



# **SELECTION OF PERSONAL PROTECTIVE EQUIPMENT**

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# SELECTION OF PERSONAL PROTECTIVE EQUIPMENT

As part of a programme of harmonisation of industry standards, the European Industrial Gases Association (EIGA) has issued the publication EIGA Doc 136, *Selection of Personal Protective Equipment*. This has been jointly produced by members of the International Harmonisation Council.

This publication is intended as an international harmonised publication for the worldwide use and application by all members of Asia Industrial Gases Association (AIGA), Compressed Gas Association (CGA), EIGA, and Japan Industrial and Medical Gases Association (JIMGA). Regional editions have the same technical content as the EIGA edition, however, there are editorial changes primarily in formatting, units used and spelling. Also, any references to regional regulatory requirements are those that apply to European requirements.

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## Amendments to 136/17

Section	Change
All	No changes made; latest edition reissued after IHC decision

Note: Technical changes from the previous edition are underlined

## **1 Introduction**

The first principle of safety risk mitigation should be elimination, substitution, and engineering controls. When exposure to hazards cannot be completely engineered out from the work area and tasks, and when safe work practices and other forms of administrative controls cannot provide sufficient additional protection, then a supplementary method of control is the use of personal protective equipment (PPE).

Also, the potential to reduce time and frequency of exposure of workers to health and safety risks should be evaluated.

This publication provides guidance on a work process for selecting and using PPE at work. Selection tables are included which are general examples of PPE for protecting personnel against hazards that could cause harm.

The information in the selection tables should not be used without giving due consideration to the prevailing work area and environmental conditions by means of specific task based risk assessments.

## **2 Scope and purpose**

The publication is intended to provide guidance and examples in selection and use of PPE. It supplements other techniques for assessing and controlling risk.

This publication is not intended to replace the need for conducting a task specific risk assessment or to provide details on other administrative or management program elements that can be associated with the proper use of certain types of PPE.

Regulatory bodies may have jurisdiction and influence PPE selection and use.

This publication does not address portable devices for detecting and signalling risks.

## **3 Definitions**

### **3.1 Publication terminology**

#### **3.1.1 Shall**

Indicates that the procedure is mandatory. It is used wherever the criterion for conformance to specific recommendations allows no deviation.

#### **3.1.2 Should**

Indicates that a procedure is recommended.

#### **3.1.3 May**

Indicates that the procedure is optional.

#### **3.1.4 Will**

Is used only to indicate the future, not a degree of requirement.

#### **3.1.5 Can**

Indicates a possibility or ability.

## **3.2 Technical definition**

### **3.2.1 Personal protective equipment (PPE)**

All equipment designed to be worn or held by workers to protect them against one or more hazards likely to endanger their safety and health at work, and any addition or accessory designed to meet this objective.

NOTE—PPE includes working clothes and uniforms specifically designed to protect the safety and health of the worker.

## **4 General Requirements**

### **4.1 Responsibilities**

Management is responsible for determining the PPE needs of personnel, contractors, and visitors at facilities within their responsibility in accordance with the laws and regulations applicable to the location in which the PPE is being used.

In respect of contractors, management shall determine minimum levels of PPE required; however, specific requirements shall be determined by task-based assessment.

When necessary, management should ask for support from technical and safety experts or from medical experts in order to assess the medical fitness of employees before selecting the appropriate PPE.

### **4.2 Risk assessments for selecting personal protective equipment**

Risk assessments shall be conducted and documented in each work area to assess the risks related to the process, relevant tasks and activities associated with the work area. Risk assessments should be reviewed when changes are made or following accidents or incidents in a work area that could impact PPE selection.

When undertaking risk assessments, the following steps are recommended:

- a) Involve the user representatives in the risk assessment process;
- b) Assess the residual risks associated with specific work areas and tasks to determine the need for PPE; and
- c) Select the PPE that matches the relevant risk. Ensure relevant regulations codes, standards, and PPE specifications are reviewed [1].<sup>1</sup>

### **4.3 Maintenance of personal protective equipment**

PPE shall be checked for defects before each use and shall be regularly cleaned, maintained, and repaired (unless disposable) in accordance with the manufacturer's instructions or replaced.

Records of maintenance of PPE shall be kept where required.

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<sup>1</sup> References are shown by bracketed numbers and are listed in order of appearance in the reference section.

#### 4.4 Storage

Storage methods shall be in accordance with the manufacturer's instructions. In some cases, specific storage receptacles for PPE not in use can be required to keep PPE clean or to prevent contamination or deterioration.

#### 4.5 Training

Personnel required to use PPE shall be trained in the following areas before first use:

- The hazards the selected PPE is being used to protect against;
- The reason for the PPE selection (what, when and where to use it);
- How to use the selected PPE (e.g., how to put it on, fit, adjust and remove);
- The selected PPEs capabilities and limitations to provide protection; and
- Checks required before PPE's use;
- PPEs proper care, maintenance, useful service life, and disposal.

Some types of PPE, for example supplied air respirator, can require more specialised training, including periodic retraining or medical evaluation.

Use of PPE by personnel shall be monitored and any misuse corrected and recorded.

#### 4.6 Personnel

Personnel have a duty to use PPE as instructed and store it appropriately when not in use. Defects or loss shall be reported and the PPE promptly repaired or replaced.

#### 4.7 Records

Records of PPE maintenance, risk assessments and training shall be kept by the employer. Issue of PPE shall be recorded if required by local regulations.

#### 4.8 Identification of areas where personal protective equipment is required

Working areas on-site where specific PPE is required shall be clearly identified (e.g., "Hearing Protection Required in This Area" signs).

### 5 Personal protective equipment assessments, selection, and specifications

When performing a risk assessment, review work areas and tasks for general and specific sources of hazards such as:

- sources of motion; e.g., vehicle movements (fork lift trucks, delivery vehicles), 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;
- sources of high and low temperatures that could result in burns, frostbite, or eye injury;
- types of chemical exposures including risk of oxygen deficiency or enrichment;
- sources of harmful dust;
- sources of light radiation, e.g., welding, brazing, cutting, furnaces, heat treating, high intensity lights, lasers, etc.;
- sources of falling objects or potential for dropping objects;
- sources of sharp objects which could pierce the feet or cut the hands;
- sources of rolling or pinching objects which could crush body parts;
- layout of workplace including working at height;

- location of co-workers and adjacent activities;
- ambient weather conditions; and
- any electrical hazards.

In addition, injury and accident data, work place inspections and audit findings should be reviewed to help identify other sources of hazard.

The following sections contain general recommendations for the protection requirements for common tasks and the type of PPE to be used. They should be used as a starting point for the selection of the PPE required for any given hazardous situation and as an aid to minimize risk. Final selections should be based on a specific review of:

- work task;
- duration of the task;
- risk of injury during the task;
- consequences of any exposure to an injurious chemical;
- any related chemical's safety data sheet (SDS); and
- any relevant regulatory or national consensus standard exposure limits.

The risk of PPE being degraded by exposure to the hazard or conditions in the work area should be considered. Personnel should be aware of the limitations, proper use, and care of PPE in accordance with manufacturer's instructions.

When selecting PPE, ensure that the protection provided by the PPE does not restrict the activity of the user or cause undue discomfort that can discourage the user from correctly using the PPE.

When several types of PPE have been specified for a work area or task, a check should be conducted to ensure that they are compatible and do not interfere with each other such that the effectiveness of the PPE is reduced. Integrated PPE systems may be considered.

## **5.1 Hearing protection**

All hearing protection shall meet the requirements of local legislation and relevant, recognised standards [2].

The wearing of hearing protection shall be mandatory in areas where noise exceeds the regulatory levels.

A sound level survey, according to regulations where specified, should be conducted to determine actual noise levels in areas where noise levels are suspected to be above regulatory levels (e.g., compressor buildings and platforms, pump rooms, process areas, turbines, high pressure gas vents, etc.).

The choice of the hearing protection should be determined by taking into consideration both separately and in combination:

- noise level;
- duration of exposure;
- ambient noise level;
- noise reduction rating to be achieved;
- frequency of use; and
- compatibility when used in conjunction with additional PPE required for work activity (e.g., gloves, helmet, goggles, etc.).

**5.2 Eye and face protection**

All eye and face protection shall meet the requirements of local legislation and relevant, recognised standards [3].

Eye and face protection for all tasks and work areas should be determined based on all hazards identified by the risk assessment.

Standard prescription glasses shall never be considered as eye protection. Whether or not contact lenses are allowed, and the proper eye and face protection to be worn over them, should be determined on a case-by-case basis. Contact lenses can interfere with the use of eye wash stations to quickly remove contaminants.

Eye and face protection recommendations for various hazard categories are represented in Table 1.

Face shields should not be considered primary eye protection and should be worn with additional eye protection (safety glasses or goggles).



**Table 1 Eye and face protection selection**

<b>Hazard Classification</b>	<b>Hazard</b>	<b>Consequences</b>	<b>Recommended Protection <sup>1)</sup></b>
<b>Chemical</b>	<ul style="list-style-type: none"> <li>Chemical or solvent splashes</li> <li>Liquid jets</li> <li>Corrosive or irritating gases and fumes</li> </ul>	<ul style="list-style-type: none"> <li>Eye irritation</li> <li>Eye inflammation</li> <li><u>Temporary blindness</u></li> <li><u>Facial burns</u></li> <li>Blindness</li> </ul>	<ul style="list-style-type: none"> <li>Safety glasses with side shields and face shield <sup>2)</sup> or</li> <li>Goggles</li> </ul>
<b>Cryogenic or heat burn</b>	<ul style="list-style-type: none"> <li>Cryogenic liquids and nitrous oxide or carbon dioxide (splashes)</li> <li>Cryogenic liquid jets</li> <li>Heat source</li> <li>Flame</li> <li><u>Dry ice particles</u></li> </ul>	<ul style="list-style-type: none"> <li><u>Facial burns</u></li> <li><u>Temporary blindness</u></li> <li>Blindness</li> </ul>	<ul style="list-style-type: none"> <li>Safety glasses with side shields and face shield or</li> <li>Goggles</li> </ul>
<b>Radiation</b>	<ul style="list-style-type: none"> <li>Glare</li> <li>Welding arc</li> <li>Laser radiation</li> <li>Infrared radiation</li> <li>Ultraviolet radiation</li> </ul>	<ul style="list-style-type: none"> <li>Eye irritation</li> <li>Skin irritation</li> <li>Temporary blindness</li> <li>Eye burns</li> <li>Facial burns</li> <li>Blindness</li> </ul>	<ul style="list-style-type: none"> <li>Peaked caps or brimmed headwear; and</li> <li>Tinted or polarized safety glasses with side shields, or</li> <li>UV protective safety glasses with side shields, or</li> <li>Welding goggles or welding helmet</li> </ul>
<b>Mechanical</b>	<ul style="list-style-type: none"> <li>High pressure/velocity gas release</li> <li>Particles from stamp marking of cylinders</li> <li>Dust, insulation, catalyst, perlite</li> <li>Powder washing</li> <li>Metal chips and other particles from manual tools such as handling of mechanical parts, drilling, cutting, sawing</li> <li>Metal chips and other particles from power tools such as drilling, brushing, grinding, chipping, sawing</li> <li>Sand or grit blasting</li> </ul>	<ul style="list-style-type: none"> <li>Eye irritation</li> <li>Temporary blindness</li> <li>Eye perforation</li> <li>Blindness</li> </ul>	<ul style="list-style-type: none"> <li>Safety glasses with side shields, or</li> <li>Goggles, or</li> <li>Face shield</li> </ul>
<b>Electrical</b>	<ul style="list-style-type: none"> <li>Arc flash</li> </ul>	<ul style="list-style-type: none"> <li>Temporary blindness</li> <li>Facial burns</li> <li>Eye burns</li> <li>Blindness</li> </ul>	<ul style="list-style-type: none"> <li>Safety glasses with side shields <sup>3)</sup> and arc-rated face shield <sup>4)</sup></li> </ul>

<sup>1)</sup> The recommended protection devices are described generically and should be further classified to fit the appropriate hazard. For example, goggles and safety glasses can be made out of different materials to protect against specific hazards. Safety glasses constructed from polycarbonate materials are a good compromise between weight and performance (resistance to scratches, hot particles, chemicals and UV).

<sup>2)</sup> Due to the potential of creating a respiratory hazard, face shields alone should not be worn when working with gases or chemicals that create hazardous vapours.

<sup>3)</sup> Best practice in the United States is to use safety glasses for all activities, including all low-voltage electrical work. See NFPA 70, *National Electric Code*® for more information [7].

<sup>4)</sup> A face shield with a hood might be required based on risk assessment.

### 5.3 Respiratory protection

All respiratory protection shall meet the requirements of local legislation and relevant, recognised standards [4].

Before entering a potential or identified risk area such as a confined space or an area where paint or cleaning solvents are used, the type and concentration of respirable contaminant should be established by the risk assessment, so the appropriate respirator can be selected. Where the concentration of a contaminant is unknown or the environment exceeds the immediately dangerous to life or health (IDLH), the use of supplied air respirators is required.

Specific respiratory protection shall be worn when personnel have the potential to be exposed to hazards greater than the regulatory limits. Minimum protection recommendations for various respiratory exposures and activities are represented in Table 2.

For filter cartridge respirators, the filter shall be selected to match the material and contamination level where assessments show a risk of exposure greater than permissible limits. To determine the proper cartridge for air-purifying respirators, either consult a safety professional or the SDS of the substance that needs to be filtered. Generally, cartridges are assigned a colour or other coded descriptor designating the type of contaminant they filter.

Supplied air respirators are available in different types and shall be selected based upon the potential hazard and activity. Some examples are self-contained breathing apparatus (SCBA), airline respirator, airline respirator with escape cylinder, and forced air supplied hoods. An airline respirator shall not be connected to instrument air distribution systems as these systems can be backed up by nitrogen or the quality of the air might not be suitable for breathing, for example having too high an oil content. Only certified breathing air shall be used.

**Table 2 Respiratory protection selection**

<b>Exposure/activity</b>	<b>Recommended PPE</b>
Abrasive blasting	Disposable dust mask or filter cartridge respirator with appropriate grade of filters, or supplied air respirator
Asbestos	Filter cartridge respirator with filters classified for asbestos use or supplied air respirator
Solvents such as chlorinated solvents used for cleaning or solvents used in painting, etc.	Filter cartridge respirator or supplied breathing air respirator
Confined space entry (where safe levels of oxygen or contaminant cannot be guaranteed)	Supplied air respirator
Carbon dioxide release	Supplied air respirator
Dust such as from cutting of insulation materials, handling of molecular sieve, carbon filters, mineral wool insulation, etc.	Disposable dust mask, filter cartridge respirator or supplied air respirator
Perlite	Disposable dust mask or filter cartridge respirator but additional protection recommended to provide full face protection; or supplied air respirator. See EIGA Doc 95 [4].
Oxygen deficient atmospheres (for example, from inert cryogenic liquid vapours) or unknown atmospheres	Supplied breathing air respirator
Petroleum (hydrocarbon)-based products	Filter cartridge respirator or supplied air respirator
Toxic gases Acute toxic gases category 1 (for example, arsine, phosphine, fluorine, diborane) Other acute toxic gases (for example, ammonia, carbon monoxide, chlorine, hydrogen chloride)	Filter cartridge respirator or supplied air respirator
Extremely hazardous and poisonous gases (Within Europe: Toxic gases of class T+ for example, arsine, phosphine, fluorine, diborane, etc.)	Supplied air respirator
Welding/cutting fumes	Filter cartridge respirator or supplied air respirator

#### 5.4 Head protection

All head protection shall meet the requirements of local legislation and relevant, recognised standards [5].

Typical head protection for various examples of exposures and activities is represented in Table 3. If there is a risk of losing the head protection due to position of the body, working conditions or ambient conditions, chin straps or harnesses should be considered to prevent this.

**Table 3 Head protection selection**

Exposure/activity	Recommended PPE
Overhead hazards, for example pipework or falling objects in ASUs, carbon dioxide production and their storage areas	Hard hat (safety helmet)
Bulk transfilling of liquefied gases and cryogenic liquids	Hard hat (safety helmet)
Construction, demolition, excavation, scaffolding, craneage, overhead hazards	Hard hat (safety helmet)
Electrical work (over 440V or over 50V in the U.S.)	Electrically rated hard hat (safety helmet)
Customer deliveries, where construction, demolition, etc., exists or as required by customer	Hard hat (safety helmet)
Activities where there is a risk of the worker's head hitting against objects, for example, when working beneath vehicles in a maintenance garage	Bump cap

### 5.5 Fall protection

All safety belts, harnesses, lanyards, and connecting devices shall meet the requirements of local legislation and relevant, recognised standards [6].

When using fall arrest systems, it is essential to ensure that the fall distance of the system is considered and includes elongation of the system under load.

To reduce the risk of suspension trauma associated with prolonged suspension in fall arrest systems, employers shall implement plans to prevent prolonged suspension in fall protection devices (see EIGA Safety Info 36, *Working at Height – the Hazard of Suspension Trauma when using Fall Arrest Systems*) [6].

Typical fall protection is presented in Table 4.

**Table 4 Fall protection selection**

Exposure/activity	Recommended PPE
Risk of falling where no collective fall protection exists (for example, guard rails, barriers)	System consisting of, for example, full body safety harness, safety line (lanyard) attached to a suitable anchorage point
<b>WARNING:</b> Safety belts should be used only in positioning system applications. These belts typically have side "D-rings", and may be used only for restraining a worker within a safe area. This type of belt shall not be used for arresting a fall.	

### 5.6 Hand protection

All hand protection shall meet the requirements of local legislation and relevant, recognised standards [7].

All hand protection is made for specific purposes and should be selected on this basis.

Selection of hand protection should consider that the dexterity and sense of touch required by the task is not compromised.

Typical hand protection for various examples of exposures and activities is represented in Table 5.

**Table 5 Hand protection selection**

Exposure/activity	Recommended PPE
Abrasive blasting	Leather gauntlets <sup>1)</sup>
Chemicals	SDS recommended hand protection NOTE: Materials of construction of gloves for chemical protection vary by chemical, form (liquid or solid), and concentration and task. Chemical-specific protection should be determined using the SDS and product manufacturer or supplier's recommendation.
Cylinder handling and filling (non-cryogenic)	<ul style="list-style-type: none"> <li>Leather <sup>1)</sup> wrist gloves</li> <li>Fabric gloves <ul style="list-style-type: none"> <li>Fabric gloves with leather <sup>1)</sup> palms (to prevent slippage while handling cylinders)</li> </ul> </li> </ul>
Handling cold equipment	Insulated gauntlets/gloves
<ul style="list-style-type: none"> <li>Loading and unloading of cryogenic liquids</li> <li>Filling of cryogenic liquids, nitrous oxide or carbon dioxide</li> <li>Breaking lines or connections on cryogenic liquid systems</li> </ul>	Insulated gauntlets/gloves specifically selected to prevent liquid penetration and ingress of cryogenic liquids and to provide mechanical resistance (for example, against rips/tears)
Electricity	Voltage-rated gloves Arc flash-rated gloves NOTE Match type to electrical potential and specific task.
Materials handling/warehouse	<ul style="list-style-type: none"> <li>Leather <sup>1)</sup> wrist gloves</li> <li>Fabric gloves</li> <li>Fabric gloves with leather palms</li> </ul>
Welding/cutting	Leather <sup>1)</sup> gauntlets
High temperature	Leather <sup>1)</sup> gloves or insulated gloves
Sharp edges, for example when: <ul style="list-style-type: none"> <li>Scraping labels</li> <li>Handling broken glass</li> </ul>	Cut- and/or puncture-resistant gloves
<sup>1)</sup> May be leather or synthetic material with equivalent performance.	

## 5.7 Protective footwear

All safety shoes shall meet the requirements of local legislation and relevant, recognised standards [8].

Minimum specifications for all footwear are:

- Steel or composite safety toe caps;
- Where personnel are required to climb ladders, soles should have a defined heel to reduce the risk of slipping off ladder rungs; and
- Soles shall be slip resistant and provide appropriate resistance to oil, static electricity, heat, chemical, abrasive, etc., hazards based on the intended use.

The selection of protective footwear may be adapted to seasonal weather conditions and ground conditions, provided the basic protection type is maintained, e.g., water penetration-resistant uppers during wet seasons; ankle protection for uneven surfaces.

The International Organization for Standardization (ISO) provides the European standard for safety footwear in ISO 20345:2011 [8]. The codes applicable to European safety footwear are provided in Table 6.

Typical foot protection for various examples of exposures and activities is represented in Table 7.

**Table 6 Typical footwear specifications**

Type of Protection	Code
200 joule toecap protection. Closed seat region (fully enclosed heel). Antistatic properties. Energy absorption of seat region. Water penetration and water absorption resistance.	S2
200 joule toecap protection. Closed seat region (fully enclosed heel). Antistatic properties. Energy absorption of seat region. Water penetration and water absorption resistance. Sole penetration resistance. Cleated outsole.	S3
Metatarsal protection	M
Insulation against cold	CI

**Table 7 Protective footwear selection**

<b>Exposure/activity</b>	<b>Recommended PPE</b>
Production plant, maintenance activities	S2, leather or equivalent material
Cryogenic liquid transfers	S2, CI, leather or equivalent impermeable material
Workshops, equipment installations at customer premises	S3, leather or equivalent material
Cylinder handling and filling	S2, M, leather or equivalent material with toe or metatarsal protection
Materials handling/warehouse	S2, leather or equivalent material
Electrical works	S2, non-conductive sole
Welding/cutting	S3, leather or equivalent material
Chemical handling	S2, SDS-recommended foot protection <sup>1)</sup>
ATEX classified areas (Equipment for potentially explosive atmospheres, Europe only)	S2, anti-static sole
<sup>1)</sup> Materials of construction of shoes for chemical protection vary by chemical, form (liquid or solid), and concentration. Chemical-specific protection shall be determined using the SDS and manufacturer or supplier's recommendation.	

## 5.8 Protective clothing

All protective clothing shall meet the requirements of local legislation and relevant, recognized standards [9, 10].

All protective clothing is made for specific purposes and should be selected on the basis of a task-specific risk assessment.

Ordinary working clothes and uniforms worn in the gases industry should be taken into consideration as part of the risk assessment process, although these can only provide limited protection and in some cases, can increase the consequences of exposure.

Typical protective clothing for various examples of exposures and activities is represented in Table 8.

In addition, flame resistant clothing will not support combustion after the heat source is removed. There are two main types of flame resistant fabric used to manufacture flame resistant clothing: fabric made from inherently flame resistant fibres or chemically treated fabrics.

In areas where FRC is mandatory, the outer layer(s) of clothing shall be FRC.

Inner garments including underwear worn under FRC should be constructed of natural fibre material, e.g., cotton or wool, or flame-resistant materials. Other synthetic materials can melt and cause serious burns due to the adhesion of molten material to the skin.

**Table 8 Protective clothing selection**

Exposure/activity	Recommended PPE
Chemical Handling	Materials of construction of clothing for chemical protection vary by chemical, form (liquid or solid), concentration, and task. Chemical-specific protection shall be determined using the SDS and manufacturer or supplier's recommendation.
Electrical flash fire	Flash fire rated/Arc rated clothing suitably rated for the task's arc flash potential
ATEX classified areas	Flame resistant clothing (FRC) with anti-static properties [9, 10]
Transfiling of flammable gases, liquids, or powders	Flame resistant clothing [9, 10]
Transfiling of oxygen and nitrous oxide (liquid or gaseous)	Flame resistant clothing (FRC) or natural fibre material, e.g., cotton or wool
Transfiling of other cryogenic liquid gases	Long sleeves and trousers
Areas where there could be vehicular traffic or inadequately lighted areas	High visibility clothing
Welding/cutting	Varies depending upon type of welding, may include leather outer garments, welding jackets and aprons, long sleeves and trousers, welder cap [10]

## 6 References

Unless otherwise specified, the latest edition shall apply.

[1] **U.S.:** OSHA 29 CFR 1910.132, *Personal Protective Equipment*, U.S. Government Printing Office. [www.gpo.gov](http://www.gpo.gov)

**Europe:** Council Directive 89/656, *Minimum health and safety requirements for the use by workers of personal protective equipment at the workplace* <http://eur-lex.europa.eu/en/index.htm>

Council Directive 89/686, *Approximation of the laws of the Member States relating to personal protective equipment* <http://eur-lex.europa.eu/en/index.htm>

[2] **U.S.:** OSHA 29 CFR 1910.95, *Occupational Noise Exposure*, U.S. Government Printing Office. [www.gpo.gov](http://www.gpo.gov)

**Canada:** CSA Z94.2, *Hearing Protection Devices—Performance, Selection, Care, and Use*, Canadian Standards Association. [www.csa.ca](http://www.csa.ca)

**Europe:** EN 352-1: *Hearing protectors. Safety requirements and testing, Ear-muffs*, [www.cen.eu](http://www.cen.eu)



[3] **U.S.:** OSHA 29 CFR 1910.133, *Eye and Face Protection*, U.S. Government Printing Office. [www.gpo.gov](http://www.gpo.gov)

NFPA 70, *National Electrical Code*®, National Fire Protection Association. [www.nfpa.org](http://www.nfpa.org)

**Canada:** CSA Z94.3, *Eye and Face Protectors*, Canadian Standards Association. [www.csa.ca](http://www.csa.ca)

CSA Z94.3.1, *Selection, use, and care of protective eyewear*, Canadian Standards Association. [www.csa.ca](http://www.csa.ca)

**Europe:** EN 166, *Personal eye protection—Specifications*, [www.cen.eu](http://www.cen.eu)

EN 170, *Personal eye-protection—Ultraviolet filters—Transmittance requirements and recommended use*, [www.cen.eu](http://www.cen.eu)

[4] **U.S.:** OSHA 29 CFR 1910.134, *Respiratory Protection*, U.S. Government Printing Office. [www.gpo.gov](http://www.gpo.gov)

**Canada:** CSA Z94.4, *Selection, Use, and Care of Respirators*, Canadian Standards Association. [www.csa.ca](http://www.csa.ca)

**Europe:** EIGA Doc 95, *Perlite Management*, European Industrial Gases Association. [www.eiga.eu](http://www.eiga.eu)

NOTE This publication is part of an international program for industry standards. The technical content of each regional document is identical, except for regional regulatory requirements. See the referenced document preface for a list of harmonized regional references.

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[5] **U.S.:** OSHA 29 CFR 1910.135, *Head Protection*, U.S. Government Printing Office. [www.gpoaccess.gov](http://www.gpoaccess.gov)

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**Canada:** CSA Z94.1, *Industrial Protective Headwear—Performance, Selection, Care, and Use*, Canadian Standards Association. [www.csa.ca](http://www.csa.ca)

**Europe:** EN 397, *Specification for industrial safety helmets*, [www.cen.eu](http://www.cen.eu)

[6] **U.S.:** OSHA 29 CFR 1926.502, *Fall protection systems criteria and practices*, U.S. Government Printing Office. [www.gpo.gov](http://www.gpo.gov)

ANSI/ASSE Z359, *Fall Protection Code*, American Society of Sanitary Engineering. [www.asse-plumbing.org](http://www.asse-plumbing.org)

**Europe:** EIGA Safety Info 36, *Working at height — the hazard of suspension trauma when using fall arrest systems*, European Industrial Gases Association. [www.eiga.eu](http://www.eiga.eu)

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[7] **U.S.:** OSHA 29 CFR 1910.138, *Hand Protection*, U.S. Government Printing Office. [www.gpo.gov](http://www.gpo.gov)

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[8] **U.S.:** OSHA 29 CFR 1910.136, *Occupational Foot Protection*, U.S. Government Printing Office. [www.gpo.gov](http://www.gpo.gov)

**Canada:** CSA Z195, *Protective footwear*, Canadian Standards Association. [www.csa.ca](http://www.csa.ca)

**Europe:** ISO 20345: *Personal Protective Equipment—Safety footwear*, [www.iso.org](http://www.iso.org)

[9] **U.S.:** ANSI Z49.1, *Safety in Welding and Cutting and Allied Processes*, American Welding Society. [www.aws.org](http://www.aws.org)

**Europe:** ISO 11611: *Protective clothing for use in welding and allied processes*, [www.iso.org](http://www.iso.org)

EN 1149-1: *Protective clothing. Electrostatic properties—Test measurement for surface resistivity*, [www.cen.eu](http://www.cen.eu)

[10] **U.S.:** NFPA 2112, *Standard on Flame-Resistant Garments for Protection of Industrial Personnel Against Flash Fire*, National Fire Protection Association. [www.nfpa.org](http://www.nfpa.org)

NFPA 2113, *Standard on Selection, Care, Use, and Maintenance of Flame-Resistant Garments for Protection of Industrial Personnel Against Short-Duration Thermal Exposures*, National Fire Protection Association. [www.nfpa.org](http://www.nfpa.org)

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PD CEN/TR 14560: *Guidance for selection, use, care and maintenance of protective clothing against heat and flame*, [www.cen.eu](http://www.cen.eu)

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