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Safety, Health and Environment National Authority

# INDUSTRY GUIDANCE NOTE

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| **Guidance To Personal Protective Equipment (PPE)** | | | **IGN 04/2021** |
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**Guidelines to Personal Protective Equipment**

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# 1. INTRODUCTION

## 1.1 Purpose

The purpose of this document is to describe the various types of Personal Protective Equipment (PPE) that must be worn during certain work activities. The document also recommends the PPE standards that must be considered during purchasing.

## 1.2 Applicable Laws

Workplace Safety and Health Order, 2009
Workplace Safety and Health (General Provisions) Regulations, 2014
Workplace Safety and Health (Construction) Regulations, 2014

## 1.3 Scope

### 1.3.1 Responsibilities

- The correct use of PPE is applicable to all persons within the relevant workplace and such controls should be adhered to and be suitably managed at all times whilst the hazards

### 1.3.2 Management

- Ensure that PPE is available and used within his area of responsibility

### 1.3.3 HSE Officer

- Carries out regular HSE inspections to check that PPE is being worn
- Ensures that signboards are installed to remind workers to wear their PPE

### 1.3.4 Supervisors

- Must ensure that PPE is available for his workers
- Must ensure that PPE is of the correct type
- Must ensure that the PPE is properly maintained

- Supervisors must ensure that all persons who report to him are wearing the correct PPE

1.3.5 Employees

- Always use the correct PPE where necessary
- Wear PPE correctly and do not modify or alter the PPE in any way
- Report any loss or defects in the PPE to your supervisor
- Take good care of the PPE to prevent it from becoming unnecessarily damaged

## 2. GENERAL REQUIREMENT

2.1. Purchasing of PPE

Purchasing of PPE shall only be done after a risk assessment is carried out. The risk assessment will determine the nature and extent of the hazards associated with the work activity.

All PPE selected will conform to an appropriate British (BS) / European (EN) Standard which are listed in this document. Alternative standards are acceptable if the quality and standard of the PPE is the same.

2.2 Risk Assessment in the Selection of PPE

Suppliers should be able to advise on the different types of PPE available and their suitability for different tasks and activities. It may be necessary in a few particularly difficult cases to obtain advice from specialist sources – including manufacturers.

Factors to be considered when assessing the suitability of PPE:

- Is it appropriate for the risks involved and the conditions at the workplace where exposure may occur?
  e.g. eye protection designed for use against chemical splashes will not offer adequate face protection when using an angle grinder to cut steel or stone, or gloves worn for use with some chemicals may be degraded by other chemicals.

- Does it prevent or adequately control the risks involved without increasing the overall level of risk?
- Can it be adjusted to fit the wearer correctly?

- Has the state of health of those who will be wearing it and the result of appropriate health surveillance been taken into account?

- What are the needs of the job and the demands it places on the wearer?

Consider, for example, length of time the PPE will be worn, physical effort required to do the job and requirements for visibility and communication.

- If more than one item of PPE is worn, are they compatible?
  e.g. does the use of a particular type of respirator make it difficult to get eye protection to fit properly?

2.3 Storage, Inspection and Maintenance

- All PPE must be well looked after and be properly accommodated when not in use, e.g. stored in a dry, clean cupboard, or in the case of smaller items, such as eye protection, in a box or case.

- PPE must be kept clean & in good repair – the manufacturer's maintenance schedule (including recommended replacement periods & shelf lives) should normally be followed.

## 3. EYE PROTECTION

### 3.1 Purpose

The purpose of the eye protector is to ensure that users are adequately protected from eye and/or face hazard so as to prevent or minimise injuries arising from such hazards.

Appropriate eye-protectors shall be worn by users who are exposed or likely to be exposed to hazards such as, but not limited against impact, chemical or molten metal splashes, dust, or radiation from welding arcs or lasers. It may take the form of spectacles, goggles, visors, face shields or hoods.

A person's eyes are very vulnerable and an incident can completely change a person's way of life forever. Analysis of the injuries to people's eyes shows that damage is caused either:

- 75% by impact
- 10% by abrasion following ingress of dust or other foreign body
- 15% by burns or chemical contamination.

The majority of these injuries would have been prevented if the correct eye protection had been worn.

### 3.2 Types of hazard

3.2.1 It is essential to conduct risk assessment comprising hazard identification, risk evaluation and control to assess the eye and/or face hazard(s) that exist in the work environment. This is necessary to determine the need for eye protection and the type of eye-protectors required.

The following are just some of the risks and hazards that might be met in the workplace, which would require the use of eye protection. The list should not be taken as exhaustive.

- Using hammers and chisels

- The handling of, or coming into contact with, corrosive or irritant substances, such as acids or alkalis
- The use of any gas or vapour under pressure
- Any work using molten metals or other molten substances
- Working with any equipment which uses light producing instruments
- Work carried out using abrasive materials where sparks may be given off at speed
- Work with any tools which will result in chippings being broken off
- Work with milling machines where fine fragments of metal are spun off at speed
- Work involving welding where intense lights may be produced
- Work with equipment where radiation is given off.

3.2.1 Issue of Eye Protection and Stock

Eye protectors should be:

- Issued on a personal basis to the person at risk
- Maintained and readily available in sufficient numbers for persons occasionally employed
- Kept available in sufficient numbers so that any which become lost, destroyed or defective can be immediately replaced.

3.2.3 Fixed shields

Where possible, a fixed shield should be provided which can be used together with eye protection:

- Conform to the relevant British Standard specification
- Be cleaned regularly, disinfected and properly maintained
- Be so constructed and kept in position as to protect the eyes.


*Bench grinder with fixed guards*

## 3.3 Eye protection requirements

### 3.3.1 Employer responsibility

Under the Workplace Safety and Health Order, 2009, the employer or principal is required to protect the safety and health of the employees or users by controlling risks at the workplace. Where eye protection is required, suitable eye-protector equipment shall be provided and maintained by the employer or principal. The employer or principal shall be responsible for the establishment of procedures in handling emergencies if an eye and/or face injury occurs. They shall also be responsible for ensuring that the users are properly trained in the use and care of the eye-protection equipment.

### 3.3.2 Visitors requirements

Arrangements should be made for providing visitors to any hazardous site areas with suitable eye-protectors. Eye-protectors should be selected according to the risk and exposure encountered by the visitors.

If spectacles or goggles are appropriate eye-protectors for provision, these should be of the type that can be worn over normal prescription spectacles.

3.3.3 Signage

Appropriate signage such as "eye protection required" areas shall be designated with signage posted, where the use of eye protection is mandatory.

3.3.4 Emergency use

Suitable facilities for quick flushing of the eyes and /or face shall be provided and properly maintained within the work area for emergency use where there may be possible contact with toxic or corrosive substances.

3.4 Types of eye protectors and their fields of use

3.4.1 Eye-protectors are designed to protect against mechanical, chemical, electric arc and optical radiation. Not every eye-protector is designed to provide protection for all these hazards. Care should be taken to ensure the correct type of eye-protector is used.

There are seven main types of eye protector and it is important to select and issue the correct type to give the required protection.

1. General purpose industrial eye protection impact goggles
   - Grade II
   - Grade I
2. Molten metal goggles
3. Chemical goggles
4. Dust goggles
5. Gas tight goggles

6. Lens filters (for use during welding)

7. Face and hand shield; helmets (for protection during welding)

3.4.2 Spectacles

Spectacles are primarily used to provide protection from impacts and optical radiation. A spectacle may consist of the following components:

(a) Front with bridge area: fixed or adjustable bridge, adjustable nose pads;

(b) Lens or lenses: removable or non-removable, plano or prescription;

(c) Temples: fixed or adjustable, spatula, cable or headband;

(d) Side shield: solid or ventilated, flatfold or cup;

(e) Lift-front filter.

3.4.3 Goggles

Protective devices designed to fit the face immediately surrounding the eyes. Goggles are available with fixed or flexible frames and available in two (2) styles:

(a) Eyecups: cover the sockets completely;

(b) Cover: worn over spectacles.

Goggles are normally ventilated (direct or indirect) to minimise fogging;

(a) Direct ventilation to exclude direct passage of large particles;

(b) Indirect-ventilation to exclude direct passage of dust, liquids or light.

3.4.4 Face-shields

Face-shields may have a headgear supporting a window that shields the whole or part of the wearer's face, in addition to the eyes. The material used for windows depends on the types of hazard. Plastics, with glass insert, or wire screen are commonly used. Face-shields are secondary protectors and shall be used with primary protectors.

### 3.4.5 Welding hand-shields

Hand-shields are hand-held devices that protect the eyes, face and neck.

### 3.4.6 Welding helmets

Helmets are headgears used to shield the eyes, face, neck and part of the top cranium from impact as well as optical radiation. Helmets are commonly available in stationary lens and lift-front type.

### 3.4.7 Standards and Markings

The current standard for safety spectacles, goggles and face shields is EN166. The standard has different sub-classes, listed below, so the description may be complex (e.g. a gas safety goggle conforms to BS EN 166.1.B.3.5.9).

The standard EN 166 must be present on all types of Eye Protection.

**Overview** *of main standards relating to Eye Protection*

**Standards - Basic:**

*EN166 - Technical performance standard - The core technical standard*
*EN167 - Methods for optical tests*
*EN168 - Methods for tests other than optical*

**Standards - Product Type:**

*EN169 - Filters for welding and related techniques - Transmittance requirements and recommended utilisation*
*EN170 - Ultraviolet filters - Transmittance requirements and recommended utilisation*
*EN171 - Infrared filters - Transmittance requirements and recommended use*
*EN172 - Solar radiation filters - Sunglare filters for industrial use*

**Standards - Field of Use:**

*Welding -*
*EN175 - Equipment for eye and face protection during welding and allied processes*
*EN379 - Specification for welding filters with switchable and dual luminous transmittance*
*Laser -*
*EN207 - Filters and eye protection against laser radiation*
*EN208 - Eye protection for adjustment work on lasers and laser systems*
*Mechanical / Heat Protection -*
*EN1731 - Mesh type eye and face protectors for industrial and non-industrial use against mechanical hazards and / or heat*

## TABLE A

| Description of Mark Under EN166 | Symbol & Location | | Type of Eye-Protector & Comments |
|---|---|---|---|
| | *Frame* | *Lens* | |
| ***Optical Class*** *- The first digit seen after EN166 notation* | | | |
| Class 1 (high optical quality)<br>Suitable for occasional wear. Refractive power of ± 0.06 dioptres | | *1* | Normal optical quality for all safety spectacles & goggles |
| Class 2 (medium optical quality)<br>Suitable for occasional wear. Refractive power of ± 0.12 dioptres | | *2* | When seen within a specification the figure 2 usually refers to the standard EN170 and not optical class, see tables b, c &d |
| Class 3 (low optical quality)<br>Only suitable for exceptional wear. Refractive power of ± 0.25 dioptres | | *3* | When seen within a specification the figure 3 usually refers to the standard EN170 and not optical class, see tables b, c &d |
| ***Mechanical Strength*** | | | |
| Minimum Robustness | *N/A* | *N/A* | |
| Increased Robustness (12m/s) | | *S* | Spectacles with reinforced mineral lenses |
| Low Energy Impact (45m/s) | *F* | *F* | Faceshields, goggles & spectacles |
| Medium Energy Impact (120m/s) | *B* | *B* | Faceshields & goggles |
| High Energy Impact (190m/s) | *A* | *A* | Polycarnoate faceshields (High Energy Impact is rarely required in industrial use and can adversely affect the optical class) |
| Resistance to high speed particles at extremes of temperature -5˚C to +55˚C | *(T)* | *(T)* | Can be seen in conjunction with symbols F, B or A |
| ***Field(s) of Use*** | | | |
| Liquids (droplets or splashes) | *3* | | Goggles (indirect vent & unvented) & faceshields |
| Large Dust Particles (particles size >5μm) | *4* | | Goggles (indirect vent & unvented) |
| Gas & Fine Dust Particles (smoke/dust with particle size <5μm) | *5* | | Goggles (unvented) |
| Resistance to Short Circuit Electric Arc | *8* | *8* | Faceshields minimum thickness 1.4mm. 99.9% UV filtration |
| Molten Metal and Hot Solids | *9* | *9* | Goggles & faceshields |
| Hard Coat - resistance to damage by fine particles (optional) | | *K* | |
| Non-Mist - resistance to misting (optional) | | *N* | |
| Enhanced reflectance (optional) | | *R* | Gold coated visors |
| Radiant Heat - mesh type protection only | *G* | | |
| Eye protector designed to fit a small head | *H* | | |

### What do EN169, 170,171 & 172 relate to?

*These are the standards that deal with the shade and filtering characteristics of the lenses of eye protectors. They indicate the levels of protection afforded against Ultraviolet light, Infrared light, Sunlight and against the high intensity light produced during Welding processes. The numbers used to describe these characteristics appear only on the lenses of the eye protector; table* ***(B)*** *below illustrates how these numbers relate to specific European Standards.*

## TABLE B

| Description of Mark Under EN169, 170, 171, & 172 | Marking on Lens | See tables (C) & (D) for more in depth explainations |
|---|---|---|
| The **1st** digit after the **EN** ref is the '**Code Number**' indicating the type of filter, except for EN169 where only a shade number appears | *2 & 3* | 2 & 3 = UV Fliters to **EN170** |

## TABLE C

| European Standard | Nature of Protection | Code Number 1st digit (type of filter) | Shade Number 2nd & 3rd digit | Applications | Appropriate Lens Colours |
|---|---|---|---|---|---|
| EN169 | Welding Filters | The Welding standard only requires a Shade Number | 1.2 to 16 | Welder's assistant (shade 1.7)<br>Braze welding (shade 3 to 5)<br>Oxy-cutting (shade 5 to 7)<br>Arc welding (shades greater than 7 require a face shield) | IR Shades: 1.7, 3.5<br>Welding Glass |
| EN170 | Ultraviolet (UV) Filters | 2 & 2C<br>(2C was previously 3) | 1.2 to 5 | Welding - short circuit<br>Electric Arc<br>Sunlight | Clear<br>Amber<br>Blue<br>HDL Yellow (high definition lens) |
| EN171 | Infrared (IR) Filters | 4 | 1.2 to 10 | Arc welding<br>Glass manufacturing<br>Foundry work<br>Sunlight | IR Shades: 1.7, 3.5<br>Blue Cobalt |
| EN172 | Solar (sun protection) Filters | 5 & 6 | 1.1 to 4.1 | High intensity solar glare<br>Outdoor work | I/O Silver (indoor/outdoor)<br>TSR Grey (traffic signal recognition)<br>SCT400 (spectrum control technology)<br>Cappuccino<br>Blue Mirror<br>Silver Mirror |

## TABLE D

| 1st digit Code Number (type of filter) | Description of Property |
|---|---|
| 2 | UV Protection (EN170). The number 2 indicates the filter may effect colour recognition |
| 2C | UV Protection (EN170). The number 2C (previously 3) indicates the filter allows good colour recognition |
| 5 | Solar Protection (EN172). i.e. sunglare protection - with no infrared (IR) protection |
| 6 | Solar Protection (EN172). i.e. sunglare protection - with infrared (IR) protection |
| **2nd & 3rd digit Shade Number** | **Description of Property** |
| 1.2 | Allows more than 74.4% light transmission, but less than 100% |
| 1.7 | Allows more than 43.2% light transmission, but less than 58.1% |
| 2.5 | Allows more than 17.8% light transmission, but less than 29.1% |
| 3.1 | Allows more than 8.0% light transmission, but less than 17.8% |

Table C explains what the shade numbers on a lens represent (2nd and 3rd digit).

Table D provides more information on shade numbers with EN170 and EN 172.

1. Example: A Braze welding goggle has the markings EN166 1F349, EN169 5
   1F349 refers to EN166, the Technical Performance Standard where:
   '1' denotes 'optical class 1', the highest optical class
   'F' denotes 'low energy impact resistance'
   '3' denotes resistance to 'liquids (droplet or splashes)'
   '4' denotes resistance to 'dust particles'
   '9' denotes resistance to molten 'metal & hot solids'
   5 refers to EN169, the Welding Filter Standard where:
   '5' denotes the Shade Number; In this case "a shade solar filters (sun protection) welding lens'

2. Example: A goggle is marked EN166 1F, EN172 5-2.5
   1F refers to EN166, the Technical Performance Standard where:
   '1' denotes 'optical class 1', the highest optical class
   'F' denotes 'low energy impact resistance'

   5-2.5 refers to EN172, the Solar Protection Standard where:
   '5' the Code Number denotes 'the solar protection offered by the lens has no infrared element'
   '2.5' denotes the Shade Number; in this case it indicates that light transmission is less than 29.1%

3.5 Proper selection and use of personal eye-protectors

3.5.1 Where it is not possible to eliminate or control the risks, personal eye-protectors shall be supplied to operators and visitors in areas where eye hazards may exist. These eye-protectors should be worn at all times.

If an eye-protector has to be worn with other personal protective equipment, the required items shall be carefully chosen for their

compatibility, replacing the combination of items with an integral unit, if available. A trial of the selected equipment shall be conducted to gain wearers' acceptability. If compatibility is not achieved, there is a possibility that:

(a) The expected levels of protection may be achieved; or

(b) The personal protective equipment may not be worn.

3.5.2 Vision screening

Individuals identified as requiring eye protection should be subjected to a vision screening process.

This process will also identify those persons who require vision correction and subsequently, should be referred to an optician for a full eye examination.

3.5.3 Selection of eye-protectors

The hazards and risk association with a particular task or area shall be evaluated and the most appropriate type of eye-protector shall be selected. In the selection of eye-protectors, the following should be considered:

(a) The nature of the hazards and risks to the eyes. For a combination of hazards, more than one type of eye-protectors may be needed, e.g. welding goggles and a suitable face-shield.

(b) The environmental condition under which the operator is working. In particular, working in confined spaces may give rise to reflected hazards, requiring sideways and rearwards protection.

(c) The visual requirement of the task.

(d) The condition of the operator's eyesight.

(e) The appropriateness of the frame as a safety frame.

(f) The personal preference of the wearer for particular safety frames. Comfort and appearance are usually the main factors

in user preference. Lightness, ventilation and unrestricted vision are important considerations.

(g) The size of the glasses shall be able to fully protect the eyes.

3.5.4 Comfort and fit

The eye protection equipment provided should be comfortable to wear. Factors which increase discomfort include poor visibility and heaviness. Unless the eye-protector is comfortable and fits well, the overall level of protection selected to counteract the potential hazard may not be readily achieved.

Comfort

In assessing the likely comfort of eye protection, the following factors should be taken into account, preferably with the involvement of the eventual users:

(a) Weight
(b) Fit and adjustment means (if any)
(c) If appropriate, the seal against the face
(d) Pressure points
(e) Peripheral vision
(f) Ventilation features
(g) Day and light time reflections
(h) Aesthetic appeal
(i) Compatibility with other PPE
(j) Any other appropriate to the particular task of the users.

` 3.5.5 Compatibility

In situations where other PPE such as safety helmets, ear-muffs and respirators are worn with eye-protectors, it is essential that an evaluation be made to determine that one item of PPE does not adversely affect the fit of the other. If it does, then one or both items of PPE may not provide the intended degree of protection.

The most common causes of incompatibility problems are as follows :

(a) Sidearms of spectacles and headbands of goggles breaking the acoustic seal of the ear-muff.

(b) The nose-bridge of spectacles and goggles breaking the seal and fit of half mask and filtering facepiece respirators, and vice versa.

Problems of incompatibility sometimes require the preferred type and style of eye-protection to be substituted for another. Preference should be given to devices that are intended by the manufacturer to be worn together. Ideally, multi-protection devices that are integrated should be selected provided they are adequate, suitable and approved for use by recognised standards.

3.5.6 Prescription spectacles

Prescription spectacles (as distinct from prescription eye-protectors) are generally inadequate against flying objects or particles and could even be hazardous.

Normal streetwear prescription spectacles shall not be used as safety prescription spectacles and shall not be worn as eye protection in work area where eye protection is required.

For persons requiring eye protection in addition to sight correction, the following options should be considered:

(a) The use of prescription spectacles worn with additional protection, e.g. wide vision goggles or over-spectacles.

(b) For higher impact protection or protection against splash, an impact rated wide-vision goggle should be used. Ensure that there is sufficient gap between lens of goggles and prescription eyewear as deflection may affect the prescription spectacle lens.

(c) The use of contact lenses may be worn under an eye-protector appropriate to the hazards of the task being undertaken.

For long duration of usage, it is recommended that safety prescription spectacles are to be used. Any near distance work, particularly for older workers, should be considered during sight testing by a qualified optician or optometrist.

3.5.7 Goggles

Particular attention should be paid to the following:

(a) Goggles are usually manufactured in one face size. There should be no gap between the goggle and the face;

(b) Over-tightening of the headband to achieve a better fit should be avoided;

(c) Once adjusted it is desirable to tuck in loose ends of the headband.

The use of anti-mist lenses should be considered for preventing misting or fogging during use.

3.5.8 Face screens

The headband on which screens are mounted are usually adjustable over the crown and at the back of the head. Particular attention should be paid to the following:

(a) The screen and its support should not touch the face;

(b) There should be no undue contact with the top of the chest or shoulders during head movement;

(c) The extent of the coverage necessary should be checked with the screen in the working position.

3.5.9 Eye-protectors for welding

Intended for protection of eyes against impact and optical radiation such as ultraviolet or infra-red radiation. Welders exposed to such radiation from all forms of arc welding should use secondary protective devices like welding helmet or shields fitted with appropriate lens filters,

in addition to safety spectacles. Except in gas welding, cutting, brazing or soldering, safety spectacles or goggles with the appropriate filters for infra-red and ultraviolet radiation can be used. ( refer to Tables A,B,C and D above).

3.5.10 Eye-protectors for outdoor use

Intended for protection of eyes against glare and ultraviolet radiation. Users who are required to work outdoors, especially in the tropics or sub-tropics should use eye-protectors fitted with lens coated with ultraviolet filters and should be of the appropriate tint to reduce glare.

Note 1 - The shade of the tints does not correspond to the percentage of absorption of UV radiation. It must have UV coatings with a maximum of 0.01 mean UV spectral transmisstant at 280nm to 315nm.

Note 2 - Eye protectors intended for outdoor use may not be suitable for use in artificial lighting condition e.g. confined space, low light areas.

3.5.11 Misting/fogging of eye-protector

One of the most common problems associated with the use of eye-protectors, particularly goggles, is misting of the lenses. This can be prevalent when physical exertion forms part of the job, or movement from one part of the workplace to another involves a change in the ambient temperature.

A number of approaches have been tried, with varying degree of success. These include:

(a) Provision of ventilation holes in the eye-protector;

(b) Double glazed lenses;

(c) Anti-misting coatings.

Each of these has associated problems.

It has not been possible to specify a required ventilation area to prevent misting. Goggles used as eye protection against dust, liquid splashes of gases, pose particularly difficult ventilation problems.

Double glazed lenses have been used when protection is required against the dust and sparks. However, the temperature of the hot air carrying the sparks and dust and the high ambient temperatures may partly account for their successes. Double glazed eye-protectors tend to be stiffer than single lens versions, and may therefore be more uncomfortable.

Anti-mist lenses and compounds act by either absorbing moisture until saturated or by causing it to spread out as a transparent film. They are useful in fluctuating wind conditions where the highest airflow generated is sufficient to remove existing condensed moisture. Eye-protectors with anti-mist lenses are marked with the symbol '*N*' on the lens. However, where impact protection is required, it is important to establish that the lens strength is not reduced by anti-mist compound.

Combinations of ventilation holes and double glazing and/or anti-misting coatings have also been tried. Where misting of eye-protectors could be a problem, it is recommended that a number of appropriate types are selected for the user trial prior to selecting the most suitable.

3.5.12 Abrasion for eye-protectors

Abrasion for the surface of lenses creating haze is a well-known phenomenon, particularly with plastic materials. An abrasion resistant coating may considerably increase the useful life of the eye-protector. Eye-protectors with abrasion resistance coating are marked with the symbol '*K*" on the lenses. Where impact protection is required it is important to establish that the lens strength is not reduced by the abrasion resistant compound.

3.5.13 Eye protection for wearers of contact lenses

The wearing of contact lenses under eye-protectors is entirely satisfactory in most industrial situations provided that the user is adequately trained in the use of the lenses. However, the wearing of contact lenses cannot be considered under any circumstances as replacement for normal eye safety procedures. It is in the interest of the users of contact lenses to inform their employer that contact lenses are worn by them for appropriate action in the event of an accident involving the eyes.

However, some industrial situations could be more hazardous to the wearers of contact lenses. These include situations where the hazard is dust or harmful liquids, gases or vapours as the consequence of a failure to protect the eyes might be greater when contact lenses are in place.

3.5.14 Always choose eye protection appropriate to the hazard and ensure that it fits properly and is comfortable to the wearer.

1) Safety spectacles normally incorporate side shields and are suitable for general workshop or laboratory use when protection against impact or occasional light chemical splash is required. They may be fitted with prescription lenses: where these are required at work, then the cost of the spectacles will be borne by the person's employer.

Eye shields (over specs) are similar to safety spectacles, but they may be worn over ordinary prescription spectacles. They are

particularly suitable for occasional use; either by visitors or by spectacle wearers (so avoiding the expense of prescription safety glasses), but their optical quality is generally not good enough for prolonged use.

Although safety spectacles are commonly worn in laboratories and their use is strongly encouraged, they are not sealed to the face and so are not appropriate where there is a serious risk of eye injury from toxic or corrosive chemicals (e.g. where large volumes may be splashed onto the head and run down into the eyes).

2) Goggles provide total protection to the eyes, although they are heavier and less convenient than safety spectacles. They may be worn over prescription spectacles.

Un-vented goggles offer far better protection than safety spectacles where there is a serious danger of chemical splash, but may be prone to misting up. Double glazing or treated lenses alleviate this; directly or indirectly ventilated goggles are also available. However, directly ventilated goggles do not give good protection against ingress of chemicals, gases, and dust; indirectly ventilated goggles give protection against liquid ingress, but do not prevent entry of gases or vapours. It may be required and necessary to wear goggles in combination with a face shield.

Face shields protect the whole face as well as the eyes, but do not fully enclose the eyes, so do not give protection against dusts and gases. They are comfortable to wear, not prone to misting and may be used with ordinary spectacles. For high impact hazards a face shield must be worn in combination with safety glasses.

Face shield

3) Maintenance and Cleaning

Dirty lenses impair vision, causing eye fatigue and leading to incidents. The plastic lenses of eye protectors should be wet cleaned to avoid scratching; scratched lenses and face shields should be replaced.

Safety spectacles and goggles should be issued on a personal basis and should be thoroughly cleaned before issue to another person.

## 4. HEAD PROTECTION

This provides protection:

i) against falls (e.g. crash helmets, cycle helmets, climbing helmets)

ii) against falling objects or against striking fixed objects (e.g. industrial safety helmets used on building sites)

iii) against striking fixed objects (e.g. bump caps used when working in spaces with limited headroom).

4.1. Standards

Industrial safety helmets and bump caps are the type most commonly used. They should conform to the relevant standards. The most common standards relating to head protection are:

EN397 - The technical performance standard for safety helmets

EN812 - The technical performance standard for bump caps

EN443 - The technical performance standard for Fire Fighting helmets

EN397 & EN812 are the technical standards to which all safety helmets and bump caps must be approved

BS EN 960 : 2006 head forms for use in the testing of protective helmets

ISO 3873 ; 1977 Industrial Safety helmets

ANS/ISEA Z89.1 :2009 Industrial head protection

AS/NZS 1800 : 1998 Occupational protective helmets – selection , care and use

AS/NZS 1801 : 1997 Occupational helmets

Reference is made to SS 98 : 2013 Singapore standard Specification for Industrial Safety Helmets

| *Option/Explanation* | *Symbol* |
|---|---|
| a. Low temperature performance | -20/-30°C |
| b. Electrically insulating | 400V AC |
| c. Resistance to lateral deformation | LD |
| d. Resistance to splashes of molten metal | MM |
| e. Flame resistant | F |
| * Resistance to penetration to -40°C<br>*(currently outside EN397: 1995 see specific helmets for this optional test)* | -40°C |
| * Electrical Resistance<br>*(currently outside EN397: 1995 see specific helmets for this optional test)* | 1000V AC |

4.2.Selection

To achieve a good fit, ensure the helmet:

- is the correct shell size
- has an adjustable headband, and (if fitted) chin strap
- is compatible with other PPE that needs to be worn, e.g. eye, ear or respiratory protection (many helmets can accept dedicated, clip-on, face, eye or hearing protection).


Safety Helmet with chin strap

Safety Helmet with Accessories

## 4.3. Physical requirements

### 4.3.1 Construction

Typical Components of Industrial Safety helmets

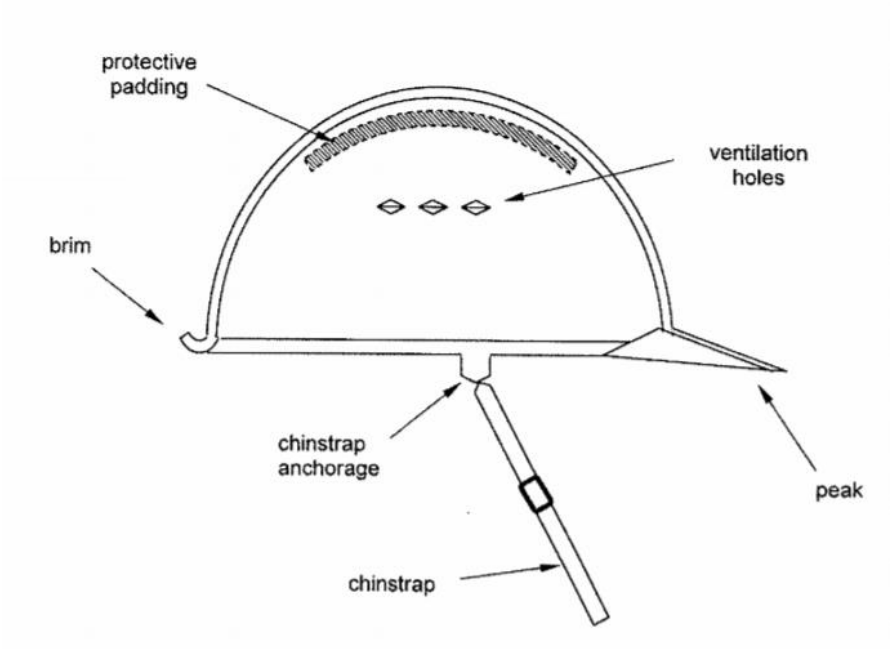



Figure 1. Shell

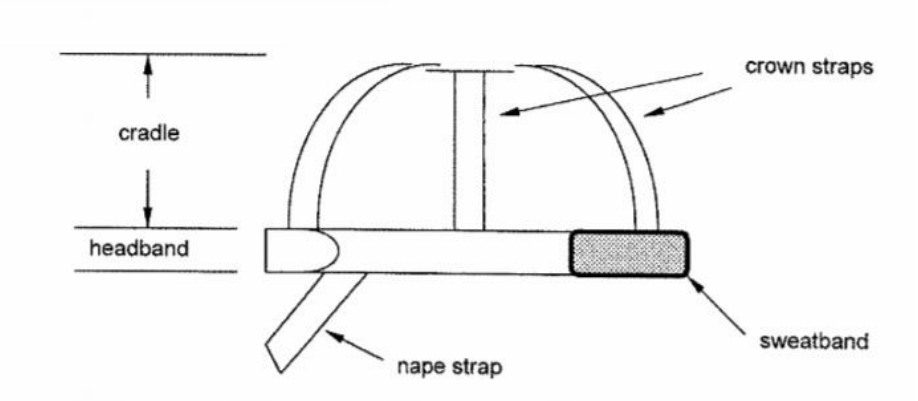



Figure 2. Harness

The helmet shall consist of a shell and a harness comprising a headband and a cradle.

The helmet and its accessories or attachment devices shall not have any sharp edges, roughness or projections so as to protect against any injuries that could caused when the wearer comes into contact with these surfaces.

Replacement parts shall be designed and manufactured in such a way that they can be easily adjusted, removed and attached without requiring the usage of any tools.

4.3.2 Shell

The shell shall be of one-piece construction, with or without a brim or peak. The brim and the peak shall be an integral part of the shell. All edges and any holes in the shell shall be radiused and smooth. Either the helmet shell or the headband shall be fitted with a chinstrap or with the means of attaching one. For helmets used where there are electrical hazards, any metal rivets or other electrically conducting material passing through the shell shall be insulated that they cannot, under either wet or dry conditions, form an electrical connection between the outside and inside of the helmet.

The shell shall have as uniform a strength as possible and shall not be specially reinforced at any point. This does not exclude a gradual

increase in shell thickness or ribs or means for attaching the harness but does exclude other highly localized reinforcement.

4.3.3 Harness

The harness shall be securely attached to the shell of the helmet. It shall be easily removable and replaceable. The harness of the same size of helmets shall be interchangeable between shells of the same size.

The design of the helmet should provide for maximal adjustment of the harness within the shell, in order to optimize wearer comfort.

4.3.4 Headband

The headband may be cushioned from the shell by shock absorption pads. It shall be not less than 25 mm in width and shall be designed so that it does not cause local pressure on the forehead after long wearing. It shall be securely attached to the shell and the crown straps. The headband should be fitted with a sweatband which shall cover at least the forehead portion of the headband. The sweatband shall be replaceable. If the sweatband is integral to the headband, the headband shall be replaceable.

4.3.5 Cradle

The cradle shall consist of at least four (4) crown straps. The straps shall be attached to the cradle at equal spacing. If the cradle incorporates textile tapes, their individual widths shall be not less than 15 mm, and the total of the widths of the tapes radiating from their intersections shall not be less than 72mm.

4.3.6 Ventilation

If the helmet shell is provided with holes for ventilation purposes, the total area of such holes shall be not less than 150 $mm^2$ and not more than 450 $mm^2$.

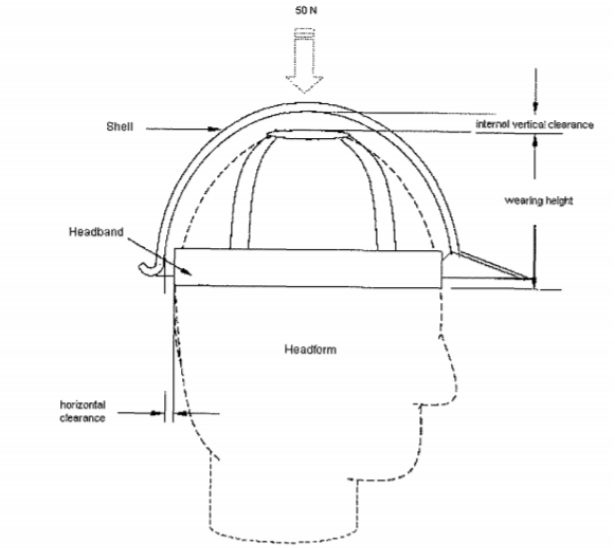



Figure 2. An example depicting the internal vertical clearance, wearing height and horizontal clearance

4.3.7 Internal vertical clearance

The internal vertical clearance shall be not less than 25 mm and not more than 50 mm.

4.3.8 Horizontal Clearance

The horizontal clearance at the front and sides of the helmet shall not be less than 5 mm.

4.3.9 Chin strap

Either the helmet shell or the headband shall be fitted with a chin strap or with means of attaching one. Any chin strap supplied with the helmet shall not be less than 10mm wide when non-tensioned and shall be attached either to the shell or to the headband. Chin strap should always be worn to prevent the helmet from being dislodged off the wearer's head.

4.3.10 Helmet mass

Helmets should be light as possible without prejudicing design strength and efficiency. If the mass of a complete helmet, including harness but

without accessories exceeds 400 g, this mass, determine to the nearest 30 g, shall be shown as a label attached to the helmet.

4.3.11 Helmet accessories

The helmet may also be fitted with other accessories if so required by the purchaser. Such fittings shall no way affect the performance. Any devices fitted to the helmet should be so designed that they are unlikely to cause any injury to the wearer in the event of an accident. In particular, there should be no metallic part(s) or rigid projection(s) on the inside of the helmet such as might cause injury.

4.3.12 Materials

The material used should be of durable quality i.e. their characteristic should not undergo appreciable alteration under the influence of ageing or of circumstances of use to which the helmet is normally subjected.

4.3.13 Shell

The shell shall be made of materials that are hard, durable and inherently moisture-resistant. Both the surfaces and edges shall have a smooth finish. Any fibre reinforcing material used in construction of the shell shall not be loose or exposed to cause skin irritation or disease. When fibre reinforcing material is used in the construction of the shell it should be applied in a uniform manner with no gap in the reinforcement.

4.3.14 Harness

The headband and cradle forming the harness shall be made of durable, sweat-resistant and heat-resistant materials that are known not to cause any skin disease(s).

Note : Some helmets may not be suitable for under conditions where flying molten material may be encountered or where the temperature to which the helmet will be subjected to fails outside the temperature

range specified. Care should be taken to select helmets made from suitable material for use under specific conditions.

## 4.4 Care and maintenance of industrial safety helmets

### 4.4.1 Cleaning

It is recommended that safety helmets be cleaned regularly. Safety helmets are made of robust materials with most compounds having a smooth moulded finish enabling easy cleaning and maintenance. In general, normal washing methods using warm water band mild detergent are adequate. Harness should be removed from the shell to facilitate washing. The use of solvents, very hot water, or harsh abrasives to remove tars, paints, oils and other materials is not advisable unless the advice of the manufacturer has been sought.

### 4.4.2 Periodic inspection and maintenance

Helmets should be:

- stored properly, out of sunlight or excessive heat
- inspected regularly for signs of wear or damage to shell or harness
- cleaned using only soap and water, not abrasive cleaners or solvents.

All components, shells, harnesses, headbands and accessories should be visually inspected at least weekly for signs of unauthorised alterations, dents, cracks, deep scratches, penetration or other damage due to Impact or rough treatment which may reduce the degree of safety originally provided.

Helmets showing damage or deterioration to the shell should be immediately withdrawn from service and discarded (completely destroyed).

Helmets shown to have been subjected to significant impact should be discarded, even where the damage incurred is not obvious.

4.4.3 Practices detrimental to the safe working life and performance of helmets.

The following practices are considered detrimental to the safe working life and performance of the helmet and should be avoided:

(a) Storage of placement of the helmets near any window, particularly the rear window of motor vehicles, since sunlight and extreme heat may cause degradation that will adversely affect the degree of protection they provide.

NOTE : Helmets placed on the rear window ledge of motor vehicles may also become dangerous missiles in the event of an accident or sudden braking occurs.

(b) Spray painting or other similar modifications of helmets, may have a damaging impact, and helmets may be rendered ineffective by petroleum products, cleaning agents, paints, adhesives without the damage being visible to the user. The practice of painting helmets for specific identification in the workplace is prohibited. The use of self-adhesive material (especially solvent-based) is not advisable. The advice of the helmet manufacturer should be sought.

(c) Exposure to aerosol sprays, such as insect repellents may also damage and render the helmet ineffective without the damage being visible to the user.

(d) Alterations, distortion or damage to the shell, for example, splits and cracks, or to the harness, especially if such alterations reduces the clearance between the shell and the wearer's head. This includes the drilling of holes in the shell other than complying with the requirements of ventilation of holes specified in 6.6.6.

4.4.4 Re-issue of safety helmets

Manufacturers specify a replacement date and this should generally be complied with.

Replacement will be required if the helmet or harness has been damaged, for instance if the shell

- has received a severe impact (even if there is no apparent damage)
- is deeply scratched
- has any crack visible to the naked eye.

No safety helmet should be re-issued unless the helmet has been thoroughly cleaned and inspected. In general, when helmet is being re-issued to a different user, at least a new sweatband and chinstrap should be fitted.

4.4.5. Working life

Discoloration of the shell colour, or loss of gloss surface, and or weathering of the surface may indicate a loss of strength. Ultraviolet degradation may first manifest itself in a loss of surface gloss called chalking or discoloration. Under further degradation, the surface will produce a network of fine cracks or flake away, or both. At the first appearance of any of these phenomena, the shell should be replaced. Helmets which have been in use for longer than three (3) years should be inspected (subject to proper care and maintenance as recommended above) and representative samples tested.

Shells with splitting or cracking of the materials should be discarded.

Plastic components of harnesses may deteriorate more rapidly in service and harnesses should therefore be replaced when becoming defective either by replacing the components or issuing with new helmet.

4.4.6 Disposal

Polymetric materials are non-biodegradable. Used, defective or unwanted helmets that are no longer in service should be disposed off responsibly. The helmet shell should be crushed to manageable sizes and sent for re-cycling. Such practices shall also be keeping with the local environment protection practices or requirements.

4.4.7 Limitation of protection

Industrial safety helmets meeting the requirements of this standard are designed to provide optimum protection under average conditions. Users are cautioned that if unusual conditions prevail (for example, higher or lower extremes of temperature than those described) or if there are signs of abuse or mutilation of the helmet or any other components, the degree of protection may be reduced.

Neither the impact/penetration requirements nor the electrical insulation requirements should be construed to indicate the safe impact level or safe voltage to which the industrial worker may be subjected. The maximum voltage against which helmets will protect the wearer depends on a number of variable factors, such as characteristics of the electrical hazards and the equipment involved, the care exercised in maintenance of the equipment and the prevalent weather conditions.

4.4.8. Use

A helmet must be used in warehouse areas, on construction sites, working at height, and other areas where there is a risk of head injury. Helmets shall not be painted, decorated with stickers or modified.

4.4.9 Some dos and don'ts for safety helmets

Do

- Wear the helmet the right way around – it does not give proper protection when worn back to front.
- Keep a supply of helmets for visitors on site. These should be checked before each issue.
- Wear a chin strap if you have to bend forward or down, look up or work where it is windy.
- Wear the helmet so that the brim is level when the head is upright, i.e. do not wear it sloping up or down as this may significantly reduce the protection it can provide.

Don't

- Don't use your helmet as a handy basket – it is not designed for carrying tools and nails.
- Don't paint it or use solvents to stick labels to it, or scratch an identification mark onto it: the shell could weaken and rapidly deteriorate. The manufacturer can be asked to add a label.
- Don't store them in heat or direct sunlight, such as in the rear window of a car – excessive heat may weaken the helmet.

## 5. HAND PROTECTION

Gloves may be used to give protection against toxic or corrosive chemicals, microbiological or radiological contamination, cuts and abrasions, impact, vibration or extremes of heat and cold.

### 5.1 Standards

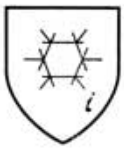
Standards for protective gloves are complex and basic standards are listed below. A summary of the main glove standards is given below:

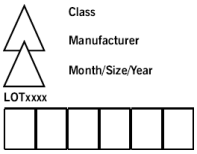
| | |
|---|---|
| BS EN 420 | General requirements for all gloves (Sizing, product and packaging information and marking, etc.) |
| BS EN 374-2 | Resistance to penetration by micro-organisms |
| BS EN 374-3 | Resistance to chemical hazards |
| BS EN 381 | Chainsaw hazards |
| BS EN 388 | Protect against mechanical hazards |
| BS EN 407 | Protect against heat and fire |
| BS EN 421 | Protect against ionising radiation |
| BS EN 511 | Protect against low temperature |
| BS EN 659 | Firefighters' gloves |
| BS EN12477 | Protective gloves for welders |

Gloves will have more information on the packaging, including:

- The CE mark – showing it conforms to the appropriate standard, with the approved body identification number
- A pictogram indicating the gloves protective properties
- A series of numbers accompanying the pictogram, indicating its performance in the various tests applicable to that standard.

GLOVE STANDARDS AND ASSOCIATED MARKINGS

| STANDARD | PICTOGRAM | DESCRIPTION | RATING |
|---|---|---|---|
| BS EN 374 – 2<br>Micro-organisms |  | Resistance to penetration by micro-organisms | 1-6 |
| BS EN 374 – 3<br>Chemical Hazards |  | Resistance to chemical permeation (break through time)<br>1 >10mins, 2>30mins, .. 6>240mins | 1-6 |
| BS EN 388<br>Mechanical Hazards |  <br>abcd | a) Resistance to **abrasion**<br>b) Blade **cut** resistance<br>c) **Tear** resistance<br>d) **Puncture** resistance | 1-4<br>1-5<br>1-4<br>1-4 |
| |  | Impact Cut | Pass/Fail |
| |  | Static Electricity | Pass/Fail |
| BS EN 407<br>Thermal Hazard |  | a) Burning behaviour / flammability<br>b) Contact heat<br>c) Convective heat<br>d) Radiant heat<br>e) Small splashes of molten metal<br>f) Large splashes of molten metal | 1-4<br>1-4<br>1-4<br>1-4<br>1-4<br>1-4<br>x = test NA |
| BS EN 511<br>Protection from Cold |  | a) Resistance to convective cold<br>b) Resistance to contact cold<br>c) Permeability to water | 0-4<br>0-4<br>0-1 |

| | | | |
|---|---|---|---|
| BS EN 421<br><br>Radioactive Contamination |  | Resistance to ionising radiation (the amount of lead in the glove is marked on it) | |
| BS EN 60903 |  | Electrical Resistance | 00,0-4 |

**Note : For ratings, the higher the number the higher the level of performance**

5.2 Selection

Choose gloves appropriate for the job and consider whether long cuffs, gauntlets or sleeve protectors may be required. Ensure that they offer good fit, comfort and dexterity.

Electrical Glove

5.2.1 Chemical resistance

For use with chemicals, it is essential to choose the correct glove material, considering both the nature of the chemical and the degree of exposure that may be expected.

Advice on resistance to specific chemicals can be obtained from the glove manufacturer.

Chemical gloves have a limited life because the glove material becomes permeated, penetrated or degraded by the chemical. Always comply with the breakthrough time specified on the glove or label.

Chemical Glove

Chemical Glove for spill cleanup and removing broken glass

Heavyweight splash protection gloves are generally made of vinyl, neoprene, nitrile, or latex (natural rubber).

Disposable gloves, being thinner, offer less protection against chemical penetration, but much greater dexterity. While this makes them useful in the laboratory, they are generally only suitable for protection against occasional, unexpected splashes. Once contaminated, they should

be washed, and then removed; the hands should be washed and a new pair of gloves donned.

5.2.2 Latex gloves

Note that all latex gloves present a risk of causing irritation, sensitisation, or allergic reaction in susceptible individuals, although this risk is reduced in gloves with lower levels of latex protein and process chemicals.

Powdered latex gloves carry an additional risk to sensitised individuals, because the latex protein leaches into the powder and becomes airborne when gloves are removed, or may be carried around on the wearer's clothing. This may affect others in the vicinity, not just the person wearing the gloves. Therefore, powdered latex gloves must not be used.

5.2.3 Abrasion and penetration resistance

Leather or chain mail gloves provide protection against cuts (e.g. from blades) and abrasions. Knitted Kevlar gloves give good dexterity and protect against cuts, so are useful where protection against broken glass is needed.

Consistent protection against needle stick injuries is difficult to achieve and no glove should be relied upon for this.

5.2.4 Thermal protection

A variety of heat, cold and fire resistant gloves are available, generally made from leather or synthetic fibres. To avoid injury when used with molten metals or cryogens, gloves should be worn in such a way that liquids cannot run down the wearer's sleeve into the glove. Kitchen staff must wear gloves when handling hot items.

5.2.5 Food Handling

For hygiene reasons, gloves must be worn when handling foods. Food handling gloves should be marked with the following symbol.

Additionally, the following symbols may be present.

**Suitable for contact with aqueous foods (pH >4.5)**

**Suitable for contact with alcoholic foods (<10%)**

**Suitable for contact with acidic foods (pH ≤ 4.5)**

**Suitable for contact with oil or foods in oil - reduction factor 1**

**Suitable for contact with butter, margarine and other fatty foods - reduction factor 2**

**Suitable for contact with fish and other fatty foods - reduction factor 3**

**Suitable for contact with meats and other fatty foods - reduction factor 4**

**Suitable for contact with chocolate, pastry, cakes and other fatty foods - reduction factor 5**

5.3 Maintenance

Gloves rarely provide complete protection against hazards and this protection is reduced by wear, damage, and chemical contamination. They should be checked before use for cuts or pinholes and replaced if necessary.

Gloves heavily contaminated on the outside, or contaminated on the inside, by chemicals must be replaced.

5.4 Use

Those wearing gloves must take care not to transfer contamination to everyday items like door handles, light switches and phones, especially where these are used by persons who do not wear gloves.

**Gloves must never be worn while using rotating machinery such as lathes, pillar drills. There is the possibility that the glove will become entangled.**

## 6. HEARING PROTECTION

### 6.1 Purpose

The purpose of hearing protection is to ensure that employees are adequately protected from noise levels that exceed the Permissible Exposure Levels.

### 6.2 Permissible Exposure Limit (PEL)

A person shall be deemed to be exposed to excessive noise where the noise that he would be exposed to, if he was not wearing any hearing protector, exceeds the Permissible Exposure Limit (PEL) for the equivalent sound pressure level of 85 dB(A) over an 8-hour workday or the limit as provided in the table below:

**Permissible Exposure Limits (PEL) for noise**

| Sound pressure level dB(A) | Maximum duration per day |
|---|---|
| 85 | 8 hours |
| 86 | 6 hours 21minutes |
| 87 | 5 hours 2 minutes |
| 88 | 4 hours |
| 89 | 3 hours 11 minutes |
| 90 | 2 hours 31 minutes |
| 91 | 2 hours |
| 92 | 1 hour 35 minutes |
| 93 | 1 hour 16 minutes |
| 94 | 1 hour |
| 95 | 48 minutes |
| 96 | 38 minutes |
| 97 | 30 minutes |
| 98 | 24 minutes |
| 99 | 19 minutes |
| 100 | 15 minutes |
| 101 | 12 minutes |
| 102 | 9 minutes |
| 103 | 7.5 minutes |
| 104 | 6 minutes |

| | |
|---|---|
| 105 | 5 minutes |
| 105 | 4 minutes |
| 107 | 3 minutes |
| 108 | 2.5 minutes |
| 109 | 2 minutes |
| 110 | 1.5 minutes |
| 111 | 1 minute |
| 112 | 56 seconds |
| 113 | 45 seconds |
| 114 | 35 seconds |
| 115 or more | 30 seconds |

6.3 Indications

Appropriate hearing protectors shall be used by employees who are exposed to noise levels that exceed the permissible exposure levels, or are likely to exceed the permissible noise level as indicated in the above table. The use of suitable hearing protectors is required if the daily Permissible Exposure Limit (PEL) exceeds 85 dB9(A) in an 8-hour workday.

In the first instance one should try to eliminate the noise hazard at source. If this is impracticable, suitable protection such as ear muffs must be made available if the noise level exceeds 80dB(A) when averaged over an 8hour working day. If the average noise exposure exceeds 85dB(A) ear protection must be provided and must be worn.

6.4 Employer Responsibility

The employer or workplace occupier shall provide suitable hearing protectors to all persons employed or working in the workplace who are exposed or likely to be exposed to excessive noise. The hearing protectors shall:

(a) Correctly fit the user;

(b) Attenuate the exposure of the user to sound pressure levels below 85 dB(a); and

(c) Not prejudice the health and safety of the user.

The workplace occupier shall post clear warning signs at all entrances to or at the periphery of all areas where persons will be or are likely to be exposed to excessive noise.

Hearing protector signage

6.5 Employee responsibility

The employee shall use the hearing protection in accordance with the instructions and training received.

6.6 Common sources of noise

- Mechanical Machinery
- Explosions
- Steam
- Heavy vehicle movements
- Hammering / impact sounds

6.7 Standards

- EN 352-1 deals with requirements for ear-muffs
- EN 352-2 with ear-plugs
- EN 352-3 with ear-muffs attached to industrial safety helmets.

6.8 General

Hearing protection devices are available in many forms and can be categorised as:

(a) Passive (non-electronic)

(b) Active

These may be further classified by function modes as shown below (but the list is not exhaustive):

i. Amplitude-sensitive hearing protector
ii. Flat frequency response hearing protector
iii. Active Noise Reduction (ANR) hearing protectors
iv. Communication hearing protectors

6.9 Passive hearing protectors

These are devices that rely solely on structural elements to block or otherwise control the transmission of sound into the auditory system and that do not use electronic circuits. Passive hearing protectors reduce noise exposure as a result of the mechanical or physical properties of the devices on or on the ear.

6.10 Selection

To ensure protectors are suitable for the conditions where they are to be used and are efficient in providing protection, the following factors should be taken into consideration during selection:-

- The level, duration and nature of noise exposure
- The job and working environment;
- Compatibility with other Personal Protective Equipment (PPE)
- The fit to the wearer
- Any difficulty or discomfort experienced

There are various types of ear protectors:-

- Permanent re-usable ear plugs
- Disposable ear plugs
- Semi insert protectors (canal caps)
- Ear muffs

The selection of ear protectors should be made following an assessment by a competent person of the nature of the hazard, i.e. decibel range and the degree of risk (loudness and exposure time).

Occasionally in very high noise areas, a combination of ear plugs and ear muffs are needed.

| EARPLUGS | |
|---|---|
| **Advantages** | **Disadvantages** |
| Small and easily carried. | Moulded ear plugs need more time to fit. |
| Can be worn conveniently and effectively with no interference from eye protection, head- wear, ear rings or hair. | The level of protection provided by good ear plugs may be less and more variable between wearers than is provided by good ear muffs. |
| Do not impede head movement in restricted areas. | Dirt may be introduced into the ear canal if plugs are inserted with dirty hands. |
| Except for some pre-formed and moulded plugs, cost of ear plugs is much less than ear muffs. | It is difficult to monitor persons wearing ear plugs because they cannot be seen from a distance. |
| Relatively comfortable in hot environments. | Ear plugs can only be worn in healthy ears. |

| EAR MUFFS | |
|---|---|
| **Advantages** | **Disadvantages** |
| The noise attenuation provided by good ear muffs is generally greater and less variable than that of good ear plugs. | Ear muffs can be uncomfortable to wear in hot environments. |
| One size fits most heads. | They are not easily carried or stored. |
| It is easy to monitor groups wearing ear muffs because they can be seen from a distance. | They are not convenient to wear without their interference with eye protection, headwear, ear rings or hair. |
| At the beginning of a hearing conservation programme, ear muffs are usually accepted more readily than ear plugs. | Usage or deliberate bending of suspension bands may reduce protection to substantially less than expected. |
| Ear muffs can be worn despite minor ear infections. | Ear muffs may impede head movement in restricted areas. |
| Ear muffs are not easily misplaced or lost. | Ear muffs are more expensive than ear plugs. |
| Conversation while wearing ear muffs is easier because attenuation is specific to frequencies which do not cover speech. | |

6.11 Noise Surveys

To choose the correct hearing protection for any given situation you need to know how 'loud' the noise is and how it is made up i.e. high piercing tones or low base tones. To do this accurately a Noise Attenuation Survey should be carried out. The survey will provide specific information on the total amount of noise in an environment in dB (decibels) and break the noise down into specific frequency ranges or octave bands, indicating whether the noise consists of high, medium or base tones or a combination and at what volumes (dB).


**Please bear in mind that the comfort of the wearer is of paramount importance. Selection of ear protection of an unnecessary high level of attenuation can be counterproductive since it may not always be worn.**

6.12 Maintenance of Ear Muffs

- Check the cup seals for general cleanliness and for signs of hardening, tearing and deformation. Service kits, including new seals, are available from most manufactures.
- Check the cup condition for cracks, holes and unofficial modifications.
- Check the tension in the headband. Holding the headband at its mid-point on the end of a finger can carry this out; if there is a gap between the cups, the headband tension may have reduced. Check by comparison with a new muff.
- Check the seals on helmet-mounted muffs. If they sit on the side of a helmet for long periods they will become deformed.
- If users notice any skin irritation around the area of the head where the seal fits, they must seek medical advice and also inform their supervisor.

6.13 Active hearing protectors

Active hearing protectors are devices that contain electronic components including transducers (i.e. speakers and microphones) to increase or

decrease the transmission of sound into the auditory system and/or provide other functions. They are also referred to as electronic hearing protection devices. All hearing protectors with electronic components are considered "active'.

6.14 Amplitude-sensitive hearing protectors

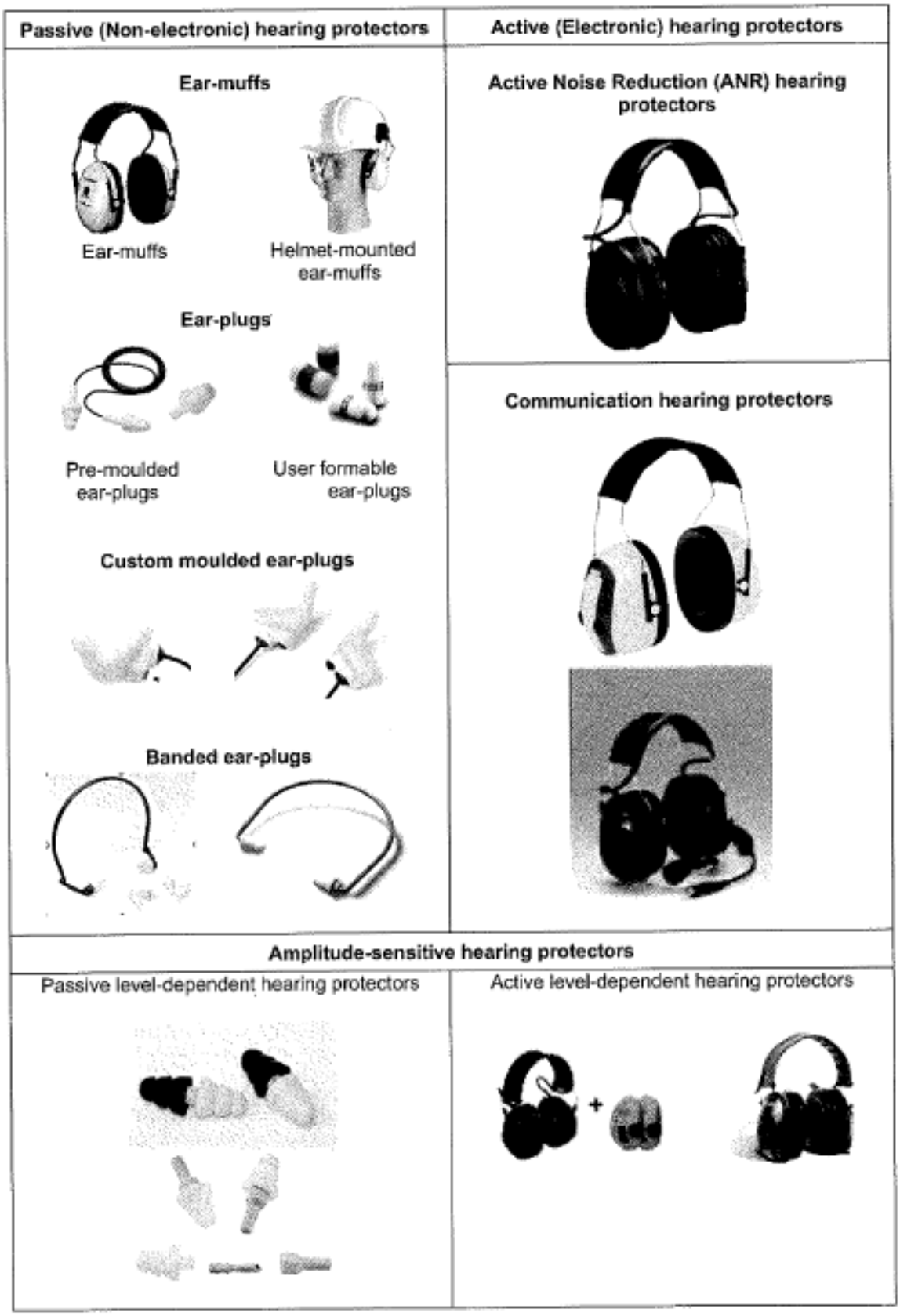
A hearing protector also referred to as a level-dependent hearing protector that is designed to exhibit a change in attenuation as a function of sound level. These devices may be passive or active.

6.15 Passive level-dependent hearing protectors

These devices can be either ear-muffs or ear-plugs. They normally incorporate an acoustic filter which allows the transmission of low sound pressure levels but offers more attenuation to high sound pressure levels. These types of hearing protectors are designed to be effective against very high single impulse noises, such as fire alarms, rather than the continuous noise or repetitive impulses found in most industrial situations.

6.16 Active level-dependent hearing protectors

Level dependent hearing protectors are designed to provide different attenuation as the sound level changes. Their main purpose is to protect against impulsive or intermittent hazardous noise while allowing communication during quiet periods. They include a variety of hearing protectors that have electronic components which supplement or enhance the passive hearing protection.




Some examples of common hearing protection devices

## 7. RESPIRATORY PROTECTION EQUIPMENT (RPE)

In common with all other PPE, respiratory protection is the last resort, and is only to be used after other means of controlling exposure have been considered. Such circumstances might include where:

- Exposures exceed the occupational exposure limit, and control measures are in the process of being installed.
- Maintenance work is being carried out, and personnel/staff need to enter areas with high contamination levels to service equipment.
- Employees need RPE for escape in the event of plant failures.
- Exposures are of short duration (e.g. connection of gas cylinders) and the permanent installation of other protective measures is not reasonably practicable.

### 7.1 Main Hazards

In today's working environment there are essentially five (5) main types of hazard, grouped into two (2) broader categories of Gas & Vapour and Particulates which includes Dusts, Mists & Fumes.

DUSTS are created when solid materials are broken into fine particles. The smaller the dust the greater the hazard. Dusts are produced by operations such as grinding, drilling, blasting, sanding and milling.

MISTS are tiny liquid droplets that are formed from liquid materials by atomisation and condensation processes such as spraying, plating, mixing and cleaning operations.

FUMES are created when solid materials vaporise under high heat. The vapour then cools quickly and condenses into extremely fine particles e.g. particles within metal fumes are generally less than one micron in diameter. Metal fumes can originate from operations such as welding, smelting and pouring of molten metal.

GASES are created below room temperature from compounds that are easily liquefied by pressure. Gases themselves are characterised by their ability to diffuse or spread freely throughout a container in a similar fashion to air. Examples include oxygen, carbon monoxide, nitrogen and helium.

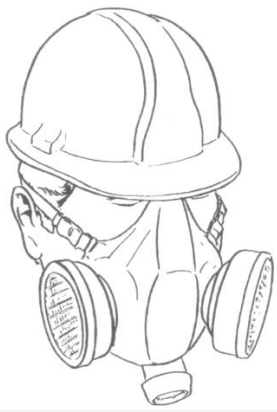
VAPOURS are the gaseous state of substances that are either liquids or solids at room temperature. They are created through the process of evaporation. Petroleum is an example of a volatile liquid that evaporates easily, producing petroleum vapour. Other examples include paint thinners and degreasing solvents.

7.2 Two (2) major classes of Respiratory Protection Equipment (RPE)

A wide range of types of respiratory protective equipment is available from various manufacturers. The equipment functions on the basis of two (2) distinct principles outlined below.

(1) Filters -These work by purifying the air breathed. The air inhaled is drawn through a filter or medium that removes the harmful substance or pollutant. The nature of the filtering agent depends on the type of pollutant to be dealt with. These types are commonly called respirators.

(source CITB UK)



More complex types have filter cartridges that may be general for various types of dust or fumes, or specific to a particular substance.

WARNING - DO NOT USE any Filtering Respirator

- In oxygen deficient atmospheres
- In poorly ventilated areas or in confined spaces
- In atmospheres where the concentration of Toxic Contaminants is unknown or is Immediately Dangerous to Life or Health (IDLH)
- For Fire Fighting, Sand Blasting or for protection against Gas or Vapour contaminants with poor warning properties i.e. odour, taste or irritation
- At concentrations of substance greater than those for which the respirator is marked or permitted by applicable regulations
- Where chemicals are likely to 'desorb'. In such cases, filters must only be used once then immediately discarded

(2) Air supply – These work by supplying clean air. The air can be supplied straight through an airline via a pump or compressor or, alternatively, the person may carry compressed air in cylinders. These types are known as breathing apparatus.

Air Supplied Breathing Apparatus
(source CITB UK)

## 7.3 Standards & Selection

When selecting respirators great care must be taken to ensure that the correct equipment is selected and offers the suitable protection for the contaminant being protected against. Expert advice should be sought. Below is a brief guide to selection.

### 7.3.1 Selecting Disposable Respirator

Disposable Respirators are classified in BS EN 149:2001 according to the degree of protection that they provide.

A respirator that does not bear a CE marking can only be expected to filter out large particulates, and should generally not be used. CE marked filters will be marked P1, P2 or P3, and the meaning is as follows.

| Category | Assigned Protection factor |
|---|---|
| FFFP1 | 4 |
| FFFP2 | 10 |
| FFFP3 | 20 |


Disposable Respirator

### 7.3.2 Selecting Half Mask Respirator

EN140 is the European standard that covers the technical specifications for both Half & Quarter masks. A half mask is defined as covering the nose, mouth and chin, and a quarter mask as covering only the nose and mouth. Both types of mask usually have their face pieces manufactured from natural or synthetic based rubber allowing the mask the flexibility to fit the contours of the face.

Half masks can come with a variety of different types of filter conforming to various standards:

- EN141 Gas filters to remove specified Gases & Vapours or combined filters for removing solids, and /or liquid particles and specified gases and vapours. Each of the types of filters has three (3) Classes - Class 1, Class 2 & Class 3.
- EN143 Covers particle filters and these are classified according to their filtering efficiency. Here again there are three (3) classes of filter P1, P2 & P3. P1 filters are intended for use against solid particles only, P2 and P3 filters are subdivided according to their ability to remove both solid and liquid particles or solid particles only.
- EN371 Deals specifically with AX filters. AX filters are designed for use against certain low boiling organic compounds. The filters are classified in only one type and class, AX.

7.3.3 Full Face Mask Respirator

EN136 is the European standard that covers the technical specifications for Full Face Masks. A full face respirator is defined as covering the eyes, nose, mouth and chin. The masks can be manufactured in natural rubber, EPDM or silicone rubber.

There are three (3) classes of Full-Face Masks:

Class 1 Light duty and low maintenance

Class 2 General duty, with maintainable parts

Class 3 Heavy duty fire fighters

Full Face respirators masks can come with a variety of different types of filter conforming to various standards:

- EN141 Gas filters to remove specified Gases & Vapours or combined filters for removing solids, and /or liquid particles and specified gases and vapours. Each of the types of filters has three (3) Classes - Class 1, Class 2, & Class 3.
- EN143 Covers particle filters and these are classified according to their filtering efficiency. Here again there are three (3) classes of filter P1, P2 & P3. P1 filters are intended for use against solid particles only, P2 and P3 filters are subdivided according to their ability to remove both solid and liquid particles or solid particles only.
- EN371 Deals specifically with AX filters. AX filters are designed for use against certain low boiling organic compounds. The filters are classified in only one type and class, AX. The maximum weight of filters that is allowed under the standards is 500 grams.

7.4 Maintenance

Estimates of the cartridge life of the RPE should be made when undertaking risk assessment.

Dust and particulate filters will become clogged when heavily contaminated, and breathing will become more difficult.

Filters for vapours, when spent, will allow the contaminant to pass right through. At this stage it is important that the wearer leaves the contaminated area and obtains a new filter.

Filters should not be left lying about in dust laden atmospheres, where dust may then settle on the inside of the mask. They should be put away in a clean place.

RPE should be examined before use, with particular attention paid to the harnesses, rubber parts that ensure a good seal.

**Manufacturer's maintenance schedules and instructions should be adhered to in respect of cleaning, disinfection, examination, repair, testing and record keeping.**

## 8. FOOT PROTECTION

The most common type is the safety boot or shoe, fitted with a steel toecap and possibly a steel mid-sole. These are used for construction, oil & gas, marine or agricultural work, and may also be needed for those involved in maintenance or manual handling. They usually have slip resistant soles, which may be resistant to oils or other chemicals.

Other footwear for specialist applications includes Wellington boots, chain saw boots, foundry boots (for molten metal resistance), anti-static footwear (which reduces the danger from igniting flammable atmospheres and gives some protection from electric shock) and conductive footwear (particularly suitable for handling static-sensitive devices, but giving no protection against electric shock).

### 8.1 Standards

Safety footwear should comply with EN 345 (with toe protection of 200 or 100 joules). Footwear with anti-static or slip resistant properties should conform to EN 347.

### 8.2 Selection

The choice of safety footwear should first be made on the basis of the protection required, but comfort is a significant issue and should not be ignored. A choice of makes and styles may have to be offered to ensure that appropriate footwear is always worn when needed. Boots, not shoes, must be worn where ankle protection is needed.

Care should be taken in the choice of anti-static and conductive footwear. Both give protection against the hazard of static electricity and anti-static footwear also gives some protection against electric shock. However, conductive footwear provides no protection against electric shock and must not be used where this is a risk.

### 8.3 Maintenance

Footwear should be checked for wear or damage and replaced if necessary.

## 9. FALL ARREST

A personal fall arrest system is taken as the equipment required to secure a person to an anchorage point in such a way that a fall from height is either totally prevented or safely arrested.

### 9.1 Legal Requirements

Any person working at height at more than two (2) metres is required to wear a safety harness, unless the person at height is protected by some other means, such as a barrier / guard rail.

Examples for working at height include:

- Work on masts and telecoms towers
- Work on roofs
- Construction work
- Erecting scaffolding
- Working from cherry pickers
- Rescue from confined spaces

(source CITB UK)

9.2 Fall Arrest components

At its simplest, there are three(3) different elements that need to be put together to form a personal fall arrest system.


[1] A full body harness - one, two or three 'point' dependent on the work activity.

[2] An intermediate attachment or connecting device to join the harness to the anchorage point or connector e.g. a shock absorbing lanyard/man-yard, fall arrest block, rope grab etc. NB. The potential fall distance must be calculated to determine the type of intermediate attachment to be used.

[3] An anchorage connector - if the intermediate attachment does not have its own in-built anchorage connector then you will need one e.g. a webbing strap, steel sling or girder grip etc to attach the intermediate device to the anchorage/secure tie-off point i.e. the girder, scaffolding or life line.

In the Workplace Safety and health (General Provisions) Regulations, 2014 regulation 23(12) states that it is a legal requirement to provide fall protection if a person has to work at a place which is above 2 metres.

## 9.3 Equipment Categories

### *The functional equipment categories*

**Fall Arrest:** The legislation as outlined above, states that a fall arrest system be used when working at heights of 2 metres or more if a fall hazard exists.

*This type of system consists of:*

- *Body Wear* - Full body harness (when choosing personal fall protection equipment, it is recommended that you plan for a possible rescue or evacuation. A 2 or 3 point harness will allow you to attach a rescue device)
- *Intermediate Attachment* - with shock absorbing element e.g. Shock absorbing lanyard, Fall arrest block etc
- *Anchorage Point/Anchorage Connector*

**Positioning:** A positioning system is used to hold a worker in place allowing a hands free work environment at elevated heights.

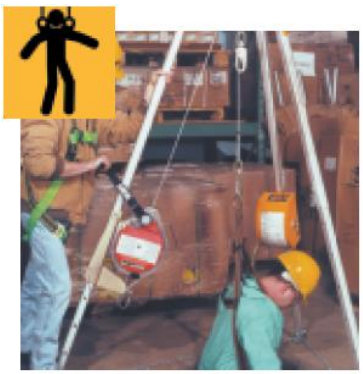
*This type of system typically consists of:*

- *Body Wear* - Harness or belt (positioning belts can only be used without a harness when a fall hazard does not exist)
- *Intermediate Attachment* - Positioning lanyard and Fall arrest system
- *Anchorage Point/Anchorage Connector*

**Restraint:** A restraint system is used to restrict the worker's movement in order to prevent him from reaching a location where a fall hazard exists.

*This type of system typically consists of:*

- *Body Wear* - Full body harness or Belt (positioning belts can only be used without a harness when a fall hazard does not exist)
- *Intermediate Attachment* - Restraint lanyard
- *Anchorage Point/Anchorage Connector*



**Access & Rescue:** Primarily used in confined space applications where workers must enter tanks, manholes etc and may require retrieval from above, should an emergency occur.

*This type of system typically consists of:*

- *Body Wear* - 2 or 3 point Full body harness
- *Intermediate Attachment* - Retractable life-line/Retrieval unit
- *Anchorage Point/Anchorage Connector* - Tripod, Davit

## 9.4 Accessories

***Lanyards***

Have a maximum length of 2 metres, so should only be used in work situations that require limited amounts of movement.

***Fall Arrest Blocks***

Available with cable lengths from 2.5m to 40m, automatic retractable cable blocks allow freedom of movement over a wide work area. They are particularly suited to workers who need to move relatively quickly up and down on a worksite. The automatic braking system arrests fall in seconds.

***Rope Grabs***

For freedom to move around an elevated work site - this could be horizontal or vertical, fixed or flexible. In the event of a fall the guided type fall arrester grabs onto the anchorage line and arrests the fall, resulting in limited travel.

The choice between using a rope or a webbing lanyard is primarily a function of habit as both materials offer the same high level of performance.

***Rope Lanyards***

Can become rigid and difficult to handle when dirty, but offer great durability and a longer working life than webbing.

***Webbing Lanyards***

Are more lightweight, visible and easier to handle than rope but offer less durability.

## 9.5 Training

Persons working at height are required to undertake "work at height training".

## 9.6 Permit To Work (PTW)

When involved in high-risk construction work and when working at a height of 2 meters or above where a person could fall, a PTW shall be required.

9.7 Standards for Harnesses

EN353-1 Guided type fall arresters, rigid anchorage line and rails

EN353-2 Guided type fall arresters, flexible anchorage line

EN354 Lanyards

EN355 Shock Absorbers

EN358 Work positioning systems

EN360 Retractable type fall arresters

EN361 Full body harnesses

EN362 Connectors

EN363 Fall arrest systems

EN795(b) Anchorage devices - Class B

## What to look for

**Rear 'D' Ring:** *The 'D' ring is the basic attachment point on a harness for fall arrest. It is suited to standard site work where the worker only needs to be attached for safety and does not need to work in suspension at height.*

**Front 'D' Rings:** *These are used together for fall arrest; a front attachment provides better control. Generally more comfortable to hang in, they may also be used in a rescue situation.*

**Front Anchorage Loops:** *The loops are connected using a karabiner. A fall arrest intermediate attachment is then connected to this. Used in a variety of climbing (with rope grabs), confined space, rescue and work positioning situations.*

**Side 'D' Rings on the Belt:** *These 'D' rings must not be used for fall arrest applications. Most commonly they are used for work positioning where the worker is required to be suspended for extended periods of time. The use of a belt enhances the comfort for the worker.*

## 10. BODY PROTECTION

### 10.1 Introduction

Clothing used on the body is wide ranging and includes coveralls and aprons to protect against chemicals and other hazardous substances, outfits to protect against temperature extremes and the weather and clothing to protect against machinery such as chain saws. In addition, the range is extended with items worn on the body on top of clothing, for example high visibility garments and flotation devices. They all fall within the generic description of body protection.

Man with Apron

### 10.2 Standards

Clothing standards are complex and a number of standards may be encountered, for example -

i) EN 471 for hi-visibility

ii) EN 342 for cold resistance

iii) EN 465 for chemical resistance

iv) EN 343 for water penetration/breathability

v) EN 531 for flame retardance.

vi) EN 393-396 for buoyancy aids

Clothing giving protection against chemicals may carry additional descriptions, e.g. simple or complex design; type descriptions (from Types 1 to 7) may also be encountered. Manufacturers' or suppliers' literature should be consulted for a full explanation of these codes.

10.3 Selection

As with all PPE, choose protective clothing appropriate to the task, but ensure it fits and is comfortable to wear. It must also comply with the BS EN standards as stated in section 12.2 of this Guidance.

**General industrial**

Hazards of the type generally encountered in an industrial environment consist of exposure to dirt, grease and oil. Protection against these substances in routine operations shall be achieved by wearing polycotton coveralls made from a cotton/polyester mix fabric. These garments are available with both long and short sleeves. In general, coveralls should not be tucked into safety boots.

**Low risk chemicals**

Protection shall be achieved with chemical resistant clothing, e.g. coveralls and laboratory coats, made from uncoated cotton or synthetic material such as nylon or Terylene with a water-resistant finish.

**Solvents, oils, greases**

The heavier protection required shall be afforded by coveralls, coats and aprons made from neoprene or polyurethane coated nylon, or Terylene or rubber aprons.

**Chemical suits**

Protection against stronger chemicals shall be achieved by the use of totally encapsulating suits which are either vapour-proof or liquid-splash proof and are fed with breathable air.

**Vapour suits**

Protection against hazardous vapours shall be achieved by the use of totally encapsulating suits made of butyl, PVC, viton or a combination of viton and butyl or teflon.

**Fibres and dust**

Protection shall be achieved by wearing suits made from bonded olefin that forms a dense shield which keeps out fibres and dust particles.

**Weather protection**

In the Bruneian climate, protection is required against the sun and rain. The problem of sunburn may be overcome by wearing long sleeved coveralls and a neckerchief. Jackets, trousers and leggings made with PVC coated cotton or nylon offer protection against rain and these materials are also resistant to abrasion, cracking and tearing and protect against most oils, chemicals and acids. 'Breathable' waterproof fabrics such as Goretex keep out water while allowing body perspiration to escape.

**Cryogenic protection**

Protection against the effects of contact with cryogenic substances, e.g. LNG, liquid nitrogen, etc shall be achieved with a PVC coat worn over a cryogenic apron and PVC leggings.

**Heat protection**

Protection against sparks and flames shall be achieved by the wearing of cotton or cotton and polyester coveralls with special flame-retardant finishes. Heavy duty cotton material (denim) gives good protection against sparks and weld spatter but the best protection against this type of hazard is leather, usually in the form of a special apron. Reflective aluminium suits able to withstand high temperatures are used by fire-fighters.

**Food processing**

Food quality coveralls shall be worn to protect against splashes from oils and fats. Butchery shall require the use of lamex or metal-mesh aprons if there is a

risk of injury to the abdomen or chest, for example when using knives or choppers.

**Chain sawing**

The special clothing described shall be worn during chain sawing operations. The front of the leg is most vulnerable to accident although the back of the leg is also at risk. Protective legwear incorporates layers of loosely woven long synthetic (Kevlar) fibres. On contact with the chain saw, the fibres are drawn out and clog the chain saw sprocket, causing the saw to stop. Legwear can be all round, which offers the greatest protection, or for the front of the legs only. Jackets with inserts of the same construction are also available.

**High visibility items**

These may be jackets, trousers, waistcoats or tabards made from PVC impregnated with fluorescent pigments. They shall be worn by persons engaged in activities where it is important to be seen to be safe, e.g. roadworkers and crane banksmen.

**Lifejacket**

This is a personal flotation device which, when fully inflated (if inflatable), provides sufficient buoyancy to automatically turn and support an unconscious person face upwards in the water with the mouth and nose well clear of the water.

**Buoyancy aid** is also a personal flotation device and is generally referred to as a work vest. Worn to provide extra buoyancy to assist a conscious person in keeping afloat, it will not turn over an unconscious person in the water from a face down position and is not recommended.

10.4 Provision of Coveralls

Coveralls shall be provided to all persons who are likely to be exposed to oils, dirt, grease during their work. Coveralls are generally also required during construction and maintenance activities.

## 10.5 Arc Flash Suits


In workplaces where potential hazards from electricity may arise such as electric shock, arc-flash and arc-blast and risk assessment indicates that workers are exposed directly to such hazards, it is recommended to wear an arch flash suit for performing the intended operation. This recommendation is not limited to the following operations-

1) Open door operation of a switchgear, panel, switchboard etc.
2) Open door rack in and rack out of a switchgear circuit breaker etc.
3) Any situation where risk assessment is done and workers are exposed to high risk of equipment failure or unsafe operations.
4) In Main Intake Substations and Substations where, Partial Discharge of electricity is identified and beyond acceptable levels.

Note that performing operation with the usage of arc flash suit are only to be used if and only if other options of operations are not available for the intended operation. Elimination of hazards should come as a priority!

The conditions of the Arc Flash Suits shall be done and examine before use e.g. for wear and tear, in accordance to the recommendations of the suit manufacturer.

The arc flash suits shall be rated to 40 cal/cm2 or higher ratings to mitigate the calculated incident energy levels exposed to workers.

10.6 Maintenance

Protective clothing should be maintained as specified by the manufacturer. In the case of laboratory/medical coats or protective overalls, arrangements should be made for such regular laundering as may be required, taking due account of any contamination which may be present.

## 11. REFERENCES


- Health Safety and Environment Manual, Ministry of Development Negara Brunei Darussalam. ISBN 978-99917-56-01-9
- SS 473 : Part 2 : 2011 Specification for personal eye-protectors
- SS 98 : 2013 Specification for industrial safety helmets
- SS 549 : 2009 Selection, use , care and maintenance of hearing protectors
- BSI certification and testing for personal protective equipment

# PPE standards – testing and certification service

## Protective helmets

| | | |
|---|---|---|
| **BS 6658:1985** | Protective Helmets for Vehicle Users | |
| **BS EN 4110:1979** | Visors for Vehicle Users | |
| **BS EN 397:2012 +A:2012** | Industrial Safety Helmets | CE |
| **BS EN 812:2012** | Industrial Bump Caps | CE |
| **PAS 017:1995** | Riot Helmets for Police use | |
| **BS EN 1078:2012** | Helmets for Pedal Cyclists and for users of Skateboards | CE |
| **PAS 028:2002** | Marine Safety Helmets | CE |
| **UN ECE Regulation 22.05** | Protective Helmets for drivers and passengers of mopeds and motor cycles with or without side-car and for visors fitted to such helmets or intended to be added to them | |
| **AS/NZS 1801:1997** | Occupational protective helmets | |

## Sports helmets

| | | |
|---|---|---|
| **VG1 040.01 2014-12** | Helmets for equestrian activities | CE |
| **PAS 015:2011** | Equestrian Helmets | CE |
| **BS EN 1384:2017** | Helmets for equestrian activities | CE |
| **BS 7928:2013** | Head protectors for cricketers | CE |
| **BS EN 966:2012** | Helmets for Airborne Sports | CE |
| **BS EN 1077:2007** | Helmets for Alpine Skiers and Snowboarders | CE |

## Impact protection for the body

| | | |
|---|---|---|
| **BS EN 1177:1998** | Impact absorbing playground surfacing | CE |
| **IRB/REG12/Iss 1/2005** | Specific items for rugby players' clothing (headgear, shoulder padding & banned items) | |

## Respiratory products

| | | |
|---|---|---|
| **BS EN 140:1999** | Half/Quarter masks | CE |
| **BS EN 14387:2004 +A1:2008** | Gas Filters and Combined Filters | CE |
| **BS EN 143:2000** | Particle Filters | CE |
| **BS EN 149:2001 +A1:2009** | Filtering half masks to protect against particles | CE |
| **BS EN 1827:2009 +A1:2009** | Half masks separable filters to protect against gases or gases and particles | CE |
| **BS EN 12941:1998 +A2:2008** | Powered Hoods and Helmets | CE |
| **BS EN 1294:1998 +A2:2008** | Powered air for full/half masks | CE |
| **BS EN 136:1998** | Full face masks – Class 1, 2, or 3 | CE |
| **BS EN 405:2001 +A1:2009** | Valve Combined Filtering Half Mask | CE |
| **BS EN 137:2006** | Self Contained Breathing Apparatus | CE |
| **BS EN 138:1994** | Fresh Air Hose for use with face mask | CE |
| **BS EN 14594:2005** | Continuous Flow Compressed Airline Breathing Apparatus | CE |
| **BS EN 402:2003** | Self Contained Breathing Apparatus Escape Mask | CE |

## Respiratory products – *continued*

| | | |
|---|---|---|
| **BS EN 1146:2005** | Self Contained Open-Circuit Compressed Air Breathing Apparatus with Escape Hood | CE |
| **BS EN 14683** | Surgical Masks | |
| **AS/NZS 1716:2012** | Respiratory protective devices | |

## Hearing protection

| | | |
|---|---|---|
| **BS EN 352-1:2002** | Earmuffs | CE |
| **BS EN 352-2:2002** | Earplugs | CE |
| **BS EN 352-3:2002** | Earmuffs on safety helmets | CE |
| **BS EN 352-4:2001** | Level Dependent Earmuffs | CE |
| **BS EN 352-5:2002** | Active Noise Reduction Earmuffs | CE |
| **BS EN 352-6:2002** | Earmuffs with electrical audio input | CE |
| **BS EN 352-7:2002** | Level dependent earplugs | CE |
| **AS/NZS 1270:2002 (R2014)** | Acoustics - Hearing protectors | |

## Eye protection

| | | |
|---|---|---|
| **BS EN 166:2002** | Personal Eye Protection | CE |
| **BS EN 175:1997** | Welders eye and face protection | CE |
| **BS 4110:1979** | Visors for Vehicle Users | |
| **BS EN 169:2002** | Welding filters | CE |
| **BS EN 170:2002** | Ultraviolet filters | CE |
| **BS EN 171:2002** | Infrared Filters | CE |
| **BS EN 172:1995** | Sun glare filters for industrial use | CE |
| **BS EN 1731:2006** | Mesh face screens | CE |
| **BS EN ISO 12312-1: 2014** | Eye and face protection. Sunglasses and related eyewear. Sunglasses for general use | |
| **BS 5883:1996** | Swimming goggles | |
| **AS/NZS 1337.1:2010** | Eye and face protectors for occupational applications | |

## Glove protection

| | | |
|---|---|---|
| **BS EN 60903:2003** | Live working: Gloves of insulating materials | CE |
| **BS EN 659:2003 +A1:2008** | Protective gloves – Firefighters | CE |
| **BS EN 374-1:2016** | Protective Gloves – chemicals and micro organisms | CE |
| **BS EN 374-2:2014** | Protective gloves – micro organisms | CE |
| **BS EN 16523-1:2015** | Determination of material resistance to permeation by chemicals | CE |
| **BS EN 374-4:2013** | Protective gloves against chemicals and micro-organisms. Determination of resistance to degradation by chemicals | CE |
| **BS EN ISO 379-5: 2016** | Protective plans against dangerous chemicals and micro-organisms | CE |
| **BS EN 388:2016** | Protective gloves – mechanical risks | CE |
| **BS EN 407:2004** | Protective gloves – heat and fire | CE |
| **BS EN 420:2003 +A1:2009** | Gloves – general requirements | CE |
| **BS EN 511:2006** | Protective gloves - cold | CE |

**Key:** A BSI Kitemark™ scheme is currently available on this.

CE BSI can provide PPE Notified Body services for these complex and intermediate products as indicated above.

Continued over >>

## Protective footwear

| | | |
|---|---|---|
| **BS EN 15090:2012** | Footwear for firefighters | CE |
| **BS EN ISO 20345:2011** | Safety footwear | CE |
| **BS EN ISO 20346:2014** | Personal protective equipment Protective footwear | CE |
| **BS EN ISO 20347:2012** | Occupational footwear | CE |

## High visibility clothing

| | | |
|---|---|---|
| **BS EN ISO 20471:2013** | High visibility clothing | CE |

## Protective clothing

| | | |
|---|---|---|
| **BS EN 464:1994** | Protection against liquid and gaseous chemicals, including aerosols and solid particles | CE |
| **BS EN 14605:2005 +A1:2009** | Protection against liquid chemicals with liquid tight connections (Type 3 Equipment) | CE |
| **BS EN ISO 17491-4:2008 + A1:2016** | Protection against liquid chemicals | CE |
| **BS EN 469:2014** | Protective clothing for firefighters | CE |
| **BS EN 510:1993** | Protective clothing for use with risk of entanglement with moving parts | CE |
| **BS EN 530:2010** | Abrasion resistance of protective clothing materials | CE |
| **BS EN ISO 11612: 2015** | Protective clothing to protect against heat and flame | CE |
| **BS EN ISO 15025: 2016** | Protective clothing against heat and flame | CE |
| **BS EN ISO 14116: 2015** | Protective clothing against heat and flame | CE |
| **BS EN ISO 12127-1: 2015** | Protective clothing against heat and flame | CE |
| **BS EN 943-1:2002** | Protective clothing against liquid and gaseous chemicals, aerosols and solid particles | CE |
| **BS EN 943-2:2015** | Protective clothing against liquid and gaseous chemicals | CE |
| **BS EN 1073-1:2016** | Protective clothing against radioactive contamination | CE |
| **BS EN 1073-2:2002** | Protective clothing against radioactive contaminations | CE |

## Protective clothing – *continued*

| | | |
|---|---|---|
| **BS EN 1149-1:2006** | Protective clothing – electrostatic properties | CE |
| **BS EN 1149-2:1997** | Protective clothing – electrostatic properties | CE |
| **BS EN ISO 6529:2001** | Protection against permeation by liquids and gasses (ISO 6529:2001) | CE |
| **BS EN ISO 10819:2013** | Mechanical vibration and shock. Hand-arm vibration. Measurment and evaluation of the vibration transmittability of glove at the palm of the hand | CE |
| **BS EN ISO 13995:2001** | Protection against mechanical properties (ISO 13995:200) | CE |
| **BS EN ISO 13997:1999** | Resistance to cutting by sharp objects (ISO 13997:1999) | CE |
| **BS EN 342:2004** | Protection against cold | CE |
| **BS EN 343:2003+A1:2007** | Protection against foul weather | |

## Fall arrest equipment

| | | |
|---|---|---|
| **EN 341:2011** | Descender Devices | CE |
| **BS EN 360:2002** | Retractable type fall arresters | CE |
| **BS EN 361:2002** | Full Body Harnesses | CE |
| **BS EN 362:2004** | Connectors | CE |
| **BS EN 795:2012** | Anchor points | CE |
| **BS EN 813:2008** | Sit harnesses | CE |
| **BS EN ISO 12401:2009** | Deck safety harness and safety line for use on recreational craft | CE |
| **BS EN 1496:2017** | Rescue lifting devices | |
| **BS EN 1497:2007** | Rescue harnesses | |
| **BS EN 1498:2006** | Rescue loops | |
| **BS EN 358:2000** | Work positioning belts | CE |
| **BS EN 1891:1998** | Low stretch kernmantel ropes | CE |

**END**