

## SECTION 5

# PERSONAL PROTECTIVE AND SAFETY EQUIPMENT

### 05.A GENERAL

#### 05.A.01 Responsibilities.

- a. The use of PPE is a control measure that is to be used only after a hazard evaluation identifies hazards associated with a particular job or activity, and it is determined that the hazards cannot be eliminated and/or controlled to an acceptable level through engineering design or administrative actions. Utilize process and engineering controls before PPE to protect employees.
- b. Based on hazard evaluations conducted by supervisors, employers shall identify and select, and each affected employee shall use, PPE and safety equipment that will provide appropriate protection. > **See 29 CFR 1910.132.**
- c. Employers shall communicate PPE and safety equipment decisions to each affected employee. Employees shall use all PPE and safety equipment that may be required to maintain their exposure within acceptable limits.
- d. The employer will make all reasonable efforts to accommodate employees with religious beliefs that may conflict with determined PPE requirements. However, when reasonable efforts to accommodate employee's religious beliefs do not provide the necessary safe working environment (without PPE), then the employee must use the appropriate PPE or the employee will not be allowed to work in the area where the hazard requiring protection exists.

05.A.02 Employees shall be appropriately trained in the use, care, and limitations of all required PPE and safety equipment.

EM 385-1-1  
XX Sept 13

- a. Employees must be trained in and shall demonstrate an understanding of the following aspects of PPE prior to use: selection (for specific hazard); donning, doffing and adjusting; limitations and useful life; inspection and testing; and proper care including maintenance, storage and disposal.
- b. 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 shall make certain that the employee receives the necessary re-training to acquire the appropriate skills.
- c. The employer shall verify through written certification that each affected employee has received and understood the required training. The written certification shall identify the name of each employee trained, the date(s) of the training, and the subjects taught.

05.A.03 A copy of the manufacturer's use, inspection, testing, and maintenance instructions shall be maintained at the job site and readily available to personnel using the PPE and safety.

05.A.04 Personal protective and safety equipment shall be tested, inspected, and maintained in a serviceable and sanitary condition as recommended by the manufacturer.

- a. Defective or damaged equipment, or equipment that has exceeded its useful life shall not be used. It shall be tagged as out of service and/or immediately removed from the work site to prevent use.
- b. Previously used PPE must be cleaned, disinfected, inspected, and repaired as necessary before issuing to another employee.

05.A.05 When employees provide their own safety equipment or PPE, the employer is responsible for assuring its adequacy in protecting against the hazard and its state of repair.

05.A.06 Minimum requirements.

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

(1) Short sleeve shirt;

(2) Long pants (excessively long or baggy pants are prohibited);  
and

(3) Leather or other protective work shoes or boots. Open toe shoes are prohibited.

b. Protective equipment shall be of heat, fire, chemical, and/or electrical-resistive material when conditions require protection against such hazards.

05.A.07 Persons involved in activities that subject the hands to injury (for example, cuts, abrasions, punctures, burns, chemical irritants, toxins, vibration, and forces that can restrict blood flow) shall select and use hand protection appropriate for the hazard in accordance with ANSI/International Safety Equipment Association (ISEA) 105.

05.A.08 Protective leg chaps shall be worn by workers who operate chain saws. Protective leg chaps must meet the specifications in American Society for Testing and Materials (ASTM) Standard F1897.

**05.B EYE AND FACE PROTECTION**

05.B.01 Persons shall be provided with eye and face protection equipment for the specific jobsite hazards, as listed in Table 5-1, when machines or operations present potential eye or face injury.

EM 385-1-1  
XX Sept 13

- a. Eye and face protection equipment shall meet the requirements of ANSI/ American Society of Safety Engineers (ASSE) Z87.1, and bear a legible and permanent "Z87" logo to indicate compliance with the standard.
- b. Eye and face protection equipment shall be distinctly marked to facilitate identification of the manufacturer.

05.B.02 When required by this regulation to wear eye protection, persons whose vision requires the use of corrective lenses in eyeglasses shall be protected by one of the following:

- a. Prescription safety glasses providing optical correction and equivalent protection;
- b. Protective glasses with sideshields 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, or
- d. Goggles that incorporate corrective lenses mounted behind the protective lenses.

TABLE 5-1

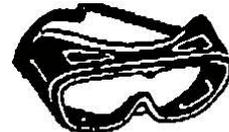
EYE AND FACE PROTECTOR SELECTION GUIDE



A. Spectacle,  
No sideshield



E. Spectacle,  
Non-Removable  
Lens



I. Cover Goggle,  
Direct Ventilator



B. Spectacle, Half  
Sideshield



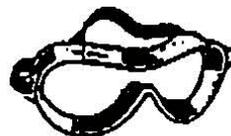
F. Spectacle,  
Lift Front



J. Cup Goggle,  
Direct Ventilator



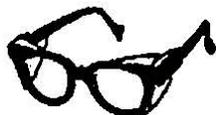
C. Spectacle, Full  
Sideshield



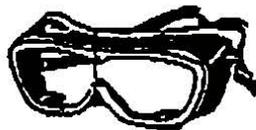
G. Cover Goggle,  
No Ventilation



K. Cup Goggle,  
Indirect Ventilator



D. Spectacle,  
Detachable  
Sideshield



H. Cover Goggle,  
Indirect Ventilation



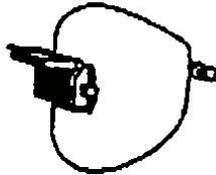
L. Spectacle,  
Headband  
Temple

Table 5-1 (CONTINUED)

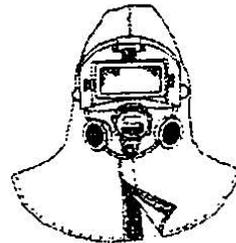
EYE AND FACE PROTECTOR SELECTION GUIDE



M. Cover Welding Goggle, Indirect Ventilation



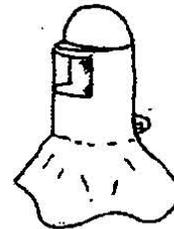
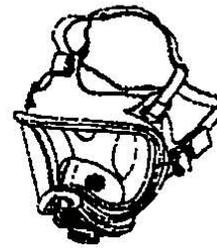
Q. Welding Helmet, Lift Front



S. Respirator



N. Faceshield



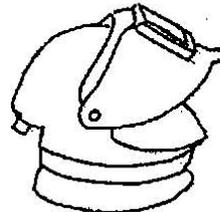
T1. Respirator



T2. Respirator



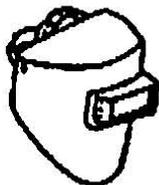
R. Respirator



U. Respirator



O. Welding Helmet, hand Hold



P. Welding Helmet, Stationary Window

**Table 5-1 (CONTINUED)**

**EYE AND FACE PROTECTOR SELECTION GUIDE**

<b>IMPACT:</b> Chipping, grinding, machining, masonry work, riveting and sanding				
<b>Assessment See Note (1)</b>	<b>Protector Type</b>	<b>Protectors</b>	<b>Limitations</b>	<b>Not Recommended</b>
Flying fragments, objects, large chips, particles, sand, dirt, etc.	B, C, D, E, F, G, H, I, J, K, L, N	Spectacles, goggles, faceshields  SEE NOTES (1)(3)(5)(6)(10) For severe exposures add N	Protective devices do not provide unlimited protection.  SEE NOTE (7)	Protectors that do not provide protection from side exposure SEE NOTE (10)  Filter or tinted lenses that restrict light transmittance, unless it is determined that a glare hazard exists. Refer to OPTICAL RADIATION.
<b>HEAT:</b> Furnace operations, pouring, casting, hot dipping, gas cutting, and welding				
<b>Assessment See Note (1)</b>	<b>Protector Type</b>	<b>Protectors</b>	<b>Limitations</b>	<b>Not Recommended</b>
Hot sparks	B, C, D, E, F, G, H, I, J, K, L, N	Faceshields, goggles, spectacles For severe exposure add N  SEE NOTE (2)(3)	Spectacles, cup and cover type goggles do not provide unlimited facial protection  SEE NOTE (2)	Protectors that do not provide protection from side exposure
Splash from molten metals	N	Faceshields worn over goggles H, K  SEE NOTE (2)(3)		
High temperature exposure	N	Screen faceshields, reflective faceshields	SEE NOTE (3)	

**Table 5-1 (CONTINUED)**

**EYE AND FACE PROTECTOR SELECTION GUIDE**

<b>CHEMICAL:</b> Acid and chemical handling, degreasing, plating				
<b>Assessment See Note (1)</b>	<b>Protector Type</b>	<b>Protectors</b>	<b>Limitations</b>	<b>Not Recommended</b>
Splash	G, H, K  N	For severe exposure add N	Ventilation should be adequate but protected from splash entry	Spectacles, welding helmets, hand shields
Irritating mists	G	Special purpose goggles	SEE NOTE (3)	
<b>DUST:</b> Woodworking, buffing, general industry conditions				
<b>Assessment See Note (1)</b>	<b>Protector Type</b>	<b>Protectors</b>	<b>Limitations</b>	<b>Not Recommended</b>
Nuisance dust	G, H, K	Goggles, eyecup and cover types	Atmospheric conditions and the restricted ventilation of the protector can cause the lenses to fog. Frequent cleaning may be required.	
<b>OPTICAL RADIATION:</b> Welding: electric arc				
<b>Assessment See Note (1)</b>	<b>Protector Type</b>	<b>Protectors</b>	<b>Limitations</b>	<b>Not Recommended</b>
O, P, Q	Typical filter lens shade		Protection from optical radiation is directly related to filter lens density. SEE NOTE (4). Select the darkest shade that allows adequate task performance.	Protectors that do not provide protection from optical radiation.

**NOTES:**

- (1) Care should be taken to recognize the possibility of multiple and simultaneous exposure to a variety of hazards. Adequate protection against the highest level of each of the hazards must be provided.
- (2) Operations involving heat may also involve optical radiation. Protection from both hazards shall be provided.
- (3) Faceshields shall only be worn over primary eye protection.
- (4) Filter lenses shall meet the requirements for shade designations in Table 5-2 and Table 10-1.
- (5) Persons whose vision requires the use of prescription (Rx) lenses shall wear either protective devices fitted with prescription (Rx) lenses with sideshields or protective devices designed to be worn over regular prescription (Rx) eyewear.
- (6) Wearers of contact lenses shall also be required to wear appropriate covering eye and face protection devices in a hazardous environment. It should be recognized that dusty and/or chemical environments may represent an additional hazard to contact lens wearers.
- (7) Caution should be exercised in the use of metal frame protective devices in electrical hazard areas.
- (8) Refer to ANSI/ASSE Z87-1, Section 6.5, Special Purpose Lenses.
- (9) Welding helmets or hand shields shall be used only over primary eye protection.
- (10) Non-sideshield spectacles are available for frontal protection only.

EM 385-1-1  
XX Sept 13

05.B.03 Personnel who are considered blind in one eye and are working in other than administrative functions shall wear safety glasses with sideshields at all times.

05.B.04 Operations that require the use of, or exposure to, hot or molten substances (for example, babbitting, soldering, pouring or casting of hot metals, handling of hot tar, oils, liquids, and molten substances) shall require eye protection, such as goggles with safety lenses and screens for side protection, or face masks, shields, and helmets giving equal protection. Lens mountings shall be able to retain in position all parts of a cracked lens.

05.B.05 Operations that require handling of harmful materials (for example, acids, caustics, hot liquids, or creosoted materials) and operations where protection from gases, fumes, and liquids is necessary shall require the wearing of goggles with cups of soft pliable rubber and suitable faceshields, masks, or hoods that cover the head and neck, and other protective clothing appropriate to the hazards involved.

05.B.06 Operations where protection from radiant energy with moderate reduction of visible light is necessary, including welding, cutting, brazing, and soldering, shall 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. > **See Table 5.2.**

05.B.07 Glare-resistant glasses that comply with ANSI Z80.3 with an ultraviolet A-region (UVA) and ultraviolet B-region (UVB) 99% filtration shall be worn when conditions require protection against glare. When conditions so warrant, polarized lenses shall also be considered.

05.B.08 Tinted or automatically darkening lenses should not be worn when work tasks require the employee to pass often from brightly to dimly lighted areas.

**TABLE 5-2**

**REQUIRED SHADES FOR FILTER LENSES AND GLASSES IN  
WELDING, CUTTING, BRAZING, AND SOLDERING**

<b>OPERATION</b>	<b>SHADE NUMBER</b>
Soldering	2
Torch Brazing	3 or 4
Cutting (light) up to 1 in (2.5 cm)	3 or 4
Cutting (medium) 1 to 6 in (2.5 to 15.2 cm)	4 or 5
Cutting (heavy) 6 in (15.2 cm) or more	5 or 6
Gas welding (light) up to 1/8 in (0.3 cm)	4 or 5
Gas welding (medium) 1/8 to 1/2 in (0.3 to 1.2 cm)	5 or 6
Gas welding (heavy) 1/2 in (1.2 cm) or more	6 or 8
Atomic hydrogen welding	10 – 14
Inert-gas metal-arc welding (nonferrous) - 1/16 to 5/32 in (0.1 to 0.4 cm) electrodes	11
Inert-gas metal-arc welding (ferrous) - 1/16 to 5/32 in (0.1 to 0.4 cm) electrodes	12
Shielded metal-arc welding - 1/16 to 5/32 in (0.1 to 0.4 cm) electrodes	10
Shielded metal-arc welding - 3/16 to 1/4 in (0.4 to 0.6 cm) electrodes	12
Shielded metal-arc welding - 5/16 to 3/8 in (0.7 to 0.9 cm) electrodes	14
Carbon arc welding	14

EM 385-1-1  
XX Sept 13

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

### **05.C HEARING PROTECTION AND NOISE CONTROL**

05.C.01 The employer shall evaluate the workplace for noise hazards initially and regularly during the course of work. When noise hazards are known or expected, the employer shall develop a hearing conservation program that includes identification and assessment of noise hazards and the measures to be taken to protect personnel against them. USACE workplace hearing conservation programs shall comply with the requirements of ER 385-1-89. Contractors programs shall comply with American Conference of Governmental Industrial Hygienist Threshold Limit Values@ and this manual at a minimum.

#### 05.C.02 Identification of noise hazards.

a. Noise measurements shall be made whenever there is difficulty in communicating at distances greater than two feet, upon worker complaint of excessive noise, or whenever hazardous noise levels are suspected.

b. Noise assessments and/ or measurements shall be performed and documented when any new facility or new equipment is placed in service and when areas that in the past were not noise hazardous become noise hazardous for any reason.

#### 05.C.03 Assessment of noise hazards

a. Instruments used to measure noise shall meet or exceed the requirements listed below.

b. For continuous (steady-state) noise and impact (impulse) noise, the instrument settings shall be in accordance with Table 5-3.

**TABLE 5-3**  
**SETTINGS FOR NOISE MEASURING EQUIPMENT**

<u>Feature</u>	<u>Dosimeter (ACGIH)</u>	<u>Dosimeter (DoD and USACE)*</u>	<u>Type 2 (or better) Sound Level Meter for Continuous Noise (USACE)*</u>	<u>Type 1 Sound Level Meter for Impulse Noise (USACE)*</u>
<u>Criterion Time</u>	<u>8 hours</u>	<u>8 hours</u>	<u>8 hours</u>	<u>8 hours</u>
<u>Criterion Level</u>	<u>85 dB</u>	<u>85 dB</u>	<u>85 dB</u>	<u>85 dB</u>
<u>Weighting</u>	<u>A</u>	<u>A</u>	<u>A</u>	<u>Unweighted, linear, or Z</u>
<u>Peak Weighting</u>	<u>Unweighted</u>	<u>Unweighted, linear, or Z</u>	<u>Unweighted, linear, or Z</u>	<u>Unweighted, linear, or Z</u>
<u>Threshold Level</u>	<u>80 dB</u>	<u>80 dB</u>	<u>80 dB</u>	<u>140 dB</u>
<u>Upper bound on integration</u>	<u>130 dB</u>	<u>None</u>	<u>None</u>	<u>None</u>
<u>Time Weighting</u>	<u>Slow</u>	<u>Slow</u>	<u>Slow</u>	<u>Impulse</u>
<u>Exchange Rate</u>	<u>5 dB</u>	<u>3 dB</u>	<u>3 dB</u>	<u>3 dB</u>

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

c. Dosimeters shall measure the entire employee's work shift to be considered full-shift sampling.

d. Calibration of noise measuring equipment shall be in accordance with Manufacturer's instructions (USACE refer to Appendix D of ER 385-1-89).

e. Workplaces known or suspected to include hazardous noise will be assessed (surveyed) initially, annually, and whenever site conditions change impacting noise generation.

f. Exposure standards

(1) For impact (impulse) noise, personnel exposures may not exceed 140 dBP (unweighted) without effective hearing protection devices.

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

(3) Contractors personnel shall comply with the ACGIH, TLV and Government employees shall comply with ER 385-1-89, continuous noise exposure standards, outlined in Table 5-4.

Table 5-4  
Non-DoD Continuous Noise Exposures  
[OSHA standard]

<u>Duration per day (hours)</u>	<u>Permissible sound-pressure level (dBA)</u>
<u>8</u>	<u>85</u>
<u>4</u>	<u>88</u>
<u>2</u>	<u>91</u>
<u>1</u>	<u>94</u>
<u>0.5 = 30 min</u>	<u>97</u>
<u>0.25 = 15 min</u>	<u>100</u>

(4) When the daily noise exposure is composed of two or more periods of noise exposure of different levels, the combined effects must be considered. Exposure to different levels for various periods of time shall be computed according to the following formula:

$$C_n = T_1 / L_1 + T_2 / L_2 + \dots + T_x / L_x$$

Where:

C<sub>n</sub> = combined noise exposure factor;

T = the total time of exposure at a specified sound-pressure level (in hours), and

L = the total time of exposure permitted at that level (in hours), from Tables 5-2 or 5-3, as appropriate

If the sum exceeds 1, the mixture of exposure periods exceeds the TLV.

05.C.04 Noise controls. Practical engineering or administrative controls shall be considered and implemented when personnel exposed to continuous (steady-state) sound-pressure levels exceeding the limits specified stated above.

a. Engineering controls are the primary means of controlling exposures to excessive noise in the workplace. These controls may include lubrication, isolation, damping, baffles, or other methods.

b. Administrative controls.

(1) Noise-hazardous areas include all areas where the noise values exceed the standards above and shall be posted to indicate the presence of hazardous noise levels and the requirement for hearing protection. Equipment identified as noise hazardous shall be labeled as a noise hazard requiring the use of hearing protection. If noise hazards impact personnel working in adjacent areas, the individuals in the adjacent areas shall be notified of the noise values and offered hearing protection.

(2) If noise exposure to employees cannot be effectively reduced to a perceived sound pressure level of 85 dBA, operating limits may be imposed, i.e. limits on times of operation, limits on time spent near the noise source, limits on operating RPM, etc.

c. Personal Protective Equipment.

(1) Hearing protection devices shall provide for the attenuation of noise to acceptable levels, i.e. 85 dBA for continuous (steady-state) noise. If necessary to hear audible warnings, hearing protection devices should not attenuate hearing levels below an individual's hearing threshold.

(2) Dual hearing protection (earplugs and a second method, i.e. ear muffs or acoustic helmet, worn concurrently, shall be used whenever employees are exposed to continuous noise greater than 115 dBA.

The second method of hearing protection is, by default, considered to provide an additional 5 dBA attenuation to the employee.

(3) The use of the NIOSH de-rating scheme for hearing protection may be appropriate to safeguard the health of workers. De-rating is not appropriate for custom ear mold hearing protection devices.

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

#### 05.C.04 Evaluation of hearing protection and noise control programs

a. A Hearing Conservation Medical Surveillance program should include all personnel who are exposed to hazardous noise or ototoxic chemicals (including arsenic, carbon disulfide, carbon monoxide, cyanide, lead and derivatives, manganese, mercury and derivatives, n-hexane, Stoddard solvent, styrene, trichloroethylene, toluene, and xylenes). The usage of these chemicals should be considered in development of the Hearing Conservation Medical Surveillance program.

b. All contractors who expose employees to noise greater than the values listed above shall have a hearing conservation program which includes:

(1) A written program on the identification, documentation, engineering controls, personal protection devices, and hearing testing for all employees.

(2) Employee training on the hazards of noise and the methods of protection provided.

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

(4) Pre-job and post-job hearing testing of individuals who will be working in noise hazardous environments greater than 30 days a year for the contractor.

## 05.D HEAD PROTECTION

05.D.01 All persons working in or visiting hard hat areas shall be provided with and required to wear Type I or Type II, Class G (General – not to exceed 2,200 volts) or Class E (Electrical-not to exceed 20,000 volts) headgear. The selection of the type of hardhat shall be based on the activity and addressed in the AHA. For emergency response operations and other activities with greater need for side impact protection, Type II head protection is required. > **See Appendix B.**

- a. Hard hat areas or activities are those areas with potential hazard of head injury; in general, all construction areas are considered hard hat areas. However, specific areas may be considered designated as non-hard hat areas, or activities may be considered non-hard hat activities, if identified and properly documented in the associated AHA. The identification and analysis of head hazards will be documented in an AHA, APP, or project safety and health plan, as appropriate.
- b. Points of entry to a hard hat area shall have a sign warning of the requirement to wear hard hats.

05.D.02 All protective headgear shall meet the requirements of ANSI Z89.1.

- a. No modification (i.e. paint or stickers) to the shell or suspension is allowed except when such changes are applied or approved by the manufacturer.
- b. Hard hats shall be worn with the bill facing forward unless the GDA has determined exceptions for certain trades in order to accommodate appropriate mission accomplishments. Headgear must be designed to accommodate these needs.

EM 385-1-1  
XX Sept 13

c. Protective headgear worn near electric lines and equipment shall be Class E.

d. No ball caps, knit caps, or other headdress shall be worn under the hard hat that could interfere with the fit or stability of the hard hat.

05.D.03 Protective headgear and components shall be visually inspected on a daily basis for signs of damage (dents, cracks, etc.) that might reduce the degree of safety integrity originally provided. Headgear will be periodically inspected for ultraviolet degradation as evidenced by cracking or flaking of the helmet.

05.D.04 Drilling holes or in any way changing the integrity of the hard hat is prohibited. Alterations that will reduce the dielectric or impact strength will not be made.

05.D.05 Protective headgear worn by USACE employees shall (in addition to complying with the preceding specifications) be:

a. White in color and marked with a 1 in (2.5 cm) band of red reflective material placed along the base of the crown with a 5 in (12.7 cm) break in front. A red Corps of Engineers castle insignia will be centered at the front of the hat with the base of the insignia approximately  $\frac{3}{4}$  in (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. Requests for variations in color and marking to accommodate occupational specialties shall be submitted for consideration to HQUSACE Safety and Health Office.

c. Chin straps will be worn when wearers are subject to high wind conditions and/or working on elevated structures.

## **05.E PROTECTIVE FOOTWEAR**

05.E.01 Protective footwear that ~~addresses~~ is rated to protect against the hazard(s) identified in the PHA/AHA shall be provided and worn.

05.E.02 All protective footwear shall meet ASTM F2412 and F2413 standards.

05.E.03 Add-on type devices, such as strap-on foot, toe or metatarsal guards, shall not be used as a substitute for protective footwear and must be demonstrated by the employer to be equally effective via independent testing data for these devices).

05.E.04 For activities in which USACE or contractor personnel or official visitors are potentially exposed to foot hazards, the applicable PHA/AHA, APP, or project safety and health plan shall include an analysis of, and prescribe specific protective measures to be taken for, reducing foot hazards.

05.E.05 Personnel shall, as a minimum, wear safety-toed boots meeting ASTM Standards F2412 and F2413 while working on construction sites unless it can be demonstrated by a PHA/AHA to the GDAs satisfaction that a different type of foot protection is required.

05.E.06 Footwear providing protection against impact and compressive forces, conduction hazards, electrical hazards, and sole puncture shall comply with the applicable requirements of ASTM F2412 and F2413. Footwear providing protection against impact and compression hazards shall be rated as I/75 and C/75.

a. Unexploded ordnance (UXO) personnel whose job tasks required protective footwear but require no metal parts in or on their footwear shall wear Conductive footwear (Cd) with protective toe cap/composite toe footwear.

b. Personnel participating in wild land fire management activities shall wear leather lace-up boots with slip-resistant soles, such as a hard rubber lug-type or tractor tread, a top height of 8 in (20.3 cm) or more with composite toes. Soles

EM 385-1-1  
XX Sept 13

shall not be made of composition rubber or plastic, which have low melting points.

## **05.F HIGH-VISIBILITY APPAREL**

05.F.01 High-visibility apparel meeting, at minimum, ANSI/ISEA 107 Performance Class 2 requirements, shall be worn by workers (such as, but not limited to, signal persons, spotters, survey crews and inspectors) 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, illumination, or visually complex backgrounds where ambient visibility is at least 50 ft (15.2 m); OR

c. Workers are exposed to vehicular or equipment traffic at speeds up to 35 mph (56.3 kph);

05.F.02 If any or all of the following conditions exist, Class 3 high-visibility apparel meeting ANSI/ISEA 107 shall be worn for higher visibility (such as, but not limited to, signal persons, spotters, survey crews and inspectors) whenever:

a. Reduced visibility conditions exist due to weather conditions, illumination, or visually complex backgrounds where ambient visibility is less than 50 ft (15.2 m); OR

b. Workers are exposed to vehicular or equipment traffic in excess of 35 mph (56.3 kph);

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

d. Workers are involved in activities in close proximity to vehicular traffic with no protective barriers.

05.F.03 When working at night, on or near sites where vehicle traffic is present, workers (such as, but not limited to, signal persons, spotters, survey crews and inspectors) shall 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.

05.F.04 The apparel background material color shall be either fluorescent yellow-green, fluorescent orange-red, or fluorescent red (see ANSI/ISEA 107). When choosing color, optimization of color conspicuity between the wearer and work environment shall be considered.

05.F.05 The apparel shall be:

a. Free of roughness, sharp edges and projections that could cause irritation or injury;

b. Should fit correctly to ensure that the vest remains in place for the expected period of use, environmental conditions, and wearer movements;

c. Cleaned, laundered and/or dry cleaned in accordance with the care label located on the apparel; and

d. Replaced if it fails to comply with and of the above or ANSI/ISEA 107.

## **05.G RESPIRATORY PROTECTION**

05.G.01 General. The use of respirators is required when occupational exposure levels exceed OSHA Permissible Exposure Limits (PELs) or ACGIH TLVs, and engineering or administrative exposure controls are not feasible to implement.

EM 385-1-1  
XX Sept 13

05.G.02 The voluntary use of filtering face piece dust masks (nuisance dust masks) is permissible in atmospheres that are not hazardous. Prior to use of the voluntary respirators (including filtering face piece masks), the respirator must be evaluated and approved by the respiratory program administrator to ensure that the respirator use will in itself not create a hazard. The employee shall be instructed in the limitations of the respirator and the correct method of wearing and using the respirator.

05.G.03 Written respiratory protection program. A written respiratory protection program shall be developed and implemented when respirators are used.

a. All employees using respirators, with the exception of employees voluntarily using only filtering face pieces (NIOSH-approved dust masks), shall be included in the respiratory protection program.

b. A respiratory protection program administrator with the technical qualifications (training and experience) and administrative authority to develop, implement and update (as necessary) the respiratory protection program shall be identified and so designated in the program.

(1) The program administrator shall ensure that all respirator users comply with the requirements of the program.

(2) Program Administrator Qualifications. The program administrator shall have the documented knowledge and experience to understand OSHA's respiratory protection standard (29 CFR 1910.134), evaluated respiratory hazards at the facility/project or similar facility/project, selected appropriate respirators based on similar hazards as the facility/project hazards or potential hazard, and trained employees on the use of similar respirators.

c. Respiratory protection programs shall address each of the following topics:

- (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, cartridge and canister 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;
- (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; and
- (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, *Information for Employees Using Respirators When Not Required Under the Standard*.

EM 385-1-1  
XX Sept 13

05.G.04 Medical evaluation. All employees, with the exception of employees voluntarily using filtering face pieces, shall be medically evaluated to ensure they are fit enough to wear the selected respirators. Evaluation options for respirator use are as follows:

a. Completion of the respirator questionnaire from 1910.134 Appendix C which is reviewed by a medical professional. A follow-up with the recommended medical exam and testing if required by the reviewing medical professional. Medical clearances to wear respirators shall include the following:

- (1) Telephone, e-mail, and physical address of the medical facility/provider;
- (2) Printed name of the licensed, certified health care provider along with his/her signature;
- (3) The statement of clearances or respiratory limitations only (no personal medical information shall be included. Employee identification shall not include the full social security number);
- (4) Date of examination and date that clearance expires.

b. Respirator Medical Evaluation Service. An on-line, 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 Board-Certified or Board-Eligible Occupational Medicine Physician and based upon Appendix C to 29 CFR 1910.134, OSHA Respirator Medical Evaluation Questionnaire. Medical clearances to wear respirators shall include the information in (1) – (4) above.

c. Additional Medical Evaluations shall be provided when:

- (1) An employee reports medical signs or symptoms that are related to the ability to use a respirator;
- (2) A supervisor or the respirator program administrator informs the employer that an employee needs to be reevaluated;

- (3) Information from the respiratory protection program, including observations made during fit testing and program evaluation, indicates a need for employee reevaluation;
- (4) A change occurs in workplace conditions (e.g., physical work effort, protective clothing, temperature) that may result in a substantial increase in the physiological burden placed on an employee, OR
- (5) It has been two years since the last medical evaluation.

d. All USACE respirator users shall have a pre-placement history and targeted physical. The exam shall include a pulmonary function test, evaluation of the cardiovascular and respiratory system, and any tests required by the Occupational Health Provider.

05.G.05 Respirator Selection. Respirator selection shall be completed by the Respirator Program Administrator.

- a. The selection shall be based on objective industrial hygiene data or objective industrial hygiene data for similar operations.
- b. Before industrial hygiene data is obtained, the respirator program administrator shall use knowledge of the hazard and work methods to determine the highest potential exposure, which shall be used to select the respiratory protection.
- c. To determine the change out schedule of the respirator cartridge or respirator canister, the respirator program administrator shall use the objective industrial hygiene data or data from similar operations.
- d. An air purifying respirator shall not be used in an atmosphere with less than 19% oxygen or an atmosphere that is immediately dangerous to life and health.

EM 385-1-1  
XX Sept 13

05.G.06 Fit testing. Employees wearing respirators with tight-fitting face pieces [Supplied Air Respirators (SARs) and Self-Contained Breathing Apparatus (SCBAs) included] shall be fit tested to ensure that selected respirators achieve a proper face to face piece seal. Fit testing shall be performed before initial use of the selected respirator, whenever respirator size, make or model is changed, and at least annually thereafter. Fit testing requirements shall comply with respiratory protection program requirements.

05.G.07 Air Supplied and Self Contained Breathing Apparatus (SCBA). If air supplied or SCBA respirators (excluding diving respirators) are used:

a. All air supplied to airline or SCBA respirators shall meet the Grade D breathing air requirements from ANSI/Compressed Gas Association Commodity Specification for Air.

b. If an airline respirator is used in an environment that has the potential to become Immediately Dangerous to Life and Health (IDLH), the respirator shall have an alternate source of breathing air for escape from the environment.

c. If an airline respirator is used in an environment that has the potential to become IDLH, there shall be a respirator air attendant to prevent the lines from becoming tangled or tied, to change the air supply tanks, and/or to confirm the air source (compressor or air supply tank manifold) is adequately working. If the air supply is interrupted, the attendant shall notify the respirator users to leave the area where the respirators are required.

05.G.08 Training and information. The program administrator or his designee shall provide respirator user 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. Annual training shall ensure that each employee using a respirator can demonstrate knowledge of the following topics:

- a. Why the respirator is necessary and how improper fit, usage, or maintenance can compromise the protective effect of the respirator;
- b. Limitations and capabilities 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 and storage of the respirator;
- f. How to recognize medical signs and symptoms that may limit or prevent the effective use of respirators; and
- g. The general requirements of the OSHA respirator standard at 29 CFR 1910.134.

05.G.09 Recordkeeping. Establish and retain written information regarding medical evaluations, fit testing, and the respirator program. The following shall be made available upon request:

- a. Records of medical evaluations must be retained and made available, as needed;
- b. Fit test records must be maintained for respirator users until the next fit test is administered. Establish a record of the Qualitative Fit Test (QLFT) and Quantitative Fit Test (QNFT) administered to an employee including:
  - (1) The name or identification of the employee tested;
  - (2) Type of fit test performed and name of the test administrator;
  - (3) Specific make, model, style, and size of respirator tested;

EM 385-1-1  
XX Sept 13

(4) Date of test; and

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

c. Retain a written copy of the current respirator program.

**05.H PERSONAL FALL ARREST EQUIPMENT INCLUDING LINEMAN'S EQUIPMENT INCLUDING LINEMEN'S EQUIPMENT (ELECTRICALLY RATED HARNESES). See Section 21.H.05.**

**05.I ELECTRICAL PROTECTIVE EQUIPMENT**

05.I.01 Persons working on electrical distribution systems shall be provided with the appropriate electrical protective equipment. This equipment shall be inspected, tested, and maintained in safe conditions in accordance with Table 5-5.

05.I.02 Employees shall use rubber gloves, sleeves, blankets, covers, and line hoses as required by special conditions for work on energized facilities. Rubber goods provided to protect employees who work on energized facilities must meet ASTM F18 standards. Electrical workers' rubber insulating protective equipment shall be visually inspected for damage and defects prior to each use.

05.I.03 Rubber protective equipment must be subjected to periodic electrical tests. Rubber insulating gloves shall be inspected before first issue and every 6 months thereafter; rubber insulating blankets and sleeves shall be inspected before their first issue and every 12 months thereafter. Rubber insulating covers shall be inspected upon indication that insulating value is suspect (per OSHA1910.137).

**TABLE 5-5**

**STANDARDS FOR ELECTRICAL PROTECTIVE EQUIPMENT**

<b>SUBJECT</b>	<b>NUMBER AND TITLE</b>
Head Protection	ISEA/ANSI Z89.1, <i>Requirements for Protective Headwear for Industrial Workers</i>
Eye and face protection	ANSI Z87.1, <i>Practice for Occupational and Educational Eye and Face Protection</i>
Gloves	ASTM D120-02a, <i>Standard Specification for Rubber Insulating Gloves</i>
Sleeves	ASTM D1051, <i>Standard Specification for Rubber Insulating Sleeves</i>
Gloves and sleeves	ASTM F496, <i>Standard Specification for In-Service Care of Insulating Gloves and Sleeves</i>
Leather protectors	ASTM F696, <i>Standard Specification for Leather Protectors for Rubber Insulating Gloves and Mittens</i>
Footwear	ASTM F1117, <i>Standard Specification for Dielectric Overshoe Footwear</i>
	ASTM 2412, <i>Standard Test Methods for Foot Protection</i> ASTM 2413, <i>Standard Specification for Performance Requirements for Foot Protection</i>
Visual inspection	ASTM F1236, <i>Standard Guide for Visual Inspection of Electrical Protective Rubber Products</i>
Apparel	ASTM F1506, <i>Standard Performance Specification for Flame Resistant Textile Materials for Wearing Apparel for Use by Electrical Workers When Exposed to Momentary Electric Arc and Related Thermal Hazards</i>

EM 385-1-1  
XX Sept 13

05.1.04 Electric arc flash protection shall be provided for any person entering the flash protection boundary . > **See 11.B.** Flame-resistant clothing and PPE must be worn as determined by the incident exposure associated with the specific task. Refer to NFPA 70E for specific Hazard Risk Classifications > **See Table 5-6 PPE Category Level Chart for clothing/equipment requirements [per NFPA Table 130.7(C)(16)].** ***Synthetic clothing such as acetate, nylon, polyester, rayon, either alone or in blends with cotton, may not be worn while in the flash protection boundary.***

- a. Employees must wear protective eye equipment whenever there is a danger from electric arcs, flashes, flying objects, or electrical explosion.
- b. Employees must wear arc rated clothing whenever they may be exposed to potentially energized electrical equipment.
  - (1) Arc flash rated suits and their closure design must permit easy and rapid removal.
  - (2) The entire arc flash rated suit, including the window, must have energy-absorbing characteristics suitable for arc flash exposure.
  - (3) Clothing and equipment required by the degree of electrical hazard exposure can be worn alone or be integrated with normal apparel.
  - (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. > ***Synthetic materials that can melt next to skin shall not be worn.***
- c. 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 parts. 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.

d. Dielectric overshoes are required where electrically insulated footwear is used for protection against step and touch potential.

**TABLE 5-6**  
**PPE CATEGORY LEVEL CHART**

Hazard/Risk Category	Protective Clothing and PPE
0	Cotton Undergarments Long Sleeved Shirt (natural fiber) Long Pants (natural fiber) Hard Hat Safety Glasses or Goggles Hearing Protection (inserts) Leather Gloves (as needed) or Insulating Gloves w/ Protectors Leather Boots
1	Cotton Undergarments Arc Rated Long Sleeve Shirt or FR coveralls Arc Rated Long Pants or FR coveralls Hard Hat w/ Arc Rated Face Shield Hearing Protection (inserts) Hard Hat Safety Glasses or Goggles Leather Gloves or Insulating Gloves w/ Protectors Leather Boots
2	Cotton Undergarments Arc Rated Long Sleeved Shirt and Pants or Arc Rated Coveralls Instead Hard Hat w/ Arc Rated Face Shield w/ Sock Balaclava Safety Glasses or Goggles Hearing Protection (inserts) Leather Gloves or Insulating Gloves w/ Protectors Leather Boots
3	Cotton Undergarments Arc Rated Long Sleeved Shirt and Long Pants

	<p>Arc Rated Coveralls (worn over the above)          Arc Rated (25 cal) Arc Flash Suit Jacket          Arc Rated (25 cal) Arc Flash Pants          Arc Rated (25 cal) Arc Flash Suite Hood          Hard Hat          Safety Glasses or Goggles          Hearing Protection (inserts)          Arc Rated Leather Gloves or Insulating Gloves w/          Protectors          Leather Boots</p>
4	<p>Cotton Undergarments          Arc Rated Long Sleeved Shirt and Long Pants          Arc Rated Coveralls (worn over the above)          Arc Rated (40 cal) Arc Flash Suit Jacket          Arc Rated (40 cal) Arc Flash Suit Pants          Arc Rated (40 cal) Arc Flash Suit Hood          Hard Hat          Safety Glasses or Goggles          Hearing Protection (inserts)          Arc Rated Leather Gloves or Insulating Gloves w/          Protectors          Leather Boots</p>

05.1.05 An air test shall be performed on electrical workers' rubber insulating gloves before each use.

05.1.06 Protective equipment of material other than rubber shall provide equal or better electrical and mechanical protection.

05.1.07 Tools must be insulated and manufactured to meet ASTM F18. The insulating tool portion shall be made of fiberglass-reinforced plastic (FRP).

05.1.08 Only live-line tool poles having a manufacturer's certification to withstand at least the following test shall be used: 100 (kiloVolts) kV ac per ft (305 mm) of length for 5 minutes or 75 kV ac per ft (305 mm) for FRP tools. Records shall be maintained

for all live-line tools to demonstrate satisfactory accomplishment of laboratory and shop test.

05.I.09 Wooden tools are not authorized for use.

05.I.10 When using live-line tools, workers shall use voltage rated gloves and not place their hands closer than necessary to energized conductors or to the metal parts of the tool.

05.I.11 Only tools and equipment intended for live-line bare hand work should be used on transmission lines. The tools shall be kept dry and clean and shall be visually inspected before use each day.

05.I.12 See Section 05.H for requirements on lineman's personal fall protection equipment.

## **05.J PERSONAL FLOTATION DEVICES**

05.J.01 Inherently buoyant Type III, Type V work vests, or better USCG-approved personal flotation devices (PFDs) shall be provided and properly worn (zipped, tied, latched, etc., in closed fashion) by all persons in the following circumstances: > **See 05.J.02; 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;
- c. Working alone at night where there are drowning hazards, regardless of other safeguards provided;
- d. In skiffs, small boats, or launches, unless in an enclosed cabin or cockpit; or
- e. Whenever there is a drowning hazard.

EM 385-1-1  
XX Sept 13

05.J.02 Automatic-Inflatable PFDs Type V or better, USCG-approved for Commercial Use, may be worn by workers in lieu of inherently buoyant PFDs (See conditions 05.J.01.a-e above), provided the following criteria is met:

a. PFDs are worn only by workers over 16 years of age and those who weigh 90 lb (40.8 kg) or more;

b. An AHA shall be developed for the intended activity and shall be used to select the most appropriate PFD for the activity;

c. PFDs must be inspected, maintained, stowed and used in accordance with the manufacturer's instructions. PFDs used in heavy construction or maintenance activities or where hot work (welding, brazing, cutting, soldering, etc.) is to be performed must be designed, tested and certified by the manufacturers for this type of work;

➤ ***NOTE: The standard commercial auto-inflatable PFD does not meet these requirements.***

d. PFDs shall provide a 30-pound minimum buoyancy post-deployment and shall have a status indicator window;

e. Personnel shall be trained in the use, maintenance, restrictions, care, storage, inspection and post-deployment procedures per manufacturer's instructions;

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

g. In-water testing is required for all first time users to validate performance and to become familiar with the use and feel of the PFD.

05.J.03 All wearable PFDs shall be of an international orange (or orange/red) or ANSI 107 yellow-green color.

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

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

05.J.04 Each PFD shall be equipped with a USCG-approved automatically activated light. Lights are not required for PFDs on projects performed exclusively during daylight hours.

05.J.05 Before and after each use, the PFD shall be inspected for defects that would alter its strength or buoyancy.

05.J.06 Throwable devices (Type IV PFD).

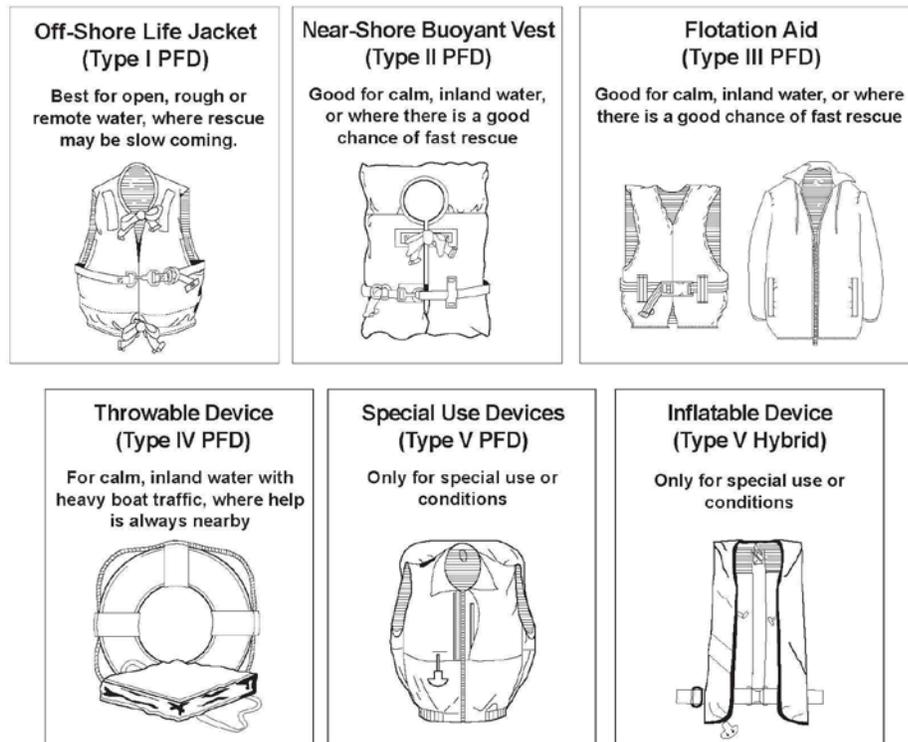
a. On USCG-inspected vessels, ring buoys are required to have automatic floating electric water lights (46 CFR 160).

b. On all other floating plant and shore installations, lights on life rings are required only in locations where adequate general lighting (e.g., floodlights, light stanchions) is not provided. For these plants and installations, at least one life ring, and every third one thereafter, shall have an automatic floating electric water light attached.

c. All PFDs shall be equipped with retroreflective tape in accordance with USCG requirements.

**FIGURE 5-1**

**PERSONAL FLOTATION DEVICES**



d. Life rings (rope attachment not required) and ring buoys (rope attachment required) shall be USCG-approved; shall have at least 70 ft (21.3 m) of 3/8 in (0.9 cm) of attached solid braid polypropylene, or equivalent. Throw bags may be used in addition to life rings or ring buoys. These throwable devices and lifelines shall be inspected at a minimum, every 6 months and shall be stored in such a manner as to allow immediate deployment and will be protected from degradation from weather and sunlight. Life rings or ring buoys shall be readily available and shall be provided at the following places:

(1) At least one not less than 20 in (51 cm) on each safety skiff up to 26 ft (7.9 m) in length (46 CFR 117.70).;

(2) At least one (1) 24 in (61 cm) in diameter on all motor boats longer than 26 ft (7.9 m) in length up to 65 ft (19.8 m) in length and for motor boats 65 ft (19.8 m) in length or longer, a minimum 3 life buoys of not less than 24 in (61 cm) and one additional for each increase in length of 100 ft (30.4 m) or fraction thereof; and

(3) At least one (1) at intervals of not more than 200 ft (60.9 m) on pipelines, walkways, wharves, piers, bulkheads, lock walls, scaffolds, platforms, and similar structures extending over or immediately next to water, unless the fall distance to the water is more than 45 ft (13.7 m), in which case a life ring shall be used. (The length of line for life rings at these locations shall be evaluated, but the length may not be less than 70 ft (21.3 m).)

05.J.07 At navigation locks, an analysis of the benefits versus the hazards of using floating safety blocks (blocks that may be quickly pushed into the water to protect individuals who have fallen in the water from being crushed by vessels) shall be made.

a. This analysis shall be documented as an AHA.

b. If the use of blocks is found acceptable, consideration shall be given to 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, alternative safety measures shall be developed.

## **05.K LIFESAVING AND SAFETY SKIFFS**

05.K.01 At least one skiff shall be immediately available at locations where employees work over or immediately next to water. Skiffs shall be kept afloat or ready for instant launching.

05.K.02 Personnel trained in launching and operating the skiff shall be readily available during working hours. Lifesaving personnel

EM 385-1-1  
XX Sept 13

shall perform a lifesaving drill, including the launching and recovery of the skiff, before the initiation of work at the site and periodically thereafter as specified by the GDA (but at least monthly or whenever new personnel are involved).

05.K.03 Skiffs shall be kept afloat or ready for instant launching.

05.K.04 Required equipment must be onboard and meet or exceed USCG requirements and the requirements of Section 19 of this manual. Skiffs shall be equipped as follows:

- a. Four (4) oars (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 70 ft (21.3 m) of 3/8 in (0.9 cm) solid braid polypropylene, or equivalent, line attached; and
- e. PFDs in number equaling the skiff rating for the maximum number of personnel allowed on board.
- f. Fire Extinguisher.

05.K.05 In locations where waters are rough or swift, or where manually operated boats are not practical, a power boat suitable for the waters shall be provided and equipped for lifesaving.

05.K.06 Skiffs and power boats shall have buoyant material capable of floating the boat, its equipment, and the crew.

05.K.07 On vessels (such as skiffs) without permanently mounted navigation lights, portable battery-operated navigation lights will be available and used for night operations.

## **05. L. HAND PROTECTION**

05.L.01 Employers shall select and require employees to use appropriate hand protection when employees' hands are exposed to hazards such as those from skin absorption of harmful substances; severe cuts or lacerations; severe abrasions; punctures; chemical burns; thermal burns; and harmful temperature extremes; and sharp objects.

05.L.02 Employers shall base the selection of the appropriate hand protection 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.

05.L.03 Employees shall be trained to recognize hand hazards, select appropriate gloves for all anticipated hazards, and to inspect and properly store gloves.

05.L.04 Gloves should fit snugly. Workers will wear the right gloves for the hazard (for example, heavy-duty rubber gloves for concrete work, welding gloves for welding, insulated gloves and sleeves when exposed to electrical hazards, etc.).

05.L.05 Gloves will be inspected thoroughly prior to use to assure they are in good condition and will provide the protection required.

**TABLE 5-6**

**HAND AND ARM PROTECTION**

<u>Metal Mesh, Leather, or Canvas Gloves</u>	<ul style="list-style-type: none"><li>• <u>Sturdy gloves made from metal mesh, leather, or canvas provide protection from cuts, burns, and sustained heat.</u></li></ul>
<u>Leather Gloves</u>	<ul style="list-style-type: none"><li>• <u>Protection against sparks, moderate heat, blows, chips, and rough objects. Welders in particular need the durability of higher-quality leather gloves.</u></li></ul>
<u>Aluminized Gloves</u>	<ul style="list-style-type: none"><li>• <u>Provide reflective and insulating</u></li></ul>

	<p><u>protection against heat. Usually used for welding, furnace, and foundry work. Normally require an insert made of synthetic material that protect against heat and cold.</u></p>
<p><u>Aramid Fiber Gloves</u></p>	<ul style="list-style-type: none"> <li>• <u>Aramid is a synthetic material that protects against heat and cold also used to make gloves that are cut- and abrasive-resistant and wear well</u></li> </ul>
<p><u>Fabric and Coated Fabric Gloves</u></p>	<ul style="list-style-type: none"> <li>▪ <u>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</u></li> <li>▪ <u>Cotton flannel gloves coated with plastic transform fabric gloves into general-purpose hand protection offering slip-resistant qualities</u></li> <li>▪ <u>Coated fabric gloves are used for tasks ranging from handling bricks and wire rope to handling chemical containers in laboratory operations</u></li> <li>▪ <u>For protection against chemical exposure hazards, always check with the manufacturer to determine the gloves' effectiveness against the specific chemicals and conditions in the workplace</u></li> </ul>
<p><u>Chemical and Liquid-Resistant Gloves</u></p>	<ul style="list-style-type: none"> <li>▪ <u>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</u></li> <li>▪ <u>Use of rubber gloves also reduces the risk of exposure to blood and other</u></li> </ul>

	potentially infectious substances
<u>Butyl Rubber Gloves</u>	<ul style="list-style-type: none"> <li>▪ <u>Protect against nitric acid, sulfuric acid, hydrofluoric acid, red fuming nitric acid, and peroxide. Resist oxidation, ozone corrosion, abrasion and remain flexible at low temperatures.</u></li> </ul>
<u>Natural Latex or Rubber Gloves</u>	<ul style="list-style-type: none"> <li>▪ <u>Comfortable wear and pliability along with their protective qualities make them a popular general purpose glove</u></li> <li>▪ <u>Resist abrasions caused by sandblasting, grinding, and polishing and protect workers' hands from most water solutions of acids, alkalis, salts, and ketones.</u></li> <li>▪ <u>Hypoallergenic gloves, glove liners, and powderless gloves possible alternatives for those allergic to latex</u></li> </ul>
<u>Neoprene Gloves</u>	<ul style="list-style-type: none"> <li>▪ <u>Good pliability, dexterity, high density, and tear resistance. Provide protection from hydraulic fluids, gasoline, alcohols, organic acids, and alkalis</u></li> </ul>
<u>Nitrile Rubber Gloves</u>	<ul style="list-style-type: none"> <li>▪ <u>Provide protection from chlorinated solvents such as trichloroethylene and perchloroethylene.</u></li> <li>▪ <u>Intended for jobs requiring dexterity and sensitivity, yet stand up to heavy use even after prolonged exposure that cause other gloves to deteriorate.</u></li> <li>▪ <u>Resist abrasion, puncturing, snagging, and tearing</u></li> </ul>