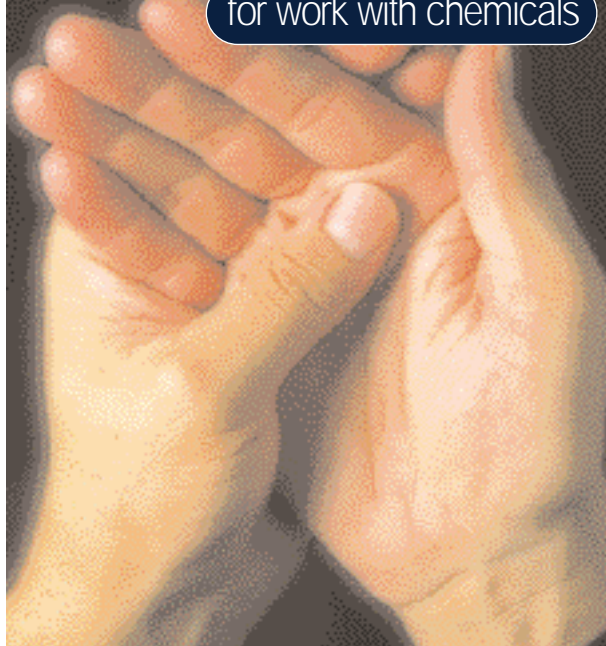


Selecting

protective gloves

for work with chemicals



Guidance for employers and health and safety specialists

Introduction

UK industry spends about £30 million a year buying chemical protective gloves to use as personal protective equipment (PPE). Such gloves are available in a wide selection of natural and synthetic materials and range in price from 25p to £60 a pair (March 2000).

This leaflet provides practical advice to employers and self-employed people on how to select the best chemical protective gloves to withstand exposure to chemical agents and so meet the prime requirement of PPE,¹ which is to protect the wearer.

All liquids, solids, gases, vapours, aerosols, fumes, dusts and fibres are chemical agents. They are called chemical agents to distinguish them from biological agents (such as micro-organisms) and physical agents (such as noise, vibration and friction).

Managers, supervisors, employees, health and safety professionals, safety representatives and trade union representatives will also find this leaflet useful.

The law

The law requires that employers make a suitable and sufficient assessment of the risks to health from exposure to chemical agents at work. This is covered by the Health and Safety at Work etc Act 1974 (HSW Act)¹ and the Control of Substances Hazardous to Health Regulations 1999 (COSHH).²

If it can be clearly shown that:

- there are situations at work where risks to health and safety are unavoidable; and
- methods of control other than protective gloves are not reasonably practicable;

employers have further legal duties to provide suitable protective gloves to any employee who may be exposed to such risk.³ Any protective gloves provided must be manufactured to the appropriate standard and be compatible with:

- the wearer;
- the work to be done;
- any other PPE to be worn, such as aprons, overalls or shoes.

Chemical resistance of protective gloves

Protective gloves are available in a wide range of natural and synthetic materials; however, there is no single glove material (or combination of glove materials) able to provide unlimited resistance to any individual or combination of chemical agents. There are three ways in which any protective glove will, at some stage, fail to protect the wearer from exposure to any chemical agent and these are:

permeation – the process by which a chemical agent migrates through the protective glove at a molecular level;

penetration – the bulk flow of a chemical agent through closures, porous materials, seams and pinholes or other imperfections in the protective glove;

degradation – a damaging change in one or more physical properties of the protective glove as a result of exposure to a chemical agent.

Selecting suitable protective gloves

The selection of suitable protective gloves is a complicated procedure and the degree of protection they give is not always easy to establish. When choosing gloves, always seek expert help from the manufacturer/distributor of the chemical agent or glove. They are best placed to provide you with glove performance test data which can be used to assist in predicting the permeation, penetration and degradation of specific glove materials by specific chemical agents.

There are four requirements which must be met for any protective glove selected to be suitable. The glove must:

- be appropriate for the risk(s) and the conditions where it is used;
- take into account the ergonomic requirements and state of health of the person wearing it;
- fit the wearer correctly, if necessary, after adjustments;
- either prevent or control the risk involved without increasing the overall risk.

Proper selection should therefore take into consideration the wearer, the workplace conditions and the protective glove. Employees need to be trained in the correct way to put on, wear and then take off protective gloves to ensure maximum protection. There should be adequate facilities for disposal of contaminated protective gloves.

If protective gloves are selected or worn incorrectly there is every possibility that this may increase the wearer's overall risk to health because:

- contaminant may get inside the glove to reside permanently against the skin which could cause greater exposure than if a glove had not been worn at all; or,
- wearing a glove for extended periods can lead to the

development of excessive moisture (sweat) on the skin which in itself will act as a skin irritant; or,

- wearing gloves manufactured in natural rubber (latex) can cause an allergenic reaction in susceptible individuals, causing the skin disease contact urticaria to occur.

Selecting protective gloves must be part of an overall health and safety risk assessment for the job to be done. The risk assessment must clearly demonstrate that exposure to the health and safety risk is unavoidable and that other methods of control are not reasonably practicable.

Remember that gloves should be used as a control measure only as a last resort¹ and where other methods of control are not reasonably practicable. This is because:

- gloves only protect the wearer – they do not remove the contaminant from the workplace environment;
- some types of glove are inconvenient and interfere with the way people work;
- wearing gloves interferes with the wearer's sense of touch;
- the extent of protection depends upon good fit and attention to detail;
- if protective gloves are used incorrectly, or badly maintained, the wearer may receive no protection;
- for glove design to be effective, the glove needs to be used correctly in the workplace.

Because glove selection is a complex issue, employers and others responsible for selection will inevitably demand a simple, easy-to-read guide. Table 1 gives a simple guide to selection to help with glove material choice.

Table 1 recommends the **most suitable** glove materials to protect wearers from exposure. The importance of using a material depends on the extent of exposure. For chemical groups such as strong acids, only one choice of glove material is identified as most suitable, whereas a range of materials may be suitable for other chemical groups such as weak acids. Where there is a choice of glove material, the extent of exposure to the chemical agent will be a significant factor in choosing between, for example, a neoprene glove or a less costly natural rubber

| Chemical group | Glove material | | | | | |
|---|----------------|----------------|-----------|-----|-------|--------|
| | Natural rubber | Nitrile rubber | Neoprene™ | PVC | Butyl | Viton™ |
| Water miscible substances, weak acids/alkalis | ✓ | ✓ | ✓ | ✓ | - | - |
| Oils | - | ✓ | - | - | - | - |
| Chlorinated hydrocarbons | - | - | - | - | - | ✓ |
| Aromatic Solvents | - | - | - | - | - | ✓ |
| Aliphatic solvents | - | ✓ | - | - | - | ✓ |
| Strong acids | - | - | - | - | ✓ | - |
| Strong alkalis | - | - | ✓ | - | - | - |
| PCBs | - | - | - | - | - | ✓ |

glove. If workers' gloves are significantly contaminated for extended periods, the neoprene glove may be required. If, however, there is only occasional splashing of chemical onto the glove, then the less costly natural rubber glove may be adequate.

Other factors to consider are the manual dexterity required for the job and required length of the glove (ie do you need gauntlets?). If workers cannot do their job because the glove material is too thick or stiff, then they may decide not to wear them.

Always remember that if the inner surface of a glove becomes contaminated, it will not matter how much care, attention and expertise has gone into the selection process – exposure will occur. If, for example, you have to take off your contaminated gloves temporarily, your hands may become contaminated from handling the gloves. If you then put the same pair of gloves back on again, you could transfer the chemical contaminant to the inside surface of the glove. To prevent this, you should wash the gloves thoroughly before taking them off.

Remember that:

To protect the wearer,
gloves must be used properly!

Further reading

Health risks management: A guide to working with solvents HSG188 1999
HSE Books ISBN 0 7176 1664 9

Latex and you INDG320 2000 HSE Books

HSE will publish further guidance on dealing with skin exposure in early 2001:

Assessing and managing risks at work from skin exposure to chemical agents

Cost and effectiveness of chemical protective gloves

Choice of skin care products for the workplace: Guidance for employers and health and safety specialists

References

- 1 *The Health and Safety at Work etc Act 1974*
HMSO 1974 ISBN 0 10 543774 3
- 2 *General COSHH ACOP and Carcinogens ACOP and Biological agents ACOP. Control of Substances Hazardous to Health Regulations 1999 Approved Codes of Practice* L5 1999
HSE Books ISBN 0 7176 1670 3
- 3 *Personal protective equipment at work. The Personal Protective Equipment at Work Regulations 1992 Guidance on Regulations* L25 1992
HSE Books ISBN 0 7176 0415 2

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This leaflet contains notes on good practice which are not compulsory but which you may find helpful in considering what you need to do.

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