9

TLE Industrial Arts:

Electrical Installation and Maintenance (EIM)

Quarter 1 – Module 3

Preparing Electrical Tools (Week 3)

DepED
DEPARTMENT OF EDUCATION

What I Need to Know

This module contains information and suggested learning activities on the preparation of electric materials and tools. It includes instructions and procedures on how to prepare appropriate tools and materials needed in electrical wiring installation, proper storing of unused and/or surplus electrical materials upon completion of the job, and proper ways on maintaining and storing basic tools and equipment.

After going through this module, you are expected to:

1. identify electric tools and materials for the task,
2. categorize electrical tools according to use, and
3. report damaged tools.

What I Know

Please do not forget to write the following in your answer sheet:
Name: _____ Yr. & Section: _____
Yr. Level & Subject (Specialization): _____ Module No: _____
Name of the Activity (e.g., What I know) _____ Date: _____

Multiple Choice

Directions: Read each statement carefully. Write the letter of your correct answer in your answer sheet.

1. It is a tool used to drive and pull out screws.
   A. hammer B. pliers C. screw driver D. soldering tool
2. They are made of either hard steel or plastic, used to drive and pull out nails.
   A. EMT bender B. hammer C. steel tape D. wire puller
3. It is a tool used to bend electrical metal tubing.
   A. cables B. cutting tool C. EMT bender D. soldering tools
4. It is a single, usually cylindrical, flexible strand or rod of metal.
   A. cable B. conductor C. insulator D. wire
5. It is needed to make holes in building structure for passage of wires and conduit in both new and old installation, indoor or outdoor wiring.
   A. cutting tool B. drilling equipment C. Measuring tool D. soldering tool
6. A small, liquid-fuel torch that shoots out a hot flame intensified by pressurized air. A. Blow Torch B. Heat Gun C. Soldering Gun D. Soldering Iron
7. A tool used to facilitate access to screws located in areas that cannot be reached easily by a regular screwdriver.
   A. Allen Screwdriver C. Philip Screwdriver

B. Flat Screwdriver D. Stubby Screwdriver

8. It is used to pull wires into the conduit or raceway.
   A. Auger Brace B. EMT bender C. Hand Drill D. Wire puller (fish wire)
9. A kind of hammer, usually with a heavy wooden, plastic or rubber head and a short handle, for driving a chisel, etc.
   A. Ball Peen Hammer B. Clamp meter C. Claw Hammer D. Mallet
10. A fine-tooth saw with a blade under tension in a frame that is used for cutting hard materials (such as metal).
    A. Back Saw B. Hacksaw C. Keyhole Saw D. Jig Saw

What's In

Electrical work cannot be done without the right tools. As basic tools have been improved over the years and new specialized tools are developed, the list of tool choices for electricians becomes even longer.

Nevertheless, there is a short list of "must-have" tools that every electrician needs! Indeed, one cannot do the work without having these types of electrical tools. What are these tools? Has the list changed significantly over the years?

What's New

ELECTRICAL TOOLS AND MATERIALS

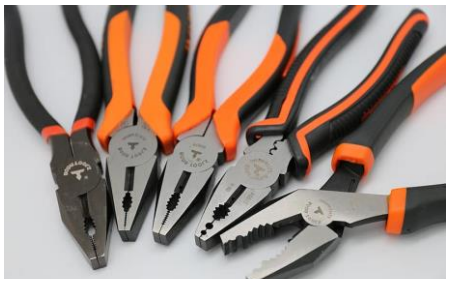
A. Pliers. They could be with insulated or uninsulated handles. The handle insulation is not considered sufficient protection alone. Other safety precautions must be observed. Common types of pliers are:

https://tinyurl.com/slip-joint-pliers

Slip Joint

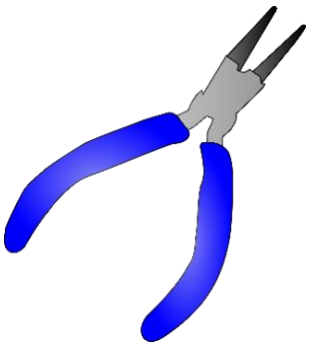
https://tinyurl.com/diagonal-cutting

Diagonal Cutting



https://www.pikist.com/free-photo-snwre

Combination Pliers



https://tinyurl.com/long-nose-pliers

Long Nose/Needle Nose Pliers

Snap Ring

https://tinyurl.com/snap-ring

1. **Slip Joint**. Slip-joint pliers are useful for a variety of household repairs such as replacing a sink drain basket, repairing a kitchen faucet, doing auto repairs, or installing hoses. You can use them to hold a nut steadily while loosening a screw with a screwdriver, bend or straighten a small nail, cut a thin wire, or compress a light clamp. In addition, slip-joint pliers can be used for grasping tools like screwdriver handles or chisels.
2. **Diagonal Cutting.** It is used for work involving cutting and skinning wires, cutting, and removing pins, nails, and other fasteners.
3. **Combination Pliers.** They are used to grip, splice, or cut wires, and strip insulation.
4. **Long Nose/Needle Nose.** It is used to grip small objects, reach awkward places, hold wires, bend loops, and attach wires. It also works best when working smaller gauge wire.
5. **Snap Ring.** Snap Ring pliers are used for installation and removal of snap rings. To stop and return springs eliminate the issue of overspreading, as well as accelerating the installation or removal process by positioning the pliers at the exact location of the ring's lug holes.

B. Screwdrivers are used to drive and pull out screws. They come in various sizes and shapes with either sharp or square tips. The width of the screwdriver should match the width of the screw slot. Common types of screwdrivers are:

Flat Head Screwdriver

Philip Screwdriver

Stubby Screwdriver

Allen Screwdriver/Wrench

1. **Flat Head Screwdriver.** Flat Head Screwdriver is used for loosening or tightening slotted screw fasteners for woodworking or other applications that would not require a power tool.
2. **Philip Screwdriver.** Philip Screwdriver is used to drive and pull out Philip head screws.
3. **Stubby Screwdriver.** A stubby screwdriver is a tool used to facilitate access to screws located in areas that cannot be reached easily by a regular screwdriver.
4. **Allen Screwdriver.** An Allen wrench is one of the simplest wrenches to use. The Allen wrench itself is a small L-shaped wrench with six sides used to drive or pull out Allen screws.

Wire puller (fish wire) is used to pull wires into the conduit or raceway.

EMT bender is a tool used to bend electrical metal tubing.

C. **Drilling Equipment** is needed to make holes in building structure for passage of wires and conduit in both new and old installation, indoor or outdoor wiring.

Common types of drilling tools and equipment are:

Electric Drill

Auger Brace

Hand Drill

Gimlet

Drill bits

Masonry bit

1. **Electric Drill.** It is a tool for drilling holes in wood and other soft materials. It has a built-in motor. It could be wireless, which means the electricity is provided by an attached rechargeable battery or wired by a cord that can be plugged in a wall socket.

2. **Auger Brace.** A hand-operated tool for boring holes in wood, consisting of a crank-shaped turning device, the brace, that grips and rotates the hole-cutting tool, the bit.

3. **Hand Drill.** A small portable drilling machine resembling a breast drill but designed to be held and operated by hand.
4. **Gimlet.** A small tool with a screw point, grooved shank, and cross handle for boring holes.
5. **Drill Bits.** Are cutting tools used in most drilling equipment. They are used in boring holes on wood or metals.
6. **Masonry Bit.** A kind of bit used in drilling holes on concrete walls or spaces.

D. Soldering tools are used in making splices and taps connections of wires.

Soldering Iron

Soldering Gun

Blow Torch

1. **Soldering Iron**. A pointed or wedge-shaped device that is usually electrically heated and that is used for soldering.
2. **Soldering Gun.** It is an approximately pistol-shaped, electrically powered tool for soldering metals using tin-based solder to achieve a strong mechanical bond with good electrical contact. The tool has a trigger-style switch so it can be easily operated with one hand.
3. **Blow Torch**. A small, liquid-fuel torch that shoots out a hot flame intensified by pressurized air. It is used to melt metal, remove old paint, etc.

E. Hammers are used to drive and pull-out nails. They are made of either hard steel or plastic. A claw hammer with fiberglass insulated handle is specially designed for electricians.

Common examples of hammer are:

Claw Hammer

Ball peen hammer

Mallet (plastic or rubber hammer)

1. **Claw Hammer.** A Claw Hammer is a tool primarily used for driving nails into or pulling nails from some other object.
2. **Ball Peen Hammer.** A ball peen hammer is a hammer with two ends on the head, one that is round and the other flat. They are commonly used to drive cold chisels, set rivets, and bend and shape metal.
3. **Mallet**. A kind of hammer, usually with a heavy wooden, plastic or rubber head and a short handle, for driving a chisel, etc.

Measuring tools and instruments. The electrician uses the following measuring tools and devices to measure value of voltage, current and resistance, wire length, opening sizes of wire, conduit, and other items.

Steel Tape(push/pull roll)

Wire gauge

Vernier caliper

Multitester

Voltmeter

Ammeter

Galvanometer

Micrometer caliper

Clamp meter

Phase Sequence Tester

High Potential Tester

Megger 

1. **Steel Tape (push/pull roll).** It is a flexible roll of thin steel that retracts into its protective case. It is used for measuring irregular and regular shapes.
2. **Wire Gauge.** It is a tool which measures a wire's cross sectional area.
3. **Vernier Caliper.** A measuring instrument that consists of an L-shaped frame with a linear scale along with its longer arm and an L-shaped sliding attachment with a **Vernier scale**, it is used to read directly the dimension of an object represented by the separation between the inner or outer edges of the two shorter arms.
4. **Multi – tester.** A multi - tester is an electronic tool used to measure voltage, amps, and resistance across circuits. By attaching two leads to different parts of an electrical system, professionals can use multi - testers to detect levels of voltage and resistance, or changes in electrical currents.
5. **Voltmeter.** A voltmeter, also known as a voltage meter, is an instrument used for measuring the potential difference, or voltage, between two points in an electrical or electronic circuit.
6. **Ammeter.** It is an instrument for measuring either direct or alternating electric current, in amperes.
7. **Galvanometer.** Galvanometer is an instrument for measuring a small electrical current or a function of the current by deflection of a moving coil. The deflection is a mechanical rotation derived from forces resulting from the current.
8. **Micrometer Caliper**. A precision instrument with a spindle moved by a finely threaded screw, for the measurement of thicknesses and short lengths, commonly used by machinists for turning shafts or boring holes.
9. **Clamp Meter.** Clamp meter measures any of these: AC current, AC and DC voltage, resistance, continuity, and, with some models, DC current, capacitance, temperature, frequency and more.

10. **Megger**. The Megge**r** is the instrument used for measuring the resistance of the insulation**.** If the resistance of the insulation is high, the pointer of the moving coil deflects towards the infinity, and if it is low, then the pointer indicates zero resistance.
11. **Phase Sequence Tester.** This handheld instrument detects the phase sequence of three-phase systems. Color-coded test leads are provided for connecting to the three mains phases of the system under test.
12. **High Potential Tester**. Hipot Test checks that current would not flow from one point to another point (and turns up the voltage really high just to make sure no current will flow).

Sawing and cutting tools. Two of the commonly used types of saw are:

Hack saw

Keyhole saw

1. **Hacksaw.** A fine-tooth saw with a blade under tension in a frame that is used for cutting hard materials (such as metal).
2. **Keyhole Saw.** A hand saw with a long narrow blade for cutting short radius curves similar to a compass saw.

What's More

Use a separate sheet in doing this activity. Be sure to write the following:

Name: _____ Grade and Section: _____
Subject: _____ Lesson Title: _____

Directions: Classify the following tools accordingly. Identify whether it is a PLIER, SCREWDRIVER, SAWING AND CUTTING TOOL, MEASURING TOOL AND INSTRUMENT, HAMMER, SOLDERING TOOL, or DRILLING EQUIPMENT.

_____ 1. Philip screwdriver

_____ 2. Keyhole saw

_____ 3. Multi – tester
_____ 4. Hack saw
_____ 5. Flat head screwdriver
_____ 6. Electric drill
_____ 7. Long nose/needle nose plier
_____ 8. Steel tape
_____ 9. Vernier caliper
_____ 10. Soldering iron
_____ 11. Snap ring
_____ 12. Ball peen hammer
_____ 13. Ammeter
_____ 14. Soldering gun
_____ 15. Drill bit

What I Have Learned

Directions: List down example tools or equipment for every item. Use a separate sheet in doing this activity.

A. Electrical Pliers:

_____ _____
_____ _____
_____

B. Screw Drivers:

_____ _____
_____ _____

C. Drilling Equipment:

_____ _____
_____ _____
_____ _____

D. Soldering Tools:

_____ _____
_____

E. Measuring Tools and Instrument:

_____ _____
_____ _____

_____ _____

Assessment

Please do not forget to write the following in your answer sheet:
Name: _____ Yr. & Section: _____
Yr. Level & Subject (Specialization): _____ Module No: _____
Name of the Activity (e.g., What I know) _____ Date: _____

Multiple Choice

Directions: Read each statement carefully. Write the letter of your correct answer in your answer sheet.

.

1. A small, liquid-fuel torch that shoots out a hot flame intensified by pressurized air. A. Blow Torch B. Heat Gun C. Soldering Gun D. Soldering Iron
2. A tool used to facilitate access to screws located in areas that cannot be reached easily by a regular screwdriver.

   A. Allen Screwdriver C. Philip Screwdriver

   B. Flat Screwdriver D. Stubby Screwdriver
3. It is used to pull wires into the conduit or raceway.

   A. Auger Brace B. EMT bender C. Hand Drill D. Wire puller (fish wire)
4. A kind of hammer, usually with a heavy wooden, plastic or rubber head and a short handle, for driving a chisel, etc.

   A. Ball Peen Hammer B. Clamp meter C. Claw Hammer D. Mallet
5. A fine-tooth saw with a blade under tension in a frame that is used for cutting hard materials (such as metal).

   A. Back Saw B. Hacksaw C. Keyhole Saw D. Jig Saw
6. It is a tool used to drive and pull out screws.

   A. hammer B. pliers C. screw driver D. soldering tool
7. They are made of either hard steel or plastic, used to drive and pull out nails.

   A. EMT bender B. hammer C. steel tape D. wire puller
8. It is a tool used to bend electrical metal tubing.

   A. cables B. cutting tool C. EMT bender D. soldering tools
9. It is a single, usually cylindrical, flexible strand or rod of metal.

   A. cable B. conductor C. insulator D. wire
10. It is needed to make holes in building structure for passage of wires and conduit in both new and old installation, indoor or outdoor wiring.

    A. cutting tool B. drilling equipment C. Measuring tool D. soldering tool

Answer Key

What's More

1. Screw Driver
2. Sawing and Cutting Tool
3. Measuring tool and Instrument
4. Sawing and Cutting Tool
5. Screw Driver
6. Drilling Equipment
7. Plier
8. Measuring Tool and Instrument
9. Measuring Tool and Instrument
10. Soldering Tool
11. Plier
12. Hammer
13. Measuring Tool and Instrument
14. Soldering Tool
15. Drilling Equipment

What I Have Learned

A. Combination Pliers
Snap Ring
Long/Needle Nose Pliers
Diagonal Cutting
Slip Joint
B. Philip Screw driver
Flat head screw driver
Stubby Screw Driver
Allen Screw Driver
C. Electric Drill
Gimlet
Drill Bit
Auger Brace
Hand drill
Masonry Bit
D. Soldering Tool
Soldering Gun
Blow Torch

What I Have I learned (continuation)

E. Steel Tape
Wire Gauge
Venier Caliper
Multi-tester
Voltmeter
Ammeter
Galvanometer
Micrometer Caliper
Clamp Meter
Megger
Phase Sequence Tester
High Potential Tester

References

Department of Education Learner's Material, first edition 2014

Online Sources:

https://tinyurl.com/electrical-tools

https://tinyurl.com/slip-joint-pliers

https://tinyurl.com/slip-joint-pliers

https://www.pikist.com/free-photo-snwre

https://tinyurl.com/long-nose-pliers

https://tinyurl.com/snap-ring

https://tinyurl.com/diagonal-cutting