

energized, except that, when such centers and transformers are moved while energized as permitted under this subsection, energized high-voltage cables attached to such centers and transformers may be moved only by a qualified person and the operator of such mine shall require that such person wear approved and tested insulated wireman's gloves.

(Pub. L. 91-173, title III, §308, Dec. 30, 1969, 83 Stat. 780.)

#### REFERENCES IN TEXT

For the operative date of this subchapter, referred to in subsec. (d), see section 509 of Pub. L. 91-173, set out as an Effective Date note under section 801 of this title.

### § 869. Underground low- and medium-voltage alternating current circuits

#### (a) Circuits providing power for three-phase equipment; circuit breakers

Low- and medium-voltage power circuits serving three-phase alternating current equipment shall be protected by suitable circuit breakers of adequate interrupting capacity which are properly tested and maintained as prescribed by the Secretary. Such breakers shall be equipped with devices to provide protection against under-voltage, grounded phase, short circuit, and over-current.

#### (b) Circuits used underground; direct neutral grounds; ground conductors for frames; exceptions; grounding resistors

Low- and medium-voltage three-phase alternating-current circuits used underground shall contain either a direct or derived neutral which shall be grounded through a suitable resistor at the power center, and a grounding circuit, originating at the grounded side of the grounding resistor, shall extend along with the power conductors and serve as a grounding conductor for the frames of all the electrical equipment supplied power from that circuit, except that the Secretary or his authorized representative may permit ungrounded low- and medium-voltage circuits to be used underground to feed such stationary electrical equipment if such circuits are either steel armored or installed in grounded rigid steel conduit throughout their entire length. The grounding resistor, where required, shall be of the proper ohmic value to limit the ground fault current to 25 amperes. The grounding resistor shall be rated for maximum fault current continuously and insulated from ground for a voltage equal to the phase-to-phase voltage of the system.

#### (c) Inclusion of fail safe ground check circuits in resistance ground systems; operative functions; time extension; couplers for power circuits; guidelines for construction

Six months after the operative date of this subchapter, low- and medium-voltage resistance grounded systems shall include a fail safe ground check circuit to monitor continuously the grounding circuit to assure continuity which ground check circuit shall cause the circuit breaker to open when either the ground or pilot check wire is broken, or other no less effective device approved by the Secretary or his authorized representative to assure such continuity,

except that an extension of time, not in excess of twelve months, may be permitted by the Secretary on a mine-by-mine basis if he determines that such equipment is not available. Cable couplers shall be constructed so that the ground check continuity conductor shall be broken first and the ground conductors shall be broken last when the coupler is being uncoupled.

#### (d) Disconnecting devices installed in conjunction with circuit breakers; purpose; trailing cables for mobile equipment; guidelines for construction; time extension; splices

Disconnecting devices shall be installed in conjunction with the circuit breaker to provide visual evidence that the power is disconnected. Trailing cables for mobile equipment shall contain one or more ground conductors having a cross sectional area of not less than one-half the power conductor, and, six months after the operative date of this subchapter, an insulated conductor for the ground continuity check circuit or other no less effective device approved by the Secretary or his authorized representative to assure such continuity, except that an extension of time, not in excess of twelve months may be permitted by the Secretary on a mine-by-mine basis if he determines that such equipment is not available. Splices made in the cables shall provide continuity of all components.

#### (e) Connections of single phase loads

Single phase loads shall be connected phase to phase.

#### (f) Circuit breakers; markings

Circuit breakers shall be marked for identification.

#### (g) Trailing cables for medium voltage circuits; guidelines for construction

Trailing cables for medium voltage circuits shall include grounding conductors, a ground check conductor, and ground metallic shields around each power conductor or a grounded metallic shield over the assembly, except that on equipment employing cable reels, cables without shields may be used if the insulation is rated 2,000 volts or more.

(Pub. L. 91-173, title III, §309, Dec. 30, 1969, 83 Stat. 782.)

#### REFERENCES IN TEXT

For the operative date of this subchapter, referred to in subsecs. (c) and (d), see section 509 of Pub. L. 91-173, set out as an Effective Date note under section 801 of this title.

### § 870. Trolley wires and trolley feeder wires

#### (a) Intervals for cutoff switches

Trolley wires and trolley feeder wires shall be provided with cutout switches at intervals of not more than 2,000 feet and near the beginning of all branch lines.

#### (b) Overcurrent protection devices

Trolley wires and trolley feeder wires shall be provided with overcurrent protection.

#### (c) Location of wires

Trolley wires and trolley feeder wires, high-voltage cables and transformers shall not be lo-