

BUILDING ELECTRICAL INSTALLATION

NTQF LEVEL II

Learning Guide-31

Unit of Competence: Install Electrical Circuit Protection

Module Title: Installing Electrical Circuit Protection

LG Code: EIS BEI2 M09LO1-LG-31

TTLM Code: EIS BEI2 M09 TTLM 1019v1

LO 1: Plan and Prepare for fault findings



Instruction Sheet	Learning Guide-31
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This learning guide is developed to provide you the necessary information regarding the following **content coverage** and topics:

- Communicating and confirming instructions for work activity
- Identifying tools, equipment and PPE for installation of electrical wiring
- Obtaining materials with established procedures

This guide will also assist you to attain the learning outcome stated in the cover page.

Specifically, **upon completion of this Learning Guide, you will be able to:**

- Communicate and confirm instructions for work activity
- Identify tools, equipment and PPE for installation of electrical wiring
- Obtain materials with established procedures

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below 3 to 6.
3. Read the information written in the information “Sheet 1, Sheet 2, and Sheet 3 ”.in page 2,4,14
4. Accomplish the “Self-check 1, Self-check 2, and Self-check 3 ”**in page 3, 13, and 19**respectively.

Page 1 of 76	Federal TVET Agency Author/Copyright	TVET program title Building electrical installation Level II	Version -1 October 2019
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Information Sheet-1	Communicating and confirming instructions for work activity
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1.1 Plan and Prepare

A plan is typically any diagram or list of steps with details of timing and resources, used to achieve an objective to do something. It is commonly understood as a temporal set of intended actions through which one expects to achieve a goal.

Prepare mean make (something) ready for use or consideration.

1.2. Communicating instruction for work activity

It is important in a workplace Communication setting because people must interact with one another in ways that will get the job done as quickly and effectively as possible and in ways that will maintain the morale of the trainees. Both of these are important aspects of workplace communications.

In order to work efficiently, trainer (for example) must be able to communicate to their trainees what is needed. If they are not clear about what their trainees need to do, there will be mistakes that make the trainer lose time.

It is also important to communicate in ways that maintain the trainees' morale. If the trainers communicate in angry or degrading ways, the trainees will tend to feel unhappy with their situations. This will decrease their desire to work and will therefore decrease productivity in the workplace.

1.3. Confirming instructions for work activity

Before starting an Electrical installation, there are some important procedures to carry out. There should be a detailed Electrical Wiring Diagram to start with. This is normally prepared by an Electrical Engineer. First he calculates the Electrical Loads, Currents, Cable sizes and the Protective devices for the Electrical Installation. Once these information are obtained Electrical Drawings based on this information is done on a CAD or by a Draftsman on paper. He incorporates these details into a Diagram with Electrical Symbols and text details so that referring these Electrical Diagrams, the Installer[s] can carry out the installation job. Based on this information, the quantities of material and components needed for the job also is worked out. There are specifications for carrying out Electrical Installation Work so that the completed installation will abide to rules and regulations of the Electrical Industry. One needs to be familiar with Electrical Symbols appearing in Electrical Drawings. These symbols can be different from a region to region so one has to be familiar with the symbols used in that part of the world he is living. The Electrical Wiring Diagram will indicate the areas or locations of a

Page 2 of 76	Federal TVET Agency Author/Copyright	TVET program title Building electrical installation Level II	Version -1 October 2019
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Information Sheet- 2	Identifying tools, equipment and PPE for installation of electrical wiring
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2.1 Tools, Equipment and PPE

Every electrician needs basic hand tools, equipment and PPE to perform everyday tasks, fortunately, today's basics are better than older models, providing more comfort and safety than their predecessors. Manufacturers have made tools more 'ergonomically correct,' and improved designs help cut down on hand and wrist injuries often caused by repetitive movement. Plus, they make it easier to perform the same motion over and over because the tools just feel more comfortable. While today's designs may provide more safety and comfort, they're still the basic hand tools, equipment and PPE electricians have been using for years.”

2.2. Identifying tools, equipment and PPE for installation of electrical wiring

2.2.1 Electrical Tools

I. Screw Drivers

Screw drivers are the most common hand tools in electrical and electronics jobs. It is used for securing various styles of screws in electrical/electronic equipment and devices. They are available in a wide variety of handles, shank lengths, shapes, and driver styles.

- a. Handle – it is made of hardwood or plastic, the handle may have a rubber grip for electrical protection, positive gripping.
- b. Shank – a tempered steel alloy that can withstand the distortion caused by the torque during normal use. The shank may have either a round or square cross section. Shank lengths vary from 8 cm to 40 cm.
- c. Driver style – is design for all screw head configuration. In electrical the most common drive style used are the following; Philips, and flat screw.

1. Flat Screw driver

This tool is used to drive slotted head screws and should never be used for prying and bending. It's width are varied in different sizes such as; 2

Page 4 of 76	Federal TVET Agency Author/Copyright	TVET program title Building electrical installation Level II	Version -1 October 2019
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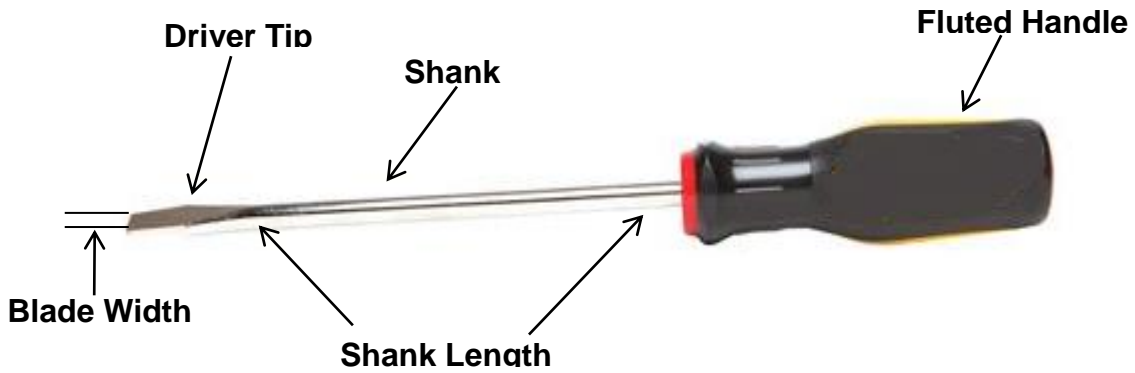


Fig.2.1

2. Phillips Screw Driver

This tool made to fit the tapered cross-slots of a screw head. The more contact points the more driving force and less slippage. It is available in different sizes; 0, 1, 2, 3, and 4. In driving screws, the tip and the head should be aligned.

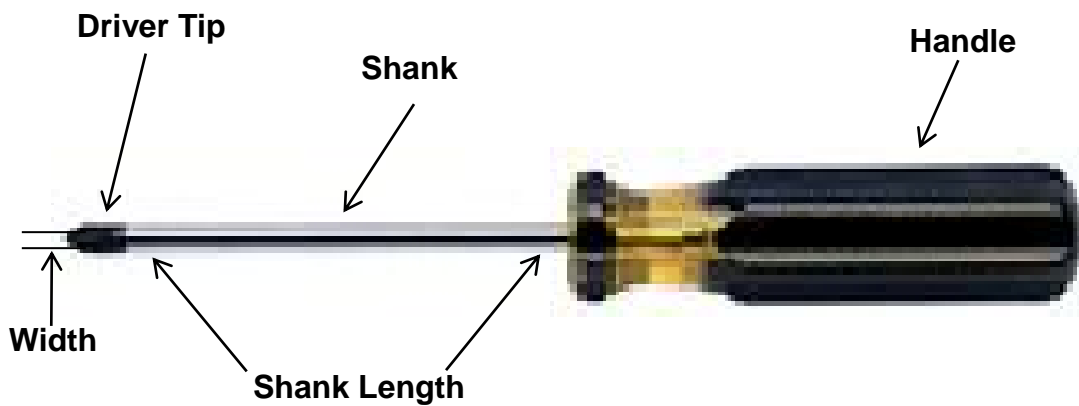


Fig.2.2

II. Pliers

1. Electrician Plier/Combination Plier

Page 5 of 76	Federal TVET Agency Author/Copyright	TVET program title Building electrical installation Level II	Version -1 October 2019
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This plier is design for cutting electrical conductors and also for gripping materials particularly conductors. It has a separated jaws, a rod gripping section, side cutter, wire cropper, a fixed pivot, and parallel handles. The flat serrated jaws are used to bend sheet metal and twist electrical conductors. The rod gripping section is used to hold and bend small rods. The side cutter is located above the pivot point, where maximum pressure may be applied. A pair of croppers is located above the pivot, it is used to shear larger electrical wires. Combination pliers used around electrical installation where the the sleeves are insulated over the handles to prevent possibility of electrical shock.



Fig.2.3

- 2. Diagonal Side Cutter Plier –** This tool is designed specifically for cutting electrical conductors. It is used for cutting jobs such as trimming the ends of electrical wire on terminal connection. This tool has a fixed pivot. The jaws are offset by about 15 degrees and are shaped to give enough knuckle clearance while making flush cuts. The diagonal side cutting pliers are used for cutting small materials such as wires, cotter pins, tie wires, and other small materials. These pliers are not applicable in holding or gripping objects.

Fig.2.4



3. **Long nose Plier** – This tool is design to make loop ends on wire connection to terminal screws. It also used to hold electrical wires when stripping the insulator using side cutter plier.



Fig.2.5

4. **Vise Grip Plier** – are designed to hold objects with jaws that can be locked onto the objects.



Fig.2.6

- 5. End Cutting Plier** – The end cutting pliers are used to crop wire flush to the working surface. It is designed to keep hands and fingers safely away from the wire ends.

Fig.2.7



- 6. Flat Nose Plier** – The flat nose plier have flat serrated jaws, a fixed pivot, and curve handles which may have insulated sleeves. This plier is used to bend light sheet metal and electrical conductors.

Fig.2.8



- 7. Wire Stripper Plier** – This tool is used to remove insulation from the conductor or wire for electrical connection during the wiring installation , service of electronic equipment or assembly. It contains a single slot adjustment within the handle to allow for different gauges of wire.

Fig.2.9



III, Hammers

Page 8 of 76	Federal TVET Agency Author/Copyright	TVET program title Building electrical installation Level II	Version -1 October 2019
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1. **Claw Hammer** – This tool used for driving and pulling common nails and tapping objects like chisel, center punch and others.



Fig.2.10

2. **Ball Peen Hammer** – This tools are deal for heavy-duty striking operations. It is used for driving cold chisel for cutting rods or big wires, and making hole on the concrete wall.



Fig.2.11

3. **Bumping Body Hammer** – This tool used to straighten and form metals or objects.



Fig.2.12

IV. Saws

1. **Cross Cut Saw** – This tool consist of thin and flat steel blades that have a row of spaced notches or teeth along the edge. The blade is fastened to a handle. It is used to cut against the grain of the wood.

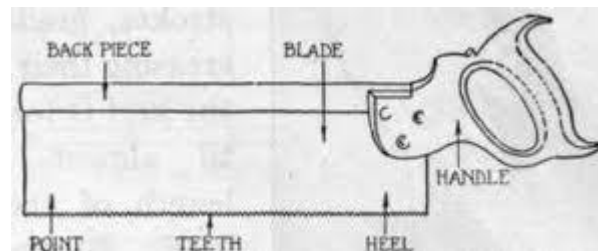


Fig.2.13

2. Back Saw – This tool has a straight blade and parallel top and bottom, with a heavy strip of steel or brass wrapped along the back to provide rigidity. It is used for cutting and making joints of the lumber section.

A backsaw is a specialized handsaw for cutting tenons (joints or grooves) in wood. The blade is rectangular; 8 to 14 inches in length, with a hardwood or plastic handle and a metal-reinforced back edge (opposite the teeth) to keep the blade from bending while cutting. There are 11 to 20 teeth, or points, per inch. Backsaws are used to cut across the wood grain similar to the larger and more flexible crosscut saw.

Fig.2.14



3. Nested Saw – Consist of a wooden handle to which several different blades can be attached, making up different types of saws such as Keyhole saw or compass saw. A slotted end at the heel of each blade slips into pistol-grip type handle where a wingnut fastens it in place. It is used to cut along curved lines and holes on the plyboard or plywood.



Fig.2.15

4. **Key Hole Saw** – This tool is the smallest type of saw. Its blade has a very narrow point small enough to enter a ¼ inch hole. It is used for cutting, shaping, and enlarging hole.



Fig.2.16

Hack Saw – This tool is designed to cut almost any size or shape of metal object. The hacksaw used two types of blades, hard and flexible type f blade depending on the nature of the task. The blade is held to the saw frame by pins that fit into small holes at each end of the blade. Blade tension is adjusted by a screw and wingnut assembly at either the nose or the handle end of the frame



Fig.2.17

2.2.2 Electrical equipment

An electricity meter, electric meter, electrical meter, or energy meter is a device or an electrical equipment that measures the amount of electric energy consumed by a residence, a business, or an electrically powered device. Electric utilities use electric meters installed at customers' premises for billing purposes.

Page 11 of 76	Federal TVET Agency Author/Copyright	TVET program title Building electrical installation Level II	Version -1 October 2019
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Fig 2.18. Energy meter

2.2.3. Personal protective equipment (PPE) for installation of electrical wiring

PPE for electrical work, including testing and fault finding must be suitable for the work, properly tested and maintained in good working order. The PPE must be able to withstand the energy at the point of work when working energized. Training must be provided in how to select and fit the correct type of equipment, as well as training on the use and care of the equipment so that it works effectively. Depending on the type of work and the risks involved, the following PPE should be considered:

- **Face Protection**—use of a suitably arc rated full face shield may be appropriate when working where there is potential for high current and arcing.
- **Eye Protection**—metal spectacle frames should not be worn.
- **Gloves**—use gloves insulated to the highest potential voltage expected for the work being undertaken. Leather work gloves may be considered for de-energised electrical work.
- **Clothing**—use non-synthetic clothing of non-fusible material and flame resistant. Clothing made from conductive material or containing metal threads should not be worn.

Page 12 of 76	Federal TVET Agency Author/Copyright	TVET program title Building electrical installation Level II	Version -1 October 2019
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- **Footwear**—use non-conductive footwear, for example steel toe capped boots or shoes manufactured to a suitable standard.
- **Safety Belt/Harness**—safety belts and harnesses should be checked and inspected each time before use with particular attention being paid to buckles, rings, hooks, clips and webbing.

Page 13 of 76	Federal TVET Agency Author/Copyright	TVET program title Building electrical installation Level II	Version -1 October 2019
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Self-Check -2	Written Test
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Directions: Choose the correct answer from the given alternatives.

1. Every electrician needs basic _____ to perform everyday tasks. (3 points)

A. Hand tools C. PPE

B. equipment

D. all

2. One of the following plier is used for cutting and gripping electrical conductors (3 points)

A. Long nose Plier B. Combination Plier C. Flat Nose Plier D. All except "C"

3. _____ is an Electrical equipment. (2 points) A. copper

B. breaker

C. switch

D. energy meter

Note: Satisfactory rating - 4 and above points Unsatisfactory - below 4 points

Score = _____

Rating: _____

Name: _____

Date: _____

Page 14 of 76	Federal TVET Agency Author/Copyright	TVET program title Building electrical installation Level II	Version -1 October 2019
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Page 15 of 76	Federal TVET Agency Author/Copyright	TVET program title Building electrical installation Level II	Version -1 October 2019
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Information Sheet-3	Obtaining materials with established procedures
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3.1. Procedures of Obtaining materials

To obtain certain materials, the established procedures are:

- preparing proposal
- identifying necessary materials
- listing down the description and quantities of materials
- obtaining from either governmental ,nongovernmental or private organization

Electrical materials are developed and constructed for a special purpose such as to:

1. Control the flow of current in an electrical circuit;
2. Carry electrical current from the source to the load or current consuming apparatus;
3. Hold and secure wires to its fixtures inside and outside houses and buildings
4. Protect the houses, buildings, appliances' and instruments from any destruction and damage

3.2 Convenience outlet of electrical materials

A device that acts as a convenient source of electrical energy for current consuming appliances. It is where the male plug of an appliance is inserted and usually fastened on the wall or connected in an extension cord. It maybe single, duplex, triplex or multiplex and could be surface type or flush type.



Surface Type (Duplex)



Flush Type (Duplex)

Fig.3.1 convenience out let

Page 16 of 76	Federal TVET Agency Author/Copyright	TVET program title Building electrical installation Level II	Version -1 October 2019
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- **Male plug-**

A device inserted to a convenience outlet to conduct electric current. A flat cord is attached to it on one end and the other end is connected to a current consuming instrument or appliance.



Fig 3.2

- **Lamp holders-**

Devices that hold and protect the lamp and are also called as Lamp Sockets/Receptacles

II. These come in many designs and sizes. They are reclassified as flush, hanging (weatherproof/chain) and surface types.



Flush Type

Hanging
(chain)

Surface Type

Hanging
(weather)

Fig 3.3

- **Switch -**

A device that connects and dis-connects the flow of electric current in a circuit. There are many shapes, designs, and types and they are classified as hanging, flush, and surface types.



Fig 3.4

- **Fuse**

- A circuit protective device that automatically blows and cut the current when and over load or short circuit happens.



Circuit

fig 3.5

- **Breaker**

- a protective device used to automatically blows and cuts the current when trouble in the circuit such as short circuit or overload occurs.



Fig 3.6

- **Junction Box**

Page 18 of 76	Federal TVET Agency Author/Copyright	TVET program title Building electrical installation Level II	Version -1 October 2019
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- An octagonal shaped electrical material where the connections or joints of wires are being done. It is also where the flush type lamp holder is attached. This could be made of metal or plastic (PVC) Poly vinyl chloride.



fig 3.7

- **Utility Box**

- A rectangular shaped metallic or plastic (PVC) material in which flush type convenience outlet and switch are attached.



Fig 3.8

- **Flat Cord-**

Is a duplex stranded wire used for temporary wiring installation and commonly used in extension cord assembly. It comes in a roll of 150 meters and with sizes of gauge # 18 and gauge #16 awg (American wire gauge)

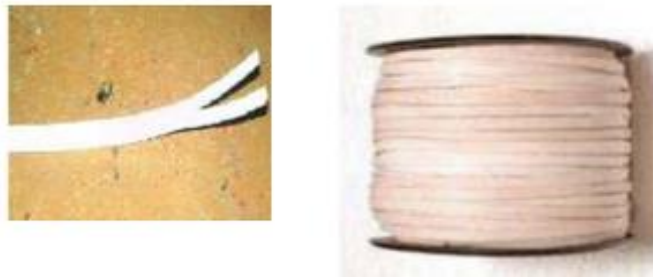


Fig 3.9

- **Electrical Wire/Conductor could be:**

- Stranded wire which is made of multiple strands joined together to make a single wire.
- Solid wire is made of a single strand of copper or aluminum wire. These are used in wiring installation inside and outside the buildings.

- **Conduits/Pipes-**

Electrical materials used as the passage of wires for protection and insulation. These could be rigid metallic, flexible metallic conduit (FMC), rigid non metallic (PVC), and flexible non-metallic or corrugated plastic conduit (CPC)

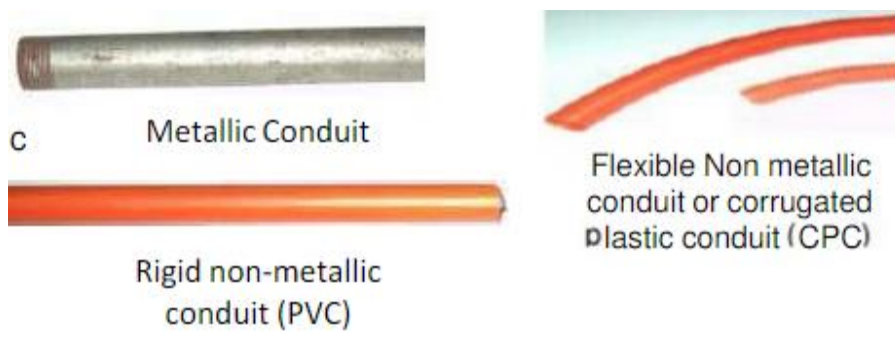


Fig 3.10

- **Clamps**

- Electrical materials used to hold and anchor electrical conduits in its proper position.



Metal Clamp



Plastic Clamp

Fig 3.11

- **Connectors**

- used to attach metallic or non-metallic conduit to the junction or utility



Metal Connector



Flexible Non
Metallic Connector

Fig 3.12

Self-Check -3	Written Test
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Directions: choose the best answer from the given alternatives.

1, _____ Controls the flow of current in an electrical circuit (2 points)

A. switch B. breaker C. conduits D. connectors

2. One of the following Carry electrical current from the source to the load or current consuming apparatus. (2 points) A, ectrical conductors .B.Switches C. Conduits D.breaker

3. ___ Hold and secure wires to its fixtures inside and outside houses and buildings. (2 points)

A. conduits B. breaker C. switch D. energy meter

4. _____ Protect the houses, buildings, appliances' and instruments from any destruction and



Damage.(2 points) A. conduits B. breakers C. switches D. energy meter



5.

This material is called _____.(2 pts)

- A. Male plug B. Lamp holders C. Fuse D. Switch

Note: Satisfactory rating – 5 and above points Unsatisfactory - below 5 points

Score = _____

Rating: _____

Name: _____

Date: _____

Reference

- <https://buyersask.com/electrical/10-common-electrical-defects-home-inspectors-find/>
- EBCS 10
- IEE Regulation 2017

Page 22 of 76	Federal TVET Agency Author/Copyright	TVET program title Building electrical installation Level II	Version -1 October 2019
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BUILDING ELECTRICAL INSTALLATION

NTQF-LEVEL II

Learning Guide-32

Unit of Competence: Install Electrical Circuit Protection

Module Title: Installing Electrical Circuit Protection

LG Code: EIS BEI2 M09LO2-LG-32

TTLM Code: EIS BEI2 M09TTLM 1019v1

LO2: Install Electrical Protection System

Page 23 of 76	Federal TVET Agency Author/Copyright	TVET program title Building electrical installation Level II	Version -1 October 2019
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Page 24 of 76	Federal TVET Agency Author/Copyright	TVET program title Building electrical installation Level II	Version -1 October 2019
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Instruction Sheet	Learning Guide -32
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This learning guide is developed to provide you the necessary information regarding the following **content coverage** and topics:

- Following safety procedures throughout the process of installation
- Performing Correct procedures for Installation of electrical protection system
- Following Schedule of work to quality standard and with agreed time
- Waiting instructions from a supervisor if unplanned events or conditions occur
- Doing On-going checks of quality of work

This guide will also assist you to attain the learning outcome stated in the cover page.

Specifically, **upon completion of this Learning Guide, you will be able to:**

- Follow safety procedures throughout the process of installation
- Perform Correct procedures for Installation of electrical protection system
- Follow Schedule of work to quality standard and with agreed time
- Wait instructions from a supervisor if unplanned events or conditions occur
- Do On-going checks of quality of work

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below 3 to 6.
3. Read the information written in the information “Sheet 1, Sheet 2, Sheet 3 and Sheet 4” in page 23, 27,34, 36, and 39
4. Accomplish the “Self-check 1, Self-check 2, Self-check 3, self-check 4 and Self-check 5” in **page 26, 33, 35,38 and 42** respectively.
5. If you earned a satisfactory evaluation from the “Self-check” proceed to “Operation Sheet 1, Operation Sheet 2 and Operation Sheet 3 ” in **page 43,45 and 47**
6. Do the “LAP test” in **page 49**.



Information Sheet-1	Following safety procedures throughout the process of installation
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1.1. Following safety procedure

Electrical instructions **throughout the process of installation** may include, but not be limited to:

1. De-energizing circuits, if possible, and providing a means to prevent re-energization
2. Grounding conductors and all possible conducting parts
3. Controlling associated generating equipment
4. Testing of equipment to ensure safe conditions
5. Provision of rubber-insulated protective equipment rated for the highest voltage present
6. Qualified personnel
7. PPE and protective clothing (e.g., hardhats, safety shoes, eye and face protection, insulated live-line tools, hot sticks, cotton or fire-resistant clothing, and arc protection)
8. Working on experimental equipment

A safe work environment is not always enough to control all potential electrical hazards. You must be very cautious and work safely. Safety rules help you control your and others risk of injury or death from workplace hazards. If you are working on electrical circuits or with electrical tools and equipment, you need to use following golden safety rules:

21 Golden Safety Rules

Rule no.1

Page 26 of 76	Federal TVET Agency Author/Copyright	TVET program title Building electrical installation Level II	Version -1 October 2019
---------------	---	--	----------------------------



Avoid contact with energized electrical circuits. Please don't make fun of this rule if you already know this (*and you probably already know if you are reading these lines*) and remember that if something bad occurs – you probably won't have second chance. That's not funny.

Rule no. 2

Treat all electrical devices as if they are live or energized. **You never know.**

Rule no. 3

Disconnect the power source before servicing or repairing electrical equipment.

The only way to be sure.

Rule no. 4

Use only tools and equipment with non-conducting handles when working on electrical devices. Easy to check.

Rule no. 5

Never use metallic pencils or rulers, or wear rings or metal watchbands when working with electrical equipment. This rule is very easy to forget, especially when you are showing some electrical part pointing with metallic pencil. Always be aware.

Rule no. 6

When it is necessary to handle equipment that is plugged in, be sure hands are dry and, when possible, wear nonconductive gloves, protective clothes and shoes with insulated soles. Remember: gloves, clothes and shoes.

Page 27 of 76	Federal TVET Agency Author/Copyright	TVET program title Building electrical installation Level II	Version -1 October 2019
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Fig. 1 Safety clothes, gloves and shoes

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Rule no. 7

If it is safe to do so, work with only one hand, keeping the other hand at your side or in your pocket, away from all conductive material. This precaution reduces the likelihood of accidents that result in current passing through the chest cavity.

If you ever read about current passing through human body you will know, so remember – work with one hand only.

If you don't clue about electric current path through human body, read more in following technical articles:

[Do You Understand What Is Electric Shock?](#)

[What psychological effect does an electric shock?](#)

Rule no. 8

Minimize the use of electrical equipment in **cold rooms** or other areas where **condensation** is likely. If equipment must be used in such areas, mount the equipment on a wall or vertical panel.

Rule no. 9

If water or a chemical is spilled onto equipment, shut off power at the main switch or circuit breaker and unplug the equipment.

Page 28 of 76	Federal TVET Agency Author/Copyright	TVET program title Building electrical installation Level II	Version -1 October 2019
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Very logical. NEVER try to remove water or similar from equipment while energized. Afterall, it's stupid to do so.

Rule no. 10

If an individual comes in contact with a live electrical conductor, do not touch the equipment, cord or person. Disconnect the power source from the circuit breaker or pull out the plug using a leather belt.

Tricky situation, and you must be very calm in order not to make the situation even worse. Like in previous rules – Always disconnect the power FIRST.



Always disconnect the power FIRST

Fig. 2. Disconnect the power source

Rule no. 11

Equipment producing a “tingle” should be disconnected and reported promptly for repair.

Rule no. 12

Do not rely on grounding to mask a defective circuit nor attempt to correct a fault by insertion of another fuse or breaker, particularly one of larger capacity.

Rule no. 13

Drain capacitors before working near them and keep the short circuit on the terminals during the work to prevent electrical shock.

Rule no. 14

Never touch another person's equipment or electrical control devices unless instructed to do so. Don't be too smart. Don't try your luck.



Rule no. 15

Enclose all electric contacts and conductors so that no one can accidentally come into contact with them.If applicable do it always, if not be very careful.

Rule no. 16

Never handle electrical equipment when hands, feet, or body are wet or perspiring, or when standing on a wet floor.Remember: Gloves and shoes

Rule no. 17

When it is necessary to touch electrical equipment (for example, when checking for overheated motors), use the back of the hand. Thus, if accidental shock were to cause muscular contraction, you would not “freeze” to the conductor.

Rule no. 18

Do not store highly flammable liquids near electrical equipment.

Rule no. 19

Be aware that interlocks on equipment disconnect the high voltage source when a cabinet door is open but power for control circuits may remain on.Read the single line diagram and wiring schemes – know your switchboard.

Rule no. 20

De-energize open experimental circuits and equipment to be left unattended.

Rule no. 21

Do not wear loose clothing or ties near electrical equipment. Act like an electrical engineer, you are not on the beach.

Self-Check -1	Written Test
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Directions:choose the best answer from the given alternatives.

1, _____is one of the safety procedures(3 points) A. De-energizing circuits

Page 30 of 76	Federal TVET Agency Author/Copyright	TVET program title Building electrical installation Level II	Version -1 October 2019
---------------	---	--	----------------------------



- B. Grounding conductors C. Controlling associated generating equipmentD. all
- 2, _____the power source before servicing or repairing electrical equipment.(3 points)
 A, Disconnect.BswitchingC.connectD. ON
- 3.Never use ____, when working with electrical equipment. (2 points)
 A.metallic pencilsor rulersB.Wear ringsC. metal watchD. all

Note: Satisfactory rating – 4 and above points Unsatisfactory - below 4points

Score = _____
Rating: _____

Information Sheet- 2	Performing Correct procedures for Installation of electrical protection system
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2.1. Performing correct procedures for Installation of electrical protection system.

Procedures are the specific methods employed to express policies in action in day-to-day operations of the organization.

Electrical -system protection is a branch of electrical power engineering that deals with the protection of electrical power systems from faults through the disconnection of faulted parts from the rest of the electrical network.The devices that are used to protect the power systems from faults are called protection devices.

5. Electrical safety tips you should know for your home

- Replace or repair damaged power cords.
- Exposed wiring is a danger that cannot go overlooked.
- Don't overload your outlets.
- Avoid extension cords as much as possible.
- Keep electrical equipment or outlets away from water.
- Protect small children from hazards.

2.1.1. Protection against overcurrent

Page 31 of 76	Federal TVET Agency Author/Copyright	TVET program title Building electrical installation Level II	Version -1 October 2019
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An overcurrent is a current greater than the rated current of a circuit. It may occur in two ways:

1. Overload current

2. Short circuit or fault current

These conditions need to be protected against in order to avoid damage to circuit conductors and equipment. In practice, fuses and circuit breakers will fulfill both of these needs.

- **Overloads**

Overloads are overcurrent, occurring in healthy circuits. They may be caused, for example, by faulty appliances or by surges due to motors starting.

- **Short circuits**

A short-circuit is the current that will flow when a 'dead short' occurs between live conductors (phase to neutral for single-phase; phase to phase for three phase). Prospective short-circuit current is the same, but the term is usually used to signify the value of short-circuit at fuse or circuit breaker positions.

Prospective short-circuit current is of great importance. However, before discussing it or any other overcurrent further, it is perhaps wise to refresh our memories with regard to fuses and circuit breakers and their characteristics.

- **Fuses and circuit breakers**

As we all know, a fuse is the weak link in a circuit which will break when too much current flows, thus protecting the circuit conductors from damage. It must be remembered that the priority of the fuse is to protect the *circuit conductors*, not the appliance or the user. Calculation of cable size therefore automatically involves the correct selection of protective devices.

There are many different types and sizes of fuse, all designed to perform a certain function. The IEE Regulations refer to only four of these: BS 3036, BS 88, BS 1361 and BS 1362 fuses. It is perhaps sensible to include, at this point, circuit breakers to BS 3871, BS EN 60898 and RCBOs to BS EN 61009, although the BS 3871 MCBs are no longer included in the IEE Regulations.

- **Fuses**

Page 32 of 76	Federal TVET Agency Author/Copyright	TVET program title Building electrical installation Level II	Version -1 October 2019
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A fuse is simply a device which carries a metal element, usually tinned copper, which will melt and break the circuit when excessive current flows.

There are three types of fuse:

1. The rewirable or semi-enclosed fuse;
2. The cartridge fuse and fuse link; and
3. The high-rupturing-capacity (H.R.C.) fuse.

1. The rewirable fuse (BS 3036)

A rewirable fuse consists of a fuse, holder, a fuse element and a fuse carrier, the holder and carrier being made of porcelain or Bakelite (Fig. 1).

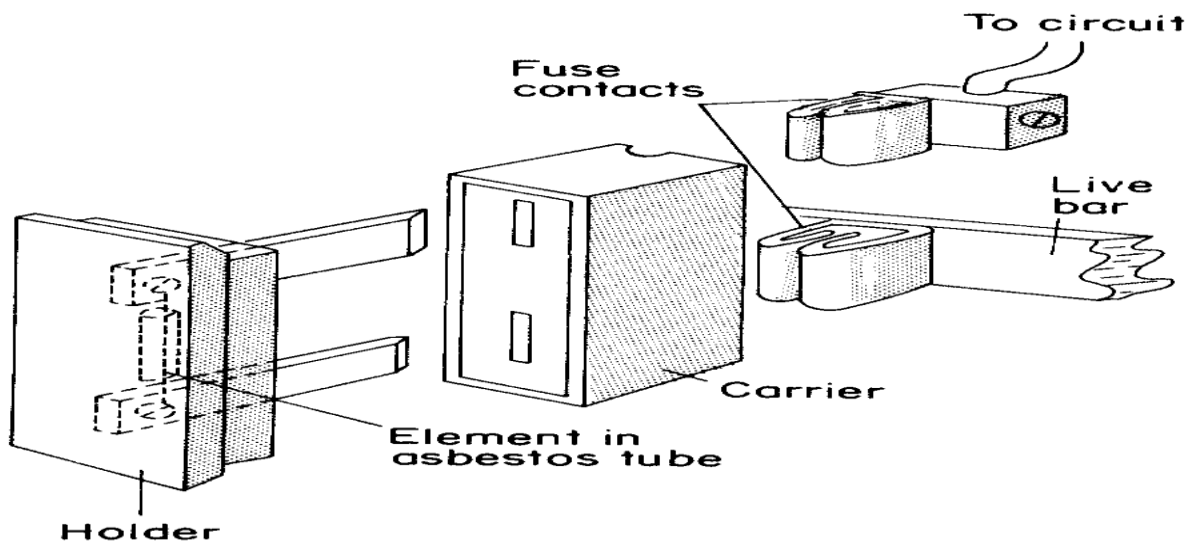


Fig.2.1. Typical rewirable fuse assembly

The circuit for which this type of fuse is designed has a color code which is marked on the fuse holder and is as follows:

- 45 A – green
- 30 A – red
- 20 A – yellow
- 15 A – blue
- 5 A – white

Although this type of fuse is very popular in domestic installations, as it is cheap and easy to repair, it has serious disadvantages.

1. The fact that it is repairable enables the wrong size of fuse wire (element) to be used.

2. The elements become weak after long usage and may break under normal conditions.
- 3 Normal starting-current surges (e.g. when motors etc. are switched on) are 'seen' by the fuse as an overload and will therefore break the circuit.
- 3 The fuse holder and carrier can become damaged as a result of arcing in the event of a heavy overload.

2. Cartridges fuse (BS 1361 and BS 1362)

A cartridge fuse consists of a porcelain tube with metal and caps to which the element is attached. The tube is filled with silica (Fig. 17.5).

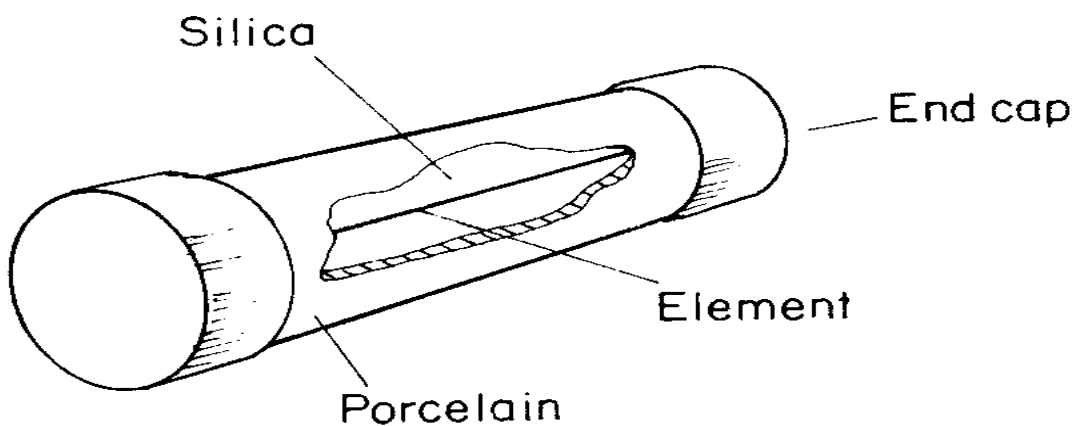


Fig 2.2 Cartridge fuse

These fuses are found generally in modern plug tops used with 13 A socket outlets, and in some distribution boards and at mains intake positions (Electricity Board fuse). They have the advantage over the rewirable fuse of not deteriorating, accuracy in breaking at rated values and not arcing where interrupting faults. They are, however, expensive to replace.

3. High-rupturing-capacity fuses

The H,R,Cfuse is a sophisticated variation of the cartridge fuse and is normally found protecting motor circuits and industrial installations. It consists of a porcelain body filled with

Page 34 of 76	Federal TVET Agency Author/Copyright	TVET program title Building electrical installation Level II	Version -1 October 2019
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silica with a silver element and lug type and caps. Another feature is the indicating element which shows when the fuse has blown.

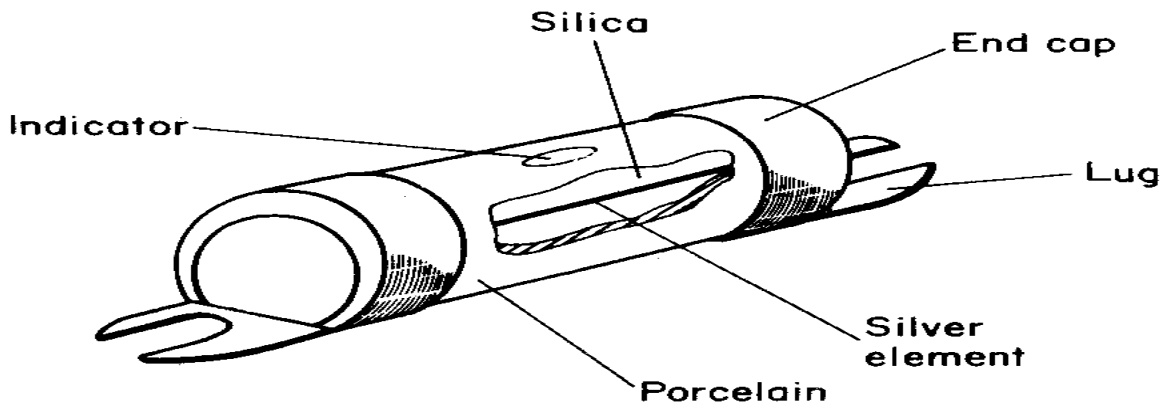


Fig.2.3 HRC fuse

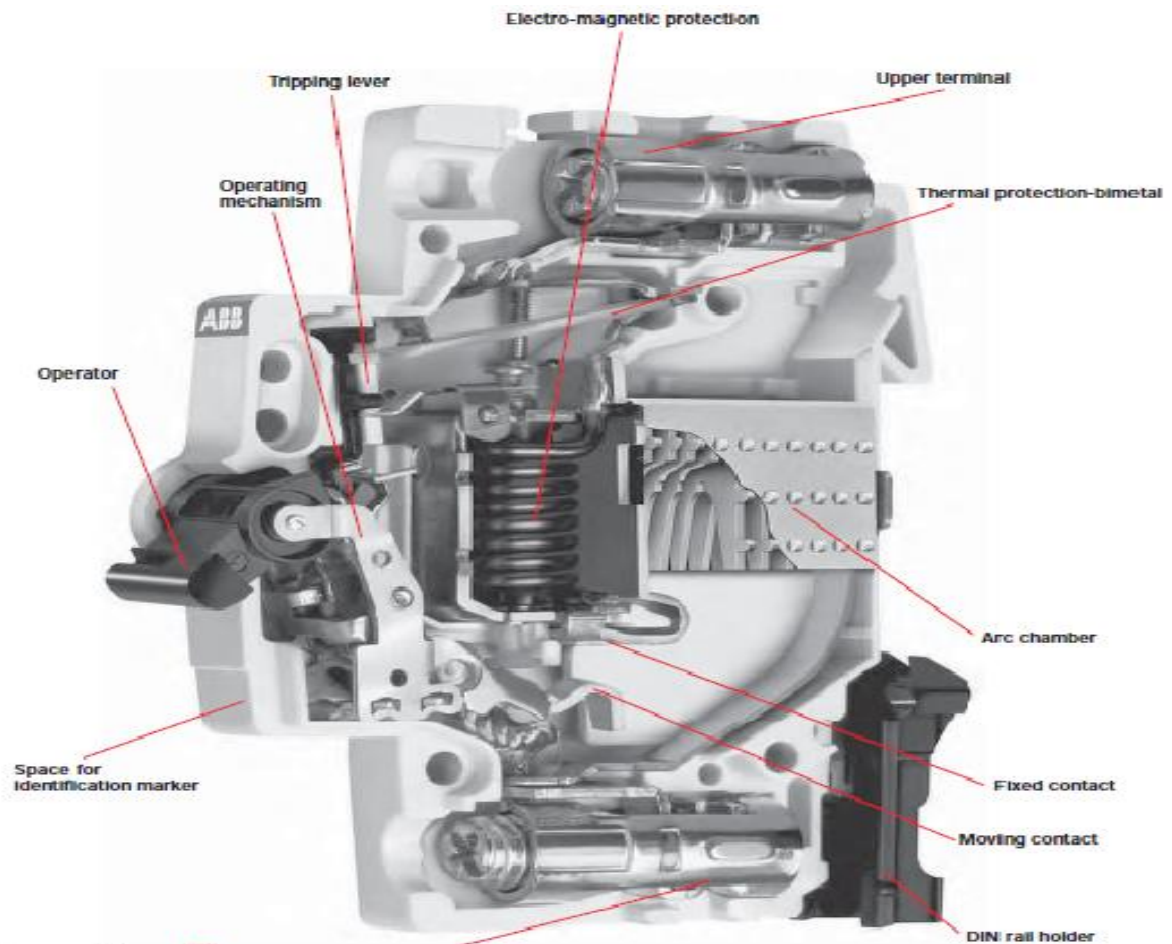
It is very fast-acting and can discriminate between a starting surge and an overload.

- **Circuit breaker (CB)**

A circuit breaker (CB) is an automatically operated electric switch designed to protect an electrical circuit from damage caused by an overload or short circuit.

Operation of Circuit breaker:

All circuit breakers have a common feature in their operations, although details vary substantially depending on the class of stress, rating and type of circuit breaker.



AutomationForum.co

Fig 2.4 circuit breaker

The circuit breaker must detect an error condition. In low-voltage contact breakers, it is usually done in a tripping lever. A high-voltage circuit breaker has separated the device to feel an over current or other error. An error is detected; the contact in the contact breaker must be open to interrupt the circuit. Mechanical energy stored in the tripping lever is used to separate contacts, although some of the energy required may be obtained from the fault flow itself. When one current is interrupted, a circular arc is fixed. This circular arc chamber must be inserted, cooled and extinguished in a controlled manner, such that the gap between contacts can hold the voltage in the circuit again. Finally, once the error condition is clean, the contact must be reclosed to rebuild energy (energy) to the interrupting circuit.

Circuit Breakers:-It is a device designed to open and close a circuit by non- automatic means, and to open the circuit automatically on a predetermined over current without injury to itself when properly applied within its rating. So, circuit breaker is combination device composed of a manual switch and an over current devices. Essentially a circuit breaker

Page 36 of 76	Federal TVET Agency Author/Copyright	TVET program title Building electrical installation Level II	Version -1 October 2019
---------------	---	--	----------------------------



consists of a carefully calibrated by metallic strip. As current flows through the strip, heat is created and the strip bends. If enough current flows through the strip, it bends enough to release a trip that opens the contacts, interrupting the circuit just as it is interrupted when a fuse blows or a switch is opened. In addition to the bimetallic strip that operates by heat, most breakers have a magnetic arrangement that open the breaker instantly in case of short circuit. A circuit breaker can be considered a switch that opens itself in case of overload. Circuit breakers are rated in amperes just as fuses are rated. Like fuses, breakers are tested in open air to carry 110% of their rated loads indefinitely without tripping. Most breakers will carry 150% of their rated load for perhaps a minute; 200% for about 20 second.

Standard rating: Both fuse and circuit breakers are available in standard ratings of 6,10,16,20,25,35,50,53,80,100,125,160,224,250,300 and large sizes.

Comparison between MCB versus convectional fuses

MCB	Convention al fuses
<p>1. Protection</p> <p>MCB instantly switches off the supply automatically if there is a short circuit, overload or earth fault. It thus prevents damage to expensive wiring and the risk of fire.</p>	<p>Sometimes, fuse wire of proper rating is not used which results in non-disconnection (melting) of fuse wire in the event of short circuit, or power overload. This can lead to electrical accidents, as the tripping is essential in such cases.</p>
<p>2. Safety</p> <p>Re-starting power supply after tripping due to over load or short circuit is easy. Just switch on the MCB like switching on a lamp, which any person can do.</p>	<p>TO replace a blown fuse in between live current carrying points is potentially dangerous especially in the dark. The fuse wire may go loose even if replaced and this may be dangerous while fixing the fuse.</p>
<p>3. Convenience</p>	<p>The system using rewirable is not</p>



<p><i>The MCB needs no maintenance and repairs. It doesn't deteriorate with time.</i></p>	<p>convenient as the exact size of fuse wire may not be available as the time of wiring. Also complete kit of hand tools has to be kept ready all the time.</p>
<p>4. Look <i>The board where MCB is installed gives a beautiful look as it is compact and elegant</i></p>	<p>The fuse board is not compact one and large enough to be hidden.</p>

Self-Check -2	Written Test
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Directions: choose the best answer from the given alternatives.

1, _____ is an automatically operated electric switch designed to protect an electrical circuit from damage caused by an overload or short circuit(2 points)

- A. switch B. breaker C. conduits D. connectors

2. One of the following is simply a device which carries a metal element, usually tinned copper(2points) A, ectrical conductors B. switches C. fuse D. breaker

3. ___ is the current that will flow when a 'dead short' occurs between live conductors (phase to neutral for single-phase; phase to phase for three phase. (2 points)

- A. conduits B. short-circuit C. switch D. energy meter

4. _____ Protect the houses, buildings, appliances' and instruments from any destruction and Damage.(2 points) A. conduits B. breakers C. switches D. all

Note: Satisfactory rating – 4 and above points Unsatisfactory - below 4points

Score = _____
Rating: _____

Name: _____

Date: _____

Page 38 of 76	Federal TVET Agency Author/Copyright	TVET program title Building electrical installation Level II	Version -1 October 2019
---------------	---	--	----------------------------



Information Sheet-3	Following Schedule of work to quality standard and with agreed time
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3.1. Following Schedule of work to quality standard

. What is Quality?

- The ongoing process of building and sustaining relationships by assessing, anticipating, and fulfilling stated and implied needs.
- Quality is the customers' perception of the value of the suppliers' work output.
- A product or process that is Reliable, and that performs its intended function is said to be a quality product.
- Quality is nothing more or less than the perception the customer has of you, your products, and your services!
!

- **Quality policy**

Quality policy is a document jointly developed by management and quality experts to express the quality objectives of the organization, the acceptable level of quality and the duties of specific departments to ensure quality.

Your quality policy should:

- State a clear commitment to quality.
- Recognize customer needs and expectations.
- Be actively supported by senior management.
- List the quality objectives you want to achieve.
- Be understood by everyone in the organization.
- Be consistent with your organization's goals.
- Be maintained throughout your organization.
- Be applied throughout your organization.

- **Quality system**

Develop a quality system and a manual that describes it. Your quality system should ensure that your products conform to all specified requirements.

Your quality manual should:

- State your quality policy.
- List your quality objectives.

Page 39 of 76	Federal TVET Agency Author/Copyright	TVET program title Building electrical installation Level II	Version -1 October 2019
---------------	---	--	----------------------------



- Provide an overview of your quality system.
- Describe the structure of your organization.
- Discuss your quality system procedures.
- Introduce your quality documents and records.
- Teach people about your quality system.
- Control quality system work practices.
- Guide the implementation of your quality system.
- Explain how your quality system will be audited

3.2 Following Schedule of work with agreed time

The **Guidelines** also acknowledge that scheduling **parenting time** is more difficult when **these guidelines** are **based upon** the **developmental stages** of **trainees**. A **schedule**, often called a rota or roster, is a list of trainees, and associated information e.g. location, **working** times, responsibilities for a given time period e.g. week, month. In **shift work**, a **schedule** usually employs a recurring shift plan

Self-Check -3	Written Test
----------------------	---------------------

Directions: choose the best answer from the given alternatives.

- 1, _____ is the customers' perception of the value of the supplies' work output.
(2 points) A. switch B. breaker C. Quality D. connectors
2. Quality manual should be: (2 points) A. States quality policy. B. Lists quality objectives
C. A and B D. none
3. Quality is nothing more or less than the perception the customer has of you, your Products, and your services (2 points) A. false B. True
4. _____ is a document jointly developed by management and quality experts to express the quality objectives of the organization (2 points) A. Quality policy B. Quality C. switch D. all

Note: Satisfactory rating – 4 and above points Unsatisfactory - below 4 points

Page 40 of 76	Federal TVET Agency Author/Copyright	TVET program title: Building electrical installation Level II	<div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;">Score = _____</div> Rating: _____ Version -1 October 2019
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Name: _____

Date: _____

Information Sheet-4	Waiting instructions from a supervisor if unplanned events or conditions occur
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4.1 Reporting unplanned events or conditions

An accident is an **unplanned** or undesirable **event** that brings loss or injury. An unsafe act is an element of unsatisfactory behavior prior to the **event** which plays a significant role in the accident. Some examples include the following: short cuts, horseplay, carelessness, risk taking and lack of situational awareness

All serious and note able incidents must be reported immediately to the relevant manager/supervisor and Health Safety and Wellbeing (HSW). HSW will notify Queensland Work Health and Safety.

An incident is an unplanned event that has resulted in, or has the potential to result in injury, illness, damage or loss. The term 'incident' includes accidents and near hits.

Incidents should be reported and investigated as soon as practical after the event to prevent re-occurrences. The aim of incident investigation is to identify deficiencies in the occupational health and safety management system and improve the existing system to prevent further incidents, not to assign blame.

Record the results of the inspection and testing to make sure the electrical installation is safe to be used until the next inspection (following any work needed to make it safe)

Find any damage and wear and tear that might affect safety, and report it

Page 41 of 76	Federal TVET Agency Author/Copyright	TVET program title Building electrical installation Level II	Version -1 October 2019
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Find any parts of the electrical installation that do not meet the IET Wiring Regulations.

Help find anything that may cause electric shocks and high temperatures.

Provide an important record of the installation at the time of the inspection, and for inspection testing in the future.

Types of condition report

In general, there are two types of domestic electrical installation condition report:

Visual condition report - this does not include testing and is only suitable if the installation has been tested recently.

- **Periodic inspection reports** - this is what we would normally recommend, as it tests the installation and would find any hidden damage.

Page 42 of 76	Federal TVET Agency Author/Copyright	TVET program title Building electrical installation Level II	Version -1 October 2019
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Self-Check -4	Written Test
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Directions: answer the following questions briefly.

- 1. What mean unplanned events or conditions? (4 points)**

- 2. Mention and explain types of domestic electrical installation condition report:(4 points)**

Note: Satisfactory rating – 4 and above points Unsatisfactory - below 4points

Score = _____
Rating: _____

Name: _____

Date: _____

Page 43 of 76	Federal TVET Agency Author/Copyright	TVET program title Building electrical installation Level II	Version -1 October 2019
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Information Sheet-5	Checking quality of on-going work
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5.1 Checking quality of on-going work

Quality control (QC) is a procedure or set of procedures intended to ensure that before **work** is complete, as opposed to afterwards) meets specified requirements. Finally, the QC process must be **ongoing** to ensure that remedial efforts. A final **quality check** should include

1. measuring instrument for checking the protective measures in electrical installations by determining different, selectable via measured variables, with an appropriately designed a safety plug three-pole measuring plug, whose three of earthling contact and two plug pins existing poles are connected via measuring lines to the measuring instrument, of which, however each at most two, possibly alternating poles serve as measuring contacts for receiving required for the respective measurement potential differences, characterized in that an automatic measuring equipment in dependence on the position of the (1) and which upon insertion of the measuring plug (2) into an outlet polarity resulting possibly determined by switching, acting of the three poles (3,4,5) of the measuring plug (2) as measuring contacts, and the measuring plug (2) mounted manual switch (6) so via the automatic measuring equipment with the (1) cooperates that after the takes place setting to the respective measured further operation of the measuring apparatus only via the manual switch (6).
2. Measuring instrument according to claim 1, characterized in that the automatic measuring equipment in each case by appropriate switching the pole pin (3 or 4) makes for measuring contact, which comes to rest against phase (L), while the pole pin on the neutral conductor (N) lying (4 or 3) or the earthling contact (5), possibly alternately, as measuring contact serve.

Page 44 of 76	Federal TVET Agency Author/Copyright	TVET program title Building electrical installation Level II	Version -1 October 2019
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3. Measuring instrument according to claim 1 or 2, characterized in that one of the measuring plug (2) is attachable contact adapter (7) comprises a plug-in pot (8) are fixed to the two test probes (9,10), wherein a first on contacted by the plug receptacle (8) permanently mounted probe head (9) with the earthing contact (5) of the measuring plug (2) and a second, through a measuring cable (11) with the plug receptacle ((8) probe head associated with one of the two pole pins 3,4) of the measuring plug (2) contacted.

4. Measuring instrument according to one of the preceding claims, characterized in that the measuring plug (2) adjacent to the outer protective contacts (5) 49441 also has an earthing contact socket (12) in accordance with DIN for receiving an earthing contact pin, and the contacting of the first measuring tip (9) of the contact adapter (7) via a contact pin (13), which engages in the earthing contact socket (12).

5. Measuring instrument according to one of claims 1 to 4, characterized in that at (1) two ranges are provided for voltage measurement and the two pole pins in a first measuring range (3,4) serve as measuring contacts, so that the voltage between the phase conductor L and neutral conductor N is measured, a pole pin and the earthing contact serve as measuring contacts in a second range as and is measured here in cooperation with the automatic phase matching between the phase conductor L and the protective conductor PE.

6. Measuring instrument according to one of claims 1 to 5, characterized in that the automatic phase matching of the pole pins (3,4) is in the position of the provided for measuring the voltage between the phase L and protective conductor PE, and the measuring plug locked is provided with pole markings which enable a defined assignment to the position of the phase on the outlet.

7. Measuring instrument according to one of the preceding claims, characterized in that a touch contact (14) is provided at the measuring plug (2) connected to high impedance, preferably with a protective capacitor capacitively, via a signal circuit to the earthing contact (5) of the measuring plug (2) is such that when a dangerous lying on the protective conductor potential to the touch of the touching contact (14) comprises a body current flows to ground, which causes the signal circuit to signal the excessive PE-potential.

Page 45 of 76	Federal TVET Agency Author/Copyright	TVET program title Building electrical installation Level II	Version -1 October 2019
---------------	---	--	----------------------------



8. Measuring instrument according to one of the preceding claims, characterized in that the signal circuit includes an amplifier and its power supply is affected from a battery, which also serves to supply the measuring instrument.

9. Measuring instrument according to one of the preceding claims, characterized in that the manual switch (6) to the, preferably by a microprocessor controlled automatic measuring equipment operates, and thereby initiates the measurement sequence, and optical and / or acoustic signal means are provided on the meter that inadmissible deviations certain nominal conditions under which the measurement is carried out, in particular impermissible system voltages, signal.

10. Measuring instrument according to one of the preceding claims, characterized in that the manual switch (6) is designed as a push button, and is initiated by pressing the key, switching of the meter for a limited by a timer time, preferably 15 seconds remains effective after shuts off the measuring instrument itself.

11. Measuring instrument according to one of the preceding claims, characterized in that the manual switch (6) is designed as a sliding switch, which apart from its rest position (16) and its second position (17) for switching the measuring device, a third switching position (18) , depending on the position of the (1) enables further evaluations or tests, and causes a display extension for 15 seconds at operated again.

12. Measuring instrument according to one of the preceding claims, characterized in that in the third switch position (18) of the manual switch (6) indicates a calculated value, the measuring instrument, which is mathematically derived from the value determined in the second switch position measurement value by a computing circuit of the measuring instrument and that this calculated value of the short circuit current when the (1) assumes a provided for measuring the loop resistance or the internal resistance of switching position.

13. Measuring instrument according to one of the preceding claims, characterized in that in the third switch position (18) of the manual switch (6) flows onto the two measuring contacts a test current, which corresponds approximately to the nominal fault current of a fault-current circuit breaker to be tested when the 1) a takes for measuring the contact voltage provided switching position.

Page 46 of 76	Federal TVET Agency Author/Copyright	TVET program title Building electrical installation Level II	Version -1 October 2019
---------------	---	--	----------------------------



14. Measuring instrument according to one of the preceding claims, characterized in that the measuring device has a bush (19) for connecting a ground probe and the sleeve (19) contains a changeover contact, which defines a measuring contact of the measuring plug (2) to the ground probe, so that the freed for voltage measurement pole of the measuring plug only serves to conduct the test current.

Self-Check -5	Written Test
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Directions: answer the following questions briefly.

1. **Explain Quality** control (QC) (4 points)
2. What includes a final **quality check**? Mention at least two. (4 points)

Note: Satisfactory rating – 4 and above points Unsatisfactory - below 4 points

Score = _____

Rating: _____

Name: _____

Date: _____

Page 47 of 76	Federal TVET Agency Author/Copyright	TVET program title Building electrical installation Level II	Version -1 October 2019
---------------	---	--	----------------------------



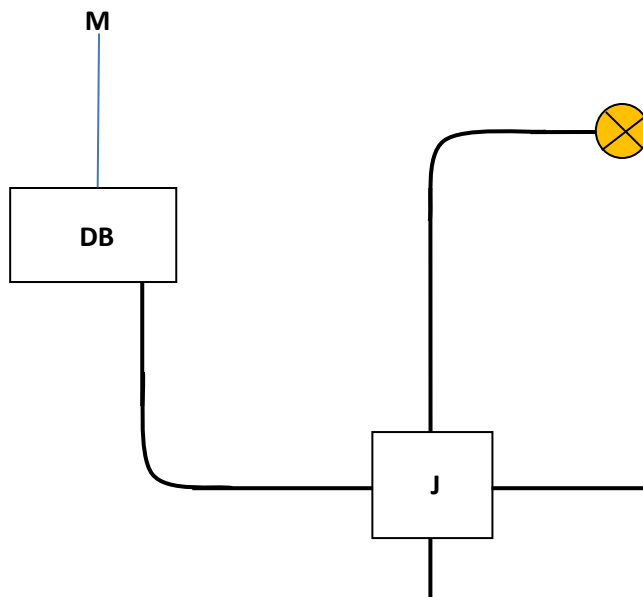
Operation Sheet-1	Install Electrical Protection System
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TITLE: Install circuit breaker for one lamp controlled from two positions on 220V/50Hz. supply.

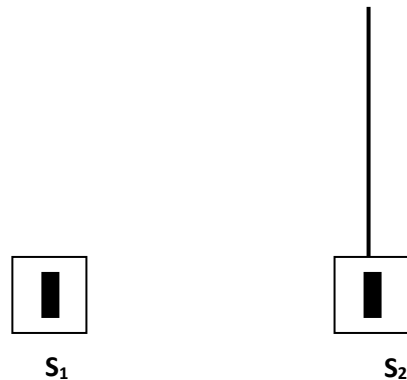
Procedure

Step 1:- wear PPE.

Step 2:- draw schematic diagram using the given lay out diagram.



Page 48 of 76	Federal TVET Agency Author/Copyright	TVET program title Building electrical installation Level II	Version -1 October 2019
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Step 3:- Draw wiring diagrams using the given lay out diagram.

Step 4:- select required tools and materials

Step 5:- Check the material and equipment

Step 6:- install conduit and connection box using by lay out diagram.

Step 7:Prepare conductors and start inserting it to the PVC conduit while being pulled on the other end until the conductors reaches the panel board.

Step 8: Connect the components from the source to final circuit

Step 9: Check the whole installation circuit and connections

Step 10: connect the power supply with installation circuit

Step 11: Check the whole installation circuit after connecting the power supply.

Page 49 of 76	Federal TVET Agency Author/Copyright	TVET program title Building electrical installation Level II	Version -1 October 2019
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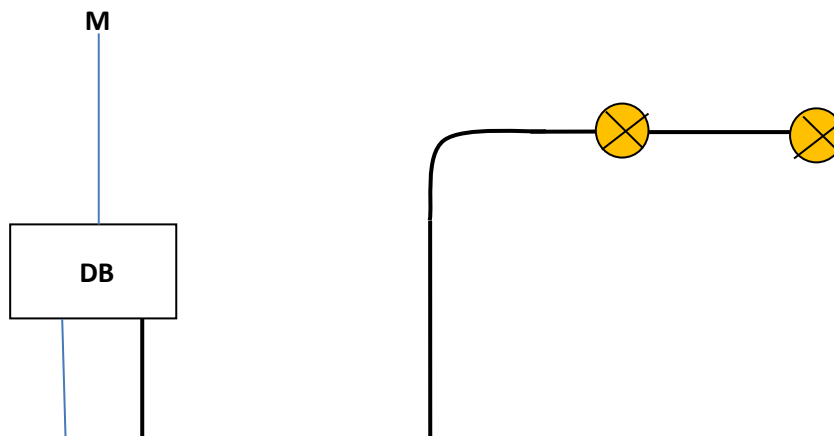
Operation Sheet-2	Install Electrical Protection System
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TITLE: Install circuit breaker for power and lighting circuit when Two lamps controlled from two positions and connect socket outlet on 220V/50Hz.supply.

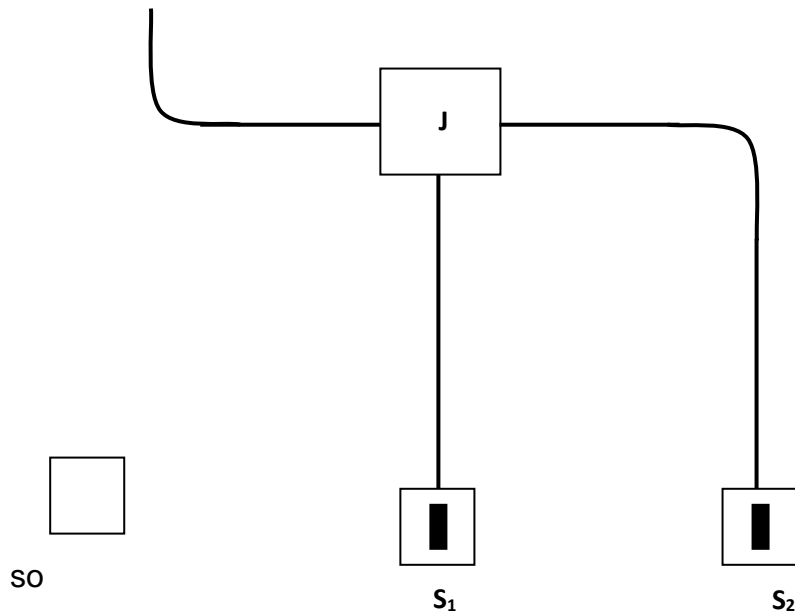
Procedure

Step 1:- wear PPE.

Step 2:- draw schematic diagram using the given lay out diagram.



Page 50 of 76	Federal TVET Agency Author/Copyright	TVET program title Building electrical installation Level II	Version -1 October 2019
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Step 3: Draw wiring diagrams using the given lay out diagram.

Step 4: select required tools and materials

Step 5: Check the material and equipment

Step 6: install conduit and connection box using by lay out diagram.

Step 7: Prepare conductors and start inserting it to the PVC conduit while being pulled on the other end until the conductors reaches the panel board.

Step 8: Connect the components from the source to final circuit

Step 9: Check the whole installation circuit and connections

Step 10: To connect the supply with installation circuit

Step 11: Check the whole installation circuit after connecting the supply.



Operation Sheet-3	Install Electrical Protection System
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TITLE: Install circuit breaker for power and lighting circuit when two lamps controlled from two positions and connect Mittad and general purpose socket outlet on 220V/50Hz.supply.

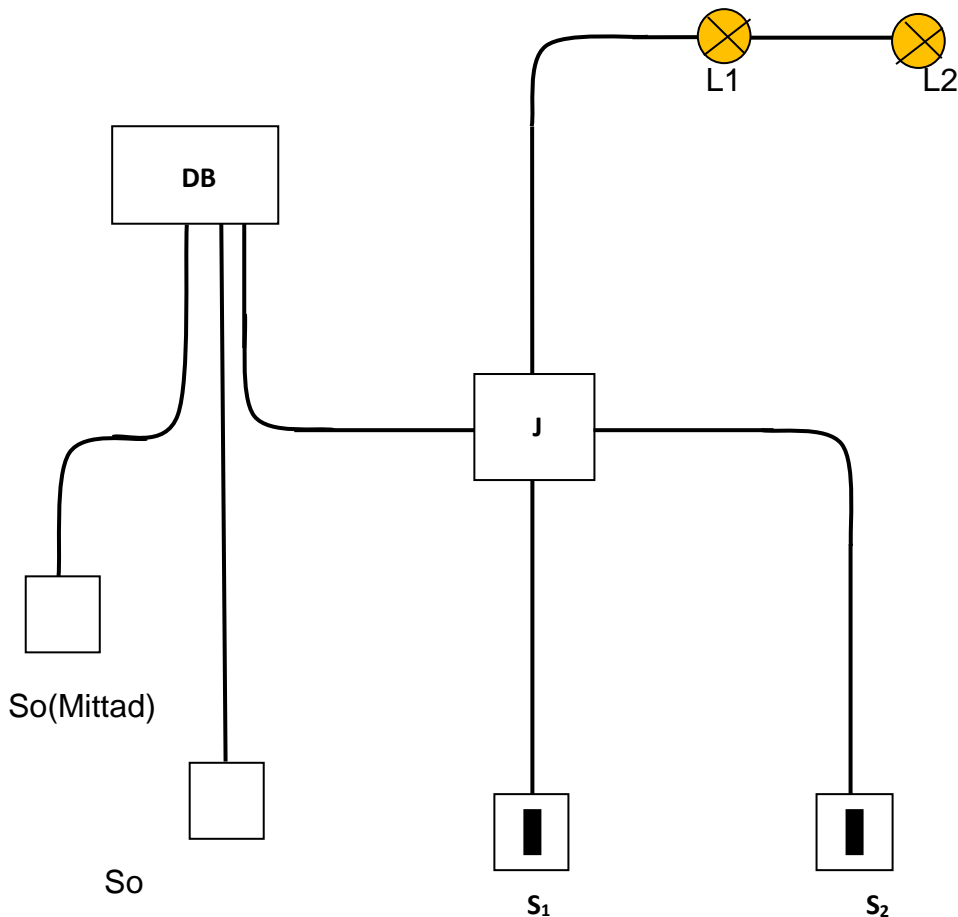
Procedure

Step 1:- wear PPE.

Step 2:- draw schematic diagram using the given lay out diagram.

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Page 52 of 76	Federal TVET Agency Author/Copyright	TVET program title Building electrical installation Level II	Version -1 October 2019
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Step 3:- Draw wiring diagrams using the given lay out diagram.

Step 4:- select required tools and materials

Step 5:- Check the material and equipment

Step 6:- install conduit and connection box using by lay out diagram.

Step 7: Prepare conductors and start inserting it to the PVC conduit while being pulled on the other end until the conductors reaches the panel board.

Step 8: Connect the components from the source to final circuit

Step 9: Check the whole installation circuit and connections

Step 10: To connect the supply with installation circuit

Page 53 of 76	Federal TVET Agency Author/Copyright	TVET program title Building electrical installation Level II	Version -1 October 2019
---------------	---	--	----------------------------



Step 11: Check the whole installation circuit after connecting the supply.

LAP Test	Practical Demonstration
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Page 54 of 76	Federal TVET Agency Author/Copyright	TVET program title Building electrical installation Level II	Version -1 October 2019
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Name: _____ Date: _____

Time started: _____ Time finished: _____

Instructions: Given necessary templates, tools and materials you are required to perform the following tasks within 8 hours.

Task 1. **Install** circuit breaker for one lamp controlled from two positions on 220V/50Hz.supply

Task 2. Install circuit breaker for power and lighting circuit when Two lamps controlled from two positions and connect socket outlet on 220V/50Hz.supply.

Task 3. : Install circuit breaker for power and lighting circuit when two lamps controlled from two positions and connect Mittad and general purpose socket outlet on 220V/50Hz.supply.

Page 55 of 76	Federal TVET Agency Author/Copyright	TVET program title Building electrical installation Level II	Version -1 October 2019
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- EBCS 10
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Page 56 of 76	Federal TVET Agency Author/Copyright	TVET program title Building electrical installation Level II	Version -1 October 2019
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BUILDING ELECTRICAL INSTALLATION

NTQF-LEVEL II

Learning Guide-33

Unit of Competence: Install Electrical Circuit Protection

Module Title: Installing Electrical Circuit Protection

LG Code: EISBEI M09LO3-LG-33

TTLM Code: EISBEI M09-TTLM 1019v1

Page 57 of 76	Federal TVET Agency Author/Copyright	TVET program title Building electrical installation Level II	Version -1 October 2019
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LO 3: Notify Completion of Work

Page 58 of 76	Federal TVET Agency Author/Copyright	TVET program title Building electrical installation Level II	Version -1 October 2019
---------------	---	--	----------------------------



Instruction Sheet	Learning Guide 33
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This learning guide is developed to provide you the necessary information regarding the following **content coverage** and topics:

- Making final checks to ensure the work conforms with instructions
- Notifying completion of work to Supervisor

This guide will also assist you to attain the learning outcome stated in the cover page. Specifically, **upon completion of this Learning Guide, you will be able to:**

- Make final checks to ensure the work conforms with instructions
- Notify completion of work to Supervisor

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below 3 to 6.
3. Read the information written in the information “Sheet 1, and Sheet 2,”.in page 53 and 56.
4. Accomplish the “Self-check 1 and Self-check 2,” **in page 55 and 58.**



Information Sheet-1	Making final checks to ensure the work conforms with instructions
----------------------------	---

1.1 Making final checks to ensure the work conforms with instructions

Electrical safety testing is essential to **ensure** safe operating standards for any product that uses electricity.

Testing or checking procedures are:

- The installing diagram must be step by step inspection and finally total inspect.
- The last inspection of the property being purchased prior to closing. This inspection is done to determine the condition of the property and ensure the property is in the same condition as at the time of the agreement of sale.
- All electrical installations must have an electrical inspection performed to ensure the installation meets the minimum electrical safety requirements
- At the final inspection, if the material is found to be unacceptable and it is determined that it can be reworked, this will be noted by the quality assurance department on the final inspection reports. 100% inspection shall be performed on the identified nonconforming characteristics. Nonconforming material will be tagged with a red tag and marked with a rework method/procedure to be utilized.
- The quality assurance department will return all nonconforming material to the responsible manufacturing process for immediate correction.
- The reworked material or process will be reinserted by the quality assurance department. Inspection shall be 100% for characteristics found discrepant at the final inspection, and sample inspected for the dimensions that were originally found to be conforming.

Page 60 of 76	Federal TVET Agency Author/Copyright	TVET program title Building electrical installation Level II	Version -1 October 2019
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- **Testing an electrical installation**

The visual inspection is carried out first, to confirm that permanently-wired electrical equipment is compliant with the safety requirements and not visibly damaged, and that fire barrier, protective, monitoring, isolating and switching devices and the relevant documentation are present. Electrical testing may commence after this inspection.



Fig. 1. It is essential to use the right tools for testing to IEC standards

Other methods are not precluded, provided that they give equally valid results. Only with the appropriate experience and training, safe clothing and the right test tools is a person considered competent to test installations to IEC 60364.6.61. When testing is undertaken it should be ensured that adequate precautions are taken to avoid damage or injury to people, equipment or property, and ensured that unauthorized persons are kept away from danger.

Page 61 of 76	Federal TVET Agency Author/Copyright	TVET program title Building electrical installation Level II	Version -1 October 2019
---------------	---	--	----------------------------



A digital multi-meter or DMM is a useful instrument for measuring voltage, current and resistance, and some meters have a facility for testing transistors and capacitors. You can also use it for checking continuity of wires and fuses.

Self-Check -1	Written Test
----------------------	---------------------

Directions: Choose the correct answer.

1. The advantage of **electrical** safety testing is _____(4 points)

A, to **ensure** safe operating

C. useless

B. to ensure unsafe operating

D. all

2. What is the use of digital multi-meter? (4 points)

A. for measuring voltage

C. for measuring resistance,

B. for measuring current

D. all

Note: Satisfactory rating – 4 and above points Unsatisfactory - below 4 points

Score = _____

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Date: _____

Page 62 of 76	Federal TVET Agency Author/Copyright	TVET program title Building electrical installation Level II	Version -1 October 2019
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Information Sheet- 2	Notifying completion of work to Supervisor
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2.1 Notifying completion of work to Supervisor

- **Notify** mean to tell someone officially about something
- **Supervisor**

Person in the first-line management who monitors and regulates employees in their performance of assigned or delegated tasks. Supervisors are usually authorized to recommend and/or effect hiring, disciplining, promoting, punishing, rewarding, and other associated activities regarding the employees in their departments.

2.1.1. To notifying completion of work include:

- Materials Safety Data Sheet & Handling Methods
- OH & S requirements are to be in accordance with State or Territory legislation and regulations, organizational safety policies and procedures, and project safety plan. This may include

Page 63 of 76	Federal TVET Agency Author/Copyright	TVET program title Building electrical installation Level II	Version -1 October 2019
---------------	---	--	----------------------------



- a. protective clothing and equipment,
 - b. use of tools and equipment,
 - c. workplace environment and safety,
 - d. handling of materials,
 - e. use of firefighting equipment,
 - f. use of first aid equipment,
 - g. hazard control and
 - h. hazardous materials and substances
- Personal protective equipment is to include that prescribed under legislation, regulation and workplace policies and practices.
 - Safe operating procedures are to include but not be limited to recognizing and preventing hazards associated with underground services, other machines, personnel, traffic control, working in proximity to others, worksite visitors and the public
- 2.1.2 Hazards and risks** may include but not be limited to uneven/unstable terrain, trees, fires, overhead and underground services, bridges, buildings, excavations, traffic, embankments, cuttings, structures and hazardous materials
- Emergency procedures related to equipment operation are to include but may not be limited to emergency shutdown and stopping, extinguishing equipment fires, organizational first aid requirements and evacuation.

Page 64 of 76	Federal TVET Agency Author/Copyright	TVET program title Building electrical installation Level II	Version -1 October 2019
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Note: Satisfactory rating – 4 and above points Unsatisfactory - below 4 points

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References

- <https://buyersask.com/electrical/10-common-electrical-defects-home-inspectors-find/>
- EBCS 10
- IEE Regulation 2017
- <https://automationforum.co/wp-content/uploads/2019/02/circuit-breaker.png>
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BUILDING ELECTRICAL INSTALLATION

NTQF- LEVEL II

Learning Guide-34

Unit of Competence: Install Electrical Circuit Protection

Page 66 of 76	Federal TVET Agency Author/Copyright	TVET program title Building electrical installation Level II	Version -1 October 2019
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Module Title: Installing Electrical Circuit Protection

LG Code: EIS BEI2 M09LO4-LG-34

TTLM Code: EIS BEI M09 TTLM 1019v1

LO 4: Clean up

Page 67 of 76	Federal TVET Agency Author/Copyright	TVET program title Building electrical installation Level II	Version -1 October 2019
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This learning guide is developed to provide you the necessary information regarding the following **content coverage** and topics:

- clearing, reusing or recycling and disposing materials in work area with legislation/regulations/codes of practice and job specification
- Cleaning, checking, maintaining and storing plant, tools and equipment standard work practices

This guide will also assist you to attain the learning outcome stated in the cover page. Specifically, **upon completion of this Learning Guide, you will be able to:**

- clearing, reusing or recycling and disposing materials in work area with legislation/regulations/codes of practice and job specification
- Cleaning, checking, maintaining and storing plant, tools and equipment standard work practices

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below 3 to 6.
3. Read the information written in the information “Sheet 1 and Sheet 2”.in page 60 and 63.
4. Accomplish the “Self-check 1 and Self-check 2,” in **page 62 and 64** respectively.



Information Sheet-1	clearing, reusing or recycling and disposing materials in work area with legislation/regulations/codes of practice and job specification
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1.1 clearing, reusing or recycling materials in work area

- **Clearing** means removing wastes or unwanted materials.
- *Reuse* is the action or practice of using something again, whether for its original purpose (conventional *reuse*) or to fulfill a different function (creative *reuse* or repurposing). It should be distinguished from *recycling*, which is the breaking down of used items to make raw *materials*. *Reuse* often requires *cleaning* or transport, which have environmental costs.
- *Recycling* is the process of converting waste *materials* into new *materials* and objects. *Recycling* reduces *waste* disposal by transforming useful *materials* such as plastic, glass and paper into new products

1.2 Disposing Materials in work area (*disposal*): Final placement or riddance of wastes, excess, scrap, etc., under proper process and authority with unlike in storage.

Page 69 of 76	Federal TVET Agency Author/Copyright	TVET program title Building electrical installation Level II	Version -1 October 2019
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Self-Check -1	Written Test
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Directions:Directions: Choose the correct answer.

1. _____ means removing wastes or unwanted materials. (3 points)

A, *reuse,*

C. *Recycling*

B. *clearing,*

D *Disposing*

2. _____ means Final placement or riddance of wastes. (3 points)

A, *Disposing*

C. *Recycling*

B. *clearing,* D A and C

3. One of the following is the process of converting waste *materials* into new *materials* and objects (2 points)

A, *Disposing*

C. *Recycling*

B. *clearing,*

D. *cleaning*

Note: Satisfactory rating – 4 and above points Unsatisfactory - below 4points

Page 70 of 76	Federal TVET Agency Author/Copyright	TVET program title Building electrical installation Level II	Version -1 October 2019
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Score = _____

Rating: _____

Name: _____

Date: _____

Information Sheet- 2	Cleaning, checking, maintaining and storing plant, tools and equipment standard work practices
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2.1 Cleaning and checking plant, tools and equipment standard work practices

Cleaning is the process of removing unwanted substances, such as dirt, infectious agents, and some items and materials require specialized cleaning techniques, due to their shape.

Tools and equipment should be cleaned and checked after using them for draining and dewatering construction sites. Both hand tools and equipment needs regular cleaning before storing them in their proper space. And plant should be cleaned regularly.

2.2. Maintaining and storing plant, tools & equipment standard work practices

Maintain mean, to keep in a condition of good repair , efficiency or to keep in an existing state, preserve or retain.

2.2.1 Maintaining and storing of tools and equipment

- A number of electrical tools and equipments including hand tools used in draining and dewatering construction sites. These tools and equipments should be maintained regularly and stored at their appropriate places.
- This activity is used to use our resources for a long period of time and increases the safety of tools and equipments.
- Performing good housekeeping

Page 71 of 76	Federal TVET Agency Author/Copyright	TVET program title Building electrical installation Level II	Version -1 October 2019
---------------	---	--	----------------------------



2.2.2. Work Area Clearance

- Work area is cleared and materials disposed of or recycled in accordance with project environmental management plan.
- After the accomplishment of the project, the area should be cleaned up according to the project quality requirement.

Self-Check -2	Written Test
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Directions:Directions: Choose the correct answer.

1. _____ is the process of removing unwanted substances, such as dirt and infectious agents (3 points)

A. *Cleaning*

C. *Recycling*

B. clearing,

D. Disposing

2. _____ mean, to keep in a condition of good repair , efficiency (3 points)

A,Disposing

C. *Recycling*

B. Maintain

D. *cleaning*

3. A number of electrical tools and equipments including hand tools used in draining and dewatering construction sites(2 points)

A. False

B. True

Note: Satisfactory rating – 4 and above points Unsatisfactory - below 4 points

Page 72 of 76	Federal TVET Agency Author/Copyright	TVET program title Building electrical installation Level II	Version -1 October 2019
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Score = _____

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- <https://buyersask.com/electrical/10-common-electrical-defects-home-inspectors-find/>
- EBCS 10
- IEE Regulation 2017
- <https://automationforum.co/wp-content/uploads/2019/02/circuit-breaker.png>

Page 73 of 76	Federal TVET Agency Author/Copyright	TVET program title Building electrical installation Level II	Version -1 October 2019
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