

Information Bulletin

Ground Fault Occurs While Removing Electrical Panel Cover

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Tracking No: 646

Summary: On July 31, 2007, an electrician opened the cover of a HVAC unit disconnect switch. When the cover was moved a ground fault occurred, tripping the unit's supply breaker. The cause of the event was due to chaffing of the supply wiring by the opening and closing of the cover during frequent routine maintenance activities.

Discussion of Activities: The HVAC unit safety switch [Square D, 60-amp, top-hinged, safety switch] was the identified energy isolation point for the activity. After opening the disconnect switch, the craftsman lifted the disconnect switch cover to verify absence of voltage during a Safe to Work Check. As the cover was raised the craftsman heard a noise (pop) and immediately backed away (see evidence of fault in picture). A check of the power distribution panel determined the circuit breaker for the HVAC unit had tripped. The craftsman properly notified supervision and placed his personal lock on the supply circuit breaker. No injury occurred because the electrician used proper techniques, followed appropriate procedures, and used the correct type of personal protective equipment during the task. The wiring method used appears to be a primary contributor to the cause of the incident. Using a loop is an acceptable practice, but care must be exercised to ensure it is not so large as to contribute to this type of event.

Analysis: An investigation determined the safety switch cover had damaged the insulation on one of three incoming feeder conductors, causing a fault to ground which tripped the supply circuit breaker. The installation of the conductors (wire training) used a loop (see picture) to accommodate extra wire length in the panel. The repeated opening of the cover wore away the insulation on the conductor. Evidence of chaffing was visible on the other two conductors. It was noticed that this particular type of disconnect panel cover has caused chafing to occur in other locations. However, other events have occurred where wires were not configured in a manner to prevent chafing or inadvertent contact with screws placed in the panel/cabinet covers leading to arcs.



Photo of HVAC UNIT #4 DISCONNECT

Recommended Actions:

1. Conductors in electrical panels should be configured to avoid a condition where normal operation or opening the covers can cause an electrical hazard.
2. When opening electrical panels, a visual check should be made to identify evidence of chaffing of conductors, or other conditions that could lead to a hazardous condition at a later date. Repair any identified problems as soon as practical.

Cost Savings/Avoidance: Not determined

Work Function: Maintenance - Electrical

ISM Core Functions: Develop/Implement Controls

Hazards: Electrical

Keywords: Chaffing, Ground Fault, Wiring Configuration, Maintenance, Disconnects

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References: Occurrence Report EM-RL-PHMC-FSS-2007-0008, MO-721 Electrical Ground Fault Event; 1995-RL-WHC-0020, Screws Penetrate Electrical Wiring; 1996-RL-FDH-0056, Replacement Screw In Electrical Box Cover Arcs And Melts; 2003-RL-HNF-0014, Electrical Fault from Panel Cover Screw