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OFFICE WEST VIRGINIA
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NOTICE OF AGENCY ADOPTION OF A PROCEDURAL OR INTERPRETIVE RULE OR A LEGISLATIVE RULE EXEMPT FROM LEGISLATIVE REVIEW

AGENCY: Board of Coal Mine Health and Safety TITLE NUMBER: 36

CITE AUTHORITY: 22A-6-1 et seq

RULE TYPE: PROCEDURAL _____ INTERPRETIVE _____

EXEMPT LEGISLATIVE RULE x

CITE STATUTE(s) GRANTING EXEMPTION FROM LEGISLATIVE REVIEW

22A-6-4

AMENDMENT TO AN EXISTING RULE: YES ____ NO x

IF YES, SERIES NUMBER OF RULE BEING AMENDED: _____

TITLE OF RULE BEING AMENDED: _____

IF NO, SERIES NUMBER OF RULE BEING PROPOSED: 48

TITLE OF RULE BEING PROPOSED: Rules and Regulations Governing High Voltage Continuous Miners

THE ABOVE RULE IS HEREBY ADOPTED AND FILED WITH THE SECRETARY OF STATE. THE EFFECTIVE DATE OF THIS RULE IS August 17, 2010

Authorized Signature

WEST VIRGINIA BOARD OF COAL MINE HEALTH AND SAFETY

1615 Washington Street, E. ▪ Charleston, West Virginia 25311 ▪ Telephone 304-558-1425 ▪ Fax 304-558-6091

FINAL REGULATIONS

To: All persons interested in Rules and Regulations constructed by the Board of Coal Mine Health and Safety

From: Joel L. Watts, Administrator – BCMH&S

Subject: Rules and Regulations Governing High Voltage Continuous Miners Title 36, section 48

Filed Date: 16 August 2010

End Date for Comments: 17 August 2010

Authority: §22.6.1

The Board of Coal Mine Health and Safety hereby promulgates a previously proposed regulation regarding the governing of high voltage continuous miners. The proposed rule was sent out for a comment period, which has sense expired. By the authority granted to the Board by the Legislatures in 22A-6-1, *et seq.*, the Board reexamined the proposed rule, suspended the need for a comment period, and directed the Administrator to file the rule with all haste, effective immediately. The rule expresses deals with high voltage continuous miners in underground coal mines, providing additional rules of operation for an added measure of safety.

36 CSR 48

TITLE 36
LEGISLATIVE RULES
BOARD OF COAL MINE HEALTH AND SAFETY

SERIES 48
RULES AND REGULATIONS GOVERNING HIGH VOLTAGE CONTINUOUS MINERS

§ 36-48-1. General.

1.1 Scope. To govern electrical safety standards that apply to high-voltage continuous miners

1.2 Authority. W. Va. Code §§ 22A-6-1 *et seq.*

1.3 Filing Date. 16 August 2010

1.4 Effective Date. 17 August 2010

§ 36-48-2. Effect of Law and Regulations.

2.1 These regulations shall have the effect of law and violations shall be deemed a violation of law and so cited with the same effect as law.

§ 36-48-3 High Voltage Protection

(a) The nominal voltage of power circuits shall not exceed 2,400 volts.

(b) The nominal voltage of the control circuits shall not exceed 120 volts.

(c) The ground-fault current shall be limited by a neutral grounding resistor to not more than 0.5 ampere. Current transformers used for the ground-fault protection shall be the single-window type and shall be installed to encircle all three-phase conductors.

(d) The trailing cable for the 2,400-volt continuous miner circuit shall be provided with instantaneous ground-fault protection set at not more than 0.125 ampere. The ground-fault protection device shall be equipped with an impedance measuring feature, "Look-Ahead" circuit, to guard against closing the circuit breaker on a circuit that has an existing ground-fault condition.

(e) The neutral grounding resistor shall be provided with backup ground fault protection that will de-energize the primary of the transformer if a ground fault occurs with the neutral grounding resistor open. This protection shall be set at 40% of the maximum voltage that could appear across the neutral grounding resistor during a ground fault. A time delay set at the lowest practical value that permits reliable coordination shall be permitted. The time delay shall not exceed 0.250 second.

(f) The neutral grounding resistor for the transformer supplying power to the 2,400-volt continuous miner shall be provided with thermal protection that will de-energize the

incoming high-voltage circuit supplying power to the power center if the grounding resistor is subjected to a sustained ground-fault. The thermal protection shall operate at either 50 percent of the maximum temperature rise of the grounding resistor, or 150^0 C (302^0 F), whichever is less. The thermal protection shall not be dependent upon control power and may consist of a current transformer and overcurrent relay in the grounding resistor circuit.

(g) The trailing cable for the continuous miner shall be provided with instantaneous short-circuit protection set at no more than the setting specified in the continuous miner approval documentation or 75 percent of the minimum phase-to-phase short-circuit current available at the continuous miner, whichever is less.

(h) The short-circuit protective device shall contain no intentional time delay and shall be based on the maximum asymmetrical starting current or have a time delay of no more than 0.05 seconds and be based on the maximum symmetrical starting current. The time delay settings shall not exceed the settings specified in the approval documentation.

(i) Guarding made of grounded metal or nonconductive flame-resistant material shall be provided to minimize the possibility of miners contacting the high-voltage trailing cable and to protect the high-voltage trailing cable from damage. The high-voltage trailing cable shall be installed on well insulated insulators or guarded at the following locations:

(1) The high-voltage trailing cable shall be guarded at the power center cable coupler for a distance of 10 feet.

(2) The high-voltage trailing cable shall be installed on well insulated insulators from the power center to the last open crosscut and shall be guarded at any location on the working section where it may be damaged by moving equipment. That portion of the trailing cable that is located in or inby the last open crosscut shall be hung when other equipment cables must cross the high-voltage trailing cable.

(3) The high-voltage trailing cable shall be provided with a guard that extends from the high-voltage miner cable entrance gland for a distance of a minimum of 10 feet.

§ 36-48-4 Cable Crossings

(1) When equipment must cross any portion of the cable, the cable must either be suspended from the roof or protected by a cable crossover having the following specifications:

(1) Have a minimum length of 33 inches;
(2) Have a minimum width of 17 inches;
(3) Have a minimum height of 3 inches;
(4) Have a cable placement area that is a minimum of two and one half inches (2 1/2") high by four and one quarter inches (4 1/4") wide;
(5) Use nonconductive material for the crossover;
(6) Made of material with a distinctive color. The color black shall not be used;
(7) Made of material that has a minimum compressive strength of 6,400 per square inch (psi)

§ 36-48-5 Splices and Repairs

(a) Splices and repairs in high-voltage trailing cables shall be made only by a certified electrician or an apprentice electrician under the immediate supervision of a certified electrician who has received hands-on training in the proper methods of splicing and repairing these high-voltage trailing cables.
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(1) Splice means the mechanical joining of one or more severed conductors in a single length of cable including replacement of: insulation, semi-conductive tape, metallic shielding, and outer jacket(s).

(2) Repair means to fix damage to any component of the cable other than the conductor.
(b) Each splice or repair made underground in a high-voltage trailing cable shall be made in a workman-like manner and in accordance with the instructions of the manufacturer of the repair materials.
(c) Temporary and/or permanent tape type splices in any high-voltage trailing cable is prohibited. Only MSHA approved permanent high-voltage splice kits containing outer jacket boots or wrap type outer jackets, either heat and/or cold application types, will be acceptable.
(d) Only four (4) permanent splices will be allowed at any one time for the portion of the high-voltage trailing cable that extends from the continuous miner outby for a distance of 300 feet. Splicing of the high-voltage trailing cable within 35 feet of the continuous miner is prohibited.

§ 36-48-6 High Voltage Trailing Cables

(a) The high-voltage trailing cable shall be designed as follows:

(1) A 100 percent semi-conductor tape shielding over each insulated power conductor;

(2) A grounded metallic braid shielding over each insulated power conductor;

(3) A ground-check conductor not smaller than a number 10 A.W.G.; or if a center ground-check conductor is used, not smaller than a number 16 A.W.G. stranded conductor; and

(4) Either a double-jacket or single-jacket as follows:

(a) A double-jacketed cable consisting of reinforced outer and inner protective layers. The inner layer must be a distinctive color from the outer layer. The color black shall not be used for either of the two protective insulation layers. The tear strength must be more than 40 pounds per inch thickness and tensile strength must be more than 2,400 pounds per square inch.
(b) A single-jacketed cable. The cable jacket must not be black. The tear strength must be more than 100 pounds per inch thickness and tensile strength must be more than 4,000 pounds per square inch.

§ 36-48-7 Examinations

(a) Frequency of examination; record keeping:

(1) Once each production shift a certified electrician shall de-energize and inspect the entire length of the high-voltage trailing cable from the section power center to the continuous miner. The inspection shall include inspecting the integrity of the outer jacket of the high-voltage trailing cable, all permanent splices, and those areas where protective guarding is required.

(2) At least once every seven days, a person qualified must test and examine high-voltage continuous mining machines to determine that electrical protection, equipment grounding, permissibility, cable insulation, and control devices are being properly installed and maintained.

(3) At least once every seven days, a certified electrician must activate the ground-fault test circuit to verify that it will cause the corresponding circuit-interrupting device to open.

(4) At least once every seven days, a certified electrician must examine and test each high-voltage continuous mining machine ground-wire monitor circuit to verify that it will cause the corresponding circuit-interrupting device to open.

(5) Record of Tests

(a) At the completion of examinations and test required under Items (1), (2), (3), and (4) of this section, the person conducting the examinations and tests must:

(i) Certify by signature and date that the examinations and tests have been conducted.

(ii) Make a record of any unsafe condition found.

(b) Any corrective action(s) must be recorded by the person taking the corrective action.

(c) The record must be countersigned by the mine foreman or equivalent mine official by the end of the mine foreman's or the equivalent mine official's next regularly scheduled working shift.

(d) Records must be maintained in a secure book that is not susceptible to alteration or electronically in a computer system so as to be secure and not susceptible to alteration.

(e) Certifications and records must be kept for at least 1 year and must be made available for inspection by authorized representatives of the Secretary and representatives of miners.

(6) When examinations or tests of equipment reveal a risk of fire, electrical shock, ignition or operational hazard, the equipment must be immediately removed from service or repaired.

§ 36-48-8 Test Circuits

(a) Each ground-fault current device shall be provided with a test circuit that will inject a current of 50 percent or less of the current rating of the grounding resistor and cause each corresponding circuit interrupting device to open. The test circuit shall not subject the equipment to an actual phase-to-phase ground fault.

(b) All components that provide short-circuit protection shall have an interruption rating in accordance with maximum short-circuit currents available inby that circuit interrupting device(s), and shall be rated for the maximum phase-to-phase voltage of the circuit.
(c) High-voltage circuits shall be protected against short-circuits, overloads, ground faults, and undervoltage by a circuit interrupting device of adequate interrupting capacity.
(d) The miner high-voltage trailing cable shall be provided with undervoltage protection which operates on loss of voltage to cause and maintain the interruption of power to the circuit to prevent automatic restarting of the equipment.
(e) Circuit interrupting devices shall not reclose automatically.

§ 36-48-9 Disconnecting Devices

(a) The section power center shall be equipped with a main disconnecting device installed to de-energize the primary of all transformers supplying high-voltage power when the device is in the open position. The high-voltage trailing cable extending to section equipment shall be equipped with a disconnecting device installed to de-energize the trailing cable when the device is in the open position.

> (1)The power center must be equipped with an externally accessible emergency stop switch hard wired into the incoming ground-wire monitor circuit that de-energizes the incoming high-voltage power circuit to the section power center in the event of an emergency.

(b) The compartment for the disconnect device and the compartment(s) that provide access to energized conductors or parts shall be provided with caution label(s) to warn miners against entering the compartment(s) before de-energizing and grounding the high-voltage circuits and before any capacitor storage devices located within the compartment(s) have been discharged and grounded. A grounding device for discharging capacitor storage devices shall be provided and stored in a dry location. A label shall be installed and maintained at the grounding device storage location to readily identify its location.
(c) Disconnecting devices shall be rated for the maximum phase-to-phase voltage of the circuit in which they are installed, and shall be rated for the full load current of the circuit that is supplied power through the device.
(d) Each disconnecting device shall be designed, installed and maintained so that--

> (1) It can be determined by visual observation that the contacts are open without removing any cover;
> (2) All load power conductors can be grounded when the device is in the "open" position; and

(3) The device can be locked in the "open" position.

(4) If a cable coupler is used as the disconnecting device. A clearly identified grounding receptacle must be provided. The conductors in the high-voltage cable must be connected to the grounded frame of the metallic power center enclosure by means of the grounding receptacle. A lockout device will be provided to lock the cable coupler to the grounding receptacle. A dust cover shall be placed on the power receptacle from which the cable was disconnected.

(e) Disconnecting devices, except those installed in explosion-proof enclosures, shall be capable of interrupting the full-load current of the circuit or designed and installed to cause the current to be interrupted automatically prior to the opening of the contacts of the device.

(f) Disconnecting devices installed in explosion-proof enclosures shall be maintained in accordance with the approval documentation.

§ 36-48-10 Signage

(a) An identification sign shall be located near each high voltage visible disconnect device at the power center providing power directly to the high voltage continuous mining machine.

§ 36-48-11 Control Circuits and Barriers

(a) The control circuit for the power center shall be interlocked with the primary disconnecting device in the power center so that:

(1) When the primary disconnecting device is in the open position, the control circuit can only be powered through an auxiliary switch in the test position; and

(2) When the primary disconnecting device is in the closed position, the control circuit can be powered only through an auxiliary switch in the normal position.

(b) Each cover or removable barrier providing access to energized high-voltage conductors or parts must be equipped with at least two interlock switches. Removal of any of these covers must automatically de-energize the incoming high-voltage to the power center.

(c) The control circuit of each 2400-volt output circuit shall be located in a properly dead fronted compartment. Trouble shooting or testing shall be able to be performed in the control circuit compartment without exposing miners to high-voltage conductors or parts.

(d) Barriers shall be provided and covers shall be arranged so that miners can work in the 2400-volt section of the power center without being exposed to any energized high-voltage conductors or parts, including capacitors, when the primary disconnect switch is in the open and grounded position.

(e) Barriers shall be provided and covers shall be arranged so that miners can test and troubleshoot low and medium voltage circuits without being exposed to any energized high-voltage conductors or parts, including capacitors, regardless of the position of the primary disconnect switch.

§ 36-48-12 Trouble-shooting

(a) Trouble-shooting and testing of energized circuits shall be limited to the following:

(1) Trouble-shooting and testing of energized circuits shall only be conducted on low and medium voltage circuits; and

(2) Trouble-shooting and testing of energized low- or medium-voltage circuits and equipment shall only be performed by persons certified to perform electrical or an apprentice electrician under the immediate supervision of a certified electrician. These persons shall wear rubber insulating gloves rated at least for the

nominal voltage of the low- or medium-voltage circuit or equipment while trouble-shooting or testing.

(b) Any on-board ungrounded, three-phase power circuit must be equipped with a light that will indicate a grounded-phase condition. The indicator light must be installed so that it can be observed by the continuous mining machine operator from any location the machine is normally operated. The machine must have a test circuit for the indicator light circuit to ensure that the circuit is operating properly. The test circuit must be designed so that when activated, it does not require removal of any electrical enclosure cover or create a double-phase to ground fault. A test circuit for the ground-fault indicator system shall be provided and a functional test of the system shall be conducted at least every seven (7) days. The test circuit shall be wired in a manner that the circuit cannot be bypassed. When the ground –fault indicator light indicates a ground fault on any of the ungrounded circuits, the following maintenance procedures shall be implemented.

(1) The continuous miner shall only be trammed to a well supported area; and

(2) The ground-fault shall be located and corrected prior to the continuous miner being placed back into operation.

(c) Each output circuit from the section power center shall be equipped with a MSHA approved ground-wire monitoring device. Each receptacle shall be interlocked with the ground wire monitor circuit such that the circuit interrupting device will open when the trailing cable is disconnected from the power center receptacle.

(d) Each ground-wire monitor and associated circuits shall be examined and tested at least weekly to verify proper operation and to verify that it will cause the circuit interrupting device to open.

(e) Before any electrical work (including testing, troubleshooting, and fault finding) is performed inside any compartment of the section power center containing high-voltage components or parts, including capacitors, person(s) with electrical certification to perform high-voltage work shall determine that the contacts of the primary disconnect device in the power center are open and grounded, shall lock-out and tag the primary disconnect device, and shall assure that all 2400-volt capacitors have been discharged and grounded.

(f) Before any electrical work (including testing, troubleshooting, and fault finding) is performed on any trailing cable or piece of section mining equipment supplied power by a trailing cable from the section power center, a certified electrician qualified to perform high-voltage work shall determine that the contacts of the secondary disconnect device are open and grounded, and shall lock-out and tag the secondary disconnect device.

(g) Each person who is to perform work on the circuit or equipment must install a lockout device and shall be clearly identified on a tag that is attached to the visual disconnecting device. In cases of high voltage work each person must confirm that circuits are properly grounded.

(h) Each padlock(s) and tag shall be removed only by the person(s) who installed them, except that if that person is unavailable, the lock and tag may be removed by a person authorized by the operator provided that the authorized person is qualified to perform electrical work on high-voltage circuits and equipment as required and that the authorized person determines that the removal of the lock and tag does not pose a hazard to miners.

(i) Trouble-shooting and testing shall only be performed to determine voltage or current waveforms. Electrical work such as changing parts , repairing parts, tightening electrical connections or devices in energized panels or working on energized cables is prohibited.

§ 36-48-13 Trailing Cables

(a) During normal operations of making unit power moves, either advancement or retreat or when it becomes necessary to move additional slack high-voltage trailing cable from the power center to the last open crosscut, the high-voltage cable shall be deenergized, locked and tagged out, prior to the high-voltage trailing cable being handled or a unit power move is made.
(b) The 2400-volt continuous miner trailing cable shall only be connected to the working section power center. With the exception of the continuous miner trailing cable, handling of any other energized high-voltage power cable in the mine is prohibited.
(c) All electrical protective equipment used to handle energized high-voltage trailing cables shall be provided by the mine operator.
(d) Miners shall not handle or move the energized high-voltage trailing cables unless they are wearing properly tested, Class 1 rated insulated gloves (minimum 7500-volts rating). Miners must not handle energized high-voltage cables with any parts of their bodies except by hand and with the proper high voltage equipment.
(e) Other electrical protective equipment such as, tongs or hot sticks may be used in conjunction with the properly rated insulated gloves while handling the energized high-voltage trailing cable if the protective equipment is rated to withstand at least 7,500 volts, designed and manufactured for cable handling, is not damaged or defective.

§ 36-48-14 Protective Equipment

(a) Electrical personal protective equipment shall be visually inspected before each use for signs of damage or defects.
(b) Rubber gloves shall be examined and tested before each use to ensure their effectiveness, and electrically tested every thirty days in accordance with publication ASTM F496-02a.

(1)The rubber glove portion must be air-tested at the beginning of each shift to ensure its effectiveness.

(2) Both the leather protector and rubber insulating gloves must be visually examined before each use for signs of damage or defects.

(3) Damaged rubber gloves must be removed from the underground area of the mine or destroyed. Leather protectors must be maintained in good condition or replaced.

(c) Damaged or defective protective equipment shall not be used and shall be destroyed immediately and removed from the mine by the completion of the shift on which the equipment was found to be defective.
(d) Personal protective equipment shall be electrically tested and stored in accordance with a nationally recognized standard, such as ASTM 496-91.

§ 36-48-15 Inspection

(a) Each ground-fault test circuit shall be actuated weekly by a certified electrician or an apprentice electrician under the immediate supervision of a certified electrician qualified to perform electrical work on high-voltage circuits and equipment and this qualified person shall also activate the emergency stop button and verify that the corresponding devices open.
(b) The continuous mining machine(s) must not be used for cutting purposes or operated in the mining and production of coal until after The Office of Miners' Health, Safety and

Training has inspected the equipment and procedures and determined both are in compliance with all the terms and conditions of this regulation

§ 36-48-16 Training

(a) Prior to using the high-voltage continuous miner system, training shall be conducted for all qualified persons on the proper testing procedures to be utilized. All miners assigned to work in the area of the high-voltage trailing cable shall be instructed in the safety precautions for handling and use of high-voltage trailing cables. The training shall be "hands on" specific, and shall be incorporated into the annual refresher training plan for the mine.

(b) Specialized training for certified electricians will be required to repair, maintain and/or trouble-shoot the high-voltage trailing cable and equipment. This training shall focus on the requirements of this law and other applicable laws set forth by the State of West Virginia. The safety committee at the mine or other interested persons may monitor this training.

§ 36-48-17 Tramming

(a) Tramming the continuous mining machine in and out of the mine, and from section to section, must be done in accordance as follows:

(1) The power source must not be located in areas where permissible equipment is required;

(2) The continuous mining machine must not be used for mining or cutting purposes, except when powered by the approved high voltage power center.

(3) The energized high-voltage cable must be mechanically secured on-board the continuous mining machine, if applicable.

(4) Prior to tramming the continuous mining machine:

(5) A certified electrician must activate the ground-fault and ground-wire monitor test circuits of the power sources to ensure that the corresponding circuit-interrupting device opens the circuit.

(6) Corrective actions and recordkeeping resulting from these tests must be made.

(7) Where applicable, a certified electrician designated by the mine operator must activate the test circuit for the grounded-phase detection circuit on the continuous mining machine to ensure that the detection circuit is functioning properly. Corrective actions resulting from this test failure must be made.

(b) In addition, the following power sources may be used only to tram the continuous mining machine:

(1) A medium-voltage power transformer or a step up low to medium power transformer can be used to supply 995 volts through a trailing cable to the continuous mining machine. The medium-voltage power transformer or low to medium transformer must not be used to back-feed the high-voltage circuits of the continuous mining machine; and meet all applicable requirements for medium-voltage and low voltage.

(2) Alternate methods for tramming with power sources other than those listed are prohibited unless a permit is issued by the director or his authorized representative.

§ 36-48-18 Validation of Existing Waivers

(a) Upon the effective date of the enactment of this regulation all waivers previously granted for modifying West Virginia State Code 22A-2-40(80) by the Technical Review Committee for operation of high voltage miners will be null and void.

(b) All other existing standards in West Virginia State Mining Laws, Rules and Regulations or in Title 30 Code of Federal Regulations must also apply to these high voltage continuous miner circuits and equipment where appropriate.