

# INTERNATIONAL STANDARD

# IEC 61010-1

Second edition  
2001-02

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GROUP SAFETY PUBLICATION

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**Safety requirements for electrical equipment  
for measurement, control, and laboratory use –**

**Part 1:  
General requirements**

*This **English-language** version is derived from the original **bilingual** publication by leaving out all French-language pages. Missing page numbers correspond to the French-language pages.*



Reference number  
IEC 61010-1:2001(E)

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International Electrotechnical Commission  
Международная Электротехническая Комиссия

PRICE CODE **XE**

*For price, see current catalogue*

## CONTENTS

	Page
FOREWORD .....	11
INTRODUCTION .....	15
Clause	
1 Scope and object .....	17
1.1 Scope .....	17
1.2 Object .....	19
1.3 Verification .....	19
1.4 Environmental conditions .....	21
2 Normative references .....	21
3 Terms and definitions .....	25
3.1 Equipment and states of equipment .....	25
3.2 Parts and accessories .....	25
3.3 Electrical quantities .....	27
3.4 Tests .....	27
3.5 Safety terms .....	27
3.6 Insulation .....	31
4 Tests .....	33
4.1 General .....	33
4.2 Sequence of tests .....	35
4.3 Reference test conditions .....	35
4.4 Testing in SINGLE FAULT CONDITION .....	39
5 Marking and documentation .....	47
5.1 Marking .....	47
5.2 Warning markings .....	57
5.3 Durability of markings .....	57
5.4 Documentation .....	57
6 Protection against electric shock .....	63
6.1 General .....	63
6.2 Determination of ACCESSIBLE parts .....	63
6.3 Permissible limits for ACCESSIBLE parts .....	65
6.4 Protection in NORMAL CONDITION .....	73
6.5 Protection in SINGLE FAULT CONDITION .....	73
6.6 Connections to external circuits .....	81
6.7 CLEARANCES and CREEPAGE DISTANCES .....	85
6.8 Procedure for dielectric strength tests .....	101
6.9 Constructional requirements for protection against electric shock .....	107
6.10 Connection to MAINS supply source and connections between parts of equipment .....	109
6.11 Disconnection from supply source .....	115

Clause	Page
7 Protection against mechanical HAZARDS .....	119
7.1 General.....	119
7.2 Moving parts .....	119
7.3 Stability .....	121
7.4 Provisions for lifting and carrying .....	123
7.5 Wall mounting.....	123
7.6 Expelled parts.....	123
8 Mechanical resistance to shock and impact.....	125
8.1 ENCLOSURE rigidity test .....	125
8.2 Drop test.....	129
9 Protection against the spread of fire.....	131
9.1 Eliminating or reducing the sources of ignition within the equipment .....	135
9.2 Containment of fire within the equipment, should it occur.....	135
9.3 Limited-energy circuit.....	139
9.4 Requirements for equipment containing or using flammable liquids.....	141
9.5 Overcurrent protection .....	143
10 Equipment temperature limits and resistance to heat .....	145
10.1 Surface temperature limits for protection against burns.....	145
10.2 Temperatures of windings.....	145
10.3 Other temperature measurements.....	147
10.4 Conduct of temperature tests.....	147
10.5 Resistance to heat.....	149
11 Protection against HAZARDS from fluids.....	153
11.1 General.....	153
11.2 Cleaning.....	153
11.3 Spillage.....	153
11.4 Overflow.....	153
11.5 Battery electrolyte.....	155
11.6 Specially protected equipment .....	155
11.7 Fluid pressure and leakage.....	155
12 Protection against radiation, including laser sources, and against sonic and ultrasonic pressure .....	161
12.1 General.....	161
12.2 Equipment producing ionizing radiation.....	161
12.3 Ultraviolet (UV) radiation.....	161
12.4 Microwave radiation .....	163
12.5 Sonic and ultrasonic pressure.....	163
12.6 Laser sources .....	165
13 Protection against liberated gases, explosion and implosion .....	165
13.1 Poisonous and injurious gases.....	165
13.2 Explosion and implosion .....	165
14 Components .....	169
14.1 General.....	169
14.2 Motors .....	173
14.3 Overtemperature protection devices.....	173
14.4 Fuse holders.....	175
14.5 MAINS voltage selecting devices.....	175

Clause	Page
14.6 HIGH INTEGRITY components.....	175
14.7 MAINS transformers tested outside equipment.....	175
14.8 Printed circuit boards .....	175
14.9 Circuits or components used as transient overvoltage limiting devices .....	177
15 Protection by interlocks .....	179
15.1 General .....	179
15.2 Prevention of reactivating .....	179
15.3 Reliability .....	179
16 Test and measurement equipment.....	179
16.1 Current measuring circuits.....	179
16.2 Multifunction meters and similar equipment.....	181
Annex A (normative) Measuring circuits for ACCESSIBLE current.....	183
Annex B (normative) Standard test finger .....	189
Annex C (normative) Measurement of CLEARANCES and CREEPAGE DISTANCES .....	193
Annex D (normative) Parts between which insulation requirements are specified .....	201
Annex E (normative) Reduction of POLLUTION degrees .....	209
Annex F (normative) ROUTINE TESTS .....	211
Annex G (informative) Leakage and rupture from fluids under pressure .....	215
Annex H (informative) Index of defined terms.....	227
Bibliography.....	229
Figure 1 – Maximum duration of short-term temporary ACCESSIBLE voltages in SINGLE FAULT CONDITION .....	69
Figure 2 – Charged capacitance level in NORMAL CONDITION and SINGLE FAULT CONDITION .....	71
Figure 3 – Detachable MAINS supply cords and connections .....	111
Figure 4 – Impact test using sphere .....	127
Figure 5 – Flow chart to explain the requirements for protection against the spread of fire..	133
Figure 6 – Baffle.....	137
Figure 7 – Area of the bottom of an ENCLOSURE to be constructed as specified in 9.2.1 b)1).....	139
Figure 8 – Ball-pressure test apparatus .....	151
Figure 9 – Ratio between hydraulic test pressure and RATED maximum working pressure ...	159
Figure 10 – Flow chart for conformity options 14.1 a), b), c) and d).....	171
Figure A.1 – Measuring circuit for a.c. with frequencies up to 1 MHz and for d.c. ....	183
Figure A.2 – Measuring circuits for a.c. with sinusoidal frequencies up to 100 Hz and for d.c. ....	185
Figure A.3 – Current measuring circuit for electrical burns .....	187
Figure A.4 – Current measuring circuit for wet contact .....	187

	Page
Figure B.1 – Rigid test finger (test probe 11 of IEC 61032).....	189
Figure B.2 – Jointed test finger (test probe B of IEC 61032) .....	191
Figure C.1 – Examples of methods of measuring CLEARANCE and CREEPAGE DISTANCES .....	199
Figures D.1 a) to D.1 d) – Protection between HAZARDOUS LIVE circuits and circuits not exceeding the values of 6.3.2 in NORMAL CONDITION and having external TERMINALS of ACCESSIBLE parts .....	203
Figures D.1 e) to D.1 h) – Protection between HAZARDOUS LIVE circuits and other circuits which do not exceed the values of 6.3.2 in NORMAL CONDITION and which have external TERMINALS .....	203
Figure D.2 a) and D.2 b) – Protection from a HAZARDOUS LIVE internal circuit for an ACCESSIBLE part which is not bonded to other ACCESSIBLE parts .....	205
Figure D.2 c) and D.2 d) – Protection from a HAZARDOUS LIVE primary circuit for ACCESSIBLE TERMINALS of a secondary circuit which does not exceed the values of 6.3.2 in NORMAL CONDITION.....	205
Figure D.3 – Protection of external ACCESSIBLE TERMINALS of two HAZARDOUS LIVE circuits ..	207
Figure G.1 – Conformity verification process .....	217
Table 1 – Symbols.....	51
Table 2 – Tightening torque for screw assemblies .....	77
Table 3 – Multiplication factors for CLEARANCE for altitudes up to 5 000 m .....	87
Table 4 – CLEARANCES and CREEPAGE DISTANCES for MAINS CIRCUITS .....	89
Table 5 – CLEARANCES for circuits derived from MAINS CIRCUITS .....	91
Table 6 – CLEARANCE values for the calculation of 6.7.3.2 .....	95
Table 7 – CREEPAGE DISTANCES .....	97
Table 8 – CLEARANCES for measurement categories II, III and IV .....	99
Table 9 – Test voltages for BASIC INSULATION .....	105
Table 10 – Correction factors for test voltage according to test site altitude.....	107
Table 11 – Physical tests on power supply cords.....	113
Table 12 – Acceptable perforation of the bottom of an ENCLOSURE.....	137
Table 13 – Limits of maximum available current .....	141
Table 14 – Overcurrent protective device .....	141
Table 15 – Surface temperature limits in NORMAL CONDITION .....	145
Table 16 – Insulation material of windings .....	147
Table 17 – Impulse withstand voltages .....	177
Table 18 – Output impedance for impulse generators .....	177
Table E.1 – Reduction of the POLLUTION degree of internal environment through the use of additional protection.....	209
Table G.1 – Test pressures for equipment with pressures above 14 MPa .....	221

## INTERNATIONAL ELECTROTECHNICAL COMMISSION

# **SAFETY REQUIREMENTS FOR ELECTRICAL EQUIPMENT FOR MEASUREMENT, CONTROL, AND LABORATORY USE –**

## **Part 1: General requirements**

### FOREWORD

- 1) The IEC (International Electrotechnical Commission) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of the 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, the IEC publishes International Standards. 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. The 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 the 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 National Committees.
- 3) The documents produced have the form of recommendations for international use and are published in the form of standards, technical specifications, technical reports or guides and they are accepted by the National Committees in that sense.
- 4) In order to promote international unification, IEC National Committees undertake to apply IEC International Standards transparently to the maximum extent possible in their national and regional standards. Any divergence between the IEC Standard and the corresponding national or regional standard shall be clearly indicated in the latter.
- 5) The IEC provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with one of its standards.
- 6) Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. The IEC shall not be held responsible for identifying any or all such patent rights.

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 second edition cancels and replaces the first edition published in 1990, amendment 1 (1992) and amendment 2 (1995). It constitutes a technical revision.

The text of this standard is based on the following documents:

FDIS	Report on voting
66/233/FDIS	66/244/RVD

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

This publication has been drafted in accordance with the ISO/IEC Directives, Part 3.

Annexes A to H form an integral part of this standard.

In this standard, the following print types are used:

- requirements and definitions: in roman type;
- NOTES: in smaller roman type;
- *conformity: in italic type*;
- terms used throughout this standard which have been defined in clause 3: SMALL ROMAN CAPITALS.

The committee has decided that the contents of this publication will remain unchanged until 2002. At this date, the publication will be

- reconfirmed;
- withdrawn;
- replaced by a revised edition, or
- amended.

The contents of the corrigenda of May 2002 and April 2003 have been included in this copy.

Withdrawn



## INTRODUCTION

This part 1 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.

Withdrawn

# 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 part of IEC 61010 specifies general safety requirements for electrical equipment intended for professional, industrial process, and educational use, any of which may incorporate computing devices, as defined in a) to d) below, when used under the environmental conditions of 1.4.

a) Electrical test and measurement equipment

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

NOTE All indicating and recording electrical measuring instruments (except those excluded in 1.1.2) fall within the scope of IEC 61010 unless they are panel meters designed only for building-in to other equipment. Built-in panel meters are considered to be components and only need to meet the relevant requirements of IEC 61010, or other standards, as part of the equipment into which they are built.

b) Electrical 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 or analyses substances, or is used to prepare materials, and includes in vitro diagnostic (IVD) equipment

This equipment may also be used in areas other than laboratories, for example self-test IVD equipment may be used in the home.

d) Accessories intended for use with the above (for example, sample handling equipment).

##### 1.1.2 Equipment excluded from scope

This standard does not apply to equipment within the scope of

- a) IEC 60065 (Safety requirements for audio, video and similar electronic apparatus);
- b) IEC 60204 (Controls for electrical machines);
- c) IEC 60335 (Safety of household and similar electrical appliances);
- d) IEC 60364 (Electrical installations of buildings);
- e) IEC 60439-1 (Low-voltage switchgear and controlgear assemblies);
- f) IEC 60521 (Class 0,5; 1 and 2 alternating current watt-hour meters);
- g) IEC 60601 (Medical electrical equipment);

- h) IEC 60950 (Safety of information technology equipment including electrical business equipment, except as specified in 1.1.3);
- i) IEC 61558 (Power transformers, power supply units and similar).

### 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. If HAZARDS from moisture or liquids could affect equipment that conforms to IEC 60950 and is used with equipment which conforms to this standard, the instructions for use should specify any additional precautions required.

## 1.2 Object

### 1.2.1 Aspects included in scope

The purpose of the requirements of this part 1 is to ensure that the design and methods of construction used provide adequate protection for the OPERATOR and the surrounding area against

- a) electric shock or burn (see clause 6);
- b) mechanical HAZARDS (see clauses 7 and 8);
- c) excessive temperature (see clauses 9 and 10);
- d) spread of fire from the equipment (see clause 9);
- 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).

NOTE Attention is drawn to the existence of additional requirements which may be specified by national authorities responsible for the health and safety of labour forces.

### 1.2.2 Aspects excluded from scope

This standard does not cover

- a) reliable function, performance or other properties of the equipment not related to safety;
- b) effectiveness of transport packaging;
- c) EMC requirements, which are covered by IEC 61326;
- d) protective measures for explosive atmospheres (see IEC 60079);
- e) servicing (repair);
- f) protection of servicing (repair) personnel.

NOTE Servicing personnel are expected to be reasonably careful in dealing with obvious HAZARDS, but the design should protect against mishap by the use of warning labels, shields for hazardous voltage TERMINALS, segregation of low-voltage circuits from hazardous voltages, etc. More important, servicing personnel should be trained to recognize unexpected HAZARDS and to react accordingly.

## 1.3 Verification

This standard also specifies methods of verifying, through inspection and type testing, that the equipment meets the requirements of this standard.

NOTE Requirements for ROUTINE TESTS are given in annex F.

## 1.4 Environmental conditions

### 1.4.1 Normal environmental conditions

This standard applies to equipment designed to be safe at least under the following conditions:

- a) indoor use;
- b) altitude up to 2 000 m;
- c) temperature 5 °C to 40 °C;
- d) maximum relative humidity 80 % for temperatures up to 31 °C decreasing linearly to 50 % relative humidity at 40 °C;
- e) MAINS supply voltage fluctuations up to  $\pm 10$  % of the nominal voltage;
- f) transient overvoltages typically present on the MAINS supply.

NOTE The normal level of transient overvoltages is impulse withstand (overvoltage) category II of IEC 60364-4-443.

- g) applicable RATED POLLUTION degree.

### 1.4.2 Extended environmental conditions

This standard applies to equipment designed to be safe not only in the environmental conditions specified in 1.4.1, but also in any of the following conditions for which the equipment is RATED by the manufacturer:

- a) outdoor use;
- b) altitude above 2 000 m;
- c) ambient temperatures below 5 °C or above 40 °C;
- d) relative humidity above the levels specified in 1.4.1;
- e) MAINS supply voltage fluctuations exceeding  $\pm 10$  % of the nominal voltage.

## 2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of IEC 61010. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of IEC 61010 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

IEC 60027, *Letter symbols to be used in electrical technology*

IEC 60060, *High-voltage test techniques*

IEC 60065, *Audio, video and similar electronic apparatus – Safety requirements*

IEC 60085, *Thermal evaluation and classification of electrical insulation*

IEC 60227, *Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V*

IEC 60245, *Rubber insulated cables – Rated voltages up to and including 450/750 V*

IEC 60309, *Plugs, socket-outlets and couplers for industrial purposes*

IEC 60335, *Safety of household and similar electrical appliances*

IEC 60529, *Degrees of protection provided by enclosures (IP Code)*

IEC 60651, *Sound level meters*

IEC 60664-3, *Insulation coordination for equipment within low-voltage systems – Part 3: Use of coatings to achieve insulation coordination of printed board assemblies*

IEC 60707, *Flammability of solid non-metallic materials when exposed to flame sources – List of test methods*

IEC 60799, *Electrical accessories – Cord sets and interconnection cord sets*

IEC 60804, *Integrating-averaging sound level meters*

IEC 60825-1, *Safety of laser products – Part 1: Equipment classification, requirements and user's guide*

IEC 60947-1, *Low-voltage switchgear and controlgear – Part 1: General rules*

IEC 60947-3, *Low-voltage switchgear and controlgear – Part 3: Switches, disconnectors, switch-disconnectors and fuse-combination units*

ISO 306:1994, *Plastics – Thermoplastic materials – Determination of Vicat softening temperature (VST)*

ISO 3746, *Acoustics – Determination of sound power levels of noise sources using sound pressure – Survey method using an enveloping measurement surface over a reflecting plane*

ISO 4126-1, *Safety valves – Part 1: General requirements*

ISO 9614-1, *Acoustics – Determination of sound power levels of noise sources using sound intensity – Part 1: Measurement at discrete points*