

# **DIESEL MECHANIC**



**MINING QUALIFICATIONS AUTHORITY**

## **CODE: ST**

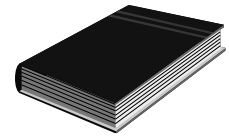
# **PERFORM SAFE WORK PRACTICE**

# INDEX

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## SOURCE REFERENCES



Mines Health and Safety Act

Manufacturers and Suppliers Specifications

In-company Standard Operating Procedures

In-company documentation

Operating drawings and schematic diagrams

## OBJECTIVE

You will be learning towards the outcome “Perform safe work practices”. Whilst learning towards the outcome you will be required to achieve the following:

- Familiarise with the general safe work practices to be observed in the work place.
- Complete the work task.

On completion of this module, the learner must be able to:

- Recall the unsafe acts and unsafe conditions that can lead to accidents in the work place.
- Explain the role of good housekeeping and hygiene in the prevention of accidents and injury in the work place.
- Explain the role of the correct care and use of tools and equipment in the prevention of accidents.
- Name the different types of personal protective equipment that can be used to prevent accidents and state the instances where it must be worn.
- Recognise the different safety signs in general use in industry.
- State the general safety precautions that electricians must take when working on electrical circuits and apparatus.

During this process you must adhere to certain specified requirements as listed in the Module.

## ASSESSMENT AND EVALUATION CRITERIA

You will be assessed, when you are confident that you may achieve the outcomes as listed, to determine your competence as measured against the required criteria. This assessment will be in line with accepted best practices regarding assessment.

All answers must be correct and in accordance with the module content.

# 1. INTRODUCTION TO SAFETY IN THE WORKPLACE

**ITEM / TASK:** Responsibilities. (from the Mine Health and Safety Act)

**DESCRIPTION:**

A. **The employer or manager** must, inter alia –

- ensure a healthy and safe work environment for employees,
- ensure that employees are trained to deal with the health and safety risks associated with their work,
- provide workers with appropriate personal protective equipment (PPE), free of charge.

B. **The employee** must –

- take care to protect his own health and safety, as well as the health and safety of other persons who may be affected by what he does,
- use and take proper care of PPE and other safety facilities and equipment provided,
- comply with prescribed health and safety measures.

**ITEM / TASK:** Definition of an accident.

**DESCRIPTION:**

An accident is an undesired event, often caused by

- **unsafe acts** of persons, and/or
- **unsafe conditions** in the work place,

which may result in

- **physical harm** (injury, death, negative influence on health),
- **damage** to tools, equipment or property,
- **loss of production.**

## 2. BASIC CAUSES OF ACCIDENTS

**ITEM / TASK:** Unsafe acts.

**DESCRIPTION:**

The following are considered to be **unsafe acts** in the work place and must be avoided:

- Working at unsafe speeds and taking shortcuts.
- Doing jobs that you are untrained for and not authorised to do.
- Working without guards on machinery, i.e. not replacing or fitting guards on moving machinery where there is a risk of being caught or where other injury may result.
- Failure to secure machinery or material.
- Using incorrect tools for the job or broken or worn tools (e.g., blunt screwdrivers, burred chisels, etc.).
- Making adjustments to machines without switching it off and waiting for it to become stationary.
- Touching moving parts of machinery.
- Not wearing personal protective equipment (PPE) when required by the job to do so.
- Not obeying safety signs in the work place (e.g. smoking where it is prohibited).
- Horse play in the work place (e.g. pushing or shoving fellow employees).

**ITEM / TASK:** Unsafe conditions.

**DESCRIPTION:**

The following **unsafe conditions** in the work place must be recognised and corrected:

- Lack of machine guards.
- Unsafe construction (e.g. scaffolds, material stacks, etc.).
- Unguarded holes or walkways.
- Badly marked or unmarked exits and walkways.
- Poor ventilation, lighting and high noise levels.
- Dangerous chemicals that is not safely stored and marked.
- Lack or unavailability of sufficient and appropriate fire fighting equipment.
- Lack or unavailability of appropriate PPE.



## SELF TEST 1

1. Name three responsibilities that you, as an employee, have for safety in the work place.

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2. Give a definition of an accident.

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3. Name any eight unsafe acts in the work place that may cause accidents to happen.

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4. Name any six unsafe conditions in the work place that may lead to accidents.

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Check your answers against the module notes or given answers (where applicable). If they are correct, ask your Training Officer to sign off your work. The Training Officer will spot check your work before signing.

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### 3. HOUSEKEEPING AND HYGIENE

**ITEM / TASK:** Housekeeping.

**DESCRIPTION:**

- A. Housekeeping means “a place for everything and everything in its place”.
- B. Good housekeeping improves the work environment and working conditions because:
- Injuries are avoided when gangways and walkways are kept clear of superfluous material.
  - It cuts down time spent looking for tools, goods and material.
  - Space is saved when everything is stacked away tidily.
  - Fire hazards are reduced because combustible materials are kept in proper receptacles.

**ITEM / TASK:** Elements of good housekeeping.

**DESCRIPTION:**

- A. Mark out passages, aisles and roadways clearly and keep them clear.
- B. Clean up oil spills immediately to prevent slipping.
- C. Provide facilities for proper storage of tools, equipment and material.
- D. Provide bins for waste, and mark it clearly.
- E. Put up safety notices and signs.
- F. Introduce colour coding.
- G. Enforce rules.
- H. Use checklists to make regular inspections.

**ITEM / TASK:** Typical accidents arising from poor housekeeping.

**DESCRIPTION:**

- A. People tripping over loose objects on floor and in work area.
- B. Slipping and falling on greasy, wet and dirty floors.
- C. Articles and material dropping from above.
- D. Hands or other parts of body cut on projecting nails, wire, steel strapping, etc.
- E. Bumping against poorly stacked or badly placed material or objects.
- F. Fires (e.g. spontaneous combustion of oil rags).



**ITEM / TASK:** Good hygiene.

**DESCRIPTION:**

- A. Put litter in bins.
- B. Keep lockers and change rooms clean.
- C. Maintain high levels of personal hygiene to prevent skin disease and the ingestion (swallowing) of hazardous chemical and biological substances (germs, bacteria, etc.), in the following way:
  - Do not eat or store food and drink in work areas.
  - Keep your skin and work clothing clean.
  - Wash hands before eating and after using the toilet.



## SELF TEST 2

1. State, in one sentence, what is meant by “good housekeeping”.

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2. Name any five typical accidents that may arise from poor housekeeping.

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3. Name three elements of good hygiene that should be observed in the work place.

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4. How would you ensure personal hygiene in the work place?

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Check your answers against the module notes or given answers (where applicable). If they are correct, ask your Training Officer to sign off your work. The Training Officer will spot check your work before signing.

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## 4. CORRECT USE OF TOOLS AND EQUIPMENT

**ITEM / TASK:** Safe care and use of hand tools.

**DESCRIPTION:**

A. Check for defects:

- Hammers – handles tight, no mushrooming of heads.
- Files – handles fitted, sharpness.
- Screwdrivers – Tips square and correctly shaped, not worn, handles in good condition, insulated and secured.
- Chisels and punches – heads not mushroomed and burred.
- Spanners – not rounded.

B. Apply general safety rules:

- Use correct tool for the job.
- Use correct size tool for the job.
- Report and replace broken tools.
- Use tools correctly.
- Store tools away after use.

C. Use hand tools safely:

- Screwdrivers – work secured, must fit the screw, use drill or awl to start the screw.
- Hammers – keep eyes on nail or chisel etc., wear gloves or use foam rubber discs. Wear goggles if necessary.
- Files – keep clean and harp, ensure handle is fitted and tight, never hit with a hammer or use as a lever, do not put in pocket.

**ITEM / TASK:** Portable electrical equipment.

**DESCRIPTION:**

A. Examine before use:

- Make sure it is earthed (if not double insulated) - earth wire to centre pin on plug top.
- Check cord for cracks or weakness – replace, do not patch.
- Check switch for correct on/off operation.
- Check for damage or cracks in housing.

**B. Operate safely:**

- Place cord safely – away from heat, water and oil, out of the way of persons walking or vehicles crossing.
- Stop tools before adjusting.
- Secure work piece.
- Work at correct speed – do not force.
- Wear PPE when appropriate.

**ITEM / TASK:** Safe use of ladders.

**DESCRIPTION:**

**A. Examine before use:**

- Keep ladders clean – dirt hides defects, grease or oil cause people to slip.
- Check for defects, cracks etc. – repair or replace.
- Check safety feet where fitted.
- Check hinges on step ladder.

**B. Use ladders safely:**

- Use correct ladder for the job (type and size).
- No metal ladders or metal-reinforced ladders when working on electrical apparatus (Mining Reg. 21.6.4).
- Do not bring into contact with power conductors.
- Place at correct angle – feet  $\frac{1}{4}$  to  $\frac{1}{3}$  of its length from the object it is resting against, if possible it should extend 1m above its support.
- Unless ladder is securely tied at the top, it must be held by another person.
- Lock hinges when using a step ladder.
- Lock doors before placing ladder over door.
- Do not lean ladder against windows or doors.
- Use both hands to climb ladder.
- Haul tools up using a bucket or basket, and remove after use.
- Store out of the way and safely after use – either lying on its side or suspended from several wall brackets to prevent warping.



## SELF TEST 3

1. Fill in the checks that you would make on the following tools and equipment:

- Hammers \_\_\_\_\_
- Files \_\_\_\_\_
- Screwdrivers \_\_\_\_\_
- Chisels \_\_\_\_\_
- Spanners \_\_\_\_\_
- Portable electrical equipment \_\_\_\_\_

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2. Name five steps in the safe operation of electrical equipment.

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3. Name the checks you would make on a ladder before using it.

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## 5. PERSONAL PROTECTIVE EQUIPMENT (PPE)

**ITEM / TASK:** Introduction.

**DESCRIPTION:**

- A. Personal protective equipment (PPE) is not always the best safeguard against a particular hazard. It is better to remove or minimise the danger by other means.
- B. If this fails, PPE is the last line of defence.
- C. It is important that the correct type of PPE be chosen for a particular hazard e.g. a dust respirator is not suitable protection against noxious fumes.

**NB:**

***It is very important that you know which PPE is correct for a particular hazard, and the correct way of wearing it.***

- D. The rules and instructions regarding the wearing of PPE must be strictly obeyed. It is for your own safety. Some hazards, like noise, can take a long time before the effects become noticeable, but it can lead to permanent disabilities.

**ITEM / TASK:** Hand protection.



**DESCRIPTION:**

- A. Leather gloves must be worn when working with hot or sharp objects or when handling heavy material.
- B. Rubber gloves must be worn when working with dangerous liquids such as acids, poison, etc. These are **not** insulated gloves.
- C. Insulated gloves (of special rubber) are worn when working on live conductors, i.e. when it is not possible to switch the power off, e.g. when working on live overhead lines.

**NB:**

***Great care must be taken to ensure that they are of the correct voltage rating, clean, dry and in perfect condition.***

**ITEM / TASK:** Foot protection.



**DESCRIPTION:**

- A. Safety shoes and boots, with steel caps where appropriate, must be worn to protect the feet and metatarsal bones.

**ITEM / TASK:** Eye and face protection.



**DESCRIPTION:**

- A. Safety goggles must be worn when grinding, chiselling, drilling, chasing or using any machinery that may cause particles to fly and endanger the eyes, e.g. turning, milling etc.
- B. Darkened safety goggles must be worn when using oxy-acetylene equipment.
- C. A welding helmet or shield must be worn when using an arc welder.
- D. A face shield should be worn when working with dangerous liquids such as acids.

**ITEM / TASK:** Hearing protection.



**DESCRIPTION:**

- A. Hearing protection in the form of ear plugs or ear muffs must be worn when noise of 85 dB and louder occur in the work place. Noise-induced deafness is a serious problem that often only manifest after a long time.
- B. Protection is required against two types of noise:
- Continuous loud noise such as may occur in plants and factories.
  - Intermittent very loud noise, such as blasting, shooting, hard banging as in a plater workshop.
  - Ear plugs and earmuffs are capable of reducing noise by 25 – 40 dB.

**ITEM / TASK:** Head protection.



**DESCRIPTION:**

- A. Hard hats must be worn in all mines, factories and plants, and on building sites or any other area where there is a danger of falling objects or materials.
- B. Caps or hairnets to be worn by people with long hair, working with moving machines such as grinders, pedestal drills, etc.



**WARNING**

PROTECTIVE  
CLOTHING MUST BE  
WORN

**WAARSKUWING**

BESKERMENDE KLERE  
MOET GEDRA WORD

**ITEM / TASK:** Protective clothing.

**DESCRIPTION:**

- A. Where necessary and appropriate, suitable overalls should be worn in the work place.
- B. Rubber aprons are used when working with dangerous liquids such as acids and other chemicals.
- C. Leather aprons must be worn when working with hot objects and when welding or cutting with a gas torch.
- D. Spats and leggings are used to protect the legs.



**ITEM / TASK:** Safety belts / harness.

**DESCRIPTION:**

- A. Safety belts / harness must be used when working in high places such as on roofs, on poles and on overhead lines.
- B. When working on overhead lines, the safety belt / harness should be fastened to the pole and not over the cross arm, in order to facilitate the removal of a person injured by electrical shock or in the event of electrocution.



**ITEM / TASK:** Protection against inhalation of hazardous substances.

**DESCRIPTION:**

- A. Dust masks or mechanical filter respirators are used to filter out dust, and should be used when working in dust laden atmospheres, or where dust is created during grinding, chasing etc.

***NOTE: These are not suitable for gases and fumes.***

- B. Chemical cartridge gas masks must be used when working with substances giving off noxious gases and fumes.
- C. A rescue pack, which is a form of canister respirator, is a compulsory item to be either carried by every person going underground or to be immediately available to every person working underground in a fiery mine.



## SELF TEST 4

1. Name two important aspects to keep in mind when choosing PPE.

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2. State **when** you would use PPE and **what type** of PPE you would use for the following types of protection:

- Hand protection (three types).

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- Foot protection.

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- Eye and face protection (four types).

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- Hearing protection (two types).

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- Head protection (two types).

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- Protective clothing (four types).

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- Safety belts / harness.

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- Protection against inhalation of dangerous substances (two types).

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Check your answers against the module notes or given answers (where applicable). If they are correct, ask your Training Officer to sign off your work. The Training Officer will spot check your work before signing.

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
## 6. SYMBOLIC SIGNS

A SYMBOLIC SAFETY SIGN CONSISTS OF:





















- A geometric shape
- A colour
- A pictogram




An organised system of identifying industrial hazards with easily recognised safety signs has been developed for South African conditions. (For further details see SABS specification No. 1186/1978).



**THERE ARE FIVE DIFFERENT CATEGORIES OF SIGNS, EASILY DISTINGUISH-ABLE FROM ONE ANOTHER, AND EASILY IDENTIFIED.**

	<p><b><u>TRIANGULAR SIGNS:</u></b></p> <p>Warn against certain hazards in the environment</p>		<p><b><u>CIRCULAR SIGNS WITH OBLIQUE DIAGONAL LINE:</u></b></p> <p>Prohibit certain acts or things.</p>
	<p><b><u>CIRCULAR DISKS:</u></b></p> <p>Mandatory use of personal protective equipment.</p>		<p><b><u>SQUARE:</u></b></p> <p>Informatory sign for direction &amp; location of first aid and emergency exits, etc.</p>
	<p><b><u>SQUARE FRAME:</u></b></p> <p>Informatory sign for location of fire equipment.</p>		

**THE FOLLOWING SAFETY SIGNS ARE COMMONLY USED IN THE MINING INDUSTRY AND MUST BE RECOGNISED.**

	Location of fire fighting equipment		Fire extinguisher
	Fire hose reel		Fire hydrant
	Smoking prohibited		Fire & open light prohibited
	Loose clothing, ties and unconfined long hair prohibited		First Aid
	General direction		Direction to escape route
	General warning of danger		Warning of fire
	Warning of explosion		Warning of electrical shock
	Warning of suspended load		Eye protection shall be worn
	Respiratory protection shall be worn		Head protection shall be worn
	Hearing protection shall be worn		Hand protection shall be worn

	Foot protection shall be worn		Keep area clean
	Foot protection shall be worn		Safety harness shall be worn

 <p><b>DO NOT SWITCH ON. WORKING ON LINE MOENIE AANSKAKEL NIE. MANNE WERK AAN LYN KUSETSHENZWA OCINGWENI</b></p>	<p><b>DANGER HIGH VOLTAGE</b></p>  <p><b>GEVAAR HOË SPANNING</b></p>	<p><b>DANGER LIVE WIRES ISOLATE SUPPLY BEFORE WORK COMMENCES</b></p> <p><b>GEVAAR LEWENDIGE GELEIERS ISOLEER TOEVOER VOORDAT ENIGE WERK VERRIG WORD</b></p>
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## SELF TEST 5

Fill in what each of the following signs mean.


Check your answers against the module notes or given answers (where applicable). If they are correct, ask your Training Officer to sign off your work. The Training Officer will spot check your work before signing.

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## 6. WIRING AND MINING REGULATIONS

**ITEM / TASK:** Wiring regulations.

**DESCRIPTION:**

- A. The SABS code of practice for the wiring of premises (SABS 0142 of 1993 as amended) contain the regulations that must be adhered to when wiring electrical installations.
- B. These regulations will be dealt with in detail during the course of training in the electrical trade.

**ITEM / TASK:** Mining regulations.

**DESCRIPTION:**

- A. There are also a number of mining regulations, promulgated under the Mine Health and Safety Act, that regulate how certain electrical work must be done in a mine.
- B. The pertinent regulations are extracted below.

**NB:**

**Regulations printed in bold print below must be learnt. The others should be read and noted, because they will become important later in your career.**

ITEM	REG	POTENTIAL HAZARD	SAFE WORK PRACTICES
1. Safety measures during repairs	20.9.3.1	<ul style="list-style-type: none"> <li>To prevent injury and loss of life caused by electrocution.</li> </ul>	<ul style="list-style-type: none"> <li>The person in immediate charge of any work on or repairs to machinery shall ensure that the power supply to such machinery is switched off and locked out or disconnected in accordance with a code drawn up in writing by the engineer or competent person appointed in terms of regulation 2.13.2, and that the power supply remain disconnected or switched off until the work or repairs have been completed.</li> </ul>



	20.9.3.2	<ul style="list-style-type: none"> <li>To prevent injury or loss of life.</li> </ul>	<ul style="list-style-type: none"> <li>No person shall conduct maintenance or repair work, and no person shall cause or permit such work to be done, until all reasonable precautions have been taken to ensure that the work can be done safely. A machine or any part of a machine, which may fall on the person conducting such work or on any other person, shall be adequately supported.</li> </ul>
2. Electrical apparatus	21.1.1.1	<ul style="list-style-type: none"> <li>To prevent injury or electrocution.</li> </ul>	<ul style="list-style-type: none"> <li>All electrical apparatus shall be selected, installed, worked, marked and maintained in such a manner as not to constitute a hazard and shall be placed and protected in such a manner that no person can be injured by inadvertent contact with any live portion thereof.</li> </ul>
3. Incorrect switching	21.1.1.2	<ul style="list-style-type: none"> <li>To prevent injury or electrocution.</li> </ul>	<ul style="list-style-type: none"> <li>Where the incorrect switching of unattended switch gear by an unauthorised person may constitute danger to persons, switch gear shall be enclosed in a manner specified in regulation 21.1.2 or the switching mechanism must be suitably locked to prevent unauthorised operation.</li> </ul>

4. Danger to persons	21.1.2	<ul style="list-style-type: none"> <li>To prevent injury or electrocution.</li> </ul>	<p>Any place where electric apparatus is installed and which may constitute a danger to person shall be –</p> <ul style="list-style-type: none"> <li>fenced off or enclosed effectively;</li> <li>provided with notices at all entrances prohibiting unauthorised access;</li> <li>kept closed and locked at all entrances, if unattended by an authorised person to prevent unauthorised access.</li> </ul>
5. Cable trench	21.2	<ul style="list-style-type: none"> <li>To prevent injury to persons.</li> </ul>	<ul style="list-style-type: none"> <li>No cable trench shall be left open, uncovered or unprotected, except at a place where work is being carried out in such trench.</li> </ul>
6. Ring feed	21.3.3	<ul style="list-style-type: none"> <li>To prevent injury or electrocution.</li> </ul>	<ul style="list-style-type: none"> <li>Where a ring feed or the possibility of electrical back feed exists at any apparatus a prominent notice to that effect shall be fixed to such apparatus.</li> </ul>
7. Interfere with electrical apparatus	21.4	<ul style="list-style-type: none"> <li>To prevent injury or electrocution.</li> </ul>	<ul style="list-style-type: none"> <li>No person shall interfere with or render ineffective any electric apparatus provided for safety or protection unless it is necessary to do so to perform work associated with such apparatus.</li> </ul>
8. Examination of apparatus	21.6.1	<ul style="list-style-type: none"> <li>To prevent injury or electrocution.</li> </ul>	<ul style="list-style-type: none"> <li>No examination, adjustment, testing, repairs or other work necessitating the dangerous approach to or the handling of electric apparatus shall be carried out unless such apparatus is dead; provided that where the apparatus must be live for the purpose of examination, adjustment, testing, repair or other work it may be done by or under the direct supervision of a competent person.</li> </ul>

9. Entry where there are live conductors	21.6.2	<ul style="list-style-type: none"> <li>To prevent injury and electrocution.</li> </ul>	<ul style="list-style-type: none"> <li>No person other than a duly authorised competent person shall enter a place where electric apparatus is installed unless all live conductors therein are insulated adequately or otherwise protected effectively against inadvertent contact: Provided that an authorised competent person may in an emergency be assisted by a person acting under the immediate personal supervision of such authorised competent person.</li> </ul>
10. Discharge electrically	21.6.3	<ul style="list-style-type: none"> <li>To prevent injury or electrocution.</li> </ul>	<ul style="list-style-type: none"> <li>Whenever work is to be carried out on electric apparatus which has been isolated from all sources of supply, effective precautions shall be taken by earthing or other means to discharge electrically such apparatus and any adjacent apparatus to prevent any conductor or apparatus from being made live accidentally inadvertently while any person is working thereon.</li> </ul>
11. Metal ladder	21.6.4	<ul style="list-style-type: none"> <li>To prevent injury or electrocution.</li> </ul>	No metal ladder or ladder with metal reinforced stiles may be used for examination, repair or other work necessitating the dangerous approach to or work on electric apparatus.

## **7. SAFETY PRECAUTIONS FOR ELECTRICIANS**

**ITEM / TASK:** Introduction.

**DESCRIPTION:**

- A. Electricity is dangerous and cannot be seen or heard. The victim of electric shock can suffer permanent injuries or death by electrocution.
- B. Most cases of electric shock can be attributed to ignorance, negligence and wilful disregard of safety precautions.
- C. Every possible safety precaution must, therefore, be taken when working on electric circuits or apparatus.

**ITEM / TASK:** Isolate and lock out.

**DESCRIPTION:**

- A. The most effective safety precaution is to ensure that the electricity supply is switched off before any repairs are carried out on electrical apparatus or appliances.
- B. Lock out the isolating switch with a padlock or other suitable locking device, and place a notice board on the switch to inform people that somebody is working on the electric circuit. If the switch is fitted with fuses, remove them as an extra precaution.

**ITEM / TASK:** Work on live circuits.

**DESCRIPTION:**

- A. In cases where it is not possible to switch off the supply, insulated rubber gloves must be used.
- B. Ensure that the gloves have the correct voltage rating and that they are in perfect condition (not worn or perished).

**ITEM / TASK:** Protection devices.

**DESCRIPTION:**

- A. It is imperative that electrical protection equipment, such as no-volt, overload and earth leakage devices be kept in good working order to ensure the safety of personnel and equipment.
- B. No-volt apparatus on a motor ensures that the motor will not start automatically after the electric supply was interrupted.

**ITEM / TASK:** Testing of electric appliances.

**DESCRIPTION:**

- A. Periodic tests must be carried out on all electrical appliances to ensure that they remain in safe working condition.
- B. Special attention must be given to loose connections, perished insulation, joints in cables, broken lids and covers over connections.

**ITEM / TASK:** Adherence to wiring regulations.

**DESCRIPTION:**

- A. All installations must be carried out according to standard regulations for the wiring of premises to ensure maximum safety.



## SELF TEST 6

1. To what can most electrical accidents be attributed?

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2. What are the two most important things that an electrician must do when working on electrical circuits and apparatus?

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3. What precautions must be taken when an electrician has to work on a live circuit?

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Check your answers against the module notes or given answers (where applicable). If they are correct, ask your Training Officer to sign off your work. The Training Officer will spot check your work before signing.

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### **REMEMBER ALWAYS WORK SAFE**

Once you have passed all the self tests, you are now at liberty to request a Formative Assessment from your Assessor.