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PPE SELECTION GUIDANCE DOCUMENT

PURPOSE

The purpose of this document is to provide assistance with the selection of personal protective equipment (PPE) that is appropriate to workplace hazards encountered at Emory University.

SCOPE

This document applies to all Emory University employees, including healthcare, faculty, staff, students, contractors, and visitors who perform tasks requiring the use of PPE for hazard mitigation.

EYE AND FACE PROTECTION

Eye and face protection are required when exposed to eye or face hazards resulting from flying particles, molten metal, liquid chemicals, acids, or caustic liquids, chemical gases or vapors, or potentially injurious light radiation. All eye and face protection must meet current ANSI Z87.1 standards. The following are examples of occupations for which eye and face protection is routinely recommended: laboratory workers, carpenters, electricians, machinists, mechanics, plumbers, and welders.

Employees who wear prescription lenses while engaged in operations that involve eye hazards must wear eye protection that incorporates the prescription in the design, or wear eye protection that is designed to be worn over the prescription glasses.

The following are examples of various types of eye and face protection:

- **Safety Glasses** - Protective eyeglasses made with durable frames, tempered glass or plastic lenses, and side shields. Safety glasses provide protection from flying particles resulting from tasks such as carpentry, woodworking, grinding, etc.
- **Safety Goggles –** Vinyl framed eye protection with impact-resistant lenses and a pliable body design. Goggles seal around the eye area to provide protection from impact hazards and chemical splashes.
- **Face Shields -** Protective devices that provide protection for the entire face. Face shields may only be used in conjunction with safety glasses or goggles. Face shields provide added protection against flying particles, metal sparks, and chemical or biological splash hazards.
- **Welding Goggles –** Protective devices with impact-resistant lenses available in graduated shades of filtration. Welding goggles provide protection from sparking, scaling, or splashing metals and harmful light rays.
- **Welding Helmets and Shields –** Protective devices that provide protection for the eyes and face from infrared or radiant light burns, flying sparks, metal spatter and slag chips encountered during welding, brazing, and soldering. Appropriate shade numbers for various operations are listed in Table 2 on page 3.

Table 1 provides general guidance for selection of proper eye and face protection associated with the listed hazard sources.

Table 1, Eye and Face Protection Selection

HAZARD SOURCE	ASSESSMENT OF HAZARD	PROTECTION
IMPACT Chipping, grinding, machining, masonry, woodworking, sawing, drilling, chiseling, powered fastening, riveting, and sanding.	Flying fragments, objects, large chips, particles, sand, dirt, etc.	• Safety glasses with side protection or goggles • For severe exposure, face shield over primary eye protection
HEAT Furnace operations, pouring or casting molten metal, hot dipping, welding, cutting, and brazing.	Hot sparks	• Face shields, goggles, and safety glasses with side protection • For severe exposure, face shield over primary eye protection [1,2,3]
	Splash from molten metals	• Face shield over goggles [1,2,3]
	High temperature exposure	• Screened face shields, reflective face shields [1,2,3]
CHEMICALS and/or BIOHAZARDS Handling hazardous chemicals or biohazardous fluids.	Splash	• Goggles • For severe exposure, face shield over primary eye protection [3,11]
DUST Woodworking, buffing, general dusty conditions	Irritating mists	• Special-purpose goggles
	Nuisance dust	• Goggles [8]
LIGHT and/or RADIATION Welding: Electric arc	Optical radiation	• Welding helmets or welding face shield [9,12] • Typical shades (see Table 2)
WELDING Gas cutting, torch brazing, torch soldering	Optical radiation	• Welding goggles or welding face shield [3,9] • Typical shades (see Table 2)
GLARE	Poor vision	• Safety glasses with shaded or special-purpose lenses, as suitable [9,10]

[1] Care should be taken to recognize the possibility of multiple and simultaneous exposures to a variety of hazards. Adequate protection against the highest level of each of the hazards should be provided.

[2] Operations involving heat may also involve light radiation; protection from both hazards must be provided.

[3] Face shields may only be worn over primary eye protection (safety glasses or goggles).

[4] 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] 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 restricted ventilation of can cause lenses to fog and require frequent cleansing.

[9] Welding helmets or face shields may only be used over primary eye protection (safety glasses or goggles).

[10] Non-side shield safety glasses are available but are not acceptable eye protection for impact hazards.

[11] Ventilation should be adequate without compromising splash protection.

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

Table 2 provides general guidance for selection of the appropriate filter lenses for protection against radiant energy.

Table 2, Filter Lenses for Protection Against Radiant Energy

OPERATIONS	ELECTRODE SIZE 1/32 IN.	ARC CURRENT	PLATE THICKNESS (IN.)	PLATE THICKNESS (MM)	MINIMUM PROTECTIVE SHADE[1]
Shielded metal arc welding	<3	<60			7
	3-5	60-160			8
	5-8	160-250			10
	>8	250-550			11
Gas metal and flux cored arc welding		<60			7
		60-160			10
		160-250			10
		250-500			10
Gas Tungsten arc welding		<50			8
		50-150			8
		150-500			10
Air carbon (light)		<500			10
Arc cutting (heavy)		500-1000			11
Plasma arc welding		<20			6
		20-100			8
		100-400			10
		400-800			11
Plasma arc cutting[2]					
Light		<300			8
Medium		300-400			9
Heavy		400-800			10
Torch brazing					3
Torch soldering					2
Carbon arc welding					14
Gas Welding					
Light			Under 1/8	Under 3.2	4
Medium			1/8 to 1/2	3.2 to 12.7	5
Heavy			Over 1/2	Over 12.7	6
Oxygen Cutting					
Light			Under 1	Under 25	3
Medium			1 to 6	25 to 150	4
Heavy			Over 6	Over 150	5

[1] As a rule of thumb, start with a shade that is too dark to see the weld zone. Then go to a lighter shade which gives sufficient view of the weld zone without going below the minimum shade allowed. In oxyfuel gas welding or cutting where the torch produces a high yellow light, use a filter lens that absorbs the yellow or sodium line in the visible light of the (spectrum) operation.

[2] These values apply where the arc is clearly seen; lighter filters may be used when the arc is hidden by the work

piece.

HAND PROTECTION

Hand protection is required when there is a potential for exposure to hazards from skin absorption of harmful substances; severe cuts or lacerations; severe abrasions; punctures; chemical burns; thermal burns; and harmful temperature extremes. No one type or style of glove can provide protection against ALL potential hazards. Selection of appropriate hand protection should be based on:

1. Evaluation of the performance characteristics of the hand protection relative to the tasks to be performed;
2. Evaluation of the identified hazards and potential hazards
3. Conditions present;
4. Duration of use.

It is important to determine the performance characteristics of gloves relative to the specific hazard, how long the glove can be worn, and whether it can be reused. The work activities of the employee should be analyzed to determine the degree of dexterity required; the duration, frequency, and degree of exposure; and physical stresses that will be applied. The following are examples of occupations for which hand protection is routinely recommended: laboratory workers, welders, electricians, and custodians.

For chemical hazards, the following factors should be considered for selection of proper hand protection:

1. Toxic properties of the chemical **must** be determined in relation to skin absorption.
2. Safety Data Sheets (SDS's) are a valuable source of information.
3. For mixtures and formulated chemicals, gloves should be selected based on the chemical component with the shortest breakthrough time.
4. Gloves must be able to be removed in such a manner as to prevent skin contamination.
5. Refer to the glove manufacturer's website or visit the Links and Resources section on the main page of the EHSO website.

HEAD PROTECTION

Head protection is required when there is a risk of impact from falling or fixed objects or when electrical shock is present. The protection used must meet current ANSI Z89.1 standards and must be appropriately marked to verify its compliance. The manufacturer's name and the class designation of G, E, or C must be marked on the inside of the hat. The following are examples of occupations for which head protection is routinely recommended: carpenters, electricians, mechanics, welders, warehouse operations, and construction or renovation operations personnel.

Tar, paint, oils, and some chemicals can damage the shell and compromise the integrity of head protection. Helmets should not be painted, and the manufacturer's instructions should be consulted if tars, paints, or similar materials need to be cleaned from the shell of the helmet. **Helmets must not be altered in any of the following ways:**

1. Holes drilled in the helmet;
2. Paint or inscriptions on the helmet;
3. Exposure to extreme temperatures or direct sunlight for long periods of time; or

4. Placement of stickers on the helmet (stickers can hide signs of deterioration.)

Table 3 provides general guidance for selection of proper head protection associated with the listed hazard sources.

Table 3, Head Protection Selection Chart

HAZARD SOURCE	ASSESSMENT OF HAZARD	PROTECTION
IMPACT Chipping, grinding, machining, masonry work, woodworking, sawing, drilling, chiseling, powered fastening, riveting, and sanding	Falling objects, parts, and heavy tools	Class C helmet
PENETRATION	Sharp falling and flying objects	Class C helmet
ELECTRICAL	Contact with exposed electrical wires and conductors	Class G helmets – impact and penetration resistance and low-voltage insulation up to 2,200 V Class E helmets – impact and penetration resistance and high voltage insulation up to 20,000 V

FOOT PROTECTION

Foot protection is required when working in areas where there is a risk of foot injuries due to falling or rolling objects, objects piercing the sole, or in areas with electrical hazards. Foot protection must meet current ANSI Z41 standards. The following are examples of occupations for which foot protection is routinely recommended: shipping and receiving, carpenters, electricians, machinists, mechanics, plumbers, welders, pipe fitters, and groundskeepers.

Safety Shoes

Safety shoes are designed to protect feet from falling or rolling objects, cuts, and punctures. The shoe may incorporate metatarsal protection or a shield that protects the upper surface of the foot from impact or compression hazards.

Rubber boots

Rubber boots protect the feet from contact with acids, solvents, or other chemicals, or a dirty or wet working environment. Rubber boots do not generally offer impact or compression protection and may need to be worn in conjunction with safety shoes to provide adequate protection against workplace hazards. If chemical protection is required, the rubber boot must be compatible with and provide adequate protection against the expected exposure.

Table 4 provides general guidance for selection of proper foot protection associated with the listed hazard sources.

Table 4, Foot Protection Selection Chart

HAZARD SOURCE	ASSESSMENT OF HAZARD	PROTECTION
IMPACT Chipping, grinding, machining, masonry work, woodworking, sawing, drilling, chiseling, powered fastening, riveting, and sanding	Falling objects, parts, and heavy tools	Safety shoes
PENETRATION	Nails, metal, and other sharp objects	Foot protection with puncture resistant soles
COMPRESSION	Rolling or pinching objects	Safety shoes
CHEMICALS and/or **BIOHAZARDS** Handling hazardous chemicals or biohazardous materials	Blood, urine, liquids, solvents, oils, paints, corrosives, and acids	Rubber boots or shoes for severe exposure
ELECTRICAL	Contact with conductors, arcing, sparks, or static discharges	Foot protection with special non-conductive and insulating soles

REFERENCES:

1. OSHA Personal Protective Equipment - 29 CFR 1910.132-138
2. OSHA Non-mandatory Compliance Guidelines for Hazard Assessment and Personal Protective Equipment Selection – 1910 Subpart I Appendix B