

USE FUSED LEADS

Using test leads with fuses prevents injury from multimeter misuse or failure



This article was adapted from “Multimeter accident prevention plan: an electrical inspector’s survival guide” by Steve Smith of the Electrical Safety Authority.

Since 2002, the Electrical Safety Authority (ESA) has been performing in-depth investigations to determine root causes of electrical incidents. During these investigations a trend emerged for incidents involving multimeters. About 80 percent of these incidents resulted in critical injuries to the worker.

ESA’s analysis of these incidents pointed to user error as the most common cause, followed closely by internal component failure. User errors included

- using the wrong setting (e.g., selecting the ohms scale when testing voltage)

- choosing the wrong “CAT” rating of meter for the application
- using the wrong probe socket (i.e., amps instead of volts)
- improper use of the product (e.g., switching settings while under load)
- wrong voltage (system voltage exceeded the meter’s rated voltage).

As well, wear and tear on the meter and contamination inside can lead to internal component failure or a compromise of the components’ dielectric properties.

Examination of devices involved in incidents showed that even when some meters had internal protection, it did not appear to prevent a dead short from happening during testing.

Fused leads

Fused leads (leads containing fuses) offer a significant level of protection. Here’s the proof.

As part of its investigation, ESA contracted a high-voltage/high-current laboratory to test how fused leads handle internal meter failures. When properly rated fuses were used, fused leads were effective in preventing at least four of the five most common user error scenarios, as well as most internal failures. The only scenario the fused leads did not offer protection from was an extreme overvoltage condition. This was

due to the voltage limitations of the fuse itself.

Get the right equipment

Ensure that both your multimeter and fused leads are certified. Look for proof of independent testing by an organization accredited by the Standards Council of Canada, such as CSA (Canadian Standards Association) International.

As well, ensure that they have the appropriate category rating. For most contractor applications, a multimeter and fused leads should be CAT III rated. The internal probe fuse and lead fuses must be rated as high as or higher than the equipment you are going to work on—usually a minimum of 30 kA (200 kA is preferable). Fast-acting test lead fuses limit the energy released in the event of an arc flash.

Some fused leads have the following features

- blown fuse indication
- 200,000 amp interrupt capacity
- “CC” rated rejection-type fuse
- CAT III rating
- the ability to accommodate optional alligator clips.

For additional information, see the section on Multimeters in the Electrical Hazards chapter of the *Construction Health and Safety Manual*, available online at www.csao.org. 