Standard and shall have the ANSI Z87.1 designation imprinted on the lens and/or frame.
- Face shields are secondary protectors and shall only be used in conjunction with safety eyewear and/or safety goggles.

### 6.2.4 Eye and Face Protection for Welding, Cutting, Brazing, and Soldering

- Welding goggles, face shield, or a welding helmet shall be worn when employees are engaged in electric arc welding, gas welding, cutting, torch brazing, soldering, or exposed to glare.
- Electric arc welding requires the use of a welding helmet or shield with shade numbers of 10-14.
- Gas welding requires the minimum use of welding goggles or a welding face shield with shade numbers of 4-8 for welding, 3- 6 for cutting, and 3-4 for brazing.
- Cutting, torch blazing, and soldering require the minimum use of spectacles or a welding face shield with shade numbers of 1.5-3.
- When exposed to glare, spectacles with a shade shall be worn.

<b>EHS Approved By:</b>	<i>Annette Chism, Sr. Director</i> EHS	<b>Revision date:</b>	June 2026
<b>Page #</b>	8	<b>Original date:</b>	October 1996

### 6.3 Fall Protection

The College's Fall Protection Program (29 CFR 1910.140 and §1929.104-105) covers fall protection use on campus. In most circumstances, fall protection is required when an employee is exposed to a fall of 4 feet or more.

### 6.4 Foot and Leg Protection

#### Appendix D General Guidance for PPE Selection

Foot protection is required when an employee is working in areas where there is a danger of foot injuries due to falling or rolling objects, or objects piercing the sole, or when the use of protective footwear will protect the affected employee from an electrical hazard, such as a static-discharge or electric-shock hazard that remains after the employer takes other necessary protective measures.

- Footwear must comply with ANSI Z41.
- Safety shoes are required where there is the potential of puncturing the sole or when there is a risk of falling or rolling objects over 50 pounds. All individuals involved in routine materials handling must wear safety shoes.
- Slip-resistant soles are required for work on slippery surfaces.
- Rubber overshoes may be used in areas where water or hazardous materials are present.
- Studded treads and overshoes should be used when employees must work on ice- or snow-covered walking surfaces.
- Leg protection can include cut-resistant chaps or shin guards.

### 6.5 Hand and Arm Protection

#### Appendix E General Guidance for PPE Selection

Appropriate hand protection is required when an employee's hands are exposed to hazards, including skin absorption of harmful substances, cuts or lacerations, abrasions, electrical hazards, punctures, chemical burns, thermal burns, and harmful temperature extremes. Protective equipment includes gloves, finger guards, and arm coverings.

There are many types of gloves available today to protect against a wide variety of hazards. The nature of the hazard and the operation involved will affect the selection of gloves or arm protection. In general, gloves fall into the following four categories:

- Leather, canvas, or metal mesh gloves: These types of gloves protect against burns, cuts, and punctures.
- Fabric and coated fabric gloves: These types of gloves are made of cotton or other fabrics. They generally protect against dirt, chafing, and abrasions.
- Insulating rubber gloves: These gloves are used for protection against electrical hazards.
- Chemical and liquid resistant gloves: When working with chemicals with high acute toxicity, working with corrosive materials in high concentrations, handling chemicals for extended periods of time or immersing all or part of a hand into a chemical, the appropriate glove material should be selected, based on chemical compatibility.

<b>EHS Approved By:</b>	<i>Annette Chism, Sr. Director</i> <i>EHS</i>	<b>Revision date:</b>	June 2026
<b>Page #</b>	9	<b>Original date:</b>	October 1996

Specialized information on glove selection is available from EHS. Contact EHS for help in selecting the proper glove for the task.

## 6.6 Head Protection

### Appendix F General Guidance for PPE Selection

Head protection is required in areas where there is potential for head injury from falling objects or impact with other surfaces. Employees who may work near exposed electrical conductors that could contact the head are required to wear protective headgear designed to reduce the risk of electrical shock. Head protection must meet ANSI Z89.1.

- Hard hats should be replaced every five years unless an expiration date is provided. Suspension straps should be replaced annually.
- Hard hats should be replaced if they show signs of wear or damage or if the hard hat has sustained an impact during use.
- A hard hat is required where there is the danger of falling objects, impact hazards or electrical hazards. Hard hats are divided into two types (Type I or Type II) and three industrial classes (G, E, and C).
- Type I hard hats are intended to reduce the force of impact resulting from a blow only to the top of the head.
- Type II helmets provide a degree of protection to the front, side, and rear. This helmet category may be useful for workers who are not always in an upright position.
- Class G (General Application) are formerly known as Class A hard hats and are rated for 2,200 volts.
- Class E (Electrical Application) are formerly known as Class B hard hats and are rated for 20,000 volts.
- Class C (Conductive) hard hats do not offer electrical protection.

## 6.7 Hearing Protection

The College's Hearing Conservation Policy (29 CFR 1910.95) covers hearing protection. Hearing protection is required at >85 decibels and in all posted areas. As a matter of institutional practice, hearing protection is recommended during all noisy tasks.

## 6.8 High Visibility Clothing

High-visibility clothing is required when employees are working in areas where moving vehicles or heavy equipment are present, such as roadways or construction sites. The purpose of this clothing is to alert drivers/operators to the presence of the employee. The selection of high-visibility clothing shall consider lighting, weather, traffic speed, the presence of heavy equipment, and other relevant factors. At a minimum, Dartmouth College employees are expected to wear a reflective vest when working within areas where moving vehicles or heavy equipment are present.

<b>EHS Approved By:</b>	<i>Annette Chism, Sr. Director</i> <i>EHS</i>	<b>Revision date:</b>	June 2026
<b>Page #</b>	10	<b>Original date:</b>	October 1996

## 6.9 Respiratory Protection

The College's Respiratory Protection Program (29 CFR 1910.134) covers respiratory protection.

## 6.10 Working Over or Near Water

### 6.10.1 River and Lakes

- Employees working over or near water, where the danger of drowning exists, will be provided with U.S. Coast Guard-approved life jackets or buoyant work vests. This requirement includes work on docks when they are installed or removed in the Connecticut River or at Dartmouth Sailing Center on Mascoma Lake.
- Ring buoys with at least 90 feet of line shall be provided and readily available for emergency rescue operations. The distance between ring buoys shall not exceed 200 feet.

### 6.10.2 Pools

For work over or near swimming pools, a means to protect a worker from electrocution, drowning, or fall injury must be incorporated into the work. Examples could include, but are not limited to:

- Netting anchored above water, designed by a licensed PE (Professional Engineer) to absorb the fall of a person, electrically powered devices, and all tools and/or materials in use for the work to be performed.
- Mobile elevated work Platforms (MEWPs) with rails to prevent the fall of a person or equipment.
- Scaffolding with rails to prevent the fall of a person or equipment.
- The buddy system.
- The use of U.S. Coast Guard-approved life jackets or buoyant work vests provided employees are not engaging in work that may result in electrocution.

## Appendix G Revision History

<b>EHS Approved By:</b>	<i>Annette Chism, Sr. Director</i> <i>EHS</i>	<b>Revision date:</b>	June 2026
<b>Page #</b>	11	<b>Original date:</b>	October 1996

## Appendix A: Definitions

**Administrative Control** - An administrative (work practice) control is a change in the way the activity is conducted, or a procedure that reduces the likelihood of exposure to a hazardous material, condition, or process.

Examples include written safety policies, procedures, rules, schedules, and training that reduce the duration, frequency, and severity of exposure to a hazardous material, condition, or process.

**Body Protection**- Clothing or suits that protect against chemical exposure, heat, flame, or contamination.

**Competent Person** - An individual capable of identifying hazards and authorized to take corrective action.

**Defective PPE** - Equipment that is damaged, degraded, or no longer provides adequate protection.

**Donning and Doffing** - Procedures for properly putting on and removing PPE to prevent contamination or injury.

**Engineering Control** - An engineering control is the redesign, replacement, or application of equipment to an activity or work environment to reduce or eliminate exposure to a hazardous material, condition, or process.

**Eye and Face Protection** - Safety glasses, goggles, or face shields that protect against impact, splash, radiation, or airborne debris.

**Fall Protection Equipment** - Systems including harnesses, lanyards, anchors, and connectors used to prevent or arrest falls.

**Foot Protection** - Safety footwear designed to protect against impact, compression, puncture, electrical, or slip hazards.

**Hand Protection** - Gloves selected based on hazard type (cut, chemical, thermal, vibration, etc.).

**Job Hazard Assessment (JHA)** - A job hazard assessment is the evaluation of the personal protective equipment requirements for a specific activity or work environment, so that the individual is protected from exposure to a hazardous material, condition, or process.

**Head Protection** - Helmets or hard hats designed to protect against impact, penetration, or electrical hazards.

**Hearing Protection** - Devices such as earplugs or earmuffs that reduce noise exposure to acceptable levels.

**High-Visibility Apparel** - Garments designed to enhance worker visibility in low-light or high-traffic environments.

**Inspection (Pre-Use)** - A visual and functional check performed by the user before each use.

**Personal protective equipment (PPE)** - Equipment worn to minimize exposure to hazards that cause serious workplace injuries and illness. Examples of PPE include lab

<b>EHS Approved By:</b>	<i>Annette Chism, Sr. Director</i> EHS	<b>Revision date:</b>	June 2026
<b>Page #</b>	12	<b>Original date:</b>	October 1996

coats, hardhats, safety shoes, gloves, safety glasses, goggles, hearing protectors, respirators, fall and electrical protection devices, and other such devices meant to protect an individual from exposure to a hazardous material, condition or process.

**Qualified Person** - An individual with recognized credentials or expertise related to PPE design, selection, or hazard mitigation.

**Respiratory Protection** - Devices worn to protect against inhalation hazards (dusts, fumes, vapors, gases). Must align with a formal respiratory protection program if required.

**Sanitization / Decontamination** - Processes used to clean PPE and remove hazardous substances.

**Service Life** - The expected usable lifespan of PPE under normal conditions.

<b>EHS Approved By:</b>	<i>Annette Chism, Sr. Director EHS</i>	<b>Revision date:</b>	June 2026
<b>Page #</b>	13	<b>Original date:</b>	October 1996

# Appendix B: Job Hazard Assessment

## Job Hazard Analysis

Shop / Facility: _____	Supervisor / Prepared By: _____	Date: _____
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### Hazard Analysis

TASK	HAZARD	CAUSE	PREVENTION

### PPE Required

Check all PPE required for this task:

<input type="checkbox"/> Safety Glasses / Goggles	<input type="checkbox"/> Face Shield	<input type="checkbox"/> Welding Helmet / Filter Lens	<input type="checkbox"/> Disposable Respirator
<input type="checkbox"/> Chemical Cartridge Respirator	<input type="checkbox"/> Hearing Protection	<input type="checkbox"/> Hard Hat	<input type="checkbox"/> Safety Shoes / Boots
<input type="checkbox"/> Slip-Resistant Shoes	<input type="checkbox"/> Winter Boots and/or Ice Cleats	<input type="checkbox"/> High Visibility Vest or Clothing	<input type="checkbox"/> Life jacket

<b>EHS Approved By:</b>	<i>Annette Chism, Sr. Director EHS</i>	<b>Revision date:</b>	June 2026
<b>Page #</b>	14	<b>Original date:</b>	October 1996

<input type="checkbox"/> Nitrile / Chemical Gloves	<input type="checkbox"/> Cut-Resistant Gloves	<input type="checkbox"/> Leather / Welding Gloves	<input type="checkbox"/> Anti-Vibration Gloves
<input type="checkbox"/> Protective Clothing / Coveralls	<input type="checkbox"/> Fire-Resistant Clothing	<input type="checkbox"/> Rubber Apron	<input type="checkbox"/> Fall Protection Harness
<b>Other:</b> _____			

### Equipment Procedures / Requirements

List all procedures, OSHA references, and safe work requirements applicable to this task:

- 1.
- 2.
- 3.
- 4.
- 5.

**Standard requirements for all tasks:** Only authorized users may operate equipment. Report any observed defect or safety hazard to your supervisor immediately. Keep hands, hair, and loose clothing clear of all moving parts. Where any object could cause foot injury if dropped, safety shoes will be worn.

### Special Conditions / Permits Required

<input type="checkbox"/> Hot Work Permit	<input type="checkbox"/> Confined Space Entry Permit	<input type="checkbox"/> Lockout / Tagout (LOTO)	<input type="checkbox"/> Electrical Safety / Arc Flash
<input type="checkbox"/> Hazardous Material Handling	<input type="checkbox"/> Elevated Work / Fall Protection	<input type="checkbox"/> Radiation / Laser Use	<input type="checkbox"/> Other (specify below)

### Review & Acknowledgment Signatures

By signing below, workers confirm they have read, understood, and agree to follow the procedures and controls in this JHA.

Printed Name	Signature	Date

<b>EHS Approved By:</b>	Annette Chism, Sr. Director EHS	<b>Revision date:</b>	June 2026
<b>Page #</b>	15	<b>Original date:</b>	October 1996

**Supervisor / Safety Officer Review**

<b>Supervisor Name:</b> _____	<b>Title:</b> _____	<b>Signature:</b> _____	<b>Date:</b> _____
<b>EHS Representative:</b> _____	<b>Title:</b> _____	<b>Signature:</b> _____	<b>Date:</b> _____

**Annual Review / Revision Log**

Rev. #	Date	Description of Change	Revised By
1			
2			
3			

<b>EHS Approved By:</b>	<i>Annette Chism, Sr. Director EHS</i>	<b>Revision date:</b>	June 2026
<b>Page #</b>	16	<b>Original date:</b>	October 1996

## Appendix C: Eye and Face Protection

The Supervisor shall ensure that each affected employee uses appropriate eye or face protection when exposed to eye or face hazards from flying particles, molten metal, liquid chemicals, acids or caustic liquids, chemical gases or vapors, or potentially injurious light radiation. The Supervisor shall ensure that each affected employee uses eye protection that provides side protection when there is a hazard from flying objects. Detachable side protectors (e.g. clip-on or slide-on side shields) meeting the pertinent requirements of this section are acceptable.

The Supervisor shall ensure that each affected employee who wears prescription lenses while engaged in operations that involve eye hazards wears eye protection that incorporates the prescription in its design or wears eye protection that can be worn over the prescription lenses without disturbing the proper position of the prescription lenses or the protective lenses.

The following chart provides general guidance on selecting eye and face protection.

Potential Hazard	Type of Work	PPE
Impact, Flying Objects	Chipping, Stonework, Wood Power Tools, Metal Power Tools, Plastering, Outdoor Work	ANSI Z87 Glasses
Splashes, Abrasive Blasting, Arc Flash	Labs, Acid and Alkali Handling, Sand Blasting, Mixing Chemicals, Electrical System Work	Face Shield
Flying particulate, Dust, Wind	Aerosols, Mixing Liquids	Safety Goggles
Ultraviolet Lights, Burns, Flashes, Slag, Sparks, Molten Metal, Glare	Welding, Brazing, Soldering, Stud welding, Hot Dip operations	Welding Shield
Irritant gasses, Chemicals, Compressed gasses	Lab work in hoods with gases	Gas-Resistant Goggles
Ultraviolet lights, Burns, Flashes, Glare	Torch cutting, Brazing, Furnace work, Spot welding	Welding Goggles
Lasers, Ultraviolet Lights, Radiation	Laser cutting, Etching, Survey Work	ANSI Z136 Glasses

<b>EHS Approved By:</b>	<i>Annette Chism, Sr. Director</i> EHS	<b>Revision date:</b>	June 2026
<b>Page # 17</b>		<b>Original date:</b>	October 1996

## Appendix D: Footwear and Leg Protection

This Appendix applies to personal protective footwear requirements governed by OSHA Regulation 29 CFR 1910.136. The American National Standards Institute (ANSI) sets standards for a wide range of products, including safety footwear. Protective footwear for purchase must meet both ASTM F2412 and ASTM F2413. The ASTM F2412 standard is for impact and compression-resistant safety footwear. ANSI standard ASTM F2413 covers the minimum requirements for safety footwear, including impact and compression resistance, metatarsal protection, and electrical hazard protection. Protective footwear must at a minimum, meet both manufacturing requirements contained in consensus standard ASTM F 2412 and ASTM F 2413 provided by the American Society for Testing and Materials (ASTM). Additionally, protective footwear for employees working with electricity must meet the requirements listed in the National Electrical Code (NEC), which references the consensus standard developed by the National Fire Protection Association, NFPA 70E-2023.

The following chart provides general guidance on selecting proper foot and leg protection.

Potential Hazard	Type of Work	PPE
Dropped Objects	Construction, Facilities, material handling, heavy equipment, etc.	Safety Toe Boots
Puncture	Construction, Facilities, uneven ground, etc.	Puncture-resistant boot (Metal Shank)
Electrical	Electrical, Construction, Facilities, etc.	70E electrical-rated boots
Weather	Primary Outdoor Work Functions	Waterproof and/or insulated boots
Top of foot contact	Chipping ice/concrete, material handling, etc.	Metatarsal guards
Walking and working surfaces	All	Shoe with proper grip and traction
Static	Research, Electrical, etc.	Electrostatic dissipative (ESD) footwear

<b>EHS Approved By:</b>	<i>Annette Chism, Sr. Director</i> EHS	<b>Revision date:</b>	June 2026
<b>Page #</b>	18	<b>Original date:</b>	October 1996

Potential Hazard	Type of Work	PPE
Chain saws, Chop saws, large unmounted cutting equipment	Cutting trees, concrete, pipe, metals, etc.	Class 3 speed protection boots and either type A or C coverage chaps
Chemical/Biological	Lab, Research, Clean up, etc.	Chemical-resistant boots or boot covers
Impact, Compression, and cuts	Logging, Tree work, etc.	Leg Guards
Wet environments	Research, Facilities, Clean up, etc.	Waders or waterproof boots

<b>EHS Approved By:</b>	<i>Annette Chism, Sr. Director EHS</i>	<b>Revision date:</b>	June 2026
<b>Page #</b>	19	<b>Original date:</b>	October 1996

## Appendix E: Hand and Arm Protection

Employees working in areas where there is a possible danger of injury to the hands and arms from severe cuts, lacerations, punctures, abrasions or from contact with chemical, radiological, biological, absorption, permeation and thermal hazards should be protected. Employees exposed to electrical shock and burns should be protected by protective gloves contained in the PPE section of the Electrical Safe Work Practices Policy which Supervisors should refer to for electrical hazard guidance. Gloves should be sized and made readily available in different sizes, must be comfortable and sufficient stock for supply should be inventoried since many types of gloves are single use. In cases where exposure to environmental conditions such as UV rays while working outdoors, or exposure to cold temperatures appropriate gloves for environmental conditions must be readily available for employee use.

### Care of Protective Gloves

Inspect protective gloves before each use to ensure they are not torn, punctured, or otherwise rendered ineffective. A visual inspection will help detect cuts or tears but a more thorough

inspection - by filling the gloves with water and tightly rolling the cuff towards the fingers - will help reveal any pinhole leaks. Gloves that are discolored or stiff may indicate deficiencies caused by excessive use or degradation from chemical exposure. Discard and replace any gloves with impaired protective ability. Carefully evaluate any reuse of chemical-resistant gloves, taking into consideration the absorptive qualities of the gloves. A decision to reuse chemically exposed gloves should take into consideration the manufacturer's recommendation for proper use and storage.

### Glove Selection

- The best place to start when selecting gloves for a task is to compare the exposure hazards to the protective qualities of the gloves available from your supplier.
- Many tasks will involve multiple hazards, and the glove selected should either protect against all of the hazards, or more than one type of glove may have to be worn. A common example of this is when leather gloves (cut/puncture/abrasion resistant) are worn over voltage-rated rubber gloves. Certain chemical and/or radiation hazards may require double gloving (of the same type).
- Before purchasing gloves, review the work activities to determine the degree of dexterity required, the duration, frequency, and degree of exposure to the hazard, and the physical stresses that will be applied.
- There are several factors to consider when selecting a glove, such as size, the type of cuff, lining, and length.

Factors that influence chemical-resistant glove selection include:

- Chemical(s) being handled- whether it is hazardous or non-hazardous to personnel
- Concentration of chemical- the strength of the chemical in terms of percentage

<b>EHS Approved By:</b>	<i>Annette Chism, Sr. Director</i> <i>EHS</i>	<b>Revision date:</b>	June 2026
<b>Page # 20</b>		<b>Original date:</b>	October 1996

- Temperature of chemical
- Frequency of contact- time in contact with the chemical
- Immersion or splash contact- whether there is continuous contact or precautionary/incidental contact with the chemical
- Breakthrough- length of time a material is in contact with chemical before it degrades
- Dexterity and grip requirements
- Size and comfort requirement- must be sized and comfortable to wear

Potential Hazard	Type of Work	PPE	Hazard(s)
Cut-resistant gloves	Sharps or any cut hazard. Wear a cut level appropriate for the task. (A1-A9 cut levels)	Cut-resistant gloves	
Extreme temperatures	Cryogenic research, Hot plate work, Hot material work, etc.	Thermally insulated mittens	
Burns, Heat, Metal work, Welding, etc.		Leather gloves	
Burns and Chemical Hazards	Chemical handling	Tyvek Gauntlet	
Biohazards and Chemical Hazards	Work that may expose employees to blood or other potentially infectious agents, or to certain chemicals	Nitrile Gloves	
Sharps/Animals	Animal work, Puncture hazard, etc.	Wire Mesh Gloves	

### Hand protection for the use of chemicals

The SDS is always the best source for guidance when sourcing personal protective equipment (PPE) for hands and arms. If the information is not provided in the SDS, then refer to the glove and/or arm protective device manufacturer's chemical resistance guide.

Some examples of chemical-resistant gloves include:

■ **Butyl gloves** are made of a synthetic rubber and protect against a wide variety of chemicals, such as peroxide, rocket fuels, highly corrosive acids (nitric acid, sulfuric acid, hydrofluoric acid, and red-fuming nitric acid), strong bases, alcohols, aldehydes, ketones,

<b>EHS Approved By:</b>	<i>Annette Chism, Sr. Director</i> EHS	<b>Revision date:</b>	June 2026
<b>Page #</b>	21	<b>Original date:</b>	October 1996

esters, and nitro compounds. Butyl gloves also resist oxidation, ozone corrosion and abrasion, and remain flexible at low temperatures. Butyl rubber does not perform well with aliphatic and aromatic hydrocarbons and halogenated solvents.

■ **Natural (latex) rubber gloves** are comfortable to wear, which makes them a popular general-purpose glove. They feature outstanding tensile strength, elasticity, and temperature resistance. In addition to resisting abrasions caused by grinding and polishing, these gloves protect employees' hands from most water solutions of acids, alkalis, salts, and ketones. Latex gloves have caused allergic reactions in some individuals and may not be appropriate for all employees. Hypoallergenic gloves, glove liners and powderless gloves are possible alternatives for employees who are allergic to latex gloves.

■ **Neoprene gloves** are made of synthetic rubber and offer a range of protection against hydraulic fluids, gasoline, alcohols, organic acids, and alkalis. They generally have superior chemical and wear resistance to those made of natural rubber.

■ **Nitrile gloves** are made of a copolymer and provide protection from chlorinated solvents such as trichloroethylene and perchloroethylene. Although intended for jobs requiring dexterity and sensitivity, nitrile gloves stand up to heavy use even after prolonged exposure to substances that cause other gloves to deteriorate. They offer protection when working with oils, greases, acids, caustics, and alcohols, but are generally not recommended for use with strong oxidizing agents, aromatic solvents, ketones, and acetates.

The following chart is to be used to determine which glove material is best for the chemical in use, and it is good practice to reach out to the vendor prior to purchase to ensure the best available choice. For mixtures and commercial products, read the SDS to help determine the appropriate gloves.

If you are having trouble with hand or forearm selection, EHS is available to help in selection as well. [Environmental.Health.and.Safety@dartmouth.edu](mailto:Environmental.Health.and.Safety@dartmouth.edu)

<b>EHS Approved By:</b>	<i>Annette Chism, Sr. Director</i> <i>EHS</i>	<b>Revision date:</b>	June 2026
<b>Page #</b>	22	<b>Original date:</b>	October 1996

<b>Chemical</b>	<b>Neoprene</b>	<b>Latex/Rubber</b>	<b>Butyl</b>	<b>Nitrile</b>
Propyl alcohol (iso)	VG	VG	VG	VG
Sodium hydroxide	VG	VG	VG	VG
Styrene	P	P	P	F
Styrene (100%)	P	P	P	F
Sulfuric acid	G	G	G	G
Tannic acid (65)	VG	VG	VG	VG
Tetrahydrofuran	P	F	F	F
Toluene*	F	P	P	F
Toluene diisocyanate (TDI)	F	G	G	F
Trichloroethylene*	F	F	P	G
Triethanolamine (85%)	VG	G	G	VG
Tung oil	VG	P	F	VG
Turpentine	G	F	F	VG
Xylene*	P	P	P	F

Note: When selecting chemical-resistant gloves be sure to consult the manufacturer's recommendations, especially if the gloved hand(s) will be immersed in the chemical.

<b>EHS Approved By:</b>	<i>Annette Chism, Sr. Director EHS</i>	<b>Revision date:</b>	June 2026
<b>Page # 23</b>		<b>Original date:</b>	October 1996

## Appendix F: Head Protection

Employees working in areas where there is a possible danger of head injury from impact, falling or flying objects, or electrical shock and burns shall be protected by protective helmets. Employees working in areas or near electrical conductors shall ensure that a protective helmet designed to reduce electrical shock hazard is worn by each such affected employee anytime there is a possibility of contacting the head with an energized electrical conductor as referenced in the Electrical Safe Work Practices Policy.

Proper head protection is crucial in work environments with falling objects, struck-by, overhead electrical hazards, and risks from slips, trips, and falls. Both scientific understanding of head injuries and head protection technology continue to advance. Modern head protection, whether it's a safety helmet or a hard hat, varies in styles and levels of protection, allowing employers and workers to choose head protection appropriate for the job.

It is the Supervisor's choice whether to choose a hard hat or safety helmet for the employees. Dartmouth does not require Type II safety helmets unless the supervisor deems Type II to be required. All protective helmets are required to meet either Type I or Type II requirements. A Type I helmet should be considered if the hazard potential is for top impact. If hazards are present that can impact the front, back, and sides, as well as the top of a helmet, the use of a Type II helmet should be considered. If hazards are present that may cause a helmet to dislodge from a user's head, the use of a chinstrap should be considered for additional safety and helmet retention.

**Inspection:** Always refer to the manufacturer's specific guidelines for head protection care, use, and storage.

1. Inspect the outer shell for cracks, dents, or other signs of damage. Run your fingers over the surface to check for any irregularities.
2. Examine the suspension system (headband and chin strap) for wear and tear, ensuring it is securely attached to the shell and free from damage, and inspect interior cushioning for wear or compression, if applicable. Contact the manufacturer for replacement options if there are any signs of deterioration.
3. Check for labels and certification marks. Look for labels and certification marks inside the head protection. These indicate that the head protection meets the necessary safety standards and requirements. Check that the labels are legible and not tampered with. Note: only head protection having a reverse-wearing label or mark can be worn in reverse.
4. Examine accessories and attachments. If the head protection has manufacturer-approved accessories or attachments (face shields, goggles, earmuffs, etc.), inspect them for damage or signs of wear. Make sure they are securely fastened to the head protection and are functioning correctly.

<b>EHS Approved By:</b>	<i>Annette Chism, Sr. Director</i> <i>EHS</i>	<b>Revision date:</b>	June 2026
<b>Page # 24</b>		<b>Original date:</b>	October 1996

5. Check for proper fit. Before using head protection, ensure it fits comfortably and securely. Adjust the suspension system to achieve a snug fit without excessive pressure points. Head protection should not be too loose or too tight.

6. Refer to the manufacturer's guidelines for recommended lifespan or guidance on when to take head protection out of service. The service life of head protection depends on many factors, including storage, handling, use, and exposure to harsh environments, including UV Rays. Any hard hat or helmet should be discarded when it is impacted or if there are any signs of damage or degradation.

7. Clean and dry head protection before storing. After each use, clean the exterior of the head protection with mild soap and water. Ensure no dirt, debris, or chemicals are present that could compromise the OSHA Safety and Health Information Bulletin: Head Protection: Safety Helmets in the Workplace's structural integrity. Once cleaned, allow the head protection to air-dry. Avoid exposing head protection to direct sunlight, extreme temperatures, or chemicals during storage. Do not store your head protection in your car or where it may be exposed to direct sunlight or extreme temperatures.

8. Impact damage. If head protection has been impacted or subjected to significant force, retire it immediately, even if there is no visible damage. Head protection is designed for single-use impact protection and may not retain its full effectiveness after an incident.

9. Keep Records: Maintain a record of each inspection, noting the date, any findings, and actions taken. Document the date of purchase and any relevant information about the head protection to track its lifespan.

### Head protection for workplace activities

Potential Hazard	Type of Work	PPE
Head protection is designed to reduce exposure to low voltage conductors and are proof tested at 2,200 volts.	Work in spaces where head impact hazards exist.	Class G Hard Hat
Head protection is designed to reduce exposure to higher voltage conductors and are proof tested at 20,000 volts.	Work in areas where high voltage hazards exist, and LO-TO work is active	Class E Hard Hat
Head protection is not intended to provide protection against contact with electrical hazards.	Nonelectrical overhead hazard work	Class C Hard Hat

<b>EHS Approved By:</b>	<i>Annette Chism, Sr. Director</i> EHS	<b>Revision date:</b>	June 2026
<b>Page #</b>	25	<b>Original date:</b>	October 1996

Head Protection designed for working at heights and with side impact rating	Work at heights & where multiple impacts are possible.	Type II Safety Helmet
Multiple impacts on top and sides. Chin strap and penetration resistance.	Tree work, Arborist, Climbing, Bouldering, & Mountaineering.	EN12492 Helmet
Multiple impacts on top and sides. Chin strap and penetration resistance.	Biking and speeds under 28 mph. ADD EBIKE STANDARD	CPCS Rated Helmet/ EN1078
Multiple impacts on top and sides. Chin strap and penetration resistance. Designed for high-speed use.	Snowmobiles, ATV, Side by Side, Motorcycle and Dirt bikes	EN2021/ SNELL
Minor bumps, scrapes, and lacerations caused by the wearer accidentally hitting their head against stationary objects.	Working in tight spaces or areas with low ceilings or equipment.	Bump Caps

<b>EHS Approved By:</b>	<i>Annette Chism, Sr. Director</i> <i>EHS</i>	<b>Revision date:</b>	June 2026
<b>Page # 26</b>		<b>Original date:</b>	October 1996

## Appendix G: Revision History

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<b>EHS Approved By:</b>	<i>Annette Chism, Sr. Director</i> <i>EHS</i>	<b>Revision date:</b>	June 2026
<b>Page #</b> 27		<b>Original date:</b>	October 1996