

PowerFlow

APPLICATION NOTE

PRODUCTS AND INFORMATION FOR POWER PROFESSIONALS

TruPower Associates Application Note #111

Testing Molded Case Circuit Breakers

Molded case circuit breakers (MCCB) are widely used in nuclear facilities and installations of vital equipment. However, testing of molded case circuit breakers is time consuming and difficult at best. Consequently, testing of MCCB's has been largely ignored.

Without testing, it is difficult to know when the MCCB has developed a defect or is out-of-tolerance. Because they are safety related devices and may not be operated regularly, it is possible to not know about a defect until the MCCB is called upon to operate and trip... then it is too late.

This is particularly troublesome for nuclear facilities where molded case circuit breakers typically protect hundreds if not thousands of motor drives and power distribution circuits. The predictable operation of every device is necessary to ensure the overall safety of the plant. Not to mention, the rigorous test standards imposed by the Nuclear Regulatory Commission in the United States (NRC) as stipulated by the Institute of Electrical and Electronic Engineers (IEEE) Standard 279, "Criteria for Protection Systems for Nuclear Power Generating Stations." In part, Standard 279 calls for a means to test protection systems.

The standard approach for MCCB testing, in line with NEMA recommendations, involves removing the breaker from the equipment in which it is installed and transferring it to a dedicated test assembly. There it is subjected to testing designed to establish that it is operational and within acceptable limits. This requires taking the motor control operation center or distribution board on which the MCCB is installed out of service, removing the breaker, radiation screening, transporting and testing of the MCCB, and the return trip/reinstallation of the breaker. This

is time consuming and can take up to eight hours especially considering the test time alone can be two hours.

The accuracy of the testing can be compromised by moving the MCCB and taking it outside of its normal operating environment. Complications can occur with the change in the local magnetic field, a change in ambient temperature, changes in impedance, and changes in thermal resistivity that might occur with moving the MCCB.

The ODEN Primary Current Injection Test Set from Megger allows **testing of MCCB in place** avoiding all of these potential testing flaws. This can be accomplished because the ODEN utilizes a hand-held probe. The **hand-held probe is insulated** and rated for the working voltage of the equipment under test, so the need for the user to wear special safety gear is eliminated.



ODEN Primary Current Injection Test Set

The ODEN also has an **1/30 function** that injects one thirtieth of the normal test current to determine power settings. This avoids preconditioning and the cooling down period that would otherwise be needed.

Testing MCCB in place with the ODEN Primary Current Injection Test Set greatly reduces the time it takes to test MCCB's making it possible to test MCCB's more often and to reduce out-of-tolerance (OOT) statistics. Finally, MCCB's can get the attention they deserve!