

No. 8

AN ACT

HB 1429

Amending the act of July 17, 1961 (P.L.659), entitled "An act relating to bituminous coal mines; amending, revising, consolidating and changing the laws relating thereto; providing for the health and safety of persons employed in and about the bituminous coal mines of Pennsylvania and for the protection and preservation of property connected therewith; prescribing powers and duties in connection therewith; prescribing penalties; and repealing existing laws," further providing for electrical inspectors; certain definitions; protection against shock; switches, fuses and circuit breakers; underground power supply; electrical face equipment; inspection of equipment; grounding; underground illumination; telephones and signalling; trolley installation; outdoor substations, and load and distribution centers.

The General Assembly of the Commonwealth of Pennsylvania hereby enacts as follows:

Section 1. Section 106; clauses (18) and (24) of section 302; section 304; subsections (a) and (b) of section 311; subsections (c) and (e), clause (2) of subsection (g) and subsections (h) and (j) of section 313; subsections (a) and (b), clauses (1), (6) and (8) of subsection (d) and subsections (e) and (g) of section 316; subsection (a) of section 317; subsection (d) of section 320; and subsection (g) of section 321, act of July 17, 1961 (P.L.659) known as the "Pennsylvania Bituminous Coal Mine Act," are amended to read:

Section 106. Electrical Inspectors.—On or after the effective date of this act, the secretary, with the consent and approval of the Governor, shall appoint such certified electrical inspectors as he may deem necessary to inspect at least twice a year all electrical equipment used in [gassy] bituminous coal mines, and to perform such other inspections of electrical equipment in and around the bituminous coal mines of the Commonwealth as may be deemed necessary by the secretary.

Section 302. Definitions.—As used in this article, the following words and terms shall have these meanings:

* * *

(18) "Flame-resistant cable [, portable]"—A flame-resistant cable is a [portable] cable that has met the department requirements for flame resistance and has been assigned an approved number (P-number). *All flame-resistant cables used underground shall have the "P" number embossed or indented on the jacket at intervals not to exceed twelve feet.*

* * *

(24) "Mine power center"—A mine power center is a combined transformer and distribution unit, *and may include a rectifier*, complete within a metal enclosure, from which one or more low-voltage or medium-voltage power circuits are taken.

* * *

Section 304. Protection against Shock.—*Mats of rubber, insulated*

platform or other suitable insulating materials shall be provided at all stationary transformers, rectifiers, motors, generators and their controls, except portable and mobile equipment. Gloves or mats of rubber or other suitable insulating material shall be provided by the operator and used by qualified persons so engaged when repairs are made to the energized parts of any electrical apparatus, or when the energized parts of electrical apparatus have to be handled for the purpose of adjustment.

Section 311. Switches, Fuses and Circuit Breakers.—(a) Fuses and automatic circuit breakers shall be so constructed as to effectively interrupt the current on short circuit, or when the current through them exceeds a predetermined value. Open type fuses shall be provided with terminals. Circuit breakers shall be of adequate interrupting capacity [**adjustable to trip from fifty percent to one hundred and fifty percent of their normal rated capacity**].

(b) Circuit breakers used to protect feeder circuits shall be set to trip when the current exceeds by more than fifty percent the [**current carrying**] *rated* capacity of the feeder. In case the feeder is subjected to overloads sufficient to trip the circuit breaker, but of short duration, the circuit breaker may be equipped with a device which will prevent its acting unless the overload persists for a longer period than ten seconds. Trip current shall be indicated at the circuit breaker.

* * *

Section 313. Underground Power Supply.—* * *

(c) Cables in Shafts, Slopes, and Boreholes. (1) All cables passing underground through inclines, boreholes and shafts shall be installed in a manner that will prevent undue strain in sheath, insulation or conductors and damage by chafing of cables against each other or against the borehole casing or shaft. All *ungrounded* power conductors in shafts, boreholes and inclines shall be covered with suitable insulating materials and installed to provide a minimum tensile factor of safety of five. Conductors shall be securely fastened and properly supported out of contact with combustible materials. When the weight, length and construction of a cable are such that suspension from its upper end only would subject the cable to possible damage, it shall be supported at intervals necessary to prevent undue strains in the sheath, insulation, and conductors, and to provide a minimum tensile factor of safety of five. Adequate protection shall be provided so that no damage can result from water, electrolysis, moving cages, skips, ice, coal or other falling or moving materials.

(2) Installation of direct-current and [**high voltage**] alternating-current cables *carrying in excess of twenty-five kilowatts* in the same borehole shall require approval of the secretary.

* * *

(e) Braid Covered Cable [(**Weatherproof**)]. (1) No power wires or cables having what is commonly termed as weatherproof insulation or

insulation consisting of braided covering, which is susceptible to moisture absorption from the outer surface to the conductor shall be installed in any mine.

(2) *All insulated power cables purchased for use in any mine after the effective date of this act shall be protected by a flame-resistant jacket and assigned a "P" number unless either armored or installed in rigid steel conduit, a metal enclosure, or a fireproof room.*

* * *

(g) Cables [in Haulage Roads] *Underground.* * * *

(2) Cables and wires, except [fire resistant, metallic covered or ground shielded cables] *trailing or portable cables or bare return cables* shall be installed on roof, ribs, walls or timbers by means of efficient insulators *or suitable supports*. In no instance shall the method of support damage the cable jacket or armor.

* * *

(h) Branch Circuit Protection. When the potential of a branch circuit exceeds the limit of medium voltage, it shall be protected by a circuit breaker, *except as otherwise permitted under section 331, subsection (h)*. Such circuit breaker shall be equipped with an automatic overload trip arranged to open simultaneously each ungrounded power carrying conductor. Provision for positive disconnection of the branch circuit shall be included.

* * *

(j) Fireproof Rectifiers and Transformers. A portable rectifier with dry type transformer, except those using pumped tubes or glass bulb mercury arc tubes, or dry type transformer designed for underground use with adequate automatic electrical protection and substantially of fireproof construction, fully metal-clad, which will not be in the same location in excess of one year, may be installed in any intake air current, not beyond the last open crosscut and not closer than [five hundred feet from] *two hundred and fifty feet along the air route to pillar workings*. The location where such fireproof rectifier or transformer is installed need not be made fireproof with masonry or steel, but shall be equipped with doors, grillwork or otherwise to prevent entry or access by unauthorized persons.

Section 316. Electrical Face Equipment.—(a) Voltage Restriction. Motors of electrical face equipment shall not be operated at higher than medium voltage, *except as approved by the secretary under section 334 and* except those on hand held tools which shall be restricted to low voltage.

(b) Grounding. The frame of all off-track face equipment shall be effectively grounded through a safety ground conductor in its trailing cable, *or by an approved grounding device.*

* * *

(d) Trailing Cables. (1) Trailing cables for face equipment shall be

safely and efficiently insulated [by a] *and constructed with an outer sheath or jacket of flame resistant material.* They shall be approved by the secretary.

* * *

(6) No more than five temporary splices shall be made in any trailing cable. After the fifth such splice is made, the cable shall be changed before the machine is operated on the following shift. Trailing cables on equipment without cable reels shall have no temporary splices within fifty feet of the machine before the machine is operated on the following shift. *Cable jacket repairs not involving conductors or conductor insulation are not considered temporary splices.*

* * *

(8) Trailing cables on off-track equipment, *not provided with an approved grounding device,* shall contain a safety ground conductor which shall be solidly connected to the machine frame. *A ground continuity test of the cable on each machine shall be made upon completion of each temporary splice in that cable. Cables found to contain defective grounds shall be repaired before use or replaced.* The safety ground conductor shall have a cross sectional area of at least fifty percent of that of a single power conductor unless used with ground trip protective systems employing ground fault current limiting devices in which case a smaller safety ground may be used.

(e) Motors. In [any gassy mine,] *all mines,* all electrical equipment in use inby the last open crosscut shall have all their current carrying parts completely enclosed in explosion-proof enclosures. This shall not include trailing cable, except where terminated, and shall not include flexible cable as required between motors, controllers, terminal boxes and other auxiliaries. These enclosures shall not be opened except by an authorized person, and then only when the power is switched off. The power shall not be switched on while the enclosures are open.

* * *

(g) Explosion Tested Compartments. All explosion tested compartments shall be properly secured with cover clearance tolerances not exceeding four one-thousandths of an inch. Packing glands shall be correctly assembled and the packing compressed by a packing nut tightened to within *no less than* one-eighth of an inch of its seat.

* * *

Section 317. Inspection of Equipment.—(a) All [enclosed motors used underground] *electrical face equipment* shall be [opened and thoroughly] inspected by the mine electrician or person designated by him at least once every ten operating days, and, where necessary, shall then be cleaned and repaired. [Enclosed switches shall be opened and inspected at least once a month.]

* * *

Section 320. Underground Illumination.—* * *

(d) Electric lamps, when used in face areas of [gassy mines] *any mine*, shall be installed in explosion-proof enclosures.

* * *

Section 321. Telephones and Signalling.—* * *

(g) In the face areas of [a gassy mine,] *any mine*, the potential used for signal purposes shall not exceed twenty-four volts, and bare wires shall not be used for signal circuits, except on haulage roads.

* * *

Section 2. Section 322 of the act is amended by adding at the end thereof, two new subsections to read:

Section 322. Grounding.—* * *

(c) *Rectifier diodes used at any bituminous coal mine shall be connected to the supply circuit through an isolating winding in order that isolation between alternating current and direct current systems is effected.*

(d) *The initial installation of rectifiers at any bituminous coal mine shall have the approval of the district mine inspector and the district electrical inspector before being energized.*

Section 3. Subsection (b) of section 326 of the act is amended to read:

Section 326. Trolley Installation.—* * *

(b) In [gassy] *all* mines, trolley and feeder wires shall not extend beyond the last open crosscut and shall be kept at least one hundred and fifty feet from open pillar workings.

* * *

Section 4. Section 330 of the act is amended by amending the introductory paragraph and clauses (4) and (9), and by adding after clause (9), a new clause to read:

Section 330. Outdoor Substation.—The outdoor substation shall be built in accordance with current [American Institute of Electrical Engineers'] *Institute of Electrical and Electronics Engineers'* standards and shall include—

* * *

(4) Transformer bank to convert the incoming or primary voltage to the transmission voltage. The use of auto-transformers for this purpose is prohibited. Secondary or underground transmission voltage shall not exceed [seven thousand two hundred volts,] *fifteen thousand volts*, nominal, phase to phase. The transformer may be connected delta-wye, wye-delta, or delta-delta. Wye-wye connections shall not be used because of voltage instability under some conditions of load. In the event that the secondary winding is delta-connected, the neutral necessary for the four-wire transmission circuit shall be derived by use of a three-phase “zig-zag” or grounding transformer. Where such grounding transformers are used, they shall be of sufficient capacity to carry maximum ground fault current continuously. Should the substation primary or supply voltage equal the mine transmission voltage, the main transformer bank may be

omitted and the "zig-zag" transformer used to derive a system neutral if one is not otherwise available.

* * *

(9) Neutral or primary ground bed located at least twenty-five feet away from the station ground at its closest point and to which shall be connected only the inby or load end of the neutral current limiting resistor. To prevent current transformer core saturation by stray direct current return currents, or neutral conductor damage, there shall be no direct or metallic connection between any point of the *high voltage* alternating current neutral circuit and the mine direct current ground.

(10) Ground bed resistance shall be measured at least every six months and appropriate action taken to assure the maintenance of the lowest possible value of ground resistance. A record of these resistance measurements shall be kept in a book provided for that purpose.

Section 5. Clauses (4) and (6) of section 332 are amended to read:

Section 332. Load Center.—Transmission voltage shall be reduced to machine utilization voltage by a portable transformer or load center of adequate capacity for the equipment powered by it. The transformer shall be of the dry type, ventilated, nonventilated, or sealed, substantially constructed and completely enclosed in a metal case. The metal enclosure shall be connected to the high voltage system ground conductor in the high voltage cable. Complete load center construction shall render it essentially fireproof. In addition to these requirements, the following shall be observed.

* * *

(4) The transformer secondary neutral, direct or derived, shall be connected to machine trailing cable safety ground conductors through a ground current limiting resistor capable of limiting ground fault current to twenty-five amperes or less. The inby side of this resistor shall be grounded to the load center frame *if no D.C. equipment powered from a common mine D.C. system can contact the frames of A.C. equipment powered by this load center. In the event there is a possibility of frame contact between A.C. equipment and D.C. equipment supplied from a common D.C. mine system, the inby side of this resistor may be insulated from the load center frame and shall be solidly connected to the D.C. ground system.*

* * *

(6) Load centers shall be located on intake air only. Load centers shall not be located beyond the last open crosscut and shall not be located closer than **[five hundred feet from]** *two hundred and fifty feet along the air route to pillar workings.*

Section 6. Section 333 of the act is amended by adding at the end thereof, a new subsection to read:

Section 333. Distribution Centers.—* * *

(d) A combined alternating and direct current distribution or load

center complete within a substantially fireproof metal enclosure, with a dry type transformer and solid state rectifier and adequate automatic electrical protection, may be used to distribute alternating and direct current utilization power. The power supply to this unit may be low, medium or high voltage. When high voltage is utilized, the requirements of section 332 shall apply. When medium or low voltage is utilized, section 333 shall apply. However, when an external D.C. distribution device is employed, the rectifier output may be taken through a main D.C. circuit breaker to that device without the use of a plug and receptacle system.

APPROVED—The 11th day of February, A. D. 1970.

RAYMOND P. SHAFER

The foregoing is a true and correct copy of Act of the General Assembly No. 8.



Secretary of the Commonwealth.