



**DEPARTMENT OF LABOR AND ECONOMIC OPPORTUNITY**

**GENERAL INDUSTRY STANDARD**

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These rules become effective immediately upon filing with the Secretary of State  
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(By authority conferred on the director of the department of licensing and regulatory affairs  
by sections 16 and 21 of 1974 PA 154, MCL 408.1016 and 408.1021,  
and Executive Reorganization Order Nos. 1996-2, 2003-1, 2008-4, and 2011-4,  
MCL 445.2001, 445.2011, 445.2025, and 445.2030)

R 408.13301, R 408.13301a, R 408.13302, R 408.13303, R 408.13305, R 408.13306, R 408.13311, R 408.13325,  
R 408.13329, R 408.13344, R 408.13355, R 408.13367, and R 408.13387  
of the Administrative Code are amended,  
R 408.13395a, R 408.13395b, R 408.13395c, R 408.13395d, R 408.13395e, R 408.13395f, and R 408.13395g  
are added, and R 408.13390 is rescinded, as follows:

**PART 33. PERSONAL PROTECTIVE EQUIPMENT**

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## GENERAL PROVISIONS

### R 408.13301 Scope.

**Rule 3301.** (1) This standard applies to all places of general industry employment in this state and includes requirements of the employer and use by the employee of personal protective equipment and provides reasonable and adequate means, ways, and methods for the proper selection and safe use of this equipment.

(2) This standard establishes performance, care, and use criteria for all personal fall protection systems.

(3) An employer shall ensure that each personal fall protection system used to comply with MIOSHA General Industry Safety and Health Standards meets the requirements of these rules.

(4) Hearing protection shall be in compliance with Occupational Health Standard Part 380 "Occupational Noise Exposure in General Industry," as referenced in R 408.13301a.

(5) Respiratory protection shall be in compliance with Occupational Health Standard Part 451 "Respiratory Protection," as referenced in R 408.13301a.

### R 408.13301a Adopted and referenced standards.

**Rule 3301a.** (1) The following standards are adopted by reference in these rules and are available from IHS Global, 15 Inverness Way East, Englewood, Colorado, 80112, USA, telephone number: 1-800-854-7179, [www.global.ihs.com](http://www.global.ihs.com), at a cost as of the time of adoption of these rules, as stated in these rules.

(a) American National Standards Institute Standard (ANSI) Z-41 "American National Standard for Personal Protection -- Protective Footwear," 1999 edition. Cost \$25.00.

(b) ANSI/ISEA (International Safety Equipment Association) Z-87.1 "Occupational and Educational Personal Eye and Face Protection Devices," 2010 edition. Cost \$60.00.

(c) ANSI Z-87.1 "Occupational and Educational Personal Eye and Face Protection Devices," 2003 edition. Cost \$68.00.

(d) ANSI Z-87.1 "Practice for Occupational and Educational Eye and Face Protection," 1989 edition, revised 1998. Cost: \$148.00.

(e) American Society of Testing Materials Standard (ASTM) D-120 "Standard Specification for Rubber Insulating Gloves," 2009 edition. Cost: \$58.00.

(f) ASTM D-178 "Standard Specification for Rubber Insulating Matting," 2001 edition with 2010 supplement. Cost \$47.00.

(g) ASTM D-178 "Standard Specification for Rubber Insulating Matting," 1993 edition. Cost \$56.00.

(h) ASTM D-1048 "Standard Specification for Rubber Insulating Blankets," 2012 edition. Cost \$47.00.

(i) ASTM D-1049 "Standard Specification for Rubber Insulating Covers," 1998 edition with 2010 supplement. Cost \$47.00.

(j) ASTM D-1050 "Standard Specification for Rubber Insulating Line Hose," 2005 edition with 2011 supplement. Cost \$47.00.

(k) ASTM D-1051 "Standard Specification for Rubber Insulating Sleeves," 2008 edition. Cost \$58.00.

(l) ASTM F-478 "Standard Specification for In-Service Care of Insulating Line Hose and Covers," 2009 edition. Cost \$52.00.

(m) ASTM F-479 "Standard Specification for In-Service Care of Insulating Blankets," 2006 edition with 2011 supplement. Cost: \$47.00.

(n) ASTM F-496 "Standard Specification for In-Service Care of Insulating Gloves and Sleeves," 2008 edition. Cost \$58.00.

(o) ASTM F-2412 "Standard Test Methods for Foot Protection," 2005 edition. Cost \$64.00.

(p) ASTM F-2413 "Standard Specification for Performance Requirements for Protective Footwear," 2005 edition. Cost \$56.00.

(q) ASTM F-819 "Standard Terminology Relating to Electrical Protective Equipment for Workers," 2010 edition. Cost \$41.00.

(r) ASTM F-1236 "Standard Guide for Visual Inspection of Electrical Protective Rubber Products," 1996 edition with 2012 supplement. Cost: \$47.00.

(s) Institute of Electrical and Electronics Engineers IEEE Standard 516 "Guide for Maintenance Methods on Energized Power Lines," 2009 edition. Cost: \$135.00.

(2) The following standards are adopted by reference in these rules and are available from Document Center, Inc., Customer Service, 121 Industrial Road, Suite 8, Belmont, CA 94002, USA, telephone:(650) 591-7600 or via the internet at website: [www.document-center.com](http://www.document-center.com); at a cost as of the time of adoption of these rules, as stated in these rules.

(a) ANSI Z-89.1 "American National Standard for Industrial Head Protection," 2009 edition. Cost \$61.25.

(b) ANSI Z-89.1 "American National Standard for Industrial Head Protection," 2003 edition. Cost: \$20.00.

(c) ANSI Z-89.1 "American National Standard for Personnel Protection—Protective Headwear for Industrial Workers--Requirements," 1997 edition. Cost: \$20.00.

(3) The standards adopted in these rules are available for inspection at the Department of Licensing and Regulatory Affairs, MIOSHA Regulatory Services Section, P.O. Box 30643, Lansing, Michigan, 48909-8143.

(4) Copies of the standards adopted in these rules may be obtained from the publisher or may be obtained from the Department of Licensing and Regulatory Affairs, MIOSHA Regulatory Services Section, P.O. Box 30643, Lansing, Michigan, 48909-8143, at the cost charged in this rule, plus \$20.00 for shipping and handling.

(5) The following Michigan Occupational Safety and Health (MIOSHA) standards are referenced in these rules. Up to 5 copies of these standards may be obtained at no charge from the Michigan Department of Licensing and Regulatory Affairs, MIOSHA Regulatory Services section, P.O. Box 30643, Lansing, MI, 48909-8143 or via the internet at website: [www.michigan.gov/mioshastandards](http://www.michigan.gov/mioshastandards). For quantities greater than 5, the cost, at the time of adoption of these rules, is 4 cents per page.

(a) Occupational Health Standard Part 380 "Occupational Noise Exposure in General Industry" R 325.60101 to R 325.30128.

(b) Occupational Health Standard Part 451 "Respiratory Protection," R 325.60051 to R 325.60052.

(c) General Industry Safety and Health Standard Part 50 "Telecommunications," R 408.15001 to R 408.15004.

(d) General Industry Safety and Health Standard Part 86 "Electric Power Generation, Transmission, and Distribution," R 408.18601 to R 408.18605.

(6) The appendices are informational only and are not intended to create any additional obligations or requirements not otherwise imposed or to detract from any established obligations or requirements.

#### **R 408.13302 Definitions, A to E.**

**Rule 3302.** (1) "Absorptive lens" means a filter lens whose physical properties are designed to attenuate the effect of glare, reflective, and stray light.

(2) "Anchorage" means a secure point of attachment for equipment such as lifelines, lanyards, or deceleration devices.

(3) "Apparatus" means electrical equipment.

(4) "Bare hand technique" means a method of working on energized conductors by isolating the employee from any ground potential and by placing the employee in continuous firm contact with the energized electric field.

(5) "Belt terminal" means an end attachment of a window cleaner's positioning system used for securing the belt or harness to a window cleaner's belt anchor.

(6) "Body belt" means a strap with means both for securing about the waist and for attaching to other components such as a lanyard used with positioning systems, travel restraint systems, or ladder safety systems.

(7) "Body harness" means straps that secure about the employee in a manner to distribute the fall arrest forces over at least the thighs, pelvis, waist, chest, and shoulders, with a means for attaching the harness to other components of a personal fall protection system.

(8) "Bump hat or cap" means a device worn on the head to protect the wearer from bumps or blows but which does not meet the requirements of protective helmets.

(9) "Carabiner" means a connector generally comprised of a trapezoidal or oval shaped body with a closed gate or similar arrangement that may be opened to attach another object and, when released, automatically closes to retain the object.

(10) "Chin protector" means the portion of a device that offers protection to a wearer's chin, lower face, and neck.

(11) "Competent person" means a person who is capable of identifying existing and predictable hazards in any personal fall protection system or any component of it, as well as in their application and uses with related equipment, and who has authorization to take prompt, corrective action to eliminate the identified hazards.

(12) "Conductor" means a material, such as a bus bar, wire, or cable, suitable for carrying an electric current.

(13) "Connector" means a device used to couple or connect parts of the fall protection system together.

(14) "Corrective lens" means a lens ground to the wearer's individual prescription.

(15) "Cover lens" means a removable disc or colorless glass, plastic-coated glass, or plastic that covers a filter lens and protects it from weld spatter, pitting, or scratching when used in a goggle.

(16) "Cover plate" means a removable pane of colorless glass, plastic-coated glass, or plastic that covers a filter plate and protects it from weld spatter, pitting, or scratching when used in a helmet, hood, or goggle.

(17) "D-ring" means a connector used on any of the following:

(a) In a harness as an integral attachment element or fall arrest attachment.

(b) In a lanyard, energy absorber, lifeline, or anchorage connector as an integral connector.

(c) In a positioning or travel restraint system as an attachment element.

(18) "Deceleration device" means any mechanism that serves to dissipate energy during a fall.

(19) "Deceleration distance" means the vertical distance a falling employee travels from the point at which the deceleration device begins to operate, excluding lifeline elongation and free fall distance, until stopping. It is measured as the distance between the location of an employee's body harness attachment point at the moment of activation, at the onset of fall arrest forces, of the deceleration device during a fall, and the location of that attachment point after the employee comes to a full stop.

(20) "Energized," also known as "live," means to be electrically charged, or that to which voltage is being applied.

(21) Equivalent means alternative designs, equipment, materials, or methods that the employer can demonstrate will provide an equal or greater degree of safety for employees compared to the designs, equipment, materials, or methods specified in the standard.

(22) "Eye size" means a measurement expressed in millimeters and denoting the size of the lens-holding section of an eye frame.

#### **R 408.13303 Definitions; F, G.**

**Rule 3303.** (1) "Face shield" means a device worn in front of the eyes and a portion or all of the face, whose predominant function is protection of the eyes and face.

(2) "Filter lens" means a lens that attenuates specific wavelengths of ultraviolet, visible, and infrared radiation according to the composition and density of the lens.

(3) "Filter plate" means a removable pane in the window of a helmet, hood, or goggle that absorbs varying proportions of the ultraviolet, visible, and infrared rays according to the composition and density of the plate.

(4) "Foot or toe protection" means a device or equipment, such as, but not limited to, safety toe footwear, toe protectors, or foot guards, that protects an employee's foot or toes against injury.

(5) "Footwear" means apparel worn on the feet, such as shoes, boots, slippers, or overshoes, excluding hosiery.

(6) "Frame" means a device which holds the lens or lenses on the wearer.

(7) "Free fall" means the act of falling before the personal fall arrest system begins to apply force to arrest the fall.

(8) "Free fall distance" means the vertical displacement of the fall arrest attachment point on the employee's body belt or body harness between onset of the fall and just before the system begins to apply force to arrest the fall. This distance excludes deceleration distance, lifeline and lanyard elongation, but includes any deceleration device slide distance or self-retracting lifeline and or lanyard extension before the devices operate and fall arrest forces occur.

(9) "Front" means the part of a spectacle or goggle frame that is intended to contain the lens or lenses.

(10) "Goggle" means a device with contour-shaped eyecups or facial contact with glass or plastic lenses, worn over the eyes and held in place by a headband or other suitable means for the protection of the eyes and eye sockets.

**R 408.13304 Definitions; H, I.**

**Rule 3304.** (1) "Hair enclosure" means a hat, cap, or hair net specifically designed to protect the wearer from hair entanglement in moving machinery.

(2) "Handshield" means a hand-held welding helmet. See "welding helmet."

(3) "Headband" means that part of a goggle, helmet, or hood suspension consisting of a supporting band that encircles the head.

(4) "Headgear" means that part of a protective helmet, hood, or faceshield that supports the device on the wearer's head, usually consisting of a headband and crown strap.

(5) "Helmet" also called a hard hat or cap, means a device that is worn on the head that is designed to provide limited protection against impact, flying particles, or electric shock.

(6) "Hood" means a device that is worn to provide protection against acids, chemicals, abrasives, and temperature extremes and entirely encloses the whole head including face, neck, and shoulders. Air-line hoods and hoods used to protect wearers from inhalation or harmful atmospheres are not included in this part.

(7) "Isolated" means that all energized conductors or the exposed energized parts of equipment are isolated from the work area by an insulated barrier. Conductors may be isolated by moving them out of reaching distance by use of hot line tools.

**R 408.13305 Definitions; L to R.**

**Rule 3305.** (1) "Lanyard" means a flexible line of rope, wire rope, or strap that generally has a connector at each end for connecting the body belt or body harness to a deceleration device, lifeline, or anchorage.

(2) "Lens" means the transparent part of a protective device through which the wearer sees, also referred to as a plate or window for some devices.

(3) "Lifeline" means a component of a personal fall protection system consisting of a flexible line for connection to an anchorage at one end so as to hang vertically, vertical lifeline, or for connection to anchorages at both ends so as to stretch horizontally, horizontal lifeline, and serves as a means for connecting other components of the system to the anchorage.

(4) "Lift-front" means a type of mounting frame for a welding helmet, hood, or goggles which is made of 2 connected parts. The front part, which may be removed from the line of vision, contains the high density filter plate with its cover plate, and the back part, which is fixed to the helmet, contains a low density or clear impact-resistant plate.

(5) "Light" means an optical radiation weighted by its ability to cause visual sensations.

(6) "Manufacturer" means a business entity that marks or directs the permanent marking of the components or complete devices as compliant with this standard, and sells them as compliant.

(7) "Metatarsal guards" means guards that are designed to protect the top of the foot from the toes to the ankle over the instep of the foot. These guards may be attached to the outside of shoes.

(8) "Non-removable lens" means a lens and holder that are homogeneous and continuous.

(9) "Personal fall arrest system" means a system used to arrest an employee in a fall from a walking-working surface. It consists of a body harness, anchorage, and connector. The means of connection may include a lanyard, deceleration device, lifeline, or a suitable combination of these.

(10) "Personal fall protection system" means a system, including all components, an employer uses to provide protection from falling or to safely arrest an employee's fall if one occurs. Examples of personal fall protection systems include personal fall arrest systems, positioning systems, and travel restraint systems.

(11) "Plano lens" means a lens that does not incorporate a corrective prescription. This lens is not necessarily flat.

(12) "Positioning system," also known as work-positioning system, means a system of equipment and connectors that, when used with a body harness or body belt, allows an employee to be supported on an elevated vertical surface, such as a wall or window sill, and work with both hands free. Positioning systems are also known as "positioning system devices" and "work-positioning equipment."

(13) "Prescription lens" means a lens manufactured to the wearer's individual corrective prescription.

(14) "Protective footwear" means footwear that is designed, constructed, and classified to protect the wearer from a potential hazard or hazards.

(15) "Protective helmet," "protective hat or cap," or "safety hat or cap" means a rigid device, often referred to as a safety cap or hat, that is worn to provide protection for the head or portions thereof against impact, flying particles, or electric shock, or any combination thereof, and which is held in place by a suitable suspension.

(16) "Protector" means a device that provides eye or face protection against the hazards of processes encountered in employment.

(17) "Qualified" means a person who, by possession of a recognized degree, certificate, or professional standing, or who by extensive knowledge, training, and experience has successfully demonstrated the ability to solve or resolve problems relating to the subject matter, the work, or the project.

(18) "Radiant energy or radiation" means the following kinds of radiant energy that are pertinent to this standard:

- (a) Ultraviolet.
- (b) Visible light.
- (c) Infrared.

(19) "Reaching distance" means the employee's reach as extended by a conductive material or equipment.

(20) "Rope grab" means a deceleration device that travels on a lifeline and automatically, by friction, engages the lifeline and locks so as to arrest the fall of an employee. A rope grab usually employs the principle of inertial locking, cam/lever locking, or both.

**R 408.13306 Definitions; S to W.**

**Rule 3306.** (1) "Safety belt" means a device, usually worn around the waist that by reason of its attachment to a lanyard and lifeline or a structure, will prevent a worker from falling.

(2) "Safety factor" means the ratio of the design load and the ultimate strength of the material.

(3) "Safety harness" means a belt with a shoulder strap worn around the waist and shoulder and capable of restraining a pull or fall of an employee.

(4) "Safety strap" means a restraining line secured at both ends to a safety belt or harness to hold an employee to a fixed object.

(5) "Safety toe footwear" means footwear containing a safety toe box of steel or equivalent material capable of meeting the requirements of this part.

(6) "Sanitizing" means an act or process of destroying organisms that may cause disease.

(7) "Self-retracting lifeline or lanyard" means a deceleration device containing a drum-wound line that can be slowly extracted from, or retracted onto, the drum under slight tension during normal movement by the employee. At the onset of a fall, the device automatically locks the drum and arrests the fall.

(8) "Shield" means a device to be held in the hand, or supported without the aid of the operator, whose predominant function is protection of the eyes and face.

(9) "Shell" means the portion of welding helmet or handshield that covers the wearer's face and is the part of a helmet which includes the outermost surface.

(10) "Side shield" means a part of, or attachment to, a spectacle that provides side impact-resistance.

(11) "Snaphook" means a connector comprised of a hook-shaped body with a normally closed gate, or similar arrangement that may be manually opened to permit the hook to receive an object. When released, the snaphook automatically closes to retain the object. Opening a snaphook requires 2 separate actions. Snaphooks are generally either of the following types:

(a) Automatic-locking type, which is permitted, with a self-closing and self-locking gate that remains closed and locked until intentionally unlocked and opened for connection or disconnection.

(b) Non-locking type, which is prohibited, with a self-closing gate that remains closed, but not locked, until intentionally opened for connection or disconnection.

(12) "Snood" means a flexible attachment to the back of a hood or helmet for protection against injury to the back of the head and neck.

(13) "Spectacles," also known as safety glasses, means a protective device intended to shield the wearer's eyes from certain hazards, depending on the spectacle type; also means a device patterned after conventional-type spectacle eyewear, but of more substantial construction, with or without sideshields, and with plano or corrective impact-resistant lenses of clear or absorptive filter glass or plastic.

(14) "Temple" means the part of a spectacle frame commonly attached to the front and generally extending behind the ear of the wearer.

(15) "Toe guards" means the guards that fit over the toes of regular shoes to protect the toes from impact and compression hazards. These guards may be attached to the outside of shoes.

(16) "Travel restraint," also known as a tether line, means a rope or wire rope used to transfer forces from a body support to an anchorage or anchorage connector in a travel restraint system.

(17) "Travel restraint system" means a combination of an anchorage, anchorage connector, lanyard or other means of connection, and body support that an employer uses to eliminate the possibility of an employee going over the edge of a walking-working surface.

(18) "Welding goggle" means a goggle intended for limited welding applications.

(19) "Welding faceshield" means a faceshield intended for limited welding applications. Faceshields shall be used only in conjunction with spectacles or goggles, or both.

(20) "Welding helmet" means a protective device intended to provide protection for the eyes and face against optical radiation and weld spatter, which shall be worn only in conjunction with spectacles or goggles.

(21) "Window" means the lens portion of a face shield. Lens is defined in R 408.13305(2).

(22) "Window cleaner's belt" means a positioning belt that consists of a waist belt, an integral terminal runner or strap, and belt terminals.

(23) "Window cleaner's belt anchor," also known as window anchor, means specifically designed fall-preventing attachment points permanently affixed to a window frame or to a building part immediately adjacent to the window frame, for direct attachment of the terminal portion of a window cleaner's belt.

(24) "Window cleaner's positioning system" means a system that consists of a window cleaner's belt secured to window anchors.

(25) "Work-positioning system" means the same as "positioning system."

## HAZARD ASSESSMENT

### **R 408.13308 Personal protective hazard assessment and equipment selection.**

**Rule 3308.** (1) An employer shall assess the workplace to determine if hazards are present, or are likely to be present, that necessitate the use of personal protective equipment.

(2) If the hazards are present or are likely to be present then the employer shall do all of the following:

(a) Select, and have each affected employee use, the types of personal protective equipment that will protect the affected employee from the hazards identified in the hazard assessment.

(b) Communicate selection decisions to each affected employee.

(c) Select the personal protective equipment that properly fits each affected employee.

(d) Select personal protective equipment that shall be designed and constructed to be safe for the work to be performed.

Note: Non-mandatory Appendix B contains an example of procedures that complies with the requirement for a hazard assessment.

(3) An employer shall verify that the required workplace hazard assessment has been performed through a written certification which identifies all of the following information:

(a) The workplace evaluated.

(b) The person certifying that the evaluation has been performed.

(c) The date or dates of the personal protective hazard assessment.

(d) The document is a certification of hazard assessment.

## TRAINING

### **R 408.13309 Personal protective equipment training.**

**Rule 3309.** (1) An employer shall provide training to each employee who is required by these rules to use personal protective equipment. The training shall include all of the following:

(a) When personal protective equipment is necessary.

(b) What personal protective equipment is necessary.

(c) How to properly don, doff, adjust, and wear the personal protective equipment.

(d) The limitations of the personal protective equipment.

(e) The proper care, maintenance, useful life, and disposal of the personal protective equipment.

(2) Each affected employee shall demonstrate an understanding of the training specified in subrule (1) of this rule and the ability to use the equipment properly before being allowed to perform work requiring the use of personal protective equipment.

(3) When an employer has reason to believe that any affected employee who has already been trained does not have the understanding and skill required by subrule (2) of this rule, the employer shall retrain the employee. The occurrence of any of the following circumstances requires retraining:

(a) Changes in the workplace that render previous training obsolete.

(b) Changes in the types of personal protective equipment to be used that render previous training obsolete.

(c) Inadequacies in an affected employee's knowledge or use of assigned personal protective equipment which indicate that the employee has not retained the requisite understanding or skill.

### **R 408.13310 Employer's and employee's responsibilities.**

**Rule 3310.** (1) An employer shall not permit defective or damaged personal protective equipment to be used.

(2) An employee shall use all of the personal protective equipment provided by the employer.

## **PAYMENT FOR PERSONAL PROTECTIVE EQUIPMENT**

### **R 408.13310a Payment for personal protective equipment (PPE).**

**Rule 3310a.** (1) An employer shall provide at no cost to employees the personal protective equipment necessary to protect against hazards that the employer is aware of as a result of any required assessments.

(2) An employer shall pay for replacement PPE, as necessary, under either of the following conditions:

(a) When the PPE no longer provides the protection it was designed to provide.

(b) When the previously provided PPE is no longer adequate or functional.

(3) When an employee has lost or intentionally damaged the PPE issued to him or her, an employer is not required to pay for its replacement and may require the employee to pay for its replacement.

(4) An employer is not required to pay for prescription safety eyewear with removable or permanent sideshields if the employer provides safety eyewear that fits over an employee's prescription lenses.

(5) An employer is not required to pay for non-specialty prescription safety eyewear, provided that the employer permits these items to be worn off the job-site.

(6) An employer is not required to pay for non-specialty safety-toe protective footwear, including steel-toe shoes or steel-toe boots, provided that the employer permits these items to be worn off the job-site.

(7) An employer shall provide, at no cost to employees, metatarsal guards attachable to shoes when metatarsal protection is necessary if both the following apply:

(a) If metatarsal protection is necessary and an employer requires employees to use metatarsal shoes instead of detachable guards, then the employer shall provide the metatarsal shoe at no cost to the employee.

(b) If an employer provides metatarsal guards and allows the employee, at his or her request, to use shoes or boots with built-in metatarsal protection, then the employer is not required to pay for the metatarsal shoes or boots.

(8) An employer is not required to pay for either of the following:

(a) Everyday clothing, including any of the following:

- (i) Long-sleeve shirts.
- (ii) Long pants.
- (iii) Street shoes.
- (iv) Normal work boots.
- (v) Ordinary clothing.
- (vi) Skin creams.

(b) Other items used solely for protection from weather, including any of the following:

- (i) Winter coats.
- (ii) Jackets.
- (iii) Gloves.
- (iv) Parkas.
- (v) Rubber boots.
- (vi) Hats.
- (vii) Raincoats.
- (viii) Ordinary sunglasses.
- (ix) Sunscreen.

(9) An employer shall pay for protection when ordinary weather gear is not sufficient to protect an employee and special equipment or extraordinary clothing is needed to protect the employee from unusually severe weather conditions. Clothing used in artificially-controlled environments with extreme hot or cold temperatures, such as freezers, is not considered part of the weather gear exception.

(10) All of the following apply to upgraded and personalized PPE:

(a) An employer is not required to pay for PPE requested by an employee that exceeds the PPE requirements, provided that the employer provides PPE that meets the standards at no cost to the employee.

(b) If an employer allows an employee to acquire and use upgraded or personalized PPE, then the employer is not required to reimburse the employee for the equipment, provided that the employer has provided adequate PPE at no cost to the employee.

(c) An employer shall evaluate an employee's upgraded or personalized PPE to ensure that it complies with all of the following:

- (i) Is adequate to protect from hazards present in the workplace.
- (ii) Is properly maintained.
- (iii) Is kept in a sanitary condition.

(11) If the provisions of another MIOSHA standard specify that the employer shall pay for specific equipment, then the payment provisions of that standard prevails.



## EYE AND FACE PROTECTION

### **R 408.13311 Eye and face protection; consensus standards.**

**Rule 3311.** (1) All protective eye and face protection devices shall be in compliance with any of the following consensus standards:

(a) ANSI/ISEA Z-87.1 "Occupational and Educational Personal Eye and Face Protection Devices," 2010 edition, as adopted in R 408.13301a.

(b) ANSI Z-87.1 "Occupational and Educational Personal Eye and Face Protection Devices," 2003 edition, as adopted in R 408.13301a.

(c) ANSI Z-87.1 "Practice for Occupational and Educational Eye and Face Protection," 1989 edition, revised 1998, as adopted in R 408.13301a.

(2) Protective eye and face protection devices that the employer demonstrates are at least as effective as protective eye and face protection devices that are constructed in accordance with 1 of the consensus standards adopted in subrule(1) of this rule are considered to be in compliance with this rule.

### **R 408.13312 Use of eye and face protection.**

**Rule 3312.** (1) An employer shall ensure that each affected employee uses appropriate eye or face protection, when exposed to eye or face hazards from any of the following:

- (a) Flying objects or particles.
- (b) Harmful contacts.
- (c) Exposures.
- (d) Molten metal.
- (e) Liquid chemicals.
- (f) Acids or caustic liquids.
- (g) Chemical fumes, gases or vapors.
- (h) Glare.
- (i) Injurious radiation.
- (j) Electrical flash.
- (k) A combination of these hazards

Note: Appendix B, Appendix Table 1, "Eye and Face Protector Selection Chart," and Appendix Figure 1, "Eye and Face Protective Devices Chart," which shall be used as a guide in the selection of the proper eye and face protection.

(2) An employer shall ensure that each affected employee uses eye protection that provides side protection when there is a hazard from flying objects. Detachable side protectors, such as clip-on or slide-on sideshields, that are in compliance with the pertinent requirements of this rule are acceptable.

(3) A protector shall be in compliance with all of the following minimum requirements:

- (a) Provides adequate protection against the particular hazards for which it is designed.
- (b) Fits snugly and does not unduly interfere with movements of the wearer.
- (c) Is capable of withstanding sanitizing.

(4) An employer shall ensure that eye and face personal protective equipment is distinctly marked to facilitate identification of the manufacturer.

(5) Limitations or precautions indicated by the manufacturer shall be transmitted to the user and care taken to ensure that the limitations or precautions are observed.

**R 408.13312a Filter lenses.**

**Rule 3312a.** (1) An employer shall ensure that each affected employee uses equipment that has filter lenses which have shade numbers appropriate for the work being performed for protection from injurious light radiation.

(2) Table 1 is a listing of appropriate shade numbers for various operations.

(3) Table 1 reads as follows:

<b>TABLE 1 FILTER LENSES FOR PROTECTION AGAINST RADIANT ENERGY</b>			
<b>OPERATIONS</b>	<b>PLATE THICKNESS (INCHES)</b>	<b>PLATE THICKNESS (MM)</b>	<b>MINIMUM* PROTECTIVE SHADE</b>
Gas Welding: Light Medium Heavy	Under 1/8 1/8 to 1/2 Over 1/2	Under 3.2 3.2 to 12.7 Over 12.7	4 5 6
Oxygen Cutting Light Medium Heavy	Under 1 1 to 6 Over 6	Under 25 25 to 150 Over 150	3 4 5
<b>OPERATIONS</b>	<b>ELECTRODE SIZE 1/32 IN.</b>	<b>ARC CURRENT</b>	<b>MINIMUM* PROTECTIVE SHADE</b>
Shield metal Arc welding	Less than 3 3 to 5 more than 5 to 8 more than 8	Less than 60 60 to 160 161 to 250 251 to 550	7 8 10 11
Gas metal arc welding and flux	cored arc welding	Less than 60 60 to 160 161 to 250 251 to 500	7 10 10 10
Gas tungsten arc	welding	Less than 50 50 to 150 151 to 500	8 8 10
Air carbon Arc cutting	(Light) (Heavy)	Less than 500 500 to 1000	10 11
Plasma arc welding		Less than 20 20 to 100 101 to 400 401 to 800	6 8 10 11
Plasma arc cutting	(Light)** (Medium)** (Heavy)**	Less than 300 300 to 400 401 to 800	8 9 10
Torch brazing Torch soldering Carbon arc welding			3 2 14
* As a rule of thumb, start with a shade that is too dark to see the weld zone. Then go to a lighter shade that gives a sufficient view of the weld zone without going below the minimum. In oxyfuel gas welding or cutting where the torch produces a high yellow light, it is desirable to use a filter lens that absorbs the yellow or sodium line in the visible light of the (spectrum) operation.			
** These values apply where the actual arc is clearly seen. Experience has shown that light filters may be used when the arc is hidden by the workpiece.			

**R 408.13313 Maintenance and cleanliness of protectors.**

**Rule 3313.** (1) A face or eye protector shall be kept clean and in good repair.

(2) Cleaning facilities for protectors shall be provided away from the hazard, but readily accessible to the wearer.

(3) A slack, worn out, sweat-soaked, knotted, or twisted headband shall be replaced.

(4) A face or eye protector is a personal item and shall be for the individual and exclusive use of the person to whom it is issued. If circumstances require reissue, the protector shall be thoroughly cleaned, sanitized, and in good condition.

**WELDING HELMETS AND HAND SHIELDS**

**R 408.13320 Purposes, types, styles, and marking.**

**Rule 3320.** (1) The devices described in R 408.13320 to R 408.13330 are designed to provide protection for the face, eyes, ears, and neck against intense radiant energy and spatter resulting from arc welding.

(2) A helmet and a hand shield are the only permissible types.

(3) A helmet and a hand shield shall be made with the same basic design and of the same basic materials: an opaque, bowl-shaped or modified bowl-shaped device containing a window with filter plate which allows the wearer to see the radiant object, yet prevents harmful intensities or radiation from reaching his eyes. A helmet shall be supported on the head by an adjustable headgear. A hand shield shall have a handle attached to the bottom by which it is held in the hand. The basic designs may be modified to provide protection against special hazards, but modified equipment shall meet the same requirements as the basic design.

(4) A helmet and a hand shield shall bear a permanent and legible marking by which the manufacturer may be readily identified.

**R 408.13321 Rigid helmet bodies.**

**Rule 3321.** A helmet body of a rigid helmet shall be of such size and shape as to protect the face, forehead, ears, and neck to a vertical line back of the ears. It shall have 1 or more openings in the front for filter plates or filter lenses. The helmet body shall be attached to the headgear so that it will not come in contact with any part of the head and so that it can be lifted up from in front of the face and hold its position in front of the head. The helmet body shall be made of vulcanized fiber, reinforced plastic, or other suitable material which shall be thermally insulating, noncombustible or slow-burning, opaque to visible, ultraviolet, and infrared radiations, and capable of withstanding sanitizing. The inside of the helmet body shall have a low-light reflecting finish. Rivets or other metal parts, if terminating on the inside surface, shall be adequately separated from the wearer's head.

**R 408.13322 Rigid helmet headgear or cradles.**

**Rule 3322.** A rigid helmet shall have a headgear or cradle that shall hold the helmet body comfortably and firmly on the wearer's head, but shall permit the helmet body to be tilted back over the head. The headgear shall be readily adjustable for all head sizes from 6 1/2 to 7 5/8, without the use of tools. The headgear shall be made of materials which are thermally insulating, noncombustible or slow-burning, resistant to heat, and capable of withstanding sanitizing. Where required, the headgear shall be fitted with a removable and replaceable sweatband covering at least the forehead portion of the headband. The sweatband shall be made of leather or other suitable material which is slow-burning and non-irritating.

**R 408.13323 Rigid helmet headgear substitutes.**

**Rule 3323.** A headgear for a rigid helmet may be replaced by an impact resistant hat or cap that meets the requirements of R 408.13370 to R 408.13378 of this part, or other suitable device to which the helmet body is connected, if the helmet body may be lifted and adjusted to permit unobstructed vision or lowered to furnish complete protection, as required. The alternative device shall meet the requirements for sanitizing and resistance to heat and, in addition, shall meet the applicable requirements of any additional functions, such as protection against falling objects.

**R 408.13324 Rigid helmet filter plates.**

**Rule 3324.** (1) A filter plate on a rigid helmet shall fit into the frame and cover the window.

(2) Both surfaces of a filter plate shall be well polished and shall be free from striae, waves, or other defects that would impair the optical quality of the surfaces. Filter plate surfaces shall be flat and substantially parallel.

(3) Table 2 of R 408.13312 shall be used to select the proper shade number of filter lenses or plates during welding operations.

(4) When specified, a filter plate shall be impact-resistant, unless impact-resistant eye protection is worn in conjunction with a welding helmet.

(5) A filter plate shall be marked with the shade designation and a permanent and legible marking by which the manufacturer may be readily identified. In addition, a glass filter plate, when treated for impact-resistance, shall be marked with the letter "H."

(6) A cover plate made of plain glass, of glass coated on 1 or on both sides with plastic, or of a slow-burning solid plastic sheet shall be used to protect a filter plate from damage. A cover plate shall be the same peripheral size and shape as the filter plate, and the thickness of a cover plate shall not be less than 0.050 inches. A cover plate shall transmit not less than 75% of the luminous radiation and shall be substantially free from optical imperfections.

**R 408.13325 Non-rigid helmets.**

**Rule 3325.** A helmet may be made of non-rigid materials where it is to be used in confined spaces, or may be collapsible for convenience in carrying or storing. The helmet may be of the same general shape as a rigid helmet, except that a more complete covering of the top of the head is necessary in order to maintain the face, side, and windows in proper position. The requirements for the filter plates, cover plates, and lens mounting frame are the same as for a rigid helmet. A headgear may be used. The material shall be non-conducting and opaque to ultraviolet, visible, and infrared radiations. Stitched seams shall be welded. Stitching shall not be exposed.

**R 408.13327 Hand shield.**

**Rule 3327.** A hand shield shall be constructed of materials similar to those used for a helmet and in like manner. The materials, lens mounting arrangement, and filter and cover plates shall conform to the requirements for the corresponding parts of the helmet body with headgear. The handle shall be made of a material that is a non-conductor of electricity and is noncombustible or slow-burning. It shall be of such size and shape as to be held easily by 1 hand and shall be firmly attached to the lower portion of the shield. A hand shield intended for use by other than a welding operator shall have filter and cover plates suitable for the intended use.

**R 408.13329 Helmet and hand shield lift fronts and chin rests.**

**Rule 3329.** (1) The lift front of a helmet shall be fabricated from metal, plastic, or other suitable material. A snap hinge shall be provided so that the front part will stay up or down but will not remain in a partially opened position. The lift front seal against the helmet shall be light tight. The lift front shall be designed to accommodate a clear impact-resisting plate in the back or fixed part; a filter plate, impact-resisting, when specified; and a cover plate in the front part. The back or fixed part plate shall be clear heat-treated glass or plastic not more than 3/16 inch thick or less than 1/8 inch and capable of withstanding the impact test.

(2) To avoid contact of a helmet or hand shield with the face of the wearer, a chin rest or adjustable position stop shall be provided. The chin rest and adjustable position stop shall be constructed of suitable rigid material and shall be detachable from the shell of the hand shield.

**R 408.13330 Helmet snoods, neck protectors, and aprons.**

**Rule 3330.** (1) A snood, or back-of-head-and-neck protector where required shall be of material that is flame resistant, that is a good insulator of heat and electricity, and that is capable of withstanding sanitizing. They shall be designed for easy attachment to the helmet, helmet headgear, or cradle.

(2) An apron or bib, where required for a helmet, shall be of nonflammable, nonconducting material that is flexible and capable of withstanding sanitizing.

**R 408.13332 Effect of head protection standards.**

**Rule 3332.** The characteristics and performance requirements of these rules for welding helmets shall in no way be altered through their attachment to protective hats and caps, as required by R 408.13370 to R 408.13378 of this part.

**FACE SHIELDS**

**R 408.13340 Purposes and uses.**

**Rule 3340.** (1) The devices described in R 408.13340 to R 408.13347 of this part are designed to provide protection to the front part of the head, including forehead, cheeks, nose, mouth, and chin, and to the neck, where required, from flying particles and sprays of hazardous liquids, and to provide filter protection where required. Such devices shall be worn over suitable basic eye protection devices.

(2) Typical uses for face shields include, but are not limited to, the following situations:

- (a) Woodworking operations where chips and particles fly.
- (b) Metal machining causing flying particles.
- (c) Buffing, polishing, wire brushing, and grinding operations causing flying particles or objects.
- (d) Spot welding.
- (e) Handling of hot or corrosive materials.

**R 408.13342 Types and materials.**

**Rule 3342.** (1) Face shields are of 3 basic styles: headgear without crown protector; headgear with crown protector; and headgear with crown protector and chin protector. Each of these styles shall accommodate any of the following styles of windows:

- (a) Clear transparent.
- (b) Colored transparent.
- (c) Wire screen.
- (d) Combination of plastic and wire screen.
- (e) Fiber window with filter plate mounting.
- (2) Materials used in the manufacture of a face shield shall be non-irritating to the skin when subjected to perspiration and shall be capable of withstanding frequent sanitizing. Metals, when used, shall be resistant to corrosion. Plastic materials shall be slow-burning. Clear or colored plastic materials used in windows shall be of an optical grade. Plastic windows shall not be used in connection with welding operations unless they meet the requirements of table 1 of this part.

**R 408.13343 Components.**

**Rule 3343.** A face shield shall consist of a detachable transparent plastic window, wire screen window, or opaque frame with window; a tilting support, an adjustable headgear; and, as required, a crown protector and chin protector.

**R 408.13344 Windows.**

**Rule 3344.** (1) A window shall be designed to fit the contour of the window support.

(2) A window supporting or window holding member, which shall be a band or crown protector, shall be attached to the headgear. The window support shall position the window in front of the face to provide clearance for the nose and eyeglasses of the wearer.

(3) The attachment of the window to the window support shall be secure and shall permit easy removal and replacement. The several sizes and types of windows for a face shield shall be interchangeable for attachment to the window support.

(4) A plastic or wire screen window without frame shall be not less than 9 1/2 inches wide at the top and 8 1/2 inches wide at the bottom, measured over its curved surfaces when attached and in position on the window support, and not less than 6 inches high. A window, when used in a frame, shall not be less than 4 inches wide and 2 inches high, and the frame shall conform to the dimensions specified for a window without a frame. A plastic window shall be not less than 0.040 inch nominal thickness.

(5) The exposed borders of a wire screen window shall be suitably bound or otherwise finished to eliminate sharp, rough, or unfinished edges. A wire screen window shall not be less than 20-mesh screen.

(6) A window support shall be pivotally attached to the sides of the headgear to permit easy tilting, either upward or downward, of the supporting member and of the window attached thereto. The window shall be capable of being tilted sufficiently upward so that the center of its bottom edge shall be out of the line of horizontal vision. The tension of the tilting mechanism shall be sufficient to hold the window without slippage in either the up or down position.

**R 408.13345 Headgear.**

**Rule 3345.** (1) A headgear shall consist of at least a headband and a crown strap. The headgear shall be made from materials having a low heat conductivity. The design shall hold the window and window support comfortably and firmly in place on the wearer's head and shall provide for tilting the window away from the face.

(2) A headgear shall be readily adjustable to head sizes from 6 1/2 to 7 5/8 without the use of tools. The crown strap or band shall be attached to and extend between the front and rear centers or from the middle sides of the headband. It shall form an arc over the head to assist in positioning and holding the headgear in place. An adjusting device shall be positive and hold firmly in place after being adjusted. Its mechanisms and movements shall be protected so that the wearer's hair cannot catch in the device.

(3) For greater protection, a headgear may be replaced by an impact-resistant hat or cap to which the window support is connected. The attachment may be either rigid or swiveled. If swiveled, the design shall permit lifting and adjusting the window to permit unobstructed vision or lowering to furnish protection.

**R 408.13346 Crown and chin protectors.**

**Rule 3346.** (1) A crown protector and chin protector shall be made of material having an impact-resistance not less than that of the plastic window. When the crown protector is used in conjunction with the chin protector for protection against sprays of hazardous liquids, the assembly of the crown protector and window support and the assembly of the chin protector and window shall not allow liquids to pass through any opening in the assembly and reach the face, forehead, or chin of the wearer.

(2) A crown protector shall be shaped to cover at least the frontal portion of the head and shall extend around each side at least to a vertical line at the front of the ears. It may be an integral part of the window support or a separate assembly. The design shall provide a comfortable clearance over the forehead and the head of the wearer.

(3) A chin protector shall be shaped to cover at least the chin and upper part of the neck. The design shall provide a comfortable clearance under the chin of the wearer.

**R 408.13347 Marking; special operating conditions.**

**Rule 3347.** (1) When a face shield is used in atmospheres or working areas requiring special conditions of non-conductivity or non-sparking materials used shall meet these requirements. A face shield shall be plainly and permanently labeled, identifying it as a "non-conductive face shield" or " non-sparking face shield."

(2) A headgear and a plastic window shall bear a permanent and legible marking by which the manufacturer may be readily identified. A window offered for protection against glare shall also bear its shade designation.

**EYE PROTECTORS**

**R 408.13350 Prescription lenses.**

**Rule 3350.** An employer shall assure that each affected employee who wears prescription lenses while engaged in operations that involve eye hazards shall wear eye protection which incorporates that prescription in its design or shall wear eye protection which can be worn over the prescription lenses without disturbing the proper position for the prescription lenses or protective lenses.

**R 408.13352 Materials.**

**Rule 3352.** Materials used in the manufacturing of eye protectors shall combine mechanical strength and lightness of weight to a high degree, shall be non-irritating to the skin when subjected to perspiration, and shall withstand frequent sanitizing. Metals, where used, shall be corrosion resistant. Plastic materials, when used, shall be noncombustible or slow-burning. Cellulose nitrate, or materials having flammability characteristics approximating those of cellulose nitrate, shall not be used.

**R 408.13353 Lenses.**

Rule 3353. (1) Lenses intended for use in eye protectors are of 4 basic types, as follows:

(a) Clear lenses which are impact-resisting and provide protection against flying objects.

(b) Absorptive lenses of shades 1.7 through 3.0 which are impact-resisting and provide protection against flying objects and glare or which are impact-resisting and provide protection against flying objects, and narrow-band spectral transmittance of injurious radiation.

(c) Protective-corrective lenses which are impact-resisting and either clear or absorptive, as specified for persons requiring visual correction.

(d) Filter lenses which are impact-resisting and provide protection against flying objects and narrow-band spectral transmittance of injurious radiation.

(2) Glass filter lenses intended for use in eyecup goggles shall be heat treated.

(3) The height of the safety lens shall not be less than 30 millimeters.

**R 408.13355 Eyecup goggles; components.**

**Rule 3355.** Eyecup goggles shall consist of 2 eyecups with lenses and lens retainers, connected by an adjustable bridge, and a replaceable and adjustable headband or other means for retaining the eyecups comfortably in front of the eyes. Recommended applications for the use of eyecup goggles are shown in Appendix B Table 1.

**R 408.13356 Eyecup goggles; types and models.**

**Rule 3356.** (1) Eyecup goggles shall be of 2 types as follows:

(a) Cup-type goggles designed to be worn by individuals who do not wear corrective spectacles.

(b) Cover cup-type goggles designed to fit over corrective spectacles.

(2) The 2 types of eyecup goggles are subdivided into the following classes:

(a) Chipper's models providing impact protection against flying objects.

(b) Dust and splash models providing protection against fine dust particles or liquid splashes and impact.

(c) Welder's and cutter's models providing protection against glare, injurious radiations, and impact.

(3) The basic designs may be modified to provide more protection against special hazards, but the modified equipment shall meet the same requirements as the basic design.

**R 408.13357 Eyecup goggles; fit.**

**Rule 3357.** (1) The edge of the eyecup of eyecup goggles which bears against the face shall have a smooth surface free from roughness or irregularities which might exert undue pressure or cause discomfort to the wearer. The eyecups shall be of such shape and size as to protect the entire eye sockets.

(2) Cover cup-type goggles shall provide ample clearance and not interfere with the spectacles of the wearer. The edge of the goggles which bears against the face shall have a smooth surface free from roughness or irregularities which might exert undue pressure or cause discomfort to the wearer.

**R 408.13359 Eyecup ventilation.**

**Rule 3359.** (1) Eyecups of chipper's models shall be ventilated in a manner to permit circulation of air.

(2) Eyecups of dust and splash models shall be ventilated in a manner to permit circulation of air. The ventilation openings shall be baffled or screened to prevent direct passage of dust or liquids into the interior of the eyecups.

(3) Eyecups of welder's and cutter's models shall be ventilated in a manner to permit circulation of air and shall be opaque. The ventilation openings shall be baffled to prevent passage of light rays into the interior of the eyecup.

**R 408.13360 Eyecup lenses and retaining rings.**

**Rule 3360.** (1) An eyecup shall be provided with a rigidly constructed lens retaining ring of metal or of plastic designed to accommodate lenses and to permit their ready removal and replacement without damage to the eyecup or to the lenses and without the use of tools. The ring shall provide a complete clamping action against the lens. Lens retainers for welder's and cutter's models shall accommodate a filter lens, fiber gasket, and cover lens.

(2) A filter lens shall be marked with the shade designation and a permanent and legible marking by which the manufacturer may be readily identified. A glass filter lens, when treated for impact-resistance, shall also be marked with the letter "H."

**R 408.13362 Flexible and cushioned fitting goggles; construction.**

**Rule 3362.** Flexible and cushioned fitting goggles shall consist of a wholly flexible frame, forming a lens holder or with a separable lens holder or a rigid frame with integral lens or lenses, having a separate cushioned fitting surface on the full periphery of the facial contact area. Materials used shall be chemical-resistant, non-toxic, non-irritating, and slow-burning. There shall be a positive means of support on the face, such as an adjustable headband of suitable material or other suitable means of support to retain the frame comfortably and snugly in place in front of the eyes. A frame which is a lens holder or has a separable lens holder shall hold the lenses firmly and tightly and be removable or replaceable without the use of tools. The goggles may be ventilated or not, as required by their intended use. Where chemical goggles are ventilated, the openings shall be such as to render the goggles splashproof.

**R 408.13363 Flexible and cushioned fitting goggles; protection.**

**Rule 3363.** (1) Chipper's models of flexible and cushioned fitting goggles shall provide protection against impact.

(2) Dust and splash models shall provide protection from fine dusts, fumes, liquids, splashes, mists, and spray, alone or with reflected light or glare, wind, and impact.

(3) Gas welder's and cutter's models shall provide protection against glare, injurious radiations, and impact.

**R 408.13364 Flexible and cushioned fitting goggles; marking.**

**Rule 3364.** (1) The frame of flexible and cushioned fitting goggles shall bear a trademark or name identifying the manufacturer.

(2) Each separate lens shall be distinctly marked in a manner by which the manufacturer may be identified.

(3) A heat-treated glass filter plate or lens shall also be marked with the shade designation and the letter "H".

(4) The marking shall be clear cut and permanent and so placed as not to interfere with the vision of the wearer.

**R 408.13366 Foundrymen's goggles; construction.**

**Rule 3366.** A foundryman's goggles shall consist of a mask made of a flexible, non-irritating, and noncombustible or slow-burning material, such as a leather or flexible plastic, suitable lens holders attached thereto, lenses, and a positive means of support on the face, such as an adjustable headband, to retain the mask comfortably and snugly in place in front of the eyes. The edge of the mask on contact with the face shall be provided with a binding of corduroy or other suitable material. The lens holders shall hold the lenses firmly and tightly and may be readily removable or replaceable. The lens holders shall be ventilated to permit circulation of air.

**R 408.13367 Foundrymen's goggles; protection.**

**Rule 3367.** (1) A foundryman's goggles shall provide protection against impact and hot-metal splash hazards encountered in foundry operations such as melting, pouring, chipping, babbitting, grinding, and riveting. Where required, the foundryman's goggles shall also provide protection against dusts.

(2) Applications for use of foundrymen's goggles are shown in R 408.13312a Table 1.

(3) Materials shall resist flame, corrosion, water, and sanitizing.

**SPECTACLES**

**R 408.13369 Spectacles.**

**Rule 3369.** (1) Spectacles, also known as safety glasses, of metal, plastic, or a combination thereof, shall consist of lenses in a frame that supports the lenses around their entire periphery of suitable size and shape for the purpose intended connected by a nose bridge, and retained on the face by temples or other suitable means.

(2) The spectacles, also known as safety glasses, shall be furnished with or without sideshields depending upon their intended use.

(3) The frames, temples, and sideshields may be metal or plastic, and when made of plastic, shall be of the slow-burning type.

(4) Spectacles, also known as safety glasses, shall provide protection to the eye from flying objects, and, when required, from glare and injurious radiations.

(5) Spectacles, also known as safety glasses, without sideshields are intended to provide frontal protection.

(6) Where side as well as frontal protection is required, the spectacles, also known as safety glasses, shall be provided with sideshields.

Note: Appendix B, Appendix Table 1 "Eye and Face Protector Selection Chart," and Appendix Figure 1, "Eye and Face Protective Devices Chart," shall be used as a guide in the selection of the proper eye and face protection.

(7) Frames shall be designed for industrial exposure and shall bear a trademark identifying the manufacturer on both fronts and temples. The frame front shall carry a designation of the eye size and bridge size, where applicable. Temples shall be marked as to the overall length or fitting value.

(8) Temples may be of the cable or spatula type, as specified, and shall be of such design as to permit adjustment and fit comfortably and securely on the wearer. The size of the temples shall be clearly marked.

(9) Safety lens in frames which do not comply with this part shall not be worn.

## HEAD PROTECTION EQUIPMENT

### R 408.13370 Use of head protection.

**Rule 3370** (1) An employer shall ensure that each affected employee is provided with, and wears, head protection equipment and accessories when the employee is required to be present in areas where a hazard exists from any of the following:

- (a) Falling or flying objects.
- (b) Other harmful contacts or exposures.
- (c) Where there is a risk of injury from any of the following:

- (i) Electric shock.
- (ii) Hair entanglement.
- (iii) Chemicals.
- (iv) Temperature extremes.

(2) Service facilities shall be provided for the sanitizing and replacement of needed parts when necessary and before head protection equipment is re-issued.

(3) Head protection equipment that has been physically altered or damaged shall not be worn or reissued to an employee.

(4) An employee shall not physically alter, and shall guard against damage to, the head protection equipment provided.

(5) An employee shall use the provided head protection equipment in accordance with the instructions and training received.

### R 408.13372 Criteria for head protection.

**Rule 3372.** (1) An employer shall provide each employee with head protection that meets the specifications contained in any of the following consensus standards:

(a) ANSI Z-89.1 "American National Standard for Industrial Head Protection," 2009 edition, as adopted in R 408.13301a.

(b) ANSI Z-89.1, "American National Standard for Industrial Head Protection," 2003 edition, as adopted in R 408.13301a.

(c) ANSI Z-89.1 "American National Standard for Personnel Protection—Protective Headwear for Industrial Workers--Requirements," 1997 edition, as adopted in R 408.13301a.

(2) Any head protection device that the employer demonstrates is at least as effective as a head protection device constructed in accordance with 1 of the consensus standards adopted in subrule (1) of this rule is considered to be in compliance with this rule.

### R 408.13375 Protective helmets.

**Rule 3375.** (1) Protective helmets shall be described by impact type and electrical class. All protective helmets shall meet either Type I or Type II requirements. All helmets shall be further classified as meeting Class G, Class E, or Class C electrical requirements. Helmets shall be classified as follows:

(a) Impact type protective helmets shall be either of the following:

- (i) Type I helmets intended to reduce the force of impact resulting from a blow only to the top of the head.
- (ii) Type II helmets intended to reduce the force of impact resulting from a blow to the top or sides of the head.

(b) Electrical classes for protective helmets shall be 1 of the following:

- (i) Class G, general protective helmets are intended to reduce the danger of contact with low voltage conductors. Test samples shall be proof-tested at 2200 volts (phase to ground). This voltage is not intended as an indication of the voltage at which the helmets protects the wearer.
- (ii) Class E, electrical protective helmets are intended to reduce the danger of contact with higher voltage conductors. Test samples shall be proof-tested at 20,000 volts (phase to ground). This voltage is not intended as an indication of the voltage at which the helmet protects the wearer.
- (iii) Class C, conductive protective helmets are not intended to provide protection against contact with electrical hazards.

(2) A metallic head device shall not be furnished by an employer or used by an employee for head protection, except where it has been determined that the use of other types of protective helmets or safety hats or caps is impractical, such as where chemical reaction will cause the deterioration of other types of head protection.

(3) A protective helmet furnished by an employer shall be identified on the inside of the shell with the name of the manufacturer.

(4) When used in conjunction with protective helmets, faceshields, welding helmets, and goggles shall be in compliance with the requirements in these rules, and hearing protection shall be in compliance with Occupational Health Standard Part 380 "Occupational Noise Exposure," as referenced in R 408.13301a.

(5) Winter liners and chin straps used in conjunction with class E helmets for high-voltage protection shall not contain any metallic parts or other conductive materials.

(6) Winter liners and chin straps used in areas where there is a danger of ignition from heat, flame, or chemical reaction shall be made of materials that are non-burning or flame retardant.

(7) Bump hats or caps or other limited-protection devices shall not be used as a substitute for protective helmets for the hazards described in R 408.13370.



(8) An employer shall ensure that protective helmets designed to reduce electrical shock hazard shall be worn by each affected employee who is near exposed electrical conductors that could come in contact with the employee's head.

**R 408.13376 Hoods.**

**Rule 3376.** (1) A hood shall be made of materials that combine all of the following:

(a) Have mechanical strength and lightness of weight to a high degree.

(b) Be non-irritating to the skin when subjected to perspiration.

(c) Be capable of withstanding frequent cleaning and disinfection.

(2) Materials used in the manufacture of hoods shall also be suitable to withstand the hazards to which the user may be exposed.

(3) A hood shall bear a permanent and legible marking by which the manufacturer may be readily identified.

(4) A hood shall be designed to provide adequate ventilation for the wearer.

(5) A protective helmet shall be used in conjunction with a hood where there is a head injury hazard and the hood shall be designed to accommodate such helmet.

**R 408.13378 Hair enclosures; face and head.**

**Rule 3378.** (1) A hat, cap, or net shall be worn by a person where there is a danger of hair entanglement in moving machinery or equipment, or where there is exposure to means of ignition.

(2) Hair enclosures include all of the following:

(a) Be designed to be reasonably comfortable to the wearer.

(b) Completely enclose all loose hair.

(c) Be adjustable to accommodate all head sizes.

(3) Be material used for hair enclosures of all of the following:

(a) Fast dyed.

(b) Non-irritating to the skin when subjected to perspiration.

(c) Capable of withstanding frequent cleaning.

(4) Hair enclosures shall not be reissued from 1 employee to another unless it has been thoroughly sanitized.

**FOOT AND TOE PROTECTION**

**R 408.13383 Criteria for protective footwear.**

**Rule 3383.** (1) Protective footwear shall comply with any of the following consensus standards:

(a) ASTM F-2412 "Standard Test Methods for Foot Protection," 2005 edition, as adopted in R 408.13301a.

(b) ASTM F-2413 "Standard Specification for Performance Requirements for Protective Footwear," 2005 edition, as adopted in R 408.13301a.

(c) ANSI Z-41 "American National Standard for Personal Protection -- Protective Footwear," 1999 edition, as adopted in R 408.13301a.

(2) Protective footwear that an employer demonstrates is at least as effective as protective footwear that is constructed in accordance with 1 of the consensus standards adopted in subrule (1) of this rule, shall be considered to be in compliance with the requirements of this rule.

**R 408.13384 Toe protection.**

**Rule 3384.** Where toe protection other than safety toe footwear is worn, the toe protection shall have an impact value of not less than that required for the safety toe footwear.

**R 408.13385 Use of foot protection.**

**Rule 3385.** (1) An employer shall ensure that each affected employee shall wear protective footwear when working in areas where any of the following occur:

(a) When the use of protective footwear will protect the affected employee from an electrical hazard, such as a static-discharge or electric-shock hazard, that remains after the employer takes other necessary protective measures.

(b) There is a danger of foot injuries due to falling or rolling objects.

(c) There is a danger of objects piercing the sole of the shoe.

(2) An employer shall ensure that safety shoes and boots that are not worn over shoes and that are worn by more than 1 employee are maintained, cleaned, and sanitized inside and out before being issued to another employee

**R 408.13386 Foot protection; requirements.**

**Rule 3386.** If a hazard is created from a process, environment, chemical, or mechanical irritant which could cause an injury or impairment to the feet by absorption or physical contact, other than from impact, then the employer shall provide any of the following to the employee:

(a) Boots.

(b) Overshoes.

(c) Rubbers.

(d) Wooden-soled shoes.

(e) The equivalent to subdivisions (a) to (d) of this subrule.

## ELECTRICAL PROTECTIVE EQUIPMENT

### R 408.13387 Design requirements for specific types of electrical protective equipment.

**Rule 3387.** (1) Rubber insulating blankets, rubber insulating matting, rubber insulating covers, rubber insulating line hose, rubber insulating gloves, and rubber insulating sleeves shall meet the following requirements:

(a) Blankets, gloves, and sleeves shall be produced by a seamless process.

(b) Each item shall be clearly marked as follows:

- (i) Class 00 equipment shall be marked class 00.
- (ii) Class 0 equipment shall be marked class 0.
- (iii) Class 1 equipment shall be marked class 1.
- (iv) Class 2 equipment shall be marked class 2.
- (v) Class 3 equipment shall be marked class 3.
- (vi) Class 4 equipment shall be marked class 4.
- (vii) Non-ozone-resistant equipment shall be marked type I.
- (viii) Ozone-resistant equipment shall be marked type II.
- (ix) Other relevant markings, such as the manufacturer's identification and the size of the equipment, may also be provided.

(c) Markings shall be non-conducting and shall be applied in such a manner as not to impair the insulating qualities of the equipment.

(d) Markings on gloves shall be confined to the cuff portion of the glove.

(2) Electrical requirements shall be all of the following:

(a) Equipment shall be capable of withstanding the alternating current proof-test voltage specified in Table A or the direct current proof-test voltage specified in Table B. All of the following apply:

- (i) The proof test shall reliably indicate that the equipment can withstand the voltage involved.
- (ii) The test voltage shall be applied continuously for 3 minutes for equipment other than matting and shall be applied continuously for 1 minute for matting.
- (iii) Gloves shall be capable of separately withstanding the alternating current proof-test voltage specified in Table A after a 16-hour water soak.

(b) When the alternating current proof test is used on gloves, the 60-hertz proof-test current shall not exceed the values specified in Table A at any time during the test period. All of the following apply:

- (i) If the alternating current proof test is made at a frequency other than 60 hertz, the permissible proof-test current shall be computed from the direct ratio of the frequencies.
- (ii) For the test, gloves(right side out) shall be filled with tap water and immersed in water to a depth that is in accordance with Table C. Water shall be added to or removed from the glove, as necessary, so that the water level is the same inside and outside the glove.
- (iii) After the 16-hour water soak specified in this subrule, the 60-hertz proof-test current shall not exceed the values given in Table A by more than 2 milliamperes.

(c) Equipment that has been subjected to a minimum breakdown voltage test shall not be used for electrical protection. See subrule (3) of this rule.

(d) Material used for Type II insulating equipment shall be capable of withstanding an ozone test, with no visible effects. The ozone test shall reliably indicate that the material will resist ozone exposure in actual use. Any visible signs of ozone deterioration of the material, such as checking, cracking, breaks, or pitting, is evidence of failure to meet the requirements for ozone-resistant material. See subrule (3) of this rule.

(3) Workmanship and finish shall comply with both of the following:

(a) Equipment shall be free of physical irregularities that can adversely affect the insulating properties of the equipment and that can be detected by the tests or inspections required by these rules.

(b) Surface irregularities that may be present on all rubber goods, because of imperfections on forms or molds or because of inherent difficulties in the manufacturing process, and that may appear as indentations, protuberances, or imbedded foreign material are acceptable under the following conditions:

- (i) The indentation or protuberance blends into a smooth slope when the material is stretched.
- (ii) Foreign material remains in place when the insulating material is folded and stretches with the insulating material surrounding it.

(4) Rubber insulating equipment meeting the national consensus standards in Table 4 is considered to be in compliance with the performance requirements of these rules.

TABLE 2 AMERICAN SOCIETY OF TESTING MATERIALS STANDARDS			
STANDARD TITLE	ASTM NUMBER	EDITION	SUPPLEMENT
Standard Specification for Rubber Insulating Gloves	D-120	2009	-
Standard Specification for Rubber Insulating Matting	D-178	2001	2010
Standard Specification for Rubber Insulating Blankets	D-1048	2012	-
Standard Specification for Rubber Insulating Covers	D-1049	1998	2010
Standard Specification for Rubber Insulating Line Hose	D-1050	2005	2011
Standard Specification for Rubber Insulating Sleeves	D-1051	2008	-
These standards contain specifications for conducting the various tests required in these rules. For example, the alternating current and direct current proof tests, the breakdown test, the water-soak procedure, and the ozone test described in this rule are described in detail in these ASTM standards.			
ASTM F-1236 "Standard Guide for Visual Inspection of Electrical Protective Rubber Products," 1996 Edition with 2012 supplement, as adopted in R 408.13301a, presents methods and techniques for the visual inspection of electrical protective equipment made of rubber. This guide also contains descriptions and photographs of irregularities that can be found in this equipment			
ASTM F-819 "Standard Terminology Relating to Electrical Protective Equipment for Workers," 2010 edition, as adopted in R 408.13301a, includes definitions of terms relating to the electrical protective equipment covered in these rules.			

**R 408.13387a. Electrical protective equipment.**

**Rule 3387a.** (1) Material other than rubber that offers protection equivalent to or greater than rubber may be used if the material is certified to meet the appropriate ASTM standard tests.

(2) An insulated blanket, glove, or sleeve shall be capable of withstanding the voltage to which it may be subjected.

(3) Exposed conductors or equipment, or both, except for conductors or equipment being directly worked on, that is energized from 750 volts to 28,000 volts phase to ground and that an employee may reach into or touch shall be isolated or covered with at least 1 of the following:

- (a) An insulating blanket.
- (b) An insulating hood.
- (c) An insulating line hose.
- (d) An insulating barrier.

(4) An employee shall use insulating gloves and sleeves capable of withstanding the imposed voltage when performing any of the following activities:

(a) Working directly on, or within reaching distance of, a conductor or equipment at a nominal 750 volts or more phase to ground, except when using barehanded techniques or a hot stick. Sleeves are not required for an employee who performs routine switching operations in a substation or powerhouse. An employee who uses gloves and sleeves and works directly on or within reaching distance of a conductor or equipment energized at more than 5,000 volts phase to ground shall do so from an insulated platform or board or an aerial device that has an insulated basket.

(b) Connecting or disconnecting primary neutrals, pole ground wires, or other conductors normally connected to static wires or energized equipment, except that gloves and sleeves shall not be worn while connecting and disconnecting a service neutral or secondary neutral.

(c) Working on a de-energized conductor that extends into an area in which contact may be made with an energized conductor or exposed parts of energized equipment, unless the conductor is grounded or isolated. Insulating sleeves are optional at voltages of less than 750 volts phase to ground.

(5) An employee shall use insulating gloves capable of withstanding the imposed voltage when performing either of the following activities:

(a) When working with a powered or manual hole digger while using booms or using winch lines to install or remove poles or equipment where the hole digger may contact conductors or equipment energized at a voltage of 300 volts or more phase to ground. An employee shall not use the gloves while in the enclosed cab of the equipment.

(b) When working directly on a conductor or equipment energized at a voltage of more than 240 volts phase to ground. This does not include the use of test equipment.

**R 408.13388 Design requirements for other types of electrical protective equipment.**

**Rule 3388.** (1) The following requirements apply to the design and manufacture of electrical protective equipment that is not covered by R 408.40650:

(2) Insulating equipment used for the protection of employees shall be capable of withstanding, without failure, the voltages that may be imposed upon it.

Note 1 to subrule (2): These voltages include transient over-voltages, such as switching surges, as well as nominal line voltage. See General Industry Safety Standard Part 86 “Electric Power Generation, Transmission, and Distribution,” Appendix B, as referenced in R 408.13301a, for a discussion of transient over-voltages on electric power transmission and distribution systems.

Note 2 to subrule (2): See IEEE 516 “Guide for Maintenance Methods on Energized Power Lines,” 2009 edition, as adopted in R 408.13301a, for methods of determining the magnitude of transient over-voltages on an electrical system and for a discussion comparing the ability of insulation equipment to withstand a transient overvoltage based on its ability to withstand alternating current voltage testing.

(3) Equipment current shall comply with both of the following:

(a) Protective equipment used for the primary insulation of employees from energized circuit parts shall be capable of passing a current test when subjected to the highest nominal voltage on which the equipment is to be used.

(b) When insulating equipment is tested pursuant to these rules, the equipment current may not exceed 1 microampere per kilovolt of phase-to-phase applied voltage.

Note 1 to subrule (3): This rule shall apply to equipment that provides primary insulation of employees from energized parts. It does not apply to equipment used for secondary insulation or equipment used for brush contact only.

Note 2 to subrule (3): For alternating current excitation, this current consists of the following three components:

(a) Capacitive current because of the dielectric properties of the insulating material itself.

(b) Conduction current through the volume of the insulating equipment.

(c) Leakage current along the surface of the tool or equipment.

The conduction current shall be normally negligible. For clean, dry insulating equipment, the leakage current shall be small, and the capacitive current shall predominate.

Note 3 to subrule (3): Plastic guard equipment is considered to conform to the performance requirements of this rule, if it meets, and is used in accordance with ASTM F-712 “Standard Test Methods and Specifications for Electrically Insulating Plastic Guard Equipment for Protection of Workers,” 2006 edition with 2011 supplement, as adopted in R 408.13301a.

**R 408.13389 In-service care and use of electrical protective equipment.**

**Rule 3389.** (1) Electrical protective equipment shall be maintained in a safe, reliable condition.

(2) The following specific requirements apply to rubber insulating blankets, rubber insulating covers, rubber insulating line hose, rubber insulating gloves, and rubber insulating sleeves.

(3) Maximum use voltages shall conform to those listed in Table D.

(4) An employer shall ensure that insulating equipment is inspected for damage before each day’s use and immediately following any incident that can reasonably be suspected of causing damage. Insulating gloves shall be given an air test, along with the inspection.

Note to subrule (4): ASTM F-1236 “Standard Guide for Visual Inspection of Electrical Protective Rubber Products,” 1996 Edition with 2012 supplement, as adopted in R 408.13301a, presents methods and techniques for the visual inspection of electrical protective equipment made of rubber. This guide also contains descriptions and photographs of irregularities that can be found in this equipment.

(5) Insulating equipment with any of the following defects shall not be used.

(a) A hole, tear, puncture, or cut.

(b) Ozone cutting or ozone checking, that is, a series of interlacing cracks produced by ozone on rubber under mechanical stress.

(c) An embedded foreign object.

(d) Any of the following texture changes:

(i) Swelling.

(ii) Softening.

(iii) Hardening.

(iv) Becoming sticky or inelastic.

(v) Any other defect that damages the insulating properties.

(6) An employer shall ensure that insulating equipment found to have other defects that might affect its insulating properties is removed from service and returned for testing under subrules (10) and (11) of this rule.

(7) An employer shall ensure that insulating equipment is cleaned as needed to remove foreign substances.

(8) Insulating equipment shall be stored in a location and in a manner as to protect it from all of the following:

- (a) Light.
- (b) Temperature extremes.
- (c) Excessive humidity.
- (d) Ozone.
- (e) Other damaging substances and conditions.

(9) Protector gloves shall be worn over insulating gloves, except under the following conditions:

(a) Protector gloves need not be used with class 0 gloves, under limited-use conditions, when small equipment and parts manipulation necessitate unusually high finger dexterity.

Note to subrule (9)(a): Persons inspecting rubber insulating gloves used under these conditions shall take extra care in visually examining them. Employees using rubber insulating gloves under these conditions shall take extra care to avoid handling sharp objects.

(b) If the voltage does not exceed 250 volts, ac, or 375 volts, direct current, protector gloves shall not be used with class 00 gloves, under limited-use conditions, when small equipment and parts manipulation necessitate unusually high finger dexterity.

Note to subrule (9)(b): Persons inspecting rubber insulating gloves used under these conditions shall take extra care in visually examining them. Employees using rubber insulating gloves under these conditions shall take extra care to avoid handling sharp objects.

(c) Any other class of glove may be used without protector gloves, under limited-use conditions, when small equipment and parts manipulation necessitate unusually high finger dexterity but only if the employer can demonstrate that the possibility of physical damage to the gloves is small and if the class of glove is 1 class higher than that required for the voltage involved.

(d) Insulating gloves that have been used without protector gloves may not be reused until they have been tested under the provisions of this rule.

(10) Electrical protective equipment shall be subjected to periodic electrical tests. Test voltages and the maximum intervals between tests shall be pursuant to Table D and Table E.

(11) The test method used in this rule shall reliably indicate whether the insulating equipment can withstand the voltages involved.

Note to subrule (11): The standard electrical test methods considered as meeting this requirement are listed in Table 3.

(12) Insulating equipment failing to pass inspections or electrical tests shall not be used by employees, except as follows:

(a) Rubber insulating line hose may be used in shorter lengths with the defective portion cut off.

(b) Rubber insulating blankets may be salvaged by severing the defective area from the undamaged portion of the blanket. The resulting undamaged area shall not be smaller than 560 millimeters by 560 millimeters (22 inches by 22 inches) for class 1, 2, 3, and 4 blankets.

(c) Rubber insulating blankets shall be repaired using a compatible patch that results in physical and electrical properties equal to those of the blanket.

(d) Rubber insulating gloves and sleeves with minor physical defects, such as small cuts, tears, or punctures, shall be repaired by the application of a compatible patch. Also, rubber insulating gloves and sleeves with minor surface blemishes shall be repaired with a compatible liquid compound. The repaired area shall have electrical and physical properties equal to those of the surrounding material. Repairs to gloves shall be permitted only in the area between the wrist and the reinforced edge of the opening.

(13) An employer shall ensure that repaired insulating equipment is retested before it is used by employees.

(14) The employer shall certify that equipment has been tested pursuant to the requirements of this rule. The certification shall identify the equipment that passed the test and the date it was tested and shall be made available upon request to the department of licensing and regulatory affairs director and to MIOSHA employees or their authorized representatives.

Note to subrule (14): Marking equipment with, and entering onto logs, the results of the tests and the dates of testing are acceptable means of meeting the certification requirement.

<b>TABLE 3 AMERICAN SOCIETY OF TESTING MATERIALS STANDARDS</b>			
<b>STANDARD TITLE</b>	<b>ASTM NUMBER</b>	<b>EDITION</b>	<b>SUPPLEMENT</b>
Standard Specification for Rubber Insulating Gloves	D-120	2009	-
Standard Specification for Rubber Insulating Matting	D-178	2001	2010
Standard Specification for Rubber Insulating Blankets	D-1048	2012	
Standard Specification for Rubber Insulating Covers	D-1049	1998	2010
Standard Specification for Rubber Insulating Line Hose	D-1050	2005	2011
Standard Specification for Rubber Insulating Sleeves	D-1051	2008	-
Standard Specification for In-Service Care of Insulating Line Hose and Covers	F-478	2009	-
Standard Specification for In-Service Care of Insulating Blankets	F-479	2006	2011
Standard Specification for In-Service Care of Insulating Gloves And Sleeves	F-496	2008	-

<b>TABLE A ALTERNATING CURRENT PROOF-TEST REQUIREMENTS</b>					
<b>CLASS OF EQUIPMENT</b>	<b>PROOF-TEST VOLTAGE RMS V</b>	<b>Maximum Proof-Test Current, mA (Globes Only)</b>			
		<b>280-mm (11 in.) Glove</b>	<b>360-mm (14 in.) Glove</b>	<b>410-mm (16 in.) Glove</b>	<b>460-mm (18 in.) Glove</b>
00	2,500	8	12	-	-
0	5,000	8	12	14	16
1	10,000	-	14	16	18
2	20,000	-	16	18	20
3	30,000	-	18	20	22
4	40,000	-	-	22	24

<b>TABLE B DIRECT CURRENT PROOF-TEST REQUIREMENTS</b>	
<b>CLASS OF EQUIPMENT</b>	<b>PROOF-TEST VOLTAGE</b>
00	10,000
0	20,000
1	40,000
2	50,000
3	60,000
4	70,000

NOTE: The dc voltages listed in this table are not appropriate for proof testing rubber insulating line hose or covers. For this equipment, dc proof tests shall use a voltage high enough to indicate that the equipment can be safely used at the voltages listed in Table D.

See ASTM D-1050 "Standard Specification for Rubber Insulating Line Hose," 2005 edition with 2011 supplement and ASTM D-1049 "Standard Specification for Rubber Insulating Covers," 1998 edition with 2010 supplement, as adopted in R 408.13301a, for further information on proof tests for rubber insulating line hose and covers, respectively.

<b>TABLE C GLOVE TESTS – WATER LEVEL<sup>1,2</sup></b>				
<b>CLASS OF GLOVE</b>	<b>ALTERNATING CURRENT PROOF TEST</b>		<b>DIRECT CURRENT PROOF TEST</b>	
	<b>mm</b>	<b>in</b>	<b>mm</b>	<b>in</b>
00	38	1.5	38	1.5
0	38	1.5	38	1.5
1	38	1.5	51	2.0
2	64	2.5	76	3.0
3	89	3.5	102	4.0
4	127	5.0	153	6.0

<sup>1</sup> The water level is given as the clearance from the reinforced edge of the glove to the water line, with a tolerance of  $\pm 13$  mm. ( $\pm 0.5$  in.).

<sup>2</sup> If atmospheric conditions make the specified clearances impractical, the clearances may be increased by a maximum of 25 mm.(1 in.).

<b>TABLE D RUBBER INSULATING EQUIPMENT, VOLTAGE REQUIREMENTS</b>			
<b>CLASS OF EQUIPMENT</b>	<b>MAXIMUM USE VOLTAGE<sup>1</sup> ALTERNATING CURRENT RMS</b>	<b>RETEST VOLTAGE<sup>2</sup> ALTERNATING CURRENT RMS</b>	<b>RETEST VOLTAGE<sup>2</sup> DIRECT CURRENT AVG</b>
00	500	2,500	10,000
0	1,000	5,000	20,000
1	7,500	10,000	40,000
2	17,000	20,000	50,000
3	26,500	30,000	60,000
4	36,000	40,000	70,000

<sup>1</sup> The maximum use voltage is the ac voltage (rms) classification of the protective equipment that designates the maximum nominal design voltage of the energized system that may be safely worked. The nominal design voltage is equal to the phase-to-phase voltage on multiphase circuits. However, the phase-to-ground potential is considered to be the nominal design voltage under the following conditions:

(1) There is no multiphase exposure in a system area and the voltage exposure is limited to the phase-to-ground potential, or

(2) The electric equipment and devices are insulated or isolated or both so that the multiphase exposure on a grounded wye circuit is removed.

<sup>2</sup> The proof-test voltage shall be applied continuously for at least 1 minute, but no more than 3 minutes.

<b>TABLE E RUBBER INSULATING EQUIPMENT TEST INTERVALS</b>	
<b>TYPE OF EQUIPMENT</b>	<b>WHEN TO TEST</b>
Rubber insulating line hose	Upon indication that insulating value is suspect and after repair.
Rubber insulating covers	Upon indication that insulating value is suspect and after repair.
Rubber insulating blankets	Before first issue and every 12 months thereafter; <sup>1</sup> upon indication that insulating value is suspect; and after repair
Rubber insulating gloves	Before first issue and every 6 months thereafter; <sup>1</sup> upon indication that insulating value is suspect; after repair; and after use without protectors
Rubber insulating sleeves	Before first issue and every 12 months thereafter; <sup>1</sup> upon indication that insulating value is suspect; and after repair

<sup>1</sup> If the insulating equipment has been electrically tested but not issued for service, the insulating equipment shall not be placed into service unless it has been electrically tested within the previous 12 months.



**HAND PROTECTION**

**R 408.13392 Hand protection.**

**Rule 3392.** An employer shall select and require employees to use appropriate hand protection when employees' hands are exposed to hazards, such as those from any of the following:

- (a) Skin absorption of harmful substances.
- (b) Severe cuts or lacerations.
- (c) Severe abrasions.
- (d) Punctures.
- (e) Chemical burns.
- (f) Thermal burns.
- (g) Harmful temperature extremes.

**R 408.13393 Hand protection; selection.**

**Rule 3393.** (1) An employer shall base the selection of the appropriate hand protection on an evaluation of the performance characteristics of the hand protection related to all of the following:

- (a) The task or tasks to be performed.
- (b) Conditions present.
- (c) Duration of use.
- (d) The hazards and potential hazards identified.

(2) Hand protection interiors shall be kept free of corrosive or irritating contaminants.

(3) If more than 1 employee wears a pair of gloves, the gloves shall be sanitized before re-issuance.

**BODY PROTECTION**

**R 408.13394 Body protection.**

**Rule 3394.** (1) An employer shall ensure that each employee who is required to work so that his or her clothing becomes wet due to a condition other than the weather or perspiration uses any of the following:

- (a) Aprons.
- (b) Coats.
- (c) Jackets.
- (d) Sleeves.
- (e) Other garments that will keep his or her clothing dry.

(2) The material shall be unaffected by the wetting agent.

(3) The provision of dry, clean, acid-resistant clothing, in addition to rubber shoes or short boots and an apron, shall be considered a satisfactory substitute where small parts are cleaned, plated, or acid-dipped in an open tank.

(4) When abrasive blasting is not protected by an enclosure, the operator shall use heavy canvas or leather gloves and aprons or equivalent protection to provide protection from the impact of abrasives.

**R 408.13395a General requirements for personal fall protection systems.**

**Rule 3395a.** (1) An employer shall ensure that personal fall protection systems meet the requirements contained in this standard.

(2) Connectors shall be drop forged, pressed or formed steel, or made of equivalent materials.

(3) Connectors must have a corrosion-resistant finish, and all surfaces and edges shall be smooth to prevent damage to interfacing parts of the system.

(4) When vertical lifelines are used, each employee shall be attached to a separate lifeline.

(5) Lanyards and vertical lifelines shall have a minimum breaking strength of 5,000 pounds (22.2 kN).

(6) Self-retracting lifelines and lanyards that automatically limit free fall distance to 2 feet (0.61 m) or less shall have components capable of sustaining a minimum tensile load of 3,000 pounds (13.3 kN) applied to the device with the lifeline or lanyard in the fully extended position.

(7) A competent person or qualified person shall inspect each knot in a lanyard or vertical lifeline to ensure that it meets the requirements of subrules (5) and (6) of this rule, before any employee uses the lanyard or lifeline.

(8) D-rings, snaphooks, and carabiners shall be capable of sustaining a minimum tensile load of 5,000 pounds (22.2 kN).

(9) D-rings, snaphooks, and carabiners shall be proof tested to a minimum tensile load of 3,600 pounds (16 kN) without cracking, breaking, or incurring permanent deformation. The gate strength of snaphooks and carabiners shall be proof tested to 3,600 lbs. (16 kN) in all directions.

(10) Snaphooks and carabiners shall be the automatic locking type that require at least 2 separate, consecutive movements to open.

(11) Snaphooks and carabiners shall not be connected to any of the following unless they are designed for such connections:

(a) Directly to webbing, rope, or wire rope.

(b) To each other.

(c) To a D-ring to which another snaphook, carabiner, or connector is attached.

(d) To a horizontal life line.

(e) To any object that is incompatibly shaped or dimensioned in relation to the snaphook or carabiner such that unintentional disengagement could occur when the connected object depresses the snaphook or carabiner gate, allowing the components to separate.

(12) An employer shall ensure that each horizontal lifeline is as follows:

(a) Is designed, installed, and used under the supervision of a qualified person.

(b) Is part of a complete personal fall arrest system that maintains a safety factor of at least 2.

(13) Anchorages used to attach to personal fall protection equipment shall be independent of any anchorage used to suspend employees or platforms on which employees work. Anchorages used to attach to personal fall protection equipment on mobile work platforms on powered industrial trucks shall be attached to an overhead member of the platform, at a point located above and near the center of the platform.

(14) Anchorages, except window cleaners' belt anchors covered by R 408.13395d to R 408.13395g, shall be able to do either of the following:

(a) Capable of supporting at least 5,000 pounds (22.2 kN) for each employee attached.

(b) Designed, installed, and used, under the supervision of qualified person, as part of a complete personal fall protection system that maintains a safety factor of at least 2.

(15) Travel restraint lines shall be capable of sustaining a tensile load of at least 5,000 pounds (22.2 kN).

(16) Lifelines must not be made of natural fiber rope. Polypropylene rope must contain an ultraviolet (UV) light inhibitor.

(17) Personal fall protection systems and their components shall be used exclusively for employee fall protection and not for any other purpose, such as hoisting equipment or materials.

(18) A personal fall protection system or its components subjected to impact loading shall be removed from service immediately and not used again until a competent person inspects the system or components and determines that it is not damaged and safe for use for employee personal fall protection.

(19) Personal fall protection systems shall be inspected before initial use during each workshift for mildew, wear, damage, and other deterioration, and defective components shall be removed from service.

(20) Ropes, belts, lanyards, and harnesses used for personal fall protection shall be compatible with all connectors used.

(21) Ropes, belts, lanyards, lifelines, and harnesses used for personal fall protection shall be protected from being cut, abraded, melted, or otherwise damaged.

(22) An employer shall provide for prompt rescue of each employee in the event of a fall.

(23) Personal fall protection systems shall be worn with the attachment point of the body harness located in the center of the employee's back near shoulder level. The attachment point may be located in the pre-sternal position if the free fall distance is limited to 2 feet (0.6 m) or less.

#### **R 408.13395b System performance criteria for personal fall arrest systems.**

**Rule 3395b.** (1) Personal fall arrest systems shall comply with the requirements of R 408.13395a.

(2) An employer shall ensure that personal fall arrest systems comply with all of the following:

(a) Limit the maximum arresting force on the employee to 1,800 pounds (8 kN).

(b) Bring the employee to a complete stop and limit the maximum deceleration distance the employee travels to 3.5 feet (1.1 m).

(c) Have sufficient strength to withstand twice the potential impact energy of the employee free falling a distance of 6 feet (1.8 m), or the free fall distance permitted by the system.

(d) Sustain the employee within the system and strap configuration without making contact with the employee's neck and chin area.

(e) When the personal fall arrest system meets the criteria and protocols in Appendix D "Personal Fall Protection Systems," Non-Mandatory Guidelines, and is being used by an employee having a combined body and tool weight of less than 310 pounds (140 kg), the system is considered to be in compliance with the provisions of subrule (2)(a) to (c) of this rule.

(f) When the system is used by an employee having a combined body and tool weight of 310 pounds (140 kg) or more and the employer has appropriately modified the criteria and protocols in Appendix D "Personal Fall Protection Systems," Non-Mandatory Guidelines, then the system is deemed to be in compliance with the requirements of subrule (2)(a) to (c) of this rule.

#### **R 408.13395c System use criteria for personal fall arrest systems.**

**Rule 3395c.** (1) An employer shall ensure that any horizontal lifeline that may become a vertical lifeline, the device used to connect to the horizontal lifeline is capable of locking in both directions on the lifeline.

(2) An employer shall ensure that the personal fall arrest systems are rigged in such a manner that the employee cannot free fall more than 6 feet (1.8 m) or contact a lower level. A free fall may be more than 6 feet (1.8 m) provided the employer can demonstrate the manufacturer designed the system to allow a free fall of more than 6 feet and tested the system to ensure a maximum arresting force of 1,800 pounds (8 kN) is not exceeded.

(3) Body belts are prohibited as part of a personal fall arrest system.

#### **R 408.13395d Positioning systems for personal fall protection systems.**

**Rule 3395d.** An employer shall ensure that all positioning systems, except window cleaners' positioning systems, are capable of withstanding, without failure, a drop test consisting of a 4-foot (1.2-m) drop of a 250-pound (113-kg) weight.

**R 408.13395e Window cleaners' positioning systems.**

**Rule 3395e.** (1) An employer shall ensure that all window cleaners' positioning systems are capable of withstanding, without failure, a drop test consisting of a 6-foot (1.8-m) drop of a 250-pound (113-kg) weight.

(2) An employer shall ensure that all window cleaners' positioning systems limit the initial arresting force on the falling employee to not more than 2,000 pounds (8.9 kN), with a duration not exceeding 2 milliseconds and any subsequent arresting forces to not more than 1,000 pounds (4.5 kN).

(3) An employer shall ensure positioning systems, including window cleaners' positioning systems, meet the test methods and procedures in Appendix D "Personal Fall Protection Systems," Non-Mandatory Guidelines, are considered to be in compliance R 408.13395d and R 408.13395e.

**R 408.13395f Lineman's body belt and pole strap systems.**

**Rule 3395f.** An employer shall ensure that all lineman's body belt and pole strap systems meet the following tests:

(a) A dielectric test of 819.7 volts, AC, per centimeter, 25,000 volts per foot, for 3 minutes without visible deterioration.

(b) A leakage test of 98.4 volts, AC, per centimeter, 3,000 volts per foot, with a leakage current of no more than 1 mA.

(c) A flammability test in accordance with Table F "Flammability Test."

<b>TABLE F FLAMMABILITY TEST</b>	
<b>Test Method</b>	<b>Criteria for Passing Test</b>
1. Vertically suspend a 19.7-inch (500-mm) length of strapping supporting a 220.5-lb (100-kg) weight.	<p>Any flames on the position strap must self-extinguish.</p> <p>The positioning strap must continue to support the 220.5-lb (100-kg) mass.</p>
2. Use a butane or propane burner with a 3-inch (76-mm) flame.	
3. Direct the flame to an edge of the strapping at a distance of 1 inch (25 mm).	
4. Remove the flame after 5 seconds.	
5. Wait for any flames on the positioning strap to stop burning.	

**R 408.13395g System use criteria for window cleaners' positioning systems.**

**Rule 3395g.** An employer shall ensure that window cleaners' positioning systems meet and are used in accordance with the following:

(a) Window cleaners' belts are designed and constructed to comply with both of the following:

(i) Belt terminals will not pass through their fastenings on the belt or harness if a terminal comes loose from the window anchor.

(ii) The length of the runner from terminal tip to terminal tip is 8 feet (2.44 m) or less.

(b) Window anchors to which belts are fastened are installed in the side frames or mullions of the window at a point not less than 42 inches (106.7 cm) and not more than 51 inches (129.5 cm) above the window sill.

(c) Each window anchor is capable of supporting a minimum load of 6,000 pounds (26.5 kN).

(d) Use of installed window anchors for any purpose other than attaching the window cleaner's belt is prohibited.

(e) A window anchor that has damaged or deteriorated fastenings or supports is removed, or the window anchor head is detached so the anchor cannot be used.

(f) Rope that has wear or deterioration that affects its strength is not used.

(g) Both terminals of the window cleaner's belt are attached to separate window anchors during any cleaning operation.

(h) No employee works on a window sill or ledge on which there is snow, ice, or any other slippery condition, or one that is weakened or rotted.

(i) No employee works on a window sill or ledge unless he or she complies with either of the following:

(i) The window sill or ledge is a minimum of 4 inches (10 cm) wide and slopes no more than 15 degrees below horizontal.

(ii) The 4-inch minimum width of the window sill or ledge is increased 0.4 inches (1 cm) for every degree the sill or ledge slopes beyond 15 degrees, up to a maximum of 30 degrees.

(j) The employee attaches at least 1 belt terminal to a window anchor before climbing through the window opening, and keeps at least 1 terminal attached until completely back inside the window opening.

(k) Except as provided in subdivision (l) of this rule, the employee travels from 1 window to another by returning inside the window opening and repeating the belt terminal attachment procedure at each window in accordance with subdivision (j) of this rule.

(l) An employee using a window cleaner's positioning system may travel from 1 window to another while outside of the building, provided the employee complies with all of the following:

(i) At least 1 belt terminal is attached to a window anchor at all times.

(ii) The distance between window anchors does not exceed 4 feet (1.2 m) horizontally. The distance between windows may be increased up to 6 feet (1.8 m) horizontally if the window sill or ledge is at least 1 foot (0.31 m) wide and the slope is less than 5 degrees.

(iii) The sill or ledge between windows is continuous.

(iv) The width of the window sill or ledge in front of the mullions is at least 6 inches (15.2 cm) wide.

**APPENDIX A  
RESOURCES  
(NON-MANDATORY)**

For further assistance in implementing requirements for a hazard assessment and the selection of personal protective equipment, contact MIOSHA, OSHA, NIOSH, your union, or industry association.

MIOSHA  
Michigan Occupational Safety and Health Administration  
Consultation Education & Training Division (CET) [www.michigan.gov/cet](http://www.michigan.gov/cet)  
Phone: 517.322.1809

OSHA  
Federal Occupational Safety and Health Administration <http://www.osha.gov>

NIOSH  
National Institute of Occupational Safety and Health <http://www.cdc.gov/niosh>

**APPENDIX B**  
**GUIDELINES FOR HAZARD ASSESSMENT AND**  
**PERSONAL PROTECTIVE EQUIPMENT SELECTION**  
**(NON-MANDATORY)**

This Appendix is intended to provide compliance assistance for employers and employees in implementing requirements for a hazard assessment and the selection of personal protective equipment.

**1. CONTROLLING HAZARDS.**

PPE devices alone should not be relied on to provide protection against hazards, but should be used in conjunction with guards, engineering controls, and sound manufacturing practices.

**2. ASSESSMENT AND SELECTION.**

It is necessary to consider certain general guidelines for assessing the eyes, face, head, hands, feet, and body hazard situations that exist in an occupational or educational operation or process, and to match the protective devices to the particular hazard. It should be the responsibility of the safety officer to exercise common sense and appropriate expertise to accomplish these tasks.

**3. ASSESSMENT GUIDELINES.**

In order to assess the need for PPE the following steps should be taken:

a. Survey. Conduct a walk-through survey of the areas in question. The purpose of the survey is to identify sources of hazards to workers and co-workers. Consideration should be given to the basic hazard categories:

- (a) Impact.
- (b) Penetration.
- (c) Compression (roll-over).
- (d) Chemical.
- (e) Heat.
- (f) Harmful dust.
- (g) Light (optical) radiation.

b. Sources. During the walk-through survey the safety officer should observe:

- (a) Sources of motion; i.e., machinery or processes where any movement of tools, machine elements or particles could exist, or movement of personnel that could result in collision with stationary objects.
- (b) Sources of high temperatures that could result in burns, eye injury or ignition of protective equipment, etc.
- (c) Types of chemical exposures.
- (d) Sources of harmful dust.
- (e) Sources of light radiation, i.e., welding, brazing, cutting, furnaces, heat treating, high intensity lights, etc.
- (f) Sources of falling objects or potential for dropping objects.
- (g) Sources of sharp objects which might pierce the feet or cut the hands.
- (h) Sources of rolling or pinching objects which could brush the feet.
- (i) Layout of workplace and location of co-workers; and
- (j) Any electrical hazards. In addition, injury/accident data should be reviewed to help identify problem areas.

c. Organize data. Following the walk-through survey, it is necessary to organize the data and information for use in the assessment of hazards. The objective is to prepare for an analysis of the hazards in the environment to enable proper selection of protective equipment.

d. Analyze data. Having gathered and organized data on a workplace, an estimate of the potential for injuries should be made. Each of the basic hazards (paragraph 3.a.) should be reviewed and a determination made as to the type, level of risk, and seriousness of the potential injury from each of the hazards found in the area. The possibility of exposure to several hazards simultaneously should be considered.

#### **4. SELECTION GUIDELINES.**

After completion of the procedures in paragraph 3, the general procedure for selection of protective equipment is to:

- (a) Become familiar with the potential hazards and the type of protective equipment that is available, and what it can do; i.e., splash protection, impact protection, etc.
- (b) Compare the hazards associated with the environment; i.e., impact velocities, masses, projectile shape, radiation intensities, with the capabilities of the available protective equipment;
- (c) Select the protective equipment which ensures a level of protection greater than the minimum required to protect employees from the hazards; and
- (d) Fit the user with the protective device and give instructions on care and use of the PPE. It is very important that end users be made aware of all warning labels for and limitations of their PPE.

#### **5. FITTING THE DEVICE.**

Careful consideration must be given to comfort and fit. PPE that fits poorly will not afford the necessary protection. Continued wearing of the device is more likely if it fits the wearer comfortably. Protective devices are generally available in a variety of sizes. Care should be taken to ensure that the right size is selected.

#### **6. DEVICES WITH ADJUSTABLE FEATURES.**

Adjustments should be made on an individual basis for a comfortable fit that will maintain the protective device in the proper position. Particular care should be taken in fitting devices for eye protection against dust and chemical splash to ensure that the devices are sealed to the face. In addition, proper fitting of helmets is important to ensure that it will not fall off during work operations. In some cases a chin strap may be necessary to keep the helmet on an employee's head. (Chin straps should break at a reasonable low force, however, so as to prevent a strangulation hazard). Where manufacturer's instructions are available, they should be followed carefully.

#### **7. REASSESSMENT OF HAZARDS.**

It is the responsibility of the safety officer to reassess the workplace hazard situation as necessary, by identifying and evaluating new equipment and processes, reviewing accident records, and reevaluating the suitability of previously selected PPE.

#### **8. SELECTION CHART GUIDELINES FOR EYE AND FACE PROTECTION.**

Some occupations (not a complete list) for which eye protection should be routinely considered are:

- Assemblers.
- Carpenters.
- Chemical process operators and handlers.
- Electricians.
- Grinding machine operators.
- Laborers.
- Lathe and milling machine operators.
- Machinists.
- Mechanics and repairers.
- Millwrights.
- Plumbers and pipe fitters.
- Sanders.
- Sawyers.
- Sheet metal workers and tinsmiths.
- Timber cutting and logging workers.
- Welders.

Appendix Table 1, "Eye and Face Protector Selection Chart," and Appendix Figure 1, "Eye and Face Protective Devices," are intended to aid in identifying and selecting the types of eye and face protectors that are available, their capabilities and limitation for the hazard "activity and assessment" operations that are listed.

**APPENDIX TABLE 1  
EYE AND FACE PROTECTOR SELECTION**

This guide is not intended to be the sole reference in selecting the proper eye and face protector.

Care shall be taken to recognize the possibility of multiple and simultaneous exposure to a variety of hazards. Adequate protection against the highest level of the hazards must be provided.

ACTIVITY AND ASSESSMENT	PROTECTOR CATEGORY AND STYLES	LIMITATIONS	NOT RECOMMENDED
<b>IMPACT</b>			
<p>Chipping, grinding, machining, masonry work, riveting, and sanding.</p> <p>Flying fragments, objects, large chips, particles, sand, dirt, etc.</p>	<p>Spectacles, goggles: B, C, D, E, F, G, H, I, J, K, L. For Severe exposure add N. Respirators, R, T.</p> <p>Faceshields shall only be worn over spectacles or goggles.</p> <p>Persons whose vision requires the use of prescription lenses shall wear either protective devices fitted with prescription lenses or protective devices designed to be worn over regular prescription eyewear.</p> <p>Wearers of contact lenses shall also be required to wear appropriate spectacles or goggles depending on the specific hazard. Dusty and/or chemical environments may represent an additional hazard to contact lens wearers. Wearing of contact lenses under an R respirator is permitted.</p> <p>Goggles, helmets and faceshield windows that bear the marking "Z-87+" comply with the High Impact Test Requirements. Those with "Z-87" markings comply only with Basic Impact Testing Requirements. Spectacle lenses that are marked with the manufacturers logo and a "+" sign comply with the High Impact Test Requirements. Those spectacle lenses marked with the manufacturers logo and no "+" comply only with Basic Impact Testing Requirements. (It is important during the selection process to remember that different product categories are tested at different levels of impact resistance. Goggles are tested at a higher level of impact than spectacles and face shields are tested at a higher level than goggles.)</p> <p>The Z-87-2 frame marking indicates the frame meets high impact requirements with a minimum lens thickness of 2mm.</p>	<p>Protective devices do not provide unlimited protection.</p> <p>Note: 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 burns through contact with, or thermal burns from exposure to the hazards of electrical energy, which include radiation from accidental arcs.</p> <p>Atmospheric conditions and the restricted ventilation of the protector can cause lenses to fog. Frequent cleaning may be required.</p>	<p>Protectors that do not provide protection from side exposure.</p> <p>Filter or tinted lenses that restrict light transmittance, unless it is determined that a glare hazard exists. Refer to OPTICAL RADIATION.</p> <p>Use of faceshields alone, without spectacles or goggles.</p>



**APPENDIX TABLE 1  
EYE AND FACE PROTECTOR SELECTION**

This guide is not intended to be the sole reference in selecting the proper eye and face protector.

Care shall be taken to recognize the possibility of multiple and simultaneous exposure to a variety of hazards. Adequate protection against the highest level of the hazards must be provided.

ACTIVITY AND ASSESSMENT	PROTECTOR CATEGORY AND STYLES	LIMITATIONS	NOT RECOMMENDED
<b>HEAT</b>			
Furnace operations, pouring, casting, hot dipping, gas cutting, and welding.	Note: Operations involving heat may also involve optical radiation. (See electric arc, gas, and glare under Optical Radiation below.) Protection from both hazards shall be provided. Faceshields shall only be worn over spectacles or goggles.	Spectacles, cup and cover type goggles do not provide unlimited facial protection.	Protectors that do not provide protection from side exposure.
Hot Sparks	Goggles, spectacles: B, C, D, E, F, G, H, I, J, K, L. For severe exposure add N. Respirators R, T.	Operations involving heat may also involve optical radiation. Protection from both hazards shall be provided.	Use of faceshields alone, without spectacles or goggles.
Splash from molten metals	Faceshields worn over goggles H, K. Respirators R, T or S, U if optical radiation hazard exists.		
High temperature exposure	Screen faceshields, Reflective faceshields over spectacles or goggles.		
<b>CHEMICAL</b>			
Acid and chemicals handling, degreasing, plating. Splash and irritating mists.	Indirect vented: goggles, eyecup and cover types: G, H, K. For severe exposure add N. Respirators R, T.  Irritating Mist: Special purpose goggles: G. Cover goggle – No ventilation. Respirators R, T.	Provides protection from splash entry with adequate ventilation.  Atmospheric conditions and the restricted ventilation of the protector can cause lenses to fog. Frequent cleaning may be required.	Spectacles, welding, helmets, or handshields.
<b>DUST</b>			
Woodworking, buffing, general dusty conditions. Nuisance dust	Goggles, eyecup and cover types: G, H, K. Respirators R, T.	Atmospheric conditions and the restricted ventilation of the protector can cause lenses to fog. Frequent cleaning may be required.	

**APPENDIX TABLE 1  
EYE AND FACE PROTECTOR SELECTION**




















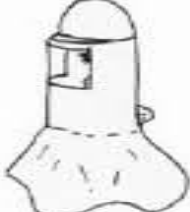


This guide is not intended to be the sole reference in selecting the proper eye and face protector.

Care shall be taken to recognize the possibility of multiple and simultaneous exposure to a variety of hazards. Adequate protection against the highest level of the hazards must be provided.

ACTIVITY AND ASSESSMENT	PROTECTOR CATEGORY AND STYLES		LIMITATIONS	NOT RECOMMENDED
<b>OPTICAL RADIATION</b>				
WELDING: Electric Arc	Note: Welding helmets or handshields shall be used only over spectacles or goggles.		Protection from optical radiation is directly related to filter lens density. Select the darkest shade that allows adequate tasks performance.	Protectors that do not provide protection from optical radiation.
Viewing electric arc furnaces and boilers	TYPICAL FILTER LENS SHADE: 10-14	PROTECTORS: Welding helmets or Welding Shields: O, P, Q Respirators S, U	Note: Filter lenses shall meet the requirements for shade designations in GI Part 33 Table 1.	Note: Filter lenses shall meet the requirements for shade designations in GI Part 33 Table 1.
WELDING: Gas, and viewing gas-fired furnaces and boilers	TYPICAL FILTER LENS SHADE: 4-8	PROTECTORS: Welding goggles, Helmets. Welding Face shields over spectacles or goggles: J, K, L, M, N, O, P, Q or Respirators S, U.	Note: Faceshields and welding helmets shall only be worn over spectacles or goggles.	Use of welding helmets or faceshields alone, without spectacles or goggles.
CUTTING	TYPICAL FILTER LENS SHADE: 3-6	PROTECTORS: Welding goggles, Helmets. Welding face shields: J, K, L, M, N, O, P, Q or Respirators S, U		
TORCH BRAZING	TYPICAL FILTER LENS SHADE: 3-4	PROTECTORS: Welding goggles, Helmets. Welding face shields: J, K, L, M, N, O, P, Q or Respirators S, U		
TORCH SOLDERING	TYPICAL FILTER LENS SHADE: 1.5-3	PROTECTORS: Spectacles or Welding Faceshield over spectacles: B, C, D, E, F, N or Respirators S, U.		
GLARE	Spectacle: A, B, Faceshields N over spectacles or goggles.			

**APPENDIX FIGURE 1  
EYE AND FACE PROTECTIVE DEVICES**

The illustrations shown are only representative of protective devices commonly available at this time.  
Protective devices do not need to take the forms shown, but must meet the requirements of this standard.

<p>A. Spectacle, No sideshield</p> 	<p>B. Spectacle, Half sideshield</p> 	<p>C. Spectacle, Full Sideshield</p> 	<p>D. Spectacle, Detachable Sideshield</p> 	<p>E. Spectacle, Non-Removable Lens</p> 
<p>F. Spectacle, Lift Front</p> 	<p>G. Cover Goggle, No Ventilation</p> 	<p>H. Cover Goggle, Indirect Ventilation</p> 	<p>I. Cover Goggle, Direct Ventilation</p> 	<p>J. Cup Goggle, Direct Ventilation</p> 
<p>K. Cup Goggle, Indirect Ventilation</p> 	<p>L. Spectacle, Headband Temple</p> 	<p>M. Cover Welding Goggle, Indirect Ventilation</p> 	<p>N. Faceshield</p> 	<p>O. Welding Helmet, hand Hold</p> 
<p>P. Welding Helmet, Stationary Window</p> 	<p>Q. Welding Helmet, Lift Front</p> 	<p>R. Respirator</p> 		
<p>S. Respirator</p> 	<p>T1. Respirator</p> 		<p>T2. Respirator</p> 	<p>U. Respirator</p> 

- (1) Care shall 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 General Industry Safety Standard Part 33 "Personal Protective Equipment," Table 1.
- (5) Persons whose vision requires the use of prescription lenses shall wear either protective devices fitted with prescription lenses or protective devices designed to be worn over regular prescription 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 protection devices in electrical hazard areas.
- (8) Refer to Section 6.5 "Special Purpose Lenses" in ANSI Z-87.1 2003 edition, as adopted in R 408.13301a.
- (9) Welding helmets or handshields shall be used only over primary eye protection.
- (10) Non-sideshield spectacles are available for frontal protection only.

## 9. SELECTION GUIDELINES FOR HEAD PROTECTION.

All head protection (helmets) is designed to provide protection from impact and penetration hazards caused by falling objects. Head protection is also available which provides protection from electric shock and burn. When selecting head protection, knowledge of potential electrical hazards is important.

Protective helmets are described by impact type and electrical class. All protective helmets shall meet either Type I or Type II requirements. All helmets shall be further classified as meeting Class G, Class E, or Class C electrical requirements. Helmets shall be classified as follows:

- (a) Impact type protective helmets shall be as follows:
  - (i) Type I helmets are intended to reduce the force of impact resulting from a blow only to the top of the head.
  - (ii) Type II helmets are intended to reduce the force of impact resulting from a blow to the top or sides of the head.
  
- (b) Electrical classes for protective helmets shall be as follows:
  - (i) Class G, General protective helmets are intended to reduce the danger of contact with low voltage conductors. Test samples shall be proof-tested at 2200 volts (phase to ground). This voltage is not intended as an indication of the voltage at which the helmets protects the wearer.
  - (ii) Class E, Electrical protective helmets are intended to reduce the danger of contact with higher voltage conductors. Test samples are proof-tested at 20,000 volts (phase to ground). This voltage is not intended as an indication of the voltage at which the helmet protects the wearer.
  - (iii) Class C, Conductive protective helmets are not intended to provide protection against contact with electrical hazards.

Where falling object hazards are present, helmets must be worn. Some examples include: working below other workers who are using tools and materials which could fall; working around or under conveyor belts which are carrying parts or materials; working below machinery or processes which might cause material or objects to fall; and working on exposed energized conductors.

Some examples of occupations for which head protection should be routinely considered are:

- Carpenters.
- Electricians.
- Linemen.
- Mechanics and repairers.
- Plumbers and pipe fitters.
- Assemblers.
- Packers.
- Wrappers.
- Sawyers.
- Welders.
- Laborers.
- Freight handlers.
- Timber cutting and logging.
- Stock handlers.
- Warehouse laborers

## **10. SELECTION GUIDELINES FOR FOOT PROTECTION.**

Safety shoes and boots which meet the American Society for Testing and Materials Standards ASTM F 2412 "Standard Test Methods for Foot Protection," 2005 edition, and ASTM F2413 "Standard Specification for Performance Requirements for Protective (Safety) Toe Cap Footwear," 2005 edition standards that provide both impact and compression protection.

Where necessary, safety shoes can be obtained which provide puncture protection. In some work situations, metatarsal protection should be provided, and in other special situations electrical conductive or insulating safety shoes would be appropriate.

Safety shoes or boots with impact protection would be required for carrying or handling materials such as packages, objects, parts or heavy tools, which could be dropped; and, for other activities where objects might fall onto the feet.

Safety shoes or boots with compression protection would be required for work activities involving skid trucks (manual material handling carts) around bulk rolls (such as paper rolls) and around heavy pipes, all of which could potentially roll over an employee's feet.

Safety shoes or boots with puncture protection would be required where sharp objects such as nails, wire tacks, screws, large staples, scrap metal etc., could be stepped on by employees causing a foot injury.

Some occupations (not a complete list) for which foot protection should be routinely considered are:

- Assemblers.
- Carpenters.
- Craters.
- Drywall installers and lathers.
- Electricians.
- Freight handlers.
- Gardeners and grounds- keepers.
- Laborers.
- Machinists.
- Mechanics and repairers.
- Packers.
- Plumbers and pipe fitters.
- Punch and stamping press operators.
- Sawyers.
- Shipping and receiving clerks.
- Stock clerks.
- Stock handlers and warehouse laborers.
- Structural metal workers.
- Timber cutting and logging workers.
- Welders.
- Wrappers.

## **11. SELECTION GUIDELINES FOR HAND PROTECTION.**

Gloves are often relied upon to prevent cuts, abrasions, burns, and skin contact with chemicals that are capable of causing local or systemic effects following dermal exposure. MIOSHA is unaware of any gloves that provide protection against all potential hand hazards, and commonly available glove materials provide only limited protection against many chemicals. Therefore, it is important to select the most appropriate glove for a particular application and to determine how long it can be worn, and whether it can be reused.

It is also important to know the performance characteristics of gloves relative to the specific hazard anticipated; e.g., chemical hazards, cut hazards, flame hazards, etc. These performance characteristics should be assessed by using standard test procedures.

Before purchasing gloves, the employer should request documentation from the manufacturer that the gloves meet the appropriate test standard(s) for the hazard(s) anticipated. Other factors to be considered for glove selection in general include:

(A) As long as the performance characteristics are acceptable, in certain circumstances, it may be more cost effective to regularly change cheaper gloves than to reuse more expensive types; and,

(B) The work activities of the employee should be studied to determine the degree of dexterity required, the duration, frequency, and degree of exposure of the hazard, and the physical stresses that will be applied.

With respect to selection of gloves for protection against chemical hazards:

(A) The toxic properties of the chemical(s) must be determined; in particular, the ability of the chemical to cause local effects on the skin and/or to pass through the skin and cause systemic effects;

(B) Generally, any "chemical resistant" glove can be used for dry powders;

(C) For mixtures and formulated products (unless specific test data are available), a glove should be selected on the basis of the chemical component with the shortest breakthrough time, since it is possible for solvents to carry active ingredients through polymeric materials; and,

(D) Employees must be able to remove the gloves in such a manner as to prevent skin contamination.

## **12. CLEANING AND MAINTENANCE.**

It is important that all PPE be kept clean and properly maintained. Cleaning is particularly important for eye and face protection where dirty or fogged lenses could impair vision.

Personal Protective Equipment (PPE) should be inspected, cleaned, and maintained at regular intervals so that the PPE provides the requisite protection. It is also important to ensure that contaminated PPE which cannot be decontaminated is disposed of in a manner that protects employees from exposure to hazards.

## **APPENDIX C**

### **PERSONAL FALL PROTECTION SYSTEMS**

#### **NON-MANDATORY GUIDELINES**

The following information generally applies to all personal fall protection systems and is intended to assist employers and employees comply with the requirements of R 408.13395a to R 408.13395g for personal fall protection systems.

#### **(a) Planning considerations.**

It is important for employers to plan prior to using personal fall protection systems. Probably the most overlooked component of planning is locating suitable anchorage points. Such planning should ideally be done before the structure or building is constructed so that anchorage points can be used later for window cleaning or other building maintenance.

#### **(b) Selection and use considerations.**

(1) The kind of personal fall protection system selected should be appropriate for the employee's specific work situation. Free fall distances should always be kept to a minimum. Many systems are designed for particular work applications, such as climbing ladders and poles; maintaining and servicing equipment; and window cleaning. Consideration should be given to the environment in which the work will be performed. For example, the presence of acids, dirt, moisture, oil, grease, or other substances, and their potential effects on the system selected, should be evaluated. The employer should fully evaluate the work conditions and environment, including seasonal weather changes, before selecting the appropriate personal fall protection system. Hot or cold environments may also affect fall protection systems. Wire rope should not be used where electrical hazards are anticipated. As required by R 408.13395a(22), an employer shall provide a means for promptly rescuing an employee should a fall occur.

(2) Where lanyards, connectors, and lifelines are subject to damage by work operations, such as welding, chemical cleaning, and sandblasting, the component should be protected, or other securing systems should be used. A program for cleaning and maintaining the system may be necessary.

#### **(c) Testing considerations.**

Before purchasing a personal fall protection system, an employer should insist that the supplier provide information about its test performance, using recognized test methods, so the employer will know that the system meets the criteria in R 408.13395a to R 408.13395g. Otherwise, the employer should test the equipment to ensure that it is in compliance.

Appendix D "Test Methods and Procedures for Personal Fall Protection Systems," Non-Mandatory Guidelines contains test methods which are recommended for evaluating the performance of any system. There are some circumstances in which an employer can evaluate a system based on data and calculations derived from the testing of similar systems. Enough information shall be available for the employer to demonstrate that its system and the tested system or systems are similar in both function and design.

#### **(d) Component compatibility considerations.**

Ideally, a personal fall protection system is designed, tested, and supplied as a complete system. However, it is common practice for lanyards, connectors, lifelines, deceleration devices, body belts, and body harnesses to be interchanged since some components wear out before others. Employers and employees should realize that not all components are interchangeable. For instance, a lanyard should not be connected between a body harness and a deceleration device of the self-retracting type, unless specifically allowed by the manufacturer, since this can result in additional free fall for which the system was not designed. In addition, positioning components, such as pole straps, ladder hooks and rebar hooks, should not be used in personal fall arrest systems unless they meet the appropriate strength and performance requirements of R 408.13395a to R 408.13395g; General Industry Safety Standard Part 50 "Telecommunications," and General Industry Safety Standard Part 86 "Electric Power Generation, Transmission, and Distribution," as referenced in R 408.13301a.

Any substitution or change to a personal fall protection system should be fully evaluated or tested by a competent person to determine that it meets applicable MIOSHA standards before the modified system is put in use. Also, MIOSHA suggests that rope be used according to manufacturer's recommendations, especially if polypropylene rope is used.

**(e) Employee training considerations.**

As required by this standard, before an employee uses a fall protection system, an employer shall ensure that he or she is trained in the proper use of the system.

The training may include the following:

- (1) The limits of the system.
- (2) Proper anchoring and tie-off techniques.
- (3) Estimating free fall distance, including determining elongation and deceleration distance.
- (4) Methods of use.
- (5) Inspection and storage.

Careless or improper use of fall protection equipment can result in serious injury or death. Employers and employees should become familiar with the material in this standard and appendices, as well as manufacturers' recommendations, before a system is used. It is important for employees to be aware that certain tie-offs, such as using knots and tying around sharp edges, can reduce the overall strength of a system. Employees also need to know the maximum permitted free fall distance. Training should stress the importance of inspections prior to use, the limitations of the equipment to be used, and unique conditions at the worksite that may be important.

**(f) Instruction considerations.**

Employers should obtain comprehensive instructions from the supplier or a qualified person as to the system's proper use and application, including, where applicable, the following:

- (1) The force measured during the sample force test.
- (2) The maximum elongation measured for lanyards during the force test.
- (3) The deceleration distance measured for deceleration devices during the force test.
- (4) Caution statements on critical use limitations.
- (5) Limits of the system.
- (6) Proper hook-up, anchoring and tie-off techniques, including the proper D-ring or other attachment point to use on the body harness.
- (7) Proper climbing techniques.
- (8) Methods of inspection, use, cleaning, and storage.
- (9) Specific lifelines that may be used.

**(g) Inspection considerations.**

Personal fall protection systems shall be inspected before initial use in each workshift. Any component with damage, such as a cut, tear, abrasion, mold, or evidence of undue stretching, an alteration or addition that might affect its effectiveness, damage due to deterioration, fire, acid, or other corrosive damage, distorted hooks or faulty hook springs, tongues that are unfitted to the shoulder of buckles, loose or damaged mountings, nonfunctioning parts, or wear, or internal deterioration shall be removed from service immediately, and should be tagged or marked as unusable, or destroyed. Any personal fall protection system, including components, subjected to impact loading shall be removed from service immediately and not used until a competent person inspects the system and determines that is not damaged and is safe to use for personal fall protection.

**(h) Rescue considerations.**

As required by R 408.13395a(22), when personal fall arrest systems are used, special consideration shall be given to rescuing an employee promptly should a fall occur. The availability of rescue personnel, ladders, or other rescue equipment needs to be evaluated since there may be instances in which employees cannot self-rescue, such as when the employee is unconscious or seriously injured. In some situations, equipment allowing employees to rescue themselves after the fall has been arrested may be desirable, such as devices that have descent capability.



**(i) Tie-off considerations.**

Employers and employees should at all times be aware that the strength of a personal fall arrest system is based on its being attached to an anchoring system that can support the system. Therefore, if a means of attachment is used that will reduce the strength of the system, such as an eye-bolt/snaphook anchorage, that component should be replaced by a stronger one that will also maintain the appropriate maximum deceleration characteristics. The following is a listing of some situations in which employers and employees should be especially cautious:

- (1) Tie-off using a knot in the lanyard or lifeline, at any location.

The strength of the line can be reduced by 50% or more if a knot is used. Therefore, a stronger lanyard or lifeline should be used to compensate for the knot, or the lanyard length should be reduced, or the tie-off location raised, to minimize free fall distance, or the lanyard or lifeline should be replaced by one which has an appropriately incorporated connector to eliminate the need for a knot.

- (2) Tie-off around rough or sharp, such as "H" or "I" beams, surfaces.

Sharp or rough surfaces can damage rope lines and this reduces strength of the system drastically. Such tie-offs should be avoided whenever possible. An alternate means should be used such as a snaphook or D-ring connection, a tie-off apparatus, such as a steel cable tie-off, an effective padding of the surfaces, or an abrasion-resistant strap around the supporting member. If these alternative means of tie-off are not available, the employer should try to minimize the potential free fall distance.

- (3) Knots.

Sliding hitch knots should not be used except in emergency situations. The one-and-one sliding hitch knot should never be used because it is unreliable in stopping a fall. The two-and-two, or three-and-three knots, which is preferable, may be used in emergency situations; however, care should be taken to limit free fall distances because of reduced lifeline or lanyard strength. MIOSHA requires that a competent or qualified person inspect each knot in a lanyard or vertical lifeline to ensure it meets the strength requirements in R 408.13395a to R 408.13395g.

**(j) Horizontal lifelines.**

Horizontal lifelines, depending on their geometry and angle of sag, may be subjected to greater loads than the impact load imposed by an attached component. When the angle of horizontal lifeline sag is less than 30 degrees, the impact force imparted to the lifeline by an attached lanyard is greatly amplified.

For example, with a sag angle of 15 degrees the force amplification is about 2:1, and at 5 degrees sag it is about 6:1. Depending on the angle of sag, and the line's elasticity, the strength of the horizontal lifeline, and the anchorages to which it is attached should be increased a number of times over that of the lanyard. Extreme care should be taken in considering a horizontal lifeline for multiple tie-offs. If there are multiple tie-offs to a horizontal lifeline, and one employee falls, the movement of the falling employee and the horizontal lifeline during arrest of the fall may cause other employees to fall. Horizontal lifeline and anchorage strength should be increased for each additional employee to be tied-off. For these and other reasons, the systems using horizontal lifelines shall be designed only by qualified persons. MIOSHA recommends testing installed lifelines and anchors prior to use. MIOSHA requires that horizontal lifelines are designed, installed and used under the supervision of a qualified person.

**(k) Eye-bolts.**

It shall be recognized that the strength of an eye-bolt is rated along the axis of the bolt, and that its strength is greatly reduced if the force is applied at right angles to this axis, in the direction of its shear strength. Care should also be exercised in selecting the proper diameter of the eye to avoid creating a roll-out hazard, such as accidental disengagement of the snaphook from the eye-bolt.

**(l) Vertical lifeline considerations.**

As required by R 408.13395a(4), each employee must have a separate lifeline when the lifeline is vertical. If multiple tie-offs to a single lifeline are used, and one employee falls, the movement of the lifeline during the arrest of the fall may pull other employees' lanyards, causing them to fall as well.

**(m) Snaphook and carabiner considerations.**

As required by R 408.13395a(11), the following connections shall be avoided unless the locking snaphook or carabiner has been designed for them because they are conditions that can result in rollout:

- (1) Direct connection to webbing, rope, or a horizontal lifeline.
- (2) Two or more snaphooks or carabiners connected to one D-ring.
- (3) Two snaphooks or carabiners connected to each other;
- (4) Snaphooks or carabiners connected directly to webbing, rope, or wire rope.
- (5) Improper dimensions of the D-ring, rebar, or other connection point in relation to the snaphook or carabiner dimensions which would allow the gate to be depressed by a turning motion.

**(n) Free fall considerations.**

Employers and employees should always be aware that a system's maximum arresting force is evaluated under normal use conditions established by the manufacturer. MIOSHA requires that personal fall arrest systems be rigged so an employee cannot free fall in excess of 6 feet (1.8 m). Even a few additional feet of free fall can significantly increase the arresting force on the employee, possibly to the point of causing injury and possibly exceeding the strength of the system. Because of this, the free fall distance should be kept to a minimum, and, as required by R 408.13395c (1) and (2), must never be greater than 6 feet (1.8 m). To assure this, the tie-off attachment point to the lifeline or anchor should be located at or above the connection point of the fall arrest equipment to the harness. Otherwise, additional free fall distance is added to the length of the connecting means such as the lanyard. Tying off to the walking-working surface will often result in a free fall greater than 6 feet (1.8 m). For instance, if a 6-foot (1.8-m) lanyard is used, the total free fall distance will be the distance from the walking-working level to the harness connection plus the 6 feet (1.8 m) of lanyard.

**(o) Elongation and deceleration distance considerations.**

During fall arrest, a lanyard will stretch or elongate, whereas activation of a deceleration device will result in a certain stopping distance. These distances should be available with the lanyard or device's instructions and shall be added to the free fall distance to arrive at the total fall distance before an employee is fully stopped. The additional stopping distance may be significant if the lanyard or deceleration device is attached near or at the end of a long lifeline, which may itself add considerable distance due to its own elongation. As required by R 408.13395c (1) and (2), sufficient distance to allow for all of these factors must also be maintained between the employee and obstructions below, to prevent an injury due to impact before the system fully arrests the fall. In addition, a minimum of 12 feet (3.7 m) of lifeline should be allowed below the securing point of a rope-grab-type deceleration device, and the end terminated to prevent the device from sliding off the lifeline. Alternatively, the lifeline should extend to the ground or the next working level below. These measures are suggested to prevent the employee from inadvertently moving past the end of the lifeline and having the rope grab become disengaged from the lifeline.

**(p) Obstruction considerations.**

In selecting a location for tie-off, employers and employees should consider obstructions in the potential fall path of the employee. Tie-offs that minimize the possibilities of exaggerated swinging should be considered.

## APPENDIX D

### TEST METHODS AND PROCEDURES FOR PERSONAL FALL PROTECTION SYSTEMS NON-MANDATORY GUIDELINES

This appendix contains test methods for personal fall protection systems which may be used to determine if they meet the system performance criteria specified in R 408.13395d to R 408.13395g.

Test methods for personal fall arrest systems, R 408.13395b and R 408.13395c.

#### **(a) General.**

The following sets forth test procedures for personal fall arrest systems as defined in R 408.13395b and R 408.13395c.

#### **(b) General test conditions.**

- (1) Lifelines, lanyards and deceleration devices should be attached to an anchorage and connected to the body harness in the same manner as they would be when used to protect employees.
- (2) The fixed anchorage should be rigid, and should not have a deflection greater than 0.04 inches (1 mm) when a force of 2,250 pounds (10 kN) is applied.
- (3) The frequency response of the load measuring instrumentation should be 120 Hz.
- (4) The test weight used in the strength and force tests should be a rigid, metal cylindrical or torso-shaped object with a girth of 38 inches plus or minus 4 inches (96 cm plus or minus 10 cm).
- (5) The lanyard or lifeline used to create the free fall distance should be supplied with the system, or in its absence, the least elastic lanyard or lifeline available should be used with the system.
- (6) The test weight for each test should be hoisted to the required level and should be quickly released without having any appreciable motion imparted to it.
- (7) The system's performance should be evaluated, taking into account the range of environmental conditions for which it is designed to be used.
- (8) Following the test, the system need not be capable of further operation.

#### **(c) Strength test.**

- (1) During the testing of all systems, a test weight of 300 pounds plus or minus 3 pounds (136.4 kg plus or minus 1.4 kg) should be used. See paragraph (b)(4) of this appendix.
- (2) The test consists of dropping the test weight once. A new unused system should be used for each test.
- (3) For lanyard systems, the lanyard length should be 6 feet plus or minus 2 inches (1.83 m plus or minus 5 cm) as measured from the fixed anchorage to the attachment on the body harness.
- (4) For rope-grab-type deceleration systems, the length of the lifeline above the centerline of the grabbing mechanism to the lifeline's anchorage point should not exceed 2 feet (0.61 m).
- (5) For lanyard systems, for systems with deceleration devices which do not automatically limit free fall distance to 2 feet (0.61 m) or less, and for systems with deceleration devices which have a connection distance in excess of 1 foot (0.3 m), measured between the centerline of the lifeline and the attachment point to the body harness, the test weight should be rigged to free fall a distance of 7.5 feet (2.3 m) from a point that is 1.5 feet (46 cm) above the anchorage point, to its hanging location (6 feet (1.83 m) below the anchorage, The test weight should fall without interference, obstruction, or hitting the floor or ground during the test. In some cases a non-elastic wire lanyard of sufficient length may need to be added to the system, for test purposes, to create the necessary free fall distance.
- (6) For deceleration device systems with integral lifelines or lanyards that automatically limit free fall distance to 2 feet (0.61 m) or less, the test weight should be rigged to free fall a distance of 4 feet (1.22 m).
- (7) Any weight that detaches from the harness should constitute failure for the strength test.

#### **(d) Force test.**

- (1) General. The test consists of dropping the respective test weight specified in paragraph (d)(2)(i) or (d)(3)(i) of this appendix once. A new, unused system should be used for each test.
- (2) For lanyard systems.
  - (i) A test weight of 220 pounds plus or minus three pounds. (100 kg plus or minus 1.6 kg) should be used. See paragraph (b)(4) of this appendix.
  - (ii) Lanyard length should be 6 feet plus or minus 2 inches (1.83 m plus or minus 5 cm) as measured from the fixed anchorage to the attachment on the body harness.
  - (iii) The test weight should fall free from the anchorage level to its hanging location, a total of 6 feet (1.83 m) free fall distance, without interference, obstruction, or hitting the floor or ground during the test.

- (3) For all other systems.
  - (i) A test weight of 220 pounds plus or minus 2 pounds (100 kg plus or minus 1.0 kg) should be used. See paragraph (b)(4) of this appendix.
  - (ii) The free fall distance to be used in the test should be the maximum fall distance physically permitted by the system during normal use conditions, up to a maximum free fall distance for the test weight of 6 feet (1.83 m), except as follows:
    - (A) For deceleration systems having a connection link or lanyard, the test weight should free fall a distance equal to the connection distance, measured between the centerline of the lifeline and the attachment point to the body harness.
    - (B) For deceleration device systems with integral lifelines or lanyards that automatically limit free fall distance to 2 feet (0.61 m) or less, the test weight should free fall a distance equal to that permitted by the system in normal use. For example, to test a system with a self-retracting lifeline or lanyard, the test weight should be supported and the system allowed to retract the lifeline or lanyard as it would in normal use. The test weight would then be released and the force and deceleration distance measured.
- (4) Failure. A system fails the force test when the recorded maximum arresting force exceeds 2,520 pounds (11.2 kN) when using a body harness.
- (5) Distances. The maximum elongation and deceleration distance should be recorded during the force test.

**(e) Deceleration device tests.**

- (1) General. The device should be evaluated or tested under the environmental conditions, such as rain, ice, grease, dirt, and type of lifeline, for which the device is designed.
- (2) Rope-grab-type deceleration devices.
  - (i) Devices should be moved on a lifeline 1,000 times over the same length of line a distance of not less than 1 foot (30.5 cm), and the mechanism should lock each time.
  - (ii) Unless the device is permanently marked to indicate the type of lifelines that shall be used, several types, such as different diameters and different materials, of lifelines should be used to test the device.
- (3) Other self-activating-type deceleration devices. The locking mechanisms of other self-activating-type deceleration devices designed for more than one arrest should lock each of 1,000 times as they would in normal service. Test methods for positioning systems as in R 408.13395d to R 408.13395g.
  - (a) General. The following sets forth test procedures for positioning systems as defined in R 408.13395d to R 408.13395g. The requirements in this appendix for personal fall arrest systems set forth procedures that may be used, along with the procedures listed below, to determine compliance with the requirements for positioning systems.
  - (b) Test conditions.
    - (1) The fixed anchorage should be rigid and should not have a deflection greater than 0.04 inches (1 mm) when a force of 2,250 pounds (10 kN) is applied.
    - (2) For window cleaners' belts, the complete belt should withstand a drop test consisting of a 250 pound (113 kg) weight falling free for a distance of 6 feet (1.83 m). The weight should be a rigid object with a girth of 38 inches plus or minus 4 inches (96 cm plus or minus 10 cm). The weight should be placed in the waistband with the belt buckle drawn firmly against the weight, as when the belt is worn by a window cleaner. One belt terminal should be attached to a rigid anchor and the other terminal should hang free. The terminals should be adjusted to their maximum span. The weight fastened in the freely suspended belt should then be lifted exactly 6 feet (1.83 m) above its "at rest" position and released so as to permit a free fall of 6 feet (1.83 m) vertically below the point of attachment of the terminal anchor. The belt system should be equipped with devices and instrumentation capable of measuring the duration and magnitude of the arrest forces. Failure of the test should consist of any breakage or slippage sufficient to permit the weight to fall free of the system. In addition, the initial and subsequent arresting forces should be measured and should not exceed 2,000 pounds (8.5 kN) for more than 2 milliseconds for the initial impact, or exceed 1,000 pounds (4.5 kN) for the remainder of the arrest time.
    - (3) All other positioning systems, except for restraint line systems, should withstand a drop test consisting of a 250 pound (113 kg) weight free falling a distance of 4 feet (1.2 m). The weight shall be a rigid object with a girth of 38 inches plus or minus 4 inches (96 cm plus or minus 10 cm). The body belt or harness should be affixed to the test weight as it would be to an employee. The system should be connected to the rigid anchor in the manner that the system would be connected in normal use. The weight should be lifted exactly 4 feet (1.2 m) above its "at rest" position and released so as to permit a vertical free fall of 4 feet (1.2 m). Failure of the system should be indicated by any breakage or slippage sufficient to permit the weight to fall free to the ground.





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