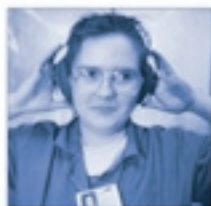


# Health and Safety



Interactive links to articles can be accessed from the contents on page 5

ESSENTIALS



# INTRODUCTION



**T**he AEEU has a proud tradition of upholding policies and systems that are essential in maintaining safe and secure workplaces. Over the years we have published many leaflets and books on various aspects of health and safety. This latest publication is new in both format and approach in dealing with everyday and more complex safety problems.

In this booklet we have included major industries, while not ignoring smaller enterprises that have problems of equal gravity. As time has moved on, much of the older legislation has

been repealed and replaced with new regulation. With this in mind, we have put an abbreviated version of the most relevant legislation into this publication. The law is constantly changing and updates are published in the Union News, the AEEU's quarterly journal. Health and Safety Essentials is available for downloading on the AEEU website at [www.aeeu.org.uk](http://www.aeeu.org.uk), or further copies are available from head office on: 020 8462 7755 ext 436.

As your interest broadens, so will your information sources need to expand. Therefore a network of people dedicated to health and safety issues is now in place. The network is responsible for all aspects of safety training, information dissemination, National representation on various official bodies and committees, and most importantly listening to what our safety representatives want, and responding to their wishes.

We hope that you find this book useful. If you need advice remember we are only a phone call, fax, e-mail, or letter away. Keep in touch, together we can make workplaces safer.

Best wishes,

A handwritten signature in black ink, appearing to read 'Ken Jackson', written in a cursive style.

Sir Ken Jackson  
General Secretary  
AEEU

## CONTENTS: CHAPTER FOUR

### General hazards in the manufacturing workplace

Interactive links to other document sections can be accessed from the document contents list below.

Document: H+S One  
**Safety Representatives and Safety Committees**

Document: H+S Two  
**The construction industry**

Document: H+S Three  
**Office hazards**

Document: H+S Five  
**Protection of eyes**

Document: H+S Six  
**Temperature**

Document: H+S Seven  
**Maintenance hazards**

Document: H+S Eight  
**Health and safety law Part 1 & Part 2**

## 4 • General hazards in the manufacturing workplace

Skin hazards	8
Mechanical damage	9
Corrosive substances	9
Physical agents	10
Solvents	10
Prevention	11
Protection: gloves	12
Mineral oils	14
Epoxy resin	18





# CHAPTER FOUR

## General hazards in the manufacturing workplace

### Skin hazards

Nearly a million working days are lost per year due to injury to workers' skins from burns, cuts, abrasions, work-induced skin cancer and dermatitis. The many causes of injury include:

- (a) Mechanical damage due to injury, friction or pressure
- (b) Corrosive substances e.g. acids and alkalis
- (c) Solvents
- (d) Oils and petroleum products
- (e) Resins
- (f) Physical agents e.g. heat, cold, sunlight, radiation

The face, neck, hands and forearms are most affected because they are the most exposed, and thus most easily contaminated. But, other areas can be affected if they are in contact with tight, contaminated clothing.

The skin is the largest organ of the body – the total skin area of an average person is about 100 square feet and the skin can provide natural protection, as long as it is not damaged by cuts or subjected to irritation or injury.

Many substances can, in contact with the skin, cause irritation. The resulting condition (known as dermatitis) may be just a reddening of the skin with a mild itching, a rash, or in some cases, open weeping sores.

Substances that cause dermatitis can be gases, liquids or solids. Workers dealing with plating, adhesives, solvents, enzymes, detergents, photographic developers, bleachers or paints are at risk. Solvents used for degreasing and other cleaning operations will remove the skin's natural oils leaving it unprotected.

Some chemicals not only irritate the skin, but also cause an allergic rash. This is called 'sensitisation'. Sensitised workers can develop a severe reaction if subsequently exposed to even a tiny amount of the chemical involved.

## Mechanical damage

This includes cuts and grazes caused by sharp edges, splinters or fragments. Friction or pressure on parts of the skin can also cause blisters, 'friction burns' and patches of hard skin. Besides being painful, any breaks in the skin can allow infections and chemicals to get in. These hazards can be avoided by improved work systems, the use of guards and protective equipment.

## Corrosive substances

Some chemicals, such as strong acids and alkalis, cause chemical burns when in contact with skin that are very similar to those caused by heat. Both destroy skin tissue. Corrosive chemicals cause damage until removed or neutralised or the corrosive reaction is complete. Corrosive-resistant protective clothing and ventilation are needed to prevent chemical burns.

The first treatment for every chemical burn is to flood the affected area as quickly as possible with water; even a few seconds delay can be very serious. Contaminated clothes should be taken off immediately. It is extremely important that emergency showers are available near to where they might be required, for example chemical manufacture.

Eye burns are very serious and no time should be lost in washing with large quantities of water; preferably by a properly designed eyewash fountain using large amounts of low-pressure water because a forceful jet could cause mechanical damage.

To prevent infection of the wound, loss of body fluid and shock medical attention should be sought for treatment of all but the most trivial of burns. Corrosive chemicals need not necessarily be liquids – they can also be gases or solids.

## Physical agents

Burns can also be caused by extreme heat, cold (frostbite) and radiation, including sunlight. People working in hot conditions may suffer from heat rashes caused by blocked skin pores and friction. Overexposure to the natural radiation in sunlight can even cause skin cancer. Protective equipment should be provided to prevent skin contact with hot surfaces or radiations, for example ultra violet light.

## Solvents

Solvents are used to clean things by dissolving grease and oils. They will also dissolve the protective coating of oil in the skin when in direct

contact. Unfortunately, the more efficient the solvent, the more harmful it is to your skin. Many substances act as solvents: water, soaps, detergents, metal degreasers, cleaning fluids and thinners. Direct contact between skin and solvent should be avoided by using impermeable protective clothing and good ventilation to get rid of vapours. Strong solvents are the most damaging to the skin, so the weakest solvent that will still do the job should be used. Never use solvents to clean oil etc. off your skin. After cleaning with a mild soap, conditioning cream will replace natural oil in the skin and prevent chapping.

Oils and petroleum products also act as solvents or have solvents added to them. The most serious effect on the skin is cancer, but dermatitis and acne are also caused by skin contact with these. More information about mineral oils is given in example 1, page 8.

Resins, both natural and synthetic, are among many hundreds of chemicals that cause skin irritation or sensitisation. Epoxy resins can irritate the skin and can cause an allergic reaction in some workers. These problems and precautions that should be taken, are common to many chemicals and are covered in example 2, page 12.

## Prevention

Preventing skin damage entails controlling exposure to any of the above harmful agents either by selecting a less harmful substance or changing working methods, by isolating the operators by use of protective clothing or by ensuring high standards of personal hygiene.

More damage can be done to workers' hands by removing contaminants after work than by anything else, where strong solvents are

used to clean up. Only mild soaps and special cleansers should be used. Cleansing is a balancing act: try to remove the contamination without removing all the natural oil in the skin. After cleansing clean towels or hot air driers should be provided and conditioning creams help to replace natural oil in the skin.

### Protection: gloves

For complete protection, guards, enclosures and mechanical handling devices may be necessary for safe working with damaging substances. Personal protection should be regarded as a second line of defence, but where necessary, it should be the correct type.

Gloves are the most common form of protection against skin diseases. Guidance in the Personal Protective Equipment (PPE) at Work Regulations 1992 gives details of processes and activities that involve risk of injury to hands with an explanation of suitable protection and standards for gloves.

Among the main types are heat resistant leather, chrome leather and asbestos-substitute for intensely hot work. Where there is a risk of severe abrasions and cuts, chrome leather reinforced with chain mail mesh is necessary. For work involving acids, alkalis and other corrosive oils and solvents, gloves made from PVC, natural rubber, Neoprene or Nitrile should be used. Expert advice should be obtained on the right type of glove for the job, including, where necessary, when to replace disposable gloves and methods of repair and use of non-disposables. When working with toxic substances that can be absorbed through the skin, particular

attention should be paid to permeability and 'break through' times for protective gloves.

The PPE Regulations and Guidance also cover:

- (a) Application to non-employees i.e. school self-employed workers (Reg 3), children on work experience and trainees
- (b) Appropriateness of the PPE to suit the job, ergonomic requirements and state of persons health, to fit the wearer correctly (Reg 4)
- (c) Compatibility of different sorts of PPE (Reg 5)
- (d) Employers to make an assessment of risks and select 'suitable' protection (Reg 6)
- (e) Employers must ensure that all PPE is maintained, cleaned or replaced as appropriate, in efficient working order and in good repair (Reg 7)
- (f) Accommodation to be provided for PPE to protect it from contamination, dirt, loss or damage (Reg 8)
- (g) Employers to provide employees with information and training about why PPE is being used and how it should be used and how to maintain it (Reg 9)
- (h) Employers to ensure that PPE is used properly. It is not enough just to make PPE available (Reg 10)
- (i) Employees to report loss or defect of PPE (Reg 11).

There have always been doubts about the degree of protection given by barrier creams. Some swear by them, others contend that they are ineffective or even harmful if they give a false sense of security or are used as a cheap alternative to more expensive forms of protection. There are so many complex creams manufactured that expert advice is necessary to choose the right type for the particular job. The companies that

manufacture barrier creams supply dozens of different types. Some of them supply a skin care service to give advice and meet specialist needs.

Two examples of common skin hazards are outlined: mineral oils and epoxy resins. Both illustrate general preventive principles, which can be applied to the prevention of skin-disease.

## Mineral oils

Millions of workers run the risk of skin health problems like acne and dermatitis from mineral oils. There is also a risk (to a lesser degree) of scrotal cancer and to respiratory health from inhalation of oil mists.

'Mineral oil' is used to describe all oil extracted from the earth, such as petrol, white spirit, paraffin, diesel oil, lubricating oil, paraffin wax, asphalt and bitumen. All mineral oils present some danger to health.

### Types of oil

Apart from fuel, the commonest use of oil in industry is for cooling and lubricating the cutting edges of tools and to prevent heat welding the metal and the tool tip together. Oils are used in turning, grinding, milling and honing, and for the working of different metals.

Cutting oils are used either neat or as an emulsion in a watery medium. These oils may be blended with vegetable or animal oil, and additives may also be used. Some of these additives may also present problems. Soluble oils are mixtures of oils and emulsifying agents such as petroleum soaps. With constant use increasing quantities of breakdown substances form in the high temperature zone between the cutting tool and the

workpiece. Some of these substances may have cancer-inducing properties.

The concentration of carcinogenic substances in mineral oils can be reduced by solvent refining: washing oils in petrol, benzene or other solvents. This reduces the concentration of carcinogens, but solvent washed oils are not entirely safe. Breakdown products will still build up over a period of time, additives may be present that are harmful or can cause sensitisation, and the danger of dermatitis is always present.

#### Skin hazards

The mineral oils such as paraffin, naphtha, diesel and other lubricating light oils are more likely to provoke dermatitis and acne rather than skin cancer (affecting the hands and arms). However, cutting oils present a greater risk, particularly neat oils and unrefined oils. The latter are often used for cheapness, but are less safe than solvent washed oils.

Whatever type of oil is used, the degree of risk is increased by greater contact of the oil with the skin. For example, operators of certain types of machines are liable to have hands and arms continually exposed to cutting oils. The outer layer of the skin is softened, broken down, and the way opened for infections.

Other parts of the body may be contaminated by splashes or contact with machines, particularly the lower half of the body that can be affected by oil-soaked overalls. When a male operator bends over or straddles machines, his scrotum can be at risk from contamination. The keeping of oily 'wipers' in trouser pockets and failure to wash oily hands before going to the lavatory, are common ways in which the lower parts of the body can be exposed to oil.

Although cancer of the scrotum is an uncommon disease, it is invariably cured by prompt treatment. The first stage, a rough patch of skin or wart on the scrotum, requires immediate medical attention. The fatality rate amongst those who contract cancer of the scrotum is high because many fail to report to their doctors early. The rate of cure is over 90 per cent in cases diagnosed early. Women can also develop genital cancer from contact with mineral oils. Precautions apply to everyone working with these oils.

#### Other hazards

Working in oily conditions frequently means being exposed to oil mist. This can be produced from a machining process itself; from the fumes given off at the cutting point (which contain breakdown products of the oil itself); from air compressors; and from lubrication systems that deliberately produce a spray of coolant directed onto the workpiece. The breathing of oil mists and fumes not only gives rise to coughs, sore throat, and other respiratory problems. It also increases the risk of cancer of the lung. Control of oil mist entails either preventing the formation of mists or controlling its release into the atmosphere, for example by using local exhaust ventilation.

#### Prevention

The first approach must be prevention of physical contact with the substance, ensuring that machinery is provided with adequate splashguards, which prevent oil being thrown onto the operator. Guards should provide total enclosure with effective sealing to prevent leakage from the guarded area.

Where this is difficult to achieve, protective clothing must be used, particularly to prevent contamination of the lower parts of the body. Protective equipment is often clumsy and uncomfortable, but where oil contamination cannot be combated by other means, it may be the only answer.

Regular solvent dry cleaning of overalls and rags is also essential. In contrast to ordinary washing, this can remove most of the oil from a contaminated garment. Weekly issue of dry cleaned overalls is recommended for all persons exposed to oil.

Washing facilities (and sometimes showers) must be provided together with a suitable range of waterless hand cleaners. On no account should hands be washed in oil or suds. The use of barrier creams on hands and forearms is a useful preventive measure. However, care should be taken to make sure that the correct type is provided in relation to the oil in use. Hand conditioning creams should also be available for use after washing.

Finally, periodic medical examinations have proved useful in the past in detecting problems at an early stage. If any health problem is suspected, medical advice should be sought immediately.

There are four golden rules for safe working with oil:

- (a) Make use of protective facilities, clothing, splash guards, impermeable aprons, barrier creams
- (b) Change into working clothing and make sure that overalls are cleaned regularly
- (c) Pay attention to personal cleanliness: wash your hands before going to the toilet, as well as afterwards, and wash your genital areas regularly

- (d) Obtain immediate first-aid treatment for all skin injuries and seek early advice for skin rashes or itching areas

## Epoxy resin

Many AEEU members are exposed to various types of resins and hardeners in their workplace, they are a hazard, but their risks can be controlled by being aware and taking precautions.

The major problem in handling these materials comes from the curing agents used to harden epoxies: some are harmful in themselves and it is from these that most skin related problems arise.

Epoxy resins are divided into two categories: cured and uncured. Most cured resins have little or no toxic effect unless curing is incomplete, when there may be some hazard. With uncured resins there is much more potential danger to anyone handling them. The degree of toxicity of uncured epoxy resins varies, and is partly dependent on the extent of uncreated curing agents. In the case of both cured and uncured epoxy resins, they are dangerous when heated to decomposition, as they emit highly toxic fumes.

### Safety precautions

Whenever undertaken indoors, the mixing of epoxy resins should be carried out only in properly ventilated areas, fitted with extraction fans, or in fume cupboards. Use of prepared mixtures should be confined to areas provided with efficient exhaust ventilation. Whenever the fully cured or hardened material is to be machined (sawn, filed, etc.), the work area should be ventilated effectively.

### Handling techniques

Handling techniques should ensure that no uncured resin or other epoxy material comes in contact with the eyes or skin. The wearing of goggles is strongly advised and it may be necessary to mount a transparent shield between the operator and workpiece. Benches should be covered with replaceable paper for removal and destruction when contaminated. Containers should be kept in a clearly marked-off area. Spillage and the contamination of tools and equipment, or the outsides of containers, should be avoided. If spillage or contamination does occur, the affected area must be cleaned up immediately.

### Protective equipment

Workers should be provided with equipment to minimise personal contact with uncured resins and hardeners. Protective clothing and neoprene gloves suitable for the materials being handled should be worn by those working with such materials. The insides of gloves must be kept clean. Damaged gloves must be replaced. Care is needed to keep cuffs free from contamination and, when necessary, protection should be provided for the sleeves and upper arms. When powder fillers or glass-fibres are in use, clothing should be designed to prevent any risk of these materials lodging between clothing and the skin. Overalls are essential for all operators engaged in continuous processes involving the use of epoxy resin materials, and in some instances, heavy-duty plastic or rubber aprons may be required for added protection. Contaminated clothing should be replaced and thoroughly cleaned before reissue. All the hazards and risks should be identified in a suitable risk assessment only if the risk cannot be reduced by other methods should PPE be used.

### Skin cleaning

If, despite all these precautions, the skin does become contaminated, the affected area should be washed immediately with warm soapy water.

Disposable paper towels or warm air driers should be used for drying.

Special creams should be kept for removing epoxy material still adhering to the skin. Do not use powerful solvents. Routine cleansing of the skin should be carried out thoroughly at the end of each working period and sufficient time allowed for 'cleaning-up' before all break periods.