201: Health and safety in building services engineering  
**Handout 13: Dealing with hazards**

**Learning outcome**

The learner will:

1. Be able to demonstrate and understand the procedures for establishing a safe working environment

**Assessment Criteria**

3.7 describe and demonstrate safe practices and **procedures** for the use of **equipment and materials** in the working environment.

**Range**

**Procedures**: Responsible persons, Competent persons, Safe isolation procedures, Permits to work, Selection and checking correct power tools hand tools or portable electrical equipment.

**Equipment and materials**: Access equipment (PASMA requirements), Portable power tools (e.g. cartridge gun, drills, grinders), Tools and materials storage facilities, Dangerous substances (e.g. cutting compounds and adhesives), Ladders, Use of mobile scaffold towers, Use of signs and guarding.

**Dealing with hazards**

**Dangerous substances**

When working in the building services industry, you will encounter many potentially hazardous substances, all of which can cause you (or others) harm if not dealt with appropriately. You will need to be able to list the relevant hazardous substance in your assessments. These hazardous substances include the following:

* adhesives
* solvents
* lubricants
* jointing compounds
* cleaning agents.

Precautions that should be taken to minimise the risk from hazardous substances include:

* PPE
* ventilation
* risk assessment
* Method Statements
* safe systems of work.

**Adhesives**

Adhesives generally give off hazardous and harmful fumes. For example, the PVC adhesive used to join PVC conduit and accessories can be very dangerous when used in poorly ventilated areas with the possibly of unconsciousness. The adhesive can also cause serious health problems if ingested or if it gets on to the skin.

**Solvents**

A solvent is a substance that dissolves a chemically different liquid, solid or gas, resulting in a solution. A solvent is usually a liquid but can also be a solid or a gas. Common uses for solvents are in:

* dry cleaning fluid
* paint thinners
* nail polish removers and glue solvents
* spot removers
* detergents
* perfumes
* nail polish.

There are a number of hazards associated with solvents, including:

* normally flammable or highly flammable
* some can be explosive
* toxic
* the fumes can cause unconsciousness and death
* some are carcinogenic
* can have environmental effects.

Here are some general precautions.

* Avoid being exposed to solvent vapours by working in a fume hood or with local exhaust ventilation (LEV) or in a well-ventilated area.
* Keep the storage containers tightly closed.
* Never use open flames near flammable solvents; use electrical heating instead.
* Never flush solvents down the drain; read safety data sheets for proper disposal information.
* Avoid the inhalation of solvent vapours.
* Avoid contact of the solvent with the skin – many solvents are easily absorbed through the skin. They also tend to dry the skin and may cause sores and wounds.

**Lubricants**

A lubricant is a substance introduced to reduce friction between moving surfaces. Hazards resulting from lubricants include the following:

* slip hazard, when spilt on surfaces
* dermatitis
* flammability.

Here are some general precautions.

* Never use open flames near flammable lubricants.
* Never flush lubricants down the drain; read safety data sheets for proper disposal information.
* Avoid contact of the lubricant with the skin; wear gloves or barrier cream.

**Cleaning agents**

Cleaning agents are substances – usually liquids – that are used to remove dirt, including dust, stains, bad smells and clutter on surfaces. The purposes of cleaning agents include: health, beauty, removing offensive odours and avoiding the spreading of dirt and contaminants to oneself and others. Some cleaning agents can kill bacteria and clean at the same time.

Cleaning agents normally water solutions that might be acidic, alkaline or neutral, depending on the use. Cleaning agents may also be solvent-based or solvent-containing and are then called degreasers.

**Permit to work systems**

Instructions or procedures are adequate for most work activities, but some require extra care. A **permit to work** is a more formal system stating exactly what work is to be carried out and when, and which parts are safe. A responsible person should assess the work and check safety at each stage. The people doing the job sign the permit to show that they understand the risks and precautions necessary.

Permits are effectively a means of communication between site management, plant supervisors and operators, and those who carry out the work. Examples of high-risk jobs where a written permit to work procedure may need to be used include hot work, such as welding, vessel entry, cutting into pipe work carrying hazardous substances, and work that requires electrical or mechanical isolation. It is also a means of coordinating different work activities to avoid conflicts. It should be emphasised, though, that a permit to work is not a replacement for robust risk assessment, but it can help bring the risk assessment ‘to life’ at the sharp end, where it matters.

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| electricity-dangers.png | **Electrical dangers**  There are many dangers related to electricity:   * faulty electrical equipment * damaged electrical equipment * exposed conductors * damaged insulation * worn electrical cables and cords * trailing cables * proximity of cables * buried/hidden cables. |

**Sources of electrical supply**

A number of sources of electricity are available to operatives within the building services industry as follows.

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| Battery drill.png | **Battery powered supplies**  Battery powered tools are now used widely in the building services industry. Using these has many advantages, including:   * no trailing leads * voltage levels that mean there is no risk of electric shock * can be used where there are no mains supplies (assuming batteries are charged elsewhere) * greater mobility.   Remember that a mains supply will still be needed to charge the batteries via a battery charger. |
| 110v tools.png | **110 volt supplies**   * The use of reduced voltage power tools and equipment on site reduces the risk of electric shock. * The 110V supply is derived from a transformer. * The secondary is centre-tapped and connected to earth, ie touching either pole and earth results in a shock of 55V that in most cases will not cause harm. * The transformer diagram is shown below: |
| 240-110 Transformer.jpg | |

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| Cable Reel.png | **230 volt supplies**   * Most premises will have socket outlets at 230V only. * Real danger of electric shock with this level of voltage so RCD protection should be used, even indoors. * If not using battery powered tools, it is not unusual for engineers to plug a 230/110V transformer in and use 110V. * Most battery chargers for battery tools will need a 230V supply for charging. |
| Generator.png | **Generating sets**   * On sites where a mains supply is not available, generators will be used to power tools, site lighting and plant. * Usually, powered by petrol engines for smaller generators and diesel for larger ones. * Cables will radiate from the generator to feed equipment and care must be taken not to create a hazard with these trailing leads. |

Reduced voltage is used on site to lessen the risk of electric shock. Construction sites are hazardous and the likelihood of cable damage is greatly increased. Also, due to construction areas being generally wet, operatives’ body resistance and hence their susceptibility to electric shock is increased. The hazards can be summarised as:

* increased likelihood for damage to equipment
* operative in better contact with earth
* more susceptible to electric shock
* trailing leads.

A **visual inspection should be carried out** on portable electrical equipment before use to ensure its safe condition. Checks should include:

* checking for a valid PAT label
* inspection for general condition to include:
  + any damage to equipment casing
  + any damage to the flexible cord (lead)
  + any damage to the plug top and any obvious connection issues, eg cord grip not properly used.

If a piece of portable electrical equipment fails the above checks it should be immediately removed from use and the matter reported to your supervisor.