# UL 61010-1

## STANDARD FOR SAFETY

Safety Requirements for Electrical Equipment For Measurement, Control, and Laboratory Use; Part 1: General Requirements

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Third Edition, Dated May 11, 2012

***Summary of Topics***

***This revision to ANSI/UL 61010-1 dated November 15, 2024 includes the changes in requirements to 3.1.7DV.1, 6.10.4DV.1, 6.10.4DV.2, 8.1DV, Table 15DV, 9.3.2DV.3, 9.3.2DV.4, 10.4.4DV, 11.6DV, 11.6.1DV, 11.6.3DV, 11.6.4DV, 12.3DV, Annex DVA, Annex DVB, DVD.1.1, DVD.2.1.1, DVD.2.4.7, DVD.2.4.6A.1, DVD.2.4.6A.2, DVD.2.4.6A.3, DVD.3.2, DVD.4.4.1, DVD.5, DVE.1.1 – DVE.1.5, DVE.2 – DVE.8, and Bibliography.***

Text that has been changed in any manner or impacted by ULSE's electronic publishing system is marked with a vertical line in the margin.

The new and revised requirements are substantially in accordance with Proposal(s) on this subject dated March 1, 2024 and July 5, 2024.

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**UL 61010-1**
**Third Edition**

# Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use – Part 1: General Requirements

May 11, 2012

(Title Page Reprinted: November 15, 2024)

This national standard is based on IEC 61010-1, Third Edition (2010).





**ANSI/UL 61010-1-2024**

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# INTERPRETATION SHEET 1

**SAFETY REQUIREMENTS FOR ELECTRICAL EQUIPMENT FOR MEASUREMENT, CONTROL, AND LABORATORY USE – Part 1: General requirements**

This interpretation sheet has been prepared by IEC technical committee 66: Safety of measuring, control and laboratory equipment.

The text of this interpretation sheet is based on the following documents:

| ISH | Report on voting |
|---|---|
| 66/497A/ISH | 66/505/RVD |

Full information on the voting for the approval of this interpretation sheet can be found in the report on voting indicated in the above table.

———————

IEC 61010-1:2010 contains a requirement in 6.8.3.1 pertaining to voltage testers for type tests as follows:

*“The generator shall be able to supply a power of at least 500 VA.”*

This has given rise to the following questions:

How does one interpret the requirement for voltage testers in 6.8.3.1 of IEC 61010-1:2010? Specifically, this subclause requires that “The generator shall be able to supply a power of at least 500 VA.” Does this requirement apply throughout the rated output range of the voltage tester? What is meant by the word “generator”? Is the “generator” the power supply within the voltage tester, or the voltage tester output, or something else?

**Interpretation:**

“A voltage tester used for type tests must be able to deliver at least 500 VA at its full-rated output voltage. It does not necessarily need to deliver 500 VA if set for lower voltages.

For example, a voltage tester that can deliver 100 mA at any test output voltage up to 5 000 V (and a current corresponding to 500 VA above 5 000 V) would meet the requirement.

The requirements for voltage testers used for routine (production line) tests are included in Annex F. The requirements of 6.8.3.1 do not apply to these voltage testers.”

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# Preface

This is the harmonized CSA Group, ISA, and ULSE standard for Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use – Part 1: General Requirements. It is the third edition of CAN/CSA-C22.2 No. 61010-1, the third edition of ANSI/ISA-61010-1 (82.02.01), and the third edition of UL 61010-1. This edition of CAN/CSA-C22.2 No. 61010-1 supersedes the previous edition published as CAN/CSA-C22.2 No. 61010-1 in 2004. This harmonized standard has been jointly revised on November 15, 2024. For this purpose, CSA Group and ULSE are issuing revision pages dated November 15, 2024, and ISA is issuing the changes to the edition dated November 15, 2024.

This harmonized standard is based on IEC Publication 61010-1: third edition Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use – Part 1: General requirements issued June 2010, as revised by IEC Corrigendum 1 issued May 2011, AMD1 issued December 2016, and Corrigendum 1 to AMD1 issued March 2019. IEC publication 61010-1 is copyrighted by the IEC.

This harmonized standard was prepared by CSA Group, the International Society of Automation (ISA), and ULSE.

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 the 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.

This is CAN/CSA-C22.2 No. 61010-1, Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use – Part 1: General requirements. This CAN/CSA-C22.2 No. 61010 Part 1 is to be used in conjunction with the appropriate CAN/CSA-C22.2 No. 61010 Part 2, which contains clauses to supplement or modify the corresponding clauses in the Part 1, to provide relevant requirements for each type of product.

This is the UL Standard for Safety for Electrical Equipment for Measurement, Control, and Laboratory Use; Part 1: General Requirements. This UL Part 1 is to be used in conjunction with the appropriate UL Part 2, which contains clauses to supplement or modify the corresponding clauses in the Part 1, to provide relevant requirements for each type of product.

CAN/CSA-C22.2 No. 61010-1, ANSI/ISA-61010-1 (82.02.01), and UL 61010-1 contain identical requirements and identical publication dates. The presentation and format of the standards material may differ between the three published standards.

### Level of Harmonization

This standard adopts the IEC text with national differences.

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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, ISA, and ULSE versions of the standard. While the technical content is the same in each organization's version, the format and presentation may differ.

**Reasons for Differences from IEC**

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

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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**.

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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 1: General requirements

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.

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This Consolidated version of IEC 61010-1 bears the edition number 3.1. It consists of the third edition (2010-06) [documents 66/414/FDIS and 66/423/RVD], its corrigenda 1 (2011-05) and 2 (2013-10) and its interpretation sheet (2013-02), and its amendment 1 (2016-12) [documents 66/612/FDIS and 66/620/RVD]. The technical content is identical to the base edition and its amendment.

International Standard IEC 61010-1 has been prepared by IEC technical committee 66: Safety of measuring, control and laboratory equipment.

It has the status of a group safety publication, as specified in IEC Guide 104.

This third edition cancels and replaces the second edition published in 2001. It constitutes a technical revision.

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This edition includes the following significant changes from the second edition, as well as numerous other changes.

• The scope of the standard has been expanded to include all locations where these products may be used, so that both professional and non-professional versions of these products are within the scope.

• The requirements for testing and measuring circuits (in various subclauses and the entirety of Clause 16) have been removed and included in a particular standard IEC 61010-2-030.

• Insulation requirements (6.7) have been completely rewritten.

  • Specific requirements have been added for solid insulation and thin-film insulation.

  • Subclause 6.7 now contains only the insulation requirements for MAINS CIRCUITS of OVERVOLTAGE CATEGORY II up to 300 V, and for secondary circuits.

  • The insulation requirements for all other circuits have been moved to a new Annex K.

• Additional requirements for protection against mechanical HAZARDS (Clause 7) have been included.

• Surface temperature limits (Clause 10) have been modified to conform to the limits of EN 563.

• Radiation requirements (Clause 12) have been modified, and take into account a distinction between intended emission and unintended emission.

• Requirements for reasonably foreseeable misuse and ergonomic aspects have been added (Clause 16).

• A new clause (Clause 17) has been added to deal with HAZARDS and environments not covered by the standard, along with a new informative annex (Annex J) dealing with RISK assessment.

• A new informative annex (Annex E) addresses methods of reducing the POLLUTION DEGREE of a micro-environment.

• Requirements for the qualification of coatings for protection against POLLUTION have been added (Annex H).

• A new informative annex (Annex I) has been added to further explain how to determine the WORKING VOLTAGE of a MAINS CIRCUIT.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

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

In this standard, the following print types are used:

– requirements and definitions: in roman type;

– NOTES: in smaller roman type;

– *conformity and tests: in italic type;*

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

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The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC web site under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

• reconfirmed,

• withdrawn,

• replaced by a revised edition, or

• amended.

**IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.**

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

**This edition incorporates Corrigendum 1 to IEC 61010-1, 3rd edition.**

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# INTRODUCTION

This International Standard specifies the safety requirements that are generally applicable to all equipment within its scope. For certain types of equipment, these requirements will be supplemented or modified by the special requirements of one, or more than one, particular part 2 of the standard which must be read in conjunction with the part 1 requirements.

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# SAFETY REQUIREMENTS FOR ELECTRICAL EQUIPMENT FOR MEASUREMENT, CONTROL, AND LABORATORY USE – Part 1: General requirements

## 1 Scope and object

### 1.1 Scope

#### 1.1.1 Equipment included in scope

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

This part of IEC 61010 specifies general safety requirements for the following types of electrical equipment and their accessories, wherever they are intended to be used.

a) Electrical test and measurement equipment

This is equipment which by electromagnetic means tests, measures, indicates or records one or more electrical or physical quantities, also non-measuring equipment such as signal generators, measurement standards, power supplies for laboratory use, transducers, transmitters, etc.

NOTE 1 This includes bench-top power supplies intended to aid a testing or measuring operation on another piece of equipment. Power supplies intended to power equipment are within the scope of IEC 61558 (see 1.1.2 h)).

This standard also applies to test equipment integrated into manufacturing processes and intended for testing manufactured devices.

NOTE 2 Manufacturing test equipment is likely to be installed adjacent to and interconnected with industrial machinery in this application.

b) Electrical industrial process-control equipment

This is equipment which controls one or more output quantities to specific values, with each value determined by manual setting, by local or remote programming, or by one or more input variables.

c) Electrical laboratory equipment

This is equipment which measures, indicates, monitors, inspects or analyses materials, or is used to prepare materials, and includes in vitro diagnostic (IVD) equipment.

This equipment may also be used in areas other than laboratories; examples include self-test IVD equipment to be used in the home and inspection equipment to be used to check people or material during transportation.

#### 1.1.2 Equipment excluded from scope

This standard does not apply to equipment within the scope of:

a) IEC 60065 (Audio, video and similar electronic apparatus);

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b) IEC 60204 (Safety of machinery – Electrical equipment of machines);

c) IEC 60335 (Household and similar electrical appliances);

d) IEC 60364 (Electrical installations of buildings);

e) IEC 60439 (Low-voltage switchgear and controlgear assemblies);

f) IEC 60601 (Medical electrical equipment);

g) IEC 60950 (Information technology equipment including electrical business equipment, except as specified in 1.1.3);

h) IEC 61558 (Power transformers, power supply units and similar);

i) IEC 61010-031 (Hand-held probe assemblies);

j) IEC 61243-3 (Live working – Voltage detectors – Part 3: Two-pole low-voltage type).

**1.1.2DV DR *Modification of Clause 1.1.2 to add the following as new items kDV) and lDV):***

**kDV) IEC 62368-1 (Audio/Video, Information and Communication Technology Equipment – Part 1: Safety Requirements).**

**lDV) UL/ULC 1389 Plant Oil Extraction Equipment and Systems.**

### 1.1.3 Computing equipment

This standard applies only to computers, processors, etc. which form part of equipment within the scope of this standard or are designed for use exclusively with the equipment.

NOTE Computing devices and similar equipment within the scope of IEC 60950 and conforming to its requirements are considered to be suitable for use with equipment within the scope of this standard. However, some of the requirements of IEC 60950 for resistance to moisture and liquids are less stringent than those in this standard (see 5.4.4 second paragraph)).

**1.1.3DV DR *Modification of Clause 1.1.3 NOTE to revise as follows:***

**Replace “IEC 60950” with “IEC 60950 or IEC 62368-1” in two places.**

**1.1.4DV DR *Addition of the following referencing the National Electrical Code and the Canadian Electrical Code:***

**This standard applies to equipment:**

**a) To be employed in accordance with ANSI/NFPA 70, National Electrical Code® (NEC);**

**b) Designed to comply with the general requirements of CAN/CSA C22.2 No. 0 and to be installed in accordance with the Canadian Electrical Code (CEC), Part I, CSA C22.1; or**

**c) Both (a) and (b).**

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**1.1.5DV DR *Addition of the following new sub-clause:***

**1.1.5DV.1 Gas, vapor and voltage detectors or sensors**

**Equipment intended to measure, sense or detect one or more electrical or physical quantities that identify an imminent hazard and used for signalling, may use this standard only when no alternative standard exists.**

**Note 1 This standard is considered not to apply to gas detectors and similar equipment within the scope of ANSI/UL 2034, ANSI/UL 2075, CSA C22.2 No. 205, or ULC-S588.**

**Note 2 Examples of standards providing additional safety requirements for gas or vapor detectors or sensors, which can be used in conjunction with this standard, are ANSI/UL 60079-29-1, ANSI/UL 920001, ANSI/UL 920004, CSA C22.2 No. 60079-29-1, or CSA C22.2 No. 62990-1.**

**Note 3 Clause 1.2.1 specifies the use of Clause 17 to assess conformity for hazards or environments not fully covered in Clauses 6 to 16, including aspects not covered by this document in Clause 1.2.2.**

**Note 4 Local and national codes may have additional requirements based on the end products' intended use.**

**Note 5 This standard is considered not to apply to voltage detectors and similar equipment within the scope of UL 1436, CAN/ULC 61243 series, or CSA C22.2 No 160.**

## 1.2 Object

### 1.2.1 Aspects included in scope

The purpose of the requirements of this standard is to ensure that HAZARDS to the OPERATOR and the surrounding area are reduced to a tolerable level.

Requirements for protection against particular types of HAZARD are given in Clauses 6 to 13, as follows:

a) electric shock or burn (see Clause 6);

b) mechanical HAZARDS (see Clauses 7 and 8);

c) spread of fire from the equipment (see Clause 9);

d) excessive temperature (see Clause 10);

e) effects of fluids and fluid pressure (see Clause 11);

f) effects of radiation, including lasers sources, and sonic and ultrasonic pressure (see Clause 12);

g) liberated gases, explosion and implosion (see Clause 13).

Requirements for protection against HAZARDS arising from REASONABLY FORESEEABLE MISUSE and ergonomic factors are specified in Clause 16.

RISK assessment for HAZARDS or environments not fully covered above is specified in Clause 17.

NOTE Attention is drawn to the existence of additional requirements regarding the health and safety of labour forces.

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