

equipment under the direct supervision of a qualified person. Disconnecting devices shall be locked out and suitably tagged by the persons who performed such work, except that, in cases where locking out is not possible, such devices shall be opened and suitably tagged by such persons. Locks or tags shall be removed only by the persons who installed them or, if such persons are unavailable, by persons authorized by the operator or his agent.

(g) Periodic examinations; maintenance; records; accessibility

All electric equipment shall be frequently examined, tested, and properly maintained by a qualified person to assure safe operating conditions. When a potentially dangerous condition is found on electric equipment, such equipment shall be removed from service until such condition is corrected. A record of such examinations shall be kept and made available to an authorized representative of the Secretary and to the miners in such mine.

(h) Electrical conductors

All electric conductors shall be sufficient in size and have adequate current-carrying capacity and be of such construction that a rise in temperature resulting from normal operation will not damage the insulating materials.

(i) Electrical connections

All electrical connections or splices in conductors shall be mechanically and electrically efficient, and suitable connectors shall be used. All electrical connections or splices in insulated wire shall be reinsulated at least to the same degree of protection as the remainder of the wire.

(j) Cables and wires; entry through metal frames

Cables shall enter metal frames of motors, splice boxes, and electric compartments only through proper fittings. When insulated wires other than cables pass through metal frames the holes shall be substantially bushed with insulated bushings.

(k) Support of power wires

All power wires (except trailing cables on mobile equipment, specially designed cables conducting high-voltage power to underground rectifying equipment or transformers, or bare or insulated ground and return wires) shall be supported on well-insulated insulators and shall not contact combustible material, roof, or ribs.

(l) Insulation of power wires; exceptions

Power wires and cables, except trolley wires, trolley feeder wires, and bare signal wires, shall be insulated adequately and fully protected.

(m) Circuit breakers; overload protection for three-phase motors

Automatic circuit-breaking devices or fuses of the correct type and capacity shall be installed so as to protect all electric equipment and circuits against short circuit and overloads. Three-phase motors on all electric equipment shall be provided with overload protection that will de-energize all three phases in the event that any phase is overloaded.

(n) Disconnecting switches for main power circuits; location and installation

In all main power circuits, disconnecting switches shall be installed underground within

five hundred feet of the bottoms of shafts and boreholes through which main power circuits enter the underground area of the mine and within five hundred feet of all other places where main power circuits enter the underground area of the mine.

(o) Switches

All electric equipment shall be provided with switches or other controls that are safely designed, constructed, and installed.

(p) Lightning arresters

Each ungrounded, exposed power conductor that leads underground shall be equipped with suitable lightning arresters of approved type within one hundred feet of the point where the circuit enters the mine. Lightning arresters shall be connected to a low resistance grounding medium on the surface which shall be separated from neutral grounds by a distance of not less than twenty-five feet.

(q) Nonapproved devices

No device for the purpose of lighting any coal mine which has not been approved by the Secretary or his authorized representative shall be permitted in such mine.

(r) Deenergizing of electric face equipment

An authorized representative of the Secretary may require in any mine that electric face equipment be provided with devices that will permit the equipment to be deenergized quickly in the event of an emergency.

(Pub. L. 91-173, title III, §305, Dec. 30, 1969, 83 Stat. 775.)

REFERENCES IN TEXT

For the operative date of this subchapter, referred to in subsecs. (a)(1), (2), (4) to (6), (10)(B), (C), (11), (12), and (c), see section 509 of Pub. L. 91-173, set out as an Effective Date note under section 801 of this title.

§ 866. Trailing cables

(a) Requirements established for flame resistant cables

Trailing cables used in coal mines shall meet the requirements established by the Secretary for flame-resistant cables.

(b) Circuit breakers; markings and visual observation of position of disconnection devices

Short-circuit protection for trailing cables shall be provided by an automatic circuit breaker or other no less effective device approved by the Secretary of adequate current-interrupting capacity in each ungrounded conductor. Disconnecting devices used to disconnect power from trailing cables shall be plainly marked and identified and such devices shall be equipped or designed in such a manner that it can be determined by visual observation that the power is disconnected.

(c) Distribution center junctions; safety connections

When two or more trailing cables junction to the same distribution center, means shall be provided to assure against connecting a trailing cable to the wrong size circuit breaker.

(d) Temporary splices; usable period; exceptions; quality

One temporary splice may be made in any trailing cable. Such trailing cable may only be used for the next twenty-four hour period. No temporary splice shall be made in a trailing cable within twenty-five feet of the machine, except cable reel equipment. Temporary splices in trailing cables shall be made in a workmanlike manner and shall be mechanically strong and well insulated. Trailing cables or hand cables which have exposed wires or which have splices that heat or spark under load shall not be used. As used in this subsection, the term "splice" means the mechanical joining of one or more conductors that have been severed.

(e) Permanent splices; quality

When permanent splices in trailing cables are made, they shall be—

- (1) mechanically strong with adequate electrical conductivity and flexibility;
- (2) effectively insulated and sealed so as to exclude moisture; and
- (3) vulcanized or otherwise treated with suitable materials to provide flame-resistant qualities and good bonding to the outer jacket.

(f) Clamping of cables

Trailing cables shall be clamped to machines in a manner to protect the cables from damage and to prevent strain on the electrical connections. Trailing cables shall be adequately protected to prevent damage by mobile equipment.

(g) Making and breaking of connections to junction boxes

Trailing cable and power cable connections to junction boxes shall not be made or broken under load.

(Pub. L. 91-173, title III, §306, Dec. 30, 1969, 83 Stat. 779.)

§ 867. Grounding of equipment**(a) Metallic enclosed power conductors; metallic frames and other equipment; methods**

All metallic sheaths, armors, and conduits enclosing power conductors shall be electrically continuous throughout and shall be grounded by methods approved by an authorized representative of the Secretary. Metallic frames, casings, and other enclosures of electric equipment that can become "alive" through failure of insulation or by contact with energized parts shall be grounded by methods approved by an authorized representative of the Secretary. Methods other than grounding which provide no less effective protection may be permitted by the Secretary or his authorized representative.

(b) Frames of offtrack direct current machines; enclosures of related detached components

The frames of all offtrack direct current machines and the enclosures of related detached components shall be effectively grounded, or otherwise maintained at no less safe voltages, by methods approved by an authorized representative of the Secretary.

(c) Stationary high-voltage equipment powered by underground delta systems

The frames of all stationary high-voltage equipment receiving power from ungrounded

delta systems shall be grounded by methods approved by an authorized representative of the Secretary.

(d) Repairs of high-voltage lines; exceptions

High-voltage lines, both on the surface and underground, shall be deenergized and grounded before work is performed on them, except that repairs may be permitted, in the case of energized surface high-voltage lines, if such repairs are made by a qualified person in accordance with procedures and safeguards, including, but not limited to a requirement that the operator of such mine provide, test, and maintain protective devices in making such repairs, to be prescribed by the Secretary prior to the operative date of this subchapter.

(e) Deenergizing of underground power circuits on idle days; exceptions

When not in use, power circuits underground shall be deenergized on idle days and idle shifts, except that rectifiers and transformers may remain energized.

(Pub. L. 91-173, title III, §307, 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.

§ 868. Underground high-voltage distribution**(a) Circuits entering underground areas of mines; circuit breakers**

High-voltage circuits entering the underground area of any coal mine 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 overcurrent.

(b) Circuits extending underground and supplying equipment; direct neutral grounds; ground conductors for frames, exceptions; location of disconnection devices, exceptions

High-voltage circuits extending underground and supplying portable, mobile, or stationary high-voltage equipment shall contain either a direct or derived neutral which shall be grounded through a suitable resistor at the source transformers, 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 high-voltage equipment supplied power from that circuit, except that the Secretary or his authorized representative may permit ungrounded high-voltage circuits to be extended underground to feed stationary electrical equipment if such circuits are either steel armored or installed in grounded, rigid steel conduit throughout their entire length, and upon his finding that such exception does not pose a hazard to the miners. Within one hundred feet of the point on the surface where high-voltage circuits enter the underground portion of the mine, disconnecting devices shall be installed and so equipped or designed in such a manner that it