



ARC GUARDTM POWER CENTER

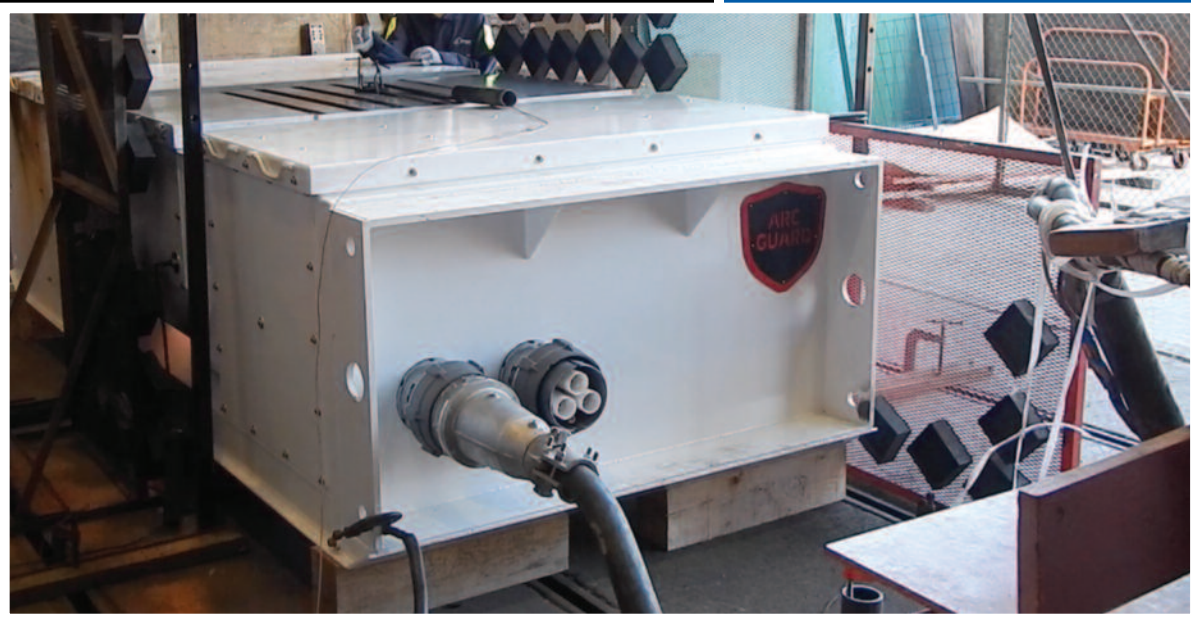
Patent #8,648,274

- Protects miners from injury or death
- Minimizes damage to mine assets
- Maximizes mine production
- Performance tested and classified as arc resistant

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Standard underground electrical equipment is designed to withstand the mechanical forces generated by bolted faults on the load terminals until a power circuit breaker or other protective device can interrupt the flow of fault current. This capability is verified by short-circuit and short time withstand tests on the equipment and interruption tests on the power circuit breakers. During a bolted fault, the voltage at the fault location is essentially zero and the fault energy is dissipated throughout the power system. The arc generated within the power circuit breaker during interruption is cooled and extinguished by the breaker. The minimal out-gassing of arc byproducts is contained in the electrical equipment as verified by interruption tests.

BMA now offers arc resistant open type underground mining electrical equipment designed to provide an additional degree of protection for personnel performing normal operating duties in proximity to the energized equipment. Such duties include opening or closing breakers, changing relay settings, programming PLCs, reading instruments or other activities that do not require cover removal.



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BMA arc resistant electrical equipment provides an added degree of protection above standard MSHA requirements. In addition to bolted faults, BMA arc resistant electrical equipment is designed and performance tested to ANSI/IEEE C37.20.7 to provide protection from the hazards of internal arcing faults. An internal arcing fault can be caused by insulation degradation, insulation contamination, entrance of water, foreign objects coming into contact with the energized bus or any other unplanned condition that creates an electrical discharge path through air. During an arcing fault, the voltage at the fault location is essentially the system voltage and the fault energy is focused within the equipment. Arc temperatures can exceed 35,000 degrees rapidly heating the air, vaporizing metal parts and creating thousands of pounds of impact force. The expanding plasma creates severe mechanical and thermal stress in the equipment, which can blow off top covers and panels open doors and burn through the enclosure.



Depiction of standard underground electrical equipment after being subjected to an internal arc.

STANDARD FEATURES

- Arc Resistant to protect miners at the front, back and sides of the equipment
- Performance tested and classified as arc resistant in accordance with ANSI/IEEE C37.20.7-2007
- Reinforced enclosure to withstand pressure from internal arcing faults
- Internal venting system with pressure dams and pressure vents to channel the flow of arc fault gases and vent these gases out the top of the gear and away from personnel
- Reinforced and sealed top covers and panels
- Reinforced bolted covers
- Ventilation inlet/outlet shrouds



Hole is top cover due to internal arc energy

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Depiction of standard underground electrical equipment during subjection to an internal arc.



Depiction of BMA Arc Resistant underground electrical equipment during subjection to an internal arc.



WARNING: All electrical equipment contains hazardous voltages. Death, serious personal injury, or property damage may result if safety instructions are not followed. Only qualified personnel should work on or around this equipment after becoming thoroughly familiar with all warnings, safety notices, and maintenance procedures provided with the equipment. The successful and safe operation of this equipment is dependent upon proper handling, installation, operation and maintenance.

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