**Section 220.50 Electrical Equipment-General**

a) Electric power circuits and electric equipment; deenergization.

 Power circuits and electric equipment shall be deenergized before work is done on such circuits or equipment, except when necessary for trouble-shooting or testing. Disconnecting devices shall be locked out and suitably tagged by the persons who perform such work, except that in cases where locking out is not possible, such devices shall be opened and suitably tagged by such persons. Locks and tags shall be removed only by the persons who installed them, or, if such persons are unavailable, by persons authorized by the operator or his agent.

b) Electric circuits and equipment; repair.

 No electrical work shall be performed on electric circuits or equipment except by a person qualified to perform electrical work and to maintain electrical equipment, or by a person trained to perform electrical work and to maintain electrical equipment at the direction of a qualified person. When such work is done by a trained person, the circuits or equipment shall be examined by a qualified person to assure safe operating condition before such circuits or equipment are energized.

c) Electric equipment; examination, testing, and maintenance.

 Electric equipment shall be frequently examined, tested and properly maintained by a person qualified to perform electrical work and to maintain electrical equipment to assure safe operating conditions. When a potentially dangerous condition is found on electric equipment, such equipment shall be identified and be removed from service until such condition is corrected. A record of such examinations shall be kept in an approved book, and shall include all dangerous conditions found, corrective actions taken, and the signature of the qualified person conducting the examination or testing. The record of examinations shall be signed by the person responsible for maintaining the equipment in safe operating condition, who shall also be a person qualified to perform electrical work and maintain electrical equipment, and records shall be made available for inspection by an authorized representative of the Department and the authorized representative of miners of such mine.

d) Electric equipment; examination and testing.

 A potentially dangerous condition within the meaning of Section 220.50(c) shall include without limitation, exposed conductors, improper frame grounding, missing guards, missing inspection covers, poorly-made splices in conductors, improper terminations, improper overload or short circuit protection, broken conduit, missing or malfunctioning safety devices, inoperative indicating lights, inoperative ground fault protection, defective monitoring circuits, and inadequate ground fields.

e) Qualified person.

 A qualified person within the meaning of Sections 220.50(b), 220.50(c), 220.60(b), 220.80(b) and Section 220.90 of this Part is an individual who has been qualified as a coal miner electrician under 30 CFR 77.103, or anyone who may be so qualified in the future as a coal miner electrician by the Department, if and when such Department adopts rules affecting coal miner electrician certification.

f) Electric equipment; frequency of examination and testing.

 The examinations and test required under the provisions of Section 220.50(c) shall be conducted as interpreted in the Mining Enforcement Safety Administration (MESA) Inspector's Manual at least monthly or more often if necessary to assure safe operating conditions. State Mine Inspectors shall be presented evidence of qualifications upon request.

g) Electric conductors; capacity and insulation.

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

h) Electric Conductors.

 Electric conductors, installed inside surface buildings and structures, shall be sufficient in size to meet the minimum current-carrying capacity provided for in the National Electrical Code in effect at the time of installation.

i) Electric conductors; mobile and portable equipment.

 Trailing cable, portable cables, and electric conductors installed in mobile or portable equipment shall have ampacities and construction in accordance with the specifications of Insulated Power Cable Engineers Association-National Electrical Manufacturers Association in effect at time of purchase and the conductors shall be sufficient in size so that a rise in temperature resulting from normal operation will not damage the insulating material.

j) Electrical connections or splices; suitability.

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

k) Cable fittings; suitability.

 Cables shall enter metal frames of motors, splice boxes, and electric compartments only through proper fittings and shall be secured to prevent chaffing of the insulation. When insulated wires, other than wiring installed in conduit, pass through metal frames, the holes shall be substantially bushed with insulated bushings and the wires be secured.

l) Electric equipment and circuits; overload, short-circuit, and ground fault protection.

 Automatic circuit-breaking devices or fuses of the correct type and capacity shall be installed so as to protect all electric equipment and circuits against short circuit and overloads. Ground fault protection shall be provided for equipment, powered by solidly or resistance grounds' systems.

m) Electric equipment and circuits; overload and short-circuit protection; minimum requirements.

 Devices providing short-circuits and overload protection shall conform to the minimum requirements for protection of electric circuits and equipment of the National Electrical Code in effect at the time of installation except that motors and circuits used in specially designed electrical systems, such as those used on some excavators, hoists and elevators, shall be considered as being provided with overload protection if the design of the system prevents the motors and associated circuits from being subjected to harmful overloads.

n) Electric equipment-switches.

 All electric equipment contracted for after the effective date of this regulation shall be provided with switches or other controls that are safely designed, constructed, and installed. The voltage of alternating current remote control circuits that are installed external to the controller enclosure shall not exceed one hundred twenty (120) volt.

o) Lightning arresters; ungrounded, exposed power conductors, and telephone wires.

 All ungrounded, exposed power conductors, control lines, and communication wires shall be equipped with suitable lightning arresters which are adequately installed and connected to a low resistance grounding medium in accordance with Section 220.70(f).

p) Lightning arresters; circuits entering or leaving buildings.

 Lightning arresters protecting circuits entering or leaving buildings shall be provided at a point near where each such circuit enters or leaves the building.

q) Transformers and high-voltage equipment; installation and guarding; minimum vertical clearance.

1) Transformers and other high-voltage equipment shall be of the enclosed type, or installed in a transformer house, or surrounded by a substantial fence at least six (6) feet high and at least three (3) feet from any energized parts, casings, or wiring.

2) Enclosures of high-voltage equipment shall be kept locked against unauthorized entry.

3) Electric equipment energized at more than one thousand (1,000) volts and containing unguarded live parts, shall be installed with a minimum vertical clearance above the surfaces where a person would normally stand, as follows:

|  |  |  |
| --- | --- | --- |
| Voltage Between Phases |  | Minimum Vertical Clearance of Unguarded Parts: |
|  |
|  |  | Feet | Inches |
|  |
| 1,000 – 6,600 |  | 8 | 0 |
|  6,601 – 11,000 | 9 | 0 |
| 11,001 – 22,000 | 9 | 3 |
| 22,001 – 33,000 | 9 | 6 |
| 33,001 – 44,000 | 9 | 10 |
| 44,001 – 66,000 | 10 | 5 |
| 66,001 – 88,000 | 11 | 0 |
|  88,001 – 110,000 | 11 | 7 |
| 110,001 – 132,000 | 12 | 2 |

r) Resistors; location and guarding.

 Resistors, heaters, and rheostats shall be located so as to minimize fire hazards and, where necessary, provided with guards to prevent personal contact.

s) Danger signs at high-voltage electrical installations.

 Danger signs shall be posted at the entrance to all high-voltage electrical installations.

t) Inspection and cover plates.

 Inspection and cover plates on electrical equipment shall be kept in place at all times except during testing or repairs. Equipment designed with exposed energized parts shall be properly guarded to prevent accidental contact.

u) Insulated platforms at power switches.

 Insulated mats or platforms, insulated for the phase-to-phase voltage of the system, shall be kept in place at all switchboards and power control switches where shock hazards exist. However, metal plates on which a person normally would stand and which are kept at the same potential as the grounded, metal noncurrent-carrying parts of the power switches to be operated, may be used.

v) Switchboards; enclosures, passageways, and clearance.

 Switchboards in stationary installations which require back access shall be provided with passageways or lanes of travel which permit access to the back of the switchboard from both ends for inspection, adjustment, or repair. Openings permitting access to the rear of any switchboard shall be guarded, except where they are located in buildings which are kept locked. Enclosures containing switchboards motor generators sets, transformers, oil circuit breakers, and resistance panels shall not be used for the storage of material.

w) Bare signal or control wires; voltage.

 The voltage on bare signal or control wires accessible to personal contact shall not exceed forty (40) volts.

x) Electric Wiring and equipment; Installation and maintenance.

 Except as otherwise provided in this Part, all wiring and electrical equipment installed after effective date of this regulation shall meet the requirements of the National Electric Code in effect at the time of installation.

y) Hazardous locations, surface facilities; bituminous and lignite mines.

1) All electrical circuits and equipment installed after effective date of this regulation with a coal preparation plant or other enclosure housing coal-handling facilities, except in sections where only wet coal is handled or in sections so maintained as to be free from dangerous amounts of coal dust, shall be of the type designed for hazardous locations, Class II, Group F, and installed in accordance with the requirements in Article 501 of the National Electrical Code.

2) Enclosed areas where methane may accumulate and is not prevented from accumulating by an adequate ventilation system shall have electric circuits and equipment of the type designed for hazardous locations, Class I, Group D, and installed in accordance with the requirements in Article 501 of the National Electrical Code.

3) An adequate ventilation system within the meaning of paragraph (b) above is a system in which:

A) The enclosed area is monitored continuously in accordance with the provisions of Section 220.20(n); and

B) The provisions of Section 220.20(a) are complied with.

z) Approved permissible equipment.

 Permissible electrical equipment which is maintained in a permissible condition may be used in lieu of equipment required in Section 220.50(y).

aa) Minimum wiring requirements for stationary structures and buildings; general.

1) All wiring shall be installed so as to be adequately protected from physical damage;

2) Raceways, cable assemblies, boxes, cabinets, and fittings shall be securely fastened in place;

3) Cables, conductors, metal raceways, cable armor, boxes, fittings, supports, and other wiring hardware shall be of proper construction and material for the environment in which they are installed;

4) Power cables within surface structures shall closely follow the surface of the building or the other continuous support and shall be secured at intervals not exceeding four and one-half (4 1/2) feet and within one (1) foot from every box fitting; and

5) All open conductors within surface structures shall closely follow the surface of the building and be installed on proper insulators which support the wires at least every four and one-half (4 1/2) feet.

bb) Equipment marking.

 All electrical equipment purchased or rebuilt after the effective date of these rules shall be provided with a plate which indicates the manufacturer's name, rated voltage, current, horsepower, frequency, number of phases, and duty cycle.

cc) Protection of power cables.

 All power cables and wiring shall be adequately protected against mechanical damage. If a cable is damaged to the extent that the outer jacket will not exclude moisture, or if the conductors or metallic shielding are exposed, the cable jacket shall be repaired to the same degree of protection as the remainder of the cable.

dd) Identification.

 Circuit breakers, disconnects, control switches, and push buttons shall be marked to show which circuit they control, unless identification can be made readily by location.