

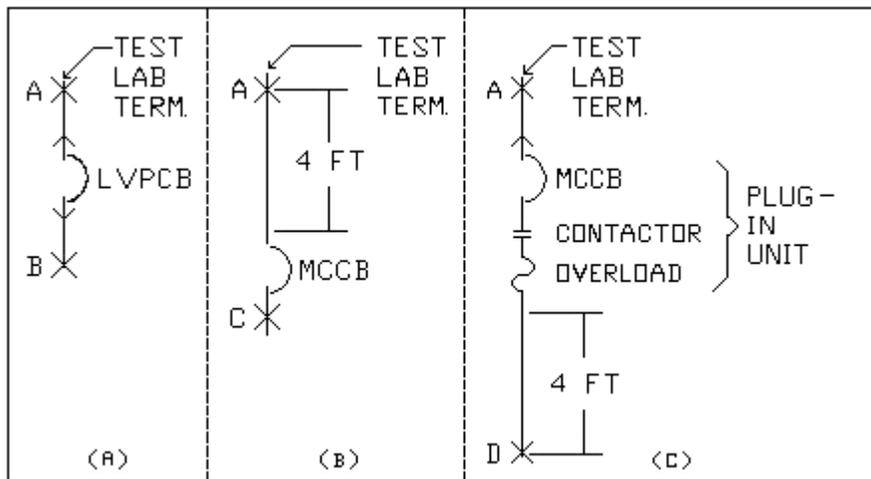
# Short Circuit Current Levels Used to Test Various Types of Circuit Breakers

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When applying interrupters of various types, it is important that we understand the meaning of the interrupting rating given to these devices. Consider, for instance, the methods of making interrupting tests on various types of circuit breakers. As the breakers get smaller and less costly, the test methods in the industry standards generally get less demanding.

When testing the interrupting capability of a high-voltage (over 1000V) circuit breaker, the current measured is the actual fault current flowing through the circuit breaker at the moment of the interruption. To rate a breaker of this class as a 25kA interrupter, it must actually interrupt 25kA. Momentary and short-time current requirements of the switchgear are also based on actual current flowing during the test. The reference standards are ANSI/IEEE C37.04, C37.06 and C37.09 for the circuit breakers and C37.20.2 for the switchgear.

For low voltage circuit breakers, this requirement changes to rating by prospective current. The test terminals of the laboratory source are short-circuited, as indicated by point A in Figure 1, and the required current flow is established. That short circuit is then removed and the equipment to be tested is connected to the test source. A short circuit is then applied to the equipment and the test made. The location of the short varies with the type of circuit breaker or equipment being tested:



**Figure 1: Fault Locations for Testing Low Voltage Equipments**

- (A) Low Voltage Power Circuit Breakers
- (B) Molded Case Circuit Breakers
- (C) Low Voltage Motor Control Centers

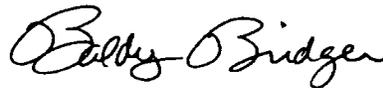
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- For a low voltage power circuit breaker, the fault is placed at the load terminals of the breaker, at point B in Figure 1. The reference standards are ANSI/IEEE C37.13 for the circuit breakers and C37.20.1 for the switchgear equipment.
- For a molded case circuit breaker, the fault is also placed at the load terminals of the circuit breaker, at point C in Figure 1. However, 4 feet of appropriately-sized conductor may be included between the test station terminals and the line terminals of the circuit breaker under test. The reference standard is UL 489.
- For a typical combination motor starter unit in a motor control center, the fault is placed at the end of 4 feet of appropriately-sized conductor connected to the load terminals of the starter unit, at point D in Figure 1. The reference standard is UL 845.

At each step of this chain, impedance is added to the test circuit, reducing the actual fault current the circuit breaker is required to interrupt. Several papers presented at recent IEEE conferences have raised questions about the adequacy of equipment certified to some of these test standards to interrupt all possible faults downstream of the circuit breaker. At least two IEEE subcommittees are discussing this matter.



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