

Chapter E 116

CONDUCTORS

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E 116.01 Electrical protection. (1) **OVERCURRENT PROTECTION REQUIRED.** Conductors shall be suitable for the location, use, and voltage. Conductors should be protected against excessive heating by the design of the system or by suitable fuses or automatic circuit-breakers except as provided in section E 117.06.

(2) **FUSES IN GROUNDED CONDUCTORS.** Conductors normally grounded for the protection of persons shall be arranged without fuses or automatic circuit-breakers interrupting their continuity between the source of electrical supply and the point at which the ground conductor is attached, unless the circuit-breaker opens all conductors of the circuit with one operation.

(3) **CIRCUITS EXPOSED TO HIGHER VOLTAGES.** If exposed through transformer windings or outdoor circuits to higher voltages, circuits of less than 750 volts shall be isolated or grounded unless in suitable cable with grounded metal sheath, placed in grounded conduit or other suitable duct or identified and guarded as required for conductors of the highest voltage to which they are exposed.

History: Cr. Register, January, 1968, No. 145, eff. 2-1-68.

E 116.02 Precaution against mechanical and thermal damage. (1) **PROTECTION AGAINST INJURY.** Where exposed to mechanical injury suitable casing, armor, or other means shall be employed to prevent injury or disturbance to conductors, their insulation, or supports.

(2) **FLAME PROOFING.** Where conductors with insulating coverings are closely grouped and any one is liable to damage from near-by conductors (as sometimes on the rear of switchboards or in cableways) they shall have a substantial flameproof outer covering. Flame proofing shall be stripped back on all conductors a sufficient distance from the terminals to give the necessary insulation for the voltage of the circuit on which the conductor is used.

(3) **PROTECTION AGAINST CONTACT.** Large conductors liable to be torn from their supports by the forces to which they are subjected (as by the magnetic fields produced) shall be so supported that they cannot come in contact with the surfaces along which they are run if uninsulated or with other conductors and equipment.

Note: This applies in particular to generator leads and conductors liable to large short-circuit currents.

(4) **CONDUCTORS BETWEEN GENERATORS AND OUTSIDE LINES.** Conductors between generators and outside lines shall be accessible and sup-

ported on approved noncombustible, nonabsorptive insulators or placed in approved cable, metal conduit, tile, or other fireproof ducts.

(5) **HIGH TEMPERATURES.** Insulated conductors exposed to excessive temperatures shall have insulation which remains effective and does not rapidly deteriorate under such conditions.

History: Cr. Register, January, 1968, No. 145, eff. 2-1-68.

E 116.03 Isolation. All conductors of more than 750 volts, and ungrounded bare conductors of more than 150 volts, shall be isolated by elevation or guarded in accordance with section E 112.05, so that no person can inadvertently come in contact with them; provided that busses and bus structures and line connections thereto may be installed in accordance with section E 112.06, in suitable locations specially arranged for such purposes.

History: Cr. Register, January, 1968, No. 145, eff. 2-1-68.

E 116.04 Guarding conductors. (1) METAL SHEATHED CABLE OUTLETS OF MORE THAN 750 VOLTS. The insulation of the several conductors of multiple-conductor cable, where leaving the metal sheath at outlets, shall be thoroughly protected from mechanical injury, moisture, and electrical strains by means of a pothead or equivalent method.

(2) **FORM OF GUARDS.** Guards shall comply with section E 112.05.

History: Cr. Register, January, 1968, No. 145, eff. 2-1-68.

E 116.05 Guarding in hazardous locations. (1) RIGID STEEL CONDUIT. Conductors in locations where flammable gas normally exists shall be in metal conduit. All fittings and outlets of such conduit shall be electrically and mechanically continuous with the conduit or metal sheath, and the conduit shall be sealed to prevent entrance of gases. (See NEC-1971 Article 500.)

Note: This rule does not apply to conductors of large section which obviously cannot be placed in conduit, such as copper bars connecting large cells with end-cell switches. This rule does not apply to adequately ventilated locations.

(2) **INSULATING SUPPORTS.** Conductors in damp locations, if neither in conduit nor in waterproof metal sheaths in other suitable ducts, shall be effectively isolated and supported on a suitable type of insulator.

History: Cr. Register, January, 1968, No. 145, eff. 2-1-68; am. (1) Register, April, 1972, No. 196, eff. 5-1-72.

E 116.06 Taping ends and joints. Ends and joints of insulated conductors, unless otherwise adequately guarded, shall have equal insulating covering with other portions of the conductor.

History: Cr. Register, January, 1968, No. 145, eff. 2-1-68.

E 116.07 Wiring for illumination. Wiring installed for the illumination of the station should be installed and protected as required for similar utilization equipment and conductors in volume 2 of the code.

History: Cr. Register, January, 1968, No. 145, eff. 2-1-68; am. Register, April, 1972, No. 196, eff. 5-1-72.