(12) Maintain all roads so that they stay in a safe condition. Eliminate or control dust, ice, ruts, and similar hazards.

(13) Minimize the deposition of mud and or other debris on roads to the extent possible. Comply with state and local erosion, sediment, and runoff control requirements.

4-9. Figures and Tables.
Not Applicable.

4-10. Checklists and Forms.
Not Applicable.

Chapter 5
Personal Protective and Lifesaving Equipment

5-1. References.

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b. American Society for Testing and Materials (ASTM) Committee F18 Standards, Electrical Protective Equipment for Workers (https://www.astm.org/COMMIT/SUBCOMMIT/F18.htm) (5-1.b)

c. ANSI/ASA S2.73/ISO 10819, Mechanical Vibration and Shock-Hand-arm Vibration – Measurement and Evaluation of the Vibration Transmissibility of Gloves at the Palm of the Hand (https://webstore.ansi.org/) (5-1.c)

d. ANSI/ASA S12.71, Performance Criteria for Systems that Estimate the Attenuation of Passive Hearing Protectors for Individual Users (https://webstore.ansi.org/) (5-1.d)

e. ANSI/American Welding Society (AWS) Z49.1, Safety in Welding, Cutting, and Allied Processes (https://webstore.ansi.org/) (5-1.e)

f. ANSI/Compressed Gas Association (CGA) G-7.1, Commodity Specification for Air (https://webstore.ansi.org/) (5-1.f)

g. ANSI/ISEA Z87.1, American National Standard for Occupational and Educational Personal Eye and Face Protection (https://webstore.ansi.org/) (5-1.g)

h. ANSI/ISEA Z89.1, American National Standard for Industrial Head Protection, (https://webstore.ansi.org/) (5-1.h)

i. ANSI/ISEA 105, American National Standard for Hand Protection Classification (https://webstore.ansi.org/) (5-1.i)

j. ANSI/ISEA 107, American National Standard for High-Visibility Safety Apparel (https://webstore.ansi.org/) (5-1.j)

k. ANSI/Laser Institute of America (LIA) Z136.1, American National Standard for Safe Use of Lasers (https://webstore.ansi.org/) (5-1.k)

l. ANSI/VC Z80.3, Ophthalmics – Nonprescription Sunglass and Fashion Eyewear Requirements (https://webstore.ansi.org/) (5-1.l)

m. ASTM D120, Standard Specification for Rubber Insulating Gloves (https://www.astm.org/products-services/standards-and-publications.html) (5-1.m)

n. ASTM D1051, Standard Specification for Rubber Insulating Sleeves (https://www.astm.org/products-services/standards-and-publications.html) (5-1.n)

o. ASTM F496, Standard Specification for In-Service Care of Insulating Gloves and Sleeves (https://www.astm.org/products-services/standards-and-publications.html) (5-1.o)

p. ASTM F696, Standard Specification for Leather Protectors for Rubber Insulating Gloves and Mittens (https://www.astm.org/products-services/standards-and-publications.html) (5-1.p)

q. ASTM F1116, Standard Test Method for Determining Dielectric Strength of Dielectric Footwear (https://www.astm.org/products-services/standards-and-publications.html) (5-1.q)

r. ASTM F1117, Standard Specification for Dielectric Footwear https://www.astm.org/products-services/standards-and-publications.html) (5-1.r)

s. ASTM F1236, Standard Guide for Visual Inspection of Electrical Protective Rubber Products (https://www.astm.org/products-services/standards-and-publications.html) (5-1.s)

t. ASTM F1449, Standard Guide for Industrial Laundering Care and Maintenance of Flame Resistant and Arc Rated Clothing (https://www.astm.org/products-services/standards-and-publications.html) (5-1.t)

u. ASTM F1506, Standard Performance Specification for Flame Resistant and Electric Arc Rated Protective Clothing Worn by Workers Exposed to Flames and Electric Arcs (https://www.astm.org/products-services/standards-and-publications.html) (5-1.u)

v. ASTM F1891, Standard Specification for Arc and Flame-Resistant Rainwear, (https://www.astm.org/products-services/standards-and-publications.html) (5-1.v)

w. ASTM F1897, Standard Specification for Leg Protection for Chain Saw Users (https://www.astm.org/products-services/standards-and-publications.html) (5-1.w)

x. ASTM F1959/F1959M, Standard Test Method for Determining the Arc Rating of Materials for Clothing (https://www.astm.org/products-services/standards-and-publications.html) (5-1.x)

y. ASTM F2178/F2178M, Standard Specification for Arc Rated Eye or Face Protective Products (https://www.astm.org/products-services/standards-and-publications.html) (5-1.y)

z. ASTM F2412, Standard Test Methods for Foot Protection (https://www.astm.org/products-services/standards-and-publications.html) (5-1.z)

aa. ASTM F2413, Standard Specification for Performance Requirements for Protective (Safety) Toe Cap Footwear (https://www.astm.org/products-services/standards-and-publications.html) (5-1.aa)

bb. ASTM F2675/F2675M, Standard Test Method for Determining Arc Rating of Hand Protective Products Developed and Used for Electrical Arc Flash Protection (https://www.astm.org/products-services/standards-and-publications.html) (5-1.bb)

cc. ASTM F2677, Standard Specification for Electrically Insulating Aprons (https://www.astm.org/products-services/standards-and-publications.html) (5-1.cc)

dd. ASTM F2757, Standard Guide for Home Laundering Care and Maintenance of Flame Resistant or Arc Rated Clothing (https://www.astm.org/products-services/standards-and-publications.html) (5-1.dd)

ee. ASTM F3387, Standard Practice for Respiratory Protection (https://www.astm.org/products-services/standards-and-publications.html) (5-1.ee)

ff. Department of Transportation (DOT), Federal Highway Administration's "Manual on Uniform Traffic Control Devices" (MUTCD) (https://mutcd.fhwa.dot.gov) (5-1.ff)

gg. DoDI 6055.12, Hearing Conservation Program (https://www.esd.whs.mil/directives/issuances/dodi/) (5-1.gg)

hh. ER 385-1-89, Hearing Conservation Program (https://www.publications.usace.army.mil/USACE-Publications/Engineer-Regulations) (5-1.hh)

ii. ER 385-1-90, Respiratory Protection Policy (https://www.publications.usace.army.mil/USACE-Publications/Engineer-Regulations) (5-1.ii)

jj. NFPA 70E, Standard for Electrical Safety in the Workplace (https://www.nfpa.org/Codes-and-Standards) (5-1.jj)

kk. NFPA 1977, Standard on Protective Clothing and Equipment for Wildland Fire Fighting (https://www.nfpa.org/Codes-and-Standards) (5-1.kk)

ll. NFPA 1989, Standard on Breathing Air Quality for Emergency Services Respiratory Protection (https://www.nfpa.org/Codes-and-Standards) (5-1.ll)

mm. OSHA Technical Manual, Health Hazards, Section III: Chapter 5 Noise (https://www.osha.gov/otm/section-3-health-hazards/chapter-5) (5-1.mm)

nn. U.S. Department of Health and Human Services/National Institute for Occupational Safety and Health (NIOSH) 98-126, Occupational Noise Exposure, June 1998 (https://www.cdc.gov/niosh/docs/98-126/) (5-1.nn)

oo. 29 CFR 1910 Subpart I, Personal Protective Equipment (https://www.govinfo.gov/content/pkg/CFR-2020-title29-vol5/pdf/CFR-2020-title29-vol5-part1910-subpartI.pdf) (5-1.oo)

pp. 29 CFR 1910.95, Occupational Noise Exposure (https://www.govinfo.gov/content/pkg/CFR-2020-title29-vol5/pdf/CFR-2020-title29-vol5-sec1910-95.pdf) (5-1.pp)

qq. 29 CFR 1910.134, Respiratory Protection (https://www.osha.gov/laws-regs/regulations/standardnumber/1910/1910.134) (5-1.qq)

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tt. 46 CFR 25.25, Life Preservers and Other Lifesaving Equipment (https://www.govinfo.gov/content/pkg/CFR-2020-title46-vol1/pdf/CFR-2020-title46-vol1-part25-subpart25-25.pdf) (5-1.tt)

uu. 46 CFR 117.70, Ring Life Buoys (https://www.govinfo.gov/content/pkg/CFR-2020-title46-vol4/pdf/CFR-2020-title46-vol4-sec117-70.pdf) (5-1.uu)

vv. 46 CFR 160, Lifesaving Equipment (https://www.govinfo.gov/content/pkg/CFR-2019-title46-vol6/pdf/CFR-2019-title46-vol6-part160.pdf) (5-1.vv)

5-2. Definitions.

a. Air-Purifying Respirator. A respirator where ambient air is passed through an air-purifying element by either inhalation or with a blower. (5-2.a)

b. Arc Rating. A value of the incident energy (IE) necessary to pass through any given material, or multiple layers of materials, to cause, with 50% probability breakopen or onset of a second-degree skin burn injury. This value is measured in calories/cm². The necessary arc rating for an article of clothing is determined by performing an arc flash analysis or a risk assessment. Arc rating is reported as the lower value of either the arc thermal performance value (ATPV) or the energy breakopen threshold (EBT). (5-2.b)

c. Atmosphere-Supplying Respirator. A class of respirators that supply a respirable atmosphere, independent of the workplace atmosphere. This class includes airline respirators and self-contained breathing apparatus (SCBA). (5-2.c)

d. Canister/Cartridge. A container with a filter, sorbent, or catalyst, or combination of these items, which removes specific contaminants from the air passed through the container. (5-2.d)

e. Competent Person (CP). See paragraphs 1-2 or 2-2, as applicable. (5-2.e)

f. Decibel (dB). A unit used to measure the intensity of a sound (sound pressure level). (5-2.f)

(1) Decibel-A-Weighted (dBA). A-weighted decibel is an expression of the relative loudness of sounds in air as perceived by the human ear.

(2) Decibel-C-Weighted (dBC). C-weighted sound level is the sound pressure in decibels measured with a sound level meter using the C-weighting network and slow meter response. The C-weighted network correlates with the ear's response for the levels above 85 dB.

g. Drowning Hazards. Drowning hazards are associated with work on, over or adjacent to water and include the lack of life jackets, ring buoys and lifesaving skiffs and other devices. Drowning hazards also include work in confined spaces (see chapter 34) and during diving operations (see chapter 30). (5-2.g)

h. Dust. Solid particles generated by handling, crushing, grinding, or detonation of organic or inorganic materials. (5-2.h)

i. Filtering Facepiece Respirator. NIOSH-approved negative-pressure particulate respirator with a filter as an integral part of the facepiece or with the entire facepiece composed of the filtering medium. (5-2.i)

j. Fit Factor. A quantitative estimate of the fit of a particular respirator to a specific individual, and typically estimates the ratio of the concentration of a substance in ambient air to its concentration inside the respirator when worn. (5-2.j)

k. Fit Test. The use of a qualitative or quantitative protocol to evaluate sealing surface leakage of a specific tight-fitting respirator while worn by an individual. (5-2.k)

l. Hazardous Noise. Noise exceeding 85 dBA. (5-2.l)

m. High Visibility Safety Apparel (HVSA). Personal protective safety clothing intended to provide conspicuity during both daytime, nighttime, and other low-light condition usage. (5-2.m)

(1) Class 2 HVSA. A category of safety clothing that increases the visibility of the wearer in both daytime and nighttime conditions. Performance Class 2 HVSA is the minimum practice for HVSA in roadway rights-of-way, temporary traffic control zones, and where traffic is moving at or below 35 miles per hour (mph) (56.3 kilometers per hour (km/h)). Class 2 HVSA must have at least 201 in^2 (1926.8 cm^2) of reflective material. See the MUTCD and ANSI/ISEA 107 for required amount of non-reflective material.

(2) Class 3 HVSA. A category of safety clothing that offers greater visibility to the wearer in complex backgrounds (for example, roadways where traffic is traveling in excess of 35 mph (56.3 km/h), emergency personnel or tow truck operators working in blizzard or hurricane conditions). Class 3 HVSA requires 310 in^2 (2000 cm^2) of reflective material. Apparel often resembles a short sleeve t-shirt; a sleeveless garment or vest alone is not considered Performance Class 3. See ANSI/ISEA 107 for required amount of non-reflective material.

(3) Class E HVSA. Supplemental apparel comprised of high visibility garments such as pants, bib overalls, shorts, and gaiters. These items do not qualify as meeting the requirements of the standard when worn alone, however, when a Class E item is worn with a Class 2 or Class 3 garment, the overall classification of the ensemble is Class 3. (See ANSI/ISEA 107)

(4) Type P HVSA. “Public safety,” emergency responder, law enforcement worker apparel that provides daytime and nighttime visual conspicuity enhancement in occupational environments that include exposure to traffic from public access highway rights-of-way or roadway temporary traffic control zones, or from work vehicles and construction equipment within a roadway temporary traffic control zone or from equipment and vehicles within the activity area. Type P HVSA provides additional

options for emergency responders, incident responders and law enforcement who have compounding hazards or require access to special equipment. (See ANSI/ISEA 107)

(5) Type R HVSA. "Roadway use" apparel that provides daytime and nighttime visual conspicuity enhancement for workers in occupational environments that include exposure to traffic from public access highway rights-of-way or roadway temporary traffic control zones, or from work vehicles and construction equipment within a roadway temporary traffic control zone. (See ANSI/ISEA 107)

n. Immediately Dangerous to Life or Health (IDLH). An atmosphere that poses an immediate threat to life, would cause irreversible adverse health effects, or would impair an individual's ability to escape from a dangerous atmosphere. IDLH values are often used to guide the selection of breathing apparatus made available to workers or firefighters in specific situations. (5-2.n)

o. Impulse Noise. The pressure-time history of a single impulse includes a rise of 40 dB or more in 1 second or faster to a peak pressure, followed by a somewhat slower decay of the pressure envelope to ambient pressure, both occurring within 1 second. When the intervals between impulses are less than 500 milliseconds, the noise is considered continuous, except for short bursts of automatic weapons fire, which are considered impulse noise. (5-2.o)

p. Negative Pressure Respirator/Tight-Fitting Facepiece Respirator. A respirator in which the air pressure inside the facepiece is negative during inhalation with respect to the ambient air pressure outside the respirator. (5-2.p)

q. Ototoxic Chemicals. An agent known to have adverse effects on organs or nerves involved in hearing or balance and may be physical (for example, noise), biological, or chemical. Examples include arsenic, carbon disulfide, carbon monoxide (CO), cyanide, lead and derivatives, manganese, mercury and derivatives, n-hexane, Stoddard solvent, styrene, trichloroethylene, toluene, xylene. (5-2.q)

r. Personal Flotation Device (PFD). A piece of equipment designed to assist a wearer to keep afloat in water. The wearer may be either conscious or unconscious. Commonly referred to as a life jacket, life preserver, life belt, Mae West, life vest, life saver. (5-2.r)

s. Personal Protective Equipment (PPE). Any equipment worn to minimize exposure to hazards that cause serious workplace injuries and illness. (5-2.s)

t. Physician or Other Licensed Health Care Professional (PLHCP). A physician or other licensed health care professional is an individual whose legally permitted scope of practice (that is, license, registration, or certification) allows him or her to independently perform, or be delegated the responsibility to perform, the activities of a physician. (5-2.t)

u. Qualitative Fit Test (QLFT). A pass/fail fit test to assess the adequacy of respirator fit that relies on the individual's response to the test agent. (5-2.u)

v. Quantitative Fit Test (QNFT). An assessment of the adequacy of respirator fit by numerically measuring the amount of leakage into the respirator. (5-2.v)

w. Radiant Energy. The energy of electromagnetic waves produced by movement of molecules excited by the heat of an electric arc, gas flame, or the passage of electric current. Includes ultraviolet, visible light, and infrared energy. (5-2.w)

x. Sound-Pressure. Steady state sound that does not significantly change in intensity or frequency with time. (5-2.x)

y. Supplied-Air Respirator (SAR) or Airline Respirator. An atmosphere-supplying respirator for which the source of breathing air is not designed to be carried by the user. (5-2.y)

z. Threshold Limit Values (TLV). Airborne concentrations of chemical substances and represent concentrations under which it is believed that nearly all workers may be repeatedly exposed, day after day, over a working lifetime, without adverse health effects. (5-2.z)

aa. Vessel. Every type of watercraft or artificial contrivance used, or capable of being used, as a means of transportation on water, including special-purpose floating structures not primarily designed for or used as a means of transportation on water. (5-2.aa)

bb. Wildland Fire. A planned or unplanned fire involving wildland fuels. (5-2.bb)

5-3. Personnel Required Qualification/Training.

a. Personnel Protective Equipment (PPE). All employees required to use PPE must be trained and demonstrate an understanding of the following for each component of PPE prior to use: (5-3.a)

(1) Proper use, to include knowing when to use, selecting the appropriate PPE for specific hazards, donning, doffing, and adjusting.

(2) Care procedures, to include maintenance, inspection, testing, storage, cleaning, and disposal.

(3) Any limitations of the equipment, to include the useful life.

b. Hearing Protection. (5-3.b)

(1) Employees exposed to hazardous noise and/or ototoxic chemicals must be trained according to 29 CFR 1910.95 (contractors) or ER 385-1-89 (USACE only).

(2) Personnel who perform noise evaluations must be trained according to ER 385-1-89 (USACE only).

c. Respiratory Protection. When respiratory protection is required, employees must be qualified and trained according to the following: (5-3.c)

(1) Respiratory Protection Program Administrator (RPPA).

(a) USACE RPPAs must meet the training and qualifications according to ER 385-1-90.

(b) Contractor RPPAs must have documented knowledge and experience to understand OSHA's respiratory protection standard (that is, 29 CFR 1910.134) evaluate respiratory hazards, select appropriate respirators based on identified hazards, and train employees on respirator use.

(2) Respiratory Protection Program Manager (RPPM) (USACE only). USACE RPPMs must meet the training and qualifications according to ER 385-1-90.

(3) Respirator Users. In addition to the elements identified for general PPE training, all employees required to use respirators must be trained before initial use and annually by an RPPA/RPPM thereafter on the following:

(a) Why the respirator is necessary and how improper fit, usage, or maintenance can compromise the protective effect of the respirator.

(b) Capabilities and limitations of the respirator.

(c) How to use the respirator effectively in emergency situations, including situations in which the respirator malfunctions.

(d) How to inspect, put on and remove, use, and check the seals of the respirator.

(e) Procedures for maintenance, cleaning, storage, and disposal of the respirator.

(f) How to recognize medical signs and symptoms that may limit or prevent the effective use of respirators.

(g) The general requirements of the OSHA respiratory protection standard, 29 CFR 1910.134.

(4) Voluntary Respirator Users. Employees who choose to voluntarily use a respirator must be trained on the following:

(a) Correct method of wearing, cleaning, using, and disposal of the respirator.

(b) Limitations of the respirator.

(c) The requirements of 29 CFR 1910.134, Appendix D.

d. Automatic-Inflatable Personal Floatation Device (PFDs) Users. Users of automatic-inflatable PFDs must be trained in the use, including restrictions, maintenance, care, cleaning, storage, inspection, and post-deployment procedures according to the manufacturer's instructions before use. Wearer must be a confident swimmer (that is, able to tread water and swim for 100'). (5-3.d)

e. Lifesaving and Safety Skiffs. When lifesaving and/or safety skiffs are required, employees must be trained to launch and operate the skiff (see para 19-3). (5-3.e)

f. Retraining. When the employer has reason to believe that any affected employee who has been trained does not have the understanding and skill required for the use of the PPE, the employer must retrain the employee to acquire the appropriate skills. (5-3.f)

5-4. Roles and Responsibilities.

a. Employer. The employer is responsible for performing a hazard evaluation of the workplace and performed activities to identify associated hazards and applicable controls. (5-4.a)

(1) To properly identify and assess such hazards, obtain input from SOH personnel or other CPs to review the hazard evaluation and assist when selecting control measures.

(2) When hazards are identified that cannot be eliminated and/or controlled to an acceptable level through higher level controls (see hazard mitigation in paras 1-6 or 2-6, as applicable), PPE may be required. The decision to use PPE must be documented and communicated to each affected employee. Identify necessary PPE for work activities in the applicable AHAs and PHAs. See chapters 1 or 2, as applicable, and paragraph 5-6.

(3) Make all reasonable efforts to accommodate employees with religious beliefs that may conflict with determined PPE requirements. However, when such efforts do not provide the necessary protection (that is, without PPE), require that the employee use the PPE or prohibit the employee from working in the area where the hazard requiring protection exists.

(4) Provide the required PPE for employee use. When employees provide their own PPE, ensure it is adequate to protect against the hazards, including it is properly maintained and sanitized.

b. Employees. Use all PPE and safety equipment as directed by the employer and this manual. (5-4.b)

c. Respiratory Protection. The following roles and responsibilities are specific to respiratory protection (that is, when respirators are required to be used): (5-4.c)

(1) (USACE) Command SOHO. Identify and designate, in writing, an RPPA with the technical qualifications (see ER 385-1-90 Appendix E) and administrative authority to develop, implement, and update (as necessary) the district's Respiratory Protection Program (RPP). The RPPA provides guidance and technical support to organizations responsible for developing and implementing RPPs.

(2) (USACE) RPPM. An RPPM must be assigned, in writing, by all command organizations requiring a RPP. The RPPM administers the program with support of the RPPA and command SOHO.

(3) RPPA/RPPM. The RPPA/RPPM or their designee must provide respirator use training annually (or earlier if the requirements change significantly due to process changes or changes in site specific operations) to personnel using respirators at the facility or project. (USACE) The RPPM must develop annual training requirements with help from the district IH or RPPA.

5-5. Inspection Requirements.

a. General. Keep a copy of the manufacturer's use, inspection, testing, and maintenance instructions at the jobsite and have it readily available to personnel using the PPE and safety equipment. (5-5.a)

b. Personal Protective Equipment (PPE). Test, inspect, and maintain PPE in a serviceable and sanitary condition according to the manufacturer’s instructions. (5-5.b)

(1) At minimum, PPE must be visually inspected before each use.

(2) Do not use defective or damaged equipment, or equipment that has exceeded its useful life. Tag it as out of service and/or immediately remove it from the work site to prevent use.

(3) Previously used PPE must be cleaned, inspected, and repaired as necessary before issuing to another employee.

5-6. Activity Hazard Analysis (AHA) Requirements.
Develop AHAs according to paragraphs 1-6 or 2-6, as applicable. Each AHA must include all required PPE and safety equipment, including type, quantity, ratings, and any replaceable materials. Select PPE and safety equipment according to the specific protection in paragraph 8 of this chapter, or as otherwise stated in this manual.

5-7. Minimum Plan Requirements.

a. Hearing Conservation Program (HCP). An HCP is required when employees are exposed to hazardous noise and/or toxic chemicals. USACE employees will follow ER 385-1-89. When required, contractors must develop and implement a written, site-specific HCP according to 29 CFR 1910.95, ACGIH TLVs, and this manual, to include the following: (5-7.a)

(1) The identification and documentation of the engineering controls, PPE, and hearing testing for all employees.

(2) Employee training on the hazards of noise and the methods of protection provided (see para 5-3.b).

(3) Labeling of all noise hazardous equipment and areas as required above.

(4) Pre-employment, annual, position change, and end-of-employment hearing testing of individuals working in noise hazardous environments greater than 30 days a year.

b. Respiratory Protection Program (RPP). A RPP is required when employees are required to use respirators. A written site-specific RPP must be developed and implemented according to this manual, 29 CFR 1910.134 (contractors), and ER 385-1-90 (USACE), to include the following: (5-7.b)

(1) Methods used to identify and evaluate workplace respiratory hazards.

(2) Procedures for selecting respirators for use in the workplace.

(3) Medical evaluations of employees required to use respirators.

(4) Fit testing procedures for tight-fitting respirators.

(5) Procedures for proper use of respirators in routine and reasonably foreseeable emergency situations.

(6) Procedures and schedules for cleaning, disinfecting, storing, inspecting, canister/cartridge change-out, repairing, discarding, and otherwise maintaining respirators.

(7) Procedures to ensure adequate air quality, quantity, and flow of breathing air for atmosphere-supplying respirators.

(8) Training of employees in the respiratory hazards to which they are potentially exposed during routine and emergency situations (see para 5-3.c).

(9) Training of employees in the proper use of respirators, including putting on and removing (donning and doffing) the respirator, any limitations on their use of the respirator, pre-use testing procedures, and respirator maintenance (see para 5-3.c).

(10) Procedures for regularly evaluating the effectiveness of the program.

(11) Project/facility-specific voluntary use guidelines and a requirement for voluntary users to learn and understand the contents of 29 CFR 1910.134 Appendix D, (Mandatory) Information for Employees Using Respirators When Not Required under the Standard.

5-8. General Requirements.

a. Minimum Requirements. (5-8.a)

(1) Employees must wear clothing suitable for the weather and work conditions. For fieldwork (for example, construction sites, industrial operations and maintenance activities, emergency operations, regulatory inspections), at a minimum, this is:

(a) Short sleeve shirt.

(b) Long pants (excessively long or baggy pants are prohibited).

(c) Leather or other protective footwear. Open-toed shoes are prohibited (see para 5-8.i.).

(2) The use of PPE and safety equipment is a control measure that should only be used after a hazard evaluation is preformed and it is determined that the hazards cannot be eliminated and/or controlled to an acceptable level through engineering design or administrative actions, or as a secondary control to provide an additional layer of protection. See paragraphs 5-4 and 1-6.a or 2-6.a, as applicable.

(a) Employers must identify and provide the required PPE for employee use. Identify PPE required for work activities in the applicable AHAs and PHAs. See paragraph 5-6 and chapters 1 or 2, as applicable.

(b) Employees must use all PPE and safety equipment as directed by the employer and this manual (see para 5-4).

(3) All employees required to use PPE must be trained according (see para 5-3).

(4) All PPE must be inspected, tested, and maintained according to the manufacturer's instructions (see para 5-5).

b. Head Protection (that is, hard hats or helmets). Head protection is required when there is a potential for head injury from, to include but not limited to, impact, falling or flying objects, or electrical burns. (5-8.b)

(1) Select the proper head protection based on the activity and according to the manufacturer's instructions.

(a) All head protection must meet the requirements of ANSI Z89.1.

(b) All persons working in or visiting hard hat areas must be provided with and required to wear Type I or Type II, Class G or Class E head protection as appropriate.

(c) Select Type II head protection for emergency response operations and other activities with greater need for side impact protection (see chapter 37).

(d) Class E head protection must be worn when working near or on electric lines and equipment.

(2) Generally, all construction areas are considered hard hat areas. However, specific areas may be designated as non-hard hat areas or activities may be considered non-hard hat activities, if identified and properly documented in the associated AHA.

(3) Post a warning sign requiring the use of head protection according to chapter 8.

(4) Do not make any modifications to a hard hat or helmet shell, suspension, or other associated components (for example, paint, drill holes), except when such changes are applied or approved by the manufacturer. Stickers are allowed provided they do not interfere with the ability to properly inspect it.

(5) Do not wear ball caps, knit caps, or other headdress under the head protection that could interfere with the fit or stability, unless authorized or provided by the manufacturer.

(6) Perform a daily visual inspection of protective headgear and components for signs of damage (for example, dents, cracks) that might reduce the degree of safety integrity originally provided. Periodically inspect headgear for ultraviolet degradation as evidenced by cracking or flaking of the helmet. (See para 5-5)

(7) Wear chin straps on hard hats or helmets during high wind conditions or working on elevated structures.

(8) Protective headgear worn by USACE employees must, in addition to complying with the preceding specifications, be:

(a) White in color and marked with a 1-inch (2.5 cm) band of red reflective material placed along the base of the crown with 5 inches (12.7 cm) break in front. Have a red Corps of Engineers castle insignia centered at the front of the hat with the base of the insignia approximately three-quarter (¾) inch (1.9 cm) above the base of the crown. Personnel may place their name above the insignia and their organization title below the insignia. The rank of military personnel should precede their name. An American Flag insignia may be worn on the back of the hard hat.

(b) Submit requests for variations in color and marking to accommodate occupational specialties for consideration to HQUSACE-SO.

c. Eye and Face Protection. Eye and/or face protection is required when there is a potential for eye and/or face injury (see table 5-1). (5-8.c)

(1) Eye and face protection must meet the requirements of ANSI/ISEA Z87.1 and bear a legible and permanent "Z87" logo to indicate compliance with the standard.

(2) Eye and face protection must be distinctly marked to identify manufacturer.

(3) When eye protection is required, protect those whose vision requires the use of corrective lenses, whether via the use of contact lenses or eyeglasses, by one of the following:

(a) Prescription safety glasses providing optical correction and equivalent protection.

(b) Protective glasses with side shields designed to fit over corrective lenses without disturbing the adjustment of the glasses.

(c) Goggles that can be worn over corrective lenses without disturbing the adjustment of the glasses.

(d) Goggles that incorporate corrective lenses mounted behind the protective lenses.

(4) Personnel who are considered blind in one eye and are working in other than administrative functions must always wear safety glasses with side shields.

(5) Operations involving the handling of harmful materials (for example, acids, caustics, hot liquids, creosoted materials) and operations where protection from gases, fumes, and liquids is necessary require the wearing of goggles with cups of soft pliable rubber and suitable face shields, masks, or hoods that cover the head and neck, and other protective clothing appropriate to the hazards involved.

(6) Wear ANSI Z80.3 compliant glare-resistant glasses with an ultraviolet A-region (UVA) and ultraviolet B-region (UVB) 99% filtration when conditions require protection

against glare. When conditions so warrant, polarized lenses must also be considered. Tinted or automatically darkening lenses should not be worn when work tasks require the employee to pass often from brightly to dimly lighted areas. For welding, cutting, brazing and soldering operations see table 5-2 for required shades.

d. Hearing Protection and Noise Control. Hearing protection is required when occupational exposure limits (OELs) are exceeded and engineering and/or administrative exposure controls are either infeasible or unable to reduce exposure levels to an acceptable level, or when required by regulation. (5-8.d)

(1) Conduct a noise evaluation and take noise measurements initially and regularly during work, or whenever there is difficulty in communicating at distances less than 3 feet (0.9 m) apart, upon worker complaint of excessive noise, or whenever hazardous noise levels are suspected. Personnel who perform noise evaluations must be trained according to ER 385-1-89 (USACE only). (See para 5-3.b)

(2) Noise Measurement Instruments. When conducting noise measurements, adhere to the following:

(a) For continuous (steady-state) noise and impact (impulse) noise, set the instrument according to table 5-3.

(b) Use noise dosimeters that can measure the employee's entire work shift for full-shift sampling.

(c) Calibrate noise measuring equipment according to the manufacturer’s instructions. (USACE refer to ER 385-1-89)

(3) Employee Exposure. To assess employee exposures to noise, contractors must follow the ACGIH TLV continuous noise exposure standards in table 5-4, whereas USACE must follow ER 385-1-89.

(a) For impact (impulse) noise, personnel exposures must not exceed 140 dBC without effective hearing protection devices.

(b) For continuous (steady-state) noise, personnel exposures must not exceed 85 dBA without effective hearing protection devices.

(c) When the daily noise exposure is composed of two or more periods of noise exposure of different levels, the combined effects must be considered. See ACGIH TLVs and BEIs for additional information.

(4) When hazardous noise and/or exposure to ototoxic chemicals is known or expected, develop a HCP according to paragraph 5-7.a.

(5) Control Measures. When personnel are exposed to noise levels exceeding the limits identified in paragraph 5-8.d(3), control measures must be implemented according to the following. Identify necessary control measures for work activities in applicable AHAs. (See para 5-6)

(a) Engineering controls are the most effective of controlling exposures to excessive noise in the workplace. Implement when possible. These controls may include lubrication, isolation, damping, baffles, or other methods.

(b) Administrative Controls.

(b-1) Post all noise-hazardous areas and equipment to indicate the presence of hazardous noise levels and the requirement for hearing protection. If noise hazards impact personnel working in adjacent areas, notify the individuals in the adjacent areas of the noise values and offer hearing protection.

(b-2) If noise exposure to employees cannot be reduced to below the required standard, operating time limits may be imposed.

(c) PPE.

(c-1) Hearing protection devices must provide for the attenuation of noise to acceptable levels (that is, 85 dBA for continuous (steady-state) noise). If necessary to hear audible warnings, hearing protection devices should not attenuate noise levels below an individual's hearing threshold (that is, approximately 20-30 dBA).

(c-2) Double hearing protection (that is, the combination of earplugs with earmuffs) is required whenever employees are exposed to continuous noise greater than 103 dBA and up to 108 dBA. Double hearing protection may not attenuate the noise sufficiently at steady- state noise levels greater than 108 dBA. Therefore, more control measures (for example, limiting individual exposure time) are required.

(c-3) Determine the attenuation of the specific hearing protection, except custom ear mold hearing protection, using the NIOSH de-rating scheme. See NIOSH 98-126 and OSHA Technical Manual, Health Hazards, Section III: Chapter 5 Noise for estimating the de-rating of hearing protection.

(c-4) Ear insert devices, to include disposable, pre-formed, or custom-molded earplugs, must be fitted to the exposed individual by an individual trained in such fitting and able to recognize the difference between a good and poor fit. Plain cotton is not an acceptable hearing protection device.

(c-5) An earplug carrying case must be provided to exposed employees when feasible.

(c-6) Employees required to wear hearing protection must be trained according to paragraph 5-3.b.

e. Respiratory Protection. Respirators are required when OELs are exceeded and engineering and/or administrative exposure controls are either infeasible or unable to reduce exposure levels to an acceptable level, or when required by regulation. See 29 CFR 1910.134 (contractors) and ER 385-1-90 (USACE). (5-8.e)

(1) When respiratory protection is required in the form of respirators, develop a RPP according to paragraph 5-7.b. For roles and responsibilities of the RPP, see paragraph 5-4.c, and for applicable training requirements see paragraph 5-3.c.

(2) Respirator Selection and Use. Respirators must be selected by the RPPA (contractor)/RPPM in coordination with the RPPA (USACE) based on knowledge of the hazards and work methods to determine the highest potential exposure. Objective industrial hygiene data for the particular task or similar operations, as appliable, may also be used to assist in selection.

(a) All respirators must be NIOSH-certified.

(b) Respirator canisters/cartridges must be changed out according to the manufacturer's instructions or as specified by the RPPA/RPPM based on the operations, the objective industrial hygiene data, or from knowledge of similar operations.

(c) Do not use air-purifying respirators in atmospheres with less than 19.5% oxygen or in at atmosphere that is IDLH.

(d) If atmosphere-supplying respirators (for example, SARs, SCBAs) are used, the following requirements apply (excludes underwater diving SCBAs, see chapter 30):

(d-1) Air supply must meet the Grade D breathing air requirements according to ANSI/CGA G-7.1. Representative samples of purchased breathing air must be taken and tested according to ASTM F3387 using an NFPA 1989 accredited lab.

(d-2) If used in an atmosphere that has the potential to become IDLH, the respirator must have an alternate source of breathing air for escape from the environment.

(d-3) If an airline respirator is used in an environment that has the potential to become IDLH, a respirator air attendant must be present to prevent the lines from becoming tangled or tied, to change the air supply tanks, and/or to confirm the air source (for example, compressor, air supply tank manifold) is adequately working. If the air supply is interrupted, the attendant must immediately notify the respirator user to leave the area where respirator use is required.

(3) Fit Testing. Perform fit testing on all employees required to wear respirators with tight-fitting face pieces, including SARs and SCBAs, according to the procedures identified in the RPP to ensure that selected respirators achieve a proper face-to-facepiece seal. Fit testing must be performed before initial use of the selected respirator, whenever respirator size, make or model is changed, and at least annually.

(4) Medical Evaluation. All respirator users, except for employees approved for voluntarily use of filtering facepieces as specified in paragraph 5-8.e(6) below, must be medically evaluated to ensure they are fit enough to wear the selected respirators before being fit tested. All USACE respirator users must have a pre-placement history and targeted physical according to ER 385-1-90. Evaluation options for respirator use include:

(a) Completion of the respirator questionnaire from 29 CFR 1910.134, Appendix C, OSHA Respirator Medical Evaluation Questionnaire. A PLHCP will review the questionnaire and may recommend medical exams and testing. The employer must ensure that a follow-up medical examination is provided for the PLHCP recommendations prior to the user receiving medical clearance.

(b) Respirator Medical Evaluation Service. An online, mail-in or in-person evaluation service for the purpose of clearing an employee to wear selected respirators may be used provided it is supervised by a PLHCP and based upon to 29 CFR 1910.134, Appendix C.

(c) Provide additional medical evaluations when an employee reports medical signs or symptoms that are related to the ability to use a respirator; or a change occurs in workplace conditions (for example, physical work effort, protective clothing, temperature) that may result in a substantial increase in the physiological burden placed on an employee.

(d) Medical Clearances. Medical clearances to wear respirators must include the following:

(d-1) Telephone, e-mail, and physical address of the medical facility/provider.

(d-2) Printed name of the PLHCP along with his/her signature.

(d-3) The statement of clearances or respiratory limitations only (that is, no personal medical information or employee social security number may be included).

(d-4) Date of examination and date that clearance expires.

(5) Recordkeeping. Employers (Contractor)/RPPM (USACE) must establish and retain written information regarding medical evaluations, fit testing, and the respirator program. The following must be made available upon request:

(a) Records of medical approval.

(b) Fit test records must be kept for respirator users until the next fit test is administered. Establish a record of the QLFT and QNFT administered to an employee including:

(b-1) The name or identification of the employee tested.

(b-2) Type of fit test performed and name of the test administrator.

(b-3) Specific make, model, style, and size of respirator tested.

(b-4) Date of test.

(b-5) The pass/fail results for QLFTs or the fit factor and strip chart recording or other recording of the test results for QNFTs.

(6) Voluntary Use. The employer may allow the voluntary use of NIOSH-approved particulate filtering facepiece respirators (for example, N-95, P-95) in atmospheres that are below acceptable OELs (that is, a respirator is not required) and where such use will not in itself create a hazard, as determined by the RPPA (contractor)/RPPM in coordination with the RPPA (USACE). Before such use, the employee must be trained according to paragraph 5-3.c(4).

f. High-Visibility Safety Apparel (HVSA). HVSA is required when there are hazards associated with personnel visibility. (5-8.f)

(1) All HVSA must meet the requirements of ANSI/ISEA 107.

(2) Class 2 (Type R or P) HVSA must be worn whenever:

(a) There is limited visibility of workers exposed to mobile/heavy equipment operations, vehicles, load handling, or other hazardous activities.

(b) Reduced visibility conditions exist due to weather conditions (for example, rain, snow), illumination, or visually complex backgrounds where ambient visibility is at least 50 feet (15.2 m).

(c) Workers are exposed to vehicular or equipment traffic at speeds up to 35 mph (56.3 km/h).

(3) Class 3 (Type R or P) HVSA must be worn whenever:

(a) Reduced visibility conditions exist due to weather conditions (for example, rain, snow), illumination, or visually complex backgrounds where ambient visibility is less than 50 feet (15.2 m).

(b) Workers are exposed to vehicular or equipment traffic in excess of 35 mph (56.3 km/h).

(c) Workers are performing tasks which divert attention from approaching vehicular traffic, traveling in excess of 35 mph (56.3 km/h), as posted.

(d) Workers are involved in activities near vehicular traffic with no protective barriers.

(4) When working at night, on or near sites where vehicles are present, workers must wear, at a minimum, a Class 3 high-visibility safety coverall/jumpsuit or a Class 3 high-visibility safety jacket and Class E high-visibility pants, or bib overalls.

(5) If the use of high-visibility safety apparel proves to create a greater hazard due to moving machinery, pinch points, heat stress, or other reasons, develop an AHA detailing rationale for infeasibility of use and alternate safety measures to be used to ensure same level of worker safety and submit to the USACE supervisor for approval or acceptance by the KO or COR. Work may not commence until such acceptance has been obtained. (See para 5-6)

(6) The apparel background material color must be either fluorescent yellow-green, fluorescent orange-red, or fluorescent red (see ANSI/ISEA 107). When choosing color, consider optimization of color conspicuity between the wearer and work environment.

(7) All high-visibility apparel must be:

(a) Free of roughness, sharp edges, or projections that could cause irritation or injury.

(b) Correctly fitted to ensure that it remains in place for the expected period of use, environmental conditions, and wearer movements.

(c) Cleaned, laundered and/or dry-cleaned according to the manufacturer's instructions (for example, the label located on the apparel).

(d) In useable condition with limited rips, tears or fading.

(e) Inspected to ensure that the PPE meets the updated performance requirements including background material and reflective or combined-performance material and has been tested by an accredited laboratory.

(f) Replaced if it does not comply with any of the above or ANSI/ISEA 107.

g. Personal Flotation Devices (PFD). PFDs are required when there are hazards associated with water, to include but not limited to drowning. (5-8.g)

(1) Employers must provide, and users must properly wear (that is, zipped, tied, latched) inherently buoyant Type III, Type V work vests, or better USCG-approved PFDs in the following circumstances (see figure 5-1):

(a) On floating pipelines, pontoons, rafts, or stages.

(b) On structures or equipment extending over or next to water except where guardrails, personal fall protection system, or safety nets are provided for employees (see chapter 21).

(c) Working alone at night where there are drowning hazards, regardless of other safeguards provided.

(d) On vessels or floating plants, unless inside an enclosed cabin or cockpit.

(e) Whenever there is a drowning hazard.

(2) Automatic-inflatable PFDs Type V or better, USCG-approved for Commercial Use, may be worn by workers in lieu of paragraph 5-8.g(1), provided the following criteria is met:

(a) Personnel must be trained according to paragraph 5-3.d.

(b) In-water testing is performed prior to use for all first-time users so that wearers become familiar with the feel and performance of the PFD.

(c) PFDs must be inspected, maintained, stowed, and used according to the manufacturer's instructions. PFDs used in heavy construction or maintenance activities, or where hot work (for example, welding, brazing, cutting, soldering) is performed, must be designed, tested, and certified by the manufacturers for this type of work. An AHA must be developed for the intended activity and must identify the most appropriate PFD for the hazard(s) identified. (See para 5-6)

Note. The standard commercial auto-inflatable PFD often does not meet these requirements.

(d) PFDs must provide a 30-pound minimum buoyancy, post-deployment, and must have a status indicator window.

(e) PFDs are worn by workers over 16 years of age who weigh 90 lbs. (40.8 kg) or more.

(f) All auto-inflatable PFDs must be worn at all times a drowning hazard exists. The USCG-approval for auto-inflatable PFDs is contingent upon the PFD being worn, not stowed.

(3) All wearable PFDs must be international orange, orange/red, or ANSI 107 yellow-green in color.

(a) Each inherently buoyant PFD must have at least 31 in^2 (200 cm^2) of retroreflective material attached to its front side and at least 31 in^2 (200 cm^2) on its back side, per USCG requirements (see 46 CFR Part 25.25-15).

(b) Each auto-inflatable PFD must have at least 31 in^2 (200 cm^2) of retroreflective material attached to its front side and at least 31 in^2 (200 cm^2) on its bladder that is visible when deployed (with the exception of Work Vests, which are allowed to have a total of 31 in^2 (200 cm^2) front and back, combined).

(4) Equip each PFD with a USCG-approved automatically activated light. Lights are not required for PFDs on projects performed exclusively during daylight hours.

(5) Before and after each use, inspect PFDs for defects that would alter its strength or buoyancy.

(6) Throwable Devices (Type IV PFD). See chapter 19 for requirements when working on vessels.

(a) All throwable devices must be USCG-approved.

(b) Ring buoys must be readily available and at intervals of not more than 200 feet (61 m) on pipelines, walkways, wharves, piers, bulkheads, lock walls, scaffolds, platforms, and similar structures extending over or immediately next to water. When the fall distance to the water is more than 45 feet (13.7 m), life rings must be used.

(c) Ring buoys must have at least 90 feet (27.4 m) of three-eighths (3/8) inch (1 cm) of attached solid braid polypropylene, or equivalent. Life rings are not required to have rope attached.

(d) Equip all PFDs with retroreflective tape according to USCG requirements.

(e) On all non-USCG inspected vessels and shore installations, lights on life rings are required only in locations where adequate general lighting (for example, floodlights, light stanchions) is not provided. For these plant and installations, at least one life ring, and every third one thereafter must have an automatic floating electric water light attached.

(f) Store all devices in such a manner as to allow immediate deployment and will be protected from degradation from weather and sunlight.

(g) Throw bags may be used in addition to life rings or ring buoys.

(h) These throwable devices and lifelines must be inspected at a minimum, every six months.

(7) Safety Blocks. At all navigation locks, perform an analysis of the benefits versus the hazards of using floating safety blocks (that is, blocks that may be quickly pushed into the water to protect individuals who have fallen in the water from being crushed by vessels). If the use of blocks is found acceptable, consider the size and placement of the blocks, the appropriate means of securing and signing the blocks, etc. When the use of blocks is found unacceptable, develop alternative safety measures.

h. Hand Protection. Hand protection is required when there is a potential for hand injury from, to include, but not limited to, absorption of harmful substances, cuts or lacerations, abrasions, punctures, chemical burns, thermal burns, temperature extremes, or vibration (see table 5-5). (5-8.h)

(1) Select appropriate hand protection based on an evaluation of the performance characteristics of the hand protection relative to the task(s) to be performed, conditions present, duration of use, and the hazards and potential hazards identified.

(2) Gloves must fit snugly.

(3) All hand protection must meet the requirement of ANSI 105, ASTM F18 (Electrical hazard resistance), F2292 (cut resistance) (see also table 5-6), F2878 (needle puncture resistance), F739 (Chemical permeation), D3889 or D3884 (Abrasion resistance), F 1358 (Heat and Flame Protection), F1060 (Conductive Heat Resistance), and ANSI S2 (Vibration Reduction).

i. Protective Footwear. Foot protection is required when there is a potential for foot injury from, to include but not limited to, impact, puncture, or electrical hazards. (5-8.i)

(1) Protective footwear providing protection against impact and compressive forces, conduction hazards, electrical hazards, slip resistance, and sole puncture must meet ASTM F2413 and ASTM F2412. Footwear providing protection against impact and compression hazards must be rated as I/75 and C/75. Employees may wear protective footwear that the employer demonstrates to the USACE supervisor/KO or COR satisfaction is at least as effective as protective footwear that is constructed according to either of the two ASTM standards.

(2) Add on devices, such as protective toe caps and puncture resistant devices, are allowed as long as they are used as an integral and permanent part of the protective footwear and meet the requirements of ASTM F2413.

(3) Unexploded ordnance (UXO) personnel whose job tasks require protective footwear but require no metal parts in or on their footwear must wear conduction protective footwear with protective toe cap/composite toe footwear.

(4) Personnel participating in wild land fire management activities must wear NFPA 1977 compliant leather lace-up boots with slip-resistant soles, such as a hard rubber lug-type or tractor tread, and a top height of 8 inches (20.3 cm) or more. Soles must not be made of compounds that have low melting points (for example, rubber or plastic).

j. Full-Body Protection. Full-body protection is required when there is a potential for bodily injury from, to include but not limited to, radiation, temperature extremes (air or water), hot splashes from molten metals and other hot liquids, impacts from tools, machinery, or materials, or hazardous chemicals or substances. (5-8.j)

(1) Select appropriate body protection based on an evaluation of the performance characteristics of the body protection relative to the task(s) to be performed, conditions present, duration of use, and the hazards and potential hazards identified. Employers must ensure that their employees wear PPE only for the parts of the body exposed to possible injury. Examples of body protection include laboratory coats, coveralls, vests, jackets, aprons, surgical gowns, and full body suits. Working near or over the water, protection may include full body anti-exposure suit or dry suit with PFD.

(2) Protective clothing comes in a variety of materials, each effective against particular hazards, such as:

(a) Paper-like fiber disposable suits provide protection against dust and splashes.

(b) Treated wool and cotton adapts well to changing temperatures, is comfortable, and fire-resistant and protects against dust, abrasions, and rough and irritating surfaces.

(c) Duck is a closely woven cotton fabric that protects against cuts and bruises when handling heavy, sharp, or rough materials.

(d) Leather is often used to protect against dry heat and flames.

(e) Rubber, rubberized fabrics, neoprene, and plastics protect against certain chemicals and physical hazards.

(f) Check with the clothing manufacturer to ensure the material selected will protect against the specific hazard. Manufacturer information must be available onsite.

(g) Chemicals with designations “prevent skin contact” or “skin” indicate there is a potential dermal hazard. For situations where direct skin contact may occur, chemical protective clothing providing resistance to permeation, penetration, and degradation is recommended.

(3) Protective leg chaps made of cut-resistant material must be worn by workers who operate chainsaws. Protective leg chaps must meet the specifications in ASTM F1897.

(4) For personal fall protection equipment, including lineman's equipment (electrically rated harnesses), see chapter 21.

(5) If a hazard assessment indicates a need for full body protection against toxic substances or harmful physical agents, the clothing should be carefully inspected before each use, it must fit each worker properly, and it must function properly and for the purpose for which it is intended.

k. Electrical Protective Equipment. Electrical protective equipment (for example, tools, PPE) is required when persons perform work that involves exposure to electrical hazards. (5-8.k)

(1) Inspect, test, and maintain all electrical protective equipment in safe conditions according to the manufacturer's instructions and table 5-7 (see para 5-5).

(a) Perform an air test on rubber insulating gloves before each use.

(b) Perform periodic electrical tests on rubber insulating gloves before first issue and every 6 months thereafter.

(c) Perform periodic electrical tests on rubber insulating blankets and sleeves before first issue and every 12 months thereafter, or when the insulating value is suspect (rubber insulating covers) according to 29 CFR 1910.137.

(2) Employees must use electrical protective gloves, sleeves, blankets, covers and line hoses as required by special conditions for work on energized components. Rubber goods provided to protect employees who work on energized components must meet ASTM Committee F18 standards or equivalent as determined by the Authority Having Jurisdiction (AHJ) (see chapter 11).

(3) Protective clothing and other PPE must be provided for any person entering the arc flash protection boundary and the limited approach boundary based on the electrical hazard risk assessment (see chapter 11).

(a) Do not wear synthetic clothing (for example, acetate, nylon, polyester, rayon), either alone or in blends with cotton while in the arc flash protection boundary.

(b) Employees must wear protective eye equipment when identified within the electrical hazard assessment.

(c) Employees must wear arc-rated clothing whenever they may be exposed to potentially energized components (see table 5-8).

(c-1) Arc-rated suits and their closure design must allow easy and rapid removal.

(c-2) The entire arc-rated suit, including the window, must have energy-absorbing characteristics suitable for arc flash exposure.

(c-3) Clothing and equipment required by the degree of electrical hazard exposure can be worn alone or be integrated with normal apparel.

(c-4) Protective clothing and equipment must cover associated parts of the body and all normal apparel that is not flame-resistant, while allowing movement and visibility.

(d) Employees must wear rubber-insulating gloves where there is a danger of hand or arm injury from electric shock or arc flash burns due to contact with energized components. Gloves made from layers of flame-resistant material provide the highest level of protection. Leather glove protectors should be worn over voltage-rated rubber gloves.

(4) Dielectric footwear is required where step and touch potential protection is necessary based on the electrical hazard assessment.

(5) Protective equipment of material other than rubber must provide equal or better electrical and mechanical protection

(6) Other protective equipment needed when performing electrical work (for example, insulated tools, fuse or fuse holder handling equipment, temporary protective grounds (TPG), fiberglass rods, ladders, protective, rubber insulation and guard equipment) must be manufactured to meet the standard specifications listed in NFPA 70E. Test all protective equipment using the standard testing methods listed in NFPA 70E.

(7) Only live-line tool poles having a manufacturer's certification to withstand at least the following test may be used: 100 (kilovolts) kV AC per ft (305 mm) of length for 5 minutes or 75 kV AC per ft (305 mm) for fiberglass-reinforced plastic (FRP) tools. Maintain records for all live-line tools to demonstrate satisfactory accomplishment of laboratory and shop test.

(8) Wooden tools are not authorized for use.

(9) When using live-line tools, workers must use voltage rated gloves and not place their hands closer than necessary to energized conductors or to the metal parts of the tool.

(10) Use only tools and equipment intended for live-line bare hand work on transmission lines. The tools must be kept dry and clean and must be visually inspected before use each day.

(11) Tools must be insulated and manufactured to meet ASTM F18. The insulating portion of tool must be made of FRP.

(12) Tools must be insulated and manufactured to meet ASTM standards as referenced in table 5-7 or equivalent as determined by the AHJ.

l. Lifesaving Skiffs. A skiff ensures prompt rescue of employees that fall into the water, regardless of other precautions taken to prevent this from occurring. A skiff supplies a backup to potential failures of fall protection devices, the use of fall protection systems is not a substitute for the skiff. (5-8.l)

(1) Lifesaving and/or safety skiffs are required during construction activities where work is performed over or immediately next to water irrespective of the fall protection provided. During any operations and maintenance activities that cause an employee to work outside the designated permanently installed safety controls (that is, guardrails) at least one lifesaving skiff should be immediately available.

(2) Provide personnel trained in launching and operating the skiff readily available during working hours. Lifesaving personnel must perform a lifesaving drill to include the launching and recover of the skiff before the initiation of work at the site and periodically thereafter as specified by the USACE supervisor/KO or COR (at least monthly or whenever new personnel are involved). (See paragraph 5-3)

(3) An employer must have a lifesaving skiff available that could, at the minimum, retrieve an employee from the water no more than three to four minutes from the time they entered the water. However, if there are any additional hazards, such as very cold water, rapids an employee could be swept into, etc., the lifesaving skiff would have to be able to retrieve an employee before they sustained injuries because of those additional hazards.

Note. If the water is so shallow that rescuers could simply run in (and a skiff would foul on the bottom anyway), a skiff may not be required.

(4) Required equipment onboard must meet or exceed USCG requirements and the requirements of chapter 19 of this manual. Skiffs must be equipped as follows:

(a) Four (4) oars, or two (2) if the skiff is motor powered.

(b) Oarlocks attached to gunwales or the oars.

(c) One (1) ball-pointed boat hook.

(d) One (1) ring buoy with 60 feet (18.3 m) of three-eighths (3/8) inch (1 cm) solid braid polypropylene, or equivalent, line attached.

(e) PFDs in number equaling the skiff rating for the maximum number of personnel allowed on board.

(f) Fire extinguisher.

(5) In locations where waters are rough or swift, or where manually operated boats are not practical, provide a power boat suitable for the waters and equip it for lifesaving.

(6) Skiffs and power boats must have buoyant material capable of floating the boat, its equipment, and the crew.

(7) Vessels without permanently mounted navigation lights (for example, skiffs), must be equipped with portable battery-operated navigation lights and use them during night operations.

(8) Provide additional skiffs as necessary based on the task, hazards, availability, etc.

5-9. Figures and Tables.

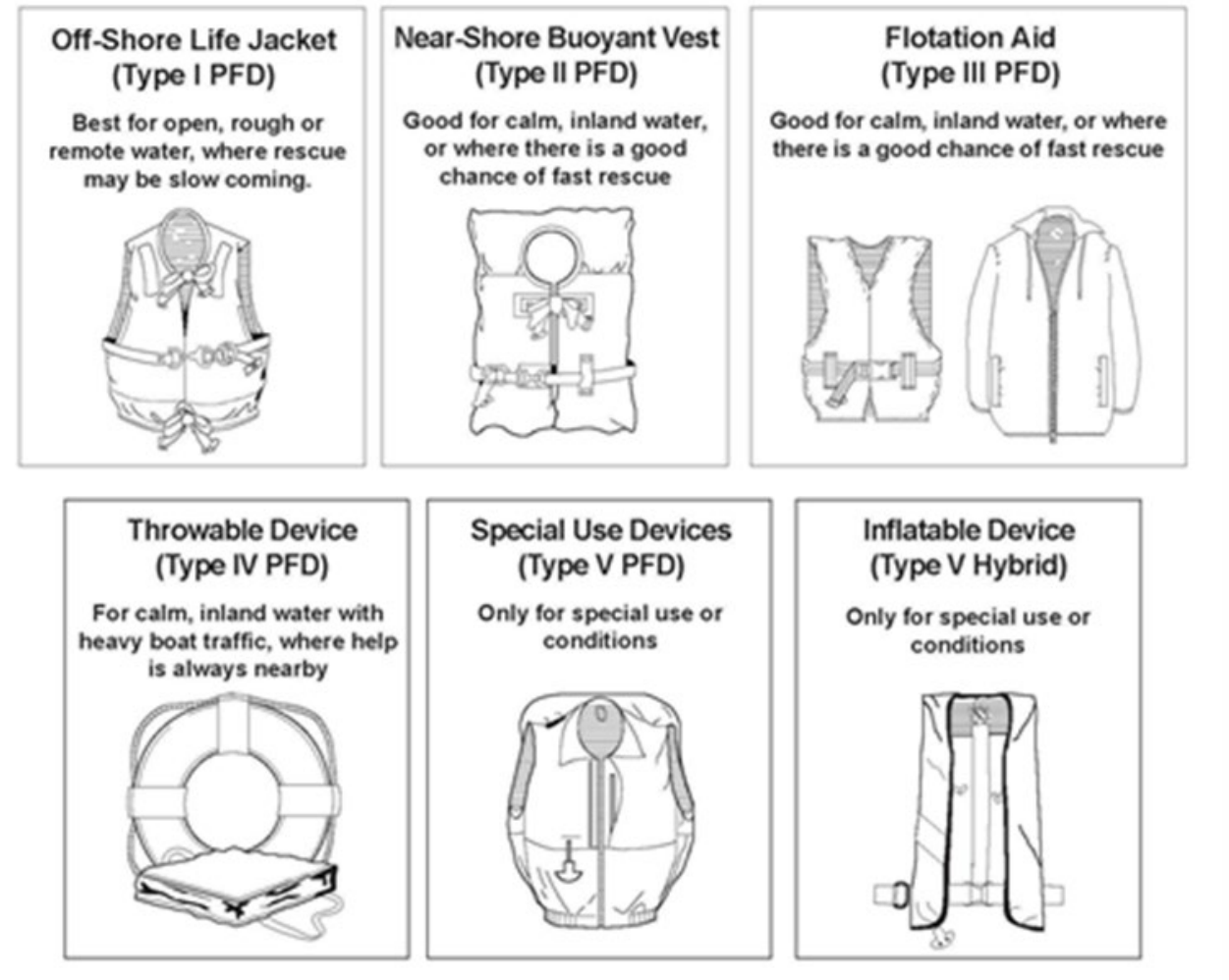


Figure 5-1. Personal Floatation Devices (PFD)

Table 5-1
Eye and Face Protector Section Guide

Hazard	Protectors	Limitations	Marking[1]
IMPACT - Chipping, grinding, machining, masonry work, riveting, and sanding			
Flying fragments, objects, large chips, particles, sand, dirt, etc.	• Spectacles with side protection • Goggles with direct or indirect ventilation • Face shield worn over spectacles or goggles • Welding helmet worn over spectacles or goggles • Loose-fitting respirator worn over spectacles or goggles • Full-facepiece respirators	Caution should be exercised in the use of metal frame protective devices in electrical hazard areas. Metal frame protective devices could potentially cause electrical shock and electrical burn through contact with, or thermal burns from exposure to the hazards of electrical energy, which include radiation from accidental arcs. To provide adequate protection, ensure goggles fit tightly to the face. Atmospheric conditions and the restricted ventilation of a protector can cause lenses to fog. Frequent cleaning may be required.	Impact rated: + (spectacle lens) Z87+ (all other lens) Z87+ (plano frame) Z87-2+ (Rx frame)
HEAT - Furnace operations pouring, casting, hot dipping, gas cutting, and welding			
Hot sparks	• Spectacles with side protection • Goggles with direct or indirect ventilation • Face shield worn over spectacles or goggles • Loose-fitting respirator worn over spectacles • Full-facepiece respirator	Spectacles, cup, and cover type goggles do not provide unlimited facial protection. Operations involving heat may also involve optical radiation. Protection from both hazards must be provided.	*Note*. There are currently no marking designations for eye protection to heat or high-temperature exposure in the ANSI/ISEA Z87.1 standard.

Table 5-1
Eye and Face Protector Section Guide — Continued

Hazard	Protectors	Limitations	Marking[1]
Splash from molten metal	• Face shield worn over goggles • Loose-fitting respirator worn over spectacles or goggles • Full-facepiece respirator	Lens mounting must be able to retain in position all parts of a cracked lens.	
High temperature exposure	• Screen face shield over spectacles or goggles • Reflective face shield over spectacles or goggles		
CHEMICAL - Liquids, acid and chemical handling, degreasing, plating.			
Splash, droplets, and sprays	• Goggles with indirect ventilation (eyecup or cover type) • Face shield worn over goggles) • Loose-fitting respirator worn over spectacles or goggles • Full-facepiece respirator	Atmospheric conditions and the restricted ventilation of a protector can cause lenses to fog. Frequent cleaning may be required. To provide adequate protection, ensure goggles fit tightly to the face.	Splash/droplet: D3
Irritating Mist	• Goggle with no ventilation (cover type) • Face shield worn over goggles • Loose-fitting respirator worn over spectacles or goggles • Full-facepiece respirator	Atmospheric conditions and the restricted ventilation of a protector can cause lenses to fog. Frequent cleaning may be required. To provide adequate protection, ensure goggles fit tightly to the face.	*Note.* There are currently no marking designations for eye protection to irritating mists exposure in the ANSI/ISEA Z87.1 2020 standard.

Table 5-1
Eye and Face Protector Section Guide — Continued

Hazard	Protectors	Limitations	Marking[1]
DUST - Woodworking, buffing, general dusty conditions			
Nuisance dust	• Goggles with direct or indirect ventilation (eyecup or cover type) • Full-facepiece respirator	Atmospheric conditions and the restricted ventilation of a protector can cause lenses to fog. Frequent cleaning may be required. To provide adequate protection, ensure goggles fit tightly to the face.	Dust: D4
Fine dust	• Goggles with indirect ventilation or no ventilation • Full-facepiece respirator	To provide adequate protection, ensure goggles fit tightly to the face.	Fine dust: D5
OPTICAL RADIATION			
Infrared Radiation (IR)	• Spectacles with side protection • Goggles with direct or indirect ventilation • Face shield worn over spectacles or goggles • Welding helmet worn over spectacles or goggles • Loose-fitting respirator worn over spectacles or goggles • Full-facepiece respirators	For proper fit of protector; there must be no penetration of direct infrared spectra light in all non-lens areas. Side shields must have filtering capability equal to or greater than the front lenses.	IR: R and scale number

Table 5-1
Eye and Face Protector Section Guide — Continued

Hazard	Protectors	Limitations	Marking[1]
Visible Light (Glare)	• Spectacles with side protection (UVA and UVB 99% filtration) • Goggles with direct or indirect ventilation • Face shield worn over spectacles or goggles • Welding helmet worn over spectacles or goggles • Loose-fitting respirator worn over spectacles or goggles • Full-facepiece respirators	For proper fit of protector; there must be no penetration of direct visible light in all non-lens areas. Side shields must have filtering capability equal to or greater than the front lenses.	Visible: L and scale number
Ultraviolet (UV) Radiation	• Spectacles with side protection (UVA and UVB 99% filtration) • Goggles with direct or indirect ventilation • Face shield worn over spectacles or goggles • Welding helmet worn over spectacles or goggles • Loose-fitting respirator worn over spectacles or goggles • Full-facepiece respirators	For proper fit of protector; there must be no penetration of direct UV light in all non-lens areas. Side shields must have filtering capability equal to or greater than the front lenses.	UV: U and scale number

Table 5-1
Eye and Face Protector Section Guide — Continued

Hazard	Protectors	Limitations	Marking[1]
Lasers	Refer to ANSI/LIA Z136.1 for guidance in choosing the correct protective eyewear when working with lasers.		*Note.* There are currently no marking designations for eye protection to lasers in the ANSI/ISEA Z87.1 standard.
Electric Arcs	Refer to NFPA 70E "Standard for Electrical Safety in the Workplace", for guidance in choosing the correct protective eyewear when working on electrical equipment.	Only face shields provide compliant eye and face protection, worn over protective spectacles.	*Note.* There are currently no marking designations for eye protection to electrical arcs in the ANSI/ISEA Z87.1 standard.
Arc Welding: Arc Process Examples: Shielded Metal Arc Welding (SMAW) Gas Metal Arc Welding (GMAW) Gas Tungsten Arc Welding (GTAW) Air Carbon Arc Welding (CACA) Carbon Arc Welding (CAW) Plasma Arc Welding (PAW) Plasma Arc Cutting (PAC) Viewing electric arc	• Welding helmet over spectacles or goggles • Face shield over spectacles or goggles • Respirator (if required by AHA) TYPICAL FILTER LENS SHADE: 10-14	Protection from optical radiation is directly related to filter lens density. Select the darkest shade that allows adequate task performance. For proper fit of protector; there must be no penetration of direct visible light in all non-lens areas. Side shields must have filtering capability equal to or greater than the front lenses. Welding helmets are intended to shield the eyes and face from optical radiation, heat, and impact. Welding helmets should not be used as stand-alone protective devices and should be worn in conjunction with goggles or spectacles.	Welding: W shade number UV: U scale number IR: R scale number Variable tint: V Special purpose: S

Table 5-1
Eye and Face Protector Section Guide — Continued

Hazard	Protectors	Limitations	Marking[1]
furnaces and boilers.	•	Filter lens shade selection is to be made based on the welding process, arc current, electrode size and/or plate thickness. Use ANSI Z49.1:2012, table 1, Guide for Shade Numbers, to select the proper filter lens shade for both protection and comfort (reduction in visible glare). *Note.* Filter lenses must meet the requirements for shade designations in table 7 of ANSI/ISEA Z87.1-2020.	
Oxyfuel Gas Welding: Process Examples: Oxyfuel Gas Welding (OFW) Viewing gas-fired furnaces and boilers	• Welding goggles • Welding helmet over spectacles or goggles • Welding face shield over spectacles or goggles TYPICAL FILTER LENS SHADE: 6 -8	Protection from optical radiation is directly related to filter lens density. Select the darkest shade that allows adequate task performance. For proper fit of protector; there must be no penetration of direct visible light in all non-lens areas. Side shields must have filtering capability equal to or greater than the front lenses. Welding helmets are intended to shield the eyes and face from optical radiation, heat,	Welding: W shade number UV: U scale number Visible: L scale number IR: R scale number Variable tint: V Special purpose: S
Oxyfuel or Oxygen Cutting	• Welding goggles • Welding helmet over spectacles or goggles • Welding face shield over spectacles or goggles TYPICAL FILTER LENS SHADE:3-6		

Table 5-1
Eye and Face Protector Section Guide — Continued

Hazard	Protectors	Limitations	Marking[1]
	•	and impact. Welding helmets should not be used as stand-alone protective devices and should be worn in conjunction with goggles or spectacles. Filter lens shade selection is to be made based on the welding process, arc current, electrode size and/or plate thickness. Use ANSI Z49.1: 2012, table 1, Guide for Shade Numbers, to select the proper filter lens shade for both protection and comfort (reduction in visible glare). *Note.* Filter lenses must meet the requirements for shade designations in table 7 of ANSI/ISEA Z87.1-2020.	
Torch brazing	• Welding goggles • Welding helmet over spectacles or goggles • Welding face shield over spectacles or goggles • TYPICAL FILTER LENS SHADE: 3-4		
Torch soldering	• Spectacles Welding face shield over spectacles • TYPICAL FILTER LENS SHADE: 2	Shade or special purpose lenses, as suitable. *Note.* Refer to definition of special purpose lenses in ANSI/ISEA Z87.1.	

Table 5-1
Eye and Face Protector Section Guide — Continued

Hazard	Protectors	Limitations	Marking[1]
Glare	• Spectacles with or without side protection • Face shield over spectacles or goggles.		

*Table 8-9.b is as excerpted from ANSI/ISEA Z87.1, Occupational and Educational Personal Eye and Face Protection Devices Annex J.
1. Refer to ANSI/ISEA Z87.1 table 3 for complete marking requirements.
2. Refer to ANSI Z49.1: "Safety in Welding, Cutting, and Allied Processes", Guide for Shade Numbers, to select the proper lens filter protective shade based on welding process, arc current (in amperes), Electrode Size (arc welding only) and metal plate thickness (for oxyfuel and oxygen cutting only).
3. Refer to ANSI/LIA Z136.1 "Safe Use of Lasers", for guidance on choosing the correct protective eyewear when working with lasers.

Table 5-2
Required Shades for Filter Lenses/Glasses in Welding, Cutting, Brazing and Soldering

OPERATION	SHADE NUMBER
Soldering	2
Torch Brazing	3 or 4
Oxygen Cutting (light) up to 1 inch (2.5 cm)	3 or 4
Oxygen Cutting (medium) 1 to 6 inches (2.5 to 15.2 cm)	4 or 5
Oxygen Cutting (heavy) 6 inches (15.2 cm) or more	5 or 6
Oxyfuel Gas welding (light) up to 1/8 inch (0.3 cm)	4 or 5
Oxyfuel Gas welding (medium) 1/8 to 1/2 inch (0.3 to 1.3 cm)	5 or 6
Oxyfuel Gas welding (heavy) 1/2 inch (1.3 cm) or more	6 or 8
Atomic hydrogen welding	10 – 14
Inert-gas metal-arc welding (nonferrous): 1/16 inch to 5/32 inch (0.2 to 0.4 cm) electrodes	11
Inert-gas metal-arc welding (ferrous): 1/16 to 5/32 inch (0.2 to 0.4 cm) electrodes	12
Shielded metal-arc welding: 3/32 to 5/32 inch (0.1 to 0.4 cm) electrodes	10
Shielded metal-arc welding: 5/32 to 1/4 inch (0.4 to 0.6 cm) electrodes	12

Table 5-2
Required Shades for Filter Lenses/Glasses in Welding, Cutting, Brazing and Soldering — Continued

OPERATION	SHADE NUMBER
Shielded metal-arc welding: More than 1/4 inch (0.6 cm) electrodes	14
Carbon arc welding	14
Plasma arc cutting up to 100 amps	8
Plasma arc cutting 100 to 200 amps	10
Plasma arc cutting 200 to 400 amps	12
Plasma arc cutting greater than 400 amps	14

Note:
Operations where protection from radiant energy with moderate reduction of visible light is necessary (for example, welding, cutting, brazing, soldering) require eye and face protection suitable to the type of work, providing protection from all angles of direct exposure, and with lenses of the appropriate shade.

Table 5-3
Settings for Noise Measuring Equipment

Feature	Noise Dosimeter (ACGIH and USACE)	Type 2 (or better) Sound Level Meter for Continuous Noise (USACE)*	Type 1 Sound Level Meter for Impulse Noise (USACE)*
Criterion Time	8 hours	8 hours	8 hours
Criterion Level	85 dB	85 dB	85 dB
Weighting	A	A	C (preferred) or Z
Peak Weighting	Z	Z	C (preferred) or Z
Threshold Level	80 dB	80 dB	80 dB
Upper bound on integration	140 dB	140 dB	140 dB
Time Weighting	Slow	Slow	Fast
Exchange Rate	3 dB	3 dB	3 dB

Note:
When used for the purposes of delineating noise hazardous areas or evaluating noise exposures to personnel.

Table 5-4
Continuous Noise Exposures (ACGIH TLV)

Duration per day (hours)	Permissible sound-pressure level (dBA)
12	83
10	84
8	85
4	88
2	91
1	94
0.5 = 30 min	97
0.25 = 15 min	100

Table 5-5
Hand and Arm Protection

Type	Uses	Limitations	Applications
Cotton or cloth gloves	• Prevent small scratches. • Can be used as a lining to prevent perspiration if placed under other gloves. • Protects against the handling of light materials.	• Do not offer a high level of protection (thin layer). • Do not prevent burns or cuts.	• Handling fragile objects.
Fabric and coated fabric gloves	• Protect against dirt, slivers, chafing and abrasions. • Protection against certain moderately concentrated chemicals. • Coated gloves can offer slip-resistant qualities.	• Do not provide sufficient protection for use with rough, sharp, or heavy materials. • Do not protect the entire hand from chemicals.	• Tasks ranging from handling bricks and wire rope to handling chemical containers.
Metal mesh gloves	• Provide protection against punctures and cuts.	• Do not protect against power-driven blades, saws, and tools. • Cannot be used near electrical distribution systems or equipment.	• Sheet metal applications. • Using hand knives or blades.
Leather gloves	• Resistant to sparks and moderate heat. • Protects against abrasions from rough objects.	• Poor protection against liquids. • Limited protection against cuts and punctures.	• Welding work. • General purpose.

Table 5-5
Hand and Arm Protection — Continued

Type	Uses	Limitations	Applications
Butyl rubber gloves	• Protect against corrosive acids and bases, ketones, and esters. • Resists oxidation, ozone corrosion, abrasion and remain flexible at low temperatures.	• Do not protect against aromatic or aliphatic hydrocarbons (for example, gasoline, diesel fuel, kerosene, turpentine).	• Cleaning applications.
Natural latex or rubber gloves	• Resistant to chemicals, oils, solvents, and microorganisms. • Offer dexterity for precision work. Strong dry grip. • Abrasion resistant.	• Many people are allergic to latex. • Provides limited range of mechanical protection.	• Medical applications. • Cleaning. • Chemical handling. • General purpose.
Neoprene rubber gloves	• Good pliability, dexterity, high density, and tear resistance. • Provide protection from hydraulic fluids, gasoline, alcohols, organic acids, and alkalis. • Cold water resistant.	• Poor for halogenated and aromatic hydrocarbons. • Less effective against mechanical risks. • Not very resistant to aromatic solvents.	• Automotive. • Chemical and industrial cleaning. • Water related activities and colder wet environments.
Nitrile rubber gloves	• Provide protection from chlorinated solvents such as trichloroethylene and perchloroethylene. • Resists abrasion, puncturing, snagging, and tearing. • Good alternative to latex.	• Not resistant to ketones and halogen products.	• Wet or greasy environments. • Food handling. • Automotive industries. • Jobs requiring dexterity and sensitivity.
Anti-vibration gloves	• Reduce high frequency vibration from tools like grinders, sanders, saws.	• Often do not protect against low frequency vibrations (e. g., chisels and pavement breakers). • May limit dexterity and grip.	• Operating vibrating equipment or tools.

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

Table 5-6
Hand and Arm Protection Cut Resistance Levels

ANSI/ISEA Cut Resistance Level	Typical Tasks
A1 Very light cut hazards.	Nuisance cut hazards, small parts assembly, product inspection and QC. Provide very limited protection against cutting hazards.
A2-A3 Light/Medium cut hazards	General purpose, light material handling, warehousing, small parts assembly (sharp edges), packaging, construction.
A4-A6 Medium/High cut hazards	Manufacturing, sheet metal handling, drywall work, electrical, carpet installation, heating, ventilation, and air conditioning (HVAC) assembly/installation/maintenance, light sheet metal stamping, automotive, construction framing, glass handling, machining.
A7-A9 High/Extreme cut hazards	Metal fabrication, industrial blade maintenance and changing, automotive assembly, metal stamping, recycling plant/sorting. Assembly of large, bulky, or heavy objects with sharp edges and/or difficult to grip.

Table 5-7
Standards for Electrical Personal Protective Equipment

SUBJECT	STANDARD DOCUMENT INFORMATION
Arc Rated Apparel	ASTM F1506
Arc Rated Face Protection	ASTM F2178/F2178M
Arc Rated Gloves	ASTM F2675/F2675M
Arc Rated Rainwear	ASTM F1891
Arc Rated and Flame-Resistant Apparel Care	ASTM F1449
	ASTM F2757
Dielectric Footwear	ASTM F1117
	ASTM F1116
Insulating Aprons	ASTM F2677
Insulating Gloves and Leather Protectors	ASTM D120
	ASTM F696
Insulating Sleeves	ASTM D1051
Insulating PPE Care and Inspection	ASTM F496
	ASTM F1236

Table 5-8
Arc Flash Personal Protective Equipment

Arc-Flash PPE Category	PPE
1	Arc-Rated Clothing, Minimum Arc Rating of 4 cal/cm² (see note 1) Arc-rated long-sleeve shirt and pants or arc-rated coverall Arc-rated face shield (see note 2) or arc flash suit hood Arc-rated jacket, parka, high-visibility safety apparel, rainwear, or hard hat liner (optional) (see note 6) Hard hat; Safety glasses/goggles (S); Ear canal inserts (see note 3); Heavy-duty leather gloves (see note 4); Leather footwear (optional) (see note 5)
2	Arc-Rated Clothing, Minimum Arc Rating of 8 cal/cm² (see note 1) Arc-rated long-sleeve shirt and pants or arc-rated coverall Arc-rated flash suit hood or arc-rated face shield (see note 2) and arc-rated balaclava Arc-rated jacket, parka, high-visibility safety apparel, rainwear, or hard hat liner (optional) (see note 6) Hard hat; Safety glasses/goggles (S); Ear canal inserts (see note 3); Heavy-duty leather gloves (see note 4); Leather footwear (see note 5)
3	Arc-Rated Clothing selected so the System Arc Rating meets the required minimum arc rating of 25 cal/cm² (see note 1) Arc-rated long-sleeve shirt (A) Arc-rated pants (A) Arc-rated coverall (A) Arc-rated arc flash suit jacket (A) Arc-rated arc flash suit pants (A) Arc-rated arc flash suit hood Arc-rated gloves (see note 4) Arc-rated jacket, parka, high- visibility apparel, rainwear, or hard hat liner (optional) (see note 6) Hard hat; Safety glasses/goggles (S); Ear canal inserts (see note 3); Leather footwear (see note 5)

Table 5-8
Arc Flash Personal Protective Equipment (PPE) — Continued

Arc-Flash PPE Category	PPE
4	Arc-Rated Clothing selected so the System Arc Rating meets the required minimum Arc Rating of 40 cal/cm² (see note 1) Arc-rated long-sleeve shirt (A) Arc-rated pants (A) Arc-rated coverall (A) Arc-rated arc flash suit jacket (A) Arc-rated arc flash suit pants (A) Arc-rated arc flash suit hood Arc-rated gloves (see note 4) Arc-rated jacket, parka, high- visibility apparel, rainwear, or hard hat liner (optional) (see note 6) Protective Equipment: Hard hat; Safety glasses/goggles (S); Ear canal inserts (see note 3); Leather footwear (see note 5)

A = as required. S = selection required.
Notes:
[1] Arc rating is the lower value of either the ATPV or EBT defined in ASTM F1959.

[2] Face shields must have wrap-around guarding to protect the face including forehead, ears, and neck.

[3] Other types of hearing protection are permitted to be used instead of or in addition to ear canal inserts provided they are worn under an arc-rated arc flash suit hood.

[4] If rubber insulating gloves with leather protectors provide arc flash protection in addition to shock protection. Higher class rubber insulating gloves with leather protectors, due to their increased material thickness, provide increased arc flash protection.

[5] Footwear other than leather or dielectric must be permitted to be used provided it has been tested to demonstrate no ignition, melting, or dripping at the minimum arc rating for the respective arc flash PPE category.

[6] The arc rating of outer layers worn over arc-rated clothing as protection from the elements or for other safety purposes, and that are not used as part of a layered system, must not be required to be equal or greater than the estimated IE exposure.

5-10. Checklists and Forms.

Not Applicable.