PERSONAL PROTECTIVE EQUIPMENT (PPE)

1. Personal Protective Equipment is equipment designed and manufactured to be worn or held by a person for protection against one or more risks to that person's health or safety.

Some equipment, such as specialised breathing apparatus, or face visors may be used by more than one person and care should be taken to ensure that they are returned and maintained in satisfactory condition. Before and after they are used they should be properly cleaned with suitable anti-bacterial/anti-viral products to avoid carrying infections to the next user.

2. Laboratory Coats/Protective Overalls

Within the School the wearing of laboratory coats or protective overalls is compulsory in all designated areas identified by the display of Laboratory Coat signage.

Laboratory coats are intended to protect the person and their clothing. They should always be worn fastened up. They provide much reduced protection if they are not fastened.

Wearing of contaminated laboratory coats may result in the spread of contamination if worn outside the designated laboratory coat area. In some laboratories the activity will deem that specific laboratory coats must be worn in that area only and not outwith.

Laboratory coats should not be worn in toilets, offices, libraries, write up areas or places for eating and drinking. A failure to follow this very basic precaution can result in others in the building (as well as the wearer) being exposed to the contamination.

If there is a likelihood of splashing liquids, a thick rubber or plastic apron should be worn over the normal laboratory coat.

When laboratory coats are to be laundered, all pockets must be checked and their contents emptied before being sent to the laundry.

3. Eye Protection

In accordance with the University's Eye Protection Policy, eye protection is mandatory for all persons working and entering any designated Eye Protection Zone.

The following area types are designated as Eye Protection Zones:

- Workshops or laboratories where there is use of powered tools or other tools with potential for generating projectiles or dust, processes involving liquid, hot metal or compressed gases.
- Laboratories where there is work with hazardous substances.
- Laser controlled areas.

Eye Protection Zones are identified by the display of Eye Protection signage.

Normal spectacles are not an effective or acceptable form of eye protection. Individuals that normally wear glasses should either wear additional Over-safety Glasses or prescription safety glasses.

The University Policy identifies where responsibility lies:

Managers and Supervisors shall:

- Carry out suitable and sufficient risk assessments to identify, amongst other things, the risk of eye injury from the activities they are required to manage or supervise.
- Provide information, instruction and training to staff and students, as appropriate, for the proper use and care of eye protection.
- Identify eye protection zones in line with this policy and ensure they are clearly sign posted.
- Monitor compliance with the eye protection requirements and take appropriate action.

Employees and Students shall:

- Comply with the requirements and wear eye protection in the eye protection zones and where risk assessment identifies need for eye protection for a particular task.
- Ensure eye protection provided is used and kept in satisfactory condition.
- Report any damage to eye protection to their manager/supervisor.

4. Hand Protection

Gloves are essential in laboratories and workshops and should be worn whenever there is a likelihood of the hand coming onto contact with substances or materials that could damage or injure the skin, or with toxic substances that could be absorbed through the skin. Cuts and abrasions on hands should be sealed with plasters before donning gloves in case the gloves split or skin contamination occurs when removing gloves.

When selecting gloves, it is vital to choose the correct glove to provide the right level of protection against the substances with which you are working. As a general rule, nitrile or neoprene gloves are recommended for preventing hand contamination however care is required as they tear readily or can burn if near a flame.

When wearing gloves do not touch anything that someone else without gloves might touch (e.g. telephone, computer keyboard, door handle).

Glove Comparison Chart

Glove Material	Intended Use	Advantages and Disadvantages	Example Image
Nitrile	Incidental contact (disposable exam glove) Extended contact (thicker reusable glove). Only to be used for temporary exposure. For longer term exposure a more suitable replacement glove type should be sought	Excellent general use glove. Good for solvents, oils, greases, and some acids and bases. Clear indication of tears and breaks. Good alternative for those with latex allergies.	
Neoprene	Extended contact	Good for acids, alkalis, alcohols, fuels, peroxides, hydrocarbons, and phenols. Good for most hazardous chemicals. Poor for halogenated and aromatic hydrocarbons.	

Kevlar leather	Manual handling and workshop operations.	Cut-resistant gloves. Designed to protect hands from mechanical damage and from sharp materials including wood and metal. **Note:** Gloves, other than close fitting disposable nitrile gloves, which will easily tear, must not be used while machining as they could easily get caught in rotating equipment resulting in major injuries.	
Kevlar Nitrile coated Leather	Heat Resistant gloves	For hot working including furnaces, ovens and welding.	

4.1 Latex Gloves and Allergic Reactions

Latex allergy is caused by contact with latex proteins found in latex gloves. Latex gloves are not permitted unless there are extenuating circumstances and a risk assessment has been conducted, approved and accepted by the LSC.

4.2 Gloves and Rotating Machinery

Gloves should not be worn when operating rotating machinery (e.g. lathes, milling machines, drills) in case the glove gets caught in the rotating parts and draws in the hand, arm and body.

With the use of coolants and cutting fluids it is important to reduce your contact with wet workpieces and surfaces. To minimise hand contact close fitting disposable nitrile gloves, which will easily tear if caught up in moving parts, are acceptable.

You should ensure your hands are kept clean and in good condition:

- Using pre-work creams may help to make removing contaminants easier but they do not provide an effective barrier. After-work creams are particularly beneficial because they help restore the natural moisture content of the skin after washing hands.
- Cover any cuts and abrasions with a waterproof dressing.
- Wash regularly with soap and water to remove metalworking fluids from your skin. Avoid using abrasive or powerful solvent cleaners.

4.3 Hand Skin Health Surveillance

The wearing of gloves creates a restrictive, occlusive environment within the glove itself. Occlusion means an area is covered or enclosed and, in the case of gloves, can potentially impact on hand health.

Within the gloved hand there is:

- A lack of airflow.
- Friction caused by the glove repeatedly rubbing against the skin.
- A rise in temperature within the glove, increasing perspiration.
- An accumulation of sweat causing skin to macerate affecting deeper, regenerative layers of the skin.
- Rise in pH level disrupting the skin’s acid mantle, its natural barrier protection.

Where the wearing of gloves repeatedly for extended periods is required, a risk assessment must consider the need for hand health surveillance. Where a risk assessment identifies a requirement for health surveillance, it should be discussed initially with the LSC or HS&W Team.

Similarly, where individuals have their hands in water for extended periods of time or wash their hands frequently during the working day (e.g. more than 20 times), the same requirement for hand skin health surveillance is required.

Where a skin condition becomes apparent the individual should stop working and report it to their line manager/supervisor or the LSC who should then complete an accident report. Work should not recommence until appropriate arrangements are put in place.

5. Safety Helmets (Hard Hats)

Industrial safety helmets are intended to protect against falling objects or impact with fixed objects. Hard Hat Zones are identified by the display of Hard Hat signage.

To fit correctly head protection should:

- Be of an appropriate shell size for the wearer;
- Have an easily adjustable headband and, if necessary, nape and chin strap;
- Be comfortable;
- Be able to accommodate a thermal liner when used in cold weather.

Head protection should be compatible with the work being done. For example:

- If working in windy conditions or where repeated bending or looking up is required a chinstrap or other secure retention system will be required.
- If other PPE such as ear defenders or eye protectors are required then the design should allow them to be worn safely and in comfort.

Factors that affect helmet performance in shock absorption or penetration resistance of helmets can occur from:

- Exposure to certain substances;
- Exposure to heat and sunlight;
- Ageing due to heat, humidity, sunlight and rain.

Contact with certain chemical agents should be avoided, including paint, adhesives, and cleaning agents. Where names or other markings need to be applied using adhesives, advice should be sought from the helmet manufacturer.

Exposure to heat or sunlight can cause the shell to become brittle. Head protection should never be stored therefore near a window, for example the rear window of a motor vehicle.

Head protection should normally be replaced at intervals recommended by the manufacturer. This is usually 5 years after the date of manufacture.

It will also need replacing when the shell is damaged or when it is suspected that the shock absorption or penetration resistance has deteriorated.

For example, when:

- The shell has received a severe impact.
- Deep scratches occur.

- The shell has any visible cracks.

6. Bump Caps

Bump Caps are designed to protect the head from bumps or scrapes and can be an alternative to the full Hard Hat in environments where the risk does not include items falling from height.

7. Respiratory Protective Equipment (RPE)

Laboratory and workshop procedures and experimental work should be designed to keep airborne contaminants such as dust, toxic gases, allergens and fumes away from people. The provision of facemasks or breathing apparatus should be considered as a last resort and only in exceptional circumstances when it has not been possible to provide protection by other means.

Respiratory protective equipment may also be required for use in an emergency (e.g. spillage or failure of normal controls).

It must be remembered that respiratory protective equipment (like all personal protective equipment) protects only the wearer. If someone needs to wear a facemask the question must be asked, is it safe for anyone else to be in the same room?

Respiratory protective equipment must be selected with care. There are many different types designed to protect against different hazards. If protection is needed against fumes from a particular chemical, a facemask designed to protect against dust will offer absolutely no protection at all. The amount of protection required should also be considered. No respiratory protective equipment provides 100 percent protection. Manufacturer's specifications should be consulted before purchase to determine the amount of protection provided. Once the type of respiratory protective equipment required has been selected, Face Fit Testing must be undertaken and the choice of mask recorded to ensure that future purchases are of the same type and fit.

Recommended masks for use with dust are:

- FFP2: 3M type 9300
- FFP3: 3M type 9332

Masks for use with organic vapours:

- Recommended mask for organic vapours: 3M type 9922

Anyone in any doubt about the type of equipment they need should contact the LSC.

7.1 Training in Use of Respiratory Equipment

Anyone who is required to use respiratory protective equipment should ensure that they have adequate training in its use. Even very basic disposable facemasks can offer little or no protection if used incorrectly (e.g. such facemasks are designed to be thrown away at the end of every day. They must be stored in an area free of contamination so contaminants do not accumulate on the inside of the mask.

A copy of the training record must be placed with the LSC who will retain it on file.

7.2 Face Fit Testing

Prior to wearing a face mask, a face fit test **must** be done by a trained assessor. The School of Engineering has a number of technicians trained and equipped to carry out qualitative Face-Fit testing (see appendices). Qualitative testing is used to determine the seal quality of disposable half-masks and re-usable half-mask respirators. It relies on the person's sense of taste to determine the mask's effectiveness. If you are intending using face masks contact a face fit tester to arrange.

It may not be possible to get a satisfactory face test if the user has facial hair. After satisfactory completion of a Face-Fit Test users must ensure that they do not allow the growth of facial hair to compromise the effectiveness of the respirator.

For full face masks a quantitative test is required by an external provider. The process of quantitative face fit testing is not reliant on the person (taste/smell) and uses methods such as particle counting to effectively measure the quality of the seal. If you require to use a full face mask contact the LSC to arrange for a quantitative test.

7.3 Self-Contained Breathing Apparatus

Self-contained breathing apparatus (i.e. with cylinders of compressed air supplying a face mask) must only ever be used by authorised users who have undergone full training and where necessary refresher training. Such equipment may be required in an emergency and is operated by a specialist team.

8. Safety Footwear

Safety boots or shoes normally have steel toe-caps and may also have other safety features including slip resistant soles, steel midsoles and insulation against extremes of heat and cold. Safety footwear should be used where it is necessary to move heavy equipment.

Sandals or opened toed footwear give little or no protection and must not be worn in a laboratory or workshop areas.

The risk assessment for the task should be used to identify if any particular type of footwear is required for a particular task.

The selection of foot protection depends primarily on the hazard. However, comfort, style and durability should also be considered. The choice should be made on the basis of suitability for protection, compatibility with the work and the requirements of the user.

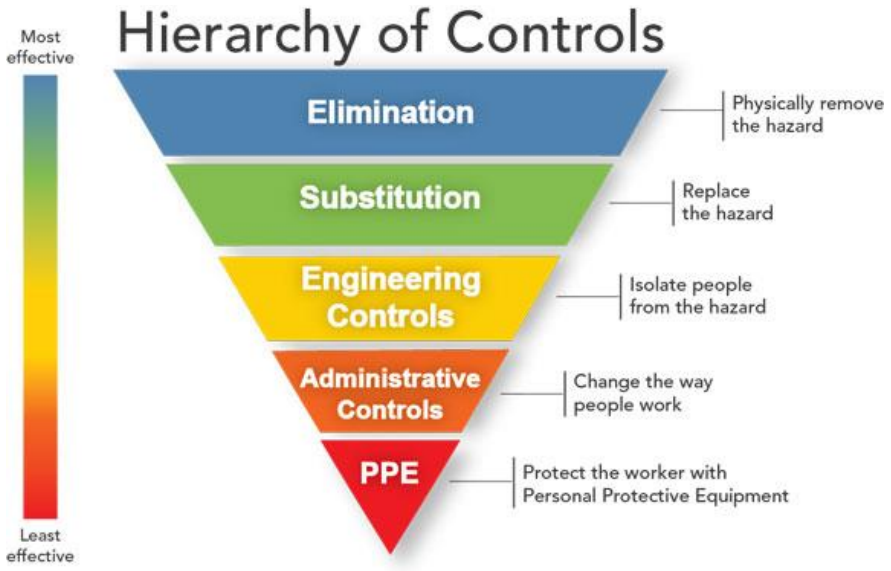
Generally, safety footwear should be flexible, water resistant, non-slip and absorb perspiration. Inflexible or unnecessarily bulky footwear will result in tired feet and legs. Boots not shoes are required when ankles need protection. Consideration should be given to the ability of the footwear to resist corrosion, abrasion and wear and tear.

Always follow the manufacturer's instructions and markings for appropriate use and level of protection.

9. Overreliance on PPE

Over-reliance on PPE is a common mistake in risk management. PPE should be considered the last line of defence because it is not as reliable or as effective as other types of control

measures (see hierarchy of controls). PPE relies on user compliance and proper maintenance. In addition, PPE can fail and dramatically and abruptly change exposure.



Taken from: https://www.cdc.gov/niosh/topics/hierarchy/default.html .

Revision Record			
Issue	**Name**	**Date**	**Reason for review**
1	ES	31/5/2022	Transfer from main handbook
	ES	26/8/2022	Added alt text for images