

Safety requirements for voltage testing instruments

1. FOREWORD

1.1. Approval

1.1.1. This standard is owned by _____.
name of promulgating organization or department

1.1.2. Questions related to the correct application or interpretation of this standard should be directed to _____.
insert appropriate authority here

1.2. Purpose

1.2.1. This standard establishes minimum safety requirements for handheld electrical measurement instruments used for voltages up to 750 Volts AC. This standard is intended to ensure the selection and use of appropriate handheld electrical measurement instruments to prevent employee injuries and other incidents during troubleshooting, repairs and servicing of electrical systems and equipment. Significant injuries, including shocks and arc flash burns have occurred as a result of unprotected contact with energized electrical components and with arc flash and blasts associated with high energy electrical faults. Handheld electrical measurement instruments are used to verify the absence or presence of voltage, and as such these instruments are safety devices.

1.3. Applicability/scope

1.3.1. All _____ activities are affected by this standard.
identify appropriate application area

1.3.2. This standard applies to all _____ employees,
name of company
and persons performing work at Company locations when working within the restricted approach boundary of exposed energized electrical conductors or circuit parts.

1.3.3. All electrical measurement instruments shall meet this standard

1.4. Change control/review process

1.4.1. Requests for changes to this standard must be made to the Director, Occupational Health and Safety (or other appropriate authority).

1.4.2. This standard will be reviewed at a minimum of every three years from the revision date for appropriate changes. Additional changes may be made more frequently to ensure clarity or correct errors.

1.4.3. The master copy (controlled copy) will reside on the Company intranet at

insert URL here as appropriate

1.4.4. Revisions to this standard will be identified with a bar in the left margin. Always use the most recent revision, signified by the revision date, when applying this standard.

1.5. Deviation process

Deviations to this standard must be submitted in writing to the Director, Occupational Health and Safety along with supporting documentation for alternative procedures and/or practices that provide at least equal protection to the methods stated in the standard.

1.6. Training

Each employee shall receive training on and shall demonstrate proficiency in the use of the test instruments issued for use in performing a task. Such training shall cover the:

- Selection of the appropriate test instrument for the task
- Limitations of the test instrument
- Instruction on the proper inspection and potential damage that could occur
- Proper handling and storage
- Correct interpretation of the test instrument indications
- Instruction on the correct and safe use of the test instrument for the task

Training shall be documented when the employee demonstrates proficiency in the test instrument's use. Employees shall be familiar with the test instruments that they are using and shall be a qualified person as defined in this standard. Each instrument shall have an appropriate instruction manual. Employees are required to read the instruction manual specifically for the test instrument in use, and sign a training acknowledgement form indicating that they have read the manual and understand the correct use and limitations of the instrument (see Appendix 1). Supervisors of qualified employees are responsible for ensuring that the appropriate employees have completed the required training and have completed the training acknowledgement form. This form shall be kept in the Supervisor's office or designated location for the duration that the instrument is in use. If a new testing instrument is issued, a new training acknowledgement form is required.

2. DEFINITIONS

2.1. Qualified person

A person who has been trained and is knowledgeable in the construction of electrical equipment, the recognition and avoidance of electrical hazards, special precautionary techniques, personal protective equipment, insulating and shielding materials, insulated tools, and test equipment to prevent injury. Qualified persons have additional training requirements if working within the limited approach boundary.

2.2. Boundary, limited approach

The linear distance in all directions from an exposed energized electrical part that defines the safe approach distance for unqualified persons. This distance is a minimum of three feet, six inches (1.0 meters) from an exposed, energized part of 50 V-750 Volts, nominal.

2.3. Voltage test instrument

A device capable of measuring the presence of voltage. These instruments may also incorporate special features, such as the ability to indicate continuity.

2.4. Volt-ohmmeter

A device capable of measuring continuity, voltage, and current. These instruments may also incorporate other special features, such as the ability to indicate capacitance and true-rms. They are also referred to as multimeters.

3. REFERENCES

3.1. International Electrotechnical Commission (IEC) 61010-1

"Safety requirements for electrical equipment for measurement, control, and laboratory use—Part 1: General requirements"—latest version, as amended.

4. INSTRUCTIONS/REQUIREMENTS

4.1. General

- 4.1.1. All handheld electrical measurement tools used by employees shall be certified as meeting IEC 61010-1 by third party independent testing laboratories known as NRTLs (Nationally Recognized Testing Laboratories). The US Department of Labor maintains a list of NRTLs at this site <https://www.osha.gov/dts/otpc/nrtl/nrtllist.html>.
- 4.1.2. Nationally Recognized Testing Laboratories include the Canadian Standards Association (CSA), Technischer Überwachungsverein (TUV), or Underwriters Laboratory (UL). The independent testing laboratory's mark shall appear on the exterior of the instrument.

Note: Instruments for use in North America shall be UL listed and CSA certified to the following standards:

- UL 3111-1 "Standard for Safety for Electrical Measuring and Test Equipment, Part 1"—General Requirements
- UL 3111-2-031 "Handheld Probe Assemblies for Electrical Measurement and Test"
- UL 3111-2-032 "Standard for Safety for Handheld Current Clamps for Electrical Measurement and Test"
- CSA C22.2.1010 "Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use—General Requirements"
- ISA/ANSI 82.01 "Safety Standard for Electrical and Electronic Test Measuring, Controlling, and Related Equipment—General Requirements"

Note: Instruments for use in Europe shall be CE marked and listed by third party independent testing laboratories as specified in 4.1.1.

- 4.1.3. Instrument model numbers meeting this standard will be listed in the corporate Qualified Source List. (Note: it is recommended that the organization establish a list of approved suppliers and approved model numbers to guide those making test instrument acquisitions). Other instruments may also meet this standard, but it is the responsibility of the requisitioner to ensure that other instruments meet the criteria of this standard.
- 4.1.4. All voltage testing instruments for use in manufacturing, assembly, and parts distribution centers shall be at minimum IEC 61010-1 Category III at 600 Volts for protection against transient voltages. Instruments used outdoors or in outbuildings shall be at least IEC 61010-1 Category IV at 600 Volts. Dependent on the application, it may be necessary to specify instruments capable of measuring higher voltages. All handheld electrical measurement instruments used by employees shall be rated for the nominal voltage of the system or component being measured. Such test instruments shall also have an appropriate overvoltage category rating, as shown in See Table 1.
- 4.1.5. As specified in IEC 61010-1, section 9.5.2, overcurrent protection shall be provided within the instrument, or in the test probes or leads. If the overcurrent protection is incorporated in the instrument's test probes it shall not produce a false negative reading while measuring energized equipment. Overcurrent protection may be in the form of fuses, circuit breakers, thermal cutouts, and impedance-limiting circuits or similar means to prevent excessive energy from being drawn into the instrument.
- 4.1.6. The design of the instrument's test probes shall minimize the potential for contact with exposed energized parts while performing measurements. Handheld electrical measurement instruments shall be equipped with spring-loaded, retractable covers on the instrument's test probes or flared finger guards. The maximum exposed probe length shall not exceed .75 inch (1.90 cm)
- 4.1.7. Handheld electrical measurement instruments shall be inspected before each use for damaged insulation on leads and other obvious physical damage. Damaged test instruments shall not be used until authorized repairs have been completed.
- 4.1.8. All handheld electrical measurement instruments shall be tested prior to, and after use, with a known energized electrical source to ensure that the instrument is functioning correctly (Live-Dead-Live approach). Self-test circuits or battery-powered simulators shall not be used to verify function.

- 4.1.9. Handheld electrical measurement instruments shall not be modified without the written consent of the original equipment manufacturer. The replacement of any defective components must be with identical components to the original or as authorized by the original equipment manufacturer.
- 4.1.10. Handheld test instruments shall not be stored in a manner that could cause damage to the instrument or the test leads. Test leads shall not be wrapped around the instrument for storage, but shall be folded neatly and the instrument placed into a suitable case or container.

TABLE 1: IEC 61010 categories

Measurement categories IAW IEC/EN 61010-031		
Measurement category	Description	Examples
CAT IV	<p>Three-phase at utility connection, any outdoor conductors.</p> <p>Limited only by the utility transformer feeding the circuit.</p> <p>>50 kA short circuit current.</p>	<ul style="list-style-type: none"> • The “origin of installation”—where low-voltage connection (service entrance cables) is made to utility power. • Electricity meters, primary overcurrent protection equipment. • Outside and service entrance, service drop from pole to building, run between meter and panel. • Overhead line to detached building, underground line to well pump.
CAT III	<p>Three-phase at distribution including single-phase commercial lighting.</p> <p><50 kA short circuit current.</p>	<ul style="list-style-type: none"> • Equipment in fixed installations, such as switchgear and polyphase motors. • Bus and feeders in industrial plants. • Feeders and short branch circuits, devices fed directly from distribution panels. • Lighting systems in larger buildings. • Appliance outlets with short connections to service entrance.
CAT II	<p>Single-phase receptacle-connected loads.</p> <p><10 kA short circuit current.</p>	<ul style="list-style-type: none"> • Appliance, portable tools, and other household similar loads. • Outlet and long branch circuits. <ul style="list-style-type: none"> - Outlets more than 10 meters (30 feet) from CAT III sources. - Outlets at more than 20 meters (60 feet) from CAT IV sources.

APPENDIX 1

Sample instruction acknowledgment

I, _____ have read the manual for the
employee name (print)

_____, and understand the use
make of instrument model number

and limitations of this test instrument.

employee signature

supervisor (print)

supervisor (signature)

This form shall be retained in the office of the supervisor or training department for the duration that this instrument is in use.

Fluke. *Keeping your world up and running.*®

Fluke Corporation
 PO Box 9090, Everett, WA 98206 U.S.A.

Fluke Europe B.V.
 PO Box 1186, 5602 BD
 Eindhoven, The Netherlands

For more information call:
 In the U.S.A. (800) 443-5853 or
 Fax (425) 446-5116
 In Europe/M-East/Africa +31 (0) 40 2675 200 or
 Fax +31 (0) 40 2675 222
 In Canada (800)-36-FLUKE or
 Fax (905) 890-6866
 From other countries +1 (425) 446-5500 or
 Fax +1 (425) 446-5116
 Web access: <http://www.fluke.com>

©2015 Fluke Corporation.
 Specifications subject to change without notice.
 Printed in U.S.A. 8/2015 6006023a-en

Modification of this document is not permitted without written permission from Fluke Corporation.