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PART 5 FEES FOR TESTING, EVALUATION, AND APPROVAL OF MINING PRODUCTS

5.30 Fee Calculation

Waiver of Application Fee for Testing, Evaluation and Approval of Mining Products

Title 30, Code of Federal Regulations, Part 5 requires applicants to submit an application fee for each product approval action listed in the fee schedule which is subject to an hourly rate. That application fee is no longer required by MSHA.

Waiver of the application fee eliminates any potential delay in the initiation of processing approval actions. The waiver of this application fee will not reduce the total cost to the applicants seeking product approval. The final invoice issued by MSHA will include all costs for time expended.

Fee Estimate Provisions for Approval Applications

The Approval and Certification Center offers several pre-authorization options that an applicant may consider when submitting applications under 30 CFR Parts 7, 15 through 29, 33, 35, and 36. Preauthorization provides a mechanism for MSHA to begin evaluating or testing of the applicant's product prior to the fee estimate process. Examples of preauthorization available to the applicant include:

1. A preauthorization notice, authorizing MSHA to expend a stated amount of money in evaluating or testing the applicant's product while the MSHA fee estimate process proceeds, is submitted with the application. This will allow immediate evaluation work to begin if there are no other applications awaiting initial actions.

   After receipt of an application with attached pre-authorization, the Approval and Certification Center will provide an estimate of the total anticipated charges and continue with processing or cancel the action depending upon the applicant's response to the estimate letter. If the applicant chooses to cancel, fees will be charged for work performed up to the cancellation.

2. A statement authorizing MSHA to expend the necessary amount of money to process a specific application,

without a stated maximum, is submitted with the application. This statement permits work to begin immediately on the submitted application if there are no other applications awaiting initial action. The company will not receive an estimate letter for their application. At the conclusion of the investigation, the company will receive an invoice for the processing of the application.

3. A blanket authorization is a statement prepared by the applicant authorizing MSHA to expend the necessary amount of money to process all applications, without stated maximum, and is submitted with the application. This authorization permits work on all submitted applications to begin immediately if there are no others awaiting initial action. The company will not receive an estimate letter for any of their applications. At the conclusion of each investigation, the company will receive an invoice for processing that application.

PART 18 ELECTRIC MOTOR-DRIVEN MINE EQUIPMENT AND ACCESSORIES

Subpart A General Provisions

18.4 Electrical Equipment For Which Approval Will Be Issued

Interconnection of MSHA Evaluated Mine-Wide Monitoring Systems and MSHA-Approved Equipment

Section 18.4 of 30 CFR indicates that approval will be issued only for a complete electric machine. However, 30 CFR Section 18.20(b) indicates that all possible designs, circuits, arrangements, or combinations of components cannot be foreseen and that modifications to the requirements could be made to obtain the same degree of protection. Mine-Wide Monitoring System circuits connected to approved electric equipment in accordance with this policy are intrinsically safe. Therefore, the same degree of protection is provided for the approved machine with or without the interface to the MSHA-evaluated Mine-Wide Monitoring System.

When an electric cable(s) from an MSHA-classified barrier in an MSHA-Evaluated Mine-Wide Monitoring System terminates in an explosion-proof enclosure on MSHA-approved equipment, the following conditions shall be met:

1. The MSHA evaluation of the specified Mine-Wide Monitoring System shall include the condition of use that permits the system to be connected to MSHA-certified explosion-proof enclosures.

2. The interconnection of an MSHA-evaluated Mine-Wide Monitoring System and MSHA-approved electric equipment shall be documented on the drawings and specifications submitted by the applicant requesting approval of the electric equipment. When the interconnection results in a modification of existing permissible electric equipment and circuitry within the permissible electric equipment, such modification shall be documented by the operator under an acceptable Field Modification Application or by the manufacturer under an Extension of Approval Application or the Stamped Notification Acceptance Program (SNAP).

3. Electric cables (data transmission lines from a blue outstation) within MSHA-certified enclosures shall be terminated at a classified barrier with a

classification that matches the classified barrier at the blue outstation. A Power Circuit (P.C.) barrier with a voltage in the enclosure is required when power circuits are monitored or power is obtained from within the MSHA-Certified enclosure.

When electric cables leave an MSHA-certified enclosure and terminate in an MSHA-classified sensor, the following conditions shall be met:

1. The sensor shall have a classification label.

2. The electric cable shall be shielded and the shield grounded at the MSHA-certified enclosure. Classified barrier grounds shall be connected to ground within the enclosure using no less capacity than a No. 12 AWG copper wire.

3. The sensor classification shall have the same letter classification as the classified barrier located within the MSHA-certified enclosure and connected to each individual sensor cable. A barrier classification label shall be attached to the exterior of the MSHA-certified enclosure and in close proximity to each barrier cable entrance. The method of attaching the label shall not impair any explosion-proof feature of the equipment.

4. No connection shall be made to the data transmission line from the blue outstation between the matching letter-classified barriers. Also, where a P.C. barrier is required, connections to the classified sensor shall only be made between the P.C. barrier and the data transmission line letter-classified barrier at the MSHA-certified explosion-proof enclosure.

Physical isolation shall be provided within an MSHA-certified enclosure by means of an insulated or metallic shield around all barriers and associated electric cables.

Control functions of the monitoring system shall be capable of being manually overridden at the machine.

On approval applications incorporating MSHA-evaluated Mine-Wide Monitoring Systems, a one-line diagram shall show where the monitoring system cable is connected to the machine. The

documentation shall include all pertinent electric cable information (size, type, number of conductors, electrical rating, outside diameter). Notes indicating where the requirements above are met shall also be included.

18.6 Applications
Cable Splicing Requirements Specified in Caution Statement
Paragraph 18.6(j) of Part 18, 30 CFR, requires an applicant (equipment manufacturer) to submit a caution statement specifying the conditions for maintaining permissibility of the equipment. A sample statement is provided in Figure 3, Appendix II of Part 18. Paragraph 5 of this statement entitled Cable Requirements, includes a provision permitting no more than five temporary splices in a portable cable.

Part 75, 30 CFR, states that only one temporary splice may be made in any trailing cable. Such trailing cable may only be used for the next 24-hour period. Since this requirement is different from that referenced in the sample statement, all submitted sample caution statements specifying details on splicing are required to reflect this requirement, rather than the allowance for five splices.

Subpart B Construction and Design Requirements

18.20 Quality of Material, Workmanship, and Design

Paragraph 18.20(a) of Part 18, 30 CFR, requires equipment to be designed to facilitate inspection and maintenance.

Paragraph 18.20(b) of 30 CFR Part 18 requires equipment to be safe for its intended use.

Acceptance of Fiber Optic Cables and Cables Smaller than #14 AWG

The Mine Safety and Health Administration Approval and Certification Center has established a program for the evaluation of fiber optic cables and will include electrical signaling cables smaller than #14 AWG. This program establishes a mechanism that manufacturers may use to obtain acceptance of the subject cables for mine use.

The program affords MSHA an opportunity to evaluate the application of new technology as applied to the mining industry while providing manufacturers with a means to obtain MSHA evaluation of these products.

A fee will be charged for the evaluation and testing of these products as prescribed under Part 5, 30 CFR. This fee will be determined on an hourly basis similar to the present cable program. The major difference in the new program is that the test procedure has been modified by eliminating the electrical current requirements, changing the ignition time, and changing the pass/fail criteria.

Fiber Optic Cables Used on Approved Equipment

Fiber optic cable that does not contain current-carrying conductors will be acceptable for use on approved equipment, provided it:

1. is accepted by MSHA as flame-resistant unless totally enclosed within an MSHA flame-resistant hose conduit or other MSHA flame-resistant material, or is totally contained within an explosion-proof enclosure;

2. is provided with strain relief where it enters any explosion-proof enclosure when the fiber optic cable extends between enclosures not on a common frame;

3. has all conductive components, such as metallic strength members or metallic vapor barriers, grounded;

4. has the manufacturer, type, and outside diameter (including tolerances) for the fiber optic cable specified on the drawings submitted for approval; and

5. is installed in a gland arrangement when existing or entering a explosion-proof enclosure. The gland arrangement or a similar one must have been explosion tested in an MSHA test enclosure at approximately 150 psig.

Cables that contain both optical fibers and current-carrying conductors are considered electric cables and will be required to meet the existing requirements of 30 CFR Part 18.

Any manufacturer's request to use a fiber optic cable in an application that does not specifically meet these requirements will be evaluated on the merit of the request.

Longwall Motor and Shearer Cables

This policy addresses specific longwall cables, namely, motor cables that supply power to all longwall motors, except those on-board the shearer, and shearer cables that supply power to longwall shearers. This policy takes into account that these cables have characteristics of both trailing and intra-machine cables as follows.

1. Longwall motor cables and shearer cables shall be accepted by MSHA as flame-resistant or be totally enclosed in MSHA accepted flame-resistant hose conduit or other flame-resistant material, have adequate current carrying capacity and short circuit protection for the loads involved, have insulation compatible with the impressed voltage, and be protected from abrasive sharp edges. These requirements currently apply to all cables on permissible face equipment. The application to longwall motor cables and shearer cables is stated here for clarification.

2. The 30 CFR 18, Table 9 length restrictions do not apply to longwall motor and shearer cables. These cables are evaluated individually at each longwall installation to ensure there is sufficient available fault current to provide adequate protection for the length of the cable used.

3. Longwall motor and shearer cables with nominal voltages greater than 660 volts shall be of a shielded construction with a grounded metallic shield around each power conductor. Shielding in these longwall cables provides enhanced safety to miners whose normal work tasks place them in close proximity to the energized cables. Should these cables be physically damaged, the shielding would greatly reduce the possibility of exposure to severe phase-to-phase faults or any other type of electrical faults on the circuit.

4. Longwall motor and shearer cables, like trailing cables once in service may be spliced, provided the splices are properly constructed. Shearer cables, like trailing cables, are constantly moving during mining operations. This movement may bring the cable into contact with surfaces of the mine terrain, mining equipment, and other cables, that occasionally results in a damaged cable that requires repair. Similarly, motor cables, like trailing cables, can be subject to damage requiring repair as a result of falling material at or near the longwall installation.

5. Energized high voltage shearer cables may be held in place (trained) provided that the miners wear properly rated insulating gloves or use hot sticks. Use of properly rated insulating gloves or hot sticks is encouraged for low and medium voltage shearer cables. However, energized motor cables shall not be handled. The policy does not permit the handling of either shearer or motor cables, except that shearer cables may be trained with electrical gloves or hot sticks. Unlike trailing cables that require extensive handling in normal mining operations, the configuration of longwall installations is such that there is no need to handle these cables except to return the cable to the coursing trough where the cable occasionally has a tendency to slip out.

Pump Motor Cables

MSHA has determined that the length of cable between a starter/controller of an MSHA-approved pump assembly and the pump motor cable fits into the same category for splicing purposes as longwall motor and shearer cables. These pump motor cables can vary from less than 100 feet to more than 1,000 feet and, like trailing cables; they can be exposed to damage from contact with surfaces of the mine terrain and mining equipment.

Disconnecting Devices Installed On-Board Mine Equipment

Disconnecting devices installed on machines submitted for approval under 30 CFR Part 18 must meet Part 75 requirements in order to comply with the requirements of 30 CFR 18.4 and 18.20(b) so that the device is safe for its intended use. In addition, field modifications will be necessary if mine operators seek to install such devices on equipment with approvals that do not include these disconnecting devices.

Load Locking Valves

All hydraulic cylinders used to elevate cutting heads on conveyor booms of loading machines and continuous miners must have hydraulic load locking valves that meet the applicable MSHA criteria in order to be considered as approved under 30 CFR Part 18.

Enclosures Housing Energy Storage Devices

Therefore, to preclude a potential electrical shock hazard, energy storage devices (not including batteries) housed in explosion-proof enclosures are required to be provided with a means of being discharged before they are accessible to maintenance personnel. The maximum discharge time for such energy storage devices must be specified on the drawings on which they appear. The circuit design, a bleeding resistor, or a discharge switch are acceptable methods of satisfying this requirement. The circuit design or bleeding resistor is the preferred form of discharging the energy storage device.

If discharge switches are used, a caution tag shall be on the enclosure cover warning that the discharge switch must be activated before the cover or cover mounting bolts are loosened.

Potential Hazard on Machines Designed with Multiple Functions

Machines that are designed to perform multiple functions from a single drive unit, simultaneously or individually, are required to be of a design that automatically disengages any engaging mechanism drive when the mechanism is shut down.

Circuit Breakers Handle Position

Manufacturers of equipment incorporating circuit breakers are required to provide a means that will make it easily discernible to ascertain the "on-off" position of vertically mounted circuit breakers. The "on-off" position shall be identified both externally, i.e., with the cover of the enclosure that houses the breaker in place, and internally, i.e., with the cover removed.

Flame Resistant Conveyor Belting on Equipment

The subject paragraph requires electrical equipment to be constructed of suitable materials. Section 18.65 of Part 18, 30 CFR, specifies the test procedures and criteria for the acceptance of conveyor belting as flame-resistant (fire-resistant).

Therefore, conveyor belting used on equipment approved under Part 18, 30 CFR, shall be flame resistant (fire-resistant) in accordance with Section 18.65 Part 18, 30 CFR.

Use of Metal Halide or Mercury Vapor Bulbs with Polycarbonate Lenses

Polycarbonate has been accepted as a suitable material with physical characteristics equivalent to 1/2-inch thick tempered glass to be used for luminaire lenses (reference Paragraph 18.46(c) of Part 18, 30 CFR). However, the high levels of ultraviolet radiation and heat generation produced by a metal halide or mercury vapor bulb cause a degradation of the polycarbonate. The change in physical characteristics results in a weakened polycarbonate exhibiting cracking and crazing.

Therefore, the use of metal halide bulbs or mercury vapor bulbs in explosion-proof enclosures with polycarbonate lenses is not acceptable.

Electric Equipment Incorporating Methane Monitors

When methane monitors are incorporated in designs of electric equipment, the following conditions shall be met.

1. The methane monitor power shut-off relay shall be installed so that all electric motors (including auxiliary fan motors), all lighting circuits, and all electrical power takeoff receptacles (except intrinsically safe receptacles) on the equipment are automatically deenergized when the relay is activated. The methane monitor may remain energized and intrinsically safe lights may remain operational. Operation of these lights shall not require energization of any additional explosion-proof

enclosures. On longwall mining systems, approved permissible telephones may also remain energized.

2. On longwall mining systems, if an additional methane monitor is installed on the shearer, it shall be installed so that all electric motors and all electrical power takeoff receptacles (except intrinsically safe receptacles) on the shearer are automatically deenergized when the relay is activated. The methane monitor may remain energized.

3. The methane monitor power shut-off relay shall be connected into the control circuitry so that it is not possible to override the methane monitor by holding down or blocking any reset (start) switch in the start position.

4. The control circuitry shall be connected so that the electric motors will not restart automatically when the methane monitor power shut-off relay is deactivated.

Parking Brakes

Paragraph 18.20(f) of 30 CFR Part 18 requires that brakes be provided for each wheel-mounted machine, unless design of the driving mechanism will preclude movement of the machine when parked. Several fatal accidents have occurred involving electric face equipment when devices designed to trap hydraulic fluid in wheel cylinders were used as parking brakes. This design is deemed inadequate for use as a parking brake because the device might inadvertently cause the brake to release due to a number of factors such as fluid leakage, thermal contraction of brake fluid, or damage to hydraulic parts or brake lines.

To correct this problem, MSHA will not approve equipment with parking brake systems that depend upon locking a column of fluid within the braking system to maintain contact between the friction material and the braking surface. Pursuant to 30 CFR 18.20(b) and (f), the parking brake, when applied, shall hold the mining equipment stationary up to its maximum rated gradeability, despite any contraction of the brake parts, exhaustion of any nonmechanical source of energy, or leakage of any kind.

The majority of rubber-tired Part 18 equipment can comply with the policy. Approval and Certification Center engineers can provide technical assistance on the design of braking systems that need to be brought into compliance.

Red Light Reflecting Material
Paragraph 18.20(g) of 30 CFR Part 18 requires red light-reflecting material on both the front and rear of each mobile transportation unit that travels at a speed greater than 2.5 mph and recommends its use on each end of other mobile machines.

Reflectors or reflecting tape is an acceptable means of satisfying this requirement. However, reflecting paint is not acceptable to satisfy this requirement.

To be consistent with the requirements for Part 75.1719-4, 30 CFR, the reflecting material shall have a minimum area of 10 square inches.

Separate Terminations for Ground and Ground-Check Conductors
When a ground monitoring circuit employs a ground-check conductor to verify the continuity of the grounding conductor to the equipment frame(s), the ground-check and the equipment grounding conductors shall be separately terminated to the metallic frame(s) inside the enclosure(s) of the electrical equipment.

18.22 Boring-Type Machines Equipped for Auxiliary Face Ventilation
Paragraph 18.22 of 30 CFR Part 18 requires each boring-type continuous-mining machine submitted for approval to be constructed with an unobstructed continuous space(s) of not less than 200 square inches total cross sectional area on or within the machine to which flexible tubing may be attached to facilitate auxiliary face ventilation.

This unobstructed continuous space(s) may consist of two or more spaces, the combined area of which must total a minimum of 200 square inches.

18.26 Static Electricity
The subject section requires nonmetallic rotating parts, such as belts and fans, to be provided with a means to prevent an accumulation of static electricity.

When V-belts are used, V-belts that meet the static conducting criteria specified in the Rubber Manufacturers Association Bulletin No. 3, Edition 2, approved 1972, Power Transmission Belt Technical Bulletin, satisfy this requirement. This criteria requires a resistivity measurement of the new belt to be 6 megohms or less when measured using two 5/8" diameter flat contacts, 8-1/2" apart on centers, moistened with water, and pressed against the belt with a force of 12-1/2 pounds per contact. The measurement shall be with an ohmmeter operating at a potential of 500 volts and having a range from 0 to 10 megohms.

18.30 Windows and Lenses

Paragraph 18.30(b) of 30 CFR Part 18 requires windows or lenses, other than headlight lenses, having an exposed area greater than 8 square inches to be provided with guarding or equivalent.

The exception for headlight lenses is also applicable to lenses of all machine lighting fixtures. Therefore, lenses having an exposed area greater than 8 square inches on machine lighting fixtures are not required to be provided with guarding or equivalent to satisfy the requirements of this paragraph. When installed on a machine, protection from damage must be provided by guarding or location, in accordance with the requirements of Paragraph 18.46(b) of Part 18.

18.32 Fastenings - Additional Requirements

Part 18, 30 CFR, provides construction requirements for explosion-proof enclosures. However, the use of eye bolts in through holes in these enclosures is not specifically addressed.

When an eye bolt is installed as a plug in a through hole in an explosion-proof enclosure, it shall be secured by a continuous gas-tight weld (all around). Eye bolts used in through holes in conjunction with other devices where future access to the devices is desired, such as core pins in motor designs, shall be secured by spot welding, brazing, or equivalent.

18.36 Cables Between Machine Components

Clamping of Hose Conduit

Paragraph 18.36(b) of Part 18, 30 CFR, requires cables between machine components to be protected from mechanical damage by position, flame-resistant hose conduit, metal tubing or troughs. To meet this requirement, when hose conduits are used, they should be clamped to a hose tube, gland extension, or equivalent, at both ends. Clamping the hose conduit directly to the cable is unacceptable.

18.37 Lead Entrances

The subject section specifies requirements for properly packed lead entrances. When the lead entrance is properly packed, a threaded packing nut shall have a minimum of a 3-effective (full) thread engagement with its mating part.

18.40 Cable Clamps and Grips

Section 18.40 of Part 18, 30 CFR, requires installation of insulated clamps or cable grips to prevent strain on both ends of each cable or cord leading from a machine to a detached or separately-mounted component. The requirement for strain relief

does not apply to intrinsically safe cables and cords where they enter nonexplosion-proof components.

Cable-grip-type strain relief devices are unacceptable as strain relief devices meeting the requirements of this section in situations where the cable is placed intermittently in tension. Under this condition, the strain relief device may creep along the cable until its use no longer prevents strain on terminals of the cable on which it is installed.

Additionally, each cable exiting a battery enclosure shall be provided with an insulated strain clamp installed to prevent strain on the cable connections at the battery terminals. Cable grips anchored to the cable are unacceptable for this application.

Where the subject strain relief device is acceptable, a section on proper installation is required to be added to the factory inspection form or other appropriate document. The directions should indicate that:

1. Sufficient slack in the cable shall be provided between the machine and the strain relief device.

2. A hose clamp shall be provided on the outby end of the strain relief device to prevent slippage along the cable jacket.

To enable MSHA to verify compliance with the requirements of 30 CFR 18.40, all applicants for approval of a machine or system shall fully identify on submitted documentation each cable clamp or grip used on the machine or system.

The following information shall be provided for insulated strain clamps on submitted or referenced drawings:

1. the flame-resistant insulation material and thickness;

2. the method of securing the clamp to the cable; and

3. the clamp dimensions with tolerances. The clamps shall be designed such that a minimum interference of l/8 inch or 10 percent of the nominal cable outside diameter, whichever is smaller, is provided between the clamp and the minimum cable outside diameter.

If cable grips are used in lieu of insulated strain clamps, the submitted or referenced drawings shall specify:

1. that sufficient slack is provided in the cable between the machine and the strain relief device; and

2. that an integral clamp is provided at the outby end of the cable grip which can be tightened to secure the grip in place after the grip is properly positioned on the cable.

18.41 Plug and Receptacle-Type Connectors

Use of Padlocks on Battery Connectors

Paragraph 18.41(f) of Part 18, 30 CFR, allows for the use of a padlock in lieu of an interlock on connectors used on mobile battery-powered machines, provided the plug is held in place by a threaded ring or equivalent mechanical fastening in addition to the padlock.

An acceptable means for meeting this requirement is the use of a device that is captive and requires a special tool to disengage to allow separation of the connector, along with a caution tag that the connector must not be disengaged under load.

18.45 Cable Reels

Insulation of Cable Reel and Spooling Devices

Paragraph 18.45(e) of Part 18, 30 CFR, requires cable reels and spooling devices to be insulated with flame-resistant material. To satisfy the intent of this requirement, any part of the machine which the trailing cable normally contacts, such as the cable reel hub and flanges, cable guide, sheaves, and bar rollers, must be insulated to prevent voltage being placed on the machine frame from spot contact with a worn or damaged trailing cable. The insulating material shall be tested and accepted as flame-resistant by the A&CC.

Isolated components, insulated from the machine frame, are acceptable if they are inaccessible to personnel during normal operation of the machine. These components do not need to be insulated from the cable.

18.47 Voltage Limitation

The voltage of alternating-current control circuits shall not exceed nominal 120 volts line-to-line. This requirement will allow any appropriate control circuit wiring configuration, including those that allow or cause 120 volt line-to-ground control voltage levels to exist.

18.48 Circuit-Interrupting Devices

Clarification of Terms Used in 30 CFR 18.48

The following terms have been more specifically defined in order to clarify 30 CFR 18.48.

1. Circuit-interrupting device. A circuit-interrupting device is considered to be a single device designed and installed to disconnect all power conductors on a machine from the trailing cable. The device shall simultaneously open all phase conductors on an alternating-current or direct-current machine. The contacts of the device shall be either spring loaded and latched closed or held closed by a magnetic field.

   The device shall be:

   a. Installed so that it can be operated (opened and closed) and reset without opening the enclosure in which it is mounted.

   b. Designed so that the interruption of all power conductors occurs in a single enclosure.

   c. Mounted in a manner so as to preclude the possibility of its closing by gravity.

   d. Capable of carrying and interrupting the full-load current of the machine.

   In addition, if the device is intended to break short-circuit current, it shall have an interrupting capacity sufficient for the maximum short-circuit current available at the line-side terminals.

2. Power Conductor/Control Conductor. A power conductor is considered to be a conductor that supplies electric power to an electric component or device on a machine or to a related detached component of a machine. This definition includes conductors supplying electric power to motors, motor controllers, power resistors, power take-off receptacles, power transformers and lighting components (e.g., transformers, resistors, ballasts and fixtures).

   Conductors not covered by this definition include:

   a. The trailing cable conductors.

   b. The conductors that supply electric power to control transformers provided that the control transformers are located in the same enclosure as the main circuit-interrupting device.

c. Control circuit conductors.

d. Conductors that supply electric power to a machine mounted methane monitoring system(s).

A control circuit is considered to be the circuit that carries the electric signals directing the function of the controller but does not carry the main power.

Note: The voltage of alternating-current control circuits shall not exceed 60 volt to ground.

Control circuit conductors are considered to be conductors used for control circuits and for connections between instrument transformer secondaries, instruments, meters, relays, or other similar equipment.

A motor controller is considered to be a device or group of devices that serves to govern, in some predetermined manner, the electric power delivered to the motor or group of motors of which it is connected.

3. Trailing Cable Termination. The trailing cable is considered to extend from the last short-circuit protective device which meets the requirements of 30 CFR 75.601 through 30 CFR 75.601-3 to the line side of the circuit interrupting device required by 30 CFR 18.48(a). When a connector or connection box is used to sectionalize the trailing cable on the machine, the portion of cable between the connector and/or connection box and the line side of the circuit interrupting device required by 30 CFR 18.48(a) will be considered to be part of the trailing cable provided the conductors in the on board portion of the trailing cable are not smaller than the minimum acceptable size of the conductors in the off board portion of the trailing cable. In addition, the on board portion of the trailing cable shall be protected in accordance with the requirements of 30 CFR 18.36(b). The on board portion of the trailing cable will not be required to be flame resistant if the cable is installed in flame resistant hose conduit.

When it is impracticable to mount the circuit interrupting device on board the machine as provided in 30 CFR 18.48(b), the trailing cable is considered to extend from the last short-circuit protective device which meets the requirements of 30 CFR 75.601 through

75.601-3 to its first point of connection on the machine.

4. Manually-Operated Controller. A "manually operated controller" as referenced in 30 CFR 18.48(a) is a rotary drum controller such as was used to control the traction motors of mining machine trucks, loaders and continuous mining machines.

These interpretations are based on current regulations and existing technology. It is recognized that these interpretations of 30 CFR, Part 18, could potentially have a significant impact on the design of mining machinery.

Deenergization of Lighting Conductors by Main Circuit-Interrupting Device

Paragraph 18.48(a) of Part 18, 30 CFR, requires that each machine be equipped with a circuit-interrupting device by means of which all power conductors can be deenergized at the machine.

Conductors to lighting components are considered power conductors and shall be deenergized by the main circuit-interrupting device.

Two-Pole Switches Required for Lighting Circuits

Paragraph 18.48(c) of Part 18, 30 CFR, requires that "separate two-pole switches shall be provided to deenergize power conductors for headlights or floodlights." These switches must be separate physical devices by which all power conductors for machine lights, headlights, or floodlights can be deenergized; i.e., a switch(s) which controls only the lighting circuit. Relay actuated contactors are not acceptable as the sole means of providing this function.

More than one separate two-pole switch may be used to satisfy this requirement. However, each switch must control only a lighting circuit. All other circuits must be controlled by a different switch(s). Three-phase lighting systems must have a separate three-pole switch to satisfy this requirement. A circuit breaker may be used as the required switch for the lighting circuit.

18.50 Protection Against External Arcs and Sparks

Power Take Off Receptacles

Section 18.50 of Part 18, 30 CFR, requires the frames of components not on a common chassis to be maintained at safe voltages by means of diode grounding, actuation of a circuit interrupting device, or a separate grounding conductor within the input power cable. In order to ensure that the PTO adequately

provides means of fulfilling these requirements for any type of auxiliary mining equipment which it may power, each PTO receptacle is required to have an electrode which is separate from those used for power, connected to frame ground.

Grounding of Machine Components

The subject section requires that provisions shall be made for maintaining the frames of all off-track machines and enclosures of related detached components at safe voltages.

All metallic enclosures used on an electrical machine are required to have a common electrical ground with the frame of the machine by either the method of attachment or by use of a separate grounding conductor.

Grounding Conductors

To improve the safety afforded by permissible products, effective May 1, 1980, the Approval and Certification Center in applying Part 18 requires:

1. The cross-sectional area of the grounding conductor shall be at least 50 percent of one of the power conductors on No. 6 (AWG) or larger cables, and cables smaller than No. 6 (AWG) shall be required to have a grounding conductor at least the same size as one power conductor. This requirement eliminates the exception previously permitted concerning the use of a ground fault tripping relay.

2. In addition, all machine-mounted lighting fixtures shall be electrically grounded to the machine by a separate grounding conductor.

Grounding Through Cable Reels

Paragraph 18.50(a) of Part 18, 30 CFR, provides for maintaining the frames of off-track machines and the enclosures of related detached components at safe voltages by use of a separate conductor(s) by which the frame or enclosure can be connected to an acceptable grounding medium.

In order to satisfy the requirements of this paragraph, alternating current cable reels shall have at least one slip ring that will be used solely for the grounding circuit.

Acceptance of Silicon Diodes for Grounding

Paragraph 18.50(c) of Part 18, 30 CFR, contains provisions for acceptance of silicon diodes for maintaining the frames of off-track machines and the enclosures of related detached components at safe voltages.

The requirements contained in this paragraph are consistent with, but not as explicit as, the requirements of Paragraphs 75.703-3(d)(1) through 75.703-3(d)(10) of Part 75, 30 CFR. Therefore, the installation and rating of silicon diodes shall be consistent with the requirements for Part 75, 30 CFR, to satisfy the provisions of Paragraph 18.50(c) of Part 18, 30 CFR. The installation of silicon diodes shall meet the following minimum requirements:

1. Installation of silicon diodes shall be restricted to electric equipment receiving power from a direct-current system with one polarity grounded;

2. Where such diodes are used on circuits having a nominal voltage rating of 250, they must have a forward current rating of 400 amperes or more, and have a peak inverse voltage rating of 400 or more;

3. Where such diodes are used on circuits having a nominal voltage rating of 550, they must have a forward current rating of 250 amperes or more, and have a peak inverse voltage rating of 800 or more;

4. Where fuses approved by the Secretary are used at the outby end of a trailing cable connected to electrical equipment employing silicon diodes, the rating of such fuses must not exceed 150 percent of the nominal current rating of the grounding diodes;

5. Where circuit breakers are used at the outby end of a trailing cable connected to electrical equipment employing silicon diodes, the instantaneous trip setting shall not exceed 300 percent of the nominal current rating of the grounding diode;

6. Overcurrent devices must be used and installed in such a manner that the operating coil circuit of the main contactor will open when a fault current with a value of 25 percent or less of the diode rating flows through the diode;

7. The silicon diode installed must be suitable to the grounded polarity of the power system in which it is used and its threaded base must be solidly connected to the machine frame on which it is installed;

8. In addition to the grounding diode, a polarizing diode must be installed in the machine control circuit to

prevent operation of the machine when the polarity of a trailing cable is reversed;

9. When installed on permissible equipment, all grounding diodes, overcurrent devices, and polarizing diodes must be placed in explosion-proof compartments;

10. When grounding diodes are installed on a continuous miner, their nominal diode current rating must be at least 750 amperes or more.

Additionally, assemblies of multiple diodes combined to provide the required voltage and current ratings are acceptable in lieu of a single diode having the required ratings.

18.51 Electrical Protection of Circuits and Equipment
Circuit-Interrupting Device; External Operation Requirement

A circuit-interrupting device may be accepted without a method for external operation if the following criteria are met:

1. the circuit-interrupting device is not required by 30 CFR 18.51(a);
2. the circuit-interrupting device protects only control circuit wire(s) or device(s);

3. the circuit-interrupting device provides protection only for cables or components internal to the explosion-proof enclosure; and

4. the circuit-interrupting device can be reclosed without exposing personnel to any energized power circuit.

18.52 Renewal of Fuses
Criteria for Suitable Interlock Systems

The following criteria shall be applied to determine a suitable interlock system as required by 30 CFR, Part 18, Section 18.52:

1. The interruption of the electrical circuit must be accomplished in an explosion proof enclosure.

2. The electrical circuit will not automatically reenergize when the explosion proof integrity is reestablished.

Silicon Controlled Rectifier (SCR) Fuses

When Silicon Controlled Rectifier fuses are used, the following interpretation applies:

1. Fuses used to protect SCR's are power fuses and therefore, the enclosure housing them shall meet 30 CFR Section 18.52 interlock requirements.

2. A microswitch circuit may be used to satisfy the interlock requirements of Section 18.52 provided that the electrical circuit will not automatically reenergize when the explosion proof integrity of the enclosure is reestablished.

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Subpart C Inspections and Tests

18.61 Final Inspection of Complete Machine Inspection of Longwall Lighting Systems

Longwall lighting systems shall be completely installed at the time the Approval and Certification Center conducts an inspection of a longwall mining system to be used in underground coal mines.

18.68 Tests for Intrinsic Safety Requirements When Using Permissible Page Phones as a Longwall Pre-Start Alarm

The face communication system typically used on longwalls is a page phone system that is electrically segregated from the longwall and any other phone system and consists of telephones previously approved as permissible under 30 CFR Part 23. When permissible page phones are used as the audio transducers of a pre-start alarm system, additional requirements must be met.

A pre-start alarm system may be accepted by the Approval and Certification Center as intrinsically safe if, in addition to the applicable requirements of 30 CFR Part 18, the following conditions are met:

1. the specified longwall face telephone system is electrically segregated from all other mine telephone systems;

2. the longwall face telephone system is a 12 volt D.C. system;

3. the longwall face telephone system is comprised of telephones approved under 30 CFR Part 23;

4. the approval numbers, with the extension levels of the telephones comprising the system are specified;

5. the output energy of the pre-start alarm signaling unit is not greater than the highest output energy of any telephone specified as part of the face telephone system; and

6. labels or plates are provided in accordance with one of the following options:

    a. a label/plate shall be attached to the exterior of the MSHA-certified, explosion-proof enclosure at the pre-start alarm system cable exit that:

(1) identifies the intrinsic safety evaluation number granted under Part 18;

(2) identified the holder of the evaluation;

(3) identifies the system model or type number;

(4) identifies the telephones that may be a part of the system by approval number and extension level granted under Part 23;

(5) warns that the system must not be connected to any other mine telephone system; and

(6) is substantial and permanent in nature.

- OR -

b. a label/plate shall be attached to the exterior of the MSHA-certified, explosion-proof enclosure at the pre-start alarm system cable exit and to each telephone on the system that:

(1) identifies the intrinsic safety evaluation number granted under Part 18;

(2) identifies the holder of the evaluation;

(3) identifies the system model or type number;

(4) warns that the system must not be connected to any other mine telephone system; and

(5) is substantial and permanent in nature.

Separation of Intrinsically Safe and Nonintrinsically Safe Conductors

Paragraph 18.68(c)(3) of 30 CFR Part 18 requires that cables and wires carrying intrinsically safe currents shall not be intermingled with nonintrinsically safe cables and wires. The following shall be regarded as intermingling:

1. Intrinsically safe wires included within the same cable or bundle with nonintrinsically safe wires.

2. Intrinsically safe wires included within the same conduit with nonintrinsically safe wires.

3. Intrinsically safe wires included within the same wiring tray with nonintrinsically safe wires unless separated by a solid noncombustible, physical barrier.

4. Any wires with excessive slack that may permit intrinsically safe wires and nonintrinsically safe wires to contact each other.

When intrinsically safe wires and nonintrinsically safe wires are housed within the same enclosure, separate terminal strips shall be used for the intrinsically safe circuit and nonintrinsically safe circuit conductors. In addition, terminals, terminal boxes, and plugs and receptacles of intrinsically safe circuits within these enclosures shall be clearly marked, such as with a label "Intrinsically Safe" and shall be clearly distinguishable.

To ensure compliance with this requirement, a note stating that "wiring for nonintrinsically safe circuits shall not be intermingled with wiring for intrinsically safe circuits" shall be required on all wiring and schematic diagrams depicting both intrinsically safe and nonintrinsically safe circuits.

Clarification of 30 CFR Section 18.68 and 30 CFR Section 18.41

Recent evaluations of intrinsically safe circuits using metallic conductors contained in the same cable with conductors on non-intrinsically safe circuits have determined that the specified intrinsically safe circuits cannot be considered by 30 CFR Section 18.68 to be intrinsically safe in this application. Therefore, the approval documentation should not identify these circuits as intrinsically safe. If the I.S. evaluation investigation is specified, a note must be included stating:

> In this application the circuit is not accepted as being intrinsically safe.

This implies, with reference to paragraph 18.41(a)(2)(ii), that inline non-explosion proof connectors which are dependent on an ISC pilot interlock circuit for permissibility will no longer be accepted. Box mounted non-explosion proof connectors may depend on an ISC pilot interlock circuit for permissibility if the interlock consists of only a short jumper wire between two pins of the plug which mates with the box mounted connector.

Control Circuit Wiring on Permissible Equipment

The Mine Safety and Health Administration (MSHA) has identified a potential hazard associated with start and stop switches and control circuit wiring on some permissible electric equipment. The problem involves sticking start switches on permissible machines that have start switches connected in parallel with stop switches.

When a stop switch operating shaft binds and holds in a stop switch, the function controlled by the switch cannot be performed and the problem is easily detectable and repairable. However, when a start switch operating shaft binds and holds in a start switch, the function controlled by the switch can usually be performed and the problem may not be easily detectable. When this condition occurs on a machine where start and stop switches are connected in parallel, one or more stop switches become ineffective. As a result, the machine could be operated with one or more stop switches incapable of performing the functions for which they were intended without the machine operator being fully aware of the problem. This condition would present a serious hazard if the switch that became ineffective was an emergency stop switch, panic bar switch, or any other stop switch that must perform properly in an emergency situation.

MSHA recommends that no start switch be connected in parallel with any stop switch. While most mining equipment control circuits are designed according to this recommendation, there are types of equipment that are designed so that a binding start switch will make one or more stop switches ineffective. These types of equipment are usually multiple operating station machines, such as roof bolting machines, which have start and stop functions at various positions around the machine.

At this time, MSHA does not propose to require immediate modification of this wiring as a condition of approval or to require immediate rewiring of equipment in the field. However, MSHA recommends that equipment manufacturers take appropriate action to ensure that the control circuits on newly manufactured machines are wired so that no stop switch can become ineffective if any start switch becomes stuck in the "on" position. To expedite the processing of wiring modifications to control circuits on previously approved equipment relating to this recommendation, MSHA will permit the original equipment manufacturer to document the modified circuit in place of the existing circuit via the Stamped Notification Acceptance Program (SNAP) administered by the Approval and Certification Center.

MSHA also recommends that operators take appropriate action to ensure that the control circuits on machines in the field are wired so that no stop switch can become ineffective if any start switch becomes stuck in the "on" position. Operators who seek to modify affected equipment in the field should contact the equipment manufacturer for assistance. Operators' field modification requests covering these changes will be processed by MSHA District Offices and the Approval and Certification Center on a priority basis. Pending any modification of affected machines, coal mine operators should check the machines, as part of the weekly examinations required by 30 CFR 75.512, to ensure that start switches are not binding and sticking in the "on" position. In addition, if a machine operator detects a binding start or stop switch, the condition should be reported immediately so it can be corrected by cleaning and lubricating the operating shaft or other appropriate means.

18.69 Adequacy Tests Sintered Metallic Friction Materials Used for Brakes on Permissible Equipment

The Mine Safety and Health Administration (MSHA) has identified a potential hazard associated with the use of sintered metallic friction materials as brake linings on permissible electric equipment. The problem is during normal braking, considerable amounts of hot, glowing particles may be thrown from the friction material/brake disc mating surfaces into the surrounding mine environment. Friction materials of this type have been used on both the service and emergency brakes, as new and replacement linings. No sintered metallic friction materials are permitted for such use, unless they are housed in explosion-proof enclosures or other enclosures that prohibit the outside atmosphere from entering the enclosure.

PART 28 FUSES FOR USE WITH DIRECT CURRENT IN PROVIDING SHORT-CIRCUIT PROTECTION FOR TRAILING CABLES IN COAL MINES

Subpart E Construction, Performance, and Testing Requirements

28.40 Construction and Performance Requirements

The Approval and Certification Center has provided clarification of the phrases: (1) "initial current interruption," (2) "evidence of restriking," and (3) "superficial damage," as stated in Paragraphs 28.40(e) and (f). In an effort to eliminate confusion and ensure uniform interpretation the following definitions are provided for your information:

1. Initial Current Interruption (Paragraph 28.40(e))
   The phrase "initial current interruption" shall be defined as the point at which the current reaches zero value for the first time during a fuse test.

2. Evidence of Restrike (Paragraph 28.40(e))
   The test voltage shall be applied across the fuse, uninterrupted, for 30 seconds after completion of the circuit interruption. The test voltage and current shall be monitored continuously using an oscillographic recorder with a total deflection of no less than 1 inch for each signal.

3. Superficial Damage (Paragraph 28.40(f))
   The tested fuse would be considered to be damaged in excess of superficial if:

   a. The tested fuse has one or more openings greater than 1/16 inch in any direction, in any metal part of the fuse.

   b. The tested fuse has one or more openings greater than 1/8 inch in any direction, in any nonmetal part of the fuse.

Acceptable performance is indicated if during that time interval there is no oscillographic and visual evidence of a tendency to restrike (excessive smoking, excessive venting of gasses, etc.). Any such evidence would constitute failure. If there is oscillographic evidence of any restriking during the first 30 second time interval, the test voltage must continue to be applied, without

interruption, for a second 30 second time interval during which no restriking (as indicated on an oscillograph) must be in evidence.

Neutral Start Methods on MSHA Approved Equipment

Equipment submitted for approval under Part 36 must be equipped with a neutral start method that ensures that the engine cranking torque will not be transmitted through the powertrain and cause machine movement.

75.1719 Illumination

Use of Alternate Lights on Statement for Test and Evaluation (STE) Application

This policy establishes requirements for the evaluation of alternate lighting fixtures specified in STE applications whose requirements are identified in Federal Register Volume 41, No. 64, Thursday, April 1, 1976, page 14108.

Photometric data is not required to be submitted with an STE application for a lighting system using alternate lighting fixtures that have been found to have similar photometric patterns. On the following page is a list of headlights and machine lights that are considered photometrically inter-changeable. The headlight fixtures use 50 watt, 12 volt, type MR-16 (EXN) and the machine lights use 100 watt, 120 volt, type A-19 incandescent bulbs.

Presently, only certain pairs of lights have been evaluated and found to have similar photometric patterns. Because of this similarity, the Approval and Certification Center will accept both fixtures to be listed on an STE application, while requiring actual photometric data on only one lighting system. The other lighting fixture of the pari may be listed as an alternate on the machine layout drawing. This policy does not limit the number of lighting fixture alternates that may be specified in an STE application. However, if the alternate fixture is not part of a pair, the actual photometric data is required for each system.

This policy does not authorize interchanging the lights on machines indiscriminately. When the STE contains a set of lights that are alternate to each other, they may be interchanged on the machine to which the STE applies. No further paperwork or evaluation is then necessary.

If the STE for the machine lists only one of the lights of the pair, the appropriate field modification must be submitted to document the permissibility of the light. No photometric data is required.

HEADLIGHTS
(with bulb type 50 watt, 12 volt,
MR-16 (EXN) clear, incandescent)

MANUFACTURER	MODEL #	CERTIFICATION # XP
Mining Controls	30,000	3493-0
Huntington Brass	1,200	3579-0
Koehler Mfg. Co.	2,200	3470-0
Joy Mfg. Co.	571390-1312	3581-0
Ocenco, Inc.	HE 50	3221-0,-1,-2
Central States Ind.	CI 50	3612-0

MACHINE LIGHTS
(with bulb type 100 watt, 120 volt,
type A-19, inside frosted, incandescent)

MANUFACTURER	MODEL #	CERTIFICATION # XP
Ocenco, Inc.	AR 100	3190-0
Central States Ind.	CI 100	3609-0