PERSONAL PROTECTIVE EQUIPMENTS

Personal protective equipments commonly referred to as "PPE "includes all clothing and work accessories designed to protect employees from injury or infection. It refers to the protective clothing, helmets, hard hats, hearing protectors, respirators, goggles or other garments or equipments meant to protect the wearers' body from injury by heat, chemicals, infection, electrical hazards, airborne particulate matter etc. The purpose of personal protective equipment is to reduce employee exposure to hazards when engineering and administrative controls are not effective to reduce these risks.PPE does not eliminate the hazard but reduce the employees risk of exposure to accident causing situations.PPE protects only the user and does not eliminate the hazard from the workplace.PPE is a second line of defense for employee protection. The first line of defense is to eliminate accident causing situations in the workplace.

CLASSIFICATION

Personal protective equipments can be broadly classified into

1. Non - respiratory protective equipments

2. Respiratory protective equipments

Non- respiratory protective devices include Head protectors, eye protectors, handand arm protectors, foot and leg protectors, body protectors and skin protectors. Respiratory protective equipments include different kinds of breathing apparatus like filter respirators, airline respirators, self- contained breathing apparatus etc

When selecting a PPE to reduce a risk to health and safety, the employer should ensure that the PPE is

- Suitable for the nature of work and any hazard associated,
  - A suitable size and fit and reasonably comfortable for the person to wear
  - Maintained, repaired or replaced
  - Used or worn by the worker ,so far as is reasonably practicable

Duties of employees on using PPE

- PPE must be worn and used in accordance with the instructions provided to them
- PPE must be examined before use
- Any defected must be immediately reported to the supervisor
- Employees must take care of the PPE provided to them

HEAD PROTECTION

An Injury to the head can pose serious threat to the brain. Therefore head protection is considered important. Head injuries are usually caused by the falling objects, bumping against a fixed object, contacting exposed electrical conductors etc.

Safety Helmets

A safety helmet must be worn where a person may be struck on the head by a falling body, flying objects, overhead spills of hot and corrosive chemicals, electric shock etc. A wide range of accessories can be fitted with the helmets for variable working conditions.

The hard shell of the safety helmet is designed to protect the head against impact. Helmets are made out of materials such as fibre-glass reinforced plastic, HDPE, aluminium alloy etc.

To provide best protection, a safety helmet must fit properly. Care and Maintenance of helmets are essential. Helmets must be checked regularly for cracks or other damages. Helmets must be cleaned at least once in a month in warm water or recommended cleanser and air dried. The helmet must be protected from direct exposure to extreme conditions of heat and cold, chemicals etc.

Hard Hats

Safety hats protect the head from impact, penetration and electrical shock. A hard hat is a type of helmet predominantly used in workplace environments such as construction sites, to protect the head from injury. Hard hats are classified into three categories

Class A - General Service, limited voltage protection

Class B - Utility Service, high voltage protection

Class C - Special Service, no voltage protection

EAR PROTECTION

High noise levels is predominant in most industrial settings, carry a very serious impact on the employees. Hearing loss has an impact on the person's quality of life. Hearing loss can also affect the safety of the working environment when a worker can't hear a warning or alarm signal. People working in highly noisy areas must wear ear protection aids.

Ear Plugs

An ear plug is a device that is meant to be inserted in the ear canal to protect the wearer from loud noise, intrusion of water, foreign bodies, dust or excessive wind. Most earplugs are made of foam that is inserted into the ear canal. Ear plugs are

rated with Noise Reduction Ratings which provide a guide to the noise protection provided by the device. Ear plugs may be better in hot, humid or confined work areas and better for employees who wear other personal protective equipments. The ear plugs may be disposable or reusable in nature. Disposable ear plugs are meant for one time usage and made of formable material. Reusable ear plugs are premolded and made of silicone, plastic or rubber.

Ear Muffs

Ear muffs are the objects designed to cover a person's ear for protection or for warmth. Ear muffs have cups and cushions that fit securely around the ears, covering them completely, and are held in place by a head band. Thermal ear muffs work in cold environment to keep a person's ear warm. Acoustic ear muffs protect the wearer from extreme noises.

EYE AND FACE PROTECTION

Eyes are vulnerable to mechanical, chemical and thermal hazards. The employer shall ensure that each affected employee uses appropriate eye or face protection when exposed to eye or face hazards from flying particles, molten metal, liquid chemicals, acids or caustic liquids, chemical gases or vapors, or potentially injurious light radiation.

OSHA suggests that eye protection be routinely considered for use by carpenters, electricians, machinists, mechanics, millwrights, plumbers and pipefitters, sheetmetal workers and tinsmiths, assemblers, sanders, grinding machine operators, sawyers, welders, laborers, chemical process operators and handlers, and timber cutting and logging workers.

Employers of workers in other job categories should decide whether there is a need for eye and face PPE through a hazard assessment.

Examples of potential eye or face injuries include:

1. Dust, dirt, metal or wood chips entering the eye from activities such as chipping, grinding, sawing, hammering, the use of power tools or even strong wind forces.

2. Chemical splashes from corrosive substances, hot liquids, solvents or other hazardous solutions.

3. Objects swinging into the eye or face, such as tree limbs, chains, tools or ropes.
4. Radiant energy from welding, harmful rays from the use of lasers or other radiant light (as well as heat, glare, sparks, splash and flying particles).

   Eye protection choices include the following

   Safety Glasses

Safety glasses are the most commonly used form of eye protection. They are basically designed to provide protection from flying particles that may strike the eyes from the front. Ordinary prescription glasses do not provide adequate protection. It must confirm to the standards. All safety glasses should have side shields.

Goggles

Goggles are intended for use when protection is needed against chemicals or particles. Impact protection goggles which contain perforations on the sides of goggle are not to be used for chemical splash protection, therefore are not recommended.

Splash goggles which contain shielded vents at the top of the goggle are appropriate for chemical splash protection, and also provide limited eye impact protection. Goggles only protect the eyes, offering no protection for the face and neck.

Face Shields

Full face shields provide the face and throat and partial protection from flying particles and liquid splash. For maximum protection against chemical splash, a full face shield should be used in combination with chemical splash goggles. Face shields are appropriate as secondary protection when implosion (e.g. vacuum applications) or explosion hazards are present. Face shields which are contoured to protect the sides of the neck as well as frontal protection are preferred.

ARM AND HAND PROTECTION

Arms and hands are vulnerable to cuts, burns, bruises, electrical shock, chemical spills, and amputation.

Gloves

Gloves provide protection for the hands and arms from chemicals, temperature extremes, and abrasion.

Their proper selection is vital to their ability to protect. This is especially true when dealing with potential exposure to chemicals. It is imperative to remember that both the thickness and the type of material the glove is manufactured from affect the ability to serve as a barrier against a chemical.

Another factor in the selection of gloves is the wearer's need for dexterity. It is often advisable to reduce the size and thickness of the glove to increase the dexterity. Caution is also required when using gloves around moving equipment. Gloves should not be used by anyone whose hands are exposed to moving parts in which their hands could get caught.

The following is a general list of the types of gloves

Disposable latex gloves

Chemical resistant gloves

Leather gloves

Non asbestos heat-resistant gloves

metal-mesh gloves for operations cutters

Cotton gloves.

FOOTPROTECTION

The toes, ankles and feet are exposed to a wide range of on the job injuries.Safety shoes and boots provide impact and compression protection for workers who handle heavy materials or work in areas where materials could roll or fall onto their feet. Foot protection is usually in the form of

steel-toed work boots, with a steel shank to protect the bottom of the foot from puncture wounds. In wet environments, steel-toed boots that are waterproof and slip-resistant may be necessary. The hazards that workers are exposed to will determine what type of foot protection is most appropriate for the job.

RESPIRATORYPROTECTION

Respiratory hazards include airborne contaminants such as dusts,mists,fumes and gases or oxygen deficient atmospheres. A respirator is a protective face piece, hood or helmet that is designed to protect the wearer against various harmful airborne agents.

Respirators should not be

the first choice for respiratory protection in workplaces. They should only be used

- when following the "hierarchy of control" is not possible (elimination, substitution, engineering or administrative controls)
- while engineering controls are being installed or repaired
- when emergencies or other temporary situations arise (e.g., maintenance operations)

The two main types are air-purifying respirators (APRs) and supplied-air respirators (SARs).

Air-purifying respirators can remove contaminants in the air that you breathe by

filtering out particulates (e.g., dusts, metal fumes, mists, etc.). Other APRs purify air by adsorbing gases or vapours on a sorbent (adsorbing material) in a cartridge or cannister. They are tight-fitting and are available in several forms

- mouth bit respirator (fits in the mouth and comes with a nose clip to hold nostrils closed -
  - for escape purposes only)
- quarter-mask (covering the nose and mouth),
- half-face mask (covering the face from the nose to below the chin), or
- full facepiece (covering the face from above the eyes to below the chin).

Respirators with a full face piece also protect the eyes from exposure to irritating chemicals.

Supplied-air respirators (SARs) supply clean air from a compressed air tank or through an air line. This air is not from the work room area. The air supplied in tanks or from compressors must meet certain standards for purity and moisture content

Supplied-air respirators may have either tight-fitting or loose-fitting respiratory inlets. Respirators with tight-fitting respiratory inlets have half or full facepieces. Types with loose-

fitting respiratory inlets can be hoods or helmets that cover the head and neck, or loose-fitting

facepieces with rubber or fabric side shields. These are supplied with air through airlines.

Examples of these classes of respirators include:

Air-purifying respirators (APRs)

- particulate respirators (previously called dust, fume, and mist respirators or masks),
- chemical cartridge respirators that can have a combination of chemical cartridges, along with a dust prefilter: this combination provides protection against different kinds of
  - contaminants in the air
- gas masks (contain more adsorbent than cartridge-type respirators and can provide a higher level of protection than chemical cartridge respirators)
- powered air-purifying respirators (PAPRs).

Supplied-air respirators (SARs)

- self-contained breathing apparatus (SCBA),
- airline supplied-air respirators,
- protective suits that totally encapsulate the wearer's body and incorporate a life-support system.

There are some combinations of airline respirators and SCBAs that allow workers to work for extended periods in oxygen-deficient areas or where there are airborne toxic contaminants. The auxiliary or backup SCBA source allows the worker to escape with an emergency source of air if the airline source fails.

There are also combination air-purifying and atmosphere supplying respirators.

These will offer worker protection if the supplied-air system fails, if the appropriate air-purifier units are selected.

These cannot be used in oxygen-deficient areas or where the air concentration of a contaminant exceeds the IDLH level (i.e., immediately dangerous to life or health).

Since filters capture particles, caution must be exercised to always check that these filters are not clogged as it makes it harder for air to pass through and increase the likelihood of contaminated air entering the mask. Cartridges can also become "full" or saturated. It will stop working and "breakthrough" will occur - this term means that the gases or vapours will leak through the cartridge. Both cartridges and filters must be replaced on a regular basis by using the manufacturer's recommendations (usually determined by using warning properties or end-of- service indicators).

There are 9 classes of particulate filters, depending on the particulate material. They are also classified based on levels of oil resistance and filter efficiency. Oil can break down certain types of filters which means it is important to know the materials you are working with at all times and always select the right cartridge for your respirator.

The main categories are:

- N series (Not resistant to oil) - May be used in any atmosphere where there is no oil particulate.

- R series (Resistant to oil) - May be used in any atmosphere where there is no oil particulate, or up to one shift where there is oil particulate present. "One shift" means eight hours of continuous or intermittent use.

- P series (Oil-Proof) - May be used in any atmosphere, including those with oil particulates, for more than one shift. If the filter is used in atmospheres with oil particulates, contact the manufacturer to find out the service life of the filter.