1.0 Personal Protective Equipment

The purpose of this course is to provide a comprehensive overview of the various standards for PPE. One must always bear in mind that, given the complexity and cross referencing in the variety of standards, that OSHA requirements establish minimal compliance requirements for which an employer is obligated to adhere. Improved protections beyond the scope of OSHA (such as ANSI and other consensus standards) can and should be provided to workplace employees in order to promote their ongoing safety and health. In other words, OSHA is the bare minimum!

1.1 Definition and Purpose

Protecting employees from hazards in the workplace is the primary goal of any safety professional, with the use of protective equipment as a vital component in an effective safety program. Personal protective equipment, typically referred to as "PPE", is any equipment worn by employees to minimizing their exposure to identified hazards in the workplace. These exposures are commonly from contact with chemical, radiological, physical, electrical, mechanical, or environmental workplace hazards.

Protective equipment incorporates barriers for many body parts including the face, eyes, head, feet, and hands. PPE typically includes such equipment as gloves, glasses, shoes, earplugs, hats, respirators, and apparel such as full-body suits.

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1.1 Definition and Purpose

Since PPE imposes a barrier between the employee and the identified hazard, it has the potential to create additional strains on the employee, impairing ability to perform work and creating significant levels of discomfort. Any of these conditions may discourage employees from using PPE correctly, therefore placing them at risk for injury or illness. Let's face it, how many times has there been a situation where an employee simply forego the option of wearing PPE because it was "too bulky", "too hot", or "it just didn't feel right" and caused an injury or illness?

For effective risk prevention, personal protective equipment should fit comfortably to encourage employee use. If the personal protective equipment does not fit properly, it can make the difference between being safely protected or dangerously exposed. It should also be safely designed, constructed, and maintained and used in the manner in which it was intended, making full use of its protective qualities for the safety of the employee.

1.1 Definition and Purpose

OSHA obviously places emphasis on proper PPE, as it has dedicated an entire subpart (versus a single standard) to its use. Title 1910, Subpart I, Personal Protective Equipment, requires that employers implement a PPE program which systematically assesses hazards in the workplace and selects the appropriate PPE that will protect employees from those hazards. When feasible, it is critical that the employer first attempt to implement other hazard control measures that eliminate the hazards identified in this assessment before consideration is made to provide any personal protective equipment. This would include simply engineering out the hazard and/or administratively controlling the hazard. PPE is ALWAYS the last line of defense. This will be described in greater detail in Section 1.4 of this course.

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1.1 Definition and Purpose

Once a determination has been made that requires the use of PPE in the workplace, a program must be implemented that addresses the following:

- The hazards present
- The evaluation, selection, maintenance, and use of PPE
- The training of employees, and
- The monitoring of the program to ensure its ongoing effectiveness

Ultimately, an effective PPE program protects employees from the risk of injury or illness by creating the all-important barrier that minimizes exposure to the risks or hazards identified. To further the effectiveness of a PPE program, the management team should demonstrate commitment to the success of the program, ensuring that employees are fully engaged in safe work practices relative to the PPE requirements that have been established.

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1.2 Applicable Standards and Regulations

While providing personal protective equipment for employees exposed to hazardous conditions in the workplace is simply the right thing to do for any employer, numerous standards and regulations are published to ensure that employers follow through with this approach and fully protect their employees. With this foundation of information, a safety professional will be able to create a custom safety approach relative to PPE that works best for the protection of workplace employees.

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1.2.1 OSHA

The Occupational Safety and Health Administration (OSHA) was created to reduce workplace hazards and implement safety and health programs that facilitate prevention through risk management. Under the General Duty Clause, employers are required to provide their employees a place of employment that “is free from recognizable hazards that are causing or are likely to cause death or serious harm to employees.” In light of this objective, OSHA has developed and revised PPE standards over time to ensure that employee protection from hazards in the workplace is considered a priority for employers.

OSHA standards relative to PPE ensure that employers furnish and require employees to use suitable protective equipment where there is a "reasonable probability" that injury or illness can be prevented with the use of such equipment. The standards also set provisions for specific equipment once PPE requirements are established in the workplace.

While OSHA’s primary PPE standards are depicted in 29 CFR 1910 Subpart I, Personal Protective Equipment, other PPE requirements can be found elsewhere, not only within General Industry Standards, but also in other industry standards and OSHA-approved state plans.

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1.2.1 OSHA

The General Industry PPE standards covered in this course are:

- General Requirements 1910.132
- Eye and Face Protection 1910.133
- Respiratory Protection 1910.134
- Head Protection 1910.135
- Foot Protection 1910.136
- Electrical Protective Equipment 1910.137
- Hand Protection 1910.138
- Occupational Noise Exposure 1910.95
- Levels of Protection and Protective Gear 1910.120/ Appendix B

1.2.1 OSHA

Additional General Industry standards exist, such as PPE requirements for confined spaces, bloodborne pathogens, and hazardous chemicals. NASP offers additional training in these specialized areas as well.

Other industries for which OSHA PPE standards also exist are:

- Shipyard Employment (Part 1915)
- Marine Terminals (Part 1917)
- Longshoring (Part 1918)
- Construction (Part 1926)

OSHA requires that many categories of PPE meet or be equivalent to standards or research developed by the American National Standards Institute (ANSI) or the National Institute for Occupational Safety and Health (NIOSH). Existing PPE inventories must meet the standards in effect at the time of its manufacture or provide protection equivalent to PPE manufactured to the criteria established. OSHA officials often participate in the development of standards, and often work in close cooperation when research is being conducted. For some products, such as electrical products in the workplace, OSHA requires third-party approval. When this is the case, it specifies the standards to which the products must be approved and accredits test labs to certify to those standards.

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1.2.2 ANSI

The American National Standards Institute (ANSI) oversees the development of voluntary consensus standards for products such as personal protective equipment. ANSI accredits standards that are developed by representatives of other standards organizations, government agencies, consumer groups, companies, and others. With a significant presence in the safety equipment community, ANSI collaborates with International Safety Equipment Association (ISEA) on many standards relative to personal protective equipment. In 2014, ANSI published the ANSI/ISEA 125-2014, American National Standard for Conformity Assessment of Safety and Personal Protective Equipment, which offers a systematic conformity assessment model for use by suppliers, manufacturers, and users of PPE to demonstrate that their products meet a certain performance standard. Three levels of conformity assessment are outlined, with each level requiring ongoing testing, quality management, corrective and preventative actions, record keeping, and declarations of conformity. Testing requirements range from the acceptability of supplier testing (level 1), using an ISO/IEC 17025 accredited laboratory (level 2), and testing at the direction of a certification body accredited to ISO/IEC 17065 (level 3). In conjunction with ANSI, ISEA has approved over 12 different standards for PPE, ranging from eye and face protection to protective apparel.

By only purchasing PPE from manufacturers that certify to ANSI/ISEA 125-2014 (especially Level 3), employers can be assured that statements of conformity to PPE standards are validated claims. This translates to due diligence by employers in industry and a lower risk portfolio for employees.

ANSI

American National Standards Institute

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1.2.3 NIOSH

The National Institute for Occupational Safety and Health (NIOSH) is responsible for conducting research and making recommendations for the prevention of work-related injury and illness. NIOSH's Personal Protective Technology Program conducts research, training and evaluation supporting the development and use of PPE. Much of the established research in this field is conducted by NIOSH's National Personal Protective Technology Laboratory (NPPTL). OSHA regulations relative to the research conducted by NIOSH are currently found in the areas of respirators, protective clothing, skin exposures, eye protection and hearing protection.

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1.3 The Importance of Hazard Assessments

PPE HAZARD ASSESSMENT CERTIFICATE

HAND HAZARDS: Hand injury can be caused by: work with chemicals or acids, exposure to cutor abrasion hazards (for example, during demolition, renovation, woodworking, or food service preparation), work with very hot or cold objects or materials, and exposure to sharps.

Check the appropriate box for each hazard.		Description of hazard(s):	Required PPE
Chemical Exposure	☑	Exposure to hazardous and non-hazardous drugs during handling and preparation, spill clean-up.	Double gloving with chemo gloves for hazardous drug handling, double gloving with approved gloves for non-hazardous drug handling.
High Heat/Cold	☐		
UV/IR Radiation	☐	Punctures from syringe needles that may contain hazardous and non-hazardous drugs during preparation and handling activities such as: dilution/reconstitution, pulling and transferring, recapping and removing needle from syringe for pharmacist review, recapping syringe for medication dispensing. Size of needles used range from 16 to 19 gauge.	
Electrical Shock	☐		
Puncture	☑		
Cuts/Abrasion	☑		
Other:	☐	Cuts from breaking drug containing ampules.	

BODY HAZARDS: Injury of the body (torso, arms, or legs) can occur during: exposure to chemicals, acids, or other hazardous materials; abrasive blasting; welding, cutting, or brazing; chipping, sanding, or grinding; use of chain saws or similar equipment; and work around electrical arcs.

Check the appropriate box for each hazard.		Description of hazard(s):	Required PPE
Chemical Exposure	☑	Exposure to drugs during handling and preparation.	Tyvek body suits.
High Heat/Cold	☐		
Impact/Compression	☐		
Electrical Arc	☐		
Cuts/Abrasion	☐		
Other:	☐		

FALL HAZARDS: Personnel may be exposed to fall hazards when performing work on a surface with an unprotected side or edge that is 4 feet or more above a lower level, or 10 feet or more on scaffolds. Fall protection may also be required when using vehicle man lifts, elevated platforms, tree trimming, performing work on poles, roofs, or fixed ladders.

Check the appropriate box for each hazard.		Description of hazard(s):	Required PPE
Fall hazard	☐		

NOISE HAZARDS: Personnel may be exposed to noise hazards when working in mechanical rooms; machining, grinding, sanding; cage washing; dish washing; working around pneumatic equipment, grounds equipment, generators, chillers, motors, saws, jackhammers, or similar equipment.

Check the appropriate box for each hazard.		Description of hazard(s):	Required PPE
Noise hazard	☐		

RESPIRATORY HAZARDS: Personnel may be exposed to respiratory hazards that require the use of respirators: during emergency responses, when using certain chemicals outside of a chemical fume hood, when working with hazardous powders, when entering fume hood plenums, when working with animals, when applying paints or chemicals in confined spaces, when welding, cutting, or brazing on certain metals, and when disturbing asbestos, lead, silica, or other particulate hazards.

Check the appropriate box for each hazard.		Description of hazard(s):	Required PPE
Chemical exposure	☑	Spill clean up of hazardous drugs.	Powered Air Purifying Respirator (PAPR)
Particulate exposure	☑	Clean up of powdered drugs.	
Other:	☐		

I certify that the above hazard assessment was performed to the best of my knowledge and ability, based on the hazards present on this date.

_____ (signature)

An employer is responsible for an assessment of the workplace to determine whether hazards are present, or are likely to be present, which necessitates the use of personal protective equipment. The “likely to be present” portion of this requirements necessitates the use of critical thinking when reviewing a particular area. This important first step in determining whether a PPE program will be necessary is a process known as a “hazard assessment.” The in-depth evaluation process includes such steps as surveying the facility and compiling and analyzing the data to determine the hazard exposures. Employers must first institute all feasible engineering and administrative controls to eliminate and/or reduce hazards before using PPE to protect employees against any hazards that are identified in this assessment. The Hazard Assessment and its level of importance in the development of a PPE Program will be further described under section 2.1 of this course.

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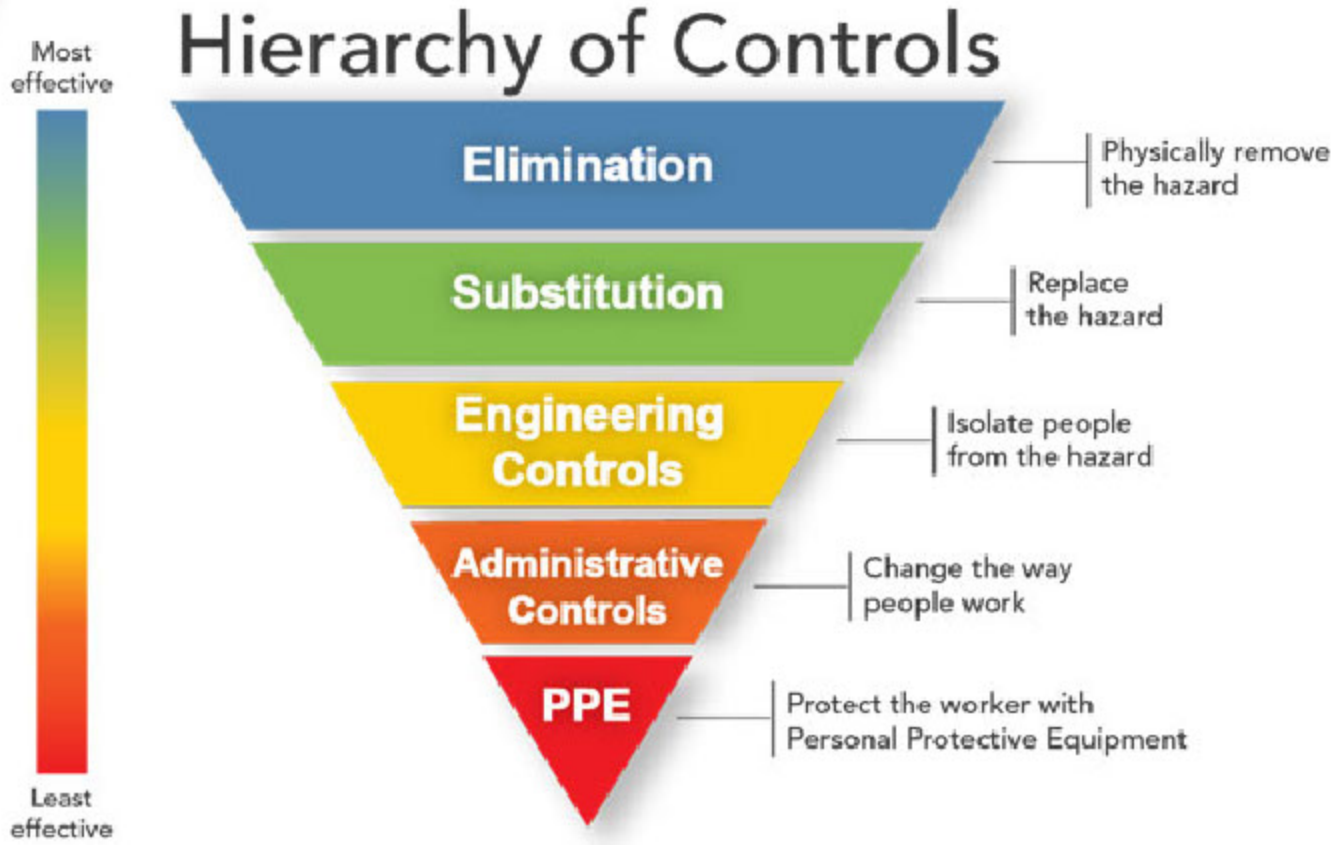
1.4 Review of Hazard Controls

Controlling a hazard at its source is the best way to protect employees from injury and illnesses in the workplace. The OSHA hazard control pyramid demonstrates that the most effective control method to either eliminate or reduce a hazard are engineering controls, followed by administrative controls.

Engineering controls are considered the “first line of defense” and typically involve physically changing equipment, machinery or the work environment to prevent employee exposure thereby eliminating the hazard altogether. Administrative controls usually include changing how or when employees perform their jobs, such as scheduling work or rotating employees to reduce exposures, as well as how an employee may perform tasks in ways that reduce exposure. Since this type of control relies on human behavior that must be managed, it is not as effective in reducing exposure, since it does not eliminate the hazard.



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1.4 Review of Hazard Controls

Personal protective equipment should not be used as a substitute for sound engineering and administrative controls. Rather, PPE should be used in conjunction with and as a supplement to these controls to reduce the risk for injury or illness. When engineering and administrative controls are not feasible or do not provide sufficient protection, employers must provide personal protective equipment to their employees and ensure its proper use. As a hazard barrier, PPE is the last line of defense since this type of control only comes into play once the identified hazard could not be avoided through other types of controls. It is only after these failed attempts that the employer should resort to PPE, acknowledging that the employee will be exposed, and that the effective use of PPE barrier may reduce the exposure. Since it is important that an employee understand that PPE does not eliminate the hazard, the use of personal protective equipment requires extensive employee awareness training. If the equipment fails, exposure will occur, creating the risk for injury or illness. Teaming the correct personal protective equipment with an effective training program will provide the employee with a large measure of safety where other controls may have been inadequate or impossible to implement.

A good example of this may be hierarchy of controls may be as follows: Joe is working with a strong solvent and is experiencing headaches and dizziness. He reports this to his supervisors, and they elect to place him in an area that has an exhaust hood to remove the toxic vapors (engineering control). He continues to work under the exhaust hood and is still experiencing headaches, so his supervisor cuts back the amount of time he can work in this area from 8 hours a day to 2 hours a day (administrative control). However, some of his symptoms remain, so management decides to allow him to wear respiratory protection (PPE).

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2.0 General Requirements

As a general rule, whenever hazards exist that are capable of causing injury or illness, protective equipment must be provided, used and maintained in a sanitary and reliable condition. All protective equipment should be of safe design and be constructed specific to the type of work being performed. If the employer allows an employee to provide their own protective equipment, the employer is responsible to ensure that it also is adequate as a preventative barrier for the identified hazard, and that the equipment is properly maintained and sanitized. Lastly, any defective or damaged equipment should not be used by an employee. We will discuss additional specific requirements in the following slides.

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2.1 Hazard Assessment and Equipment Selection

A hazard assessment is an important element of a PPE program since it produces the information necessary to select the appropriate PPE for any hazards present or likely to be present in the workplace. With this assessment, the employer is then capable of determining and evaluating the hazards. This is a performance-oriented provision that simply requires an employer to use the awareness of workplace hazards to enable the selection of the appropriate PPE for the work being performed. The employer is accountable both for the quality of the hazard assessment and for the adequacy of the PPE selected.

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2.1 Hazard Assessment and Equipment Selection

Given the significance of the hazard assessment and the resulting appropriate equipment selection, OSHA developed "Nonmandatory Compliance Guidelines for Hazard Assessment and Personal Protective Equipment Selection" that appear in the CFR as Appendix B to Subpart I of Part 1910. This appendix provides assistance to employers and employees in implementing requirements for a hazard assessment and the selection of personal protective equipment. While the provisions in this section only apply to eye, face, head, foot, and hand protection, it is suggested that the protection concepts be adopted for other types of hazards that may affect the need for further protections. Examples include the following:

- Noise hazards
- Slip, trip, or fall hazards
- Repetitive motion and stress hazards
- Hazards associated with lifting forces required of the employee

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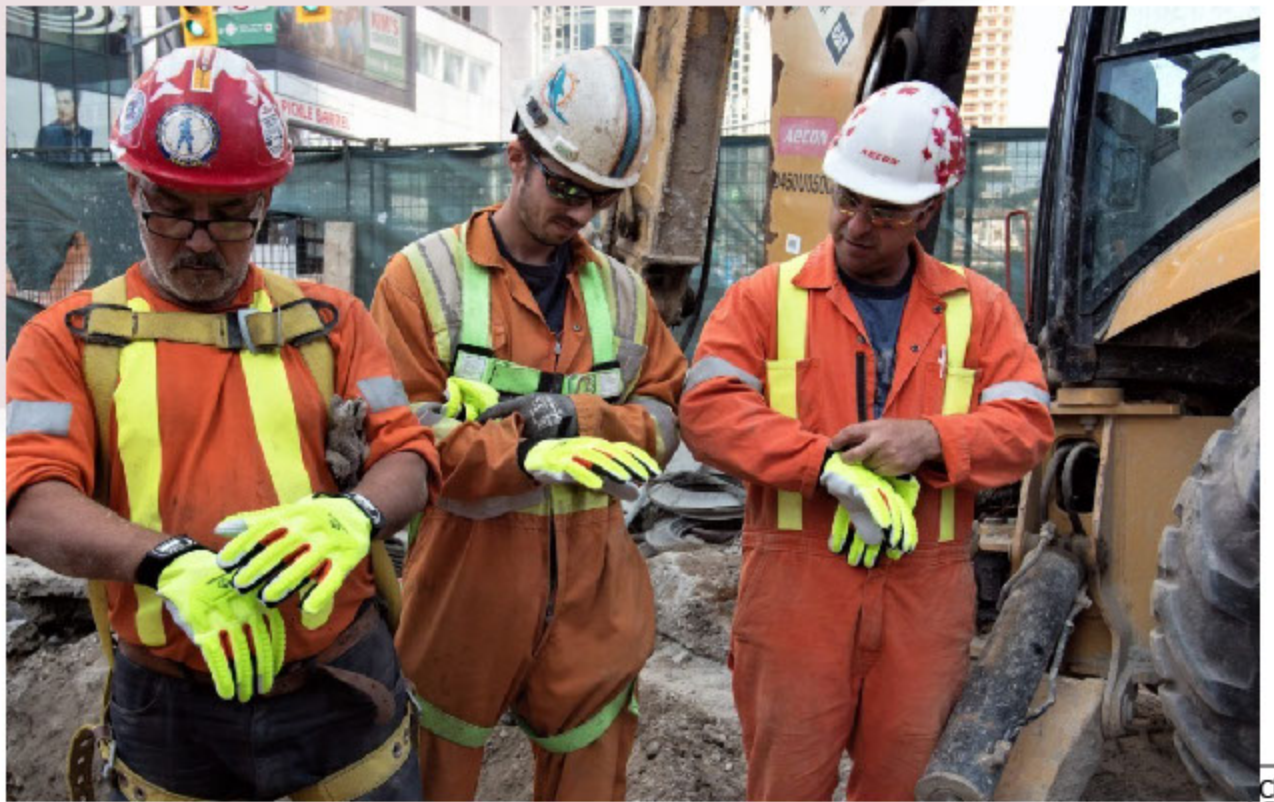
2.1 Hazard Assessment and Equipment Selection

While OSHA states that these guidelines are “non-mandatory”, NASP cautions students to accept that verbiage. If an employer did not, at the very least, implement these “non-mandatory” requirements and an employee were to get hurt or killed on the job, the employer’s program is going to be judged based on the criteria in these “non-mandatory” requirements. NASP contends, for the sake of employee safety and protection against undue lawsuits, “non-mandatory” requirements should always be considered mandatory. Further, NASP recommends that they be expanded in their implementation to include additional PPE requirements that address the need for full protection to promote the safety and health of employees. An effective PPE program will demonstrate that an employer has taken every precaution necessary to ensure that employee exposure to any identified hazard will be minimized.



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2.1.1 General Requirements for Controlling Hazards

An employer must assess the workplace to determine if hazards are present, or are likely to be present, which necessitate the use of personal protective equipment (PPE). If these hazards are present, or likely to be present, the employer must select and require that each affected employee use the types of PPE that will protect the affected employee from the hazards identified in the hazard assessment. Once the decision is made to require the use of PPE, the employer must communicate selection decisions with each affected employee. Lastly, the employer is responsible for the selection of PPE that properly fits each affected employee.

To reiterate, employers are reminded that PPE devices alone are not to be relied upon to provide protection against hazards. Rather, they should be used in conjunction with engineering and administrative controls.

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2.2 Cleaning

It is important that all PPE be kept clean and properly maintained. Cleaning is particularly important for eye and face protection where dirty or fogged lenses have the potential to impair employee's vision. PPE should be inspected, cleaned, and maintained at regular intervals so that it provides the protection for which it was intended. Lastly, it is critical that contaminated PPE which cannot be decontaminated is disposed of properly to eliminate any further exposure.

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2.3 Written Certification

An employer must verify that the hazard assessment has been performed through a written certification that identifies the following:

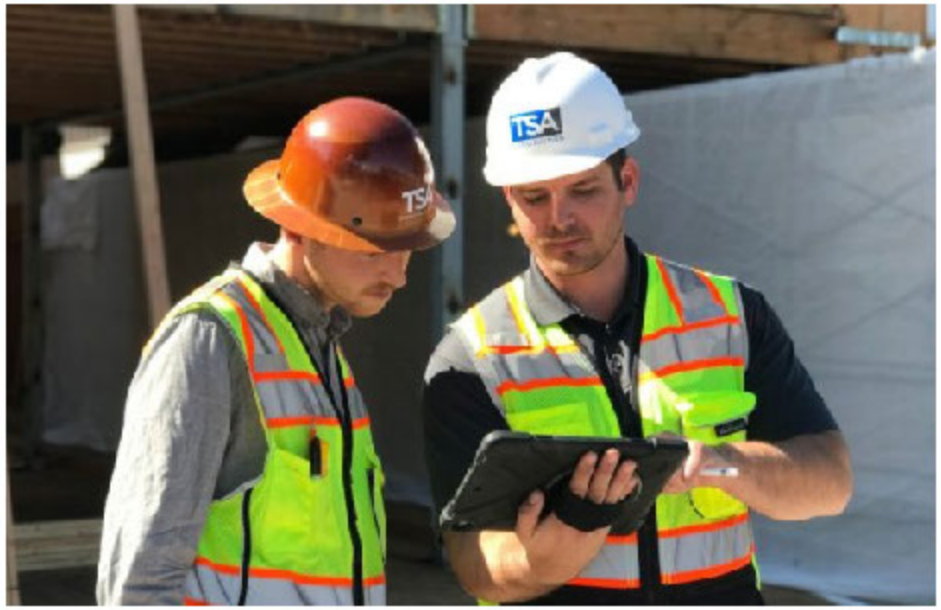
- Workplace evaluated
- The person certifying that the evaluation has been performed
- The date(s) of the hazard assessment, and
- An identification of the document as a certification of hazard assessment

2.4 Training

Employers must provide training for each employee who is required to use PPE, with an understanding of the following:

- Why PPE is necessary, with a description of the identified hazard(s)
- What PPE is necessary and how it will protect them
- When PPE is necessary to be worn
- How to properly put on, take off, adjust, and wear PPE, including how to adjust for a comfortable and effective fit
- The limitations of the PPE
- The proper care, maintenance, cleaning and disinfecting, useful life, and disposal of the PPE, to include how to identify signs of wear

2.4 Training



Moreover, each affected employee is required to demonstrate an understanding of the training provided, as well as their ability to use PPE properly, prior to performing their job that requires the use of PPE. When the employer has reason to believe that any affected employee who has already been trained does not have the understanding and skill(s) required, the employer must retrain the employee. Circumstances where retraining is required include:

1. Changes in the workplace render previous training obsolete
2. Changes in the types of PPE to be used render previous training obsolete
3. Inadequacies in an affected employee's knowledge become apparent
4. Use of assigned PPE indicate that the employee has not retained the requisite understanding or skill

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2.5 Payment

The provisions in OSHA standards that require PPE generally state that the employer is to provide such PPE; however, some of these provisions do not specify that the employer is to provide such PPE at no cost to the employee. In 2007, OSHA published an update to this provision and with this, specifically states that employers are required to pay for the PPE provided. PPE is to be provided by the employer at no cost to employees except for the following:

- Non-specialty safety-toe protective footwear (including steel-toe shoes or steel-toe boots) and non-specialty prescription safety eyewear, provided that the employer permits such items to be worn off the job-site
- When the employer provides metatarsal guards, and allows the employee, at his or her request, to use shoes or boots with built-in metatarsal protection
- Logging boots required by 29 CFR 1910.266(d)(1)(v)
- Everyday clothing, such as long-sleeve shirts, long pants, street shoes, and normal work boots
- Ordinary clothing, skin creams, or other items, used solely for protection from weather, such as winter coats, jackets, gloves, parkas, rubber boots, hats, raincoats, ordinary sunglasses, and sunscreen
- PPE lost or intentionally damaged by the employee
- Adequate employee-provided protective equipment owned by the employee which the employer allows employee to use

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2.5 Payment

While these exceptions are stated as such, it is recommended that employers assess each situation that applies to the use of PPE for their employees and consider the benefits verses the costs of not providing the protective equipment in promoting employee safety. An obvious liability exists for an employer who allows employees to wear their personal protective equipment at their own cost, as an evaluation of the equipment is required of the employer to deem it “adequate”, which not only requires time and effort, but also may instill complacency on the part of the employer to continuously manage its ongoing use. NASP recommends that an employer purchase PPE whenever feasible, to ensure uniformity of application and to assume the ultimate responsibility for its management and use.

2.6 Establishing a PPE Program

To summarize the intent of this Standard for purposes of implementing an effective PPE program, the following suggestions are provided:

- Identify steps taken to assess potential hazards in every employee's workspace and in workplace operating procedures
- Determine the appropriate PPE selection criteria
- Establish how you will train employees on the use of PPE, including:
  - What PPE is necessary, when PPE is necessary, how to properly inspect PPE for wear or damage, how to properly put on and adjust the fit of PPE, how to properly take off PPE, the limitations of the PPE, and how to properly care for and store PPE
- Describe how you will assess employee understanding of PPE training
- Document how you will enforce proper PPE use
- Identify how and when to evaluate the PPE program

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3.0 Specific Requirements: Eye, Face, Head, Foot, Hand, and Body Protection

Each year, incidents happen frequently across all industry, and often times it is due to the absence of Personal Protective Equipment, or failure to wear the provided PPE. In this section, we will discuss the importance of eye and face protection, head protection, hand protection, and body protection. Each level of protection has a set of requirements that protect PPE users from specific hazards.

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3.1 Eye and Face Protection

Thousands of people are blinded each year from work-related eye injuries that could have been prevented with the proper selection and use of eye and face protection.

OSHA requires employers to ensure the safety of all employees in the work environment. Eye and face protection must be provided whenever necessary to protect against chemical, environmental, radiological, or mechanical irritants and hazards.

Selecting the most suitable eye and face protection should take into consideration the following elements:

- Ability to protect against specific workplace hazards
- Should fit properly and be reasonably comfortable to wear
- Should provide unrestricted vision and movement
- Should be durable and cleanable
- Should allow unrestricted functioning of any other required PPE

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3.1.1 Hazards

There are many types of hazards that may exist in a workplace that could expose an employee to the risk of injury associated with the eye or face. The employer is required to attempt to control these hazards through the use of engineering or administrative controls that would either reduce or eliminate the hazards before resorting to the use of PPE to protect these vulnerable areas. Typical hazards associated with the eye or face are:

- Impact from flying objects, such as large chips or particles
- Harmful dust, such as sawdust or contaminated materials
- Heat sources generating hot liquids or extreme heat, such as casting or welding
- Chemical splashes, fumes, gases, or vapors
- Blood and other potentially infectious body fluids
- Potentially injurious optical radiation from glare or lasers

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3.1.2 General Requirements

It is important that an employer ensures that each employee uses the appropriate eye or face protection when exposed to these hazards. Protectors must meet the following minimum criteria:

- Provide adequate protection as a barrier against identified hazard(s)
- Be reasonably comfortable to wear
- Fit in a snug fashion without interfering or restricting vision or movement
- Be durable and easy to clean and disinfect
- Be kept in good repair

3.1.2 General Requirements

- For employees who are required to wear prescription lenses while performing work, either incorporate the prescription in its design, or wear eye protection that can be worn comfortably over the prescription lenses
- Must not interfere with the function of other PPE required, such as properly aligned safety goggles worn over corrective eyeglasses
- Meet applicable ANSI standards
- Be used in combination with other PPE as needed by hazard, such as the use of face shields with safety goggles, since face shields alone do not protect employees from impact hazards
- With flying objects hazards, provide not only eye protection, but also side protection, with detachable side protectors that meet the requirements
- Be marked with the identification of the manufacturer

3.1.3 Selection

Each eye, face, or face-and-eye protector is designed for a particular hazard and as such, consideration should be given to the kind and degree of hazard when selecting any eye and face protectors. Where a choice of protectors is given, and the degree of protection required is not an important issue, employee comfort may be a deciding factor.

Types of Eye and Face Protection

An employer must provide a type of protector that is suitable for the task to be performed and must ensure that the employee uses the protector appropriately. These stipulations apply to not only the employee, but also supervisors, managers, and visitors while they are working in or around hazardous areas.

- **Safety Spectacles/Glasses:** protect against moderate impact from particles.
- **Goggles:** protect eyes, sockets and the facial area from impact, dust and splashes.
- **Welding Shields:** protect eyes from burns caused by infrared or intense radiant light. Protect eyes and face from flying sparks, metal spatter and slag chips.

Click Box

3.1.3 Selection

- **Face Shields:** protect entire face from nuisance dusts and potential splashes and sprays of hazardous liquids. Since face shields are not considered eye protection, eye protection should be worn underneath it. Face shields are also not designed to protect against impact hazards.

Employees that wear corrective spectacles and those who are required to wear eye protection must wear spectacles or goggles of one of the following types:

- Spectacles with protective lenses providing optical correction
- Goggles worn over corrective spectacles without disturbing the adjustment of the spectacles
- Goggles that incorporate corrective lenses mounted behind the protective lenses

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3.1.3 Selection

If an employee wears spectacles or goggles with corrective lenses as described above and the protection from a face shield is required, the face shield should only be worn over the primary eye protection.

When limitations or precautions are indicated by the manufacturer, they should be communicated to the user and strictly observed. With eye protection requiring filter lenses and protective shading, OSHA requires certain shade levels for various types of operations to include welding, brazing, and torching. For specific information, refer to the charts that appear in the Standard under this section. Lastly, with an understanding that eye exposure to hazards may occur regardless of the PPE requirements established by an employer, it is recommended that emergency eyewash stations be placed in all locations where employees may be exposed to corrosive chemicals. First-aid instructions should be posted in close proximity to potential hazardous areas since any delay in immediate aid or an early mistake in addressing an eye injury has potential for permanent damage.

OSHA's Eye and Face Protection eTool provides compliance assistance information to employers and employees, helps implement requirements for a hazard assessment, and aids in the selection of eye and face protective equipment. It applies to occupational and educational operations involving potential eye and face hazards. Click here to view the eTool.

3.1.4 Fit

Never underestimate the importance of proper fit of glasses, goggles, or face shields. Fitting of goggles and safety spectacles should be performed by someone who has been trained properly in the procedure. Utilize your PPE vendors; care should be taken to determine not only fit, but comfort to the wearer. Prescription safety spectacles should be fitted only by qualified optical personnel.

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3.1.5 Inspection and Maintenance

Obviously, it is essential that the lenses of eyewear be kept clean, as continuous vision through dirty lenses may cause eye strain, which is often an excuse for not wearing the eyewear. Daily inspection and cleaning of the eye protector with soap and hot water, or with a cleaning solution and tissue, is recommended.

Pitted lenses, like dirty lenses, can also be a source of reduced vision and should be replaced, particularly since deep scratches or excessively pitted lenses are apt to break more readily. Slack, worn-out, sweat-soaked, or twisted headbands do not hold the eye protector in proper position. A visual inspection can determine when the headband elasticity is reduced to a point beyond proper function. Goggles should be kept in a protective case when not in use. Spectacles, in particular, should be given the same care as one's own glasses, since the frame, nose pads, and temples can be damaged with rough usage.

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3.1.5 Inspection and Maintenance

Personal protective equipment that has been previously used should be disinfected before being issued to another employee. Also, when each employee is assigned protective equipment for extended periods, it is recommended that it be cleaned and disinfected regularly. While several methods for disinfecting eye-protective equipment are acceptable, the most effective method is to disassemble the goggles or spectacles and thoroughly clean all parts with soap and warm water, carefully rinsing all traces of soap, and replacing defective parts. Once cleaned, swab thoroughly or completely and immerse all parts for 10 minutes in a solution of germicidal deodorant fungicide. Remove parts from solution and suspend in a clean place for air drying at room temperature or with heated air. Most importantly, once disinfected, these parts should not be rinsed, as this will remove the germicidal residue which retains its effectiveness after drying. The dry parts or items should be placed in a clean, dust-proof container, such as a box, bag, or plastic envelope, to protect them until reissue. With the time and effort that is expended upon such procedures, it is often more efficient to discard used PPE and issue new.

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3.1.6 ANSI Standards

Protective eye and face protection devices must comply with ANSI/ISEA Z87.1-2015, Occupational and Educational Personal Eye and Face Protection Devices. Earlier versions of this standard call for compliance based upon date of purchase. These standards ensure that personal eye and face protection devices provide the necessary protection from workplace hazards. This standard prescribes the design, performance specifications, and marking of safety eye and face products. Eye and face protection devices that an employer demonstrates are at least as effective as eye and face protection devices that are constructed in accordance with these consensus standards will be deemed to be compliant.

For an informative eye and face protection guide, please refer to the International Safety Equipment Association's, Eye and Face Protection Selection Tool. Click here to view and download the guide.

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3.1.7 Subpart I Appendix B Selection Chart

As discussed previously, OSHA established guidelines in Appendix B for the selection of face and eye protection. Highlights of these important guidelines include:

- A detailed chart depicting suggested protection based upon the hazard source and hazard category
- A reminder regarding the care to be taken when simultaneous exposures from a variety of hazards occurs whereby the highest level of each of the hazards should be provided
- Tinted or shaded lenses are not filter lenses unless they are marked or identified as such
- As required by the standard, employees whose vision requires the use of prescription lenses must wear either protective devices fitted with prescription lenses or protective devices designed to be worn over regular prescription eyewear

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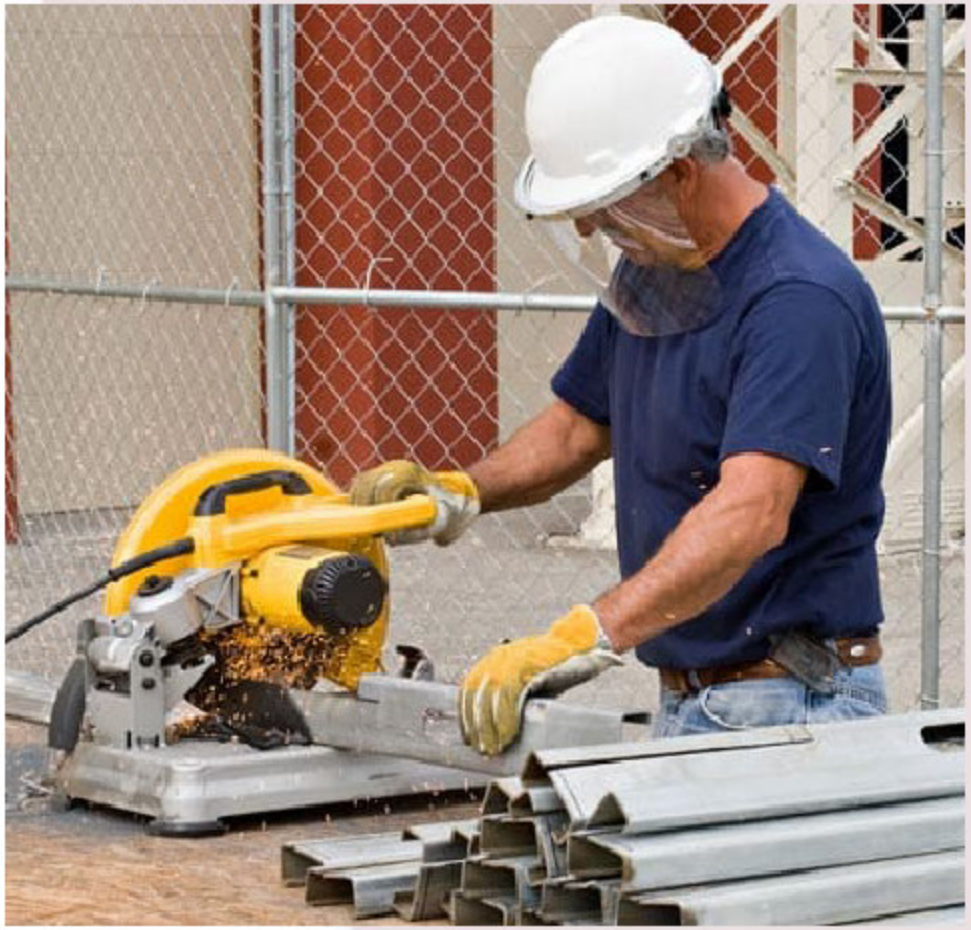
3.1.7 Subpart I Appendix B Selection Chart

- Face shields should only be worn over primary eye protection (spectacles or goggles)
- Wearers of contact lenses must also wear appropriate eye and face protection devices in a hazardous environment, such as dusty and chemical environments
- Caution should be exercised in the use of metal frame protective devices where an electrical hazard may exist
- Atmospheric conditions and the restricted ventilation of a protector may cause lenses to fog, requiring frequent cleansing
- Ventilation should be adequate, but well protected from splash entry

Since types and models of eye and face protection vary widely depending upon the hazard protection necessary, equipment suppliers and providers are excellent sources of information and assistance with the selection process. To view Appendix B, click here.



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3.2 Head Protection

Head injuries are one of the most common causes of fatality. It is important to choose the correct headgear and use it correctly. A common example of head protection is a hard hat.

Click Box

3.2.1 Head Hazards

After conducting a hazard assessment, determined hazards should be mitigated through engineering and administrative controls. If the previous controls could not effectively eliminate the risk of hazards, the application of head protecting PPE should be completed. It is important to note that hazards that may cause injuries to the head are difficult to anticipate; however, if the following conditions are identified, head protection must be provided:

- Falling objects
- Bump against fixed objects such as exposed pipes or beams
- Exposure to energized electrical conductors or other electrical hazards

Click Box

3.2.2 General Requirements

If an employer deems it necessary, given the hazard assessment, that PPE will be required for head protection, the following equipment requirements must be met:

- Resistant to penetration by objects
- Designed to reduce electrical shock hazard whenever exposure to electrical conductors exists
- Able to absorb the shock of a blow by utilizing a shock-absorbing lining composed of a shell and suspension with the headband and crown straps to keep the shell away from the skull while providing adequate ventilation
- Water-resistant
- Constructed with slow burning materials

3.2.2 General Requirements

- Accompanied by instructions explaining proper adjustment and replacement of the suspension features and the headband
- Comply with ANSI standards
- Identified inside the shell with the name of the manufacturer, the ANSI designation, and the type and class categories
- May not be worn backwards unless specifically tested to do so (usually, one will see this symbol which illustrates that the hard hat can be worn either way)

Click Box

3.2.3 Selection

Each type and class of head protectors is intended to provide protection against specific hazardous conditions. An understanding of these conditions will assist in the selection of the proper protection for the particular situation. Head protection is specified by both type and class as described in the following slides:

ANSI Protective Helmet Types

Type I: designed to reduce the force of impact from a vertical blow only to the top of the head.

Type II: intended to provide protection against both side or lateral impacts, as well as vertical blows to the top of the head. This form of impact, for example, may result from contact with the sharp corner of a side beam.

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3.2.4 ANSI Standards Criteria (Subpart I Appendix B)

ANSI established criteria for protective helmets, to include the criteria for combustibility or flammability for each type and class, as well as testing and performance requirements. The ANSI Z89.1 Standard was significantly revised in 1986, 1997 and 2003 and 2009. The current standard relative to protective helmets is ANSI/ISEA Z89.1-2014, American National Standard for Industrial Head Protection, published in collaboration with the International Safety Equipment Association. Should an employer demonstrate that the head protection devices selected are at least as effective as head protection devices that are constructed in accordance with the ANSI standard, it will be considered in compliance.

Click Box

3.2.5 Head Protection Fit

Proper fit is of utmost concern relative to head protection, as head sizes vary dramatically, and adjustments are frequently required. The proper fit includes sufficient clearance between the shell and the suspension system for ventilation and impact distribution. It should not bind, slip, fall off or irritate the skin. Headbands are adjustable in 1/8”-size increments. When the headband is adjusted to the right size, it provides sufficient clearance between the shell and the headband.

The removable or replaceable type sweatband should cover at least the forehead portion of the headband. The shell should be of one-piece seamless construction and designed to resist the impact of a blow from falling material. The internal cradle of the headband and sweatband forms the suspension. Any part that comes into contact with the head must not be irritating to normal skin.

Click Box

3.2.6 Protective Helmet Care

A daily inspection of the helmet is recommended to check for holes, cracks, tears, or other damage that may compromise the safety elements of the equipment. Hard hats that have sustained an impact, even if no damage is noticeable, should be removed from service.

Manufacturers should be consulted regarding paint or cleaning materials used, as some paints and thinners may damage the shell and reduce protection by physically weakening it or negating electrical resistance. A common method of cleaning shells is to dip them in hot water with a good detergent for at least one minute. Shells should then be scrubbed and rinsed in clear hot water. After rinsing, the shell should be carefully inspected for any signs of damage.

All components, shells, suspensions, headbands, sweatbands, and any accessories should be visually inspected daily for signs of dents, cracks, penetration, or any other damage that might reduce the degree of safety originally provided. Employees should understand that if unusual conditions occur, or if there are signs of abuse or mutilation of the helmet or any component, the margin of safety may be reduced. Helmets should not be stored or carried on the rear-window shelf of any vehicle since sunlight and extreme heat may adversely affect the degree of protection. If damage is suspected, helmets should be replaced, or representative samples tested in accordance with procedures contained in ANSI Standard. As a rule, the cradle and suspension of a helmet must be replaced annually. The helmet itself has a typical lifespan of five years. However, always check with the manufacturer for specific requirements.

3.3 Foot Protection

Safety shoes are required when the potential for serious injury to the foot may result from an employee's daily job duties. Foot injuries may occur in areas where there are rolling or falling objects, objects piercing the sole, or where feet are exposed to electrical hazards that remain after the employer has taken other necessary protective measures.

Click Box

3.3.1 Hazards

Once an employer determines that engineering or administrative controls are not feasible to address the following hazards, employees must wear protective footwear when the possibility of exposure exists:

- Heavy objects (such as barrels or tools) that might roll or fall on the feet
- Sharp objects (such as nails or spikes) that might pierce the soles or uppers of ordinary shoes
- Molten metal that might splash on feet
- Hot surfaces
- Wet, slippery surfaces
- Electrical

Click Box

3.3.2 Foot Protection Selection

Most employees think of safety shoes as being all the same. However, there are different types of shoes to protect an employee from different types of hazards:

- **Safety Shoes:** may have impact-resistant toes, metal insoles and/or heat-resistant soles that protect against puncture wounds or hot surfaces; or designed to be electrically conductive for use in explosive atmospheres; or, designed to be electrically nonconductive to protect from electrical hazards
- **Safety Boots:** typically constructed with chemical-resistant materials
- **Leggings:** protect the lower leg and feet from molten metal and welding sparks

Foot protective equipment comes in a variety of styles and materials, including steel toed and composite toed boots (the latter made of lighter, non-metal materials like Kevlar, carbon fiber, plastic, or fiberglass) as well as rubber boots and leather shoes. Any foot protection should be sturdy, and durable given the wear that it is expected to take.

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3.3.3 ANSI Standards

Foot Protection is classified according to its ability to meet minimum requirements for both compression and impact tests. These requirements and associated testing procedures may be found in ASTM F2412/ASTMF2413, Foot Protection and Performance Package. Should an employer demonstrate that the foot protection devices selected are at least as effective as foot protection devices that are constructed in accordance with the ANSI Standard, it will be considered in compliance.

Click Box

3.4 Hand Protection

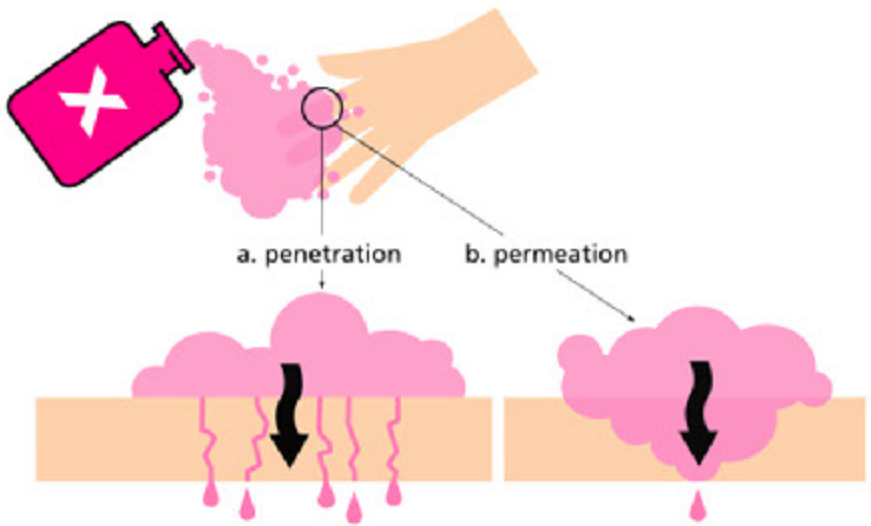
As many as 1 million hand injuries occur in workplaces each year, ranging from cuts and lacerations to amputations and fractures. A hand safety policy, along with the use of appropriate hand protection and safety knives, can reduce or eliminate most of those injuries from your workplace.

Click Box

3.4.1 Hand Hazards

The nature of hazards and the operations to be performed will determine any PPE hand protection selection. And, as always, it is critical that attempts to eliminate or reduce any hazards that may exist through engineering or administrative controls is required before an employer resorts to the use of PPE for hand protection. Given the variety and number of hazards for which a hand could be potentially exposed, a review of the type of injuries sustained may be the most ideal method by which to categorize a hazard. Examples are: cuts/lacerations, thermal burns, chemical exposure burns, skin absorption/rashes, bruises, abrasions, punctures, fractures, amputations, and harmful temperature extremes.

3.4.2 Hand Protection Selection



Employers are to base the selection of the appropriate hand protection on an evaluation of the performance characteristics of the hand protection relative to the tasks to be performed, conditions present, duration of use and the hazards and potential hazards that are identified.

The gloves' protective material and construction must be able to resist such basic criteria as penetration, permeation, and degradation. Given the significance of these types of actions to the protective nature of gloves, each of these criteria is described in detail:

Penetration

Penetration is the movement of a hazardous substance through a glove via breaks in the material such as pinholes, seams, cracks, tears and other imperfections in the glove. Damage such as excessive stretching, cuts or punctures can cause such material breaks. Gloves that have been in service for some time or have been poorly constructed are more likely to fail due to penetration damages.

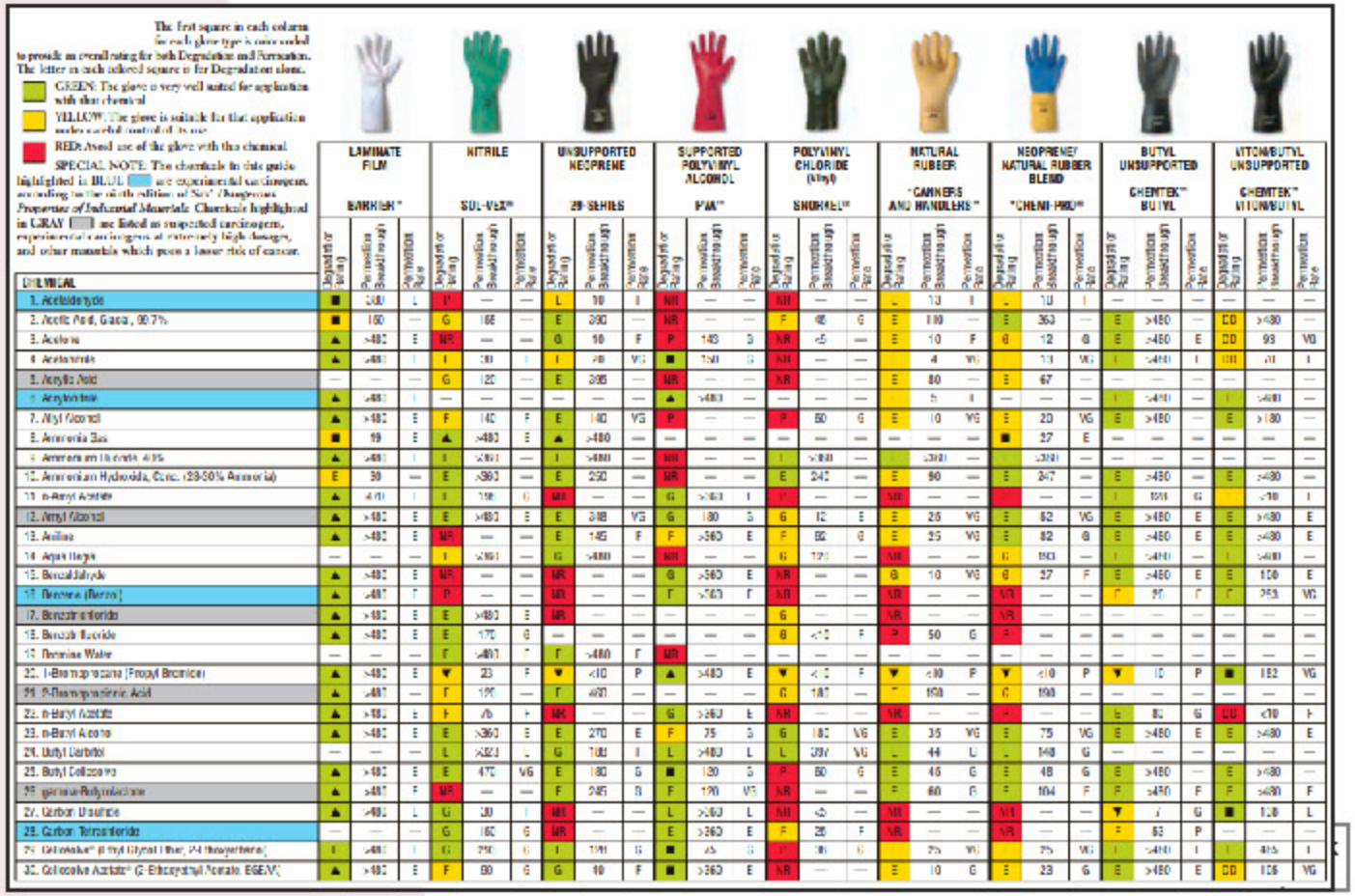
Click Box

3.4.2 Hand Protection Selection

Permeation

Permeation is the process by which a hazardous substance may dissolve or move through an intact material on a molecular level. In most cases, permeation occurs without any visible change, sensation, or other indications, exposing the hand to potential hazards. The ability of a protective material to resist permeation is an inherent property and should be considered in the selection of hand protection.

The permeation rate is the rate at which a hazardous substance moves through the glove material. It is a function of several factors such as substance concentration, material thickness, humidity, temperature, pressure, and length of contact time. The rate is inversely proportional to the thickness of the material and directly proportional to the concentration of the hazardous substance. The higher the permeation rate, the faster the substance will move through the material, with thicker materials having a slower permeation rate. A conscious effort is to be made to avoid prolonged exposure or contact with any hazardous substance while wearing any kind of protective glove since no one material can protect against permeation by all hazardous substances.



The first square in each column for each glove type is color coded to provide an overall rating for both Degradation and Permeation. The letter in each colored square is for Degradation alone.

GREEN: The glove is very well suited for application with this chemical

YELLOW: The glove is suitable for that application under careful control of its use

RED: Avoid use of the glove with this chemical

SPECIAL NOTE: The chemicals in this guide highlighted in BLUE are experimental carcinogens, according to the ninth edition of Sax' Dangerous Properties of Industrial Materials. Chemicals highlighted in GRAY are listed as suspected carcinogens, experimentals carcinogens at extremely high dosages, and other materials which pose a lesser risk of cancer.

CHEMICAL	LAMINATE FILM "BARRIER"			NITRILE "SOL-VEX"			UNSUPPORTED NEOPRENE "29 SERIES"			SUPPORTED POLYVINYL ALCOHOL "PVA"			POLYVINYL CHLORIDE (Vinyl) "SHOWA"			NATURAL RUBBER "CANNERS AND HANDLERS"			NEOPRENE/ NATURAL RUBBER BLEND "CHEMI-PRO"			BUTYL UNSUPPORTED "CHEMTEK" BUTYL			UTC/NB/BUTYL UNSUPPORTED "CHEMTEK" UTC/NB/BUTYL		
	Degradation Rating	Permeation Breakthrough	Permeation Rate	Degradation Rating	Permeation Breakthrough	Permeation Rate	Degradation Rating	Permeation Breakthrough	Permeation Rate	Degradation Rating	Permeation Breakthrough	Permeation Rate	Degradation Rating	Permeation Breakthrough	Permeation Rate	Degradation Rating	Permeation Breakthrough	Permeation Rate	Degradation Rating	Permeation Breakthrough	Permeation Rate	Degradation Rating	Permeation Breakthrough	Permeation Rate	Permeation Breakthrough	Permeation Rate
1. Acetaldehyde	■	300	L	F*	—	—	L	10	I	NR	—	—	NR	—	—	F	10	I	F	10	I	—	—	—	—	—
2. Acetic Acid, Glacial, 99.7%	■	150	—	G	168	—	E	360	—	NR	—	—	F	48	G	E	180	—	E	>480	—	ED	>480	—	—	—
3. Acetone	▲	>480	E	NR	—	—	G	10	F	P	145	G	NR	<5	—	E	10	F	G	12	G	E	>480	E	ED	98	VG
4. Acetonitrile	▲	>480	E	I	30	I	I	48	VG	■	150	G	NR	—	—	E	4	VG	I	10	VG	I	>480	I	ED	20	I
5. Acrylic Acid	—	—	—	G	120	—	E	360	—	NR	—	—	NR	—	—	E	80	—	E	67	—	—	—	—	—	—	—
6. Acrylonitrile	▲	>480	I	—	—	—	—	—	—	▲	>480	—	—	—	—	—	5	I	—	—	—	I	>480	—	I	>480	—
7. Allyl Alcohol	▲	>480	E	F	140	F	E	180	VG	P	—	—	P	60	G	E	10	VG	E	20	VG	E	>480	—	E	>180	—
8. Ammonia Gas	■	99	E	▲	>480	E	▲	>480	—	—	—	—	—	—	—	—	—	—	■	27	E	—	—	—	—	—	—
9. Ammonium Hydroxide, 40%	▲	>480	I	I	>360	—	I	>480	—	NR	—	—	I	>360	—	—	>360	—	—	>360	—	—	—	—	—	—	—
10. Ammonium Hydroxide, Conc. (28-58% Ammonia)	E	30	—	E	>360	—	E	240	—	NR	—	—	E	240	—	E	90	—	E	247	—	E	>480	—	E	>480	—
11. n-Butyl Acetate	▲	410	I	I	150	G	NR	—	—	G	>360	I	I	—	—	NR	—	—	—	—	—	I	108	G	—	<10	I
12. Amyl Alcohol	▲	>480	E	E	>480	E	E	348	VG	G	180	G	G	12	E	E	20	VG	E	62	VG	E	>480	E	E	>480	E
13. Aniline	▲	>480	E	NR	—	—	E	145	F	F	>360	E	F	60	G	E	25	VG	E	82	G	E	>480	E	E	>480	E
14. Aqua Regia	—	—	—	I	>360	—	G	>480	—	NR	—	—	G	120	—	NR	—	—	G	180	—	I	>480	—	I	>480	—
15. Benzaldehyde	▲	>480	E	NR	—	—	NR	—	—	G	>360	E	NR	—	—	G	10	VG	G	27	F	E	>480	E	E	120	E
16. Benzene (Benzol)	▲	>480	I	P	—	—	NR	—	—	I	>360	I	NR	—	—	NR	—	—	NR	—	—	I	90	I	I	253	VG
17. Benzotrichloride	▲	>480	E	E	>480	E	NR	—	—	—	—	—	G	—	—	NR	—	—	NR	—	—	—	—	—	—	—	—
18. Benzyl Fluoride	▲	>480	E	E	170	G	—	—	—	—	—	—	G	<10	F	P	50	G	P	—	—	—	—	—	—	—	—
19. Bromine Water	—	—	—	I	>480	I	I	>480	I	NR	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
20. 1-Bromopropane (Propyl Bromide)	▲	>480	E	▼	23	F	▼	<10	P	▲	>480	E	▼	<10	F	▼	<10	P	▼	<10	P	▼	10	P	■	182	VG
21. 3-Bromopropionic Acid	▲	>480	I	I	120	—	I	420	—	—	—	—	G	180	—	I	180	—	G	198	—	—	—	—	—	—	—
22. n-Butyl Acetate	▲	>480	E	F	70	F	NR	—	—	G	>360	E	NR	—	—	NR	—	—	F	—	—	E	80	G	ED	<10	F
23. n-Butyl Alcohol	▲	>480	E	E	>360	E	E	270	E	F	75	G	G	180	VG	E	35	VG	E	75	VG	E	>480	E	E	>480	E
24. Butyl Carbitol	—	—	—	L	>420	L	G	180	I	L	>480	L	L	300	VG	L	44	L	L	148	G	—	—	—	—	—	—
25. Butyl Cellosolve	▲	>480	E	E	470	VG	E	180	G	■	120	G	F	60	G	E	45	G	E	48	G	E	>480	—	E	>480	—
26. gamma-Butyrolactone	▲	>480	F	NR	—	—	F	345	G	F	120	VG	NR	—	—	F	60	G	F	104	F	F	>480	F	F	>480	F
27. Carbon Disulfide	▲	>480	L	G	30	I	NR	—	—	L	>360	L	NR	<5	—	NR	—	—	NR	—	—	▼	7	G	■	120	L
28. Carbon Tetrachloride	—	—	—	G	180	G	NR	—	—	E	>360	E	F	28	F	NR	—	—	NR	—	—	F	82	P	—	—	—
29. Cellosolve® (Ethyl Glycol Ether, 2-Ethoxyethanol)	I	>480	I	G	250	G	I	120	G	■	45	G	P	30	G	I	75	VG	I	75	VG	I	>480	I	I	405	I
30. Cellosolve Acetate® (2-Ethoxyethyl Acetate, EGEVA)	▲	>480	E	F	80	G	G	10	F	■	>360	E	NR	—	—	E	10	G	E	23	G	E	>480	E	ED	126	VG

3.4.2 Hand Protection Selection

Breakthrough Time

Breakthrough time is the time it takes a hazardous substance to completely permeate through the material and is the most common determination used to assess material substance compatibility. The breakthrough time gives an indication of how long a glove can be used before the substance will permeate through the material. It is determined by applying the substance on the glove exterior and measuring the time it takes to detect the substance on the inside surface. Obviously, the greater the breakthrough time, the more protective the material is for that particular substance. However, it is to be noted that factors such as temperature, pressure and perspiration within the glove may enhance permeation, thereby reducing the breakthrough time and the protective measures of the glove. The maximum breakthrough time is 480 minutes, equivalent to an 8-hour day.

Click Box

3.4.2 Hand Protection Selection

Degradation

Degradation is a measurement of the physical deterioration of the material due to contact or exposure with a hazardous substance or ambient conditions such as sunlight. The damage to the material from this reaction can range from slight to severe, with the following results to the material:

- Shrinking
- Swelling
- Brittleness or stiffness
- Softness, creating a potentially weaker condition
- Discoloration
- Loss of physical structure and/or strength

With these types of degradation, penetration may be allowed, and permeation could be enhanced or restricted which may ultimately compromise the protective nature of the glove, placing the employee at risk for a potentially serious hazard.

Click Box

3.4.2 Hand Protection Selection

A wide assortment of gloves, hand pads, sleeves, and wristlets for protection against various hazardous situations is available for consideration. An employer is obligated to determine the hand protection required of employees since the construction of the glove is determined by the hazard from which they are intended to protect. Work tasks performed by employees should be studied to determine the degree of dexterity required, the duration, frequency, and degree of exposure to hazards and the physical stresses that are to be applied. Typically, this type of information is collected in a Job Hazard Analysis (JHA) and is considered an excellent tool to develop the hazard assessment to determine the selection of the PPE for hand protection.

It is critical for those who are making selection determinations to know the performance characteristics of gloves relative to the specific hazard known or anticipated, such as the barrier that they provide with exposures to chemicals, heat, or flames. Gloves' performance characteristics should be assessed by using standard test procedures. Before purchasing gloves, the employer should request documentation from the manufacturer that the gloves meet the appropriate test standard(s) for the hazard(s) anticipated. For example, for protection against chemical hazards, the toxic properties of the chemical(s) must be determined, particularly, the ability of the chemical(s) to pass through to the skin and cause systemic injury or illnesses.

3.4.3 Types of Gloves

Durable Work Gloves

- ***Metal Mesh:*** Protect against accidental cuts and lacerations, commonly used by those working with cutting tools or other sharp instruments
- ***Leather Gloves:*** Protect against sparks, moderate heat, blows, chips, and rough objects, commonly used by welders who require that gloves be very durable
- ***Aluminized Gloves:*** Provide reflective and insulating protection against intense heat, commonly used by those working with molten materials

Fabric and Coated Fabric Gloves

- Gloves made of cotton or other fabric protect against dirt, slivers, chafing, and abrasion but do not provide sufficient protection to be used with rough, sharp, or heavy materials.
- Cotton flannel gloves coated with plastic transform fabric gloves into general-purpose hand protection offering slip-resistant qualities. Coated fabric gloves are used for tasks ranging from handling bricks and wire rope to handling chemical containers in laboratory operations.

3.4.3 Types of Gloves

Chemical and Liquid-Resistant Gloves: For protection against chemical exposure hazards, it is important to check with the manufacturer to determine the gloves' effectiveness against the specific chemicals and conditions in the workplace. Typically gloves made of rubber (latex, nitrile, or butyl), plastic, or synthetic rubber-like material such as neoprene protect workers from burns, irritation, and dermatitis caused by contact with oils, greases, solvents, and other chemicals. Use of rubber gloves also reduces the risk of exposure to blood and other potentially infectious substances.

- **Butyl rubber gloves** protect against nitric acid, sulfuric acid, hydrofluoric acid, red fuming nitric acid, rocket fuels, and peroxide. They resist oxidation and ozone corrosion, as well as abrasion. They remain flexible at low temperatures.

- **Natural latex or rubber gloves** provide a comfortable wear and pliability along with their protective qualities, making them a popular general-purpose glove. They resist abrasions caused by sandblasting, grinding, and polishing and protect workers' hands from most water solutions of acids, alkalis, salts, and ketones. For those allergic to latex, hypoallergenic gloves, glove liners, and powderless gloves offer possible alternatives.

Click Box

3.4.3 Types of Gloves

- **Neoprene gloves** provide good pliability, finger dexterity, high density, and tear resistance. They also provide protection from hydraulic fluids, gasoline, alcohols, organic acids, and alkalis.

- **Nitrile rubber gloves** provide protection against a wide variety of solvents, harsh chemicals, and petroleum products. While they are intended for jobs requiring dexterity and sensitivity, they stand up to heavy use even after prolonged exposure that cause other gloves to deteriorate. They resist abrasion, puncturing, snagging, and tearing.

Click Box

3.4.4 Considerations

It is important to select the most appropriate glove for a particular application, given the number of conditions that must be met, including durability and reusability. The following are other factors that need to be taken into consideration:

- Employees must be able to remove the gloves in such a manner as to prevent skin contamination
- As long as the performance characteristics are acceptable, it may be more cost effective to regularly change cheaper gloves than to reuse more expensive types
- Generally, any “chemical resistant” glove can be used for dry powder exposure
- For mixtures and formulated products, a glove should be selected based on the chemical component with the shortest breakthrough time
- PPE should be inspected, cleaned, and maintained at regular intervals so that it provides the requisite protection
- Contaminated PPE which cannot be decontaminated is to be disposed of in a manner that protects employees from any additional hazardous exposure

Click Box

3.5 Body Protection

When everyday clothes can't protect your employees from workplace hazards, they, too, might need body protection on the job. Some jobs require full-body protection, while others require only special protective clothing for the parts of the body exposed to possible injury.

The protection has to match the hazard. Examples of body protection include coveralls, splash suits, aprons, jackets, vests, lab coats and surgical gowns, and full-body suits. Body protection comes in a variety of different materials suitable for different kinds of hazards.

Click Box

3.5.1 Hazards

Once an employer determines that hazards that threaten the body or torso cannot be eliminated through the use of engineering or administrative controls, it is critical that the employer provide PPE to protect the body with the necessary barrier that will reduce the risk of injury or illness. The following are hazards that may exist in a workplace that have a potential for creating an exposure requiring protective equipment:

- Intense Heat
- Splashes of hot metals and other hot liquids
- Impacts from tools, machinery, and materials
- Cuts
- Hazardous chemicals exposure, including acids
- Contact with potentially infectious material such as blood
- Radiation

As with most hazards, the duration of exposure will define the type and construction of protective equipment required to minimize the employee exposure.

3.5.2 Types of Body Protection

There are numerous designs, styles, and types of PPE that address body protection:

- Vests
- Jackets
- Aprons and sleeves
- Coveralls
- Surgical gowns
- Full body suits

Click Box

3.5.3 Protective Clothing Materials

There are three basic criteria that determine hazardous substance compatibility of personal protective clothing: penetration, permeation, and degradation. It is recommended that the process of selecting protective clothing consider these criteria and how the material and its construction resists all three of these actions, given a variety of factors.

Hazardous substances penetrate protective clothing because of its design and construction imperfections, not because of the inherent material from which it is made. Stitched seams, buttonholes, porous fabric, and zippers can provide an avenue for the contaminant to penetrate the garment. A well-designed and constructed protective suit with self-sealing zippers and lapped seams made of a nonporous degradation resistant material prevents penetration, but as soon as the suit is ripped or punctured it loses its ability to prevent penetration.

As with gloves, permeation rates and associated breakthrough times are necessary considerations in the selection of protective clothing. It is also important to note that the protective clothing material may also be easily penetrated or permeated once it is degraded, which can frequently occur if it is stored improperly and/or used infrequently.

Click Box

3.5.3 Protective Clothing Materials

Protective clothing is available in a variety of different materials that address the conditions for which the employee will be exposed:

- **Paper-like Fiber:** Disposable suits made of this material provide protection against dust and splashes. Tyvek is a popular brand of this type of suit.
- **Treated Wool and Treated Cotton:** Natural fibers that adapt well to changing workplace temperatures. Comfortable and fire resistant. Protects against dust, abrasions, and rough or irritating surfaces.
- **Duck:** Closely-woven cotton fabric good for light-duty protective clothing. Protects employees against cuts and bruises while they handle heavy, sharp, or rough materials.
- **Leather:** Heat-resistant material. Often used to prevent exposure to dry heat and flame.
- **Rubber, Rubberized Fabrics, Neoprene, and Plastics:** Provides protection against certain acids and other corrosive chemicals.

Click Box

3.5.4 Considerations

It is important to refer to manufacturer's selection guides for the effectiveness of any of these materials as a barrier against specific chemicals. If the substance is extremely toxic, a completely enclosed full body chemical suit may be necessary. The clothing should be inspected periodically to ensure proper fit and function for continued protection.

Click Box

4.0 Specific Requirements: Respiratory Protection, Electrical Protective Equipment, Hearing Protection and Levels of Protection

Selecting the right PPE to sufficiently reduce exposure to hazards is essential to ensure the safety of your employees. The purpose of this section is to provide resources allowing safety professionals to identify and classify various types of PPE, so the appropriate safety precautions are taken when conducting business operations.

Click Box

4.1 Respiratory Protection

Given the nature of this course, this section is intended to provide an overview of respiratory protection. Since respiratory protection requires hands-on demonstration regarding use, with serious consequences if the appropriate considerations are not considered, NASP recommends further, more comprehensive training be obtained.

Click Box

4.1.1 Scope and Hazards

While most of this course has been limited to General Industry, respiratory protection as depicted in the OSHA PPE Standard applies to not only General Industry, but also to Shipyards (Part 1915), Marine Terminals (Part 1917), Longshoring (Part 1918) and Construction (Part 1926). Reference to this section by any industry that is required to provide respiratory protection will provide the necessary guidance and support for the assurance of employee safety and health.

When it comes to respiratory protection, the priority for any employer is to adopt any feasible control measures that address occupational injury and illnesses caused by breathing contaminated air in the workplace. The primary objective is to prevent atmospheric contamination through such engineering control measures as ventilation, confinement, or material substitution where feasible before considering any administrative controls. If administrative controls such as rotating employees in and out of affected areas, or changing work schedules to minimize exposures are not feasible or do not fully address the hazards, it is then that the employer may be required to resort to the use of PPE such as respirators. The typical hazards associated with contaminated air are harmful dusts, fogs, fumes, mists, gases, smokes, sprays, and vapors.

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4.1.1 Scope and Hazards

An approved respirator must be provided to each employee when PPE is necessary to protect them from exposure to contaminated air in the following circumstances:

- Where exposure levels exceed the permissible exposure limit (PEL), during the time necessary to implement feasible engineering and/ administrative controls
- In those maintenance and repair activities and during those brief or intermittent operations where exposures exceed the PEL and engineering and administrative controls are not feasible or are not required
- In regulated areas
- Where the employer has implemented all feasible engineering and administrative controls and it has been demonstrated that they are not sufficient to reduce exposures to or below the PEL
- In emergency situations

4.1.1 Scope and Hazards

While the Standard requires the use of PEL levels to determine the conditions by which respirator protection is required, NASP recommends that an employer consider the use of the Threshold Limit Value (TLV) levels established by the American Conference of Governmental Industrial Hygienists (ACGIH) as an alternative assessment tool. OSHA establishes PELs, and, as a result, they are legal limits to which an employer must abide. TLVs are generally more stringent, as they are based solely on health factors, without consideration of their economic or technical feasibility. Should TLV limits be adopted, it is suggested that an industrial hygienist participate in the determination and selection of any respiratory protection that utilizes these limits.

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4.1.2 Respiratory Protection Program

Once the need for the use of respirators is determined, an employer is required to develop and implement a written respiratory protection program with required procedures and elements for respirator use administered by a trained professional. It is to be noted that employers must provide respirators, training, and medical evaluations at no cost to an employee in this program.

The establishment and implementation of a respiratory protection program should include:

- Respirator selection procedures
- Medical evaluations of respirator users (Appendix C)
- Fit testing (Appendix A, B-1)
- Procedures for proper use in routine and foreseeable emergencies
- Procedures for cleaning, disinfecting, storing, inspecting, repairing, discarding, and otherwise maintaining respirators (Appendix B-2)
- Employee training of hazard exposures and proper use
- Evaluation procedures to determine program effectiveness

4.1.3 Respirator Selection

Prior to selecting an appropriate respirator, the PPE hazard assessment should be analyzed to evaluate the respiratory exposures, as well as to identify the workplace environment and use factors that would affect its performance and reliability.

Respirators are either **tight-fitting** (quarter mask, half mask, full facepiece and mouthpiece/nose clamp) or **loose-fitting** (hood, helmet, loose-fitting facepiece, and full body suit).

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4.1.3 Respirator Selection

Types of Respirators

- **Filters:** an "air purifying element" used in respirators to remove solid or liquid aerosols from the air passing through it.
- **Canister/Cartridge:** a container with filtering items that remove specific contaminants from the air passing through it.
- **Negative Pressure Respirator:** air pressure inside the facepiece is negative during inhalation relative to the air pressure outside the respirator
  - **Filtering Facepiece:** particulate filter as an integral part of the entire piece
  - **Air-Purifying Respirator (APR):** removes specific air contaminants

Click Box

4.1.3 Respirator Selection

- **Positive Pressure Respirator:** air pressure inside exceeds air pressure outside the respirator
  - **Powered Air-Purifying Respirator (PAPR):** air purifier that uses blower to force the air through the elements
  - **Atmosphere-Supplying:** supplies breathing air from a source independent of the ambient atmosphere. Classes include:
    - **Continuous Flow:** demand (upon creation of negative pressure) and pressure demand (upon reduction of positive pressure)
    - **Supplied Air Respirator (SAR):** designed not to be user-carried
    - **Self-Contained Breathing Apparatus (SCBA):** user carried
- **Escape-Only:** intended to be used only for emergency exit

4.1.3 Respirator Selection

Given the level of importance in the proper selection of available respirators, the following factors are required considerations in this Standard:

- The respiratory hazard(s) in the workplace are to be assessed, to include a reasonable estimate of employee exposures to the hazard(s) and an identification of the contaminant's chemical state and physical form
- Should an employer not be able to identify or reasonably estimate the employee exposure, the employer must consider the atmosphere to be IDLH (Immediately Dangerous to Life or Health) which has associated requirements for the selection of proper respirators as depicted in the Standard

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4.1.3 Respirator Selection

- Selection of a NIOSH-certified respirator with its use in compliance with the conditions of its certification and marked accordingly
- The employer must select respirators from a sufficient number of respirator models and sizes so that the respirator is acceptable to, and correctly fits, the employee
  - With the selection of all respirators, NASP recommends that not only multiple sizes be offered to the employee during the selection process, but also that a minimum of at least two different models be available from which the employee may choose
- For non-IDHL atmospheres, an employer must use the Assigned Protection Factors as depicted in Table 1 of the Standard
- An atmosphere with an oxygen content below 19.5% by volume is considered an oxygen deficient atmosphere and are to be considered IDLH

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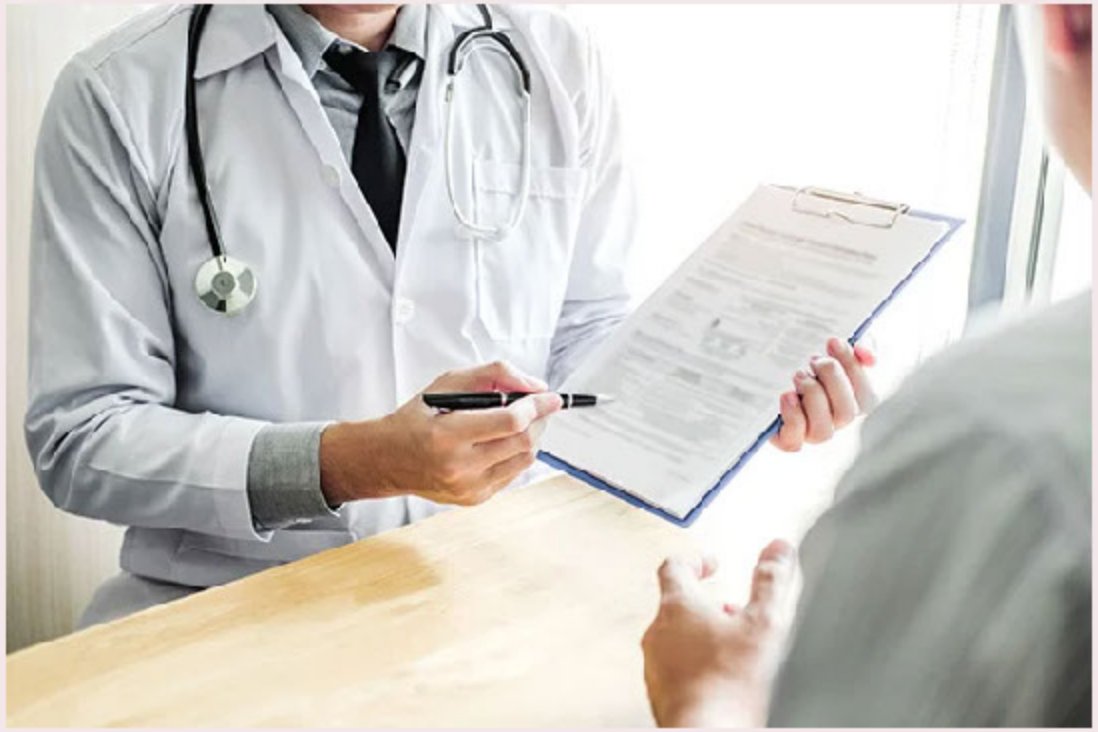
4.1.4 Medical Evaluation

Using a respirator may place a physiological burden on employees that varies with the type of respirator worn, the tasks at hand, the workplace conditions in which the respirator is used, and the medical status of the employee. As a result, the Standard specifies the minimum requirements for medical evaluation that employers must implement to determine the employee's ability to use a respirator. While not specifically noted in this section of the Standard, NASP highly recommends that the medical evaluation includes a baseline lung function test conducted by the medical professional, with regular monitoring against the baseline results. With this, a comprehensive medical evaluation is performed to ensure that the ongoing health of employees who are required to use respirators is thoroughly and accurately monitored.



The medical evaluation form required of this Standard appears as Appendix C of this section of the Standard. The form includes items for the employer to complete, as well as items for the employee to complete regarding their medical history and any current or previous exposures that they may have had to a variety of air contaminants. Given that the medical evaluation form collects personal medical information, it is to be retained by the health care professional administering the program in compliance with the Health Insurance Portability and Accountability Act (HIPAA).

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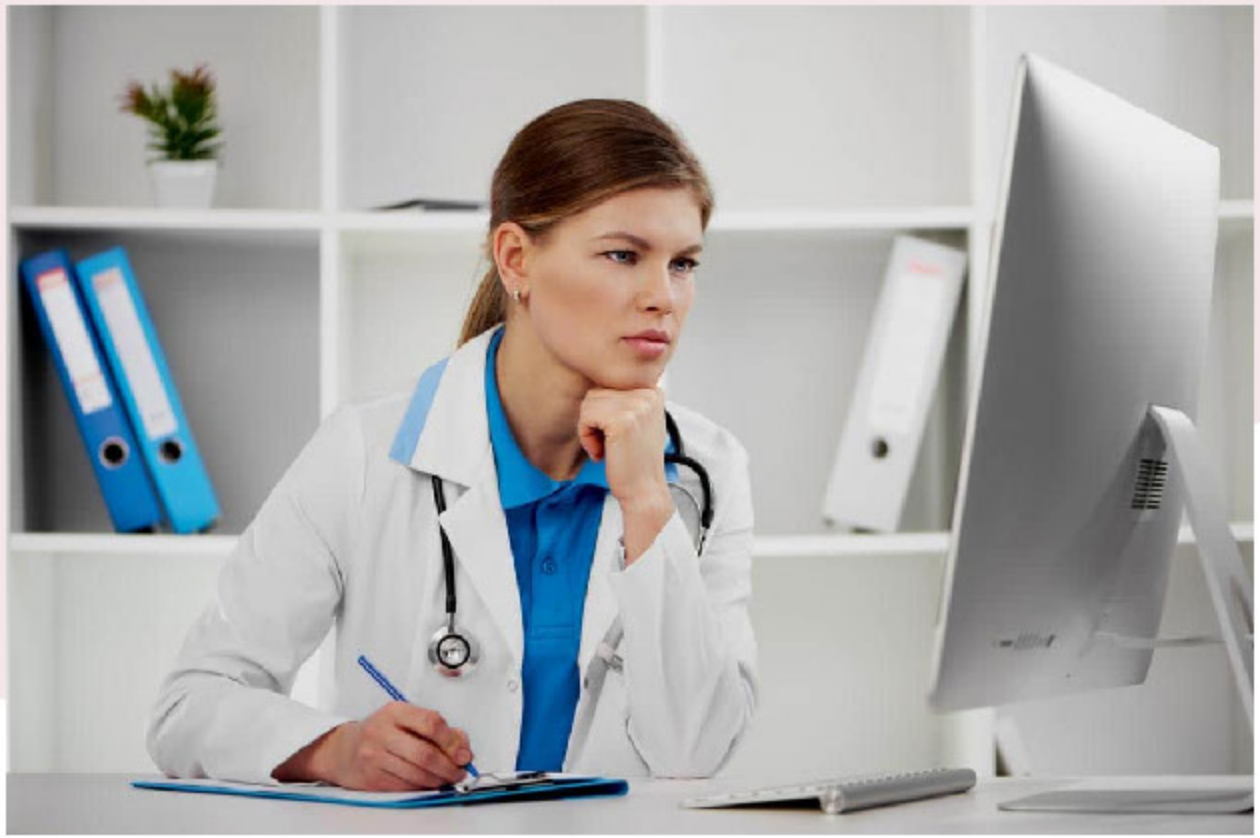
4.1.4 Medical Evaluation

A follow-up medical examination is required to be performed by the designated health care professional should the employee provide a positive response to certain questions on the evaluation form. For any employee for whom respiratory PPE is required, a physician's written recommendation is required and should include the following:

- Whether the employee is medically able to wear the respirator and if there are any limitations for using it
- The need for any follow-up medical evaluations
- A statement that the health care professional provided a copy of the written recommendation to the employee



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4.1.6 Use of Respirators

An employer is to establish and implement procedures for the proper use of respirators. These requirements include prohibiting conditions that may result in facepiece seal leakage, preventing employees from removing respirators in hazardous environments, taking actions to ensure continued effective respirator operation throughout the work shift, and establishing procedures for the use of respirators in IDLH atmospheres or in interior structural firefighting situations. To ensure that the employee utilizing a respirator is not placed in a vulnerable and potentially dangerous situation, NASP recommends that all filters are replaced before they are 80% expended.

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4.1.7 Maintenance, Care, Air Quality, and Identification

An employer is to provide for the cleaning, disinfecting, storage, inspection, and repair of respirators used by employees. Procedures and frequency intervals for thoroughly cleaning respirators are incorporated into the Standard or manufacturer's recommendations and should be strictly followed to ensure that the appropriate sanitation levels are maintained. An employer is required to provide employees using atmosphere-supplying respirators (supplied-air and SCBA) with breathing gases of high purity. An employer is to ensure that all filters, cartridges, and canisters used in the workplace are labeled and color coded with the NIOSH approval label and that the label is not removed and remains legible when in service.

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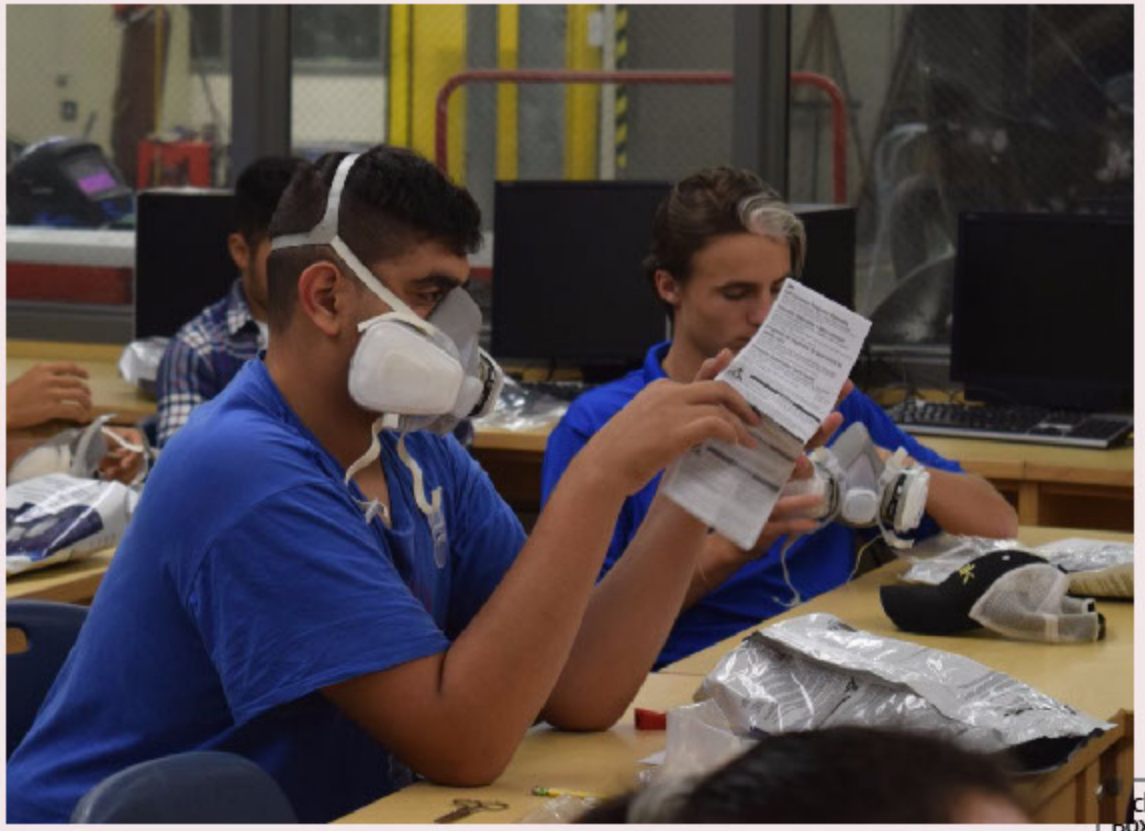
4.1.8 Training, Information and Program Evaluation

An employer is to provide effective training to employees who are required to use respirators. The training must be comprehensive, understandable, recur annually, and more often if necessary. An employer must also provide the basic information on respirators in appendix D of the 1910.134 standard to employees who wear respirators when not required by this section or by the employer to do so. An employer is to conduct evaluations of the workplace to ensure that the written respiratory protection program is being properly implemented, and to consult employees to ensure that they are using the respirators properly. NASP recommends that employee participation in this evaluation also includes an opportunity to offer input regarding any possible concerns with the equipment or the reason for its use to promote employee acceptance of the respirator program.



4.1.9 Recordkeeping

An employer is to establish and retain written information regarding medical evaluations, fit testing, and the respirator program. Typically, this information is required to be kept for a minimum of 30 years from the last employee's hire. In other words, keep this information permanently. This information will facilitate employee involvement in the respirator program, assist the employer in auditing the adequacy of the program, and provide a record for compliance determinations by OSHA.

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4.2 Electrical Protective Equipment

Employees working in areas where there are potential electrical hazards must be provided with, and use, electrical protective equipment that is appropriate for the specific parts of the body protected and for the work performed. Electrical PPE generally includes:

- Safety glasses
- Hard hats
- Insulating (rubber) gloves with leather protectors
- Flame-resistant (FR) clothing
- Face shields
- Safety shoes
- Insulating sleeves

To prevent injury from exposure to electrical conductors, it is important that all electrical protective equipment be maintained in a safe and reliable condition. All electrical protective equipment made of rubber should meet the established safety standards and specifications.

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4.2.1 Hazards

Electricity has long been recognized as a serious workplace hazard, with a significant opportunity for employees to encounter exposures to electrical hazards, regardless of industry. Most electrical injuries result from exposure to unsafe equipment or an unsafe environment. These exposures result in burns, electrical shock, and possible electrocution, as well as fires, and explosions. As with any identified hazard, the most effective method to reduce or eliminate them is through the implementation of engineering controls, such as installation of proper insulation, guarding or grounding. With administrative controls, the employer should consider the adoption of safe work practices for any employee with the potential for electrical exposure. When such controls are not feasible, it is imperative that employees use PPE during the performance of their job.

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4.2.2 Types

Given that electrical PPE provides a barrier between the employee and the energized electrical equipment, the type of barrier is determined by each specific situation and hazard. The following are typical protective equipment that provide the necessary level of protection given the specific hazard or condition that exists:

- Gloves
- Sleeves
- Insulating Blankets
- Matting
- Line hose

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4.2.3 Design Requirements

CLASS	TEST AC VOLTS	USE AC VOLTS	USE DC VOLTS	LABEL COLOR	LABEL IMAGE
00	2,500	500	750	Beige	
0	5,000	1,000	1,500	Red	
1	10,000	7,500	11,250	White	
2	20,000	17,000	25,500	Yellow	
3	30,000	26,500	39,750	Green	
4	40,000	36,000	54,000	Orange	

Specific criteria are established for electrical PPE for ideal protection to be made available to those employees who are exposed to any electrical hazard. All blankets, gloves and sleeves are to be produced by a seamless process. They are to be marked with the appropriate class designation (Class 00-Class 4), along with the manufacturer identification. The markings are to be applied in such a manner as not to not impair the insulating qualities of the equipment. Markings on gloves should be confined to the cuff. Each protective equipment item must be capable of withstanding the ac proof-test as specified in the tables that appear in this section of the Standard.

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4.2.4 ANSI Standards

Rubber insulating PPE meeting the many standards as listed in this section of the standard is deemed to be in compliance with the performance requirements in this section. Standards currently exist and have been updated for such PPE as gloves, sleeves, blankets, and matting. The employer must certify that any PPE has been tested in accordance with the requirements of the standard and the certification must identify the equipment that passed the test and the date it was tested.

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4.2.5 Care and Use

An employer is to maintain any electrical protective equipment in a safe and reliable condition, with insulating gloves to be given an air test. The equipment is to be inspected for damage before each day's use and immediately following any incident that can reasonably be suspected of causing damage. If an inspection uncovers any of the following defects or texture changes, the insulating equipment should not be used: hole, tear, puncture, cut, an embedded foreign object, swelling, softening, hardening, inelastic or stickiness.

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4.3 Hearing Protection

Noise hazards can be identified in most any workplace environment, whether it is noise from faulty or excessively loud equipment or vehicles, to the very undetectable high frequency noise from some electronic devices. Safety equipment is designed to protect workers from a great variety of hazards. But when we think of severe injuries that can occur in the workplace, we might not think of the importance of protecting our ears.

According to the National Institute for Occupational Safety and Health, approximately 22 million U.S. workers are exposed to hazardous noise levels while at work. Hearing loss disability also results in an estimated $242 million in workers' compensation payments each year. All told, that makes hearing loss one of the most common work-related illnesses in the U.S.

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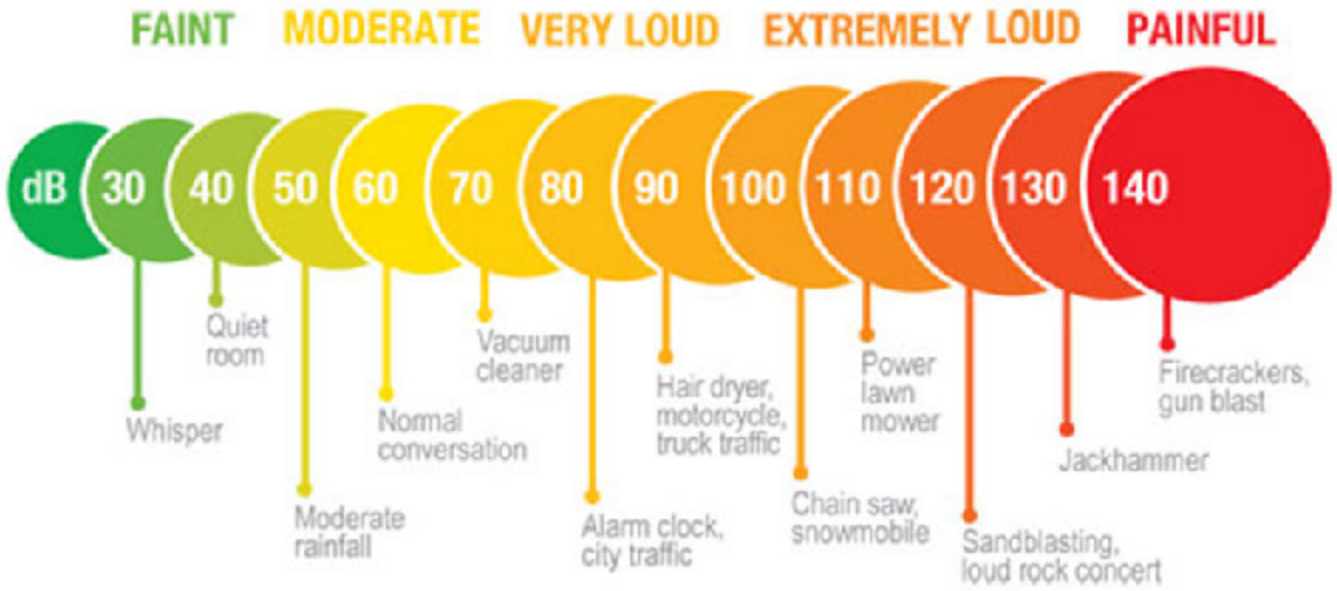
4.3.1 Hearing Hazards

Noise hazards can be identified in most any workplace environment, whether it is noise from faulty or excessively loud equipment or vehicles, to the very undetectable high frequency noise from some electronic devices. With noise hazards, engineering controls such as redesigning, replacing, or enclosing noisy equipment or areas are the most effective control measure. If such controls are not feasible, an employer must consider other administrative controls such as reducing the duration of the noise exposure. Taking these controls into consideration is important since extended high noise level exposure can cause significant hearing loss or impairment, as well as create a situation that creates physical and/or psychological stress for exposed employees. There is NO CURE for noise-induced hearing loss, so the prevention of excessive noise exposure is the only way to avoid hearing damage.



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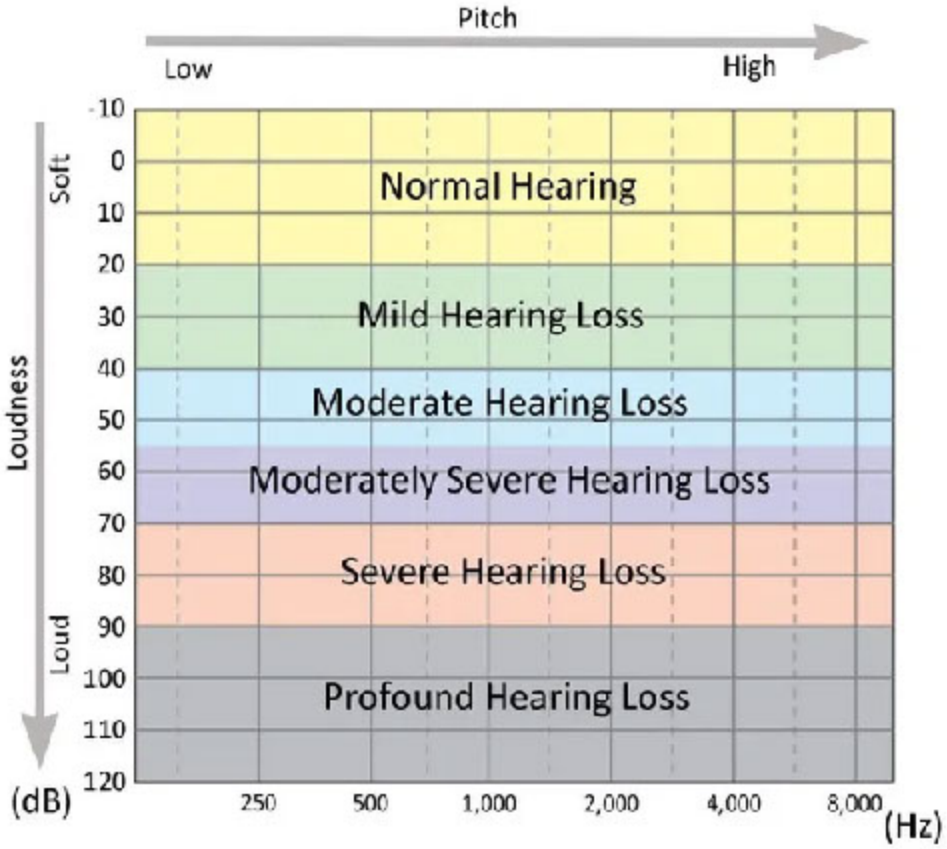
4.3.1 Hearing Hazards

Determining the need for hearing protection is a challenge, as employee exposure depends upon a number of factors:

- The level of sound measured in decibels on the A-scale (dBA)
- The duration of the exposure to sound of various levels throughout the workday or shift
- Whether an employee moves between work areas with different noise levels
- Whether noise is generated between work areas with different noise levels

Generally, the louder the noise, the shorter the exposure time before hearing protection is required. As with any other type of hazard, the employer must implement feasible engineering or administrative controls before resorting to the utilization of PPE to protect an employee against exposure to hazardous noise.



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4.3.1 Hearing Hazards

Limits for Permissible Noise Exposure (According to OSHA)	
8 hours	90 dB
6 hours	92 dB
4 hours	95 dB
3 hours	97 dB
2 hours	100 dB
1.5 hours	102 dB
1 hour	105 dB
30 minutes	110 dB
15 minutes	115 dB

OSHA states that hearing protection is required when:

- The employee's noise exposure exceeds an 8-hour time-weighted average sound level (TWA) of 90 dBA (dose of 100 percent).
- Employees who are exposed to an 8-hour TWA of 85 dBA (dose of 50 percent) and who have measured hearing loss (as prescribed by the OSHA Standard) are also required to wear hearing protection.

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4.3.2 Hearing Protection Selection

The following are various types of PPE that can be provided should a hazard assessment and exposure levels deem it necessary:

- ***Earmuffs:*** Block out noise completely by entirely covering the ear, but a perfect seal is required for ideal noise reduction.
- ***Molded earplugs:*** Usually made of plastic or silicone rubber. They are available in a variety of shapes and sizes and are usually characterized by one or more ribs or contours. They are considered multiple use; therefore, they must be cleaned and properly stored after each use.
- ***Custom molded plugs:*** Generally made of plastic and are designed from a molded wax insert of the wearer's ears. They are considered multiple use but cannot be switched ear to ear.
- ***Self-molded earplugs:*** Made of mineral down or plastic foam and are molded or formed by the wearer. Generally, one size fits all and they may be either single or multiple use.
- ***Canal Caps:*** Resemble earplugs on a flexible plastic band, offering convenience to an employee who must periodically remove the earplugs.

For those workplace areas that have significantly high noise levels, the wearing of both earplugs and earmuffs is recommended.

4.3.3 Hearing Conservation Program (HCP)

As stipulated above, employees whose noise exposures equal or exceed an 8-hour TWA of 85 dBA must be included in a Hearing Conservation Program which is to be comprised of the following elements:

- ***Monitoring:*** This program element is required to identify employees who are subjected to noise exposures of 85 dBA or more and must be repeated whenever change in production, process, equipment, or controls increases noise exposures. To determine if your facility should develop and implement a monitoring program consult Table G-16 found in 29 CFR 1910.95.

- ***Audiometric Testing Program:*** This testing element monitors employee hearing acuity over time and includes baseline and annual audiograms. It also allows for training and follow-up procedures to be followed.

- ***Hearing Protection:*** In this program element, the requirement to make PPE available to all employees exposed to an 8-hour TWA of 85 dBA or more is documented, along with those who have experienced hearing loss, defined as a "Standard Threshold Shift" in the OSHA standard.

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4.3.3 Hearing Conservation Program (HCP)

- ***Training:*** This element provides for the documentation of annual training. Training is to include: the effects of noise, the purpose, advantages, disadvantages, and attenuation characteristics of various types of hearing protectors, the selection, fitting and care of protectors and the purposes and procedures of audiometric testing.

- ***Recordkeeping:*** Noise exposure records must be retained for two years, while records of audiometric test results must be retained for the duration of the affected employee's

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4.4 Levels of Protection and Protective Gear

U.S. Environmental Protection Agency follows various levels of protection and associated protective gear when responding to emergency situations. OSHA later adopted these categories as guidelines under the 1910.120 Hazardous Waste Operations and Emergency Response, Appendix B. These guidelines can be used as a starting point for an employer in their assembly of protective clothing when response activities are affected by atmospheric contamination that may be known or suspected.

Selection of the appropriate PPE is a complex process which requires consideration a variety of conditions. Key factors involved in this process are identification of the hazards, or suspected hazards; their routes of potential hazard to employees (inhalation, skin absorption, ingestion, and eye or skin contact); and the performance of the PPE materials in providing a barrier to these hazards. The amount of protection provided by PPE is material-hazard specific. That is, protective equipment materials will protect well against some hazardous substances and poorly, or not at all, against others. The more that is known about the hazards at the site, the easier the job of PPE selection becomes. The following are guidelines which an employer can use to begin the selection of the appropriate PPE.

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4.4.1 Levels of Protection

Level A
To be selected when the highest level of skin, respiratory, and eye protection is required, as it completely isolates the employee from the surrounding atmosphere.

- SCBA or Airline respirator
- Fully encapsulated, air-tight chemical protective suit
- Other PPE such as clothing, hard hat, boots (cover) and gloves

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4.4.1 Levels of Protection

Level B
To be selected when highest level of respiratory protection is needed, but a lesser level of skin and eye protection, typically associated with chemicals that are not highly corrosive or injurious to the skin. With this level, it is important to identify the nature of the hazard for proper skin protection. This is the minimum level of protection for an IDLH, as well as for entrance to an unknown site.

- SCBA or Airline respirator
- Chemical-resistant clothing
- Other PPE such as face shield, hard hat, boots (cover) and gloves

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4.4.1 Levels of Protection

Level C

To be selected when the type of airborne substance is known, concentration measured, criteria for using air-purifying respirators met and skin and eye exposure is unlikely. With this level, it is again important to identify the nature of the hazard for proper skin protection. Periodic air monitoring must be performed at this level.

- Air-purifying respirators (NIOSH-approved full or half mask)
- Chemical resistant clothing
- Other PPE such as face shield, hard hat, boots (cover) and gloves

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4.4.1 Levels of Protection

Level D

To be selected for nuisance contamination only where work functions do not include the possibility for splashes or potential for unexpected contact with hazardous levels of any chemicals. To be used when airborne exposure below PEL value exists and work functions preclude splashes or potential for unexpected contacts with hazardous levels of any chemical. The PPE that is routinely required and used on a daily basis is designated as Level D protection.

- Basic work uniform, typically coveralls and safety boots
- No respiratory protection

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4.4.2 Level Upgrade or Downgrade

As more information about the hazards and conditions at the site becomes available, the site supervisor can make decisions to upgrade or downgrade the level of PPE protection to match the tasks at hand.

Examples of Upgrade Reasons

- Known or suspected presence of dermal hazards
- Occurrence or likely occurrence of gas or vapor emissions
- Change in work tasks that may increase the potential contact with hazardous materials
- Request of the individual performing the task

Examples of Downgrade Reasons

- Receipt of new information that the situation is less hazardous than originally thought
- Change in site conditions that decreases the hazard
- Change in work tasks that will reduce contact with hazardous materials

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