Guidance on Personal Protective Equipment

Introduction

1. Equipment which is intended to be worn or held by a person at work and which affords protection against health and safety risks is covered by the Personal Protective Equipment at Work (PPE) Regulations.

A summary of the main requirements of Regulations is given in Appendix 1. They are accompanied by Guidance from the Health and Safety Executive which should always be consulted when detailed guidance is required. A copy is available for consultation in the Safety Office. Part 2 of the Guidance contains detailed advice on the selection of PPE and has been reproduced as Appendix 2.

2. The types of PPE described are:

   - Head Protection - Page 6
   - Eye Protection - Page 9
   - Foot Protection - Page 11
   - Hand and Arm Protection - Page 14
   - Body Protection - Page 17

Application of the Regulations

3. Personal protective equipment includes both the following, when they are worn for protection of health and safety:

   (a) protective clothing such as aprons, protective clothing for adverse weather conditions, gloves, safety footwear, safety helmets, high visibility waistcoats etc; and

   (b) protective equipment such as eye protectors, life-jackets, respirators, underwater breathing apparatus and safety harnesses.

   In practice, however, these Regulations will not in their entirety apply to ear protectors, most respiratory protective equipment and some other types of PPE used at work. These types of PPE are specifically excluded from some or all of the scope of the PPE at Work Regulations because they are covered by existing Regulations such as the Noise at Work Regulations.

4. Items such as uniforms provided for the primary purpose of presenting a corporate image, and ordinary working clothes, are not subject to these Regulations. Likewise the Regulations will not apply to ‘protective clothing’ provided primarily for food hygiene purposes. However where any uniform or clothing protects against a specific risk to health and safety, for example high visibility clothing, it will be subject to the Regulations. Waterproof,
weatherproof or insulated clothing is subject to the Regulations if it is worn to protect employees against risks to their health or safety, but not otherwise.

5 The Regulations do not cover the use of PPE such as cycle helmets, crash helmets or motor cycle leathers worn by employees on the public highway but motor cycle crash helmets remain legally required for motor cyclists under road traffic legislation.

6 The Regulations do not require professional sports people to use PPE such as shin guards or head protection during competition. However, they do apply to sports equipment used in other circumstances, for example, life-jackets worn by professional canoeing instructors.

7 PPE will have to be 'CE' marked. The 'CE' mark is given after the PPE has been certified by an independent inspection body as meeting basic safety requirements

**PPE as a 'last resort'**

8 The Management of Health and Safety at Work Regulations, (MHSWR) require the University to identify and assess the risks to health and safety present in the workplace, so enabling the most appropriate means of reducing those risks to an acceptable level to be determined. There is in effect a hierarchy of control measures, and PPE should always be regarded as the 'last resort' to protect against risks to safety and health; engineering controls and safe systems of work should always be considered first. It may be possible to do the job by another method which will not require the use of PPE or, if that is not possible, adopt other more effective safeguards: for example, fixed screens could be provided rather than individual eye protection to protect against swarf thrown off a lathe.

There are a number of reasons for this approach. Firstly, PPE protects only the person wearing it, whereas measures controlling the risk at source can protect everyone at the workplace. Secondly, theoretical maximum levels of protection are seldom achieved with PPE in practice, and the actual level of protection is difficult to assess. Effective protection is only achieved by suitable PPE, correctly fitted and maintained and properly used. Thirdly, PPE may restrict the wearer to some extent by limiting mobility or visibility, or by requiring additional weight to be carried. Other means of protection should therefore be used whenever reasonably practicable.

The University should therefore, provide appropriate PPE and training in its use to its employees wherever there is a risk to health and safety that cannot be adequately controlled by other means.

**Providing PPE**

9 In order to provide PPE for its employees, the University must do more than simply have the equipment on the premises. Employees must have the equipment readily available, or at the very least have clear instructions on where they can obtain it.
Any PPE provided must be for the sole use of each employee, that is, it must not be shared with other persons or lent to them. This is to ensure that the PPE remains hygienic and otherwise free of risk to health.

10 Under the Health and Safety at Work Act 1974, no charge can be made to the employee for the provision of PPE which is used only at work.

11 PPE must be provided where risks have not been adequately controlled by other means. Where risks are sufficiently low that they can be considered to be adequately controlled, then PPE need not be provided. For example, in most workplaces there will be some risk of people dropping objects onto their feet, but it is only when there is manual handling of objects of sufficient weight to cause injury that the risk will be sufficient to require the provision of safety footwear.

12 Adequate control of the risk is also the standard of protection which the PPE provided should achieve. However, there may be some circumstances where no PPE will provide adequate control of the risk (for example fire fighters’ protective clothing can give only limited protection from radiant heat and flames). In these cases, the University is required only to provide PPE offering the best protection practicable in the circumstances. Use of PPE must not increase the overall level of risk, ie PPE must not be worn if the risk caused by wearing it is greater than the risk against which it is meant to protect.

**Ergonomic and other factors**

13 When selecting PPE to be used while doing a job, the nature of the job and the demands it places on the worker should be taken into account. This will involve considering the physical effort required to do the job, the methods of work, how long the PPE needs to be worn, and requirements for visibility and communication. Those who do the job are usually best placed to know what is involved, and they should be consulted. Other factors may also influence selection: for example, PPE used in catering may need to be cleaned easily. The aim should always be to choose PPE which will give minimum discomfort to the wearer, as uncomfortable equipment is unlikely to be worn properly.

14 There will be considerable differences in the physical dimensions of different workers and therefore more than one type or size of PPE may be needed. The required range may not be available from a single supplier. Those having to use PPE should be consulted and involved in the selection and specification of the equipment as there is a better chance of PPE being used effectively if it is accepted by each wearer.

**Compatibility of PPE**

15 If more than one item of PPE is being worn, the different items of PPE must be compatible with each other. For example, certain types of respirators will not fit properly and give adequate protection if a safety helmet is worn. In such cases when selecting PPE it should be ensured that both items when used together will adequately control the risks against which they are provided to protect.
Assessment

16 Whatever PPE is chosen, it should be remembered that, although some types of equipment do provide very high levels of protection, none provides 100%. Some indication is needed of the level of risk so that the performance required of the PPE can be estimated. This information may have been gathered as part of the overall risk assessment required under MHSWR or more generalised data may be available from sources such as HSE guidance.

In the simplest and most obvious cases which can easily be repeated and explained at any time, the assessment to identify suitable PPE need not be recorded. In more complex cases, however, the assessment will need to be recorded and kept readily accessible to those who need to know the results.

Selection of suitable PPE

17 Once potential hazards are known there may be several types of PPE that would be suitable. The risks at the workplace and the parts of the body endangered are the two key elements to consider.

For example, when assessing the need for eye protection, the Supervisor should first identify the types of hazard present, such as airborne dust, liquid splashes or projectiles, and then assess the degree of risk - for example the likely size and velocity of the projectiles. They can then select a suitable type of PPE from the range of 'CE' marked equipment available. In this case, eye protection is designed for dust or chemical protection, and to different levels of impact resistance.

18 Once a type of 'CE' marked PPE has been selected for a given application, further advice and information may be necessary to ensure that the equipment can provide the protection needed. There is a legal requirement upon manufacturers and suppliers to provide information of this type.

When selecting PPE to be used while doing a job, the nature of the job and the demands it places on the worker should be taken into account. This will involve considering the physical effort required to do the job, the methods of work, how long the PPE needs to be worn, and requirements for visibility and communication.
### Summary of the Personal Protective Equipment at Work Regulations 1992

<table>
<thead>
<tr>
<th>Provision</th>
<th>Ensure that suitable PPE is provided to employees who may be exposed to risks to their health and safety, except where the risk has been adequately controlled by other means which are equally or more effective.</th>
</tr>
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</table>
| Suitable  | To be "suitable", PPE must be:  
- appropriate to the risks and workplace conditions;  
- take account of ergonomic considerations and the state of health of the person wearing the PPE;  
- be capable of fitting the wearer correctly;  
- effective in preventing or adequately controlling the risks involved without increasing the overall risk, so far as is practicable;  
- and comply with any other provision implementing EC Directives applicable to PPE. |
| Compatibility | Ensure that PPE is compatible and effective where it is necessary to use more than one item of PPE. |
| Assessment | Assess PPE to ensure it is suitable. The assessment must include:  
- risks that have not been avoided by other means;  
- the definition of the characteristics needed in the PPE in order to be effective;  
- and comparison between the characteristics of the PPE that is needed and that which is available. |
| Review | Review the assessment where there is reason to suspect it is no longer valid, or following significant changes, and ensure that any changes required are made. |
| Maintenance | Ensure PPE provided to employees is maintained in an efficient state, in efficient working order and in good repair. |
| Accommodation | Ensure that appropriate accommodation is provided for PPE not in use. |
| Information | Ensure that the employee is provided with adequate and appropriate information, instruction and training that is comprehensible. |
| Use | Take all reasonable steps to ensure that PPE is properly used. |
| Employees' duties | Use PPE in accordance with training and instruction and return it to the accommodation after use. Employees must also report to the employer any loss or obvious defect in the PPE. |
Appendix 2

Extract from Part 2 of the Guidance to the Regulations (paragraph numbers are those used in the original document)

Selection, use and maintenance of personal protective equipment

67 This part aims to help employers to comply with their duties to select suitable PPE and maintain it. It contains information about the main types of PPE which are widely used in industry, but does not cover more specialised and less frequently used items (for example, safety harnesses). More detailed information about particular items of PPE can be obtained from suppliers. It is also wise to involve those who will wear the PPE in its selection. Where possible, more than one model satisfying the appropriate safety performance and other criteria of suitability should be made available.

Head protection

Types of protection

68 There are four widely used types of head protection:

(a) crash helmets, cycling helmets, riding helmets and climbing helmets which are intended to protect the user in falls;

(b) industrial safety helmets which can protect against falling objects or impact with fixed objects;

(c) industrial scalp protectors (bump caps) which can protect against striking fixed obstacles, scalping or entanglement; and

(d) caps, hairnets etc which can protect against scalping/entanglement.

69 The following guidance deals only with industrial safety helmets, scalp protectors and climbing helmets (ie it excludes caps and hairnets).

Processes and activities

70 The following are examples of activities and processes involving risks of falling objects or impacts, which may require the provision of head protection; it is not an exhaustive list. Some of these activities will also be subject to the Construction (Head Protection) Regulations 1989:

(a) Building work, particularly work on, underneath or in the vicinity of scaffolding and elevated workplaces, erection and stripping of formwork, assembly and installation work, work on scaffolding and demolition work.

(b) Construction work on bridges, buildings, masts, towers, hydraulic structures, blast furnaces, steel works and rolling mills, large containers, pipelines and other large plants, boiler plants and power stations.
(c) Work in pits, trenches, shafts and tunnels. Underground workings, quarries, opencast mining, minerals preparation and stocking.
(d) Work with bolt-driving tools.
(e) Blasting work.
(f) Work near hoists, lifting plant, cranes and conveyors.
(g) Work with blast furnaces, direct reduction plants, steelworks, rolling mills, metalworks, forging, drop forging and casting.
(h) Work with industrial furnaces, containers, machinery, silos, storage bunkers and pipelines.
(i) Building or repairing ships and offshore platforms.
(j) Railway shunting work, and other transport activities involving a risk of falling material.
(k) Slaughterhouses.
(l) Tree-felling and tree surgery.
(m) Work from suspended access systems, bosun’s chairs etc.

The selection of suitable head protection

72 To fit, head protection should:
(a) be of an appropriate shell size for the wearer; and
(b) have an easily adjustable headband, nape and chin strap.

The range of size adjustment should be large enough to accommodate thermal liners used in cold weather.

73 Head protection should be as comfortable as possible. Comfort is improved by the following:
(a) a flexible headband of adequate width and contoured both vertically and horizontally to fit the forehead;
(b) an absorbent, easily cleanable or replaceable sweat-band;
(c) textile cradle straps;
(d) chin straps (when fitted) which:
   (i) do not cross the ears,
   (ii) are compatible with any other PPE needed,
   (iii) are fitted with smooth, quick-release buckles which do not dig into the skin,
   (iv) are made from non-irritant materials,
   (v) can be stowed on the helmet when not in use.
Compatibility with the work to be done

74 Whenever possible, the head protection should not hinder the work being done. For example, an industrial safety helmet with little or no peak is useful for a surveyor taking measurements using a theodolite or to allow unrestricted upward vision for a scaffold erector. If a job involves work in windy conditions, especially at heights, or repeated bending or constantly looking upwards, a secure retention system is required. Flexible headbands and Y-shaped chin straps can help to secure the helmet. Head protection worn in the food industry may need to be easily cleaned or compatible with other hygiene requirements.

75 If other PPE such as ear defenders or eye protectors are required, the design must allow them to be worn safely and in comfort. Check manufacturer's instructions regarding the compatibility of head protection with other types of PPE.

Maintenance

76 Head protection must be maintained in good condition. It should:
   (a) be stored, when not in use, in a safe place, for example, on a peg or in a cupboard. It should not be stored in direct sunlight or in excessively hot, humid conditions;
   (b) be visually inspected regularly for signs of damage or deterioration;
   (c) have defective harness components replaced (if the design or make allows this). Harnesses from one design or make of helmet cannot normally be interchanged with those from another;
   (d) have the sweat-band regularly cleaned or replaced.

77 Before head protection is reissued to another person, it should be inspected to ensure it is serviceable and thoroughly cleaned in accordance with the manufacturer's instructions, eg using soap and water. The sweat-band should always be cleaned or replaced.

Damage to shell

78 Damage to the shell of a helmet can occur when:
   (a) objects fall onto it;
   (b) it strikes against a fixed object;
   (c) it is dropped or thrown.

Deterioration in shock absorption or penetration resistance

79 Deterioration in shock absorption or penetration resistance of the shell can occur from:
   (a) exposure to certain chemical agents;
(b) exposure to heat or sunlight;
(c) ageing due to heat, humidity, sunlight and rain.

80 Chemical agents which should be avoided include paint, adhesives or chemical cleaning agents. Where names or other markings need to be applied using adhesives, advice on how to do this safely should be sought from the helmet manufacturer.

81 Exposure to heat or sunlight can make the shell go brittle. Head protection should never be stored therefore near a window, eg the rear window of a motor vehicle, because excessive heat may build up.

Replacement

82 The head protection should normally be replaced at intervals recommended by the manufacturer. It will also need replacing when the harness is damaged and cannot be replaced, or when the shell is damaged or it is suspected that its shock absorption or penetration resistance has deteriorated - for example when:

(a) the shell has received a severe impact;
(b) deep scratches occur;
(c) the shell has any cracks visible to the naked eye.

Eye protection

Types of eye protection

83 Eye protection serves to guard against the hazards of impact, splashes from chemicals or molten metal, liquid droplets (chemical mists and sprays), dust, gases, welding arcs, non-ionising radiation and the light from lasers. Eye protectors include safety spectacles, eyeshields, goggles, welding filters, face-shields and hoods. Safety spectacles can be fitted with prescription lenses if required. Some types of eye protection can be worn over ordinary spectacles if necessary.

Processes and activities

84 The following are examples of activities and processes involving a risk to the face and eyes for which eye protectors should be used. It is not an exhaustive list.

(a) handling or coming into contact with acids, alkalis and corrosive or irritant substances;
(b) working with power-driven tools where chippings are likely to fly or abrasive materials be propelled;
(c) working with molten metal or other molten substances;
(d) during any welding operations where intense light or other optical radiation is emitted at levels liable to cause risk of injury;
(e) working on any process using instruments that produce light amplification or radiation; and

(f) using any gas or vapour under pressure.

Eye protectors must be provided both for persons directly involved in the work and also for others not directly involved or employed but who may come into contact with the process and be at risk from the hazards.

Selecting suitable eye protection

The selection of eye protection depends primarily on the hazard. However, comfort, style and durability should also be considered.

(a) **Safety spectacles** are similar in appearance to prescription spectacles but may incorporate optional sideshields to give lateral protection to the eyes. To protect against impact, the lenses are made from tough optical quality plastic such as polycarbonate. Safety spectacles are generally light in weight and are available in several styles with either plastic or metal frames. Most manufacturers offer a range of prescription safety spectacles which are individually matched to the wearer.

(b) **Eyeshields** are like safety spectacles but are heavier and designed with a frameless one-piece moulded lens. Vision correction is not possible as the lenses cannot be interchanged. Some eyeshields may be worn over prescription spectacles.

(c) **Safety goggles** are heavier and less convenient to use than spectacles or eyeshields. They are made with a flexible plastic frame and one-piece lens and have an elastic headband. They afford the eyes total protection from all angles as the whole periphery of the goggle is in contact with the face. Goggles may have toughened glass lenses or have wide vision plastic lenses. The lenses are usually replaceable. Safety goggles are more prone to misting than spectacles. Double glazed goggles or those treated with an anti-mist coating may be more effective where misting is a problem. Where strenuous work is done in hot conditions, 'direct ventilation' goggles may be more suitable. However these are unsuitable for protection against chemicals, gases and dust. 'Indirect ventilation' goggles are not perforated, but are fitted with baffled ventilators to prevent liquids and dust from entering. Indirect ventilation goggles will not protect against gas or vapour.

(d) **Faceshields** are heavier and bulkier than other types of eye protector but are comfortable if fitted with an adjustable head harness. Faceshields protect the face but do not fully enclose the eyes and therefore do not protect against dusts, mist or gases. Visors on browguards or helmets are replaceable. They may be worn over standard prescription spectacles and are generally not prone to misting. Face shields with reflective metal screens permit good visibility while effectively deflecting heat and are useful in blast and open-hearth furnaces and other work involving radiant heat.
Maintenance

87 The lenses of eye protectors must be kept clean as dirty lenses restrict vision, which can cause eye fatigue and lead to accidents. There are two methods for cleaning eye protectors. Glass, polycarbonate and other plastic lenses can be cleaned by thoroughly wetting both sides of the lenses and drying them with a wet strength absorbent paper. Anti-static and anti-fog lens cleaning fluids may be used, daily if necessary, if static or misting is a problem. Alternatively lenses can be 'dry' cleaned by removing grit with a brush and using a silicone treated non-woven cloth. However plastic or polycarbonate lenses should not be 'dry' cleaned as the cloth used in this method can scratch them.

88 Eye protectors should be issued on a personal basis and used only by the person they are issued to. If eye protectors are re-issued they should be thoroughly cleaned and disinfected. Eye protectors should be protected by being placed in suitable cases when not in use. Eye protector headbands should be replaced when worn out or damaged.

89 Lenses that are scratched or pitted must be replaced as they may impair vision and their resistance to impact may be impaired. Transparent face shields must be replaced when warped, scratched or have become brittle with age.

Foot protection

Types of safety footwear

90 The following are examples of types of safety footwear:

(a) The safety boot or shoe is the most common type of safety footwear. These normally have steel toe-caps. They may also have other safety features including slip resistant soles, steel midsoles and insulation against extremes of heat and cold.

(b) Clogs may also be used as safety footwear. They are traditionally made from beech wood which provides a good insulation against heat and absorbs shock. Clogs may be fitted with steel toe-caps and thin rubber soles for quieter tread and protection against slippage or chemicals.

(c) Foundry boots have steel toe-caps, are heat resistant and designed to keep out molten metal. They are without external features such as laces to avoid trapping molten metal blobs and should have velcro fasteners or elasticated sides for quick release.

(d) Wellington boots protect against water and wet conditions and can be useful in jobs where the footwear needs to be washed and disinfected for hygienic reasons, such as in the food industry. They are usually made from rubber but are available in polyurethane and PVC which are both warmer and have greater chemical resistance. Wellington boots
can be obtained with corrosion resistant steel toe-caps, rot-proof insoles, steel midsoles, ankle bone padding and cotton linings. They range from ankle boots to chest-high waders.

(e) **Anti-static footwear** prevents the build up of static electricity on the wearer. It reduces the danger of igniting a flammable atmosphere and gives some protection against electric shock.

(f) **Conductive footwear** also prevents the build up of static electricity. It is particularly suitable for handling sensitive components or substances (eg explosive detonators). It gives no protection against electric shock.

### Processes and activities

91 The following are examples of activities and processes involving risks to the feet. It is not an exhaustive list.

(a) **Construction**: Work on building and demolition sites will usually require safety footwear to protect the feet against a variety of hazards, particularly objects falling on them, or sharp objects (eg nails) on the ground piercing the shoe and injuring the sole of the foot.

(b) **Mechanical and manual handling**: There may be a risk of objects falling on or crushing the front of the foot. There may be a risk of a fall through slipping which could result in damage to the heel on impact. There is also a danger of treading on pointed or sharp objects which can penetrate the shoe and injure the sole of the foot.

(c) **Electrical**: People who work where there are flammable atmospheres should wear anti-static footwear to help prevent ignitions due to static electricity. Such footwear is similar to conventional footwear in that the soles are sufficiently insulated to give some measure of protection against electric shock.

(d) **Thermal**: Working in cold conditions requires footwear with thermal insulation. Work in hot conditions requires footwear with heat-resistant and insulating soles.

(e) **Chemical**: Footwear provided when working with hazardous chemicals should be both impermeable and resistant to attack by chemicals.

(f) **Forestry**: Forestry chain-saw boots are water-resistant and are part lined with Kevlar which strands on contact with the chain causing it to stop.

(g) **Molten substances**: Foundry boots that are easily removed should be provided where there is a danger of splashing by molten substances.
Selecting suitable foot protection

93 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.

94 Generally, safety footwear should be flexible, wet resistant and absorb perspiration. Inflexible or unnecessarily bulky footwear will result in tired feet and legs. Boots and not shoes are required where ankles need protection. You should consider the ability of the footwear to resist corrosion, abrasion and industrial wear and tear. Always follow the manufacturer's instructions and markings for appropriate use and level of protection.

(a) Soles: Work shoes and boots should have treded soles for slip-resistance. Soles can be heat and oil resistant, slip resistant, shock resistant, anti-static or conductive. Footwear intended to protect against oils, solvents or liquids need soles that are moulded or bonded to the upper. Soles that are stitched or glued may separate and expose the foot to hazard. Footwear with steel midsoles should be used where there is a risk that the sole could be pierced by nails and similar objects.

(b) Steel toe-caps: They should be capable of resisting a heavy sharp object falling from a considerable height. Footwear complying with the current British Standard will offer this resistance.

(c) Heat resistance: Leather or other heat resistant materials can be used in safety footwear to offer protection against heat, sparks and molten metal.

(d) Waterproofing: People working in wet places should wear safety footwear impervious to water. Rubber and PVC are suitable inexpensive water-proofing materials for footwear but they are not permeable. There are 'breathable materials' which are water resistant, but which also allow air to get through and perspiration to get out, and may therefore be more comfortable and more hygienic. However, footwear manufactured from this type of material tends to be more expensive.

95 Electrical hazards: The following provide protection against electrical hazards.

(a) Anti-static footwear: Anti-static footwear offers suitable protection against the hazard of static electricity and will give some protection against mains electric shock. Anti-static footwear must be worn where there is both a hazard from static build up and the possibility of contact with mains electricity. The soles must have a resistance low enough to allow static electricity to leak slowly away while maintaining enough resistance to protect against a 240 volt mains electricity shock.

(b) Conductive footwear offers greater protection against static electricity and is used where the wearer handles very sensitive components or materials. **It must not be worn where there is a danger of electric**
shock. The soles of conductive footwear must have an electrical resistance low enough to enable static electricity to be taken quickly away from the body to the earth.

96 Leg protection: The following are examples of leg protection.

(a) People working around molten metal need protection for their lower legs. For example this can be achieved by the use of foundry boots and gaiters, or a high foundry boot worn inside molten metal protective trousers.

(b) Hard fibre or metal guards should be used to protect shins against impact. The top of the foot up to the ankle can be protected by added-on metatarsal guards.

Maintenance

97 Safety footwear should be maintained in good condition, checked regularly and discarded if worn or deteriorated. Laces should be checked and replaced if necessary. Materials lodged into the tread should be removed. The stitching should be checked for loose, worn or cut seams. Spraying the upper layers of new footwear with a silicone spray or applying a protective wax will give extra protection against wet conditions.

Hand and arm protection

Types of hand protection

98 Gloves of various designs provide protection against a range of industrial hazards, including:

(a) cuts and abrasions;
(b) extremes of temperature, hot and cold;
(c) skin irritation and dermatitis;
(d) contact with toxic or corrosive liquids.

which it is constructed. Barrier creams may sometimes be used as an aid to skin hygiene in situations where gloves cannot be used. Experience shows, however, that barrier creams are less reliable than suitable gloves as a means of chemical protection.

Processes and activities

100 The following processes and activities involve risk of injury to the hands or hazards for which hand protection may be necessary. It is not an exhaustive list.

(a) Manual handling: Hands may be pierced by abrasive, sharp or pointed objects or damaged by impact when handling goods. However, gloves should not be worn when working near moving equipment and
machinery parts as the glove may get caught in the equipment and draw the hand and arm of the worker into the moving machinery.

(b) **Vibration:** Gloves are essential to keep hands warm in cold weather when operating machines that cause vibrations such as pneumatic drills and chain-saws. Vibration White Finger occurs more frequently and more severely when the hands and fingers are cold as the blood supply to the fingers is reduced by the body in an attempt to conserve heat.

(c) **Construction and outdoor work:** Keeping the hands warm and supple in cold weather is important when working on a building site handling scaffolding, bricks and timber. Manual dexterity is lost when the hands are cold, which can lead to accidents if articles are dropped. Gloves protect against hazards in site clearance such as previous contamination of soil which may contain disease spores that may seriously infect small cuts and abrasions.

(d) **Hot and cold materials:** Gloves will also protect against hazards from handling hot or cold materials and work involving contact with naked flames or welding.

(e) **Electricity:** Danger from electric shock.

(f) **Chemical:** There are many tasks where the hands may come into contact with toxic or corrosive substances. Examples include maintenance of machinery, cleaning up chemical spillages and mixing and dispensing pesticide formulations. If correctly selected and used, gloves provide a barrier between the wearer's skin and the harmful substance, preventing local damage, or in some cases absorption through the skin.

(g) **Radioactivity:** Danger from contamination when handling radio-active materials

**Selecting suitable hand protection**

102 Gloves or other hand protection should be capable of giving protection from hazards, be comfortable and fit the wearer. The choice should be made on the basis of suitability for protection, compatibility with the work and the requirements of the user. You should consider the ability of protective gloves to resist abrasion and other industrial wear and tear. Always follow the manufacturer's instructions and markings for appropriate use and level of protection. When selecting gloves for chemical protection, reference should be made to chemical permeation and resistance data provided by manufacturers.

(a) **Penetration and abrasion:** Gloves made from chain-mail or leather protect against penetration and abrasion. Gloves made from knitted Kevlar will provide protection against cuts and gloves manufactured from Kevlar needlefelt gives good puncture resistance.

(b) **Thermal protection:** Depending upon their weight and construction, terrycloth gloves will provide protection against heat and cold. Gloves made from neoprene are good for handling oils in low temperatures.
Gloves manufactured from other materials such as Kevlar, glass fibre and leather can be used to provide protection at higher temperatures.

(c) **Fire resistance:** Chromed leather gloves are fire retardant.

(d) **Chemicals protection:** Chemical protective gloves are available in a range of materials including natural rubber, neoprene, nitrile, butyl, PVA, PVC and viton. The degree of protection against chemical permeation depends on the glove material, its thickness and method of construction. As a general rule, gloves for use in handling toxic liquids should be chosen on the basis of breakthrough time. This means that the duration of use should not exceed the breakthrough time quoted by the manufacturer of the glove for the chemical substance concerned. Laboratory testing may be required in order to establish adequacy in some applications. When handling dry powders, any chemically resistant glove may be used. The durability of the gloves in the workplace should also be considered. Some glove materials may be adversely affected by abrasion.

(e) **General use gloves:** Rubber, plastic or knit fabric gloves are flexible, resist cuts and abrasions, repel liquids and offer a good grip. Rubber gloves allow a sensitive touch and give a firm grip in water or wet conditions. Leather, cotton knit or other general purpose gloves are suitable for most other jobs. General use gloves should only be used to protect against minimal risks to health and safety (e.g., for gardening and washing up and similar low risk tasks).

**Maintenance**

103 Care should be taken in the donning, use, removal and storage of protective gloves. They should be maintained in good condition, checked regularly and discarded if worn or deteriorated. Gloves should be free of holes or cuts and foreign materials and their shape should not be distorted. They should fit the wearer properly leaving no gap between the glove and the wearer's sleeve.

104 Gloves should always be cleaned according to the manufacturer's instructions as they may have particular finishes which may make the following general guidance inappropriate. For example, repeated washing may remove fungal and bacterial inhibitors from the lining of the glove which may ultimately lead to skin irritation. And there is also the risk of cross contamination as chemical residues can remain on the gloves even after washing.

105 Contact between the gloves and chemicals should be kept to a minimum as some chemicals can alter the physical characteristics of a glove and impair its protective properties. Gloves contaminated by chemicals should be washed as soon as possible and before their removal from the hands. Grossly contaminated gloves should be discarded. Gloves contaminated on the inside can be dangerous as the chemical contamination will be absorbed by the skin. Wear armlets if there is a danger of chemicals entering the glove at the cuff.
106 When wearing protective gloves do not touch other exposed parts of the body, equipment or furniture as contamination can be transferred to them. Cotton liners can be worn if hands sweat profusely.

Care for the hands when handling chemicals

107 Do not let chemicals come into contact with the skin. Wash hands frequently, dry them carefully and use a hand cream to keep the skin from becoming dry through loss of natural oils. Keep cuts and abrasions covered with waterproof plasters and change the dressing for a porous one after work. Handle and remove gloves carefully to avoid contamination of hands and the insides of the gloves.

Protective clothing for the body

Types of protection

108 Types of clothing used for body protection include:
   (a) coveralls, overalls and aprons to protect against chemicals and other hazardous substances;
   (b) outfits to protect against cold, heat and bad weather;
   (c) clothing to protect against machinery such as chain-saws.

109 Types of clothing worn on the body to protect the person include:
   (a) high visibility clothing;
   (b) life-jackets and buoyancy aids.

Processes and activities

110 The following are examples of the sorts of processes and activities that require protective clothing for the body. It is not an exhaustive list.
   (a) Laboratory work or work with chemicals, dust or other hazardous substances;
   (b) construction and outdoor work;
   (c) work in cold-stores;
   (d) forestry work using chainsaws;
   (e) highway and road works;
   (f) work on inland and inshore waters;
   (g) spraying pesticides;
   (h) food processing;
   (i) welding;
   (j) foundry work and molten metal processes;
   (k) fire-fighting.
Selection

112 Protection from chemicals and hazardous substances:

(a) **Low risk chemicals** can be protected against by wearing chemical-resistant clothing, coveralls and laboratory coats made from uncoated cotton or synthetic material such as nylon or Terylene with a water repellent finish.

(b) **Strong solvents, oils and greases** require heavier protection afforded by coats, overalls and aprons made from neoprene or polyurethane coated nylon, or Terylene or rubber aprons.

(c) **Chemical suits** protect against more potent chemicals. They are totally encapsulating suits which are either vapour-proof or liquid-splash proof and are fed with breathable air. They must be washed in warm water and a mild soap whenever they have come into contact with chemicals. The suit should be hung up to dry before being stored in cases or hung on hangers. Chemical suits have a life expectancy of three to four years and should be inspected every three months even if not in use. This entails an air test and looking at all of the seams.

(d) **Vapour suits** protect against hazardous vapours and are made of butyl, polyvinyl chloride (PVC), viton, a combination of viton and butyl or teflon. They should be air-tested with the manufacturer's test kit, before being stored in a protective case. Manufacturers of vapour proof suits generally provide a testing and repair service consisting of a visual inspection and air test.

(e) **Splash-resistant suits** are also made from the same polymers but may also be made of limited-use fabrics such as saran coated tyvek and barricade fabric.

(f) **Fibres and dust**: Protection can be obtained by wearing suits made from bonded olefin that forms a dense shield which keeps out fibres and particles.

113 Thermal and weather protection:

(a) **Keeping dry**: Jackets, trousers and leggings made with PVC coated nylon or cotton will offer protection against rain. These materials are also resistant to abrasions, cracking and tearing and will protect against most oils, chemicals and acids. 'Breathable' water-proof fabrics will keep out water while allowing body perspiration to escape. Waxed cotton will also protect against rain.

(b) **Keeping warm**: Minus 25 and Minus 50 suits are available which are guaranteed to protect at these respective sub zero temperatures. More limited protection can be obtained from quilted and insulated coats and vests.

(c) **Keeping cool**:

(i) Aluminium-asbestos clothing made of dust-suppressed materials is heat-resistant. The outside is made of aluminium and the
inside lining is cotton. This type of clothing is suitable for hot work, for example in foundries.

(ii) Welding and foundry clothing is flame retardant and is mainly of flame retardant cotton or wool materials. Chrome leather is used for aprons etc.

(iii) Molten metal splash clothing is heat resistant and should resist molten metal splash up to 1600 degrees centigrade.

(iv) Cotton or cotton and polyester coveralls with flame-retardant finishes are available to protect against sparks and flame.

114 **Food processing:** Food quality overalls and coveralls will protect against splashes from oils and fats. Butchers and slaughterhouse workers should wear lamex or chain-mail aprons if there is a risk of injury to the abdomen or chest, for example when using knives or choppers.

115 **Chainsaw protective clothing:** The front of the leg is most vulnerable to chainsaw accidents although the back of the leg is also at risk. Protective legwear incorporates layers of loosely woven long synthetic fibres. On contact with the saw chain, the fibres are drawn out and clog the chainsaw sprocket, causing the chain to stop. Legwear is available with all-round protection or with protection only for the front of the legs. The legwear with all-round protection offers the greatest protection for users. Jackets and gloves are also available with inserts of chainsaw resistant materials at vulnerable points. See paragraph 91(f) in the section on chainsaw boots.

**Personal protection worn on the body**

**High visibility clothing**

116 This is made from PVC impregnated with fluorescent pigments. This should be worn by workers on roadsides and other areas where it is important to be seen to be safe. There are three British Standard grades of high visibility clothing:

(a) Class A refers to coats and jackets offering the highest degree of conspicuousness.

(b) Class B refers to waistcoats and tabards and offers a lower level of conspicuousness.

(c) Appendix G is concerned with exposure to a particular risk such as that faced by road workers.

**Personal buoyancy equipment**

118 Life-jackets or buoyancy aids should be worn where there is a foreseeable risk of drowning when working on or near water.

(a) **A life-jacket** is a personal safety device which, when fully inflated (if inflatable), will provide sufficient buoyancy to turn and support even an unconscious person face upwards within five seconds (ten seconds if
automatically inflated). The person's head will be supported with the mouth and nose well clear of the water.

Some people are reluctant to wear life-jackets as they find them bulky and restrictive. However, either an automatically inflatable life-jacket or a type which is inflated by a manual pull-cord should overcome these problems. These are usually compact and allow for a full range of movement.

(b) **Buoyancy aids** are worn to provide extra buoyancy to assist a conscious person in keeping afloat. However, they will not turn over an unconscious person face down position.

**Maintenance**

> 119 Protective clothing should only be used for the purpose intended. It should be maintained in good condition and checked regularly. It should be repaired or discarded if damaged.