

Electrical Hazards

used in areas where it may come in contact with oils or solvents

Cord for heating devices, such as electric irons and water heaters, is made with an insulated covering which contains flame-retardant or thermosetting compound, such as neoprene. They are designed to resist high temperatures and, in the case of neoprene, dampness.

Because the metal frames of portable electrical equipment should be grounded, cord with a green-covered ground conductor should be used with a polarized plug and receptacle. If plant circuits are not equipped with polarized receptacles, a third wire taped at intervals to the cord, to prevent its breaking and to prevent a tripping hazard, may be used. One end of this third wire is electrically connected to the frame of the tool, and the other end, which should be several feet longer than the cord, terminates in a spring-type metallic clip—large enough to be clamped to a water pipe or other effective ground.

Extension lamps with brass shell sockets should be prohibited because the socket may become energized through contact with loose wires inside the socket, through abrasion of the insulation where the cord enters the socket, or through moisture in the socket insulation. Porcelain, composition, or rubber-covered sockets should be used.

Handles of portable lamp holders must be made of nonconductive material, and there should be no metallic connection between the lamp guard and the socket shell. For use near exposed live parts, such as the rear of switchboards, the guard itself should be of nonconductive material.

Since extension lamps are sometimes used under conditions in which 120-volt shock may prove fatal, it is essential that safe cords and lamp holders be provided and that they be maintained in excellent condition. In some plants the shock hazard of portable lamps is eliminated by use of small portable transformers which step the lamp voltage down to 24 volts or less. Special lamps for these units are rated at 75-watt capacity and give sufficient working light.

Test equipment

Most electrical equipment is designed for safe operation under limited overload conditions for varying periods of time. Operators

should be thoroughly familiar with the limitations of their equipment and should be trained to observe and report abnormal conditions. Continued overload may introduce additional operating hazards by causing fire, short circuits, circuit failures, or machine failures.

Through the use of various types of electrical testing meters, many of these conditions can be detected before they get out of control and cause damage.

The following types of equipment are standard and should be considered even by plants with limited budgets: split-core ammeter, voltmeter, ammeter, megohmmeter, ground fault indicators and locators, wattmeter, industrial analyzer, recording instrument, and specialized testing instruments.

The split-core ammeter can be used without tapping into the circuit. The instrument's core is slipped around one electric lead, and the scale is then read for the amount of current flow. A current reading in excess of the rated full-load current may indicate an overload or a grounded motor winding.

When test leads are used with this instrument, the line voltage can be checked to see if it equals the motor voltage rating. This check is important because low voltage can cause excessive current flow which may result in a complete breakdown, arcing, or electrical fires.

Voltmeter and ammeter When the voltage and current used in a plant exceed the range of a split-core ammeter, separate instruments should be used: a voltmeter to measure voltage and an ammeter to measure current. When these two instruments are used, more accurate readings can be taken. Also separate instruments are useful when simultaneous voltage and current readings are needed. Such readings might be necessary when tests are being made to check on voltage surges or dips and unusual power conditions while current is on.

When the current to be measured exceeds the ammeter's range, shunts should be used for direct current measurement, and current transformers, for alternating current measurement. Likewise, when voltages exceed the voltmeter's maximum rating, resistors or potential transformers must be used to step