



# Personal Protective Equipment

Document No: PPE/01



Created by:	Reviewed by:	Approved by:
Engineer Tanvir Ahmad	Saad Arif	Rao Talha Saleem Khan



DOCUMENT CONTROL

Revision No.	Revision Date	Section / Page



TABLE OF CONTENTS

1. INTRODUCTION ..... 3

2. PURPOSE AND SCOPE ..... 3

3. DEFINITIONS ..... 4

4. ROLES AND RESPONSIBILITIES ..... 5

5. PPE MANAGEMENT PROGRAM ..... 7

APPENDIX A – CLASSIFICATION & TYPES OF PPE ..... 13

APPENDIX B – PPE - HAZARD ASSESSMENT WORKSHEET ..... 24

APPENDIX C – GUIDELINES FOR SELECTION OF PPE REQUIREMENT ..... 28

APPENDIX D - MINIMUM PPE REQUIREMENTS ..... 29



## 1. INTRODUCTION

Guardian Construction Private Limited requires protecting their employees from workplace hazards such as hazardous substances, machines and work procedures that can cause injury/illness. The preferred way to do this is through engineering controls or work practices and administrative controls, but when these controls are not feasible or do not provide sufficient protection, an alternative or supplementary method of protection is to provide workers with Personal Protective Equipment (PPE).

It is to be noted that PPE alone shouldn't be relied on to provide protection for the employees. PPE should be used after all other reasonable means of reducing hazards have been carried out. PPE is considered the "*last line of defense*" against particular hazards when it is not possible to prevent workforce exposure using engineering or administrative controls.

### Hierarchy of Controls

1. Engineering Controls
2. Work Practice Controls/ Administrative Controls
3. Personal Protective Equipment

## 2. PURPOSE AND SCOPE

This procedure is designed to be used by supervisors, workers, managers, contractors and anyone responsible for the safety and health of employees. Employees are also encouraged to use information in this guide to analyze their own jobs, be aware of work place hazards and take active responsibility for their own safety.

### 3. DEFINITIONS

The following definitions shall assist in the understanding of this procedure:

<b>Personal Protective Equipment (PPE)</b>	Any equipment especially designed to be worn or held by personnel to protect themselves against work related hazards, which may endanger their health and safety.
<b>Hazard</b>	Source or situation with a potential for harm in the terms of injury or ill health, damage to property, the workplace environment; or a combination of these.
<b>Risk</b>	Combination of both likelihood and consequence(s) of a specified hazardous event occurring.  Risk = Severity (Consequence) x Probability (Likelihood of Occurrence)
<b>Risk Assessment</b>	Overall process of estimating the magnitude of risk and deciding whether or not the risk is tolerable.
<b>Restricted Area</b>	Areas prohibited to nonessential personnel.
<b>Pre-use Inspection</b>	A visual inspection (of the PPE) carried out by the user or a competent person before use as appropriate in accordance with the manufacturers' instructions.
<b>Verified fit for use</b>	Equipment that has been inspected by a competent person, who has confirmed that it is fit for use for a specified period.
<b>Guardian Personnel</b>	Guardian employees and any contract employees under direct supervision of Guardian.
<b>Hazard Identification</b>	Process of recognizing that a hazard exists and defining its characteristics
<b>Guardian Facility</b>	45-Commercial Broadway Paragon City Lahore



## 4. ROLES AND RESPONSIBILITIES

### 4.1 FACILITY INCHARGE (FIC)

Team Leader plays a pivotal role in leading and encouraging the workforce to use appropriate PPE and to ensure that the PPE used meets the requirements set out in this procedure and is fit for use. Facility Incharge is responsible for its up gradation, training and operation.

He shall:

- Ensure appropriate risk assessments have been carried out through out the facility and for all operations and activities in order to identify suitable and sufficient PPE for protecting the employees involved in such activities.
- Liaise with HSE Manager to ensure that all facility staff and contractors receive appropriate training on PPE.
- Ensure that all PPEs are being selected during all tasks and in work areas, using the same set of standards, guidelines & criteria as described in this procedure.
- Ensure that PPE program assessment and auditing is being done in accordance with the requirements of this procedure.
- Identify need for review/update/revision of this procedure in the light of experience gained and lessons learned.

### 4.2 MANAGER HSE

Manager HSE is the principal resource to provide support and advice on PPE Procedure and its interpretation and implementation. He is the custodian of the PPE Procedure.

He shall:

- Assist Facility In charges on training and other requirements as they relate to this procedure.
- Provide specialist inputs for selecting appropriate and adequate PPE
- Assist in identifying resources for training of all users of this procedure.

### 4.3 HSE COORDINATORS

HSE Coordinator shall be the focal Person for the PPE Procedure. He is the operational custodian of PPE procedure and is responsible for giving assurance to Facility Incharge that the procedure is being followed.

He shall:

- Carry out risk assessment in identifying appropriate engineering and administrative controls before or in addition to PPE.
- Carry out risk assessment specific to their work areas and activities and identify suitable and sufficient PPE to mitigate the identified risks.
- Assist and advise operational staff in the correct selection, care, storage and use of PPE.
- Review the PPE requirements for employees
- Assist and coordinate in arranging appropriate training sessions for the employees in the correct application as well as the limitations of various PPE and in the proper use, inspection, and care of PPE.
- Obtain specialist advice and assistance from Manager HSE and experts as needed.
- Identify need for review/update/revision of the PPE procedure in the light of experience gained and lessons learned.
- Ensure that documented risk assessments are available for their respective work areas and specific activities and that these identify appropriate engineering and administrative controls and suitable and sufficient PPE.

#### **4.4 CONTRACTORS**

They must:

- identify and select appropriate PPE based on tasks and area of activity
- ensure they and their teams / contractors have received appropriate trainings that cover the following as a minimum:
  - a. To identify and select correct PPE for various kinds of hazards that they are exposed to.
  - b. To conduct pre-use inspection of PPE and to ascertain its fitness for use
  - c. To know the correct procedures for donning and doffing of various PPE.
  - d. To know the correct cleaning, disinfection and storage requirements for PPE.
- Ensure that monitoring and audit processes are in place and managed to verify compliance with the requirements of this procedure.

#### **4.5 WORK FORCE**

The employees include Guardian as well as contractor's employees. Employees must ensure that:



- specific hazards related to the work area and the task have been identified and appropriate controls including PPE requirements specified. These controls and PPE requirements may be specified in the following documents:
  - a. Job Hazard Analysis
  - b. Permit to Work
  - c. Specific Work Procedures
  - d. Work Order
  - e. Written signs/ Notices in Work Areas
  - f. Direct instructions from FIC/ HSE Coordinator
- specified PPEs are available which conform to international standards.
- they have a thorough understanding and knowledge of the benefits as well as limitation of the various PPE they use.
- they thoroughly inspect all PPEs before use to ascertain that they are fit for use.
- all PPEs are worn in accordance with the manufacturer's instructions for use.
- all defective and damaged PPEs are repaired or appropriately discarded and disposed (after rendering it unusable, if required).
- any incidents and PPE failure are promptly reported so that lessons learned may be shared and PPE standards improved.

## 5. PPE MANAGEMENT PROGRAM

PPE Management Program comprises of following minimum essential elements:

- Risk Assessment
- Selection of appropriate PPE
- Communication
- Control of Issues / Receipts
- Inspections and Maintenance
- Trainings
- Audit

### a. RISK ASSESSMENT

Risk Assessment shall be carried out by HSE Coordinator with the support of and in consultation with the FIC for all hazardous or potentially hazardous work areas and tasks with a view to identify hazards and specify appropriate controls including suitable and sufficient PPEs. The risk assessment shall include but not be limited to:





---

### Area Surveys

Conduct a walk-through survey of the area(s). The purpose of the survey is to identify sources of hazards to employees. The hazards as related to the various body parts and function that are affected by them can be classified as follows:



PART OF BODY	TYPE OF HAZARD	PPE REQUIRED / AVAILABLE
Eyes & face	Chemical splash; dust projectiles; gas and vapor; radiation	Spectacles, goggles, face-shields and screens
Head & neck	Impact from falling or flying objects; risk of head bumping; hair entanglement	Helmets, bump caps, hats, caps
Ears	Continuous high noise exposure, sudden high impulse sounds	Ear muffs, ear plugs
Respiratory System	Dust; fume: vapor; smoke; gas (toxic); oxygen deficient atmosphere; hot gases	Disposable filtering face piece or respirator, half/full face respirators, breathing apparatus.
Hands & arms	Abrasion; temperature extremes; cuts and punctures; impact; chemicals; electric shock; skin infection, disease or contamination; vibration	Gloves, gauntlets, mitts, wrist cuffs, armlets
Feet & legs	Wet; electrostatic build-up; slipping; cuts & punctures; falling objects; metal and chemical splash; abrasion	Safety boots & shoes with steel toe caps (& steel mid sole), gum boots
Trunk & body	Temperature extremes; adverse weather; chemical or metal splash; spray from pressure leaks or spray guns; impact or penetration; contaminated dust; excessive wear or entanglement of own clothing	Conventional or disposable overalls; boiler suits; donkey jackets; specialist protective clothing, e.g. chain mail aprons; high visibility clothing
Full body	Falls from height	Safety belts, Full body harnesses, fall arrestors, life lines

In addition, Near Miss/ Accident record should be reviewed to help identify problem areas.

Following the walk-through survey, it is necessary to gather and organize the data and information to estimate the potential for injuries. Each of the basic hazards should be reviewed and a determination made as to the type, level of risk, and seriousness of potential injury from each hazard found in the area. The possibility of exposure to several hazards simultaneously should be considered. The objective is to prepare for an analysis of the hazards in the environment to enable proper selection of protective equipment.

**Job Hazard Analysis**

While the area survey aims to identify the hazards of the specific workplace, the Job Hazard Analysis seeks to determine the hazards related to a particular job or task.

**Consultation with employees**

Consultation with employees is one of the most effective means of identifying hazards and establishing controls at the workplace. Employees are usually well aware of what can go wrong and why, based on their job experience.

**b. PPE SELECTION AND STANDARDIZATION**

PPE shall be selected on the basis of hazards to which the worker is exposed. Approved/ accepted PPE shall be used where they are available. The PPE furnished shall provide adequate protection against the particular hazard for which it is designed according to



standards set by competent authorities. In some cases, use of PPE may create a secondary risk not identified in the original assessment. These risks should be evaluated. An assessment of the effectiveness of the equipment chosen should be made to ensure it is providing the desired protection and is not creating any additional safety or health problems.

To ensure personal protective equipment is selected appropriately, FIC in particular, and HSE Coordinator, in general, should:

- familiarize themselves with the potential hazards as well as with the design features, performance and application of various PPEs available locally or internationally. Consider whether the available PPE is appropriate for the risks involved and the conditions at the place where exposure to the risk may occur? For example, eye protection designed for providing protection against agricultural pesticides will not offer adequate face protection for someone using an angle grinder to cut steel or stone.
- understand the criteria for selecting appropriate personal protective equipment that provides adequate level of protection against the risks present. Consider whether the PPE will prevent or adequately control the risks involved without increasing the overall level of risk.
- evaluate the selected equipment to ensure it fits properly, is used appropriately, and does not create secondary health or safety risks. Careful consideration must be given to comfort and fit. PPE that fits poorly will not afford the necessary protection. Continued wearing of the device is more likely if it fits the wearer comfortably. Protective devices are generally available in a variety of sizes. Care should be taken to ensure that the right size is selected.
- what are the needs of the job and the demands it places on the wearer? For example the length of time the PPE needs to be worn, the physical effort required to do the job and the requirements for visibility and communication.
- if more than one item of PPE is being worn, are they compatible? For example, does the use of a particular type of respirator make it difficult to get eye protection to fit properly?

The above considerations may require extensive literature search, study of vendor catalogues and correspondence and consultation with PPE manufacturers, vendors and experts.

The Appendices at the end of this document provide useful information for selecting and standardizing PPE.

Appendix A gives classification and types of common PPE

Appendix B provides a useful worksheet for hazard assessment

Appendix C gives guidelines for selecting the class or category of PPE based on the hazards identified through the use of above worksheet



Appendix D gives a matrix of minimum PPE to be used in relation to generic tasks and activities. However, it should be noted that PPE should only be issued and used after assessment, consideration and the implementation of other risk control measures.

**c. COMMUNICATION**

Communication requirements include:

- Information to the employees about the hazards related to the work area as well as those related to specific tasks.
- Information about the engineering and administrative controls as well as PPE requirements.
- Signs, labels and posters for general awareness and information / warning. These signs, labels and posters should be placed at appropriate locations and in the language(s) understood by most workers. In particular, appropriate signs must be placed at locations which require mandatory use of specific PPE.
- Permit to Work / Job Hazard Analysis / Communication Meetings / Tool box talk, etc.

**d. CONTROL OF ISSUES / RECEIPTS AND RECORDS**

Guardian will provide the necessary Personal Protective Equipment to all employees and visitors under its control who may be exposed to a risk to their health or safety while at work. The respective FIC shall determine the PPE needs and arrange for their availability and issuance. He may establish criteria for replacement and re-issue of various items of PPE based on the operating conditions and nature of tasks within their teams. However, pre-mature replacements and re-issue of PPE should be permitted in the event of loss of or defects in PPE.

Contractor shall ensure that they provide appropriate PPE to their employees. All PPE used by contractors must conform to international standards or minimum standards set by Guardian.

Appropriate levels of PPE inventory shall be maintained with their respective departments for facility. FIC shall be responsible to monitor, maintain, reorder to ensure availability of PPE and suggest changes in reorder levels based on usage.

**e. INSPECTION AND MAINTENANCE**

The inspection of personal protective equipment will be carried out by HSE Coordinator/ Project Engineer/ Concerned officer. It is the responsibility of every user to properly inspect any and all personal protective equipment prior to use. The maintenance of PPE except specialized equipment is also the responsibility of the user.

FIC shall identify and designate competent personnel for carrying out maintenance work on the specialized PPE including but not limited to Personal Fall Arrest Systems, Self Contained Breathing Apparatus, Air Line or Air Supplied Respirators, Sand Blasting hoods, etc.

Manufacturer's guidelines and recommendations are to be followed and complied when performing maintenance work including replacement of parts or repairs.

**f. TRAINING**

- An explanation of the risks present and why PPE is needed.
- The operation, performance, and limitations of the equipment.
- Instructions on the selection, use and storage of PPE related to the intended use. Written operating procedures such as permits to work involving PPE shall be explained.
- Factors which can effect the protection provided by the PPE such as other protective equipment, personal factors; working conditions; inadequate fitting; defects, damage and wear.
- Recognizing defects in PPE and arrangements for reporting loss or defects.
- Practice in wearing and removing the equipment.
- Practice and instruction in inspection and, where appropriate, testing of PPE before use.
- Practice and instruction in the maintenance, which can be done by the user, such as cleaning, and the replacement of certain components.
- Instruction in the safe storage of equipment.

The extent of the training that is required will depend on the type of equipment, how frequently it is used and the needs of the people being trained.

**g. ASSESSMENTS AND AUDITS**

Informal assessment of PPE is a continuous process and is the responsibility of all FICs, HSE Coordinators, M&R Engineer/ Project Engineer and PPE users. More formal assessment is made by reviews of site incident reports involving any failings associated with PPE.

Regular and documented audits of PPE will be conducted annually. Records of these audits must be kept for a minimum of 2 years.

All incidents involving the failure, misuse or poor selection of PPE will be investigated.

The audit process should review, among other things, the following:

- New or revised standards requiring protection
- Injury and incident statistics
- Workers complaints
- Changes in tasks, processes or procedures

- Availability of alternative controls
- Availability of new PPE technology and design options

## APPENDIX A – CLASSIFICATION & TYPES OF PPE

For the purpose of selection, PPE is normally classified according to the part of body or body system which it protects. The following sub-sections provide guidance on the basic requirements as well as different types of commonly used PPE for protection of various body parts and body systems.

### 1.0 EYE/FACE PROTECTION

Eye and face protection shall be provided in hazardous environments where there is a reasonable probability that related injuries can be prevented or reduced by the use of such equipment. Appropriate eye/face protection shall be made available according to the work to be performed, and the employee/contractor shall use that protection.

Suitable eye/face protection shall be provided where machines or operations present danger from flying objects, splashed hazardous liquid, direct or reflected brightness, hazardous chemicals, injurious radiation, or a combination of these hazards.

#### **Minimum Selection Requirements:**

- a. Shall provide adequate protection against the particular hazards for which they were designed.
- b. Shall be reasonably comfortable when worn under the designated conditions.
- c. Shall fit snugly and shall not interfere with the movement of the wearer.
- d. Shall be durable.
- e. Shall be capable of being disinfected and cleaned (unless they are disposable).

### 1.1 **Applicable International Standards:**

OSHA – 29CFR 1910.133

ANSI – Z87.1

BS – 2092

EN – 166 / 169 / 175

### 1.2 **Types of Eye and Face Protection:**

The types of eyes and face protection are given below:

**1.2.1 Spectacles** – These provide general purpose protection to the wearer’s eyes against a variety of hazards depending on spectacle type such as impact and optical radiation, etc. They consist of the front frame with bridge area, lens or lenses, temples and side shields.

**Impact resistant lens type** – having an impact resistant polycarbonate lens with or without side shields and with or without brow guards. The lens may also be made of impact resistant glass or special materials to provide additional protection against heat, radiation, and other hazards. The lens may be optically clear or tinted. The lens may also be coated with special materials for providing additional scratch resistance or anti-mist qualities.

**Prescription lens type** – similar to the above spectacles but with prescription lens.

**Over Spectacles type** – having a larger frame size and usually with single large lens which can be worn over normal prescription spectacles.

**Visitors spectacles** – having a low impact resistance and suitable for infrequent visitors to plant hazard areas.

**1.2.2 Goggles** – These are primary protective devices intended to fit the face immediately surrounding the eyes in order to shield the eyes from a variety of hazards. Goggles are commonly available with rigid or flexible frames and are usually ventilated to allow passage of air to minimize fogging.

**Impact type** – these have a clear or tinted impact-resistant polycarbonate lens with direct ventilation ports in the frame to provide ventilation and avoid misting.

**Chemical splash type** – similar to the impact goggles but with indirect ventilation ports to prevent chemical splashed from entering the eyes.

**Welding Goggles** – similar in overall construction to the impact and splash goggles but equipped with dark shade glass lens protected by an additional clear glass lens according to the type of welding operation and having dark opaque frame instead of a clear frame. The goggles may be fitted with a fixed or a lift-up type goggle lens frame.

**1.2.3 Face Shields** – These are protective devices generally intended to shield the wearer’s face, or portions thereof, in addition to the eyes from certain hazards. They generally consist of a transparent or tinted window, a tilting support, an adjustable head gear with or without a crown protector. Some face shields may also have neck and chin protectors.

**Impact type** – These usually have clear polycarbonate lens windows.

**Chemical Splash type** – These usually have clear acetate lens windows.

**Welding and high temperature type** – These usually have shaded lens having different shades according to the type of welding operation or temperatures involved.

**Screen mesh type** – These usually have wire mesh screen windows and are used in forestry applications.

**Helmet mountable type** – These may be impact type or chemical splash type but instead of an adjustable head gear they have adapters for directly mounting on to a safety helmet.

## 2.0 HEAD PROTECTION

Head protection shall be provided where there is a danger from impact or penetration from falling and flying objects or from limited electric shock or burn.

### 2.1 **Applicable International Standards**

OSHA – 29CFR 1910.135 / 1926.28 / 1926.100

ANSI – Z89.1

BS – 5240 / 4033

EN – 397

NFPA – 1972

### 2.2 **Types of Head Protection**

The types of head and neck protection are given below.

**2.2.1 Safety Helmets/ Industrial hard hats** – Impact resistant type – these are meant to afford impact protection to the wearer and comprise a shell usually made of high density polyethylene (HDPE) but may also be made of Acrylonitrile Butadiene Styrene (ABS) or other synthetic and plastic materials and an adjustable harness or suspension fitted inside the shell at four, six or, sometime even eight points. The suspension or harness may have sweat bands in the forehead area for comfort.

**2.2.2 Electrical insulation type** – in addition to impact protection, these helmets provide electrical protection usually up to 440 Volts and, in some cases, even higher voltages.

**2.2.3 Bump caps** – these provide a somewhat lower impact resistance and are meant to absorb only the force of impacting against some objects instead of providing protection against objects falling from heights.

## 3.0 FOOT / TOE / INSTEP PROTECTION

Foot protection shall be provided where there is potential for foot, toe, or instep injuries. Protective footwear is intended to provide protection for the toes and/or instep against external forces. A toe box, cup or instep protector is incorporated as an integral part of the footwear during manufacture. Additionally, the footwear shall have a sole or insole that will protect against penetration. In certain situations, other features (antistatic properties, electrical resistance, etc.) may be required.

### 3.1 **Applicable International Standards :**

OSHA – 29CFR 1910.136





ANSI – Z41

EN – 344 / 345 / 346 / 347

NFPA – 1974

### 3.2 Types of Feet and Legs Protection

The types of feet and legs protection are given below

**3.2.1 Steel-toe boots** – for general protection against impact, puncture, etc. May also, additionally provide slip-resistance, antistatic protection, liquid/fuel resistance, etc.

**3.2.2 Rubber / PVC gum boots** – for general purpose protection against water, chemicals, etc. They are generally knee-high long and may be worn over normal work boots.

**3.2.3 Fireman’s boots** – used specifically for fire fighting applications.

### 4.0 HAND PROTECTION

Hand protection shall be provided where there is danger of cuts such as handling knives or slicing equipment, or danger from handling corrosive materials, such as cleaning chemicals or solvents. Cotton, leather, asbestos, or rubber gloves, chain mail gloves (full or partial), and barrier creams are typical hand protection items. Proper hand protection devices shall be identified and provided to protect against the specific hazards in the workplace.

#### 4.1 Applicable International Standards

##### Electrical Protection Gloves:

OSHA – 29CFR 1910.137

ASTM – J6.6

IEC – 903

##### Mechanical / Chemical / Heat Protective Gloves:

EN – 374 / 388 / 407 / 420 / 421 / 511 / 1073 / 1082

ISO – 2801 / 6942 / 8194

BS –EN – 31092

BS-ISO - 9920

NFPA – 1973

#### 4.2 Types of Hands and Arms Protection

The types of hands and arms protection are given below.

Gloves and mitts

Sleeves and arm coverings

Finger cots and finger tapes

#### 4.3 Common Gloves Materials.

Some of the more common glove materials and their properties and applications with examples are:

**Nitrile rubber** – a copolymer available in a wide range of acrylonitrile content; chemical resistance and stiffness increase with higher acrylonitrile content. Generally has a better abrasion resistance. Application: Oils, acids, hydroxides, etc.

**Neoprene rubber** – a synthetic rubber having greater flexibility and chemical and wear-resistance properties superior to those of natural rubber. Applications: Organic and inorganic acids, alcohols, etc.

**Polyethylene** – a fairly chemical resistant material used as a freestanding film or a fabric coating. Applications: pharmaceutical, inspections, general duty protection.

**Natural latex rubber** – a highly flexible and conforming material made from a liquid tapped from rubber plants. Applications: agriculture, construction, fishing and general handling.

**Butyl rubber** – a synthetic rubber with good resistance to weathering and a wide variety of chemicals.

**Polyvinyl chloride** – a stiff polymer that is made softer and more suitable for protective clothing applications by the addition of plasticizers. Provides excellent liquid and solvent protection and is inert to most chemicals. Applications: Most acids, chlorides, caustics, solvents, etc.

**Cotton** – a natural fiber providing comfort and breathability in general purpose applications and, in heavier weights, for abrasion and heat resistance.

**Polyester cotton** – synthetic polyester yarn mixed with cotton yarn provide longer wear and better finish.

**Leather** – made from hides of animals provides protection from rough objects, sparks and heat. Applications: welding, handling sharp and hot objects, etc.

**Goat/Sheepskin** – made from hides of goats and sheep, they are generally softer and more flexible. Used for general purpose protection against sharp objects and sparks. Also used as over-gloves for protection of electrical gloves.

#### 5.0 HEARING PROTECTION

Hearing protection shall be provided for employees in those areas in which the noise levels

cannot be “engineered out” or in which administrative controls are not practical.

A hearing conservation system, including PPE, noise monitoring, periodic audiometric testing, and employee training, shall be initiated whenever employee noise exposures equal or exceed an 8-hour time-weighted average level of 80 dBA.

A general awareness orientation shall include training in:

- a. The effects of noise on hearing.
- b. The purpose of hearing protectors, the advantages and disadvantages of various types of protectors, and instructions for selection, fitting, use, and care of the protectors.
- c. The purpose of audiometric testing and an explanation of the test procedures.

When information indicates that any employee’s exposure may equal or exceed an 8-hour time-weighted average of 80 decibels, a noise monitoring system shall be developed. The monitoring strategy shall be designed to identify employees for inclusion in the hearing conservation system and to enable the proper selection of hearing protectors.

An audiometric testing system shall include all exposed employees. A baseline audiogram shall be established with at least an annual audiogram thereafter.

## 5.1 Applicable International Standards

OSHA – 29CFR 1910.95 / 1923.101

ANSI – Z24.22

BS – 6344

EN – 352

## 5.2 Types of Hearing Protection

The types of hearing protection devices are given below.

### 5.2.1 Ear Plugs. These are inserted inside the ear canal and are available in various designs and materials. They may be corded or un-corded.

**Disposable type** – These are soft and pliable and acquire the shape of the ear canal once inserted inside. They are not re-useable.

**Polyurethane foam type** – These are soft and pliable, hence expanding inside the ear canal to acquire the shape of the canal and providing excellent noise protection. However, these can be re-used and also washed and disinfected.

**Silicone Rubber type** – These are made of soft silicone rubber. These do not expand inside the ear canal and require proper sizing and insertion to provide adequate sealing and noise protection.

**5.2.2 Ear Muffs.** These are worn over the ears and provide noise attenuation by sealing the external ear. They consist of a pair of ear cups and a head band.

**Mechanical noise attenuation type** – the muffs may be filled with acoustic foam or liquid glycerin. The attenuation provided depends upon the design of the cups and the material of the cup fillings. The head band may be all plastic with no metal parts for use in areas where there is danger of live electrical contact or may be made of a combination of metallic ribs and plastic covers. The head band may or may not be cushioned.

**Electronic noise suppression type** – these types electronically filter out sudden high volume spikes and annoying noise levels while allowing the wearer to continue to hear the general, more evenly modulated noises or conversations.

**Voice Communication type** – besides providing hearing protection, these also allow two-way or multi-channel communication through battery operated transceivers.

**Helmet mountable type** – these muffs consist only of a pair of ear cups with special arms and adapters to fit into the slots of helmet shells without a head band. The arms are adjustable whereby the muffs can be donned on the ears or removed in “parking” condition.

## 6.0 BODY PROTECTION

Body protection shall be provided where there is danger of cuts or danger from handling corrosive materials, such as cleaning chemicals or solvents. Cotton, leather, asbestos, or rubber coveralls are typical body protection items. Proper body protection devices shall be identified and provided to protect against the specific hazards in the workplace.

### 6.1 **Applicable International Standards**

EN-340 / 342 / 343 / 412 / 465 / 469 / 470 / 471 / 531

BS – 3791

NFPA – 1971

### 6.2 **Types of Body Protection Equipment.**

The types of body protection equipment are given below:

#### 6.2.1 **Apron**

**Bib type** – covering chest, waist and legs down to the knee or sometimes to ankles.

**Waist type** – covering waist and legs down to the knees or below.

**Split type** – divided at the crotch and fastened around each leg.

**6.2.2 Cape sleeve** – back, shoulders and arms covering which extends over the upper chest. They can also be worn over aprons.

- 6.2.3 **Over all** – one-piece apparel combining pull-on pants with upper portion covering body and the hands partly or wholly.
- 6.2.4 **Jacket** – covering upper body from shoulders to hips with or without sleeves.
- 6.2.5 **Coat** – Extending either to knee or ankle to give bodies and leg protection.
- 6.2.6 **Suit** – Covering from head to feet, for complete protection may or may not be used with respiratory protection.

## 7.0 **Respiratory System Protection**

Respiratory system protection shall be provided in areas that present a limited breathable environment or the possibility of an oxygen-deficient environment or air contamination. Proper Respiratory System protection devices shall be identified and provided to protect against the specific hazards in the workplace these shall include but not be limited to Air purifying respirators, chemical cartridge respirators, air-supplied respirators, combination respirators, self contained breathing devices.

### 7.1 **Applicable International Standards**

- OSHA – 29CFR 1910.134
- NIOSH – 42CFR 84 (MSHA)
- ANSI – Z88.2
- BS – 7356
- EN – 136 / 140 / 141 / 143 / 149 / 405

### 7.2 **Types of Respiratory Protection.**

The types of respiratory protection are given below.

- 7.2.1 **Disposable dust masks** – these are made of a various types of paper-thin fabric and usually provide protection against coarse non-toxic dusts. However, disposable dust masks for fine and toxic dusts are also available.
- 7.2.2 **Air purifying respirators (APR)** – These are of various types and designs but have a common feature of using filters to purify the air entering the lungs through the nose or mouth. They comprise a face piece, elastic band or harness, one-way inlet and outlet valves and optional speech membrane. These cannot be used in oxygen-deficient atmospheres or in atmospheres immediately dangerous to life and health ((IDLH).

These must be used together with appropriate air purifying filter cartridges / canisters for protection against specific particulates or gases / vapors / fumes / mists present in the environment. The commonly available filter cartridges / canisters are classified as follows:

- Type – A    Organic gases & vapors e.g. solvents with boiling point more than 65° C
- Type – B    Inorganic gases and vapors, e.g. chlorine, hydrogen sulphide, hydrogen cyanide, fluorine, cyanogen chloride, phosgene
- Type – E    Acid gases and vapors e.g. sulphur dioxide, hydrogen fluoride, formic acid, nitric dioxide
- Type – K    Ammonia and organic ammonia derivates
- Type – P    toxic particles, bacteria and virus

Various combinations of the above basic types are also available for providing multiple or universal protection.

**Half mask type** – these masks cover the mouth and nose and provide breathing protection with the help of filters screwed or push fitted upstream of the inlet valves. The filters used depend upon the contamination in the ambient air. These may be single filter type or dual filter type.

**Full face type** – these masks cover the entire face from forehead to chin and across both ears thus providing protection against respiratory hazards as well as hazards to eyes and face. These may also be single or dual filter type. The filter canisters are usually larger than those of half masks. They may sometimes also have an additional inlet connection to allow fresh air supply through a hose or tubing.

- 7.2.3 Air Supplied Respirators (ASR).** These respirators do not use any filters but have a hose connection at the inlet through which fresh or breathing quality air can be fed either through an air compressor or through a remote air source far removed from the contaminated ambient air in the immediate vicinity of work.

**Half mask type** – Similar to half mask APR but equipped with an inlet air connection instead of filter attachments.

**Full face type** – Similar to full face APR but equipped with an inlet air connection instead of filter attachments.

- 7.2.4 Powered air purifying respirators (PAPR).** These are similar to APR but have a battery powered blower attached to the waist with the help of a belt which forces the ambient air through a hose into the filters and to the mask inlet.

**Half mask type** – similar to half mask APR except the powered air blower feature described above.

**Full face type** - similar to full face APR except the powered air blower feature described above.

- 7.2.5 Self Contained Breathing Apparatus (SCBA).** This consists of a full face mask connected through a breathing hose line to a pressure regulator and air supply valve and pressure gauge to a



pressurized cylinder of breathing air worn over the back with the help of a back plate and harness assembly. The cylinders come in various configurations and materials to provide varying autonomy for the unit ranging from 5 minutes to four hours or more.

## 8.0 FALL PROTECTION

Fall protection shall be worn when a fall hazard exceeds 6 ft, but is not normally needed where portable ladders are in use. Lifelines, safety belts, full-body harnesses, and lanyards shall be used only for worker safeguarding. Any of these devices subjected to a fall shall be immediately removed from service and not used again for worker safeguarding.

### 8.1 Three system components

**8.1.1 Body Wear:** The first component is the personal protective gear worn by workers while performing the job. Effective January 1, 1998, body belts are prohibited as a fall arrest device. Body belts can still be used as a positioning device. Full-body harnesses are the only appropriate equipment to be worn in the event of a free fall.

**Full-Body Harness with Sliding Back D-Ring**— should a fall occur, the body harnesses will distribute the load throughout the body instead of concentrating the forces on the abdomen, as is the case with traditional body belts. The sliding back D-ring will keep the worker in an upright position in the event of a fall, which allows the worker to remain as comfortable as possible while awaiting a rescue.

**8.1.2 Connecting Devices:** The second system component is the connecting device. This device can be a rope or web lanyard, rope grab or retractable lifeline. However, shock absorbing lanyards are recommended because they significantly reduce the forces generated in a fall.

**Shock-Absorbing Lanyards with Locking Snap Hooks** — Lanyards with built-in shock absorbers reduce fall arresting forces by 65–80% compared to forces generated by traditional lanyards. Locking snaps feature self-closing, self-locking keepers which remain closed until unlocked and pressed open for connection or disconnection. This feature of locking snaps significantly reduces the possibility of accidental disengagement or “rollout.”

**8.1.3 Anchorage Point:** The final component of the system is the anchor point (often referred to as the tie-off point). This point must be capable of supporting 5,000 pounds per worker, such as a support beam, cross-arm strap or beam trolley.

**Reliable Anchorage Points** — Anchor points and attachments must be capable of supporting 5000 lbs. per worker. If there is any doubt about the strength of the anchor and/or attachment point — DO NOT ATTACH. Search for an alternative anchor point and select a proper attachment device.

Individually, none of these components will provide protection from a fall. Used properly with each other, they form a Personal Fall Arrest System which becomes a critically important part of the “total fall protection system.”



## 8.2 Four Functional Equipment Categories

Fall protection equipment may be divided into four functional categories:

- 8.2.1 **Fall Arrest.** A fall arrest system is designed to be passive and will only come into service should a fall occur.
- 8.2.2 **Positioning.** The second category is the personal positioning system, which holds a worker in place while allowing a hands-free work environment. Whenever a worker leans back, the system is activated, making this an “active” system. Note that a fall arrest system should be used in conjunction with the personal positioning system. A combination system should be used whenever possible, since a personal positioning system is not specifically designed for fall arrest purposes. By using this combination system, the fall arrest components will be activated should the worker suffer a fall.
- 8.2.3 **Suspension.** The third category is the personal suspension system. These systems are designed to lower and support a worker while allowing a hands-free work environment. Because the suspension system components are not designed to arrest a free fall, a back-up fall arrest system should be used in conjunction with the personal suspension system. This fall arrest system will only activate should the worker experience a free fall.
- 8.2.4 **Retrieval.** The fourth category of the system is mostly used in confined space, and is known as a personal retrieval system. This system is primarily used where workers must be lowered into tanks, manholes, etc., and may require retrieval from above should an emergency occur.

## 8.3 Applicable International Standards

OSHA – 29CFR 1926.104 / 1926.959

ANSI – A10.14

BS – 1397

EN – 361 / 362 / 355 / 358





Guardian Constructions Private Limited

PPE

APPENDIX B – PERSONAL PROTECTIVE EQUIPMENT - JOB HAZARD ANALYSIS WORKSHEET

Organization: _____	Department: _____
Location: _____	Assessment Completed By: _____
PPE Contact Person: _____	Date: _____
Job Titles/Employees Exposed: _____	

Body Area	Hazard Type	Description	Probability	Comments
	<input type="checkbox"/> Bum <input type="checkbox"/> Dust <input type="checkbox"/> Impact <input type="checkbox"/> Puncture <input type="checkbox"/> Chemical <input type="checkbox"/> Electrical <input type="checkbox"/> light <input type="checkbox"/> Radiation <input type="checkbox"/> Compression <input type="checkbox"/> Fumes <input type="checkbox"/> Mists <input type="checkbox"/> Smoke <input type="checkbox"/> Cut/Abrasion <input type="checkbox"/> Heat <input type="checkbox"/> Noise <input type="checkbox"/> Gas/Vapors		<input type="checkbox"/> Probable <input type="checkbox"/> Possible <input type="checkbox"/> Unlikely	
	<input type="checkbox"/> Bum <input type="checkbox"/> Dust <input type="checkbox"/> Impact <input type="checkbox"/> Puncture <input type="checkbox"/> Chemical <input type="checkbox"/> Electrical <input type="checkbox"/> light <input type="checkbox"/> Radiation <input type="checkbox"/> Compression <input type="checkbox"/> Fumes <input type="checkbox"/> Mists <input type="checkbox"/> Smoke <input type="checkbox"/> Cut/Abrasion <input type="checkbox"/> Heat <input type="checkbox"/> Noise <input type="checkbox"/> Gas/Vapors		<input type="checkbox"/> Probable <input type="checkbox"/> Possible <input type="checkbox"/> Unlikely	
	<input type="checkbox"/> Bum <input type="checkbox"/> Dust <input type="checkbox"/> Impact <input type="checkbox"/> Puncture <input type="checkbox"/> Chemical <input type="checkbox"/> Electrical <input type="checkbox"/> light <input type="checkbox"/> Radiation <input type="checkbox"/> Compression <input type="checkbox"/> Fumes <input type="checkbox"/> Mists <input type="checkbox"/> Smoke <input type="checkbox"/> Cut/Abrasion <input type="checkbox"/> Heat <input type="checkbox"/> Noise <input type="checkbox"/> Gas/Vapors		<input type="checkbox"/> Probable <input type="checkbox"/> Possible <input type="checkbox"/> Unlikely	
	<input type="checkbox"/> Bum <input type="checkbox"/> Dust <input type="checkbox"/> Impact <input type="checkbox"/> Puncture <input type="checkbox"/> Chemical <input type="checkbox"/> Electrical <input type="checkbox"/> light <input type="checkbox"/> Radiation <input type="checkbox"/> Compression <input type="checkbox"/> Fumes <input type="checkbox"/> Mists <input type="checkbox"/> Smoke <input type="checkbox"/> Cut/Abrasion <input type="checkbox"/> Heat <input type="checkbox"/> Noise <input type="checkbox"/> Gas/Vapors		<input type="checkbox"/> Probable <input type="checkbox"/> Possible <input type="checkbox"/> Unlikely	



Guardian Constructions Private Limited

PPE

	<input type="checkbox"/> Bum	<input type="checkbox"/> Dust	<input type="checkbox"/> Impact	<input type="checkbox"/> Puncture		<input type="checkbox"/> Probable	
	<input type="checkbox"/> Chemical	<input type="checkbox"/> Electrical	<input type="checkbox"/> light	<input type="checkbox"/> Radiation		<input type="checkbox"/> Possible	
	<input type="checkbox"/> Compression	<input type="checkbox"/> Fumes	<input type="checkbox"/> Mists	<input type="checkbox"/> Smoke		<input type="checkbox"/> Unlikely	
	<input type="checkbox"/> Cut/Abrasion	<input type="checkbox"/> Heat	<input type="checkbox"/> Noise	<input type="checkbox"/> Gas/Vapors			
	<input type="checkbox"/> Bum	<input type="checkbox"/> Dust	<input type="checkbox"/> Impact	<input type="checkbox"/> Puncture		<input type="checkbox"/> Probable	
	<input type="checkbox"/> Chemical	<input type="checkbox"/> Electrical	<input type="checkbox"/> light	<input type="checkbox"/> Radiation		<input type="checkbox"/> Possible	
	<input type="checkbox"/> Compression	<input type="checkbox"/> Fumes	<input type="checkbox"/> Mists	<input type="checkbox"/> Smoke		<input type="checkbox"/> Unlikely	
	<input type="checkbox"/> Cut/Abrasion	<input type="checkbox"/> Heat	<input type="checkbox"/> Noise	<input type="checkbox"/> Gas/Vapors			
	<input type="checkbox"/> Bum	<input type="checkbox"/> Dust	<input type="checkbox"/> Impact	<input type="checkbox"/> Puncture		<input type="checkbox"/> Probable	
	<input type="checkbox"/> Chemical	<input type="checkbox"/> Electrical	<input type="checkbox"/> light	<input type="checkbox"/> Radiation		<input type="checkbox"/> Possible	
	<input type="checkbox"/> Compression	<input type="checkbox"/> Fumes	<input type="checkbox"/> Mists	<input type="checkbox"/> Smoke		<input type="checkbox"/> Unlikely	
	<input type="checkbox"/> Cut/Abrasion	<input type="checkbox"/> Heat	<input type="checkbox"/> Noise	<input type="checkbox"/> Gas/Vapors			
Job Task	PPE Required				Special Training		



APPENDIX C – GUIDELINES FOR SELECTION OF PPE REQUIREMENT

	Eye/Face	Head	Foot/Toe	Hand	Hearing	Breathing
<b>Where needed</b>	Where machines or operations present a danger from flying objects, direct or reflected brightness, hazardous liquids, or injurious radiation.	Where there is a danger from impact and penetration from falling or flying objects or from limited electric shock.	In areas where there is a potential for foot or toe injury	Danger of cuts or from handling corrosive, solvents and/or other chemicals.	Noise exposure that equals or exceeds 85 dBA	In areas that present a limited breathable environment or the possibility of an oxygen-deficient environment or air contamination.
<b>Type of Protection</b>	Goggles, full face shields, safety glasses, side shields, welders' lenses	Safety Hats (full brim, brimless, limited voltage protection, no voltage protection)	Impact and compression resistant, puncture resistance, electric hazard resistance, conductive	Cotton, leather gloves, gauntlets; heat resistant gloves; barrier creams; chain mail gloves; PVC gloves; rubber gloves.	Full muffs, disposable plugs, Swedish wool, non-disposable plugs.	Air purifying respirators, chemical cartridge respirators, air-supplied respirators, combination respirators, self contained breathing devices.
	<b>Shall meet applicable standards.</b>	<b>Shall meet applicable standards.</b>	<b>Shall meet applicable standards.</b>	<b>Shall meet applicable standards.</b>	<b>Shall meet applicable standards.</b>	<b>Shall meet applicable standards.</b>
<b>Fitting Requirements</b>	Comfortable fit (Snugly, not interfere with movement)	Comfortable, proper fit.	Proper fit.	Proper fit	Proper fit, correct type for noise exposure	Significant fitting required.



APPENDIX D – MINIMUM PPE REQUIREMENTS [SAMPLE CASES]

Activity / Hazard	MINIMUM PPE REQUIREMENT																			
	Body Protection				Head Protection	Eye/Face Protection			Ear Protection		Respiratory Protection			Hand Protection			Foot Protection		Fall Protection	
	100% Cotton Coveralls	Apron(s)	Jacket/Fire Retardant	Chemical Suit	Hard Hat	Safety Glass with Side Shield	Chemical Goggles	Welding Hood	Ear Plugs	Ear Muff	Filter Respirator	Supplied Air Respirator	Dust Mask	Cotton Gloves	Electrical Lineman Gloves	Specialized Gloves (Oil or Acid)	Safety Shoes	Rubber Boots	Body harness	Lanyard
Process Area Exposure	x				x	x			x				x			x				
Dusty Areas	x					x						x	x			x				
Materials Handling	x				x	x							x			x				
Falling Objects & Overhead Equip.	x				x	x										x				
High Noise	x				x			x								x				
Oil Bowser Filling	x				x	x				x			x			x				
Chemical Handling	x			x	x		x			x					x	x				
Excavation Areas	x				x	x						x	x			x				
Shop Grinding	x					x		x				x				x				
Auto Mechanic / Cleaning	x				x	x							x			x				



MINIMUM PPE REQUIREMENT [SAMPLE CASES]																				
Activity / Hazard	Body Protection				Head Protection	Eye/Face Protection			Ear Protection		Respiratory Protection			Hand Protection			Foot Protection		Fall Protection	
	100% Cotton Coveralls	Apron(s)	Jacket/Fire Retardant	Chemical Suit	Hard Hat	Safety Glass with Side Shield	Chemical Goggles	Welding Hood	Ear Plugs	Ear Muff	Filter Respirator	Supplied Air Respirator	Dust Mask	Cotton Gloves	Electrical Lineman Gloves	Specialized Gloves (Oil or Acid)	Safety Shoes	Rubber Boots	Body harness	Lanyard
Electrical Work	x													x			x			
Machining (Lathe)	x					x											x			
Working at Height	x				x												x		x	x
Sand / Grit Blasting	x	x			x	x			x			x		x			x			
Water Jetting	x	x			x	x								x			x			
Scaffolding erection	x				x	x								x			x		x	x

Note: It must be noted that the above minimum PPE requirements are generic requirements for the above mentioned tasks. These are not a substitute proper PPE selection based on more specific and detailed risk assessments considering the hazards due to the task, work area, length of exposure and other simultaneous hazards.