

Selecting PPE for the Laboratory

Chemical Hygiene Plan

The following guide aids with the selection of personal protective equipment (PPE) for the laboratory, including eye and face protection, gloves, and protective clothing. For assistance in evaluating hazards and selecting appropriate PPE, contact Environmental Health and Safety (EHS).

Eye and Face Protection

Eye and face protection is worn to protect against eye and face exposures and injuries from chemicals, biological materials, cryogenic liquids, lasers, UV light, and flying particles, chips, and dust. Select eye and face protection based on the type of hazard, task, fit, and comfort. All eye and face protection must comply with the latest version of the American National Standards Institute (ANSI) standard Z87.1.

Types of Eye and Face Protection

Type	Description
Safety Glasses	Eyewear with side protection and impact-resistant lenses. Eyewear that complies with ANSI Z87.1 will be marked with "Z87." Eyewear that passes high-velocity testing for impact protection will be marked "Z87+." Safety glasses are not intended to be tight-fitting.
Splash Goggles	Eyewear that is intended to tightly fit the face surrounding the eyes and has indirect ventilation. Indirect ventilation does not allow for straight-line passage from the exterior to the interior of the goggles. Goggles that pass the droplet test will be marked with "D3."
Dust Goggles	Eyewear that is intended to tightly fit the face surrounding the eyes and has direct ventilation. Direct ventilation prevents particles ≥ 1.5 mm from entering the goggles. Straight-line passage from the exterior to the interior of the goggles exists for smaller particles. Goggles that pass the dust test will be marked with "D4."
Face Shields	Face shields provide a barrier for the wearer's face from the eyebrows to below the chin. Face shields can provide protection from specific hazards, including impact, splash, and UV, as indicated by the ANSI Z87.1 markings.

Selection Guide

Hazard	Eye and Face Protection
Chemicals - Work involving small quantities of chemicals with low splash risk	Safety glasses
Chemicals - Work involving large quantities of chemicals, strong corrosives, and work that poses a splash risk	Splash goggles Face shield can be worn over splash goggles for face protection
Chemicals - Work involving highly reactive or explosive materials	Splash goggles and face shield
Cryogenic Liquids - Work involving transfer, dispensing, or filling of cryogenic liquids	Splash goggles and face shield
Biological Materials - Work involving potentially infectious materials, including BSL2 microorganisms and viruses and human and non-human primate material	Safety glasses
Radiation - Work involving unsealed radioactive materials	Safety glasses
Lasers - Working with open beam class 3B or class 4 lasers	Laser safety eyewear with optical density (OD) for wavelength and energy/power level (laser eyewear vendors can assist with selection)
Ultraviolet light - Work with open ultraviolet light source (i.e. transilluminator)	Face shield rated for UV protection
Machinery/Equipment - Work that generates dust, particulate and chips	Safety glasses (particulate and chips) Dust goggles (dust)

Prescription Eyewear

Standard prescription eyewear does not provide protection from impact and splashes. There are two options for eye protection when prescription lenses are needed, eye protection that incorporates the prescription in its design or eye protection designed to fit over prescription glasses.

Contact Lenses

Contact lenses can be worn safely in most hazardous environments with the appropriate eye and face protection. If an eye exposure to a hazardous material occurs, immediately rinse the eye(s) at an eyewash and remove the contact lens. Discard contact lenses that have been contaminated.

Fit and Comfort

Properly fitting, comfortable safety glasses and goggles provide better protection and encourages their use. Eye protection is not one size fits all. Adjustable eyewear will fit a range of face sizes, but they might not fit people with narrow or wide heads. Safety eyewear vendors have different size and style options available when the universal size does not fit.

Gloves

Gloves are worn to protect from hand exposures and injuries from chemicals, biological materials, sharp objects, and temperature extremes. Select gloves based on the hazard, task, fit, and level of dexterity needed.

Types of Gloves

Type	Description
Disposable Nitrile	One-time, general use gloves with a thickness of 5-mil or less. Disposable nitrile gloves are intended to be used as a barrier against incidental chemical exposure and provide limited chemical protection.
Chemical Resistant	Chemical resistant gloves are available in different materials, including neoprene, PVA, PVC, natural rubber, butyl, nitrile, and laminate film. Chemical resistant gloves must be matched to the specific chemical(s) being used. Glove manufacturers and distributors have glove selection charts that provide data on breakthrough time, degradation, and permeation.
Insulated	Specialized gloves for temperature extremes: <ul style="list-style-type: none">• Terrycloth autoclave gloves provide protection from high temperatures.• Water-resistant cryogen gloves provide protection from ultra-cold temperatures.
Cut Resistant	Cut resistant gloves are available in different materials, including polyethylene, Kevlar, fiberglass, and metal mesh and are intended to protect against cuts and lacerations from handling sharp objects.

Selection Guide

Hazard	Glove
Chemicals - Work involving small quantities of chemicals and no anticipated hand contact	Disposable nitrile gloves
Chemicals - Work involving large quantities of chemicals, chemicals that have high acute toxicity from skin absorption, strong corrosives, and work involving expected hand contact	Chemical resistant gloves (refer to manufacturer's glove selection chart to match glove material to chemical)
Cryogenic Liquids - Work involving transfer, dispensing, or filling of cryogenic liquids	Insulated, water-resistant cryogen gloves
Biological Materials - Work involving potentially infectious materials, including BSL2 microorganisms and viruses and human and non-human primate material	Disposable nitrile gloves
High Temperatures - Work with autoclave or other high temperature process	Insulated, terrycloth autoclave gloves
Sharp Objects - Work involving sharp objects or live animals	Cut-resistant gloves

Importance of Dexterity and Fit

It is important to consider the dexterity needed for the task when selecting gloves. Thicker gloves may provide better protection, but the loss of dexterity and grip may introduce additional hazards. Gloves that do not fit properly can also affect dexterity and grip.

Protective Clothing

Protective clothing is worn to protect the skin from exposure to chemicals, biological materials, and fire. Select protective clothing based on the type of hazard, task, fit, and comfort.

Types of Protective Clothing

Type	Description
General Purpose Lab Coats	<ul style="list-style-type: none">• Polyester/cotton blend lab coats are the most common general use lab coat. A minimum of 65% polyester is recommended for fluid protection for general chemical and biological material use. Polyester/cotton lab coats are not flame resistant.• 100% cotton lab coats may also be used as a general use lab coat. Cotton lab coats do not offer fluid protection and can be degraded by acids, but they are not as flammable as polyester/cotton blends.
Barrier Lab Coats	Front of lab coat is 100% polyester and the back is polyester/cotton blend. Barrier lab coats provide fluid protection for blood and body fluids.
Flame Resistant Lab Coats	Lab coats made from flame resistant fabric. Garment will have UL mark and will have a label indicating that it meets NFPA 2112 and NFPA 2113 requirements.
Rubber Aprons	Chemical resistant aprons for protection against acid and caustic spills.

Selection Guide

Hazard	Eye and Face Protection
Chemicals - Work involving small quantities of chemicals with low splash risk	General purpose lab coat
Chemicals - Work involving large quantities of chemicals, strong corrosives, and work that poses a splash risk	General purpose lab coat and rubber apron
Chemicals - Work involving large quantities of flammable liquids or open flame	Flame resistant lab coat
Cryogenic Liquids - Work involving transfer, dispensing, or filling of cryogenic liquids	General purpose lab coat
Biological Materials - Work involving potentially infectious materials, including BSL2 microorganisms and viruses and human and non-human primate material	General purpose lab coat or barrier lab coat
Radiation - Work involving unsealed radioactive materials	General purpose lab coat

Fit and Comfort

Lab coat fit affects the level of protection and poorly fitting lab coats can introduce additional hazards. Select lab coats with sleeves that cover the wrist, but do not extend past the wrist. Sleeves that are too short do not protect the lower arms and wrists, and sleeves that are too long can interfere with work, get caught on something, or get contaminated. Lab coats should be able to be comfortably buttoned.

Additional PPE

Hearing Protection

Hearing protection may be needed if laboratory equipment or tasks involve noise levels ≥ 85 dBA. Contact EHS for a noise assessment and hearing protection recommendations.

Respiratory Protection

Respiratory protection may be needed if engineering controls are not available. Contact EHS for an assessment to determine if respiratory protection is needed. Respirator use requires fit-testing, medical clearance, and training.