Michigan State University

Personal Protective Equipment Guidelines

Prepared by:

Environmental Health & Safety
MICHIGAN STATE UNIVERSITY

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Personal Protective Equipment

Michigan State University
Office of Environmental Health & Safety

SUMMARY

The Personal Protective Equipment (PPE) Guideline has been developed to provide the University community with the necessary information to identify work situations that require the use of PPE, to determine the proper selection and use of PPE, and to document this information by using the PPE Hazard Assessment Certification form. This information is important to help ensure the safety and health of all MSU employees.

SCOPE

University employees who currently utilize PPE or who may encounter hazards to the eyes, face, head, feet, hands, or who conduct work involving electrical or fall hazards, as identified during the Hazard Assessment of the workplace, are subject to these PPE Guidelines. PPE will be selected and used to protect employees from the hazards and potential hazards that they are likely to encounter. Respiratory protection, hearing protection, biohazard and radiation are covered under separate guidelines. See the Respiratory Protection Manual, Hearing Conservation Program, Biosafety Manual, or Radiation Safety Manual (http://www.ehs.msu.edu/).

PPE should not be used as a substitute for engineering, work practices, and/or administrative controls to protect employees from workplace hazards. PPE should be used in conjunction with permanent protective measures, such as engineered guards, substitution of less hazardous chemicals, and prudent work practices.

REFERENCE REGULATIONS

Personal Protective Equipment Standards

- OSHA 29 CFR 1910.132 - 1910.138, https://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=10118
- MIOSHA General Industry (Part 33) http://www.michigan.gov/documents/CIS_WSH_part33_34779_7.pdf
- MIOSHA Health (Part 433) http://www.michigan.gov/documents/CIS_WSH_part433Rev_53316_7.pdf

DEFINITIONS

ANSI – American National Standard Institute, a nonprofit, voluntary membership organization that coordinates the U.S. Voluntary Consensus Standards System. Their standards have been adopted throughout government and industry for various types of personal protective equipment.

Hazard Assessment – The investigation of the work environment for potential dangers that could result in an injury or illness.

Material Safety Data Sheet (MSDS) – A document describing the hazards and safe handling practices for a specific product.

Personal Protective Equipment (PPE) – Equipment worn by workers to protect against hazards in the environment. Examples include safety glasses, face shields, respirators, gloves, hard hats, steel-toed shoes, and hearing protection.

RESPONSIBILITY

Deans, Directors, and Department Heads

- Designate and authorize individuals who will be responsible for the preparation and implementation of the Personal Protective Equipment Guidelines.
- Provide administrative and financial support for these Guidelines within individual departments.
- Ensure the Personal Protective Equipment Guidelines are implemented and maintained within the department.

EHS

- Provide oversight and administration of the program.
- Provide technical information and assist departments in implementing an effective PPE Program in their workplace.
- Provide training for PPE instruction, as needed.
- Review and revise the PPE Program, as needed for compliance with applicable regulations.

Supervisors

Implement all aspects of these Guidelines, including documentation of the hazard assessments and site specific training.

- Be familiar with the applicable government regulations, safety standards, and prudent safety practices to protect themselves and their fellow employees.
- Conduct hazard assessments (see Appendix A).
- Complete the Hazard Assessment Certification form.
- Acquire the correct PPE.
- Ensure that employees are trained;
    - General on-line training

- Site-specific training.

- Document site-specific training and maintain records.
- Retrain employees if;
  - Changes in the workplace render previous training obsolete
  - Changes in the types of personal protective equipment to be used render previous training obsolete
  - Inadequacies in an affected employee's knowledge or use of assigned personal protective equipment indicate that the employee has not retained the requisite understanding or skill.
- Document retraining of employees.

Employees

- Comply with these Guidelines and any further safety recommendations provided by supervisors and/or DPPS/ORCBS regarding PPE.
- Conduct assigned tasks in a safe manner and wear all assigned PPE.
- Report any unsafe or unhealthy work conditions and job related injuries or illnesses to the supervisor immediately.

PROCEDURES

General - The following steps are necessary for compliance with the PPE Guidelines:

1. Conduct a Hazard Assessment of the Workplace

A Hazard Assessment is not a new process; it is simply a formalization of what is done whenever personal protective equipment is selected based on the hazards of the job. When conducting a hazard assessment, a task is investigated and the hazards and the potential hazards associated with the task are determined. This allows selection of personal protective equipment that will protect the employee from the identified hazards.

A hazard assessment may be conducted on a single employee, performing a single task, or a group of employees if all the employees perform an identical task. For example, if all employees in a group are exposed to ultraviolet radiation during one type of welding, the hazard assessment could include all of the welders conducting that task. Likewise, painters using similar types of materials or laboratory workers using similar types of chemicals could be grouped under the same assessment.

The individual conducting the hazard assessment must have an intimate knowledge of each task. In some cases this may require directly observing an employee. In other instances the assessor may know all the hazards associated with a job without additional review.

- Site-specific training.

- Document site-specific training and maintain records.
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The individual conducting the hazard assessment must have an intimate knowledge of each task. In some cases this may require directly observing an employee. In other instances the assessor may know all the hazards associated with a job without additional review.

During the hazard assessment of each task, inspect the layout of the workplace and look for the following hazard sources:

a. High temperatures that could result in burns, eye injury, ignition of equipment, heat stress, etc.
b. Cold temperatures that could result in frostbite, lack of coordination, cold stress, etc.
c. Chemical exposure, including airborne or skin contact that would have the potential for splash on the skin or eyes, or the potential to breathe vapors or mists.
d. Harmful dust or particulates
e. Light radiation, e.g., welding, cutting, brazing, furnaces, heat treating, high intensity lights, etc.
f. Sources of falling objects, potential for dropping objects, rolling objects that could crush or pinch the feet.
g. Sharp objects that may pierce the feet or cut the hands.
h. Electrical hazards.
i. Observe the layout of the workplace and the location of co-workers for the potential for collision with other personnel or objects.
k. Any other identified potential hazard.

Where these hazards exist and could cause injury to employees, personal protective equipment must be selected to eliminate substantially the injury potential. A PPE Hazard Assessment Certification form and accompanying Hazard Assessment Checklist are attached as Appendix A.

To assist each department and supervisor, sample PPE Hazard Assessment Certification forms have been done for typical tasks for various job classifications. These can be viewed on the ORCBS website. Supervisor may use these Certifications as they apply to their employees. Be sure to evaluate the completed Hazard Assessment Certifications and make any necessary modifications so that they specifically address the tasks your workers perform. There may be other tasks that your workers perform that also need to be assessed and added to the Certification form. If you need assistance, please contact EHS.

2. Certify a Hazard Assessment was performed

By signing the PPE Hazard Assessment Certification forms you will be certifying that this process has been completed as required by the regulation. The forms must be kept with the departmental Hazard Communication Plan. In laboratories, the forms must be

kept with the Chemical Hygiene Plan. EHS inspectors will ask to review these forms during routine safety inspections.

3. PPE Selection Guidelines

a. General Considerations

For each hazard identified, select personal protective equipment that will protect the employee by creating a barrier against workplace hazards. Consider the likelihood of an accident and the seriousness of a potential accident. Personal protective equipment must be selected to protect against any hazard that is present or likely to be present. It is important for department personnel to become familiar with the potential hazards, the type of protective equipment that is available, and the level of protection that is provided by that equipment, i.e., splash protection, impact protection, etc.

The personal protective equipment selected must fit the employee it is intended to protect. Make certain that employees have the correct size of protective equipment. Whenever possible, select adjustable personal protective equipment. Employee input in the selection process is critical. Personal protective equipment that fits properly and is comfortable will more likely be worn by employees. Damaged or defective protective equipment must be taken out of service immediately to be repaired or replaced and employees must be provided with the proper equipment in the interim.

For the proper selection of PPE, please use the following resources:

- Information presented in these Guidelines;
- Appendix A guides: Eye and Face Protection Chart, Filter Lenses for Protection against Radiant Energy Chart; Footwear Selection Guidelines, Selection of Footwear for Chemical Resistance, Selection of Hand Protection, Selection of Protective Clothing Materials, Selection of High Visibility Clothing
- Technical assistance from ORCBS/DPPS and the manufacturers of PPE;
- MSDSs for chemicals; and
- University Stores Catalog, product descriptions.

b. Eye and Face Protection

Eye and face protection must be used where a hazard exists due to any of the following:

- Flying objects or particles
- Molten metal
- Liquid chemicals
- Harmful contacts
- Exposures
- Acids or caustic chemicals
- Chemical gases or vapors
- Glare
- Air contaminants

- Radiation
- Electrical flash
- A combination of hazards

Select eye and face protection based on Tables 1 and 2 of Appendix A. If the appropriate protection is not listed in the tables, such as laser eyewear, contact EHS for further assistance. All protective eye and face protection must comply with ANSI Z 87.1-1989. Some departments provide prescription safety glasses while others opt for the over-the-glass safety glasses.

c. Eye and Face Protection in Laboratories

Appropriate eye and face protective equipment must be worn at all times in those laboratories where eye and face hazards exist.

Safety glasses are required when an impact hazard exists or when working with low hazard chemicals, or when a low probability of splash exists. For example: pipeting, handling a closed bottle of an injurious chemical, mixing solutions and opening centrifuge tubes.

Chemical splash goggles are required when working with smaller amounts of corrosive or injurious chemicals and a reasonable probability of splash exists. For example: pouring acid out of a 1 pint bottle, pouring methylene chloride from a 1 liter bottle or working with liquids under pressure.

Face shield and chemical splash goggles are required when: working with larger quantities of corrosive chemicals and / or a high probability of eye and face injury exists. For example: working with an acid bath, pouring 4 liters of acid into a container or handling highly reactive chemicals that may spatter.

d. Head Protection

Head protection must be used when a hazard exists due to any of the following:

- Impact and penetration of falling objects
- Impact when working in low clearance areas
- Impact from hanging objects such as hooks and chains
- High voltage electric shock and burns
- Flying objects
- Electric shock
- Hair entanglement
- Chemicals
- Temperature extremes.

For example, operations requiring head protection may include: tree trimming, construction and demolition work, electric and communication line maintenance.

Protective Helmets (Hard Hats)

Protective helmets are required where falling object hazards are present. 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 process which might cause material or objects to fall; and working on exposed energized conductors.

Some examples of occupations for which head protection should be 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.

By the MIOSHA Standards, all hard hats must be certified to meet ANSI Z89.1-1986. ANSI updated the standard in 1997 changing the types of helmets to provide for crown and side impact protection. The class designation letters have also been changed. Many suppliers are now only listing their products to the 1997 standard. All hard hats meeting the 1997 standard will also meet the 1986 standard.

Be certain that hard hats provided are not bump caps. Bump caps look like hard hats but they do not meet the requirements of ANSI Z89.1-1986 and cannot be used to protect employees from the above listed hazards. To check this, inspect each hard hat to confirm that it contains the designation "ANSI Z89.1-1986" or "ANSI Z89.1-1997".

Description of Protective Helmets – 1986 Standard

Type 1	Helmets with a full brim
Type 2	Brimless helmets with a peak extending forward from the crown.
Class A	General service, limited voltage. Intended for protection against impact hazard. Used in mining, construction, and manufacturing. Provides electrical protection from low voltage conductors (tested to 2,200 volts)
Class B	Utility service, high voltage. Used by electrical workers and workers who also need protection from falling objects. Provides electrical protection from high-voltage conductors (tested to 20,000 volts)
Class C	Special service, no voltage protection. Designed for lightweight comfort and impact protection. Used in certain construction, manufacturing, refineries, and where there is a possibility of bumping the head against a fixed object. Must not be used except where it has been determined that the use of other types of protective helmets is impractical, such as where chemical reaction will cause the deterioration of other types of head protection.

Description of Protective Helmets – 1997 Standard

Type 1	Helmets providing crown impact protection
Type 2	Helmets providing lateral impact protection
Class G	General service, limited voltage. Intended for protection against impact hazard. Used in mining, construction, and manufacturing. Provides electrical protection from low voltage conductors (tested to 2,200 volts)
Class E	Utility service, high voltage. Used by electrical workers and workers who also need protection from falling objects. Provides electrical protection from high-voltage conductors (tested to 20,000 volts)
Class C	Conductive – no electrical protection. Designed for lightweight comfort and impact protection. Must not be used except where it has been determined that the use of other types of protective helmets is impractical, such as where chemical reaction will cause the deterioration of other types of head protection.

Hair enclosures

Long hair (longer than four inches) can be drawn into machine parts such as chains, belts, rotating devices, suction devices, and blowers. Hair may even be drawn into machines guarded with mesh. It may also present an ignition risk in areas near open flames or welding. Employees with long hair must cover and protect their hair with a hat, cap, net, or bandana. These items must fit so as to not present a hazard either with machinery, ignition sources, or interference with other PPE.

e. Foot Protection

Select protective footwear when employees work in areas where there is a danger of foot injuries due to falling and rolling objects, objects piercing the sole, and where employees' feet are exposed to electrical hazards. Select protective footwear based on Tables 3 and 4 of Appendix A. Protective footwear must comply with ANSI Z41-1991. Examples of situations that may require the use of protective footwear include:

- Handling heavy objects and/or tools that could be dropped;
- Work activities involving manual material handling carts, heavy pipes, or bulk rolls, all of which could potentially roll over an employee's feet;
- Work involving sharp objects such as nails, tacks, large staples, scrap metal, etc., which could penetrate the sole of the shoe;
- Work involving explosive materials such as black powder, volatile substances, cotton dust, grain dust that could be ignited by the discharge of static electricity;
- Work with electrical hazards;
- Work with electronic components.

Some occupations for which foot protection should be 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, welders, laborers, freight handlers, gardeners and grounds-keepers, timber cutting and logging, stock handlers, warehouse laborers, and farm workers.

f. Hand Protection

Select and use the appropriate hand protection when employees' hands may be potentially exposed to the following hazard sources:

- skin absorption of harmful substances
- severe cuts or lacerations
- severe abrasions
- punctures
- chemical burns
- irritating materials
- thermal burns
- harmful temperature extremes

It is important to select appropriate gloves for a particular application and to determine how long the glove can be worn, and whether it can be reused. Cloth gloves must not be worn when operating rotating equipment such as a drill or powered threading machine.

Gloves used to protect against chemical hazards should be selected based on tested performance against specific chemicals. Glove manufacturers have developed recommendations for the proper selection and use of chemically-protective gloves. For online manufacturer recommendations go to https://www.ansellpro.com/download/Ansell_8thEditionChemicalResistanceGuide.pdf or contact the manufacturer or EHS for assistance.

Refer to Appendix A, Table 5 for selection of hand protection other than chemically protective gloves.

g. Body Protection, Other than Gloves

Body protection should be worn when there is a possibility of bodily injury from hazards while performing their jobs.

Workplace hazards include the following:

- Intense heat
- Splashes of hot metals and other hot liquids
- Impacts from tools, machinery and materials
- Cuts
- Hazardous chemicals
- Contact with potentially infectious materials, like blood (refer to the Biosafety Manual for PPE guidelines)
- Radiant energy (ultraviolet, visible, infrared)

- Motor vehicle traffic

Protective clothing needs to be provided only for the specific parts of the body that are exposed to the hazard. Depending on the hazards of the workplace one or more of the following may need to be provided:

- Vests
- Jackets
- Aprons
- Coveralls
- Sleeve protectors
- Surgical gowns
- Full body suits

The process for selecting chemically resistant clothes is similar to that for gloves. Please check the manufacturers' recommendations for the proper selection of chemical protective clothing or contact ORCBS.

For protective clothing selection, other than chemical protection, refer to Appendix A, Table 6.

MIOSHA requires the use of a fluorescent orange warning garment while flagging or directing vehicular traffic. At night the garment is required to be reflectorized. A voluntary standard, ANSI/ISEA 107-1999, has been developed to provide guidance in selecting warning garments. This standard is not required by MIOSHA. Refer to Appendix A, Table 7 for selection guidance.

4. Consultation with Affected Employees

Include employees in the PPE selection process to the extent possible and provide them access to the PPE Hazard Assessment Certification form.

5. Training Requirements

Training will be conducted in two phases. Online general PPE training provided through EHS will be required for all employees who wear PPE. Site specific PPE training will be conducted by department supervisors and documented with the PPE Training Form.

On line training will include:

- When and why personal protective equipment is necessary;
- What type of personal protective equipment is necessary;
- How properly to don, doff, adjust and wear personal protective equipment;
- The limitations of the personal protective equipment;
- The proper care, maintenance, useful life and disposal of the personal protective equipment.

Site specific training will include:

- What type of personal protective equipment is necessary for each job;
- How properly to don, doff, adjust and wear personal protective equipment;
- How to obtain PPE
- Departmental cleaning, maintenance and replacement procedures.

Laboratory personnel must be instructed to remove gloves and lab coats prior to entering common areas (hallways, elevators, eating areas, rest rooms, offices, etc.).

Each employee shall demonstrate an understanding of the training and the ability to use personal protective equipment properly before being allowed to perform work requiring the use of PPE.

Appendix B is a "PPE Training Guide" which can be discussed with or distributed to employees.

6. Training Certification

Certify in writing any training that has been completed. Maintain the certification with your departmental training records. Laboratories must keep the certification with the Chemical Hygiene Plan. The certification must verify that each affected employee has received and understood the required training. The record must be identified as a certification. An example Training Certification form is provided in Appendix B.

7. Reassessment and Retraining

Reassessment of the workplace should be conducted when new equipment or processes are introduced that could create new or additional hazards. If necessary, new training must be completed. Accident records should be reviewed and the suitability of previously selected PPE be reevaluated, if warranted.

When the supervisor has reason to believe that any affected employee who has been trained does not have the understanding or skills required to use the personal protective equipment properly, the supervisor shall retrain such employees and document the retraining.

Retraining is also required when there have been changes in the workplace or personal protective equipment that render previous training obsolete, or when there are inadequacies in the affected employee's knowledge or use of the assigned personal protective equipment.

TECHNICAL SUPPORT

All referenced guidelines, regulations, and other documents are available through EHS (5-0153).

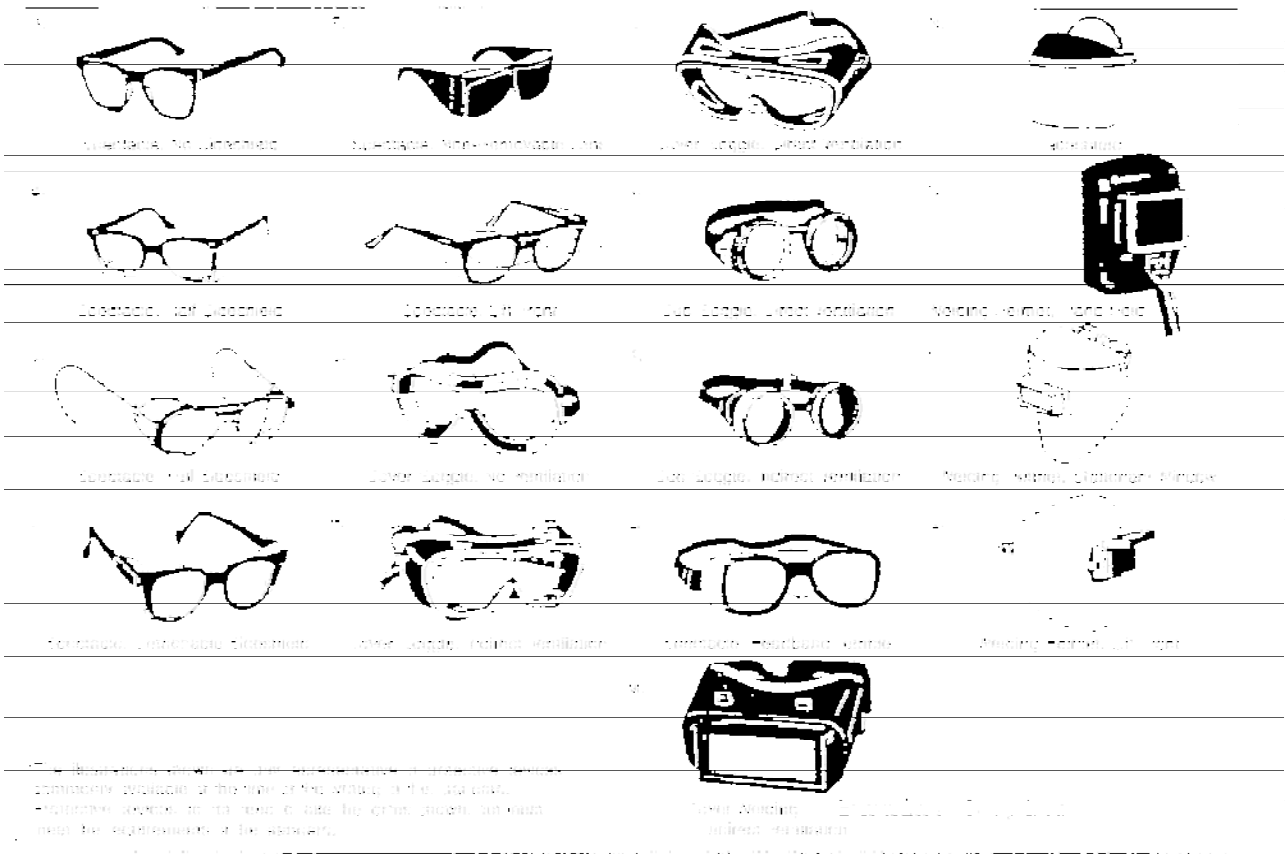
ATTACHMENTS

Appendix A - Hazard Assessment Information and PPE Selection Guides
Appendix B - PPE Training Guide

APPENDIX A

Hazard Assessment and PPE Selection Information

TABLE 1. EYE AND FACE PROTECTION SELECTION



SOURCE OF HAZARD	ASSESSMENT OF HAZARD	TYPE	PROTECTION (see notes on next page)
IMPACT - Chipping, grinding, machining, masonry work, woodworking, sawing, drilling, chiseling, powered fastening, riveting, and sanding	Flying fragments, objects, large chips, particles, sand, dirt, etc.	B, C, D, E, F, G, H, I, J, K, L, N	Spectacles with side protection, goggles, face shields. See notes (1), (3), (5), (6), (10). For severe exposure, use face shield.
HEAT - Furnace operations, pouring, casting, hot dipping, and welding.	Hot sparks	B, C, D, E, F, G, H, I, J, K, L, N	Face shields, goggles, spectacles with side protection. For severe exposure use face shield. See notes (1), (2), (3).
	Splash from molten metals	N	Face shields worn over goggles. See notes (1), (2), (3).
	High temperature exposure	N	Screen face shields, reflective face shields. See notes (1), (2), (3).
CHEMICALS - Acid and chemical handling, use of cleaning products, paint use and clean-up products, pesticide and herbicide use.	Splash	G, H, K	Goggles. For severe exposure, use face shield. See notes (3), (11).
	Irritating mists	G	Special-purpose goggles
DUST - Woodworking, buffing, general dusty conditions.	Nuisance dust	G, H, K	{Goggles, or spectacles with side protection.} See note (8).
LIGHT and/or RADIATION - Welding: Electric arc.	Optical radiation	O, P, Q	Welding helmets or welding shields. Typical shades: 10-14. See notes (9) (12).
- Welding: Gas.	Optical radiation	J, K, L, M, N, O, P, Q	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	B, C, D, E, F, N	Spectacles or welding face shield. Typical shades: 1.5-3. See notes (3), (9).
- Glare.	Poor vision	A, B	Spectacles with shaded or special purpose lenses, as suitable. See (9), (10).

NOTES FOR TABLE 1.
EYE AND FACE PROTECTION SELECTION

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 OSHA 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 face shields should be used only over primary eye protection (spectacles or goggles).
10. Non-side shield 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.

TABLE 2. FILTER LENSES FOR PROTECTION AGAINST RADIANT ENERGY

Operations	Electric Size 1/32 in.	Arc Current (amps)	Minimum* Protective Shade
Shielded metal arc welding	Less than 3 3 - 5 5 - 8 More than 8	Less than 60 60 - 160 160 - 250 250 - 550	7 8 10 11
Gas metal arc welding and flux cored arc welding		Less than 60 60 - 160 160 - 250 250 - 500	7 10 10 10
Gas Tungsten arc welding		Less than 50 50 - 150 150 - 500	8 8 10
Air carbon Arc cutting	Light Heavy	Less than 500 500 - 1000	10 11
Plasma arc welding		Less than 20 20 - 100 100 - 400 400 - 800	6 8 10 11
Plasma arc cutting	Light** Medium** Heavy**	Less than 300 300 - 400 400 - 800	8 9 10
Torch soldering Torch brazing Carbon arc welding			2 3 14

Operations	Plate Thickness – inches	Thickness – mm	Minimum * Protective Shade
Gas Welding: -Light -Medium -Heavy	 Under 1/8 1/8 to 1/2 Over 1/2	 Under 3.2 3.2 to 12.7 Over 12.7	 4 5 6
Oxygen Cutting: -Light -Medium -Heavy	 Under 1 1 to 6 Over 6	 Under 25 25 to 150 Over 150	 3 4 5

* 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. In oxyfuel gas welding or cutting where the torch produces a high yellow light, it is desirable to use a filter lens that absorbs the yellow or sodium line in the visible light of the (spectrum) operation.

** These values apply where the actual arc is clearly seen. Experience has shown that lighter filters may be used when the arc is hidden by the workpiece.

TABLE 3. FOOTWEAR SELECTION GUIDELINES

(SEE NOTES ON FOLLOWING PAGE)

Hazard Types/Area	ANSI Z41 Section 1 Impact & Compression	ANSI Z41 Section 2 Metatarsal	ANSI Z41 Section 3 Conductive	ANSI Section 4 Electrical Hazard	ANSI Section 5 Puncture Resistance	ANSI Z41 Section 6 Static Dissipative	Comments
Falling objects	Required	Recommended					Metatarsals should be recommended any time potential hazards exist that may result in blunt trauma injury to the metatarsal portion of the foot resulting from falling, moving, or rolling objects or equipment (Not just limited to falling objects)
Rolling objects	Required	Recommended					
Sharp Objects a) Glass/nails/rocks or other sharp objects	Required				Required		
Explosion Resulting from a) black powder b) volatile substances c) dust (cotton/grain elevators)	Required		Required	Do Not Use		Do Not Use	Conductive footwear must be kept clean and worn in conjunction with conductive (grounded) floors/mats/carpets.
Electrical Hazards a) Open circuits*/Dry Environment b) Dielectric/Non-Conductive Footwear *Open Circuits (600 Volts or less AC)	Required		Do Not Use	Required*		Do Not Use	For specific voltage protection check with your footwear supplier.
Electronic Components	Required					Recommended	Static Dissipative Footwear must be kept clean and worn in conjunction with static dissipative flooring

*=Check with your protective footwear supplier for these specialty applications.

I/C = Impact/Compression
Mt = Metatarsal
Cd = Conductive
EH = Electrical Hazard
PR = Puncture Resistant
SD = Static Dissipative

Required – To meet the requirements of ANSI Z41 Standard a protective toe cap is required
Do not use – Use in this area is dangerous and may result in severe injury.
Recommended – The results of a Hazard Assessment may or may not require this special feature

There are three levels of protection for Impact/Compression and Metatarsal Protection: Class 30, 50, and 75. Class 75 is recommended for most application.

NOTES TO TABLE 3 PROTECTIVE FOOTWEAR SELECTION GUIDELINES

ANSI Z41 divides protective footwear into the following six classes:

Section 1 Impact and Compression Resistance Identification Code I/C

Provides a test for a shoe's capacity to protect the toe area of the foot against falling or rolling objects. There are three levels of protection: Class 30, 50, and 75. Class 75 is the highest level and is recommended for most applications.

Section 2 Metatarsal Identification Code Mt

Provides standards for the protection of the upper foot (metatarsal bones) and toe areas. Designed to prevent or reduce injuries when the toe and metatarsal areas of the foot are exposed to drop hazards. There are three levels of protection: Class 30, 50 and 75. Class 75 is the highest level and is recommended for most applications.

Section 3 Conductive Footwear Identification Code Cd

Conductive footwear is designed to discharge static electricity from your body through your shoes into grounded floors. Floors must be grounded so that a charge can be dissipated. Conductive footwear is designed and manufactured to minimize static electricity and to reduce the possibility of ignition of volatile chemicals, explosives, or explosive dusts.

Warning – Conductive footwear may NOT be worn near open electrical circuits or highly charged objects of any kind that require Electrical Hazard (NON-conductive) footwear.

Section 4 Electrical Hazard Protective Sole and Heel Identification Code EH

The sole construction of Electrical Hazard footwear is designed to reduce the hazards due to the contact of the sole with electrically energized parts and to provide secondary electrical hazards protection on substantially insulated surfaces. The soles of electrical hazards footwear are designed to reduce the potential of electrical shock when soles are exposed to open circuits (600 volts AC or less).

Warning – Electrical Hazard non-conductive footwear may not be worn near explosives or in other environments that require Conductive footwear.

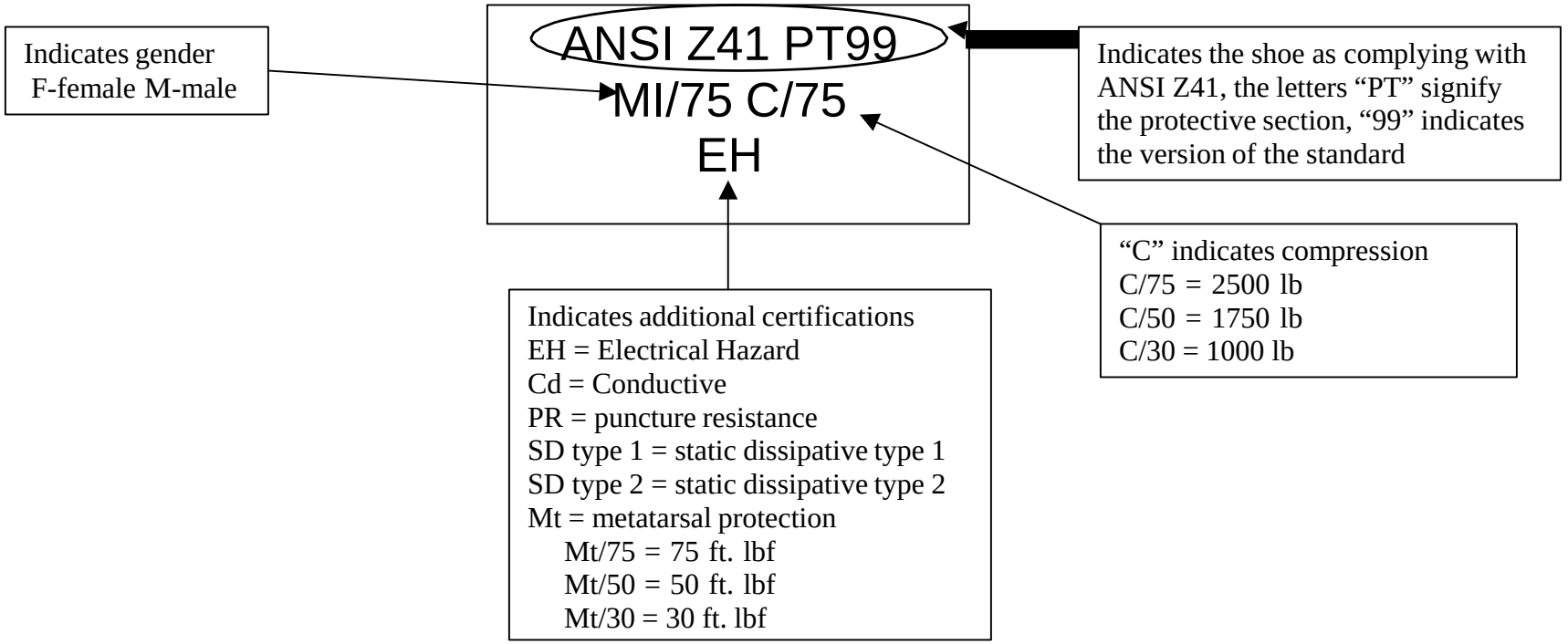
Section 5 Sole Puncture Resistant Protective Device Identification Code PR

Footwear includes a sole puncture resistant protective device. This reduces the possibility of puncture wounds to the soles of the feet by objects that could penetrate the outsoles of the footwear. The protective plate must be an integral part of the shoe.

Section 6 Static Dissipative Identification Code SD

Footwear designed to reduce the accumulation of excess static electricity by conducting body charge to ground, while maintaining a high enough level of electrical resistance.

FIGURE 1. FOOTWEAR LABELING



Description	Line	Identification
Female protective footwear	1	ANSI Z41 PT99
With impact and compression protection	2	F 1/75 C/75
Male protective footwear	1	ANSI Z41 PT99
With impact and compression protection	2	M I/75 C/75
With metatarsal and electrical hazard	3	Mt/75 EH
protection	4	PR
With puncture resistance		
Male protective footwear	1	ANSI Z41 PT99
With impact and compression protection	2	M I/30 C/30
With puncture resistance	3	PR

TABLE 4. SELECTION OF FOOTWEAR MATERIALS FOR CHEMICAL RESISTANCE

Types of Upper Materials

R=Recommended NR=Not Recommended

Contaminant	Leather	Coated Leather	Textiles & Coated Fabrics	Natural Rubber	PVC	PVC Urethane Blend	Polyurethane
Concentrated mineral acids	NR	R**	NR	R	R	NR	NR
Dilute mineral acids	R	R	NR	R	R	R	R*
Alkalis	NR	R	NR	R	R	R	R*
Fats/organic acids	R*	R	NR	NR	NR	R	R
Polar organic solvents#	R	NR	NR	R	NR	NR	NR
Non-polar organic solvents##	R	R**	NR	NR	R	R	R
Oils/lubricants	R	R**	NR	R	NR	R	R

*=Some resistance, but only short term
**=Leather with nitrile rubber coating only

Types of Soling Materials

R=Recommended NR=Not Recommended

Contaminant	PVC	PVC Urethane Blend	Nitrile Rubber	Polyurethane Polyester	Polyurethane Polyether	Natural Rubber	Leather
Concentrated mineral acids	R	NR	R	R	MR	R	NR
Dilute mineral acids	R	R	R	R	R*	R	R*
Alkalis	R	R	R	R	R*	R	R*
Fats/organic acids	NR	R	R	R	R	NR	R
Polar organic solvents#	NR	NR	NR	R	NR	R	R
Non-polar organic solvents##	R	R	R	R	R	NR	R
Oils/lubricants	NR	R	R	R	R	NR	R

*=Some resistance, but only short term

Polar organic solvents include those that dissolve in water including, ethanol, methanol, and acetone.
Non-polar organic solvent do not dissolve in water and include hexane and benzene.

TABLE 5. SELECTION OF HAND PROTECTION

Hazard	Degree of Hazard	Protective Material
Abrasion	Severe	Reinforced heavy rubber, staple reinforced heavy leather
	Less Severe	Rubber, plastic, leather, polyester, nylon, cotton
Sharp Edges	Severe	Metal mesh, staple-reinforced heavy leather, Kevlar aramid-steel mesh
	Less Severe	Leather, terry cloth (aramid fiber)
	Mild with delicate work	Lightweight leather, polyester, nylon, cotton
Chemicals		Refer to ORCBS website http://www.orcbs.msu.edu/chemical/chemical.html
Cold	Severe	Cryo-gloves, Zetex – not for immersion in liquid nitrogen
	Less severe	Leather, insulated plastic or rubber, wool, cotton
Electricity		Rubber-insulated gloves tested to appropriate voltage meeting ANSI/ASTM D120-87el
Heat	High temperatures (over 350 deg C)	Zetex high temperature
	Medium high (up to 350 deg C)	Nomex, Kevlar, heat resistant leather with linings
	Warm (up to 200 deg C)	Nomex, Kevlar, heat-resistant leather, terry cloth (aramid fiber)
	Less warm (up to 100 deg C)	Chrome-tanned leather, terry cloth
General Duty		Cotton, terry cloth, leather
Product Contamination		Thin film plastic, lightweight leather, cotton, polyester, nylon

TABLE 6. SELECTION OF PROTECTIVE CLOTHING MATERIALS

Hazard	Protective Material
Heat	Treated wool and cotton, leather, aluminized material, Nomex
Splashes of hot metals and hot liquids	Treated wool and cotton, leather, aluminized material, Nomex
Impact from tools, machinery, and materials	Leather, Kevlar, duck
Cuts	Leather, Kevlar
Hazardous chemicals	Chemical resistant clothing, contact manufacturer or ORCBS
Dusts, dirt	Paperlike fiber, duck, plastics
Abrasions, rough services	Leather, duck
Cold	Insulated cotton, insulated synthetic fabrics

Paper like fiber – Disposable suits made of this material provide protection against dusts.
Nomex – A synthetic fiber which provides high heat resistance
Kevlar – A synthetic fiber which is highly resistant to cuts and punctures.
Treated wool and cotton – Protective clothing made from treated wool and cotton adapts well to changing workplace temperatures and is comfortable as well as fire resistant. Treated cotton and wool clothing protects against dust, abrasions, and rough and irritating surfaces
Duck – Closely woven cotton fabric protects against cuts and bruises while handling heavy, sharp, or rough materials.
Leather- often used for protection against dry heat, flame, cuts, and abrasion.
Rubber, rubberized fabrics, neoprene and plastics – Protective clothing made from these materials protects against certain acids and other chemicals.

TABLE 7. SELECTION OF HIGH VISIBILITY CLOTHING

Class	Type of Work	Traffic Speed	Typical Jobs
Class I	• Workers separated from approaching traffic • Workers give their undivided attention to oncoming traffic	Less than 25mph	Warehouse workers, sidewalk maintenance workers
Class II	• Working near moving traffic • Working during inclement weather • Worker's attention is occasionally diverted from traffic	Greater than 25 mph	Roadway construction workers, grounds crews
Class III	• Workers must be seen from 1,280 feet and identified as a person • Workers must focus all their attention on their work	Greater than 50 mph	Emergency responders, accident site investigators, utility workers, survey crews, highway construction workers

Background Material Color Selection

There are three color choices fluorescent lime-yellow, fluorescent red-orange and fluorescent red.

What to consider when deciding on fluorescent background color for high visibility garments:

1. Natural environment – to be visible the garment must contrast with the natural surroundings. All three of the Fluorescent colors are not typically found in nature, but things like red-orange blending in with fall foliage or lime yellow blending in with yellow flowers need to be considered. Fluorescent colors are effective in daytime and low-light conditions.
2. Work environment – to be visible in the work environment the garment must contrast with equipment, vehicles and surroundings. It is very important that workers be identified as people and not just another piece of equipment. What is the main color of your work zone? Do you need different identities within that work zone?
3. Retroreflective trim color, type, and pattern – retroreflective trim is required for low-light and nighttime visibility, but can also be used to provide daytime contrast and human definition.
4. Recognition factor – what is the easiest color to see? That depends somewhat on what people are conditioned to see (e.g. red fire engine) and on visual perception. Colorblind people tend to see the lime-yellow color better than red or red-orange. The current trend is to associate fluorescent lime-yellow with pedestrians (pedestrian crosswalk signs).
5. Visibility demonstration – the best way to determine the appropriate background color and garment design is to conduct a visibility demonstration in your work environment.

PPE Program Compliance Checklist

Part 1. Personal Protective Equipment Hazard Assessment

- Survey the workplace and identify tasks/jobs that require personal protective equipment (PPE).
- Include all tasks that require PPE. Sample PPE assessments are viewable on the EHS web site.
- Identify potential hazards associated with each task using the Personal Protective Equipment
- Survey and Analysis Checklist (page26) for guidance.
- Indicate the required PPE on the PPE Hazard Assessment Certification Form.
- Complete the PPE Hazard Assessment Certification Form (page 28) and sign it.
- Maintain copies of the PPE Hazard Assessment Certification Forms with your Chemical
- Hygiene Plan (for laboratories) or with your Hazard Communication Program (for non- laboratory areas).

Part 2. Employee Training

- Identify the PPE online training modules required for your employees. Employees need only take those modules for the PPE that they use.
    - Eye and face
    - Gloves
    - Foot protection
    - Body protection
    - Head protection
- Distribute to employees, copies of your PPE Hazard Assessment Certification Forms.
- Instruct employees to take the EHS online PPE training for the modules required for their job.
- Provide site specific training for your employees. Include the following topics:
    - What type of personal protective equipment is necessary for each job;
    - How properly to don, doff, adjust and wear personal protective equipment;
    - How to obtain PPE
    - Departmental cleaning, maintenance and replacement procedures.
- Use the MSU Certification of Personal Protective Equipment Training Form on page 21 to document training. Maintain this record with your PPE assessments.

Environmental Health & Safety
MICHIGAN STATE UNIVERSITY

Personal Protective Equipment (PPE) Survey and Analysis

Department: _____Location: _____
Job Classification: _____Operation/Process: _____
Person performing assessment: _____Title: _____

THE FOLLOWING HAZARDS HAVE BEEN NOTED

Part of Body	Hazard	Required PPE	Notes
Hands	❒ Penetration – sharp objects	❒ Leather/cut resistant gloves	
	❒ Penetration – animal bites	❒ Leather/cut resistant gloves	
	❒ Penetration – rough objects	❒ General purpose work gloves	
	❒ Penetration – knives	❒ Metal/steel mesh, Kevlar, or heavy leather	
	❒ Chemicals	❒ Chemical resistant gloves Type:	
	❒ Extreme cold	❒ Insulated gloves	
	❒ Extreme heat	❒ Heat/flame resistant gloves	
	❒ Blood	❒ Nitrile gloves	
	❒ Electrical shock	❒ Insulated rubber gloves. Type:	
	❒ Product contamination	❒ Plastic, cotton, or nylon	
	❒ Other:	Other:	
Respiratory System	❒ For comfort for nuisance dust/mist	❒ Disposable dust/mist mask	
	❒ Welding fumes	❒ Respirator w/P100 filter	
	❒ Asbestos	❒ Respirator w/P100 filter	
	❒ Pesticides	❒ Respirator w/ cartridges as per pesticide label	
	❒ Paint spray	❒ Respirator w/ Organic vapor/P100 filter	
	❒ Organic Vapors	❒ Respirator w/ Organic vapor filters	
	❒ Acid gases	❒ Respirator w/ Acid gas filters	
	❒ Oxygen deficient, toxic, or IDLH atmosphere	❒ SCBA or Type C airline respirator	

Part of Body	Hazard	Required PPE	Notes
Eyes and Face	❒ Impact-flying objects, chips, sand, or dirt	❒ Safety glasses w/ side shields Goggles w/ face shield	
	❒ Nuisance dust	❒ Unvented chemical goggles	
	❒ UV light welding, cutting, torch brazing, or soldering	❒ Welding goggles Welding helmet/shield w/safety glasses and side shield	
	❒ Chemical – splashing	❒ Chemical goggles/ face shield	
	❒ Chemical – irritating mists	❒ Unvented chemical goggles	
	❒ Hot sparks – grinding	❒ Safety glasses w/ side shields ❒ Safety goggles w/ face shield	
	❒ Splashing molten metal	❒ Safety goggle w/ face shield	
	❒ Glare or high intensity lights	❒ Shaded safety glasses	
	❒ Laser operations	❒ Laser goggles or glasses	
	❒ Other:	❒ Other:	

THE FOLLOWING HAZARDS HAVE BEEN NOTED

Part of Body	Hazard	Required PPE	Notes
Ears	❒ Exposure to noise levels less than 85 dBA 8-hour TWA	❒ Ear muffs or ear plugs	
	❒ Exposure to noise levels less than 105 dBA 8-hour TWA	❒ Ear muffs and ear plugs	
	❒ Exposure to sparks	❒ Leather welding helmet	
	❒ Other:	❒ Other:	
Feet	❒ Impact – heavy objects	❒ Steel toe safety shoes	Ansi
	❒ Compression – rolling or pinching objects/vehicles	❒ Leather boots or safety shoes w/ metatarsal (top of foot) guards	
	❒ Slippery or wet surfaces	❒ Slip resistant soles	
	❒ Electrical hazards	❒ Electrical hazard shoes	
	❒ Explosive atmosphere	❒ Conductive footwear	Non-conductive?
	❒ Penetration – sharp objects	❒ Puncture resistant soles	
	❒ Penetration – chemical	❒ Chemical resistant boots and/or covers	
	❒ Splashing – chemical	❒ Rubber boots/closed top shoes	
	❒ Exposure to extreme cold	❒ Insulated boots or shoes	
	❒ Other:	❒ Other:	
Part of Body	**Hazard**	**Required PPE**	**Notes**
Head	❒ Object from overhead	❒ Type 1, ANSI Z89.1-1997	
	❒ Impact to side of head	❒ Type 2, ANSI Z89.1-1997	
	❒ Stuck by falling object ❒ Struck against fixed object ❒ Electrical contact with exposed wires/conductors	Hard Hat Class ❒ Class A/G ❒ Class B/E	
	❒ Special circumstances – no electrical protection	❒ Class C	
	❒ Hair entanglement or open flames	❒ Cap, hairnet, or bandana	
	❒ Other:	❒ Other:	
Body	❒ Impact – flying objects	❒ Long sleeves, apron, or coat	
	❒ Moving vehicles	❒ Traffic vest	
	❒ Penetration – sharp objects	❒ Cut-resistant sleeves or wristlets	
	❒ Penetration – knives	❒ Metal mesh, Kevlar, steel mesh, heavy leather sleeves, wristlets, or aprons	
	❒ Electrical – static discharge	❒ Static control coat or coveralls	
	❒ Hot metal or sparks	❒ Flame-resistant jacket/pants or aluminized jacket/pants	
	❒ Chemical:	❒ Lab coat or apron/sleeves	
	❒ Unprotected elevated walking/working surface	❒ Body harness and lanyard	
	❒ Other:	❒ Other:	

Personal Protective Equipment

Hazard Assessment Certification

Environmental Health & Safety
MICHIGAN STATE UNIVERSITY

Job Title _____ Date _____

Department _____ Supervisor _____

Location\Worksite _____ Signature _____

Employee Name(s) _____ (I hereby certify that this hazard assessment has been performed in accordance with the MSU PPE Guideline)

Tasks, Job Classifications, or Workstation	Potential Hazard	PPE required (Yes/No)	Type of PPE Required

APPENDIX B

PPE TRAINING GUIDE

GENERAL CONSIDERATIONS

The information provided in this document will assist in complying with the training provisions of the MIOSHA Personal Protective Equipment regulations. Prior to conducting work requiring the use of personal protective equipment (PPE), employees must be trained to know:

- When and why personal protective equipment is necessary;
- What type of personal protective equipment is necessary;
- How properly to don, doff, adjust and wear personal protective equipment;
- The limitations of the personal protective equipment;
- The proper care, maintenance, useful life and disposal of the personal protective equipment.

Upon completion of the training, the employee must be able to demonstrate his or her knowledge of these elements. Any type of training format can be used as long as a hands-on session is incorporated. PowerPoint presentations are available from EHS to assist with employee PPE training. Documentation of training is required.

Information is provided in this document for eye and face protection, as well as head, foot and hand protection. Each section can be used as needed and be adapted to individual workplaces after the completion of a Hazard Assessment to select the proper PPE.

Whenever PPE is used, employee comfort should be considered. When PPE does not fit properly, workers will tend not to use it. Follow the manufacturer's recommendations for proper PPE usage.

EYE AND FACE PROTECTION

Eye and face protection must be used where a hazard exists due to any of the following:

- Flying objects or particles
- Molten metal
- Liquid chemicals
- Harmful contacts
- Exposures
- Acids or caustic chemicals
- Chemical gases or vapors
- Glare

- Air contaminants
- Radiation
- Electrical flash
- A combination of hazards

Eye and face protection is available for protection against a variety of hazards. The hazard must be identified prior to selecting the PPE to ensure the employee will be properly protected. Side shields are required when there is an impact hazard from flying objects or a chemical splash hazard present. Safety glasses and goggles can protect against impact hazards. Safety glasses are made of special materials to provide the necessary impact protection. All eye and face protection must meet the requirements of the ANSI (American National Standards Institute) Standard Z87.1-1989, entitled "American National Standard Practice for Occupational and Educational Eye and Face Protection." Laser eyewear must meet the requirements of ANSI Z136.1, 136.2, and 136.3.

To comply with the Michigan Occupational Safety and Health Administration (MIOSHA) requirements for PPE, eye protection must:

- Provide adequate protection against the hazards for which it is designed
- Be reasonably comfortable under the conditions of use
- Fit securely without interfering with vision or movement
- Be durable
- Be kept clean and in good repair

Protective eyewear and face wear should be adjusted to provide maximum protection to the areas being protected. Eyeglasses should be worn close to the face to minimize gaps that would allow foreign materials to enter the eye. Eye and face protection should be kept clean based on recommendations from the manufacturer. When the protection becomes scratched or damaged, it should be replaced. Pits or scratches may affect the impact resistance. Workers should inspect eye and face protection before wearing and replace any defective equipment.

Goggles can be worn over spectacles and can be vented or non-vented. Goggles are available for splash and impact protection, depending on the hazard. Face shields are considered a secondary form of protection and must be used in combination with spectacles or goggles to offer the necessary impact protection to the eye.

Filter lens protection should be selected by starting 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. In oxyfuel gas welding or cutting where the torch produces a high yellow light, it is desirable to use a filter lens that absorbs the yellow or sodium line in the visible light of the operation.

TABLE 8. EYEWEAR SELECTION CHART

Type of Work	Hazard	Minimum Eye Protection	Extended Exposure Protection
Chipping, drilling, riveting, hammering, woodworking, sanding, grinding	Flying particles	• Direct-vent goggles • Spectacles with sideshields	• Face shield with clear lens worn with goggles or spectacles
Chemical handling	Liquid splash	• Indirect-vent goggles	• Faceshield with goggles
Laboratory tasks	Chemical splash, glass breakage	• Indirect-vent goggles	• Faceshield worn with goggles or spectacles
Clinical or medical jobs	Potentially Infectious material splash	• Spectacles with solid sideshields • Disposable or reusable Faceshield	• Goggles with indirect ventilation • Double-crown faceshield
Tasks in ultraviolet (UV) light	Exposure to direct or reflected UV radiation in the 200 to 400 nm range	For UV protection up to 380 nm: • spectacles or goggles with polycarbonate lens For UV protection up to 405 nm: • Spectacles or goggles with polycarbonate lens and UV inhibiting spectacle frames goggle bodies	• UV resistant faceshield worn with spectacles goggles
Laser work	Reflected or direct beam impact	• Laser-specific spectacles goggles	
Furnace operations, pouring and casting molten metal	Glare, heat, molten metals, hot sparks	• Indirect-vent goggles • Reflective faceshield worn with spectacles	• Handshield or welding helmet (Shade 4 to 8)
Welding (electric arc)	Infrared radiation and sparks	Welding helmet or shield (Shade 10 to 14)	
Welding (gas)	Infrared radiation and sparks	• Welding goggles or hand shield (filter Shade 4 to 5) • Full face protection in applications requiring a lens shade greater than Shade 5	
Cutting, brazing, soldering	Infrared radiation and sparks	• Filter lens spectacles or handshield: - Cutting (Shade 3 to 6) - Brazing (Shade 3 to 4) - Soldering (Shade 1.5 to 3)	

Inspection and Maintenance

Lenses of eye protectors must be kept clean. Continuous vision through dirty lenses can cause eyestrain - often an excuse for not wearing the eye protection. Daily inspection and cleaning of eye protectors with soap and warm water, or with a cleaning solution and tissues, is recommended.

Pitted and scratched lenses can also be a source of reduced vision and compromised protection. Excessively pitted or scratched or otherwise damaged eye and face protection must be replaced.

If safety glasses are to be worn with hearing protection, they must be compatible. If earmuffs are worn, the temple piece of the glasses must not break the seal of the muff. Thin temple piece glasses must be selected to avoid compromising the noise reduction capabilities of the muff.

Cleaning and Disinfection Procedure for Shared Use Eyewear

Safety eyewear should be regularly cleaned and disinfected. Eyewear issued for the exclusive use of one worker may be cleaned as often as necessary. Weekly or monthly cleaning is usually adequate but more frequent cleaning may be necessary. When eyewear is shared it must be cleaned and disinfected before use by a different employee. To clean and disinfect eyewear use the following procedure:

a) Check lenses for scratches. Check head straps for tears or loss of elasticity. Discard and replace any defective parts.

b) Wash in warm (43° C [110° F] maximum) water with a mild detergent or with a cleaner recommended by the manufacturer. A stiff bristle (not wire) brush may be used to facilitate the removal of dirt, taking care to not scratch the lenses

c) When the cleaner used does not contain a disinfecting agent, eyewear should be immersed for two minutes in one of the following:

   i. Hypochlorite solution (50 ppm of chlorine) made by adding approximately one milliliter of laundry bleach to one liter of water at 43° C (110° F); or,

   ii. Aqueous solution of iodine (50 ppm iodine) made by adding approximately 0.8 milliliters of tincture of iodine (6-8 grams ammonium and/or potassium iodide/100 cc of 45% alcohol) to one liter of water at 43° C (110° F); or,

   iii. Other commercially available cleansers of equivalent disinfectant quality when used as directed, if their use is recommended or approved as a disinfectant by the EPA.

d) Rinse components thoroughly in clean, warm (43° C [110° F] maximum), preferably running water. The importance of thorough rinsing cannot be

overemphasized. Detergents or disinfectants that dry on face pieces may result in dermatitis. In addition, some disinfectants may cause deterioration of plastic and elastic parts if not completely removed.

e) Eyewear should be hand-dried with a clean lint-free cloth or air-dried.

HEAD PROTECTION

Head protection is available to protect the head from falling objects (impact and penetration), electrical hazards, and bump hazards. Protective headwear must comply with ANSI-Z89.1-1986 or 1997, entitled "American National Standards for Personal Protection - Protective Headwear for Industrial Workers." Hard hats must be labeled with the ANSI Certification. ANSI reissued the Standard in 1997, adding two types of helmets:

Type 1 - Helmets providing crown impact protection

Type 2 - Helmets providing lateral impact protection.

There are three classes of headwear addressed in the ANSI Standard. Classes A and B are for helmets listed to the 1986 Standard. Classes G and E are helmets listed to the 1997 Standard.

Class A or G Helmet - will reduce the force of impact/penetration of falling objects and, are built to reduce the danger of contact with exposed "low voltage" conductors.

Class B or E Helmet - will also reduce the force of impact/penetration of falling objects and are built to reduce the danger of contact with exposed "high voltage" conductors.

Class C Helmet - offers the same type of impact/penetration protection as Class A and B helmets, but offers no protection from electrical hazards. Must not be used except where it has been determined that the use of other types of protective helmets is impractical, such as where chemical reaction will cause deterioration of other types of head protection.

Where Required

Protective helmets are required where falling object hazards are present. 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 process which might cause material or objects to fall; and working on exposed energized conductors.

Hair enclosures are required for long hair (longer than four inches), which can be drawn into machine parts such as chains, belts rotating devices, suction devices, and blowers. Hair may even be drawn into machines guarded with mesh. It may also present an ignition risk in areas near open flames or welding. Employees with long hair must cover and protect their hair with a hat, cap, net, or bandana. These items must fit so as to not present a hazard either with machinery, ignition sources, or interference with other PPE.

Proper Usage of Protective Helmets

The shell is the rigid part of the hat and the suspension is the inner portion that cradles the head. The suspension performs two functions. First it orients and keeps the helmet on the head. It is adjustable to maintain a snug and comfortable fit. The second and most important function of the suspension is to absorb and distribute the impact of a falling object. This is the reason for the space between the suspension and the shell. Never apply paints or solvents to the helmet; it could damage the strength and dielectric properties.

Accessories are available for head protection such as, hearing protection, face shields, sweat bands, and winter liners. Always follow the manufacturer's direction for proper usage of accessories.

Inspection and Maintenance

Inspect the shell and the suspension before each use. Look for cracks, chips, dents, or deterioration or any other signs that would indicate the need to replace the shell immediately. Look for cracks, tears or broken straps in the suspension and replace as necessary. Never mix suspensions and shells from different manufacturers.

Use warm soap and water to clean the helmet as necessary.

FOOT PROTECTION

Foot protection is necessary when hazards exist that could result in impact and compression, electrical, conductive, or metatarsal injuries. Foot protection must comply with the requirements of ANSI Z41-1991, "American National Standard for Personal Protection - Protective Footwear."

Selection and Maintenance

Keep protective footwear clean and polished, they will last longer. Replace broken or frayed laces. Be attentive to the wear and tear on the entire shoe or boot. Refer to Table 9 for the proper care, maintenance and useful life of protective footwear.

TABLE 9. PROPER CARE, MAINTENANCE, USEFUL LIFE AND DISPOSAL OF PROTECTIVE FOOTWEAR

	Section 1 Impact & Compression	Section 2 Metatarsal	Section 3 Conductive	Section 4 Electrical Hazard	Section 5 Puncture Resistance	Section 6 Static Dissipative	Leather	Rubber
Proper care & maintenance of protective footwear	Warning: If insert or insole is added, device may reduce the impact/compression clearance.	Keep external metatarsal guards properly laced in shoes.	Keep soles clean. Do not add comfort insoles or use foot powder, these will affect conductivity. Do not use socks made of silk, wool, or nylon, they will create static electricity	Avoid moisture. Keep free of conductive materials (e.g. screws, nails, metal shavings).		Keep sole clean. Do not add comfort insoles that will affect static dissipative properties adversely. Be sure insole maintains static dissipative test.	Clean according to footwear manufacturer's instructions. Do not store in or near direct heat	Clean according to manufacturer's specification to remove impurities. Do not store in direct sunlight or near electric motors[1].
Useful life and disposal of protective footwear	If evidence of physical damage to the toe and/or evidence of physical damage to the toe area or to the shoe exists, replace the footwear at once.	Dispose after an impact has occurred to the metatarsal guard or after exterior covering becomes torn exposing the metatarsal guard.	Dispose after soles become contaminated and/or no longer conductive.	Dispose if sole is punctured or cut, embedded with conductive materials or after significant wear causes the sole thickness to diminish	Dispose of after an object becomes embedded in the puncture resistance device.	Dispose after soles become contaminated and/or no longer test SD	Dispose after cracks or punctures appear in the leather	Dispose after cracks or punctures appear in the rubber.

(1) Sunlight and electric motors – Ultra violet light from sunlight and/or ozone from electric motors may cause rubber to crack.

Slip resistant footwear

Proper care and maintenance of protective footwear	Keep sole design clean and free of debris
Useful life and disposal of protective footwear	Dispose after tread design is worn or cracked.

Worn protective footwear should not be altered or repaired to be sure the protective footwear properties remain

HAND PROTECTION

Hand protection is available to protect against cut/punctures, abrasions, thermal burns, vibration, chemical exposures, and electrical shock. There is not a single glove that will protect from all hazards. Selection of gloves must be based on the hazards that are present, the job task, work conditions, and the duration of use. Gloves to be used to protect against the effects of chemical use should be selected based on each manufacturer's glove selection charts. Do not assume that the protection offered by one manufacturer's glove will apply to all types of similar gloves. The protection of each glove is based on the manufacturing processes and glove thickness.

Use and Maintenance

Gloves that are torn or damaged should not be used. There is potential for the glove to be caught in machinery or other equipment. Consideration of the following items is necessary when using gloves to protect against chemical hazards:

Penetration - This when a chemical passes through a physical defect in the glove, such as a pinhole or tear. Inspect gloves prior to each use.

Degradation- This occurs when the chemical has some noticeable effect on the glove. The glove may appear wrinkled, dimpled, or cracked. Dispose of gloves if any of these signs appear. Never use defective gloves.

Permeation - Permeation is the movement of a chemical through the glove. The vapor as well as the liquid phase of chemical can pass through the glove material. This is more difficult to detect than the previous types of warning signs. This is why it is very important to utilize the glove selection guides that are provided by the manufacturer. Refer to the Glove Guide for assistance in glove selection.
https://www.ansellpro.com/download/Ansell_8thEditionChemicalResistanceGuide.pdf

Assure that the glove will provide adequate protection for the chemical to be encountered. If multiple chemical hazards exist, base the effectiveness of the glove on the chemical with the fastest breakthrough time. Inspect gloves prior to each use. If gloves are to be reused, follow the manufacturer's instructions for proper decontamination and storage. It is important to note the expected service life of the glove as well, to plan for expected disposal times.

Michigan State University
Certification of Personal Protective Equipment Training

I_____ certify that the following affected employees have received and understood personal protective equipment
(print full name)
(PPE) training, which included the following: when PPE is necessary; what PPE is necessary; how to properly don, doff, adjust, and wear PPE; the limitations of the PPE; and the proper care, maintenance, useful life and disposal of the PPE. Each of the affected employees has demonstrated an understanding of the above and an ability to use the PPE properly. This training is in compliance with 29 CFR 1910.132 (f).

Name	Signature	Equipment Type	Date of Training