

WESTERN UNDERGROUND COMMITTEE

GUIDE 2.10 (2.10/01/0982)

LINE FAULT-INDICATORS

NOTE: This "Guide" summarizes the opinions, recommendations, and practices of the Western Underground Committee members and is issued only to assist these members in preparing their own specifications, or in making recommendations to specification agencies. Thus, this "Guide" may not reflect the complete requirements of each individual utility and is not binding upon them.

1.0 SCOPE

- 1.1 This Guide covers the requirements for fault-indicators for use on distribution circuits (Overhead, Pad-Mounted and Subsurface).
- 1.2 It includes performance requirements, design criteria and tests, and environmental and performance tests.

2.0 GENERAL

- 2.1 It is intended that a minimum amount of field personnel skill be required for installation and operation of the device.
- 2.2 The manufacturer shall specify the design life and minimum number of operations of the unit.
- 2.3 The unit shall be capable of operating in an environment where the ambient temperature ranges from -40°C to 85°C while attached to cables operating at 90°C normal and 130°C emergency temperature.
- 2.4 The unit shall be rugged enough to withstand normal utility work including shipping, warehousing, and crew practices.
- 2.5 The unit shall be designed to allow installation on existing energized cables.
- 2.6 Units shall be submersible if designed for subsurface or pad-mount applications.

- 2.7 Units shall be weatherproof if designed for overhead applications.
- 2.8 Units must have the capability of being installed, removed, and reset using hot line tools.
- 2.9 Units may be automatic or manual resetting.
- 2.10 Units may be supplied with or without remote indication.
- 2.11 Units shall be capable of operation with the indicator in any position.

3.0 RATINGS

- 3.1 Fault Duty: The short time current withstand ratings and test shall be in accordance with section 4.4.8 of the IEEE proposed Test Code for Faulted Circuit Indicators (p495), Draft 13 (or the latest draft).
- 3.2 Trip Current: The minimum trip ratings shall be 200, 400, 600, 800, 1000 or 1,200 amperes.
- 3.3 Speed of Response: Units shall be available under the following two categories:
 - 3.3.1 Operation within 0.0167 seconds to provide coordination between indicators and all devices except current limiting fuses.
 - 3.3.2 Operation within 0.005 seconds to provide coordination with current limiting fuses.
 - 3.3.3 Upon request, manufacturer shall provide to purchaser the time current characteristic curves of the unit.

4.0 ENVIRONMENT RATINGS

- 4.1 Submersible Units
 - 4.1.1 Submersible units shall remain operational while entire unit is under complete and continuous submersion.
 - 4.1.2 All parts of the unit including mounting hardware shall be corrosion resistant.

4.2 Overhead Units

- 4.2.1 Overhead units shall be capable of continuous exposure to weather and sunlight.

5.0 **AUTOMATIC RESET**

5.1 General

- 5.1.1 Units designed for automatic current or voltage reset shall reset automatically with return to normal conditions within the manufacturer's published tolerances.
- 5.1.2 Units designed for automatic elapsed time reset shall reset within the manufacturer's published tolerances.

5.2 Automatic Current-Reset

- 5.2.1 The current required to auto-reset shall be not more than 5 amperes RMS unless other value are agreed to by purchaser and manufacturer.
- 5.2.2 To prevent false indication due to inrush or momentary overload, the indicator shall not require loss of circuit voltage to reset.

5.3 Automatic Voltage-Reset

- 5.3.1 The minimum reset voltage shall be 5 kV for voltage gradient reset units.
- 5.3.2 Upon request, manufacturer shall provide for purchaser plots of voltage level vs. reset time.
- 5.3.3 Units designed for "hardwire" connection and reset on secondary voltage shall have a reset minimum of 110 volts.

6.0 **MANUAL RESET**

- 6.1 Manual reset units shall be capable of being reset without removal of the unit from its installed position.

7.0 INDICATOR

- 7.1 Indicator Face: Units designed with an indicator face shall be required to have an unmistakable means of indicating faulted and normal conditions. Indication scheme shall be mutually agreed upon between manufacturer and purchaser.
- 7.2 Units designed without an indicator face shall be required to have an unmistakable means of indicating faulted and normal conditions.
- 7.3 Cables utilized to provide for remote location of indicator shall be a minimum of six feet in length with longer lengths available on special order.
- 7.4 Units designed to hang directly on the overhead line shall have the capability of being read from the ground.
- 7.5 Automatic current-reset three-phase units designed with three sensors and one indicator shall be available under the following two categories:
 - 7.5.1 Units will only reset when reset current is restored in all three phases.
 - 7.5.2 Units will reset when reset current is restored in any phase.

8.0 FAULT CURRENT SENSING ELEMENT

- 8.1 If the current sensing element is of a current transformer type, it shall be available to accommodate conductors of 1 ½, 2, and 2 ½ inch diameters (larger sizes on special order).
- 8.2 Units to be used only on overhead conductors shall be available with a 1½-inch inside diameter.
- 8.3 If the fault current sensing element utilizes a separable connector test point, it must provide an adequate water seal (for continuous submersion) and shall not affect the integrity or calibration of the test point.

9.0 DESIGN TESTING

- 9.1 Design testing shall be performed in accordance with section 4.1 of the IEEE proposed Test Code for Faulted Circuit Indicators (P495) Draft 13 (or the latest draft).

10.0 PRODUCTION TESTING

Production testing shall be performed in accordance with section 4.2 of the IEEE proposed Test Code for Faulted Circuit Indicators (P495) Draft 13 (or the latest draft).

11.0 NAMEPLATE

All indicators shall be provided with a permanent nameplate, which includes the following information:

- 11.1 Manufacturer's name
- 11.2 Serial number
- 11.3 Year of manufacture
- 11.4 Trip current rating
- 11.5 Minimum current, time lapse, or other condition-affecting auto reset.
- 11.6 Nominal speed of response in seconds; see Sections 3.3.1 and 3.3.2.
- 11.7 Whether three-phase unit is three-phase or single-phase resetting.
- 11.8 Manufacturer's catalog number