

SAFETY ALERT



BURNS FROM INCORRECTLY RATED CIRCUIT BREAKER

INCIDENT

A boilermaker was attempting to reset a Residual Current Circuit Breaker (RCCB) supplying power to his welding machine. The RCCB failed internally. Burning gases and particles erupted through the casing, causing electrical burns to the boilermaker's hand.

CIRCUMSTANCES

A three phase welding outlet installed in a coal preparation plant was controlled by an RCCB mounted adjacent to it. An RCCB is a circuit breaker designed specifically to provide sensitive earth leakage protection to an outgoing circuit.

A boilermaker was attempting to close power on to his welding machine plugged into the outlet. The RCCB had tripped and the boilermaker made several attempts to close it, finally trying to close the device while holding in the test button. An electrical flash originating inside the circuit breaker propagated out through the casing, causing burns to the boilermaker's hand.

INVESTIGATION

The prospective fault level on the welding circuit was around 13000 Amps. The RCCB was rated to withstand a through fault current of 6000 Amps. This rating refers to the ability of the device to withstand short circuit currents until a coordinated upstream breaker can clear the fault.

The failed RCCB did not have a fault break or fault make rating, and was only designed to break its rated load current. In addition, the upstream breaker was not correctly rated to protect it.

When this is taken into account, the RCCB was seriously underrated for the application, in relation to both its fault break capacity and its withstand capacity.

RECOMMENDATION(S)

Mine Electrical Engineers and Managers of DCPs are reminded of the requirements of Cl 28 (1) of the *Coal Mines (General) Regulation 1999* which states:

“All electrical equipment at a mine or declared plant must be designed, installed, commissioned, operated, maintained (including servicing, repairing and overhauling) and decommissioned in such a manner as to control any risk from fire, explosion, electric shock or unintended movement of equipment.”

- In particular circuit breakers should be **adequately rated to make and break the prospective fault currents** for the circuit they are protecting. Selection of the correct circuit breaker for the job is essential, and should only be made by persons with the necessary technical competence.
- In all cases, RCCBs should be operated in accordance with their safety function and **no attempt should be made to override that function.**

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Report No: SA 99- 21 COMET Event ID 38463000
File No: C99 / 0812
Date: 20 October 1999
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