

ELECTRICAL HAZARDS

essential indicators in the circuit. Thermocouples or other thermometers are sometimes provided. These indicators provide for safer operation since the characteristics of the apparatus can be constantly observed and men need not make separate tests near energized circuits.

When high-voltage equipment not equipped with built-in indicators must be inspected, the operator or inspector should examine it carefully to see that it has a substantial ground. An electrical fault in an ungrounded machine may not be visible during operation, but touching the frame may result in fatal shock. A good ground will keep the machine at or near earth potential.

Power factor improvement capacitors are used in almost every efficiently operated distribution system. These capacitors usually have an internal discharge resistor to reduce the voltage to 50 volts within 5 minutes after the capacitor is deenergized. Nevertheless, each terminal and the case must be grounded by means of a grounding stick whenever work is to be done on or near the capacitor. This ground connection must be maintained until the entire job inspection, maintenance, or cleaning of the capacitor—has been completed.

Extreme precaution should be taken when insulation resistance of high-voltage equipment is tested to make sure that the megohmmeter is not connected into a live circuit. After it has been determined that the apparatus is completely dead, the free test lead can be attached to an exposed connection by use of a switch hook or other type of insulated hot stick. Rubber gloves should be worn in case of hand contact with the hanging leads.

Contact to test insulation resistance should be made whenever possible with an exposed conductor in the circuit to be tested. Puncturing of insulation is not recommended except with the knowledge and permission of the plant electrician, engineering department, or operator. Then it should be understood that the place punctured will be immediately taped or reinsulated.

As assurance of additional safety, especially when the punctured insulation is near metal framework or grounded structures, an insulation test should be made of the taped portion.

Rubber gloves should not be used as a

substitute for safety devices or procedures, but are worn as a supplementary measure. Before each use they should be checked for punctures, tears, or abrasions. For an on-the-job test the cuffs should be rolled up and air forced into the fingers and palms of the gloves. If there is leakage, the gloves should not be used.

Leather protectors should be worn over rubber gloves to protect the rubber from mechanical damage and from oil and grease.

An electrical glove testing service should be provided, with regular testing intervals determined by the amount of use of the gloves, the type of work, and the voltages they are subject to. If there is doubt about the insulating quality of the gloves, they should not be used.

Private testing laboratories can be relied upon for accurate testing. In some cases they will keep individual company records on the physical condition of gloves and the time schedule for retesting. Where no laboratory is available, small concerns can usually get tests made at the local public utility.

Maintenance

To be safe and to give the best service, electric equipment must be well-maintained. Motors, circuit breakers, moving parts of switches, and similar current-carrying devices wear out, break down, and need readjustments. Repairs on electrical circuits and electrical apparatus should be made only by experienced electricians (Fig. 31-13).

Only high-grade electrical equipment listed as standard by Underwriters' Laboratories, Inc., or other qualified authority, should be used in maintenance work. Inferior, unapproved equipment may become hazardous because of defective material or design or poor workmanship.

If practicable, conductors should be deenergized when maintenance work on them is necessary. Before they begin work, maintenance men should make certain that the line is dead by testing it with the voltage testing devices provided. *It is not safe to test a circuit with the fingers or with makeshift devices.*

The men should be instructed in the use of electrical testing equipment and meters: how to tap into the circuit, how to locate testing points from schematic diagrams, how to use insulated meter leads, clips, and