

Electrical Test – General

Most of the Information is From Section 10 of Our MSHA-Compliance Manual at <http://www.mine-safety.mtu.edu>

1. A good mining engineer should be able to do an adequate electrical inspection on a mine's system that will result in safe operation of the system. True ____, False ____
2. Which two parameters are most important for fuses? a) voltage and resistance rating, b) ampere and current-interruption rating, c) voltage and amperage rating.
3. The current interruption rating is usually identified by its association with the letters "IR", or "CL". True ____, False ____.
4. Which of the following is/are safe to use on a wet surface: a) double insulation, b) three-prong plugs, c) GFCI, d) Correct fusing of the circuit, e) battery-powered hand-tools.
5. GFCI stands for a) Ground Field Cutoff Impedance, b) Ground Fault Cutoff Impedance, c) Ground Field Circuit Impedance, d) Ground Field Circuit Interrupter, e) Ground Fault Circuit Interrupter
6. A GFCI: a) impedes the flow of current, b) stops the flow of current when a short circuit condition exists, c) stops the flow of current when a ground fault exists, d) detects the voltage and current to see if its too high, e) measures the difference between the current into and out of an appliance f) measures the difference between the voltage into and out of an appliance, g) can be purchased on a cord with multiple outlets that tools can be plugged into, h) should be tested frequently, i) should never be disconnected because the circuit keeps opening when a worker is using it, j) protects workers when dangerous phase to phase and phase to neutral faults exist.
7. The third wire (as evidenced by the third prong on plug) in the cord of a tool must connect the tool to a separate conductor that provides a continuous path to the service entrance ground to provide the intended protection to persons using the tool. True ____, False ____
8. A double insulated tool can be recognized by its non-conducting handle. True ____, False ____
9. Double insulated tools are an alternative means of providing some protection for workers from ground fault electrocution. True ____, False ____
10. Using double insulated hand tools with 120 Vac current provides some protection, but a double-insulated tool is not recommended for a person working on a wet surface. True ____, False ____.
11. Safety of personnel working around ungrounded delta systems requires the use of ground-fault detector lights and immediate repairs when a ground fault is indicated. True ____, False ____
12. MSHA requires that the resistance between equipment frames and the service entrance ground block be measured and found to be less than 1 ohm whenever changes are made, but at least: a) daily, b) weekly, c) monthly, d) annually, e) every 5 years.
13. In a ground fault situation, most of the fault current flows into a) the grounding electrode system, b) the grounded electrode system.
14. The grounding electrode system provides personal protection. True ____, False ____.
15. Mines are required to test grounding electrode systems whenever changes are made, but at least: a) daily, b) weekly, c) monthly, d) annually, e) every 5 years.
16. The National Electric Code is not specific on the resistance value required for the grounding electrode system, and the system is of little value in protecting personnel. True ____, False ____.
17. A standard VOM meter can be used to test ground bed resistance. True ____, False ____.

Correct Answers & Notes on Answers

1. *False - The inspection should be done by a competent licensed-commercial electrician, who knows and understands the requirements of the National Electric Code, to ensure that ground-fault protection and other systems are adequate to protect workers from electrocution. Unless the mining engineer has training and years of experience in electrical systems similar to that of a licensed commercial journeyman electrician, he will be a hazard to himself and to others if he performs this inspection.*
2. *b) - If the ampere rating is too high, the circuit will not open in a ground fault condition. If the current-interruption rating is too low, the fuse may not protect against high fault currents.*
3. *True*
4. *e) - GFCIs are also used in such locations, but these can fail leaving the person using the tool unprotected. Also there is a strong temptation for workers to remove the GFCI from the circuit if it kicks too many times while trying to get a job done.*
5. *e)*
6. *c, e, g, h, i)*
7. *True*
8. *False - The tool must clearly be labeled "double-insulated".*
9. *True - Only battery-powered tools are recommended for wet surfaces.*
10. *True*
11. *True*
12. *d)*
13. *b) - The resistance of the grounding electrode system is usually too high for the circuit breaker or fuse to open the circuit in a ground fault situation. In a correctly-working system, nearly all of the current is carried through the low-resistance grounded conductor back to the transformer, causing the overcurrent devices (fuses or circuit breakers) to open the circuit.*
14. *False*
15. *d)*
16. *True - The code only requires that another rod be driven in at a specified distance from the first one if the ground-bed resistance is greater than 25 ohms. Thus a ground bed resistance of even 1000 ohms could pass.*
17. *False - A special ground bed resistance tester is needed, which measures ground bed resistance by the fall-of-potential method (also called "3-point", or "62%" method). These instruments typically cost more than \$500. See Section 10 of Michigan Tech's MSHA-Compliance Manual for commercially-available meters.*