UL 61010-031

STANDARD FOR SAFETY

Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use – Part 031: Safety Requirements for Hand-Held and Hand-Manipulated Probe Assemblies for Electrical Test and Measurement

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UL Standard for Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use – Part 031: Safety Requirements for Hand-Held and Hand-Manipulated Probe Assemblies for Electrical Test and Measurement, UL 61010-031

Third Edition, Dated October 3, 2024

Summary of Topics

This new edition of ANSI/UL 61010-031, dated October 3, 2024 is an adoption of IEC 61010-031, Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use – Part 031: Safety Requirements for Hand-Held and Hand-Manipulated Probe Assemblies for Electrical Test and Measurement, third edition (issued December 2022). Please note that the National Difference document incorporates all of the US National Differences.

As noted in the Commitment for Amendments statement located on the back side of the title page, UL and CSA are committed to updating this bi-national standard jointly.

The new and revised requirements are substantially in accordance with Proposal(s) on this subject dated March 1, 2024.

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CSA C22.2 No. 61010-031:24
Third Edition
(IEC 61010-031:2022, MOD)



ULSE Inc.
UL 61010-031
Third Edition

Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use – Part 031: Safety Requirements for Hand-Held and Hand-Manipulated Probe Assemblies for Electrical Test and Measurement

October 3, 2024

This national standard is based on publication IEC 61010-031, third edition (2022-12).



ANSI/UL 61010-031-2024



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This Standard is subject to review within five years from the date of publication, and suggestions for its improvement will be referred to the appropriate committee. The technical content of IEC and ISO publications is kept under constant review by IEC and ISO. To submit a proposal for change, please send the following information to inquiries@csagroup.org and include "Proposal for change" in the subject line: Standard designation (number); relevant clause, table, and/or figure number; wording of the proposed change; and rationale for the change.

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This ANSI/UL Standard for Safety consists of the Third edition. The most recent designation of ANSI/UL 61010-031 as an American National Standard (ANSI) occurred on October 3, 2024. ANSI approval for a standard does not include the Cover Page, Transmittal Pages, Title Page (front and back), or the Preface. The National Difference Page is also excluded from the ANSI approval of IEC-based standards.

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Bibliography

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PREFACE

This is the harmonized CSA Group and ULSE Standard for Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use – Part 031: Safety Requirements for Hand-Held and Hand-Manipulated Probe Assemblies for Electrical Test and Measurement. It is the third edition of CSA C22.2 No. 61010-031 and the third edition of UL 61010-031. This edition of CSA C22.2 No. 61010-031 supersedes the previous edition published January 27, 2017. This edition of UL 61010-031 supersedes the previous edition published on January 7, 2020.

This harmonized standard is based on IEC Publication 61010-031: third edition, Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use – Part 031: Safety Requirements for Hand-Held and Hand-Manipulated Probe Assemblies for Electrical Test and Measurement, issued December 2022. IEC 61010-031 is copyrighted by the IEC.

This standard is considered suitable for use for conformity assessment within the stated scope of the standard.

This standard was reviewed by the CSA Subcommittee on Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use, under the jurisdiction of the CSA Technical Committee on Consumer and Commercial Products and the CSA Strategic Steering Committee on Requirements for Electrical Safety, and has been formally approved by the CSA Technical Committee. This standard has been developed in compliance with Standards Council of Canada requirements for National Standards of Canada. It has been published as a National Standard of Canada by CSA Group.

Application of Standard

Where reference is made to a specific number of samples to be tested, the specified number is to be considered a minimum quantity.

Note: Although the intended primary application of this standard is stated in its scope, it is important to note that it remains the responsibility of the users of the standard to judge its suitability for their particular purpose.

Level of Harmonization

This standard adopts the IEC text with national differences.

This standard is published as an identical standard for CSA Group and ULSE.

An identical standard is a standard that is exactly the same in technical content except for national differences resulting from conflicts in codes and governmental regulations. Presentation is word for word except for editorial changes.

All national differences from the IEC text are included in the CSA Group and ULSE versions of the standard. While the technical content is the same in each organization's version, the format and presentation may differ.

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Reasons for Differences from IEC

National Differences from the IEC are being added in order to address safety and regulatory situations present in the US and Canada.

Interpretations

The interpretation by the standards development organization of an identical or equivalent standard is based on the literal text to determine compliance with the standard in accordance with the procedural rules of the standards development organization. If more than one interpretation of the literal text has been identified, a revision is to be proposed as soon as possible to each of the standards development organizations to more accurately reflect the intent.

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NATIONAL DIFFERENCES

National Differences from the text of International Electrotechnical Commission (IEC) Publication Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use – Part 031: Safety Requirements for Hand-Held and Hand-Manipulated Probe Assemblies for Electrical Test and Measurement, copyright 2022, are indicated by notations (differences) and are presented in bold text. The national difference type is included in the body.

There are five types of National Differences as noted below. The difference type is noted on the first line of the National Difference in the standard. The standard may not include all types of these National Differences.

DR – These are National Differences based on the **national regulatory requirements**.

D1 – These are National Differences which are based on **basic safety principles and requirements**, elimination of which would compromise safety for consumers and users of products.

D2 – These are National Differences from IEC requirements based on existing **safety practices**. These requirements reflect national safety practices, where empirical substantiation (for the IEC or national requirement) is not available or the text has not been included in the IEC standard.

DC – These are National Differences based on the **component standards** and will not be deleted until a particular component standard is harmonized with the IEC component standard.

DE – These are National Differences based on **editorial comments or corrections**.

Each national difference contains a description of what the national difference entails. Typically one of the following words is used to explain how the text of the national difference is to be applied to the base IEC text:

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FOREWORD

INTERNATIONAL ELECTROTECHNICAL COMMISSION

SAFETY REQUIREMENTS FOR ELECTRICAL EQUIPMENT FOR MEASUREMENT, CONTROL, AND LABORATORY USE – Part 031: Safety requirements for hand-held and hand-manipulated probe assemblies for electrical test and measurement

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.

2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.

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8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.

9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

IEC 61010-031 has been prepared by IEC technical committee 66: Safety of measuring, control and laboratory equipment. It is an International Standard.

It has the status of a group safety publication in accordance with IEC Guide 104.

This third edition cancels and replaces the second edition published in 2015, and Amendment 1:2018. IEC 61010-031 is a stand-alone standard.

This edition includes the following significant technical changes with respect to the previous edition:

a) the scope has been made succinct. General information from the scope of Edition 2 has been moved to a new Clause 4. Consequently, Clause 4 to Clause 8 of Edition 2 have been renumbered. Clause 9 of Edition 2 has been deleted;

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b) in Clause 2, normative references have been dated and new normative references have been added;

c) in 3.1.4, the definition of probe tip has been modified;

d) in 4.1, there is no longer any differentiation between high voltage and low voltage probe assemblies. Type C probe assemblies have been merged with Type B probe assemblies;

e) in 4.1 d) "Kelvin" probes have been added to the list of probe assemblies as a new Type E and a new Figure 5;

f) in 4.1 e), probes for voltage measurement without electrical connection to conductors have been added to the list of probe assemblies as a new Type F and a new Figure 6;

g) in 4.2.1, spread of fire is no longer considered as a hazard;

h) Subclause 4.4.2.5 from Edition 2 has been deleted;

i) Subclause 4.4.4.3 from Edition 2 has been deleted;

j) in 5.4.4.1 consideration has been given to spacings and impedance;

k) in 6.1.1, removable parts of probe tips which bear markings are allowed;

l) in 6.1.5, the voltage to be marked for measurement categories is the AC line-to-neutral or DC voltage;

m) in 7.4.2, requirements for unmated connectors have been modified as follows:

1) Table 2 has been modified and expanded,

2) a calculation method for clearances of connectors above 20 kV has been defined,

3) creepage distances have been aligned with clearances;

n) in 7.4.3.1 and 7.4.3.5, requirements for IP2X probe tips with retractable sleeve have been added;

o) in 7.4.3.2, Probe tips are now applicable to non-contact probe assemblies;

p) in 7.5.2.3.2, the values of Table 5 have been modified;

q) in 7.6.2, voltage tests of clearances are done without humidity preconditioning;

r) pre-treatments for rigidity test from Clause 10 of Edition 2 have been moved to 9.2;

s) Subclause 11.1 of Edition 2 has been deleted;

t) addition of an exception for Type E probe assembly in 13.2. Removable parts of probe tips which bear markings are allowed;

u) Figure F.1 has been modified;

v) Annex G has been added, for determination of clearances for Table 2;

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w) Annex H has been added, covering line-to-neutral voltages for common mains supply systems.

The text of this International Standard is based on the following documents:

Draft	Report on voting
66/770/FDIS	66/771/RVD

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

A list of all parts of the IEC 61010 series, published under the general title, *Safety requirements for electrical equipment for measurement, control, and laboratory use*, can be found on the IEC website.

In this document the following print types are used:

– requirements and definitions: in roman type;

– NOTES and EXAMPLES: in smaller roman type;

– conformity and tests: *in italic type*;

– terms used throughout this document which have been defined in Clause 3: SMALL ROMAN CAPITALS.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

• reconfirmed,

• withdrawn,

• replaced by a revised edition, or

• amended.

DV.1 DE *Modification: Add the following to the end of the IEC Foreword:*

The numbering system in the standard uses a space instead of a comma to indicate thousands and uses a comma instead of a period to indicate a decimal point. For example, 1 000 means 1,000 and 1,01 means 1.01.

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SAFETY REQUIREMENTS FOR ELECTRICAL EQUIPMENT FOR MEASUREMENT, CONTROL, AND LABORATORY USE – Part 031: Safety requirements for hand-held and hand-manipulated probe assemblies for electrical test and measurement

1 Scope

This part of IEC 61010 specifies safety requirements for hand-held and hand-manipulated probe assemblies for electrical test and measurement, and their related accessories. These probe assemblies are for non-contact or direct electrical connection between a part and electrical test and measurement equipment. They can be fixed to the equipment or be detachable accessories for the equipment.

1DV DR *Modification of Clause 1 to add the following after the first paragraph:*

This standard does not apply to non-contact voltage detectors covered under the scope of UL 1436, ULC 61243 series, or CSA C22.2 No 160.

This group safety publication focusing on safety essential requirements is primarily intended to be used as a product safety standard for the products mentioned in the scope, but is also intended to be used by technical committees in the preparation of publications for products similar to those mentioned in the scope of this group safety publication, in accordance with the principles laid down in IEC Guide 104 and ISO/IEC Guide 51.

One of the responsibilities of a technical committee is, wherever applicable, to make use of basic safety publications and/or group safety publications in the preparation of its publications.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60027-1:1992, *Letter symbols to be used in electrical technology – Part 1: General*
IEC 60027-1:1992/AMD1:1997
IEC 60027-1:1992/AMD2:2005

IEC 60027-2:2019, *Letter symbols to be used in electrical technology – Part 2: Telecommunications and electronics*

IEC 60027-4:2006, *Letter symbols to be used in electrical technology – Part 4: Rotating electric machines*

IEC 60529:1989, *Degrees of protection provided by enclosures (IP Code)*
IEC 60529:1989/AMD1:1999
IEC 60529:1989/AMD2:2013

IEC 61010-1:2010, *Safety requirements for electrical equipment for measurement, control, and laboratory use – Part 1: General requirements*
IEC 61010-1:2010/AMD1:2016

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IEC 61180:2016, *High-voltage test techniques for low-voltage equipment – Definitions, test and procedure requirements, test equipment*

2DV DR *Modification of Clause 2 to add the following reference publications:*

C22.1-21, *Canadian Electrical Code, Part I*

CSA C22.2 No. 0:20, *General requirements – Canadian Electrical Code, Part II*

CSA C22.2 No. 160:15 (R2020), *Voltage and polarity testers*

CSA C22.2 No. 210:15 (R2020), *Appliance wiring material products*

CSA C22.2 No. 61010-1-12 (R2022) / UL 61010-1, *Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use – Part 1: General Requirements*

IEC 60664-3-2016, *Insulation coordination for equipment within low-voltage systems – Part 3: Use of coating, potting or moulding for protection against pollution*

NFPA 70, *National Electrical Code (NEC)*

UL 746E, *Polymeric Materials – Industrial Laminates, Filament Wound Tubing, Vulcanized Fibre, and Materials Used in Printed Wiring Boards*

UL 758, *Appliance Wiring Material*

UL 1436, *Outlet Circuit Testers and Similar Indicating Devices*

ULC 61243 series, *Live Working – Voltage detectors*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply (see Annex I for index of defined terms).

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

• IEC Electropedia: available at https://www.electropedia.org/

• ISO Online browsing platform: available at https://www.iso.org/obp

3.1 Parts and accessories

3.1.1
TERMINAL
component provided for the connection of a device (equipment) to external conductors

Note 1 to entry: TERMINALS can contain one or several contacts and the term includes sockets, pins, etc.

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3.1.2
ENCLOSURE
part providing protection of a probe assembly against certain external influences and, in any direction, protection against direct contact

3.1.3
PROTECTIVE FINGERGUARD
part of the ENCLOSURE that indicates the limit of safe access and that reduces the risk of the OPERATOR touching HAZARDOUS LIVE parts

3.1.4
PROBE TIP
part of a probe assembly or accessory which can touch the point being measured or tested

3.1.5
CONNECTOR
component which is attached to the PROBE WIRE, to connect the probe assembly to a TERMINAL of the equipment or to another probe assembly

3.1.6
REFERENCE CONNECTOR
CONNECTOR for connection to a reference point

3.1.7
TOOL
external device, including a key or coin, used to aid a person performing a mechanical function

3.1.8
PROBE WIRE
flexible wire or cable used as part of the probe assembly or its accessories, consisting of one or more conductors and associated insulation

3.1.9
SPRING-LOADED CLIP
probe or probe accessory with one or more hooks or jaws forced by a spring to grip the part being measured or tested

3.1.10
STACKABLE CONNECTOR
CONNECTOR assembly which contains an additional TERMINAL

EXAMPLE Figure 1 is an example of a STACKABLE CONNECTOR with a male CONNECTOR and a female TERMINAL.

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