

Module 8 Safety

Unit 8.4 Personal Safety

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Introduction

About this unit

Welcome to Unit 8.4 on personal safety.

This unit teaches you how to reduce the risk of personal injury in the workshop. You will be given information about the different types of personal protective equipment that is available.

This unit also has information about the correct and safe way to lift heavy loads to reduce the risk of back injuries.

How to use this book

As well as information about personal safety, this book contains activities and exercises.

These activities and exercises don't play a part in your assessment for this unit, but will help you find out how much you have learned.

Read the information, then answer the questions as you work through the unit.

Answers to questions and examples are provided at the end of each section for you to check your progress.

Your tutor will give you assessment tasks to check what you have learned about personal safety.

It is these assessment tasks that determine your competence in this unit.

How you will be assessed

To be assessed for this unit you will be given two assessment tasks.

These tasks will be done by you when you have finished certain parts of the work in the book.

Your tutor will help you to understand what you need to do for the tasks – do ask your tutor straightaway to explain anything you don't understand.

Finding your way

As you work through the text you'll see symbols in the left margin of some pages. These symbols or "icons" are to guide you through the content.



Read



Important- take note!



Self-checking question/activity



Assessment task



Things to do



Things not to do



Competency

The content of this training programme for Technical and Vocational teachers is based on the skills that you need to develop. The skills for each unit are set out as things that you must have learned or are able to do.

The assessment by your tutor will test what you have learned and your level of skill.

Each unit sets out the skills needed. If you already think you know enough about the unit to show that you have the skills needed, you may be able to get your tutor to test you without studying the unit.

Learning outcomes

When you have completed this unit you should be able to:

- State the precautions that must be observed to reduce the risk of personal injury in the workplace.
- State the reasons for clearly marked aisles for through traffic in workshops.
- Identify the types of protective clothing and personal equipment appropriate to your work area.
- Demonstrate or explain the correct application of each identified item of protective clothing or personal equipment.
- Demonstrate or explain the correct method of lifting items weighing approximately 15 kg or more.

Assessment criteria

Your tutor will assess what you have learned by getting you to:

- State, in accordance with provided information, and including reference to the protection of operators, the precautions to be observed to reduce the risk of personal injury in the workplace.
- List, without error, four (4) reasons or circumstances for specifically designating and marking walkways for through traffic in workshops.
- Match, without error, descriptions and illustrations of protective clothing and personal equipment.
- Demonstrate or explain, without error, the correct application of each item of clothing and equipment to a workshop activity or situation.
- Demonstrate or explain, using or describing the correct position of legs, back and head, the lifting of an object having a weight of approximately 15 kg or more.

Assessment methods

Your tutor may test your skills by any of the following methods:

- giving you an oral or written test
- giving you an assignment
- requiring a practical demonstration.
- Your instructor may also use the points contained in the learning activities as a guide to assessing your performance.

Other resources you may find useful

- information from local fire and ambulance services
- information on health and safety from national or local government
- information on health and safety from large industries in your local area.

References:

Occupational Safety Management and Engineering 4th ed.

Author: Willie Hammer

ISBN: 0-13-629379-4

Publisher: Prentice Hall

Occupational Safety and Health: for Technologist, Engineers, and Managers

3rd ed.

Author: David L. Goetsch

ISBN: 0-13-924085-3

Publisher: Prentice Hall

Internet Address:

Web page: - <http://www.safetyinfo.com>

Section 1



Safety precautions to reduce risks of personal injury

There are many hazards such as chemicals and electric tools, to be found in a workshop. However, just because hazards are there does not mean that accidents will happen. The best way to make sure accidents do not happen is to keep yourself safe. If you do not know how to use something or do not know what something is – then don't touch it, and ask for help.

Some general rules to follow when in a workshop are:

- Observe all the safety rules of the workshop.
- Keep the workshop tidy – put things away when you have finished and clean up after yourself.
- If an accident happens, report it to the person in charge.
- Make sure you know what any warning signs mean and do what they say.
- Do not do anything that you are unsure of, if in doubt — ask.



Everybody is responsible for keeping the workshop safe. You must also make sure that you do not do anything that will injure or harm someone else.

There are a number of things that everybody should do to make sure the workshop is a safe place.



Things to do

- Keep the workshop tidy and keep the exits and walkways clear at all times. Get rid of empty boxes, bottles or containers.
- Make sure all chemicals are labelled and put away as soon as you have finished with them. Any spills should be cleaned up straightaway.
- Check that you have all the safety equipment you need for a job before starting the activity.
- When using tools, put them away after you have finished with them.

- Get to know your workshop and where everything is. This equipment must be visible and accessible. Most importantly, everybody should know where to find the following:
 - a fire extinguisher
 - an emergency stop
 - a telephone in case of emergency
 - first aid kit
 - emergency exits



Smoking in the workshop

There are a number of fire hazards in a workshop. For example, flammable gases, certain chemicals, paper, wood and wood shavings.

Smoking increases the risk of fires. This is why smoking is not allowed in the workshop.

Most places have a special area set aside where people can smoke.

Safety barriers and specially designated walkways

Safety barriers and designated walkways are put in place to protect you. They are designed to keep you at a safe distance from hazardous materials (chemicals) and equipment (machines and tools).

You should only ever cross a safety barrier if you have permission to do so and you have been trained on how to work safely with the hazardous materials or equipment.

Designated walkways are usually marked out by yellow painted lines on the floor. When moving around the workshop you should keep within these painted lines. The only time you should move outside these walkways is when you are working in a particular area.

Personal protective clothing and equipment

Personal protective clothing and equipment (PPCE) is any item of clothing or equipment worn by a person to reduce their exposure to hazards. Examples of PPCE are earmuffs, respirators and gloves. The various types of PPCE are discussed further in Section 2.

Using PPCE does not remove or even control a hazard — it just reduces your exposure to the hazard — the hazard still exists.

PPCE will only work if:

- they are selected carefully
- they are used and looked after properly and regularly
- people are trained how to use them correctly.

When buying or using PPCE for the first time you will need some advice and guidance from a safety specialist. Most suppliers of PPCE will be able to advise you on the right equipment and how to use it.

You should be aware of some common problems associated with the use of PPCE:

- PPCE are often uncomfortable, making it difficult to work properly. This may cause stress, increase the time spent working in dangerous environments, and make it less likely that PPCE will be used properly.
- Some equipment or clothing may limit your field of vision or hearing range. If you can't see or hear properly, then you may not be able to see or hear warnings. Therefore, there may be more risks from other types of accidents on the job.
- Wearing PPCE may give a false sense of security, so that not all of the other more important precautions are taken. For example, safety gloves will not be much protection if a chemical is dripping down your arm. It is important that all other precautions are followed, even if PPCE is worn.
- Infection may result unless PPCE is personally issued and fitted, cleaned regularly and looked after properly, and you are properly trained how to use them. For example, sharing respirators is a way to spread colds and flu, and wearing dirty earplugs can cause ear infections.

**Remember**

The use of personal protective clothing and equipment does not remove the hazard. All it does is reduce the risk of injury or disease as long as it is selected carefully, used and looked after properly, and people are trained how to use it.

Now complete the activities below.

**Activity 1**

Find out who are the local suppliers of personal protective clothing and equipment in your area. Ask them for a catalogue in the different types of clothing and equipment they supply.

**Activity 2**

1. Name three things that you can do to help keep the workshop safe.
2. What is the purpose of safety barriers and designated walkways?
3. What is protective clothing and equipment?
4. What are three things that must be done to make sure PPCE works properly?

Compare your answers with those on the following page.



Activity 2 Answers

1. There are a number of things that you can do to help keep the workshop safe. Your answer should include some of the following points:
 - Observe all the safety rules of the workshop.
 - Keep the workshop tidy.
 - If an accident happens make sure you report it to the person in charge.
 - Make sure you know what any warning signs mean and make sure you follow them.
 - Do not do anything that you are unsure of; if in doubt, ask.
 - Keep the exits and walkways clear at all times.
 - Make sure all chemicals are labelled properly and are put away as soon as you have finished with them. Any spills should be cleaned up straightaway.
 - Make sure that you have all the safety equipment you need for a job before starting the activity.
 - Put equipment away after you have finished using it.
 - Get to know your workshop and where everything is.
2. Safety barriers and designated walkways are put in place to protect you. They are designed to keep you at a safe distance from hazardous materials (chemicals) and equipment (machines and tools).
3. Personal protective clothing and equipment is any item of clothing or equipment worn by a person to reduce their exposure to hazards.
4. PPCE will only work if:
 - they are selected carefully
 - they are used and looked after properly and regularly
 - people are trained on how to use them correctly.

If you didn't answer all the questions correctly then read the section again before going to Section 2.

Section 2



Types of personal protective clothing and equipment

Personal protective clothing and equipment (PPCE) is any item of clothing or equipment worn by a person to reduce their exposure to hazards.

There are items available to protect just about every part of your body. The different types of PPCE commonly used are discussed below.

The most important thing to consider when choosing what PPCE to use is the nature of the hazard.

For example, if working with a chemical, the hazard will come from splashes and breathing in the vapour/gas from the chemical. Therefore you would need to wear clothing and equipment that protects your skin, eyes and your lungs.

If several different items of PPCE are needed, the problems with wearing them all at once while working must be taken into account.

For example, if a respirator and safety glasses are needed, a full-face respirator may be the best option. Safety glasses may not sit properly and may prevent proper sealing with a half-face respirator. Likewise, if a safety helmet and hearing protection are both required, special types of equipment may provide better options. Some safety helmets come with earmuffs already attached to the helmet.

In Section 1 you were asked to find out who are the local suppliers of protective clothing and equipment. They will be able to advise you on the correct type of PPCE required for your work environment.

Overalls

Overalls are used for a variety of reasons.

- They protect the body from chemicals, dust, and hot and cold temperatures.
- They can be worn **over** normal clothing to prevent them from getting dirty.
- Bright coloured overalls are sometimes worn so that people can be easily seen.

There are many types of overalls available and each may be made from different materials. The type you choose will depend on what particular hazard you are trying to protect against.

Footwear

Safety footwear protects the feet from chemicals and heavy objects. There are different types available depending on what the hazard is.

For example, if you want to protect your feet against heavy objects that could fall on them, then you need to wear shoes with steel-caps built into the toe. If you want to protect your feet from chemicals only, you may choose to wear rubber boots.

Helmets

Safety helmets are most commonly worn to protect the head from falling objects. As a general rule, helmets should be worn in an area if:

- there are heavy objects or items located above head height, and;
- they are not fixed in position, and;
- there is a chance they could fall down.



Gloves

Gloves are worn to protect the hands from cuts, grazes, heat and chemicals. They are made from many different materials and come in various sizes and lengths (for example, up to wrist or up to elbow). The type you choose will depend on what particular hazard you are trying to protect against. Some of the more common gloves used are:

- cotton or leather – useful for protecting the hands against cuts and grazes
- synthetic rubber – used for protection against chemicals
- kevlar – protect against heat

Eye protection

Eye protection includes safety glasses and goggles. It is worn to protect against a variety of hazards including:

- flying objects (from grinding and sawing)
- radiation (from welding)
- chemical splash (solvents and acids)

Hearing protection

Hearing protection (HP) includes earmuffs and earplugs. It is worn to protect against high noise levels that could cause hearing loss or damage.

Hearing protectors are graded, depending on what level of noise they will protect against. The louder the noise, the higher grade HP you will need.

Therefore when choosing the correct type of hearing protectors you need to know what level of noise people will be exposed to. You will need the help of a health and safety specialist to determine what the noise levels are.

Respiratory protection

Respirators are used to prevent breathing in a poisonous substance (such as dusts, solvent vapours, acids and gases). There are two general types of respiratory protection:

- air-purifiers, which remove the substance from the breathing air by filtering or chemical absorption
- air suppliers, which provide clean air from an outside source or from a tank

There are many different types of respirators and different types of filters available to protect against exposure to different chemical hazards.

When selecting the correct respiratory protection, you must first know what substance or substances that you need to protect against.

For example, an acid gas filter is not appropriate when there are dangerous levels of ammonia in the air.



Figure 1: Examples of protective equipment



Figure 2: Two styles of air purifying respirators



Hair protection

Long hair must be tied up or kept covered when in the workshop.

People have been injured in workshops by having their hair caught up in machines such as lathes and drilling machines.

Now complete activity 3 below.



Activity 3

1. List four (4) types of PPCE that could be worn.

For questions 2-4, list the types of personal protective clothing and equipment (PPCE) that you would wear when carrying out these tasks and explain why you would use each one.

2. Grinding pieces of metal.
3. Pouring 5 L of concentrated acid from one container to another.
4. Sanding pieces of wood.

Compare your answers with those on the following page.



Activity 3 Answers

1. The different types of PPCE include

- overalls
- footwear
- helmets
- gloves
- eye protection
- hearing protection
- respiratory protection

2. Grinding can be a noisy process (could cause hearing damage if the noise was loud enough).

The process of grinding can cause small metal particles to fly out (these metal particles could hit you in the eye and cause damage).

Therefore ***hearing protection and eye protection*** should be worn.

3. At room temperature, acid vapours are given off (if breathed in these vapours are very irritating and potent).

When pouring liquids there is always a risk of splashes occurring on the skin and in the eyes (acid causes burns when in contact with the skin and eyes).

Therefore, ***gloves, respiratory protection and eye protection*** should be worn (overalls could also be worn if you wanted).

4. Sanding can be a noisy process (could cause hearing damage if the noise was loud enough).

Sanding also produces wood dust (dust can be breathed in and irritate the respiratory tract; it can also get into the eyes).

Therefore ***hearing protection, eye protection and respiratory protection*** should be worn.

If you didn't answer all the questions correctly then read the section again before going to Section 3.

Section 3



Safe lifting procedures

Back injuries, caused by incorrect lifting and handling, are a common form of personal injury.

There are simple rules to follow to avoid back injuries.

- Look at what you need to lift (the load) before starting.
- If the load is hard to grasp or too heavy, then get help.
- Check for sharp edges – if necessary use gloves to protect your hands.
- Check that there is room to move, room to lift, a clear path to where the load is going, and that there is space to set the load down.
- Use the legs when lifting. The main object is to use the leg muscles as the source of power.

The following sections discuss the proper way to lift objects to avoid injuring your back.

Weights for women and youths

The maximum weight that a person can lift safely varies widely. There are various guidelines published that describe the maximum weight that should be lifted by men and women. However, in general these guidelines do not take into account the different size and shape of loads that people may have to lift.

The modern approach is not to have weight limits, but more to do with how physically strong the person lifting is, the size and shape of the load and how it is lifted. Where possible, lifting aids should always be used instead of physical lifting. The basic rules listed in Section 3.1 should be followed.

Most men and women are able to lift a well-shaped object of around 15 kg.

Spine damage



The spinal cord is part of the central nervous system (CNS) and is connected to the brain. It runs down the middle of the back and is approximately 45 cm long and 2 cm wide. The spinal cord is protected by a bony structure, called vertebrae (this is what you can feel if you run your fingers down the middle of your back). Each vertebra is separated by fluid-filled discs that form a type of padding.

The spine can be damaged in a number of ways:

- The fluid-filled discs can be damaged which cause fluid to leak out. This causes the vertebra to rub together or pinching of the spinal cord, which will be very painful.
- The spinal cord may be damaged if the vertebra are fractured or broken.

How to lift correctly

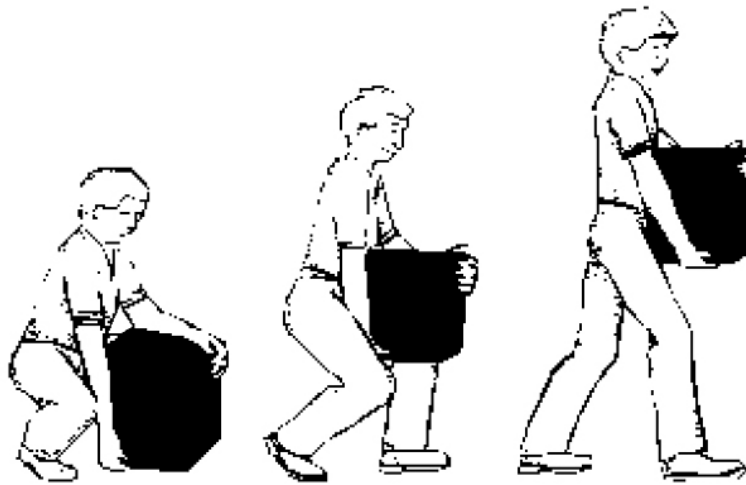
The strong muscles of the legs should be used when lifting heavy objects, as they are stronger than the back muscles. This also reduces the amount of strain placed on the back.



Do

- Lift with your legs. The "rules" for lifting an object are:
 - **Back** — straight (head up — chin in).
 - **Feet** — apart, one foot pointing in direction of intended movement, stand as close to the object as possible.
 - **Knees** — bent.
 - **Hands** — firm grip with palms not fingers.
 - **Elbows** — tucked in.
 - **Body weight** — used as counter balance.
 - **Leg muscles** — to give power to a smooth lift.

The picture below shows the correct lifting posture.



When lifting a heavy load, the key points to remember are as follow:



Do

- Bend the knees, but not beyond a right angle.
- Keep the back straight but not vertical.
- Lift using the strong leg muscles.
- Get a good grip on the load.
- While carrying, hold the load close to the body.



Do not

- Do not turn the body or head while lifting. Lift, then turn on feet.
- Do not jerk or snatch the load. Slowly lift the load.
- Do not use the weak back muscles to lift.

Lifting above the shoulder

Lifting objects above shoulder height puts too much strain on the muscles of the back and shoulders and this can cause injuries.

If you have to lift something above your shoulders, the important things to remember is to keep your back straight and keep the weight close to your body. Don't reach out with a weight in your hands!

Always get someone to help you if the situation might cause you problems.

The best height range for handling loads is around waist level, with lifting between knuckle and shoulder height being acceptable.



Carrying aids

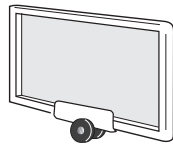
Wherever possible, aids should be used to lift an object. This means a person does not have to physically lift a load and this reduces the risk of back injuries occurring.

Many different aids can be used, as shown below.

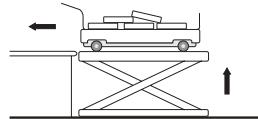
- trolleys



- wheels



- adjustable height platforms
- conveyers
- overhead cranes
- mobile hoists
- fork-lift trucks
- vacuum lifters.



Carrying aids should be easy to use, made to suit the load and be easy to get at when needed.



Remember:

There is no such thing as completely safe handling. You have to do what you can to make the operation safer.

Now complete Activity 4 below.

**Activity 4**

1. Briefly describe the four main points to remember when lifting an object.

2. When lifting an object, what part of the body is used the most?

3. Name two aids that can be used to help lift a load.

Compare your answers with those on the following page.



Activity 4 Answers

1. The four main points to remember when lifting are to:
 - Bend your knees.
 - Get a good grip on the object.
 - Keep your back straight.
 - Hold load close to your body.
2. When lifting an object, the **legs** are the main muscles used.
3. For the different types of carrying aids that can be used, see Section 3.5.

If you didn't answer all the questions correctly, then read the section again.



Assignment No. 8.4-1

Unit 8.4 Personal safety

You are now required to do the Assignment 8.4 – 1 that will be found at the end of this unit or distributed by your tutor.



Assignment No. 8.4-1

Unit 8.4 Personal Safety

To be completed and returned to your tutor for assessment.

This is an open book assignment and you may refer to whatever references you have at your disposal.

Name: _____ Due Date: _____

Question 1

List five things that you can do to keep your workshop safe.

- 1.1 _____
- 1.2 _____
- 1.3 _____
- 1.4 _____
- 1.5 _____

Question 2

Answer **true** or **false** to the following statements:

- 2.1 _____ Designated walkways are put in place to protect you.
- 2.2 _____ You are not responsible for anyone else's safety in the workshop - just your own.
- 2.3 _____ The reason smoking is not allowed in the workshop is because it is a health hazard.
- 2.4 _____ Designated walkways keep you at a safe distance from machines and tools.
- 2.5 _____ Smoking is not allowed in the workshop because it is a fire risk.

Question 3

What is personal protective clothing and equipment?

Question 4

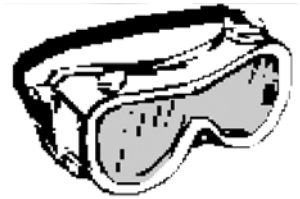
Name the personal protective clothing and equipment shown in the pictures below and briefly describe what each item is used for.



4.1



4.2



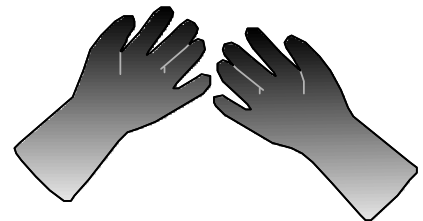
4.3



4.4



4.5



4.6

4.1 _____

4.2 _____

4.3 _____

- 4.4 _____

- 4.5 _____

- 4.6 _____

Question 5

Described below are two tasks that you may carry out in the workshop. For each task, list the personal protective clothing and equipment that you would wear and state why you would wear it.

5.1 Welding a piece of stainless steel.

5.2 Sawing some pieces of wood in half using an electric saw.

Question 6

Why is it important that you lift a heavy object correctly?

Question 7

You have a box full of books that you need to move off the floor and on to a table. The box weighs approximately 15 kg.

Describe the correct way to lift the box off the floor, specifying the position of the back, feet, knees/legs and head.

Question 8

Below are some statements related to lifting. Label the statements **DO** or **DO NOT**.

- 8.1 _____ Bend the knees.
- 8.2 _____ Lift using the leg muscles.
- 8.3 _____ Turn your body and head while lifting.
- 8.4 _____ Get a good grip on the load.
- 8.5 _____ Bend the back.
- 8.6 _____ Hold the load close to your body.
- 8.7 _____ Pick up the load in a speedy movement.

Question 9

Name 3 carrying aids that you could use to help lift and carry a load.

9.1 _____

9.2 _____

9.3 _____