10

TVL Industrial Arts:

Electrical Installation and Maintenance (EIM) NCII

Quarter 2 – Module 6:

Basic Methods and Requirements for Installation: Wiring Installation using Electrical Metallic Tubing (EMT) (Week 6)

DepED
DEPARTMENT OF EDUCATION

What I Need to Know

In this module, you will be trained to install wiring devices using different types of conduit wiring according to pipe installation especially on **Electrical Metallic Tubing**. This includes the Philippine Electrical Code (PEC) provisions in installing EMT.

In this module, you are expected to:

1. understand wiring diagram using Electrical metallic tubing;
2. draw electrical wiring diagram; and
3. install wiring devices using electrical metallic tubing.

What I Know

Name: _____ Grade and Section: _____ Quarter: ___
Module Number: _____ Lesson Title: _____

A. Multiple Choice. Choose the letter of your answer and write it on a separate sheet of paper.

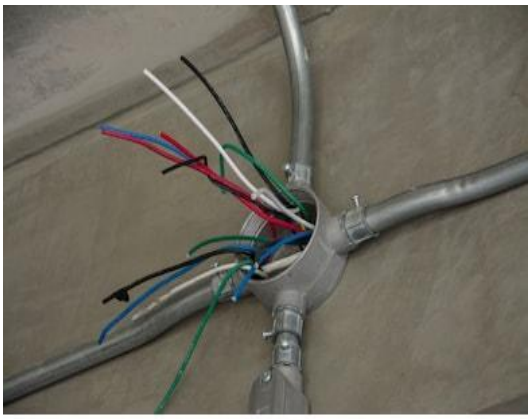
1. It is used to secure EMT conduits to electrical metallic box.
   A. EMT conduit C. EMT connector
   B. EMT coupling D. EMT strap
2. It is used to couple two EMT pipes together, or an EMT pipe and a Rigid/IMC pipe together.
   A. EMT conduit C. EMT connector
   B. EMT coupling D. EMT strap
3. Most are made of galvanized steel but can also be aluminum. It is also called "thin-wall" conduit because it is thin and lightweight.
   A. EMT conduit C. EMT connector
   B. EMT coupling D. EMT strap
4. It is used to hold, secure, and support electrical metallic tubing.
   A. EMT conduit C. EMT connector
   B. EMT coupling D. EMT strap
5. It is a tool used to bend conduit pipes in different curves and angles.
   A. Pipe cutter C. Pipe bender
   B. Pipe reamer D. Pipe threader
6. A standard length of electrical metallic tubing that follows the gas pipe
   A. 10 ft. B. 11 ft. C. 12 ft. D. 13 ft.
7. EMT protected with enamel should not be used on the following conditions **EXCEPT**_____.

A. subjected to mechanical during or after the construction
B. cinder fill
C. not in hazardous location
D. exposure to corrosive fumes and vapor

8. How many numbers of conductors used in ½-inch trade size conduit?
   A. 8 B. 9 C. 10 D. 11
9. The minimum trade size of electrical metallic conduit
   A. 1/4-inch B. 1/2-inch C. 3/4-inch D. 1 inch
10. It is the size of conduit that can accommodate a maximum of 10 wires using number 12 AWG.
   A. 3/8 B. 1/2 C. 3/4 D. 1 ¼
11. To bend a conduit in 90 degrees, what is the take up on a 1/2 EMT bender?
   A. 5 inches B. 6 inches C. 7 inches D. 8 inches
12. It refers to the removal of sharp edges at the end of the pipe.
   A. Cutting B. Splicing C. Reaming D. Cleaning
13. It is a tool used to remove burrs inside the pipe.
   A. Pipe cutter C. Pipe bender
   B. Pipe reamer D. Pipe threader
14. The maximum size of the diameter of electrical metallic conduit.
   A. 4 inches B. 5 inches C. 6 inches D. 7 inches
15. To bend a conduit in 90 degrees, what is the take up on a 3/4 EMT bender?
   A. 5 inches B. 6 inches C. 7 inches D. 8 inches

What's New

A rigid metal conduit served the same purpose as with the Electrical Metallic Tubing. They are designed to protect the electrical wiring of buildings from electrical hazards due to faulty wiring. It is usually installed buried in the concrete wall, floor, and ceiling, in masonry or similar materials. It is also used for exposed and concealed works; it provides maximum protection due to mechanical damage. In order that this wiring method will become effective, safe, and reliable, it is a must that it should follow the PEC standard and specifications.



https://www.shutterstock.com/search/electrical+conduits

What is It

Electrical Metallic Tubing–EMT

Another example of a rigid electrical conduit is an EMT (electrical metal tubing), which is mostly made of galvanized steel but can also be aluminum. EMT is also called "thin-wall" conduit because it is thin and lightweight, especially compared to RMC. EMT is rigid but can be bent with a simple tool called a conduit bender.

EMT is installed with couplings and fittings that are secured with set screw or compression-type fasteners. The tubing itself is not threaded like RMC and IMC. Common sizes of EMT include 1/2-inch, 3/4-inch, and 1-inch. It is commonly used for exposed indoor wiring that is run in residential and light commercial construction. If installed outdoors in exposed locations, it must be assembled with special watertight fittings.

A rigid metal conduit is a type of wiring installation which is designed to lessen or eliminate fire hazard and electrical accidents. The following rules and regulations on the use of electrical metallic tubing should be observed:

A. Application

Electrical metallic tubing may be used for exposed and concealed work at the same condition with rigid metal conduit. EMT protected with enamel should not be used on the following conditions:

a. subjected to mechanical during or after the construction
b. Cinder fill
c. hazardous location
d. exposure to corrosive fumes and vapor

B. Sizes

Electrical metallic tubing has a smooth surface inside diameter. Its standard length follows the gas pipe which is 10 ft. and a diameter from ½ inch, ¾ inch up to 6 inches.

C. Location of some corrosive fumes and vapor

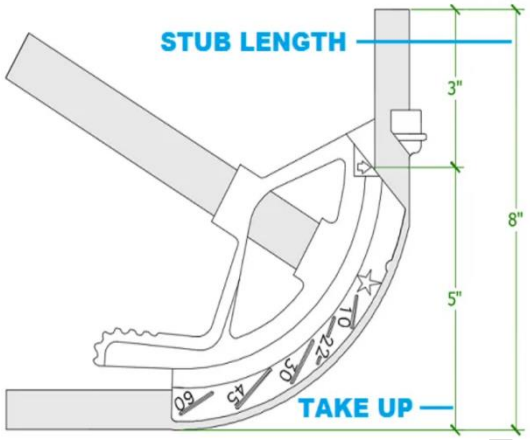
a. meat packing plant
b. tanneries
c. salt storage plant

D. Under wet location

Electrical metallic tubing can be used provided the water is prevented from entering the conduit. The support, straps and other fitting must be approved for the purpose.

E. Bending

The first thing you need to learn before bending a 90. EMT Take Up is an amount of conduit length used to figure out where to place the marks on the conduit before the bend. Most hand benders have the take up stamped on the bender or on a sticker – usually on the bender handle.



Take up:

- For 1/2 inch EMT conduit, subtract 5" from the stub length of the conduit.
- For 3/4 inch EMT conduit, subtract 6" from the stub length of the conduit.
- For 1 inch EMT conduit subtract 5" from the stub length of the conduit.

STUB is the length you need for the conduit to reach and is measured from the back of the bend or backside of the conduit.

https://electricianapprenticehq.com/how-to-bend-a-90-degree/

E. Number of conductors in tubing

The number of conductors for every single run of EMT should follow the given Table.

Trade size of conduit (inches)	Size in AWG	No. Of conductors
3/8"	16	8
1/2"	14	8
3/4"	12	10
1"	6	12
1 1/2"	2	12

Materials used for the installation of EMT

1. EMT connectors are used to secure **EMT** conduits to electrical metallic box.

https://www.yinlei.com/product/EMT-CONNECTORS-SET-SCREW-TYPE-STEEL.html

2. EMT couplings are used to couple two **EMT** pipes together, or an **EMT** pipe and a Rigid/IMC pipe together.

https://www.yinlei.com/product/EMT-COUPLING-SET-SCREW-TYPE-ALUMINUM.html

3. EMT metal strap is used to hold, secure and support electrical metallic tubing.

EMT single-hole strap EMT double-hole strap

https://www.amazon.com/uxcell-Zinc-Plated-Reinforced-Various-Surfaces/dp/B07TR4TPDS

4. EMT Conduit pipe

http://m.elecmanelectric.com/ansi-electrical-conduits/emt-imc-rsc-conduits/emt-conduit.html

5. EMT boxes

Square junction box (4 inches x 4 inches 	Utility metal box (2inches x 4 inches) 
Octagonal metal box (4 inches x 2⅛ inches) 	EMT conduit bodies/ junction boxes A. Type T EMT rigid B. Type TB EMT rigid C. Type LR EMT rigid D. Type C EMT rigid  A B C D

https://hztimes.en.made-in-china.com/product/hvGnWacJITVH/China-1-1-8-Deep-4-Octagonal-EMT-Conduit-Boxes.html

What's More

Install wiring using Electrical metallic tubing (EMT)

Instructions: Given the illustration of a Line diagram of First bulb controlled by a single pole switch, second bulb controlled by two 3-way switches and all devices connected to the load are GFCI protected.

Draw a schematic diagram in figure B, the actual wiring diagram in figure C and Pictorial diagram in figure D.

Line diagram	Schematic diagram

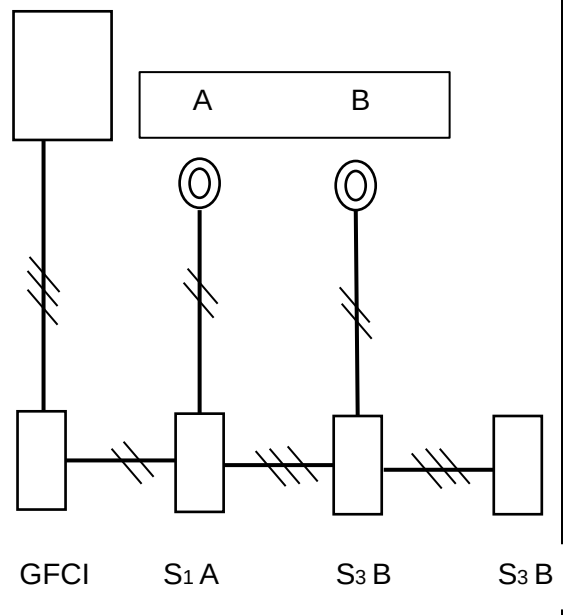



Figure A	Figure B
Actual Wiring Diagram	Pictorial Diagram
Figure C	Figure D

Assessment

Name: _____ Grade and Section: _____ Quarter: ___
Module Number: _____ Lesson Title: _____

A. **Multiple Choice**. Choose the letter of your answer and write it on a separate sheet of paper.

1. Standard length of electrical metallic tubing that follows the gas pipe
   A. 10 ft. B. 11 ft. C. 12 ft. D. 13 ft.
2. It is a tool used to bend conduit pipes in different curves and angles.
   A. Pipe cutter B. Pipe reamer C. Pipe bender D. Pipe threader
3. It is used to secure EMT conduits to electrical metallic box.
   A. EMT conduit B. EMT coupling C. EMT connector D. EMT strap
4. It is used to couple two EMT pipes together, or an EMT pipe and a Rigid/IMC

pipe together.

A. EMT conduit B. EMT coupling C. EMT connector D. EMT strap

5. Most are made of galvanized steel but can also be aluminum. It is also called "thin-wall" conduit because it is thin and lightweight.

A. EMT conduit B. EMT coupling C. EMT connector D. EMT strap

6. It is used to hold, secure, and support electrical metallic tubing.

A. EMT conduit B. EMT coupling C. EMT connector D. EMT strap

7. It is the size of conduit which can accommodate a maximum of 10 wires AWG

A. 3/8 B. 1/2 C. 3/4 D. 1 ¼

8. EMT protected with enamel should not be used on the following conditions **EXCEPT** _____.

A. subjected to mechanical during or after the construction
B. not in hazardous location
C. cinder fill
D. exposure to corrosive fumes and vapor

9. How many numbers of conductors used in 1/2-inch trade size conduit?

A. 8 B. 9 C. 10 D. 11

10. The minimum trade size of electrical metallic conduit.

A. 1/8-inch B. 1/4-inch C. 1/2-inch D. 3/4 inch

11. It refers to the removal of sharp edges at the end of the pipe.

A. Cutting B. Splicing C. Reaming D. Cleaning

12. To bend a conduit in 90 degrees, what is the take up on a 1/2 EMT bender?

A. 5 inches B. 6 inches C. 7 inches D. 8 inches

13. It is a tool used to remove burrs inside the pipe.

A. Pipe cutter C. Pipe bender
B. Pipe reamer D. Pipe threader

14. To bend a conduit in 90 degrees, what is the take up on a 3/4 EMT bender?

A. 5 inches B. 6 inches C. 7 inches D. 8 inches

15. The maximum size of the diameter of electrical metallic conduit.

A. 4 inches B. 5 inches C. 6 inches D. 7 inches

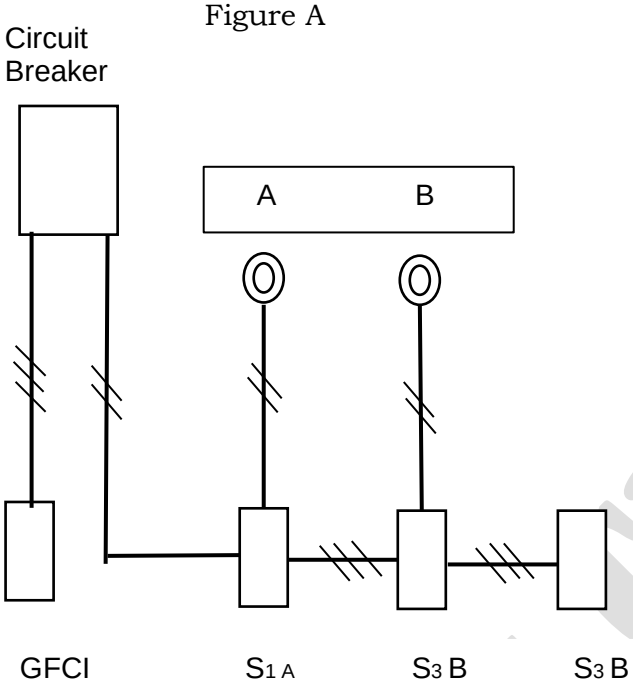
Additional Activities

Name: _____ Grade and Section: _____ Quarter: ___
Module Number: _____ Lesson Title: _____

Instructions: Given the layout of line diagram of "first bulb controlled by a single pole switch, second bulb controlled by two 3-way switches and all devices connected to the load are not GFCI protected.

Draw a schematic diagram in figure B, line diagram in figure C and the actual wiring diagram in figure D on a long size bond paper. Then check your work by looking at the answer key at the end of this module. (The light and switch are not protected by the GFCI).

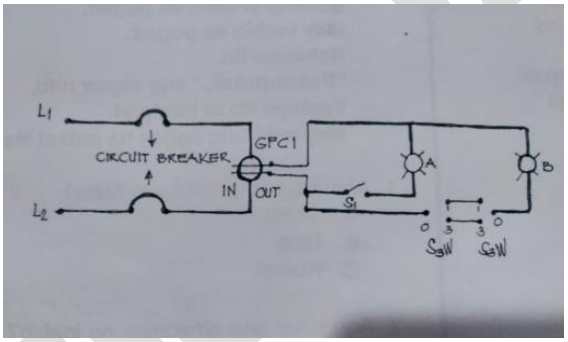
Figure A



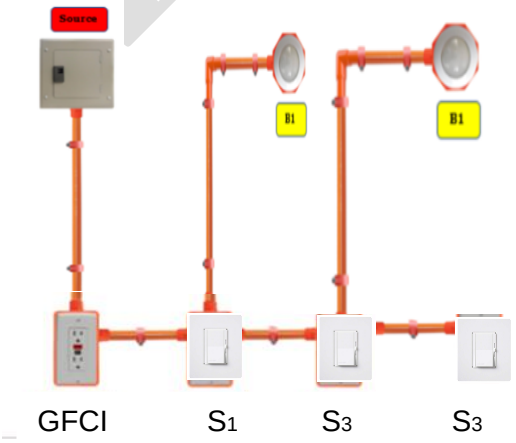
Answer Key

What's More

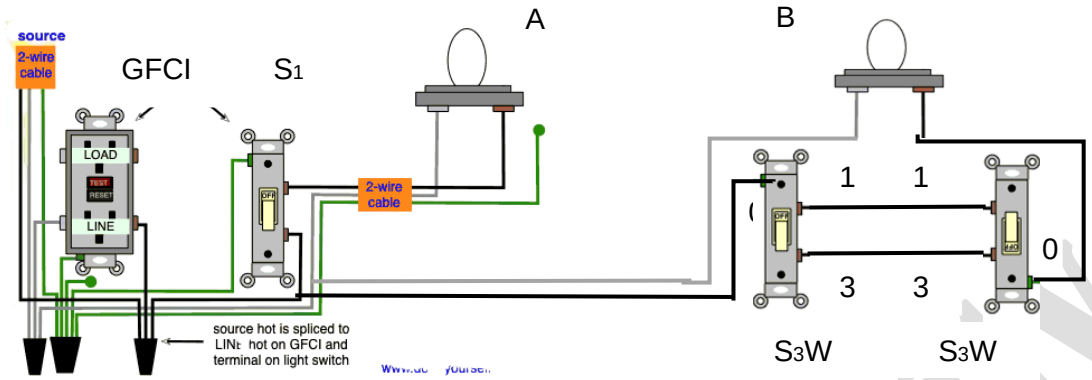
Schematic diagram



Pictorial Diagram

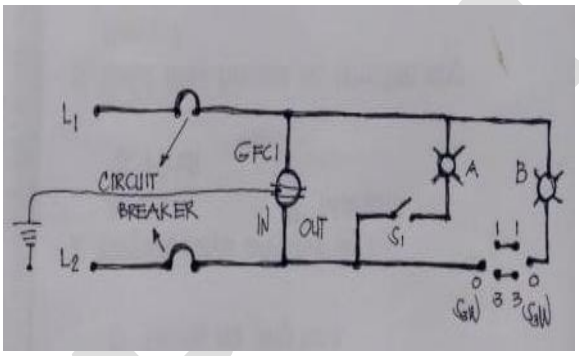


Actual wiring diagram

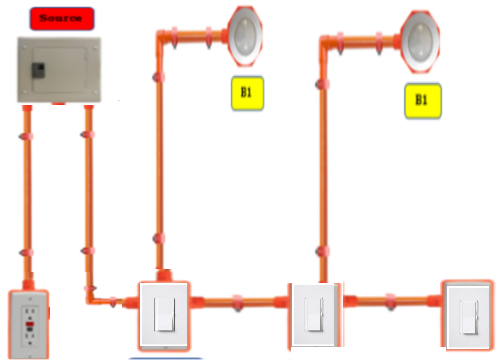


Additional Activities

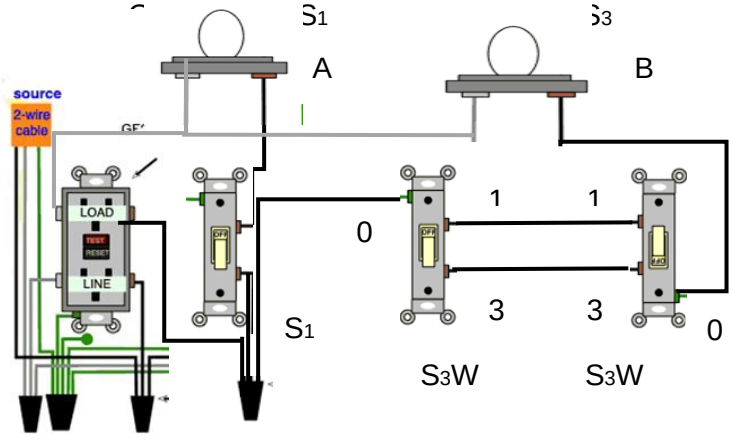
Schematic diagram



Pictorial Diagram



Actual wiring diagram



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