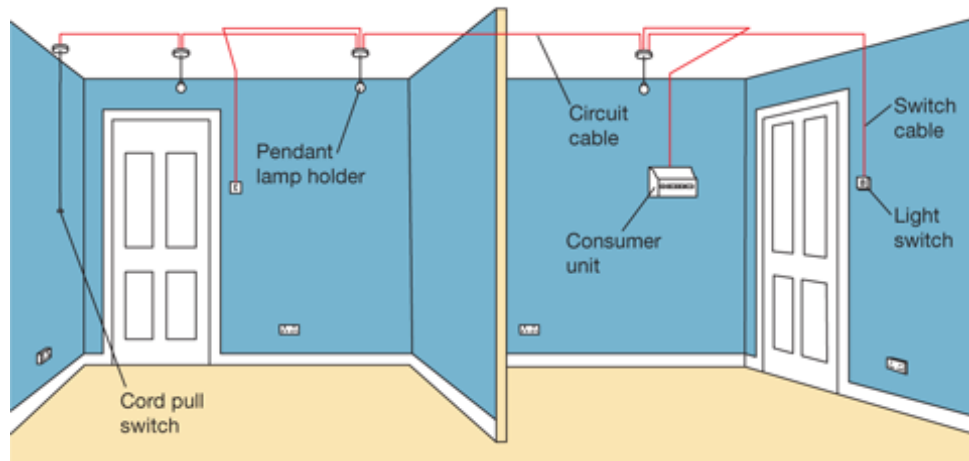


Building Electrical Installation

Level -I

Based on March, 2022 CURRICULUM Version -1



Module Title: - Connect and Terminate Electrical Wiring

Module Code: EIS BEI1 M10 0822

Nominal Duration: 70Hour

Prepared by: Ministry of Labour and Skill

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Addis Ababa, Ethiopia

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Acknowledgment

Ministry of Labor and Skills wish to extend thanks and appreciation to the many representatives of TVET instructors and respective industry experts who donated their time and expertise to the development of this Teaching, Training and Learning Materials (TTLM).

Acronym

TTLM- Teaching, Training and Learning Materials

OS-Occupational standard

EBSC-Ethiopian building standard code

Introduction to the Module

In building electrical installation the connection of wiring and includes termination and connection of all types of cords and cables, excluding specialist cables. All testing is undertaken on completed circuits where these are not connected to main supply, using appropriate methods such as continuity and resistance checks. Specifications are obtained from electrical/electronic drawings and data sheets. Soldering/desoldering of electrical/electronic components may also require the selection or Perform manual soldering/desoldering -electrical/electronic components or Perform high reliability soldering and desoldering) as applicable

This module covers the units:

- Prepare for electrical wiring installation, termination and connection
- Install electrical wiring
- Connect electrical wiring

Learning Objective of the Module

- Prepare for electrical wiring installation, termination and connection
- Install electrical wiring
- Connect electrical wiring

Module Instruction

For effective use this modules trainees are expected to follow the following module instruction:

1. Read the information written in each unit
2. Accomplish the Self-checks at the end of each unit
3. Perform Operation Sheets which were provided at the end of units
4. Do the “LAP test” given at the end of each unit and
5. Read the identified reference book for Examples and exercise
6. All work is undertaken safely and to workplace procedures and standard requirements.
7. Materials are checked for correct specifications

UNIT ONE: PREPARE FOR ELECTRICAL WIRING INSTALLATION, TERMINATION AND CONNECTION

This unit is developed to provide you the necessary information regarding the following content coverage and topics:

- Safe workplace procedure
- Correct specifications of materials
- Preparation of work.

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

- Take all work safely and to workplace procedures and standard requirements.
- Check materials for correct specifications.
- Prepare & Inspect work for correct location and specifications.

Safe workplace procedure

A health and safety policy describes a course of action that has been chosen to influence workplace decision-making and guide actions related to workplace health and safety

Health and safety policies commonly exist as a body of regulations that are defined at the level of government and are implemented by individual workplaces. In some jurisdictions, public intermediary corporations may also be used to develop policies

Occupational health and safety procedure

Correct specifications of materials

- A planned system of working to prevent illness and injury where you work by recognizing and identifying hazards and risks.
- A hazard is anything that could hurt you or someone else
- It means working out how likely it is that a hazard will harm someone and how serious the harm could be
- For example, you can pick up things from the floor and put them away to eliminate a trip hazard.
- A hazard is a situation in the workplace that has the potential to harm the health and safety of people or to damage plant and equipment.
- One of the most common physical hazards
- When working on electronic equipment always be alert.
- Always read the warnings and instructions on the label

The purpose of OHS policies and procedures

The purpose of the Health and Safety policies and procedures is to guide and direct all employees to work safely and prevent injury, to themselves and others. All employees are encouraged to participate in developing, implementing, and enforcing Health and Safety policies and procedure

The Importance of OH&S policies and procedures for Installation

- Determining the Location of the Devices/Systems to be used
- Obtaining Materials Necessary to Complete the Work in Accordance with Established Procedures
- Checking of Materials Received Against Job Requirements

- Installing wiring system and Peripherals in Accordance with Job Requirements
- Checking the Quality of the Work Undertaken in Accordance with the Established Procedures
- OHS Policies and Procedures in Conducting Tests.
- Checking Circuits and Systems Being Isolated Using Specified Testing Procedures.
- Testing Devices, Systems and/or Installation to Determine its Conformity with the Requirements

check and preparing for the installation

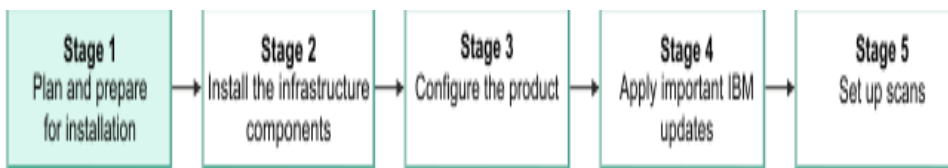


Figure1. 1 Planning and preparing for the installation

1.2. Correct specifications of materials

Each piece of electrical equipment shall bear such of the following markings as may be necessary to identify the equipment and ensure that it is suitable for the particular installation:

- The maker's name, trademark, or other recognized symbol of identification.
- Catalogue number or type.
- Voltage.
- Rated load amperes.
- Watts, volt-amperes, or horsepower. Whether for a.c., d.c., or both.
- Number of phases.
- Frequency in Hertz.
- Rated load speed in revolution per minute.
- Designation of terminals.
- Whether for continuous or intermittent duty.
- Evidence of approval.
- Such other marking as may be necessary to ensure safe and proper operation.

Self-check-1

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. The Importance of planning and Preparing Installation OH&S policies and procedures.(4 points)
 - A. Testing Devices
 - B. Checking the Quality of the Work
 - C .Checking of Materials
 - D.all
2. The important of Managing electrical risks.(2 point)
 - A. exposed high temperature parts
 - B. Identifying and assessing the risks
 - C developing risk control measures
 - D. All
3. Which one of the following are helpful in implementing safe work practices at workplace?(2pt)
 - A. Training on fire safety and emergency procedures.
 - B. Training on hazard identification, risk control, use of personal protection equipment (PPE) and first aid.
 - C. Observation of ergonomics to reduce injuries to workers.
 - D. Use and maintenance of appropriate tools for work and keeping them in good working condition.
 - E. All
4. Which one is the following include Workers should be reported the accident occur? (3pt)
 - A. Hazard
 - B. Incident
 - C. Injury
 - D. non
- 5.____It goes without saying that a happy workforce is a healthy one? (3 pt.)
 - A. Taking Care of Personal Health and Safety
 - B. Thinking of Others Health and Safety
 - C. PPE, Clothing and Hair
 - D. Remaining Alert in The Workplace

3. Which one of the following are helpful in implementing safe work practices at workplace?(2pt)
- A. Training on fire safety and emergency procedures.
 - B. Training on hazard identification, risk control, use of personal protection equipment (PPE) and first aid.
 - C. Observation of ergonomics to reduce injuries to workers.
 - D. Use and maintenance of appropriate tools for work and keeping them in good working condition.
 - E. All
4. Which one is the following include Workers should be reported the accident occur? (3pt)
- A. Hazard B. Incident C. Injury D. none

Note: Satisfactory rating 5 points Unsatisfactory - below 5 points

Score = _____

Rating: _____

Name: _____

Date: _____

UNIT TWO: INSTALL ELECTRICAL WIRE

This unit is developed to provide you the necessary information regarding the following content coverage and topics:

- specification of cables, wires, conductors for installations
- Requirements of installation
- Completion of installations testing

This unit will also assist you to attain the learning outcomes stated in the cover page.

Specifically, upon completion of this learning guide, you will be able to:

- Make installations to specifications, manufacturers requirements and to safety and industry regulations
- Fix all conduit and wiring to specifications.
- Mark/tag and label all cables, wires, conductors and installations to specification.
- Test all completed installations for compliance.
- Complete all reports, documentation correctly to required specifications.

2.1 Specification of cables, wires, conductors for installations

General specification of cables

- The size of the cable
- The type of conductor
- Number of cores
- Voltage grade

colour coding & Leveling cord, cable

It depends on the Ethiopian building standard code edition 10 they are use the colour coding below table provide

Table 2. 1 Colour identification cores of flexible cables and cord

Number of core	Function of core	Colors of core
1	Phase Neutral Protective	Brown Blue Green-&-Yellow
2	Phase Neutral	Brown Blue
3	Phase Neutral Protective	Brown Blue Green-&-Yellow
4 or 5	Phase Neutral Protective	Brown or Black Blue Green-&-Yellow

Table 2. 2 identification of cores of non-flexible cable and bare conductor for fixed wire

Function	Colour Identification
Protective (including earthing)conductor	Green or Yellow
Phase of a.c single phase circuit	Red or Yellow or Blue
Neutral of a.c single phase or three-phase circuit	Black
Phase R- three-phase a.c circuit	Red
Phase Y- three-phase a.c circuit	Yellow
Phase B- three-phase a.c circuit	Blue
Positive of d.c 2-wire circuit	Red
Outer(Positive or Negative) d.c 2-wire circuit derived from - three wire system	Red
Negative of d.c 2-wire circuit	Blue
Middle wire3 wire d.c circuit	Black

Types Of Cables Used In Internal Wiring

The wires used for internal wiring of buildings may be divided in to four different groups according to:

- The type of conductor
- The number of cores
- The voltage grading
- The type of insulation used.

According to the number of cores, the cables may be divided into: single core, twin core, twin core with ECC (earth continuity conductor).

According to voltage grading the cables may be divided in to two classes:

250/440 ,volt and 650/1100-volt cable.

According to type of insulation cables can be classified in to:

Vulcanized Indian Rubber (VIR)

-VIR cables are available in 250/440volt as well as 650/1100 volt grades and are used for general conduit wiring.

Lead sheathed cables:

- Available in 250/440 volt grade
- are used for internal wiring where climatic condition has moisture.
- Is a vulcanized rubber insulated conductor covered with a continuous sheath of lead .The sheath provides very good protection against the absorption of moisture and sufficient protection against mechanical injury and can be used without casing or conduit system.
- It is available as single core, flat twin core, flat three core and flat twin core with ECC.

PVC cables:

- Are available in 250/440 volt and 650/1100 volt grades
- Used in hidden type of wiring system.
- Since PVC cables are harder than rubber, they do not require cotton taping and braiding over it for mechanical and moisture protection.

Weather proof cables:

- Are used for outdoor wiring and for power supply
- are not affected by heat or sun or rain.
- Are either PVC insulated or vulcanized rubber-insulated conductors being suitably taped (only in case of vulcanized rubber insulated cable) braided and then compounded with weather resisting material.
- Are available in 250/440 and 650/1100 volt grades.

Flexible cords and cables:

- It consists of wires either silk or cotton or plastic covered, plastic cover is more popular as it is available various pleasing colors. Flexibility and strength is by using conductors having large number of strands

Choice of wiring system

In deciding the type of wiring system for a particular installation, the following basic factors have to be taken in to consideration.

Safety - Safety is the 1st consideration using electricity against leakage or shock. Where there is possibility of fire hazards, conduit wiring must be used.

Mechanical protection – the wiring must be protected from mechanical damage during its use.

Permanency – The wiring must not deteriorate unduly by action of weather, fumes, dampness, etc.

Appearance – It must have good appearance.

Accessibility – In wiring system there should facilities for extension, renewal, or altering.

Cost - Initial and maintenance cost must be low.

Frequently a combination of several wiring systems may be used. For example:- The lighting circuits could be carried out with PVC cables in plastics trunking or conduit or PVC insulated and sheathed cables fixed to the surface.

Methods of Wiring

There are two methods by which connections to various electrical points are given:

- Junction box (Joint box) method
- Loop in method

Junction box method:

In junction box method, the connections to electrical points are given through joints made in junction boxes by means of suitable connectors or joint cut-outs. See figure below: In this system the length of wire required may be less but the same offset by extra cost of joint boxes. The other disadvantage, fault location may be

difficult and as such, all joint boxes have to be inspected to locate the fault. The fixing of joint box may

require skill and may not give good look. Joint boxes should be located in accessible positions.

Loop-in method

Most commonly employed for domestic installations .In this system when a connection is required for a lamp

Through switch, the feeding conductor is looped - in by ringing it direct to the terminal of the switch and then carrying it forward again to the next switch. The phase wire is looped-in from one switch to the other and neutral are looped - in from one point to another. See figure below

The main advantages are:

1. No junction boxes are required
- ii. Since no joints are concealed in walls and roof spaces, they are made only at outlets and switch boards.
- iii. The connections are accessible for inspection and hence fault location is easy.

The main disadvantage is:

The cable required is more and hence voltage drop and copper losses are comparatively more.

Jointing and terminations of wires

Jointing - Whenever a conductor is to be joined to another conductor, or to accessories, or to bus-bars; a safe and effective termination or joint must be made. There are many different ways of joining two conductors together. Here we will discuss some of the more popular methods.



Figure 1.2 types of connector

2.2 PVC conduits

Conduit wiring Systems - In this system of wiring, conduits are installed on the surface of walls by means of saddles or pipe hooks or buried under the walls and cables are drawn into them. In damp situations the conduits can be spaced from the walls by means of wooden blocks fixed below the pipes at regular intervals. In order to facilitate drawing of cables a number of inspection fittings are provided along its length. Conduits can be of steel or of PVC.

Conduit wiring application –

As this system of wiring provides protection against fire, mechanical damage and dampness, it is used for:-

- 1) Places where considerable dust is present , such as in textile mills, saw mills, flour mills etc,
- 2) Damp situations
- 3) In workshops for lighting and motor wiring
- 4) Places where there is possibility of fire hazards such as oil mills varnish factories, etc.
- 5) Places where important documents are kept. ex. Record rooms.
- 6) Places where appearance is prime importance.

2.3 Trunking Conduit

Trunking is a fabricated casing for conductors and cables, generally rectangular in shape with a removable lid which allows the conductors to be laid in rather than be drawn in as is the case with conduit. It is used where a large number of conductors are to be carried, or follow the same route. Both steel and PVC trunking are available, with a wide range of such accessories as bends, tees, risers and reducers.

2.4 using mechanical connectors

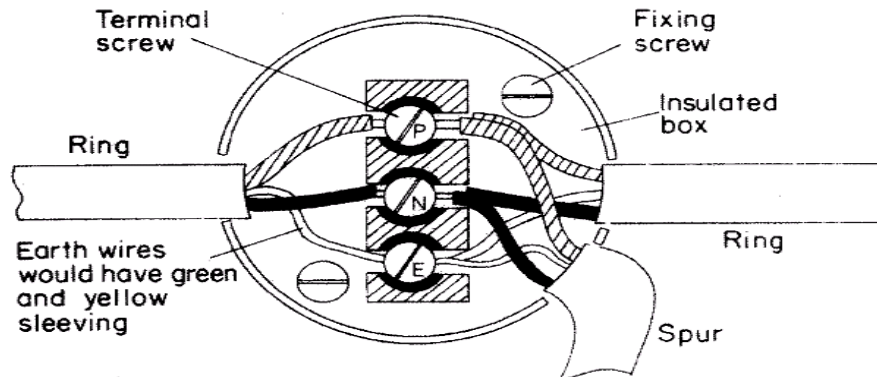


Figure 2.1 mechanical connector

2.4.1 Electrical Installation Testing Procedures

All new completed electrical installation should be tested before connection to the supply, to ensure that the installation is technically sound and free from any possible short circuits, etc. the main reasons, to test a new electrical installation or house wiring before it is switched on to the mains are as follows:

- To know the cause of failure of a particular circuit or circuits or equipment and to locate the exact position of break down.
- To ensure that it is free from faults and is as per electricity rules.
- These tests will receive the attention of the owner before any possible undue damage occurs.

The tests should be made on a new electrical installation before it is switched on to the mains are as under:

1. Insulation resistance test between installation and earth.
2. Insulation resistance test between conductors.
3. Testing of polarity.
4. Testing of earth continuity paths.
5. Earth resistance test.

Insulation Resistance Test between Installation and Earth

This test is performed to know the standard of insulation of wires and cables used in the installation.

It also ensures that the insulation is sufficient enough to avoid any possible leakage of current to earth.

The leakage of the current to earth should not exceed 0.02% of the full load current.

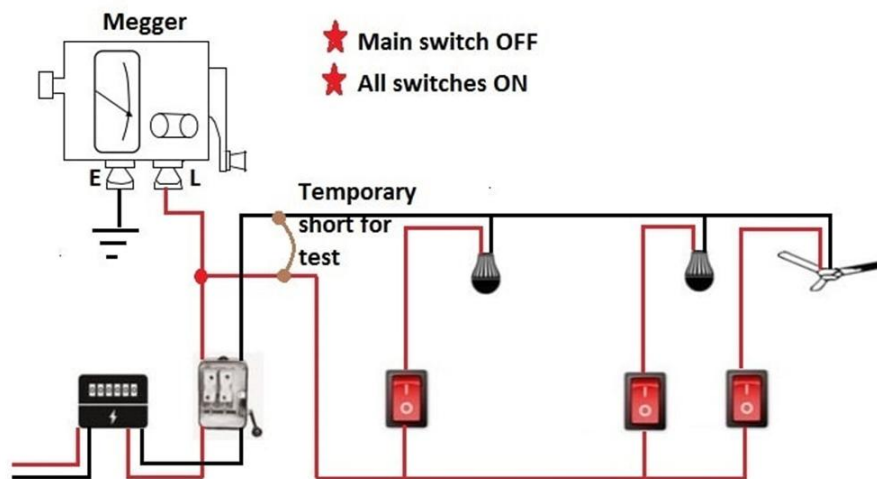
Before performing insulation resistance test between installation and earth the conditions to be fulfilled for the position of the main switch, fuses, switches, and other points should be as under:-

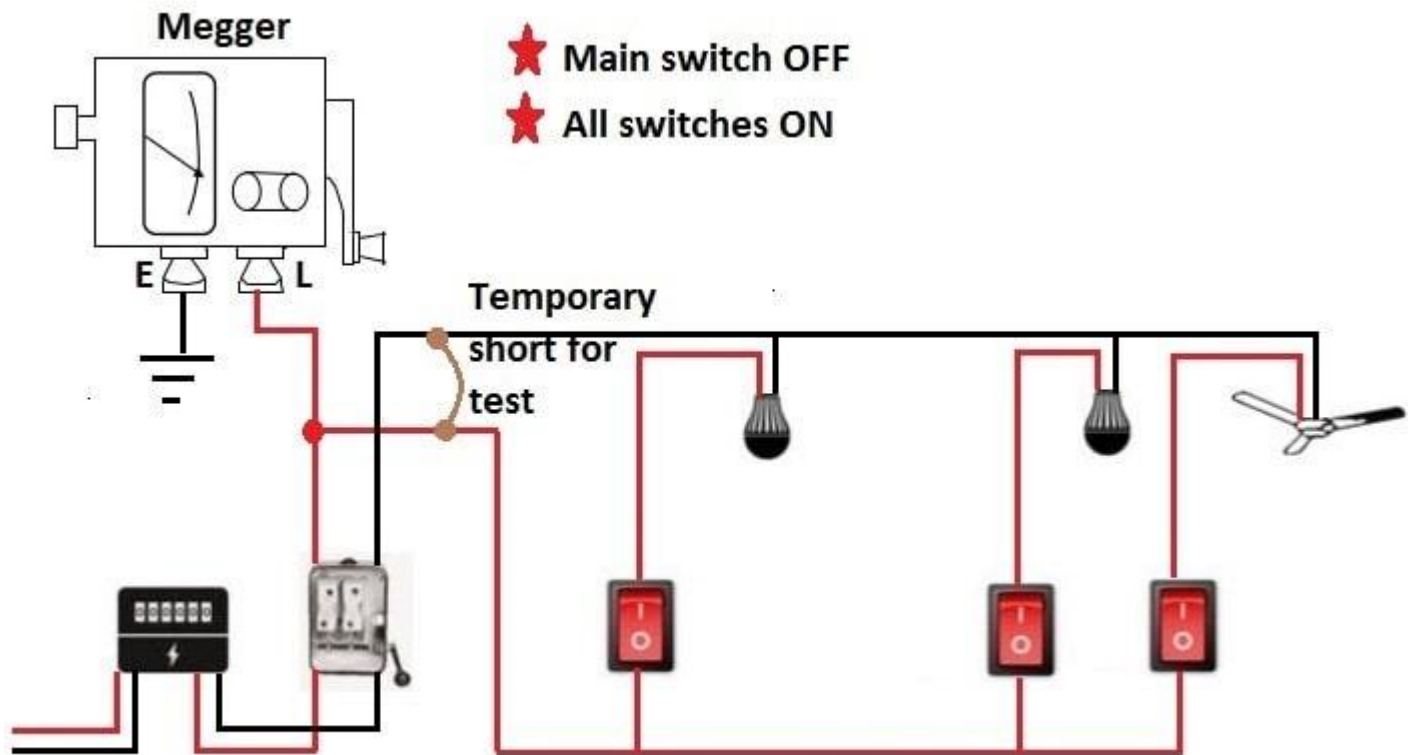
- main switch in OFF position,
- fuses beyond the main switch should be in position,
- All switches in ON position.
- All lamps and other equipment should be in their position.

For testing the whole installation, the test is conducted on the main switch. A testing set known as megger is used for the test. It is a special form of the ohmmeter.

To perform this test, the phase and the neutral is short-circuited temporarily at any suitable point as shown in

Figure2.2 .Insulation Resistance test B/n installation & earth





Insulation resistance test between installation and earth

The 'L' (line terminal) of the megger is connected to the short circuit point in the main switch and the earth terminal marked (E) is connected to earth continuity conductor or some good earth point near-by.

The handle of the tester is turned at a high speed so that sufficient testing voltage is produced.

The reading on the dial of the megger is noted.

The insulation resistance thus measured should not be less than $0.5 \text{ M}\Omega$ on a firm, sound and fixed wiring.

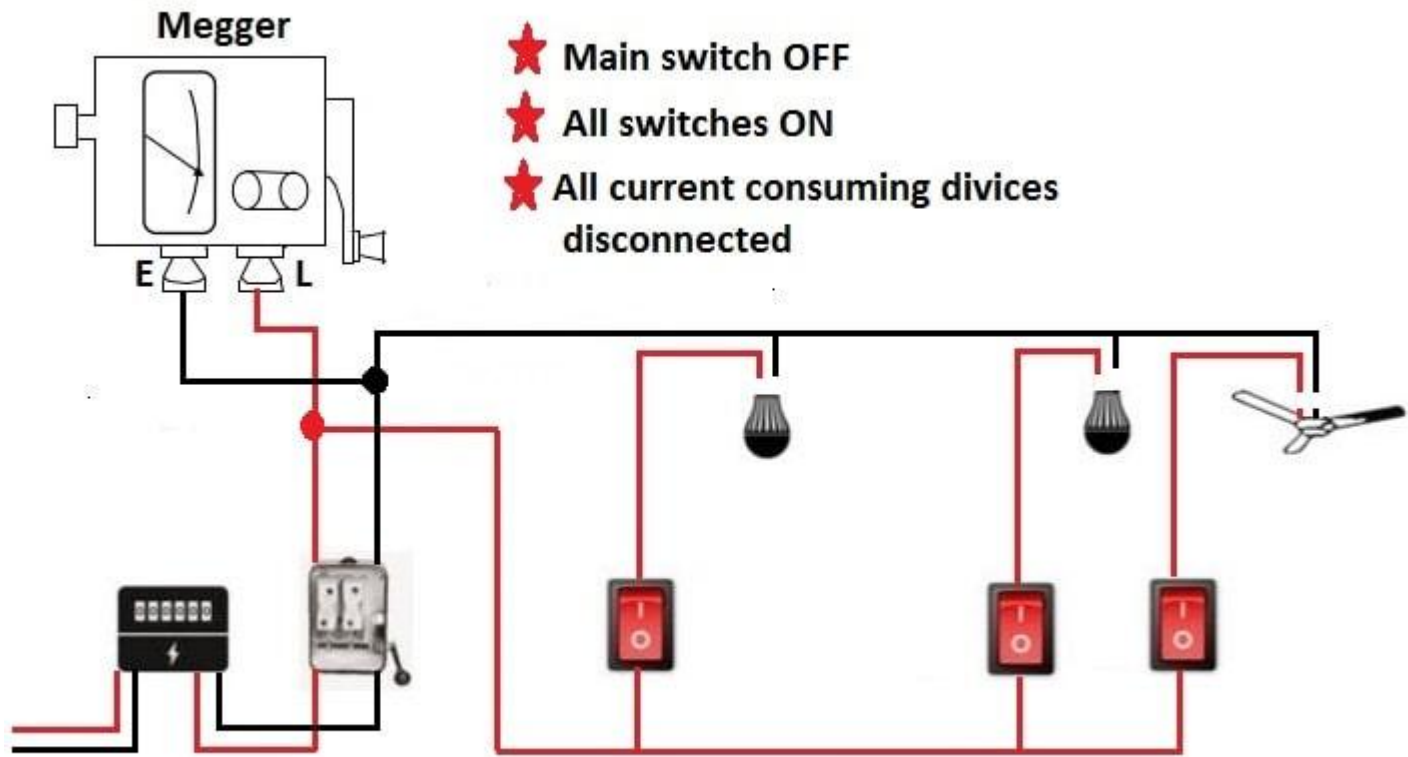
If the insulation resistance is below this value, the wiring section giving that value should be rewired or checked thoroughly until the required value is obtained.

Insulation Resistance Test between Wiring Conductors

To ensure that the insulation of the cables or wires is not damaged and there is no leakage between them, this test is performed.

Before performing this test, the position of the main switch, fuses, switches, etc. should be as under:

- main switch in OFF position,
- all switches in ON position,
- all lamps and other appliances should be removed,
- fuses beyond the main switch should be in position.



Insulation resistance test **between conductors**

The line terminal of the megger is connected to phase terminal of the installation and the earth terminal of megger is connected to neutral wire.

The insulation resistance so measured should not be less than 0.5 MΩ and not more than 1 MΩ.

Polarity Test in House Wiring

In a low voltage installation, this test is performed to verify that all single pole switches have been connected to phase wire throughout the installation.

It is very necessary to place all switches on phase so that when a switch is made OFF, the connected appliance is quite dead.

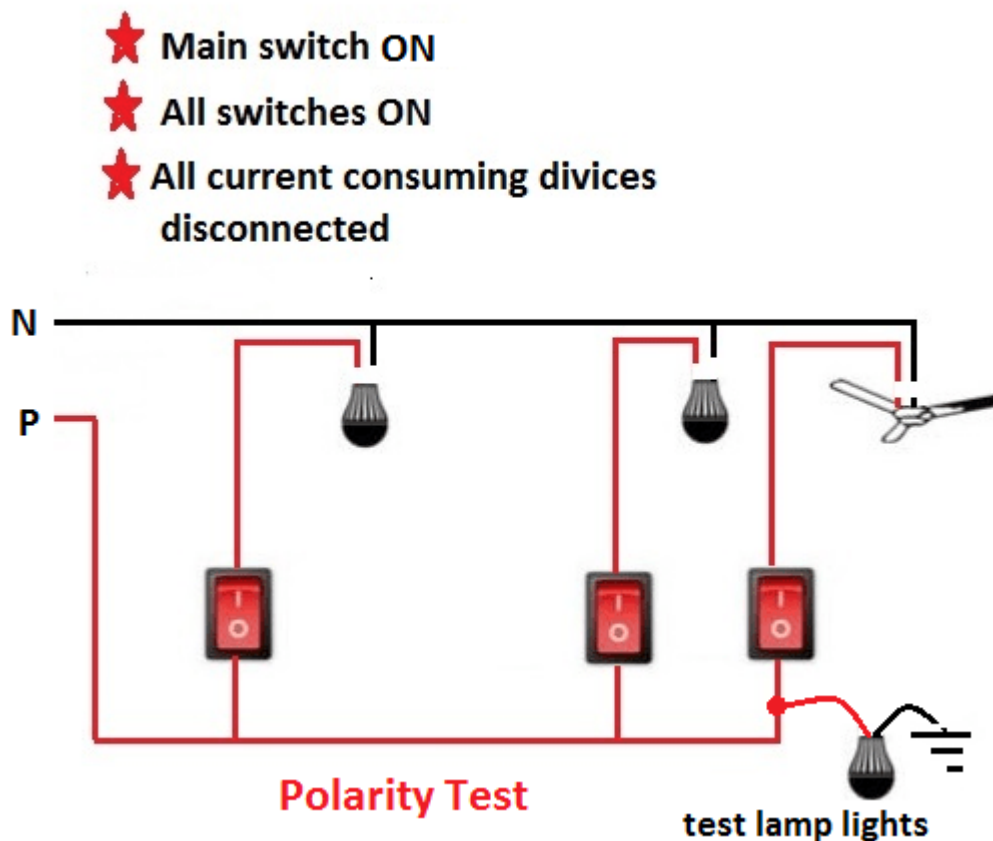
If the switch is connected to the neutral wire then the connected appliance will get phase even if the switch is in OFF position and remain alive.

There is absolutely no difference in the functioning of the switch in either case, but from the safety point of view to avoid shock, etc. the phase should always be given through the switch and neutral direct to the point.

The simple method of conducting the polarity test is by using a test lamp.

Before performing this test the position of the main switch, fuses, switches, etc. should be as under:

- main switch in ON position,
- all switches in OFF position,
- all lamps and other appliances should be removed.



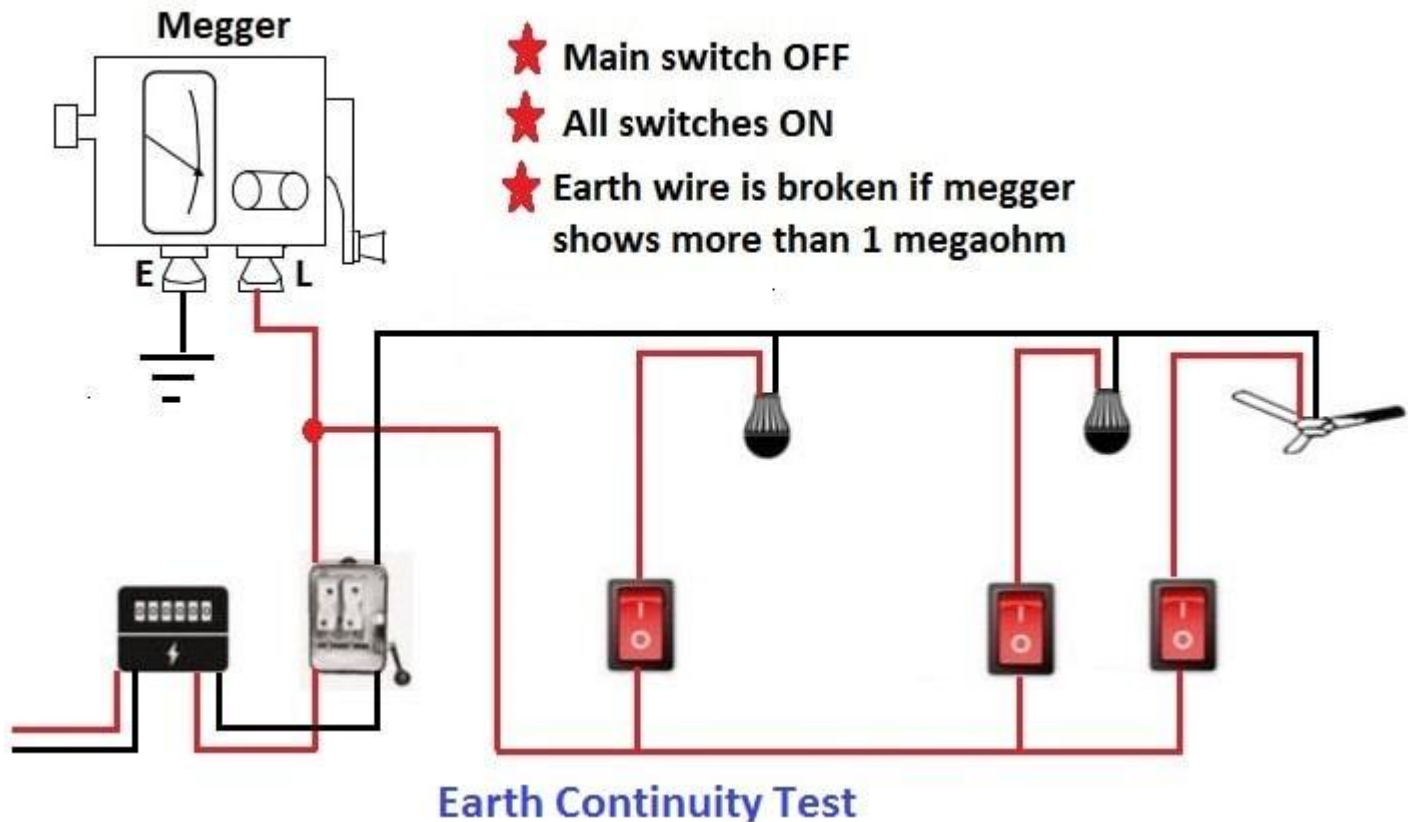
One end of the test lamp is connected to earth wire and the other end to the incoming terminal of the switch.

If the lamp lights, it indicates that the switch is connected to phase wire, otherwise to neutral wire.

Earth Continuity Test of Electrical Installation

To perform this test with the help of megger, the main switch is opened, the main fuses are withdrawn, all the switches are made ON and all the lamps are put in position.

The 'L' (line terminal) of the megger is connected to the phase conductor in the main switch and 'E' (earth terminal) of the megger is connected to an earth point.



In this test, megger should indicate a resistance value between 0.5 and 1 mega ohm.

In this case, if earthing of all the metallic parts and the earth wire will be in good condition, a sufficient amount of current will flow through test circuit and megger will show a reading up to 1 MΩ.

If it will be in bad condition then it will offer high resistance to the current. As a result, a very low quantity of current will flow and megger will show a reading more than 1 MΩ .

Therefore, if the megger shows a high reading (more than 1 MΩ), it means that the main switch or conduit is not properly earthed or the earth wire is broken somewhere requiring correction.

Self-check -1

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

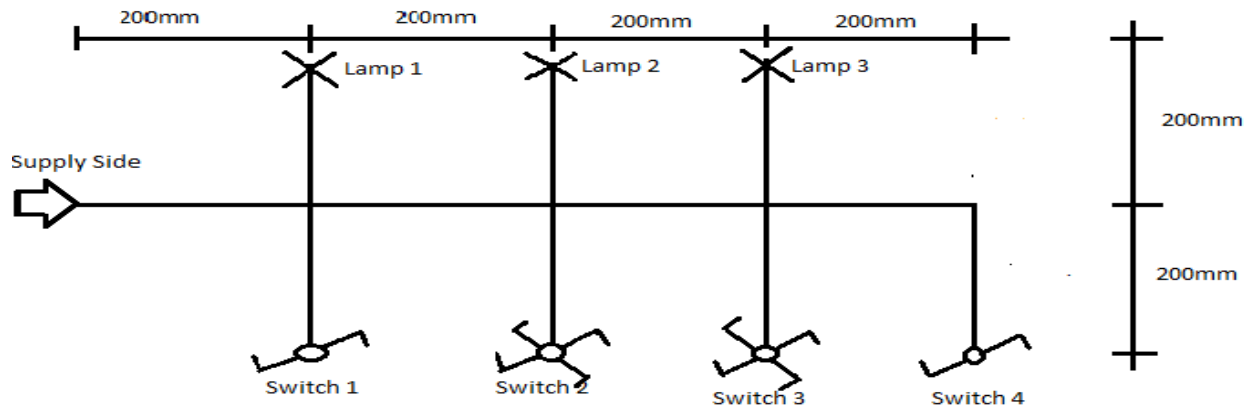
1. The reasons for testing the installation are:(5point)

- A. to ensure that the installation complies with the Regulations,
- B. to ensure that the installation meets the specification,
- C. to ensure that the installation is safe to use
- D. all

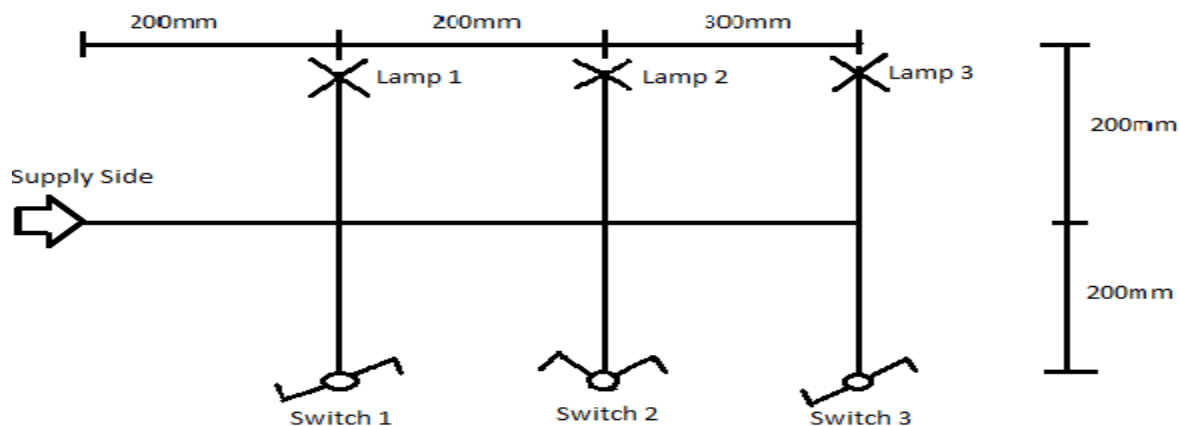
2. Check list for the initial visual inspection of an installation,(5 points)

- A. identification of conductors;
- B. routing of cables in safe zones;
- C. selection of conductors for current carrying capacity and volt drop
- D. all

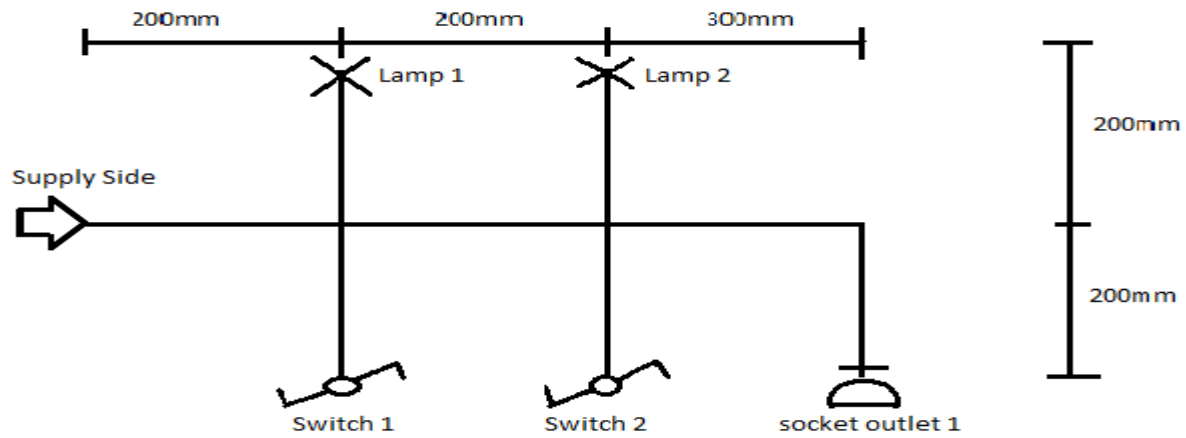
LAP TEST-1 Controlling of one – Lamp (lamp 2) from one position by using one way single pole switch, Lamp 1 & Lamp 3 each controlled by Ganged



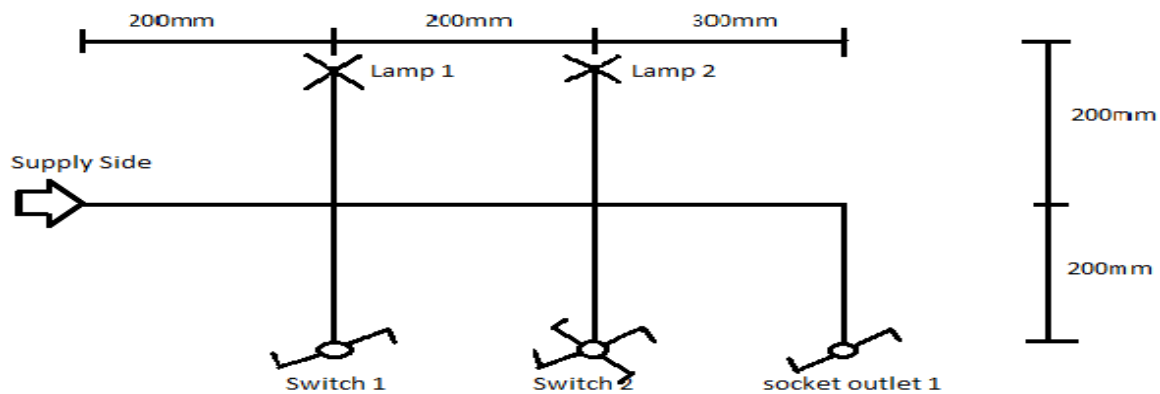
LAP TEST-2 Controlling of one – Lamp (lamp 1) from two position by using 2-two way single pole switch switch 1 & switch 3, & Lamp 2 & Lamp 3 each lamp controlled by Ganged switch switch 2.



LAP TEST-3 Controlling of two – Lamp (lamp 1 & lamp 2) from two position by using 2-two way single pole switch (switch 1 & switch 2), & Socket outlet in the circuit.



LAP TEST-4 Two incandescent lamps (L-1&L-2) will be control from three positions by using two Two-way switch and one intermediate switch.



Self-check -1

- 1, write wiring system type
- 2, write factors considered during choice of wiring system?
- 3, mention the two wiring methods
- 4, write factors considered during choice of wiring system?

Self-check -2

1. Check at list for the initial visual inspection of an installation,(5 points)
 - A. Identification of conductors;
 - B. Routing of cables in safe zones;
 - C. selection of conductors for current carrying capacity and volt drop
 - D. all
2. The reasons for testing the installation are:(5point)
 - A. to ensure that the installation complies with the Regulations,
 - B. to ensure that the installation meets the specification,
 - C. to ensure that the installation is safe to use
 - D. all

UNIT THREE: Connect Electrical Wiring System

This unit is developed to provide you the necessary information regarding the following content coverage and topics:

- Perform Connection and terminations cable & cords.
- clamping of cables and wires, sealing entry points

This unit will also assist you to attain the learning outcomes stated in the cover page.

Specifically, upon completion of this learning guide, you will be able to:

- Perform Connection and terminations.
- Termination and connection of cords and cables
- Clamping of cables and wires, sealing entry point
- Testing completed wiring and connections.

3.1 Terminating and connecting Cable&Corde

Termination – It is the process of preparing wire or conductor for connection to the terminals. This means to prepare wire for connection (remove 3cm - 5cm insulations of connecting part of wire) as the required standards.

Terminations - When a cable conductor is finally connected to the apparatus it is supplying, a safe and effective termination of that conductor must be made.

PVC singles into screw terminals - The insulation should be removed *only* far enough to allow the conductor to enter the terminal. Do not leave bare conductor showing outside the terminal

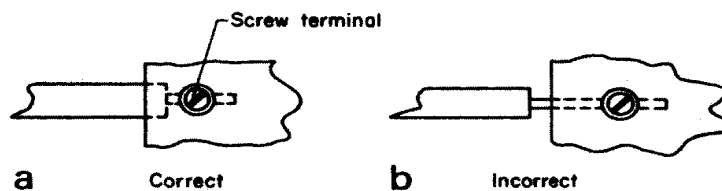


Fig 10 screw terminal

Lug terminations - Lug terminations are frequently used for connecting a conductor to a bus-bar.

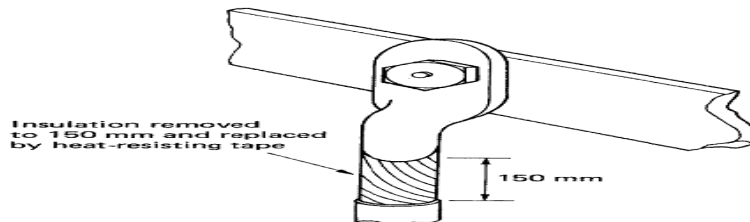
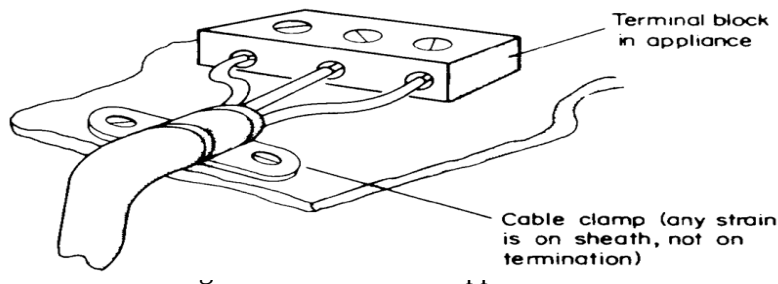


Fig 11 lug termination

Termination into appliances – Usually termination of cable into appliances, especially the portable type, should be firmly connected at or near the point of entry.



Termination is the process of preparing cable ends they can be connected to apparatus such as switch, socket outlets, lamp holders, tools soldering iron, machines, and motor termination box.

➤ **Connecting**:- joining or splicing to piece of wires using pig tail, T- tap, western union & etc type of splicing as we required. The connection must be

- ✚ Sufficient space
- ✚ Mechanically strong
- ✚ Easily make & dismake

A wiring system is a network connecting various accessories for distribution of electrical energy from the supplier to the numerous electrical energy consuming devices and equipments. It is an assembly of parts used in the formation of one or more electric circuits. Wiring consists of the conductor with its protection against mechanical damage (sheathing and/or armoring) and certain wiring accessories for fixing the system, and joining and terminating the conductors.

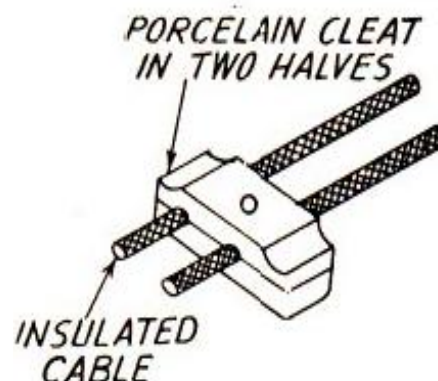
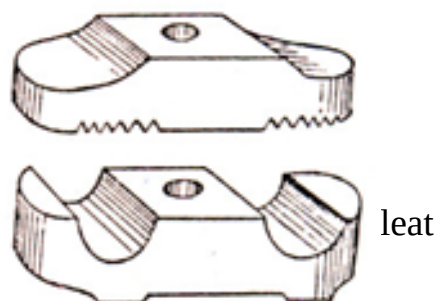
• The most commonly employed wiring systems are:-

- Cleat wiring
 - Sheathed cables wiring
 - All insulated cables wiring
- Catenaries wiring
- Conduit system
- Trunking system

Perform Connection and terminations.

Cleat wiring system

In this system PVC-insulated cables are supported on cleats made of porcelain or plastic. The system doesn't give any protection against mechanical damage and so it is useful only for dry situations and where the cables remain inaccessible. The most frequently used cables are **sheathed cables** and **all insulated cables**.



Sheathed cables wiring system - The two main metal sheathed wiring systems found today include The lead-alloy sheathed (LAS) and mineral-insulated metal sheathed (MIMS). The cables of the LAS system are insulated with vulcanized rubber and sheathed overall with a lead-based alloy containing tin and antimony. LAS systems may be run on the surface or concealed. Generally they require no further protection, unless they are exposed to mechanical damage.

All-insulated cables Wiring System - This wiring system includes TRS (Tough-Rubber Sheathed) and PVC cables (PVC-sheathed). Their main disadvantage is that they don't offer adequate protection against mechanical damage, though they are relatively cheap and easy to install. They are used for surface wiring on the surface of the wall with or without conduits and concealed wiring – buried in walls.

Catenaries wiring System - These systems are designed to take supplies from one building to another by overhead means, or else for building with high ceilings. In this system, insulated cables are carried on a steel wire strained between two points.

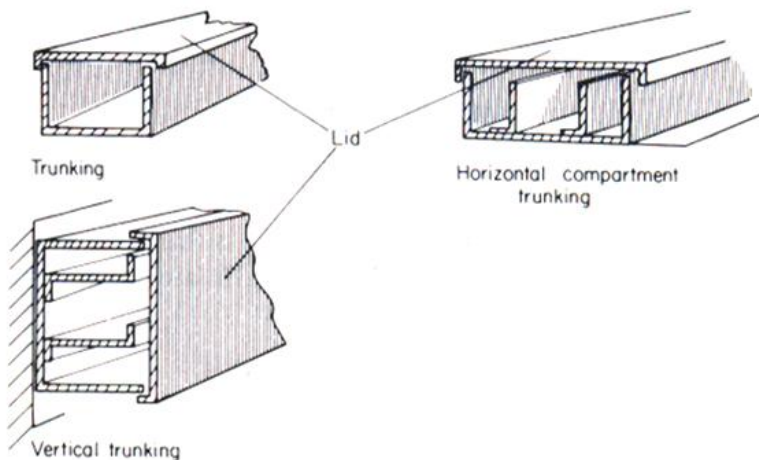
Conduit wiring Systems - In this system of wiring, conduits are installed on the surface of walls by means of saddles or pipe hooks or buried under the walls and cables are drawn into them. In damp situations the conduits can be spaced from the walls by means of wooden blocks fixed below the pipes at regular intervals. In order to facilitate drawing of cables a number of inspection fittings are provided along its length. Conduits can be of steel or of PVC.

Conduit wiring application –

As this system of wiring provides protection against fire, mechanical damage and dampness, it is used for:-

- Places where considerable dust is present , such as in textile mills, saw mills, flour mills etc,
- Damp situations
- In workshops for lighting and motor wiring
- Places where there is possibility of fire hazards such as oil mills varnish factories, etc.
- Places where important documents are kept. ex. Record rooms.
- Places where appearance is prime importance.

Trunking - Trunking is a fabricated casing for conductors and cables, generally rectangular in shape with a removable lid which allows the conductors to be laid in rather than be drawn in as is the case with conduit. It is used where a large number of conductors are to be carried, or follow the same route. Both steel and PVC trunking are available, with a wide range of such accessories as bends, tees, risers and reducers.



Choice of wiring system

In deciding the type of wiring system for a particular installation, the following basic factors have to be taken in to consideration.

Safety - Safety is the 1st consideration using electricity against leakage or shock. Where there is possibility of fire hazards, conduit wiring must be used.

Mechanical protection – the wiring must be protected from mechanical damage during its use.

Permanency – The wiring must not deteriorate unduly by action of weather, fumes, dampness, etc.

Appearance – It must have good appearance.

Accessibility – In wiring system there should facilities for extension, renewal, or altering.

Cost - Initial and maintenance cost must be low.

Frequently a combination of several wiring systems may be used. For example:- The lighting circuits could be carried out with PVC cables in plastics trunking or conduit or PVC insulated and sheathed cables fixed to the surface.

Self check-1

1. Write at least four conduit wiring application (5 point)
2. Write the most common employed wiring system(4point)
3. Write the basic factor consider during chose of wiring system (4point)

Reference

1. Buildingelectricalinstallationhttps://dps.mn.gov/divisions/ojp/forms-documents/Documents/Wilder_Program_Evaluation_8.pdf
2. **Identifying Wire Splices and Joining** <http://www.teamreporterapp.com/information-gathering/>
3. Gathering information: Available on: Information Gathering. Available on: <http://www.teamreporterapp.com/information-gathering/>
4. Medical Advice Disclaimer (2005-2019). The Importance of Using Community Resources in Treatment. Available on
5. Ethiopian building code standard edition -10

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