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# UL 60730-1

## STANDARD FOR SAFETY

### Automatic Electrical Controls – Part 1: General Requirements

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UL Standard for Safety for Automatic Electrical Controls – Part 1: General Requirements, UL 60730-1  
Sixth Edition, Dated October 31, 2024

### **Summary of Topics**

***Adoption of IEC 60730-1, Automatic electrical controls – Part 1: General requirements, (Edition 6.0, issued by the IEC September 2022) as a new Sixth Edition IEC-based UL Standard, UL 60730-1, dated October 31, 2024 with US National Differences. Please note that the national difference document incorporates all of the U.S. National Differences for UL 60730-1.***

The new and revised requirements are substantially in accordance with Proposal(s) on this subject dated January 26, 2024 and April 19, 2024.

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#### **Bibliography**

## Preface

This UL Standard is based on IEC Publication 60730-1: sixth edition, Automatic electrical controls – Part 1: General requirements. IEC publication 60730-1 is copyrighted by the IEC.

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## NATIONAL DIFFERENCES

National Differences from the text of International Electrotechnical Commission (IEC) Publication 60730-1, Automatic Electrical Controls, Part 1: General Requirements, copyright 2022 are indicated by notations (differences) and are presented in bold text.

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:

**Addition / Add** - An addition entails adding a complete new numbered clause, subclause, table, figure, or annex. Addition is not meant to include adding select words to the base IEC text.

**Modification / Modify** - A modification is an altering of the existing base IEC text such as the addition, replacement or deletion of certain words or the replacement of an entire clause, subclause, table, figure, or annex of the base IEC text.

**Deletion / Delete** - A deletion entails complete deletion of an entire numbered clause, subclause, table, figure, or annex without any replacement text.

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# FOREWORD

## INTERNATIONAL ELECTROTECHNICAL COMMISSION

### AUTOMATIC ELECTRICAL CONTROLS – 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.

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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6) All users should ensure that they have the latest edition of this publication.

7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.

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 60730-1 has been prepared by IEC technical committee 72: Automatic electrical controls. It is an International Standard.

This sixth edition cancels and replaces the fifth edition published in 2013, Amendment 1:2015 and Amendment 2:2020. This edition constitutes a technical revision.

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

- a) Structure of the main clauses    The clauses of the standard are grouped into two sections of requirements, where
- the first section consists of the Clauses 5 to 13 that, in general, addresses the construction of the product. It is noted that certain construction requirements may have verification requirements integrated within the clause to facilitate usage of the standard, and

	<ul style="list-style-type: none"> <li>• the second section consists of Clauses 14 to 26 that addresses the verification requirements;</li> </ul>
b) Scope	Relocated and deleted clauses to better reflect the products covered under the part 1 and for easier reading;
c) Normative references	Updated references;
d) Terms and definitions	Revised text in certain clauses and relocated relevant Clause H.3 subclauses into Clause 3;
e) General requirements	General structure of the standard explained along with a figure to depict the intent;
f) General notes on tests	Reduced sample size from 3 to 1, yet requiring analysis; order of tests more flexible; relocation of battery requirements from Annex V;
g) Rating	Deleted – covered under the scope;
h) Classification	Deleted – covered under information;
i) Information	Updated Table 1 to reflect entries from the classification clause, and all cross-references;
j) Protection against electric shock	Revised Clause 8 to include Clause H.8 and Clause V.8 subclauses, revised clauses as appropriate to distinguish between a live part and a hazardous live part;
k) Provision for protective earthing	
l) Construction requirements	One Y1 capacitor allowed; relocated relevant requirements of Clause H.11 and Clause V.11 into Subclause 9.2.5 and Subclause 9.13.4.4 respectively;
m) Moisture and dust	Relocated IP table from classification to Clause 14; updated references;
n) Manufacturing deviation and drift	All clauses moved to Annex H since the requirements pertain to functional safety of controls;
o) EMC-Emissions	Moved Clause H.23 into Clause 23;
p) EMC-Immunity	New EMC requirements (performance) for all controls except incorporated/integrated controls with Class A control functions. Products intended for HBES/BACS are also subjected to these requirements;
q) Fault assessment on electronic circuits	Fault assessment moved from Annex H to Clause 13; deleted test abnormal voltage for electronic disconnection;
r) Annex H	Relocated all relevant requirements for electronics to the respective clauses within the body of the standard and retained requirements related to functional safety in this annex;
s) Annex T	Revised clauses for clarity in Annex P;
t) Annex U	Removed, the necessity of the annex was not seen anymore;
u) Annex V	Included in the main part of the standard.

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

Draft	Report on voting
72/1307/FDIS	72/1320/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](http://www.iec.ch/members_experts/refdocs). The main document types developed by IEC are described in greater detail at <https://www.iec.ch/publications>.

A list of all parts of the IEC 60730 series, under the general title: *Automatic electrical controls*, can be found on the IEC website.

In the development of a fully international standard to cover automatic electrical controls, it has been necessary to take into consideration the differing requirements resulting from practical experience in various parts of the world and to recognize the variation in national electrical systems and wiring rules.

The "in some countries" clauses have been moved to the regional respectively national differences in Annex Q to Annex T.

It is envisaged that in the next edition of this document, it will be found possible to remove those differences that are covered by new IEC standards now being prepared by other technical committees.

This part 1 is to be used in conjunction with the appropriate part 2 for a particular type of control, or for controls for particular applications. This part 1 may also be applied, so far as reasonable, to controls not mentioned in a part 2, and to controls designed on new principles, in which cases additional requirements may be considered to be necessary.

Where, for a particular clause or subclause, the text of part 2 indicates:

<i>Addition:</i>	the part 1 text applies with the additional requirement indicated in a part 2;
<i>Modification:</i>	the part 1 text applies with a minor change as indicated in a part 2;
<i>Replacement:</i>	the part 2 text contains a change which replaces the part 1 text in its entirety.

Where no change is necessary, the part 2 indicates that the relevant clause or subclause applies.

NOTE In this document the following print types are used:

- Requirements proper: in roman type;
- *Test specifications: in italic type;*
- Explanatory matter: in smaller roman type;
- Defined terms: **bold type**.

The committee has decided that the contents of the base publication and its amendment 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.

**DV.1 Modification to the Notes:**

- Words in SMALL ROMAN CAPITALS in the text are defined in [Clause 3](#).

**DV.2 Addition:**

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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# AUTOMATIC ELECTRICAL CONTROLS – Part 1: General requirements

## 1 Scope

This document applies to automatic electrical controls

- for use in, on, or in association with equipment for household appliance and similar use;

NOTE 1 Throughout this document, the word "equipment" means "appliance and equipment".

- for building automation within the scope of ISO 16484 series and IEC 63044 series (HBES/BACS);

EXAMPLE 1 Independently mounted water valves, controls in smart grid systems and controls for building automation systems within the scope of ISO 16484-2.

- for equipment that is used by the public, such as equipment intended to be used in shops, offices, hospitals, farms and commercial and industrial applications;

EXAMPLE 2 Controls for commercial catering, heating and air-conditioning equipment.

- that are SMART ENABLED CONTROLS;

EXAMPLE 3 Smart grid control, remote interfaces/control of energy-consuming equipment including computer or smart phone.

- that are AC or DC powered controls with a rated voltage not exceeding 690 V AC or 600 V DC where the DC source is provided by primary or secondary batteries;

- used in, on, or in association with equipment that use electricity, gas, oil, solid fuel, solar thermal energy, etc., or a combination thereof;

- utilized as part of a control system or controls which are mechanically integral with multifunctional controls having non-electrical outputs;

- using NTC or PTC THERMISTORS and to discrete THERMISTORS, requirements for which are contained in Annex [J](#);

- that are mechanically or electrically operated, responsive to or controlling such characteristics as temperature, pressure, passage of time, humidity, light, electrostatic effects, flow, or liquid level, current, voltage, acceleration, or combinations thereof;

- as well as manual controls when such are electrically and/or mechanically integral with automatic controls.

NOTE 2 Requirements for manually actuated mechanical switches not forming part of an automatic control are contained in IEC 61058-1-1.

This document applies to

- the inherent safety of automatic electrical controls, and
- functional safety of automatic electrical controls and safety related systems,

- controls where the performance (for example the effect of EMC phenomena) of the product can impair the overall safety and performance of the controlled system,
- the operating values, operating times, and operating sequences where such are associated with equipment safety.

This document specifies the requirements for construction, operation and testing of automatic electrical controls used in, on, or in association with an equipment.

This document does not

- apply to automatic ELECTRONIC CONTROLS intended exclusively for industrial process applications unless explicitly mentioned in the relevant part 2 or the equipment standard. However, this document can be applied to evaluate automatic electrical controls intended specifically for industrial applications in cases where no relevant safety standard exists.
- take into account the response value of an automatic action of a control, if such a response value is dependent upon the method of mounting the control in the equipment. Where a response value is of significant purpose for the protection of the user, or surroundings, the value defined in the appropriate equipment standard or as determined by the manufacturer will apply.
- address the integrity of the output signal to the network devices, such as interoperability with other devices unless it has been evaluated as part of the control system.

**1DV.1 D2 Modification of Clause 1 by adding the following text:**

**CONTROLS intended to be installed in air handling spaces or in other environmental air space (plenums) are covered under the scope of this standard.**

**CONTROLS intended to manage (monitor and/or control) energy consumption of components/systems (load management) or power sources are covered under the scope of this standard.**

## **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 60038, *IEC standard voltages*

IEC 60065:2014, *Audio, video and similar electronic apparatus – Safety requirements*

IEC 60068-2-75, *Environmental testing – Part 2-75: Tests – Test Eh: Hammer tests*

IEC 60085, *Electrical insulation – Thermal evaluation and designation*

IEC 60099-1:1991, *Surge arresters – Part 1: Non-linear resistor type gapped surge arresters for a.c. systems*<sup>1</sup>

<sup>1</sup> Withdrawn.

IEC 60112:2020, *Method for the determination of the proof and the comparative tracking indices of solid insulating materials*

IEC 60127 (all parts), *Miniature fuses*

IEC 60227-1, *Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V – Part 1: General requirements*

IEC 60245-1, *Rubber insulated cables – Rated voltages up to and including 450/750 V – Part 1: General requirements*

IEC 60269 (all parts), *Low-voltage fuses*

IEC 60335-1:2020, *Household and similar electrical appliances – Safety – Part 1: General requirements*

IEC 60384-14, *Fixed capacitors for use in electronic equipment – Part 14: Sectional specification – Fixed capacitors for electromagnetic interference suppression and connection to the supply mains*

IEC 60384-16, *Fixed capacitors for use in electronic equipment – Part 16: Sectional specification – Fixed metallized polypropylene film dielectric DC capacitors*

IEC 60384-17, *Fixed capacitors for use in electronic equipment – Part 17: Sectional specification – Fixed metallized polypropylene film dielectric AC and pulse capacitors*

IEC 60417, *Graphical symbols for use on equipment*

IEC 60423, *Conduit systems for cable management – Outside diameters of conduits for electrical installations and threads for conduits and fittings*

IEC 60529:1989, *Degrees of protection provided by enclosures (IP code)*

IEC 60529:1989/AMD1:1999

IEC 60529:1989/AMD2:2013

IEC 60539 (all parts), *Directly heated negative temperature coefficient thermistors*

IEC 60664-1:2007<sup>2</sup>, *Insulation coordination for equipment within low-voltage systems – Part 1: Principles, requirements and tests*

<sup>2</sup> Withdrawn.

IEC TR 60664-2 (all parts), *Insulation coordination for equipment within low-voltage systems*

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

IEC 60664-4, *Insulation coordination for equipment within low-voltage systems – Part 4: Consideration of high-frequency voltage stress*

IEC 60695-2-10, *Fire hazard testing – Part 2-10: Glowing/hot-wire based test methods – Glow-wire apparatus and common test procedure*

IEC 60695-2-11:2021, *Fire hazard testing – Part 2-11: Glowing/hot-wire based test methods – Glow-wire flammability test method for end-products (GWEPT)*

IEC 60695-10-2, *Fire hazard testing – Part 10-2: Abnormal heat – Ball pressure test method*

IEC 60738 (all parts), *Thermistors – Directly heated positive temperature coefficient*

IEC 60747-5-5, *Semiconductor devices – Part 5-5: Optoelectronic devices – Photocouplers*

IEC 60884-1, *Plugs and socket-outlets for household and similar purposes – Part 1: General requirements*

IEC 60884-2-5:2017, *Plugs and socket-outlets for household and similar purposes – Part 2-5: Particular requirements for adaptors*

IEC 60998-2-2, *Connecting devices for low-voltage circuits for household and similar purposes – Part 2-2: Particular requirements for connecting devices as separate entities with screwless-type clamping units*

IEC 60998-2-3, *Connecting devices for low-voltage circuits for household and similar purposes – Part 2-3: Particular requirements for connecting devices as separate entities with insulation-piercing clamping units*

IEC 60999-1, *Connecting devices – Electrical copper conductors – Safety requirements for screw-type and screwless-type clamping units – Part 1: General requirements and particular requirements for clamping units for conductors from 0,2 mm<sup>2</sup> up to 35 mm<sup>2</sup> (included)*

IEC 61000-3-2, *Electromagnetic compatibility (EMC) – Part 3-2: Limits – Limits for harmonic current emissions (equipment input current ≤ 16 A per phase)*

IEC 61000-3-3, *Electromagnetic compatibility (EMC) – Part 3-3: Limits – Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current ≤ 16 A per phase and not subject to conditional connection*

IEC 61000-3-11, *Electromagnetic compatibility (EMC) – Part 3-11: Limits – Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems – Equipment with rated current ≤ 75 A and subject to conditional connection*

IEC 61000-3-12, *Electromagnetic compatibility (EMC) – Part 3-12: Limits – Limits for harmonic currents produced by equipment connected to public low-voltage systems with input current >16 A and ≤ 75 A per phase*

IEC 61000-4-2:2008, *Electromagnetic compatibility (EMC) – Part 4-2: Testing and measurement techniques – Electrostatic discharge immunity test*

IEC 61000-4-3, *Electromagnetic compatibility (EMC) – Part 4-3: Testing and measurement techniques – Radiated, radio-frequency, electromagnetic field immunity test*

IEC 61000-4-4, *Electromagnetic compatibility (EMC) – Part 4-4: Testing and measurement techniques – Electrical fast transient/burst immunity test*

IEC 61000-4-5:2014, *Electromagnetic compatibility (EMC) – Part 4-5: Testing and measurement techniques – Surge immunity test*

IEC 61000-4-5:2014/AMD1:2017

IEC 61000-4-6, *Electromagnetic compatibility (EMC) – Part 4-6: Testing and measurement techniques – Immunity to conducted disturbances, induced by radio-frequency fields*

IEC 61000-4-8, *Electromagnetic compatibility (EMC) – Part 4-8: Testing and measurement techniques – Power frequency magnetic field immunity test*

IEC 61000-4-11, *Electromagnetic compatibility (EMC) – Part 4-11: Testing and measurement techniques – Voltage dips, short interruptions and voltage variations immunity tests for equipment with current up to 16 A per phase*

IEC 61000-4-13:2002, *Electromagnetic compatibility (EMC) – Part 4-13: Testing and measurement techniques – Harmonics and interharmonics including mains signalling at a.c. power port, low frequency immunity tests*

IEC 61000-4-13:2002 /AMD1:2009

IEC 61000-4-13:2002 /AMD2:2015

IEC 61000-4-20, *Electromagnetic compatibility (EMC) – Part 4-20: Testing and measurement techniques – Emission and immunity testing in transverse electromagnetic (TEM) waveguides*

IEC 61000-4-21, *Electromagnetic compatibility (EMC) – Part 4-21: Testing and measurement techniques – Reverberation chamber test methods*

IEC 61000-4-22, *Electromagnetic compatibility (EMC) – Part 4-22: Testing and measurement techniques – Radiated emissions and immunity measurements in fully anechoic rooms (FARs)*

IEC 61000-4-28, *Electromagnetic compatibility (EMC) – Part 4-28: Testing and measurement techniques – Variation of power frequency, immunity test for equipment with input current not exceeding 16A per phase*

IEC 61000-6-1:2016, *Electromagnetic compatibility (EMC) – Part 6-1: Generic standards – Immunity standard for residential, commercial and light-industrial environments*

IEC 61000-6-2:2016, *Electromagnetic compatibility (EMC) – Part 6-2: Generic standards – Immunity standard for industrial environments*

IEC 61000-6-3:2020, *Electromagnetic compatibility (EMC) – Part 6-3: Generic standards – Emission standard for equipment in residential environments*

IEC 61000-6-4:2018, *Electromagnetic compatibility (EMC) – Part 6-4: Generic standards – Emission standard for industrial environments*

IEC 61051-1, *Varistors for use in electronic equipment – Part 1: Generic specification*

IEC 61051-2, *Varistors for use in electronic equipment – Part 2: Sectional specification for surge suppression varistors*

IEC 61051-2-2, *Varistors for use in electronic equipment – Part 2: Blank detail specification for zinc oxide surge suppression varistors. Assessment level E*

IEC 61210, *Connecting devices – Flat quick-connect terminations for electrical copper conductors – Safety requirements*

IEC 61249 (all parts), *Materials for printed boards and other interconnecting structures*

IEC 61558-2-6, *Safety of transformers, reactors, power supply units and combinations thereof – Part 2-6: Particular requirements and tests for safety isolating transformers and power supply units incorporating safety isolating transformers for general applications*

IEC 61558-2-16, *Safety of transformers, reactors, power supply units and combinations thereof – Part 2-16: Particular requirements and tests for switch mode power supply units and transformers for switch mode power supply units for general applications*

IEC 61810-3, *Electromechanical elementary relays – Part 3: Relays with forcibly guided (mechanically linked) contacts*

IEC 62151, *Safety of equipment electrically connected to a telecommunication network*

IEC 62319 (all parts), *Polymeric thermistors – Directly heated positive step function temperature coefficient*

IEC 62326 (all parts), *Printed boards*

IEC 62368-1, *Audio/video, information and communication technology equipment – Part 1: Safety requirements*

IEC 63044 (all parts), *Home and Building Electronic Systems (HBES) and Building Automation and Control Systems (BACS)*

CISPR 11, *Industrial, scientific and medical equipment – Radio-frequency disturbance characteristics – Limits and methods of measurement*

CISPR 14-1:2020, *Electromagnetic compatibility – Requirements for household appliances, electric tools and similar apparatus – Part 1: Emission*

CISPR 32:2015, *Electromagnetic compatibility of multimedia equipment – Emission requirements*  
CISPR 32:2015/AMD1:2019

ISO 4046-4:2016, *Paper, board, pulps and related terms – Vocabulary – Part 4: Paper and board grades and converted products*

ISO 7637-2:2011, *Road vehicles – Electrical disturbances from conduction and coupling – Part 2: Electrical transient conduction along supply lines only*

ISO 7637-3:2016, *Road vehicles – Electrical disturbances from conduction and coupling – Part 3: Electrical transient transmission by capacitive and inductive coupling via lines other than supply lines*

ISO 16484 (all parts), *Building automation and control systems (BACS)*

**2DV D2 Modification of Clause 2 to add the following:**

**The following UL Standards are referenced in this Standard:**

**UL 50, Enclosures for Electrical Equipment, Non-Environmental Considerations**

**UL 50E, Enclosures for Electrical Equipment, Environmental Considerations**

**UL 62, Flexible Cords and Cables**

**UL 94, Tests for Flammability of Plastic Materials for Parts in Devices and Appliances**

**UL 157, Gaskets and Seals**

**UL 248-14, Low-Voltage Fuses – Part 14: Supplemental Fuses**

**UL 310, Electrical Quick-Connect Terminals**

**UL 508, Industrial Control Equipment**

**UL 514A, Metallic Outlet Boxes**

**UL 514B, Conduit, Tubing, and Cable Fittings**

**UL 514C, Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers**

**UL 635, Insulating Bushings**

**UL 746C, Polymeric Materials – Use in Electrical Equipment Evaluations**

**UL 796, Printed Wiring Boards**

**UL 969, Marking and Labeling Systems**

**UL 1059, Terminal Blocks**

**UL 1434, Thermistor-type Devices**

**UL 4200A, Products Incorporating Button Batteries or Coin Cell Batteries (First edition including revisions through August 30, 2023)**

**UL 4248, Fuseholders series**

**UL 5085-1, Low Voltage Transformers – Part 1: General Requirements**

**UL 5085-2, Low Voltage Transformers – Part 2: General Purpose Transformers**

**UL 5085-3, Low Voltage Transformers – Part 3: Class 2 and Class 3 Transformers**

### **3 Terms and definitions**

For the purposes of this document, the following terms and definitions apply.

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

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

NOTE Where the terms "voltage" and "current" are used, they imply the RMS values, unless otherwise specified.

### 3.1 Definitions relating to ratings, voltages, currents, frequencies, and wattages

#### 3.1.1

RATED VOLTAGE, CURRENT, FREQUENCY OR WATTAGE

voltage, current, frequency or wattage assigned to a control by the manufacturer

Note 1 to entry: For three phase supply, the RATED VOLTAGE is the line-to-line voltage.

#### 3.1.2

RATED VOLTAGE, CURRENT, FREQUENCY OR WATTAGE RANGE

voltage, current, frequency or wattage ranges assigned to the CONTROL by the manufacturer and expressed by lower and upper values

#### 3.1.3

WORKING VOLTAGE

highest RMS value of the AC or DC voltage across any particular insulation which can occur when the equipment is supplied at RATED VOLTAGE

Note 1 to entry: TRANSIENT OVERVOLTAGES are disregarded.

Note 2 to entry: Open-circuit conditions and normal operating conditions are taken into account.

#### 3.1.4

EXTRA-LOW VOLTAGE

ELV

voltage not exceeding the maximum values of 50 V AC (RMS), 70,7 V AC (peak) or 120 V DC (ripple-free) between conductors and between conductors and earth which is permitted to be maintained indefinitely under normal and single-FAULT conditions

Note 1 to entry: Ripple-free is conventionally defined as an RMS ripple voltage of not more than 10 % of the DC component.

Note 2 to entry: The use of ELV other than in SELV SYSTEM or PELV SYSTEM is not a protective measure against electric shock, this is in line with IEC 61140:2016.

#### 3.1.5

SAFETY EXTRA-LOW VOLTAGE

PROTECTIVE EXTRA-LOW VOLTAGE

SELV/PELV

voltage for use in SELV SYSTEM or PELV SYSTEM between simultaneously ACCESSIBLE PART(S) and between any ACCESSIBLE PART and earth, not exceeding the limits of 30 V AC (RMS), 42,4 V AC (peak) or 60 V DC (ripple free) under normal and single-FAULT condition, which is provided by an independent source (such as motor generators, and batteries) or when obtained from higher voltage is obtained by a SAFETY ISOLATING TRANSFORMER or a converter with separate windings providing equivalent insulation

Note 1 to entry: The voltage limits are based on the assumption that the safety isolating transformer is supplied at its rated voltage. For the purpose of the output test in [12.2.1](#), the secondary output voltage limit shall be increased as specified in [19.2.2](#).

Note 2 to entry: Transformers used in converters that have separate windings and provide equivalent insulation are covered under IEC 61558-2-6 and IEC 61558-2-16.

Note 3 to entry: SELV/PELV limits are defined regardless of any special condition which may occur in installation. Different requirements may be specified in the relevant electrical installation standards (e.g. IEC 60364 series) or in the applicable local regulations.

Note 4 to entry: Ripple-free is conventionally defined as an RMS ripple voltage of not more than 10 % of the DC component.

Note 5 to entry: SELV/PELV limits may be different in other product or system standards. In case a control is declared exclusively for use in applications governed by a different standard, the limits set by the application standard apply (e.g. controls to be used

exclusively in household appliances according IEC 60335 set of standards or connected to HBES/BACS systems according to IEC 63044-3 accept different SELV voltage limits).

**3.1.5DV D1 Modification of Clause 3.1.5 NOTE 2 as follows:**

**Replace "IEC 61558-2-6" with "UL 5085-1 and UL 5085-3. Transformers used in Switch-mode power supplies are evaluated to the applicable requirements of this standard."**

3.1.6

SAFETY ISOLATING TRANSFORMER

transformer, the input winding of which is electrically separated from the output winding by an insulation at least equivalent to DOUBLE INSULATION or REINFORCED INSULATION, and which is intended to supply SAFETY EXTRA-LOW VOLTAGE circuits

**3.1.6DV DR Modification of 3.1.6 to add the following NOTE:**

**NOTE DV1: A Class 2 transformer which is considered a safety isolating transformer is defined as a step-down transformer of the low-voltage secondary type in accordance with Article 725 of the National Electrical Code, NFPA 70.**

3.1.7

ISOLATED LIMITED SECONDARY CIRCUIT

circuit from an isolated secondary winding of a transformer having a maximum capacity of 100 VA and an open-circuit secondary voltage rating not exceeding 1 000 V

3.1.8

PILOT DUTY

class of OPERATION in which the ultimate electrical load is controlled by an auxiliary means such as a relay or contactor

3.1.9

TRANSIENT OVERVOLTAGE

overvoltage with a duration of a few milliseconds or less, oscillatory or non-oscillatory, usually highly damped

Note 1 to entry: TRANSIENT OVERVOLTAGES may be immediately followed by temporary overvoltages. In such cases the two overvoltages are considered as separate events.

Note 2 to entry: IEC 60071-1 defines three types of TRANSIENT OVERVOLTAGES, namely slow-front overvoltages, fast-front overvoltages and very fast-front overvoltages according to their time to peak, tail or total duration, and possible superimposed oscillations.

[SOURCE: IEC 60050-614:2016, 614-03-14]

3.1.10

RATED IMPULSE VOLTAGE

impulse withstand voltage assigned by the manufacturer to the equipment or to a part of it, characterizing the specified withstand capability of its insulation against overvoltages

Note 1 to entry: The term rated impulse voltage is the same as impulse withstand voltage given in IEC 60664-1 overvoltage category.

3.1.11  
OVERVOLTAGE CATEGORY  
numeral defining a TRANSIENT OVERVOLTAGE condition

Note 1 to entry: Overvoltage categories I, II, III, and IV are used. See Annex D.

[SOURCE: IEC 60050-581:2008, 581-21-02, modified – Note 1 to entry has been added]

3.1.12  
SELV SYSTEM  
electrical system in which the voltage cannot exceed the values in [3.1.5](#):

- under normal conditions, and
- under single FAULT conditions, including protective earth FAULTS in other electric circuits

[SOURCE: IEC 60050-826:2004, 826-12-31; modified – "the value of extra-low voltage" has been changed to "the values in 3.1.5" and Note 1 to entry has been deleted]

3.1.13  
PELV SYSTEM  
electrical system in which the voltage cannot exceed the values in [3.1.5](#):

- under normal conditions, and
- under single FAULT conditions, except protective earth FAULTS in other electric circuits

[SOURCE: IEC 60050-826:2004, 826-12-32; modified – "the value of extra-low voltage" has been changed to "the values in 3.1.5" and Note 1 to entry has been deleted]

## 3.2 Definitions of types of control according to purpose

3.2.1  
ELECTRICAL CONTROL  
device used in, on or in association with an equipment for the purpose of varying or modifying the output from such equipment, and which embodies the aspects of INITIATION, TRANSMISSION and OPERATION

Note 1 to entry: Hereinafter, electrical control is referred to as "CONTROL".

Note 2 to entry: At least one of these aspects shall be electrical or electronic.

3.2.2  
MANUAL CONTROL  
control in which the INITIATION is by ACTUATION and in which the TRANSMISSION and the OPERATION are both direct and without any intentional time delay

3.2.3  
AUTOMATIC CONTROL  
CONTROL in which at least one aspect is non-manual

3.2.4  
SENSING CONTROL  
AUTOMATIC CONTROL in which INITIATION is by an element sensitive to the particular ACTIVATING QUANTITY declared, for example, temperature, current, humidity, light, liquid level, position, pressure or velocity

### 3.2.5

#### THERMOSTAT

cycling temperature SENSING CONTROL, which is intended to keep a temperature between two particular values under normal operating conditions and which can have provision for SETTING BY THE USER

Note 1 to entry: A THERMOSTAT will provide a TYPE 1 ACTION or a TYPE 2 ACTION as declared.

### 3.2.6

#### TEMPERATURE LIMITER

temperature SENSING CONTROL which is intended to keep a temperature below or above one particular value during normal operating conditions and which can have provision for SETTING BY THE USER

Note 1 to entry: A TEMPERATURE LIMITER may be of the automatic or of the manual reset type. It does not make the reverse OPERATION during the normal DUTY CYCLE of the appliance.

Note 2 to entry: A TEMPERATURE LIMITER will provide a TYPE 1 ACTION or a TYPE 2 ACTION as declared.

### 3.2.7

#### THERMAL CUT-OUT

temperature SENSING CONTROL intended to keep a temperature below or above one particular value during abnormal operating conditions and which has no provision for SETTING BY THE USER

Note 1 to entry: A THERMAL CUT-OUT may be of the automatic or of the manual reset type.

Note 2 to entry: A THERMAL CUT-OUT will provide a TYPE 2 ACTION.

### 3.2.8

#### ENERGY REGULATOR

self-cycling CONTROL which alters the energy to a load and which can incorporate means for SETTING BY THE USER to change the average energy supplied

Note 1 to entry: The ratio of the on-time, to the on-plus-off-time, determines the average energy supplied.

### 3.2.9

#### TIME-BASED CONTROL

automated CONTROL in which the TRANSMISSION is effected by a time-based PRIME MOVER or a time-based electrical circuit

### 3.2.10

#### ELECTRICALLY OPERATED CONTROL

AUTOMATIC CONTROL in which the TRANSMISSION is affected by an electrical PRIME MOVER and in which the OPERATION controls an electric circuit, and is without intentional significant time-delay

Note 1 to entry: An example is a relay.

Note 2 to entry: A slugged-relay may be either an ELECTRICALLY OPERATED CONTROL, or a TIME-BASED CONTROL by agreement between test house and manufacturer.

### 3.2.11

#### TIMER

TIME-BASED CONTROL which requires ACTUATION before the next cycle can take place

Note 1 to entry: During a cycle, it may require an external electrical or mechanical signal before moving from a rest position to allow the cycle to continue. An example is a programmer.

### 3.2.12

#### TIME SWITCH

TIME-BASED CONTROL which continues with a subsequent cycle when the preceding one has been completed

Note 1 to entry: An example is a 24 h CONTROL on a storage heater.

### 3.2.13

#### ELECTRICALLY OPERATED VALVE

AUTOMATIC CONTROL in which the TRANSMISSION is effected by an electrical PRIME MOVER and in which the OPERATION controls the flow of a liquid or a gas

### 3.2.14

#### ELECTRICALLY OPERATED MECHANISM

AUTOMATIC CONTROL in which the TRANSMISSION is effected by an electrical PRIME MOVER in which the OPERATION controls a mechanical device

Note 1 to entry: An example is an electrically operated interlock for a spin dryer lid.

Note 2 to entry: An electric motor is not included in this definition.

### 3.2.15

#### OPERATING CONTROL

CONTROL which starts or regulates the equipment during normal operation

Note 1 to entry: This operating control can provide CLASS A, CLASS B or CLASS C CONTROL FUNCTIONS.

### 3.2.16

#### PROTECTIVE CONTROL

CONTROL, the OPERATION of which is intended to prevent a hazardous situation during abnormal operation of the equipment

### 3.2.17

#### MULTIPURPOSE CONTROL

ELECTRICAL CONTROL that can be classified and used for more than one purpose

Note 1 to entry: An example of a MULTIPURPOSE CONTROL is a THERMOSTAT that can also be used as a TEMPERATURE LIMITER.

### 3.2.18

#### MULTIFUNCTIONAL CONTROL

ELECTRICAL CONTROL which incorporates more than one function

Note 1 to entry: An example of a MULTIFUNCTIONAL CONTROL is the combination of a THERMOSTAT and a humidistat.

### 3.2.19

#### SYSTEM

CONTROL and CONTROL sensors and actuators as applied to an application or processes

## 3.3 Definitions relating to the function of controls

### 3.3.1

#### INITIATION

alteration to that aspect of a CONTROL which is required to produce TRANSMISSION and OPERATION

### 3.3.2

#### TRANSMISSION

essential coupling between INITIATION and OPERATION which is required to enable the CONTROL to fulfil its purpose

Note 1 to entry: This includes, but is not limited to, the use of:

- a) communication lines/protocols;
- b) additional hardware and/or software;
- c) IR/RF; or

all combinations of a) to c) via Internet using, for example, modems, portable telephones, etc.

### 3.3.3

#### OPERATION

change in that aspect of a CONTROL which modifies the input to the equipment or part of the equipment

### 3.3.4

#### AUTOMATIC ACTION

that action of an AUTOMATIC CONTROL in which the TRANSMISSION and OPERATION are produced by initiation which is not the result of ACTUATION

### 3.3.5

#### SLOW-MAKE SLOW-BREAK AUTOMATIC ACTION

mode of OPERATION where the rate of contact make and/or break is directly proportional to the rate of change of the ACTIVATING QUANTITY, or to the speed of movement of a PRIME MOVER

Note 1 to entry: This action may be applicable to either the make, or the break, or both.

### 3.3.6

#### MANUAL ACTION

that action of an AUTOMATIC CONTROL or of a MANUAL CONTROL in which the TRANSMISSION and OPERATION are produced by INITIATION which is the result of ACTUATION

### 3.3.7

#### ACTUATION

movement of the ACTUATING MEMBER of the CONTROL by the USER, by hand, by foot or by any other human activity

### 3.3.8

#### LOCATED POSITION

position of the ACTUATING MEMBER to which it will return if it is released after being moved slightly

### 3.3.9

#### INTERMEDIATE POSITION

any position of any ACTUATING MEMBER which is adjacent to a LOCATED POSITION, and in which the ACTUATING MEMBER will remain and in which the OPERATION of the CONTROL is intermediate

### 3.3.10

#### ACTIVATING QUANTITY

physical characteristic of a medium, the variation or stability of which is being sensed

### 3.3.11

#### OPERATING VALUE

value of the relevant temperature, pressure, current, etc. at which a SENSING CONTROL operates on a rise or fall of the ACTIVATING QUANTITY

### 3.3.12

#### OPERATING TIME

duration of time, or the difference of time, between any two functions, electrical or mechanical, occurring during the AUTOMATIC ACTION of a TIME-BASED CONTROL

### 3.3.13

#### OPERATING SEQUENCE

intended sequence, order or pattern in which the OPERATION of the electrical or mechanical functions of a CONTROL are intended to occur as a result of either an AUTOMATIC or a MANUAL ACTION of a CONTROL

Note 1 to entry: It includes the pattern of opened or closed contacts in any LOCATED POSITION, INTERMEDIATE POSITION or position of SETTING BY THE EQUIPMENT MANUFACTURER or SETTING BY THE USER.

### 3.3.14

#### RESPONSE VALUE

OPERATING VALUE, the OPERATING TIME or the OPERATING SEQUENCE which relates a CONTROL to a particular equipment

### 3.3.15

#### TRIP-FREE

AUTOMATIC ACTION, with a reset ACTUATING MEMBER, in which the AUTOMATIC ACTION is independent of manipulation or position of the reset mechanism

### 3.3.16

#### SETTING

mechanical positioning of a part of a control in order to select an OPERATING VALUE

### 3.3.17

#### SETTING BY THE CONTROL MANUFACTURER

any SETTING carried out by the CONTROL MANUFACTURER which is not intended to be altered by the EQUIPMENT MANUFACTURER, the INSTALLER or the USER

### 3.3.18

#### SETTING BY THE EQUIPMENT MANUFACTURER

any SETTING carried out by the EQUIPMENT MANUFACTURER which is not intended to be altered by the INSTALLER or the USER

### 3.3.19

#### SETTING BY THE INSTALLER

any SETTING carried out by the INSTALLER, as instructed by the EQUIPMENT MANUFACTURER or the CONTROL MANUFACTURER, and which is not intended to be altered by the USER

### 3.3.20

#### SETTING BY THE USER

any selection of an OPERATING VALUE by ACTUATION performed by the USER

### 3.3.21

#### SET POINT

value selected by SETTING

### 3.3.22

#### ADJUSTABLE SET POINT

multiple values, within a declared range of values, which can be selected by SETTING

### 3.3.23

#### DUTY CYCLE

all automatic and MANUAL ACTIONS involved in one start-to-finish OPERATION of the controlled equipment

## 3.3.24

## CYCLE OF CONTACT OPERATION

one contact make and one subsequent contact break action, or one contact break and one subsequent contact make action

## 3.3.25

## OPERATING DIFFERENTIAL

difference between the upper and lower values of the OPERATING VALUE

## 3.3.26

## ADJUSTABLE DIFFERENTIAL

ability to change or alter the OPERATING DIFFERENTIAL within rated limits by OPERATION of a manually actuated mechanism

## 3.3.27

## FIXED DIFFERENTIAL

OPERATING DIFFERENTIAL which cannot be changed from the manufacturer's SETTING

## 3.3.28

## MAXIMUM WORKING PRESSURE

declared maximum line or SYSTEM working pressure to which the control or parts thereof can be subjected

## 3.3.29

## MAXIMUM TEMPERATURE

$T_{\max}$

declared maximum continuous ambient temperature to which the SWITCH HEAD is intended to be exposed during normal operation

## 3.3.30

## REMOTELY ACTUATED CONTROL FUNCTION

function providing any OPERATION by CONTROL devices through external means

Note 1 to entry: This includes, but is not limited to, the use of:

- a) communication lines/protocols;
- b) additional hardware and/or software;
- c) IR/RF TRANSMISSION; or

all combinations of a) to c) via Internet using, for example, modems, portable telephones, etc.

## 3.3.31

## SAFETY SHUT-DOWN

change in the state of all electrical outputs so that all safety critical electrical outputs of the CONTROL will proceed to a safe condition including shut-down

## 3.3.32

## MOUNTING SURFACE TEMPERATURE

$T_{s \max}$

declared maximum temperature to which the mounting surface of the control is intended to be exposed including any likely overshoot once a control has operated

## 3.3.33

## TOUCH CURRENT

electric current passing through a human body or through livestock when it touches one or more accessible parts of an installation or of equipment

Note 1 to entry: Touch current is often referred to as "leakage current" in many safety standards such as IEC 60335 series of standards.

[SOURCE: IEC 60050-195:2021, 195-05-21, modified – Note 1 to entry has been added]

### 3.4 Definitions relating to disconnection and interruption

Some CONTROLS can incorporate more than one form of circuit disconnection or interruption.

#### 3.4.1

##### ALL-POLE DISCONNECTION

disconnection of all supply conductors, except the protective earthed (grounded) conductor, by a single switching action

Note 1 to entry: The protective earthing conductor is not considered to be a supply conductor.

#### 3.4.2

##### FULL DISCONNECTION

contact separation in all supply poles other than protective earth so as to provide the equivalent of BASIC INSULATION between the supply mains and those parts intended to be disconnected

Note 1 to entry: There are electric strength and dimensional requirements.

Note 2 to entry: Where the number of poles on the CONTROL is equal to the number of supply poles of the appliance to which it is connected, FULL DISCONNECTION provides ALL-POLE DISCONNECTION.

Note 3 to entry: An ELECTRONIC DEVICE does not provide this disconnection.

#### 3.4.3

##### MICRO-DISCONNECTION

adequate contact separation in at least one pole for functional disconnection

Note 1 to entry: There is a requirement for the electric strength of the contact gap but no dimensional requirement.

Note 2 to entry: MICRO-DISCONNECTION denotes that for non-SENSING CONTROLS the function controlled by the disconnection is secure, and that for SENSING CONTROLS is secure between the limits of ACTIVATING QUANTITY declared in [Table 1](#), requirement 30.

Note 3 to entry: An ELECTRONIC DEVICE does not provide this disconnection.

#### 3.4.4

##### MICRO-INTERRUPTION

interruption of a circuit by contact separation, by a cycling action or by a non-cycling action which does not provide FULL DISCONNECTION or MICRO-DISCONNECTION

Note 1 to entry: There are no electric strength or dimensional requirements for the contact gap.

Note 2 to entry: An ELECTRONIC DEVICE does not provide this disconnection.

#### 3.4.5

##### OFF POSITION

position providing a visible or implied indication of a FULL DISCONNECTION or MICRO-DISCONNECTION

#### **3.4.5DV D2 Modification of Clause 3.4.5 definition as follows:**

**Add "that is mechanically secured (see [9.4.4DV](#))."** after "MICRO-DISCONNECTION"

### 3.4.6

#### ELECTRONIC DISCONNECTION

non-cycling interruption by an ELECTRONIC DEVICE of a circuit for functional disconnection and which provides a disconnection other than by means of an air gap by satisfying certain electrical requirements in at least one pole

Note 1 to entry: ELECTRONIC DISCONNECTION ensures that, for all non-SENSING CONTROLS, the function controlled by the disconnection is secure and that, for all SENSING CONTROLS, the function controlled is secure between the limits of the ACTIVATING QUANTITY declared in [Table 1](#), requirement 30.

The disconnection may be obtained by an AUTOMATIC ACTION or a MANUAL ACTION.

Some CONTROLS may incorporate circuit disconnections of more than one form.

## 3.5 Definitions of types of control according to construction

### 3.5.1

#### INTEGRATED CONTROL

CONTROL which is dependent on its correct mounting and fixing in an equipment, and which can only be tested in combination with the relevant parts of the equipment

Note 1 to entry: INTEGRATED CONTROL also denotes a CONTROL which is part of a more complex CONTROL (electrical or non-electrical).

### 3.5.2

#### INCORPORATED CONTROL

CONTROL intended to be mounted in, or on, an equipment, but which can be tested separately

Note 1 to entry: The fact that an INCORPORATED CONTROL can be tested separately does not imply that it is not allowed to be tested in an equipment as specified in [4.3.4.1.1](#).

Note 2 to entry: INCORPORATED CONTROL also denotes a CONTROL intended for incorporation in or on a more complex CONTROL (electrical or non-electrical).

### 3.5.3

#### IN-LINE CORD CONTROL

separately cased CONTROL intended to be connected to the supply and to the equipment by means of flexible cords, equipment inlets or socket-outlets, and is intended to be manually actuated

Note 1 to entry: A fuse in the plug is not regarded as a part of the CONTROL.

#### **3.5.3DV D2 Modification of Clause 3.5.3 NOTE 1 as follows:**

**NOTE 1DV: A fuse in the plug is regarded to be part of the CONTROL if the cord is non-detachable using attachment methods Y or Z.**

### 3.5.4

#### FREE-STANDING CONTROL

IN-LINE CORD CONTROL intended to stand on a table or on the floor

Note 1 to entry: It may be actuated by hand, by foot or by other similar human activity.

### 3.5.5

#### INDEPENDENTLY MOUNTED CONTROL

CONTROL intended for permanent connection to FIXED WIRING, but intended to be mounted separately from the controlled equipment

Note 1 to entry: It may be either:

- for surface mounting such as on to a wall;
- for flush mounting, such as into a wall cavity, when installation shall be possible from the front;
- for panel mounting, such as onto or into a CONTROL panel, when installation may be from the rear.

### 3.5.6

#### PULL-CORD ACTUATED CONTROL

CONTROL intended to be mounted in, or on, an equipment and actuated by means of a PULL-CORD

### 3.5.7

#### ELECTRONIC CONTROL

CONTROL which incorporates at least one ELECTRONIC DEVICE

### 3.5.8

#### ELECTRONIC DEVICE

a device in which conduction is principally by electrons moving through a vacuum, gas or semi-conductor

[SOURCE: IEC 60050-531:1974, 531-11-01]

### 3.5.9

#### ELECTRONIC ASSEMBLY

group of components, at least one of which is an ELECTRONIC DEVICE, but in which individual parts can be replaced without damage to the assembly

Note 1 to entry: An example of this is a group of components mounted on a printed circuit board.

### 3.5.10

#### INTEGRATED CIRCUIT

microcircuit in which all or some of the circuit elements are inseparably associated and electrically interconnected so that it is considered to be indivisible for the purpose of construction and commerce

[SOURCE: IEC 60050-521:2002, 521-10-03]

### 3.5.11

#### HYBRID CIRCUIT

circuit produced on ceramic substrate by means of thick-film, thin-film or surface-mounted devices (SMD) technology, without accessible electrical connections except for I/O points, and with all internal connections constructed as part of a lead frame or other integral construction

### 3.5.12

#### TWO-STEP ACTUATION

sequential performance of two distinct movements of the ACTUATING MEMBER

## 3.6 Definitions of type of automatic action of a control

### 3.6.1

#### TYPE 1 ACTION

AUTOMATIC ACTION for which the MANUFACTURING DEVIATION and the DRIFT of its OPERATING VALUE, OPERATING TIME or OPERATING SEQUENCE have not been declared and tested under this document

### 3.6.2

#### TYPE 2 ACTION

AUTOMATIC ACTION for which the MANUFACTURING DEVIATION and the DRIFT of its OPERATING VALUE, OPERATING TIME or OPERATING SEQUENCE have been declared and tested under this document

## 3.7 Definitions relating to protection against electric shock and type of insulation

### 3.7.1

#### LIVE PART

conductor or conductive part intended to be energized in NORMAL USE, including a neutral conductor, but by convention not a PEN conductor or PEM conductor or PEL conductor

Note 1 to entry: Accessible parts complying with [6.1.1](#) are not considered to be LIVE PARTS.

Note 2 to entry: Definitions for PEN, PEM and PEL can be found in IEC 61140:2016.

### 3.7.2

#### HAZARDOUS LIVE PART

live part that, under certain conditions, can give a harmful electric shock

[SOURCE: IEC 60050-195:2021, 195-06-05, modified – Note 1 to entry not included.]

### 3.7.3

#### CLASS 0 CONTROL

CONTROL in which protection against electric shock relies upon BASIC INSULATION

Note 1 to entry: This implies that there are no means for the connection of accessible conductive parts, if any, to the PROTECTIVE CONDUCTOR in the FIXED WIRING of the installation; reliance in the event of a FAILURE of the BASIC INSULATION is placed upon the environment.

Note 2 to entry: An earthing terminal is only allowed if it is for continuity or functional (as distinct from protective) purposes.

### 3.7.4

#### CLASS 0I CONTROL

IN-LINE CORD CONTROL having at least BASIC INSULATION throughout and provided with a protective earthing terminal but with a NON-DETACHABLE CORD without protective earthing conductor, and a plug without protective earthing contact which cannot be introduced into a socket-outlet with protective earthing contact

Note 1 to entry: An earthing terminal is only allowed if it is for continuity (as distinct from protective) purposes.

#### **3.7.4 DV DR Modification of Clause 3.7.4 by adding the following text after NOTE 1:**

**CLASS 0I CONTROL is not applicable.**

### 3.7.5

#### CLASS I CONTROL

CONTROL in which protection against shock does not rely on BASIC INSULATION only, but which includes an additional safety precaution in such a way that means are provided for the connection of accessible conductive parts to the protective earthing conductor in the FIXED WIRING of the installation in such a way that accessible conductive parts cannot become live in the event of a FAILURE of the BASIC INSULATION

Note 1 to entry: This provision includes a PROTECTIVE CONDUCTOR as part of the flexible cord or cable. When CLASS I CONTROLS are fitted with a two-core flexible cord or cable with a plug which cannot be introduced into a socket-outlet with earthing contact, the protection is then equivalent to that of class 0. However, the earthing provisions of the equipment in all other respects should fully comply with the requirements of class I.

Note 2 to entry: CLASS I CONTROLS may have parts with DOUBLE INSULATION or parts that provide protection against electric shock by SELV or PELV.

### 3.7.6

#### CLASS II CONTROL

CONTROL in which protection against electric shock does not rely on BASIC INSULATION only, but in which additional protective precautions, such as DOUBLE INSULATION or REINFORCED INSULATION, are provided, there being no provision for protective earthing or reliance upon installation conditions

Note 1 to entry: Such a CONTROL may be one of the types defined in [3.7.6.1](#) to [3.7.6.3](#).

Note 2 to entry: CLASS II CONTROLS may have parts that provide protection against electric shock by use of SELV.

Note 3 to entry: CLASS II CONTROLS cannot have parts that provide protection against electric shock by use of PELV, as such circuits require connection to an earthing terminal.

#### 3.7.6.1

##### INSULATION-ENCASED CLASS II CONTROL

CONTROL having a durable and substantially continuous enclosure of insulation material which envelops all metal parts, with the exception of small parts, such as name plates, screws and rivets, which are isolated from LIVE PARTS by insulation at least equivalent to REINFORCED INSULATION

#### 3.7.6.2

##### METAL-ENCASED CLASS II CONTROL

CONTROL having a substantially continuous metal enclosure in which DOUBLE INSULATION is used throughout, except for those parts where REINFORCED INSULATION is used, because the application of DOUBLE INSULATION is manifestly impracticable

#### 3.7.6.3

##### COMBINATION INSULATION-ENCASED/METAL-ENCASED CLASS II CONTROL

CONTROL which is a combination of the types described in [3.7.6.1](#) and [3.7.6.2](#)

Note 1 to entry: The enclosure of an all-insulated CLASS II CONTROL may form a part or the whole of the supplementary insulation or of the REINFORCED INSULATION. If a CONTROL with DOUBLE INSULATION and/or REINFORCED INSULATION throughout has an earthing terminal or earthing contact, it is deemed to be of class 0I or class I construction.

### 3.7.7

#### CLASS III CONTROL

CONTROL relying on limitation of voltage in [3.1.5](#) values as provision against electric shock for basic protection and

- with no provision for FAULT protection;
- which for supply are only connected to a SELV SYSTEM or a PELV SYSTEM, to form part of that SYSTEM;
- where internal circuits do not operate at a higher level than ELV;
- where in case of a single FAULT within the CONTROL no steady state touch voltage can appear or be generated exceeding ELV level; and
- not provided with a means of connection for a PROTECTIVE CONDUCTOR

### 3.7.8

#### DETACHABLE PART

part that

- can be removed or opened without the aid of a tool, or

- can be removed or opened with a tool according to the NORMAL USE and user maintenance as declared by the control manufacturer, or
- does not fulfil the test of [9.11.1.3](#)

### 3.7.9

#### ACCESSIBLE PART OR ACCESSIBLE SURFACE

part or surface which can be touched by the test finger of [Figure 5](#), when the CONTROL is mounted as in NORMAL USE, and after DETACHABLE PARTS have been removed

#### **3.7.9DV D2 Modification of Clause 3.7.9 as follows:**

Replace "[Figure 5](#)" with "[Figure R33DV.2](#)".

### 3.7.10 Definitions relating to type of insulation

NOTE In [3.7.10.1](#) through [3.7.10.5](#), the following abbreviations are used:

L LIVE PART;

A ACCESSIBLE PART (either conductive or an insulating surface);

I intermediate part.

#### 3.7.10.1

##### FUNCTIONAL INSULATION

insulation between LIVE PARTS which have a potential difference between them, and which insulation is necessary for the correct OPERATION of the CONTROL or controlled equipment (L-L)

#### 3.7.10.2

##### BASIC INSULATION

insulation applied to LIVE PARTS to provide basic protection against electric shock (L-A or L-I)

Note 1 to entry: BASIC INSULATION includes insulation between LIVE PARTS and

- intermediate conductive parts or metal foil over intermediate insulating surfaces (class II situation);
- accessible conductive parts (class 0, 0I, I situations);
- conductive parts connected to accessible conductive parts (class 0, 0I, I situations);
- metal foil over accessible insulating surfaces (class 0 situation).

#### 3.7.10.3

##### SUPPLEMENTARY INSULATION

independent insulation applied in addition to BASIC INSULATION in order to provide protection against electric shock in the event of a FAILURE of BASIC INSULATION (I-A)

Note 1 to entry: It includes insulation between intermediate conductive parts, or metal foil over intermediate insulating surfaces and

- accessible conductive parts (class II situation);
- conductive parts connected to accessible conductive parts (class II situation);
- metal foil over accessible insulating surfaces (class II situation).

#### 3.7.10.4

##### REINFORCED INSULATION

single insulation SYSTEM applied to LIVE PARTS, which provides a degree of protection against electric shock equivalent to DOUBLE INSULATION under the conditions specified in this document (L-A)

Note 1 to entry: It includes insulation between LIVE PARTS and

- accessible conductive parts;
- conductive parts connected to accessible conductive parts;
- metal foil over accessible insulating surfaces.

Note 2 to entry: The term "insulation system" does not imply that the insulation must be one homogeneous piece. It may comprise several layers which cannot be tested singly as SUPPLEMENTARY INSULATION or BASIC INSULATION.

#### 3.7.10.5

##### DOUBLE INSULATION

insulation comprising both BASIC INSULATION and SUPPLEMENTARY INSULATION (L-I-A)

[SOURCE: IEC 60050-195:2021, 195-06-08]

#### 3.7.11

##### PROTECTIVE IMPEDANCE

impedance connected between live parts and accessible conductive parts, of such value that the current, in normal use and under likely FAULT conditions in the equipment, is limited to a safe value

#### 3.7.12

##### EQUIPOTENTIAL BONDING

set of electric connections intended to achieve equipotentiality between conductive parts

[SOURCE: IEC 60050-195:2021, 195-01-10]

#### 3.7.12.1

##### PROTECTIVE EQUIPOTENTIAL BONDING

EQUIPOTENTIAL BONDING for the purposes of electrical safety

Note 1 to entry: Functional EQUIPOTENTIAL BONDING is defined in IEC 60050-195:2021, 195-01-16].

[SOURCE: IEC 60050-195:2021, 195-01-15, modified – Note 1 to entry has been added.]

#### **3.7.12.1DV DR Modification of Clause 3.7.12.1 to replace Note 1 with the following:**

**NOTE 1DV to entry: Requirements for EQUIPOTENTIAL BONDING can be found in the National Electrical Code (NEC), NFPA 70 for the installation of buildings.**

#### 3.7.13

##### EXPOSED CONDUCTIVE PART

conductive part of equipment that can be touched and that is not live under normal conditions, but that can become live when BASIC INSULATION fails

Note 1 to entry: A conductive part of a CONTROL which can only become live through contact with an EXPOSED CONDUCTIVE PART which has become live is not considered to be an EXPOSED CONDUCTIVE PART itself.

[SOURCE: IEC 60050-195:2021, 195-06-10, modified – Note 1 to entry has been added.]

## 3.7.14

## CONDUCTIVE SCREEN

screen of conductive material intended to reduce the penetration of an electric field

[SOURCE: IEC 60050-195:2021, 195-02-38]

## 3.7.15

## PROTECTIVE SCREEN, &lt;ELECTRICALLY&gt;

CONDUCTIVE SCREEN used to separate an electric circuit and/or conductors from hazardous-live-parts

[SOURCE: IEC 60050-195:2021, 195-06-17]

## 3.7.16

## PROTECTIVE SCREENING, &lt;ELECTRICALLY&gt;

separation of electric circuits and/or conductors from HAZARDOUS LIVE PARTS by an ELECTRICALLY PROTECTIVE SCREEN connected to the PROTECTIVE EQUIPOTENTIAL BONDING SYSTEM and intended to provide protection against electric shock

[SOURCE: IEC 60050-195:2021, 195-06-18]

## 3.7.17

## SIMPLE SEPARATION

separation between electric circuits or between an electric circuit and protective earth by means of BASIC INSULATION

[SOURCE: IEC 60050-826:2004, 826-12-28; modified by replacing "local" by "protective"]

## 3.7.18

## PROTECTIVE SEPARATION, &lt;ELECTRICALLY&gt;

separation of one electric circuit from another by means of basic protection and fault protection

[SOURCE: IEC 60050-195:2021, 195-06-19]

## 3.7.19

## PROTECTIVE EARTHING

earthing for purposes of electrical safety

[SOURCE: IEC 60050-195:2021, 195-01-11]

## 3.7.20

## FUNCTIONAL EARTHING

earthing for purposes other than electrical safety

[SOURCE: IEC 60050-195:2021, 195-01-13]

**3.7.21DV D2 Add the following definitions to Clause 3:**

**3.7.21DV.1****PROTECTIVE BONDING CONDUCTOR**

**a conductor in the equipment, or a combination of conductive parts in the equipment, connecting a main protective earthing terminal to a part of the equipment that is required to be earthed**

**3.7.21DV.2****PROTECTIVE EARTHING CONDUCTOR**

**a conductor connecting the main protective earthing terminal or lead in the equipment to the building earth, or in the power SUPPLY CORD, connecting a main protective earthing terminal in the equipment to an earth point in the building installation**

**3.8 Definitions relating to component parts of controls****3.8.1****SENSING ELEMENT**

that part of the CONTROL which is intended to be exposed to the influences of the ACTIVATING QUANTITY to which the AUTOMATIC ACTION of a SENSING CONTROL responds

**3.8.2****SWITCH HEAD**

complete CONTROL, except for any SENSING ELEMENT

Note 1 to entry: If by construction it is impossible to distinguish between the SWITCH HEAD and the SENSING ELEMENT, then the whole control is considered to be the SENSING ELEMENT.

**3.8.3****ACTUATING MEMBER**

that part which is manually moved, pulled, pushed or turned to cause INITIATION of a CONTROL action, or for SETTING BY THE USER

Note 1 to entry: The term "ACTUATING MEMBER" does not include any device such as a set-screw used for SETTING BY THE CONTROL MANUFACTURER if such a device is adequately locked against further movement, or if a TOOL is required for such SETTING BY THE CONTROL MANUFACTURER.

**3.8.4****ACTUATING MEANS**

any part which connects the ACTUATING MEMBER to the mechanism of the CONTROL

**3.8.5****PULL-CORD**

flexible ACTUATING MEMBER which is pulled to cause ACTUATION

**3.8.6****PRIME MOVER**

any device used to produce the mechanical energy required to provide the TRANSMISSION for an AUTOMATIC CONTROL, such as an ELECTRICALLY OPERATED CONTROL, an ELECTRICALLY OPERATED VALVE, an ELECTRICALLY OPERATED MECHANISM or a TIME-BASED CONTROL

Note 1 to entry: It may be a mechanical storage device (for example, a clockwork spring), an electro-magnetic device (for example, an electric motor, or stepping solenoid), an electro-thermal device (for example, the heating element of an ENERGY REGULATOR) or any other mechanism producing mechanical energy.

**3.8.7****CLUTCH**

mechanical device by which an ACTUATING MEMBER can override either a PRIME MOVER or an ACTIVATING QUANTITY, causing or allowing the INITIATION or cancellation of an action

**3.8.8****COVER****COVER PLATE**

part which is accessible when the CONTROL is mounted as in NORMAL USE and which can be removed only with the aid of a TOOL

Note 1 to entry: It shall not require the use of a SPECIAL PURPOSE TOOL for its removal.

### 3.8.9

#### SCREWLESS FIXED PART (OR COMPONENT)

ACCESSIBLE PART (or component) which, after attachment, installation, mounting or assembly into or onto an equipment or another component, or to a specially prepared support, is retained in position by positive means which do not depend on screws

Note 1 to entry: Disassembly or removal may require the use of a tool, either applied directly to the part (or component), or to obtain access to the retaining means.

Note 2 to entry: The following are some examples of parts which are not regarded as SCREWLESS FIXED PARTS or COMPONENTS:

- parts of components fixed permanently by rivets, glueing or similar means;
- flat, push-on connectors;
- SCREWLESS TERMINALS;
- standard plugs and socket-outlets;
- standard appliance couplers, even if such have additional latching devices to prevent a single action uncoupling;
- the replacement of a lamp in a bayonet type lampholder;
- twist-lug construction;
- friction-fit construction.

## 3.9 Definitions of types of terminals and terminations of controls

### 3.9.1

#### PILLAR TERMINAL

terminal in which the conductor is inserted into a hole or cavity, where it is clamped under the shank of the screw or screws

Note 1 to entry: The clamping pressure may be applied directly by the shank of the screw, or through an intermediate clamping member to which pressure is applied by the shank of the screw (see [Figure 12](#)).

### 3.9.2

#### SCREW TERMINAL

terminal in which the conductor is clamped under the head of the screw

Note 1 to entry: The clamping pressure may be applied directly by the head of the screw, or through an intermediate part, such as a washer, a clamping plate or an anti-spread device (see [Figure 11](#)).

### 3.9.3

#### STUD TERMINAL

terminal in which the conductor is clamped under a nut

Note 1 to entry: The clamping pressure may be applied directly by a suitably shaped nut, or through an intermediate part, such as a washer, a clamping plate or an anti-spread device (see [Figure 11](#)).

### 3.9.4

#### SCREWLESS TERMINAL

terminal in which the connection of the conductor is achieved directly or indirectly by means of springs, wedges, eccentrics, cones or the like

Note 1 to entry: The following are not regarded as SCREWLESS TERMINALS:

- terminals requiring the fixing of special devices to the conductors before clamping them in the terminal, for example, FLAT PUSH-ON CONNECTORS;
- terminals requiring wrapping of the conductors, for example, those with wrapped joints;
- terminals providing direct contact to the conductors by means of edges or points penetrating the insulation.

### 3.9.5

#### FLAT PUSH-ON CONNECTOR

assembly of a TAB and a RECEPTACLE enabling the connection, at will, of a core or conductor to a CONTROL or to another core or conductor

### 3.9.6

#### RECEPTACLE

female part of a FLAT PUSH-ON CONNECTOR intended to be permanently attached to a core or conductor (see [Figure 17](#))

### 3.9.7

#### TAB

male part of a FLAT PUSH-ON CONNECTOR (see [Figure 15](#) and [Figure 16](#))

### 3.9.8

#### IN-LINE TAB

TAB intended to be permanently attached to a core or conductor

### 3.9.9

#### TAB FORMING PART OF A CONTROL

TAB permanently attached to, or an integral part of, a CONTROL

### 3.9.10

#### TERMINATION

part by which a conductor can be connected to a CONTROL in such a way that its replacement requires either a SPECIAL PURPOSE TOOL, a special process or a specially prepared end of the conductor

Note 1 to entry: Soldering requires a SPECIAL PURPOSE TOOL. Welding requires a special process. A cable lug attached to a conductor is a specially prepared end.

### 3.9.11

#### SOLDER TERMINATION

TERMINATION in which the conductor is secured by a mechanical means, and the circuit continuity is assured by solder

### 3.9.12

#### SADDLE TERMINAL

terminal in which the conductor is clamped under a saddle by means of two or more screws or nuts (see [Figure 14a](#))

### 3.9.13

#### LUG TERMINAL

SCREW TERMINAL or STUD TERMINAL, intended to clamp a cable lug or bar by means of a screw or nut (see [Figure 14b](#))

### 3.9.14

#### MANTLE TERMINAL

terminal in which the conductor is clamped against the base of a slot in a threaded stud by means of a nut

Note 1 to entry: The conductor is clamped against the base of the slot by a suitably shaped washer under the nut, by a central peg if the nut is a cap nut or equally effective means for transmitting the pressure from the nut to the conductor within the slot (see [Figure 13](#)).

### 3.9.15

#### PROTECTIVE BONDING TERMINAL

terminal intended for PROTECTIVE EQUIPOTENTIAL BONDING purposes

Note 1 to entry: Examples are a PROTECTIVE SCREEN- or PE-terminal of a CONTROL or equipment.

### 3.9.16

#### PROTECTIVE CONDUCTOR

##### PE

conductor provided for purposes of electrical safety

[SOURCE: IEC 60050-195:2021, 195-02-09 ]

## 3.10 Definitions relating to the connections to controls

### 3.10.1

#### EXTERNAL CONDUCTOR

any cable, flexible cord, core or conductor, a part of which is external to an IN-LINE CORD CONTROL, an INDEPENDENTLY MOUNTED CONTROL or to an equipment in or on which a CONTROL is mounted

Note 1 to entry: Such a conductor may be a supply lead, a function cord or interconnecting cord between different parts of an equipment; or it may form part of the FIXED WIRING.

### 3.10.2

#### FIXED WIRING

any EXTERNAL CONDUCTOR which is permanently secured to the fabric of the building such that, in NORMAL USE at the point at which the conductor enters the equipment or CONTROL, there is no likelihood of any strain being applied to the conductor

Note 1 to entry: Such securing to the fabric of the building may be, for example, by the enclosing of conductors in conduit, burying cables in walls, adequately fixing cables or cords to walls or other surfaces, etc.

### 3.10.3

#### INTERNAL CONDUCTOR

any cable, flexible cord, core or conductor which is neither an EXTERNAL CONDUCTOR, nor an INTEGRATED CONDUCTOR

Note 1 to entry: An example is a conductor inside the equipment to interconnect the CONTROL and the equipment.

### 3.10.4

#### INTEGRATED CONDUCTOR

conductor which is inside a CONTROL, or is used to permanently interconnect terminals or TERMINATIONS of a CONTROL

### 3.10.5

#### DETACHABLE CORD

flexible external cord connected to a CONTROL or equipment by means of an equipment inlet, or plug and socket arrangement

### 3.10.6

#### NON-DETACHABLE CORD

flexible EXTERNAL CONDUCTOR connected to, or assembled to, a CONTROL according to one of the methods in [3.10.6.1](#) to [3.10.6.4](#)

### 3.10.6.1

#### TYPE X ATTACHMENT

method of attachment such that the cord can be easily replaced without SPECIAL-PURPOSE TOOLS, using standard cords without any special preparation

### 3.10.6.2

#### TYPE M ATTACHMENT

method of attachment such that the cord can be easily replaced without SPECIAL PURPOSE TOOLS, but is intended to use only a special cord, such as one with a moulded-on cord guard, or one with special prepared ends

Note 1 to entry: This attachment method does not apply if it is possible to fit a standard cord during SERVICING unless such is permitted by a particular equipment standard.

### 3.10.6.3

#### TYPE Y ATTACHMENT

method of attachment of the supply cord such that any replacement is intended to be made by the manufacturer, its service agent or a similar qualified person

### 3.10.6.4

#### TYPE Z ATTACHMENT

method of attachment such that the flexible cable or cord cannot be replaced without breaking or destroying a part of the CONTROL

### 3.10.7

#### PRIMARY BATTERY

#### CELL

any kind of electrochemical CELL in which the electrochemical reaction of interest is not reversible

Note 1 to entry: An example is an alkaline battery.

### 3.10.8

#### SECONDARY BATTERY

#### RECHARGEABLE CELL

any kind of electrochemical CELL in which the electrochemical reaction of interest is reversible

Note 1 to entry: A rechargeable battery is a group of two or more secondary CELLS.

Note 2 to entry: Examples of rechargeable batteries are nickel metal hydride (NiMH), lithium ion (Li-ion) etc.

## 3.11 Definitions relating to the performance of type 2 actions

### 3.11.1

#### MANUFACTURING DEVIATION

maximum difference of OPERATING VALUE, OPERATING TIME or OPERATING SEQUENCE which is claimed between any two CONTROLS, supplied by the manufacturer to a UNIQUE TYPE REFERENCE, when tested as submitted and in the same manner

Note 1 to entry: The difference may be related to an absolute value if permitted by the appropriate subclause of Clause [17](#).

### 3.11.2

#### DRIFT

maximum alteration of OPERATING VALUE, OPERATING TIME or OPERATING SEQUENCE of any one sample which can occur when it is tested under the conditions specified in this document

Note 1 to entry: The alteration may be related to an absolute value, or combined with the MANUFACTURING DEVIATION, if permitted by the appropriate subclause of Clause [17](#).

### 3.12 Definitions relating to the requirements for creepage distances and clearances

#### 3.12.1

##### CLEARANCE

shortest distance through air between two conductive parts, or between a conductive part and a metal foil in contact with a surface of insulating material

Note 1 to entry: The method of measurement is detailed in Annex B and [Figure 18](#).

#### 3.12.2

##### CREEPAGE DISTANCE

shortest distance along the surface of the insulating material between two conductive parts, or between a conductive part and a metal foil in contact with any ACCESSIBLE SURFACE of insulating material

Note 1 to entry: The method of measurement is detailed in Annex B and [Figure 18](#).

#### 3.12.3

##### POLLUTION

any addition of foreign matter, solid, liquid, or gaseous that can result in a reduction of electric strength or surface resistivity of the insulation

### 3.12.4 Definitions relating to the environment

#### 3.12.4.1

##### MACRO-ENVIRONMENT

environment of the room or other location in which the equipment is installed or used

#### 3.12.4.2

##### MICRO-ENVIRONMENT

environment in the immediate surrounding of an insulation, which particularly influences the dimensioning of clearances and CREEPAGE DISTANCES

#### 3.12.4.3

##### POLLUTION DEGREE

numeral characterizing the expected POLLUTION of the MICRO-ENVIRONMENT

Note 1 to entry: POLLUTION DEGREES 1, 2, 3, and 4 are used. See Annex E.

### 3.13 Miscellaneous definitions

#### 3.13.1

##### UNIQUE TYPE REFERENCE

marking such that by quoting it in full to the manufacturer of the CONTROL, a replacement can be supplied which will be fully interchangeable with the original, electrically, mechanically, dimensionally and functionally

#### 3.13.2

##### TOOL

screwdriver, a coin or any other object which can be used to operate a nut, a screw or similar part

#### 3.13.3

##### SPECIAL-PURPOSE TOOL

TOOL which is unlikely to be readily available in a normal household, for example, a key for a hexagonal socket-headed screw

Note 1 to entry: TOOLS such as coins, screwdrivers and spanners intended to operate square, or hexagonal nuts, are not SPECIAL-PURPOSE TOOLS.

#### 3.13.4

##### NORMAL USE

use of the CONTROL, or its associated equipment, for the purpose for which it was made, and in the manner intended by the manufacturer

Note 1 to entry: NORMAL USE includes any overload, or abnormal operating conditions specified in the equipment standard.

Note 2 to entry: NORMAL USE does not include any process which is necessary to maintain the CONTROL or equipment in good order, even though this may be carried out by the USER according to the manufacturer's instructions.

Note 3 to entry: NORMAL USE may include standby mode and one or more operating modes.

#### 3.13.5

##### USER MAINTENANCE

any periodic process necessary to maintain the CONTROL, or equipment, in good order, for which details are given in the manufacturer's instructions to the USER

#### 3.13.6

##### SERVICING

any process necessary to maintain a CONTROL, or equipment, in good order, that would be done by a competent person, such as in a workshop, by an electrician or by a service organization

Note 1 to entry: This includes replacing a flexible cord, thermal link or the like.

#### 3.13.7

##### MANUFACTURER SERVICING

SERVICING which can only be done by the manufacturer, or his accredited serviceman

Note 1 to entry: This may be due to the need for SPECIAL PURPOSE TOOLS, or special instrumentation, and includes the SETTING BY THE CONTROL MANUFACTURER.

#### 3.13.8

##### FAILURE

termination of the ability of an item to perform a required function

[SOURCE: IEC 60050-603:1986, 603-05-06]

#### 3.13.9

##### FAULT

state of an item characterised by its inability to perform a required function, excluding the inability during preventive maintenance or other planned actions, or due to lack of external resources

Note 1 to entry: "FAILURE" is an event, as distinguished from "FAULT", which is a state.

Note 2 to entry: After FAILURE, the item has a FAULT.

Note 3 to entry: This concept as defined does not apply to items consisting of software only.

Note 4 to entry: A FAULT is often the result of a FAILURE of the item itself, but may exist without prior FAILURE.

## 3.13.10

SMART GRID  
INTELLIGENT GRID

electric power SYSTEM that utilizes information exchange and CONTROL technologies, distributed computing and associated sensors and actuators, for purposes such as:

- to integrate the behaviour and actions of the network USERS and other stakeholders,
- to efficiently deliver sustainable, economic and secure electricity supplies

[SOURCE: IEC 60050-617:2009+AMD1:2011, 617-04-13]

## 3.13.11

SMART ENABLED CONTROL

CONTROL that integrates or uses one or more of the following functionalities:

- power demand response from the smart grid,
- demand signals from energy-consuming equipment,
- communications technology IoT,
- data analytics,
- control functions to optimize energy efficiency and deliver on operational requirements.

Note 1 to entry: For example, smart grid control, remote interfaces/control of energy-consuming equipment including computer or smart phone.

## 3.13.12

INTENTIONALLY WEAK TRACE

printed circuit board trace intended to rupture under conditions of abnormal operation to prevent the occurrence of a condition which could impair compliance with this document

Note 1 to entry: See [9.1.4](#).

### 3.14 Definitions relating to manufacturer and user

## 3.14.1

CONTROL MANUFACTURER

manufacturer of the CONTROL

## 3.14.2

EQUIPMENT MANUFACTURER

manufacturer of equipment in which, on which, or together with which the CONTROL is used

#### **3.14.2DV D2 Modification of Clause 3.14.2 to add the following NOTE:**

Note DV1 to entry: In the USA, the EQUIPMENT MANUFACTURER is indicated as the OEM (original equipment manufacturer ). The OEM receives CONTROLS from control manufacturers for integration or incorporation into equipment.

**3.14.3****INSTALLER**

person qualified to install the CONTROL and possibly the associated equipment

**3.14.4****USER**

one who uses the CONTROL with the aid of documentation (USER MAINTENANCE) during its normal life

Note 1 to entry: The USER is considered a layman.

**3.15 Definitions pertaining to thermistors**

See [J.3.15](#).

**3.16 Definitions relating to the structure of controls using software**

See [H.3.16](#).

**3.17 Definitions relating to error avoidance in controls using software**

See [H.3.17](#).

**3.18 Definitions relating to fault/error control techniques for controls using software**

See [H.3.18](#).

**3.19 Definitions relating to memory tests for controls using software**

See [H.3.19](#).

**3.20 Definitions of software terminology – General**

See [H.3.20](#).

**3.21 Definitions relating to classes of control functions**

See [H.3.21](#).

**3.22 Definitions relating to functional safety**

See [H.3.22](#).

**3.23 Definitions related to access to data exchange**

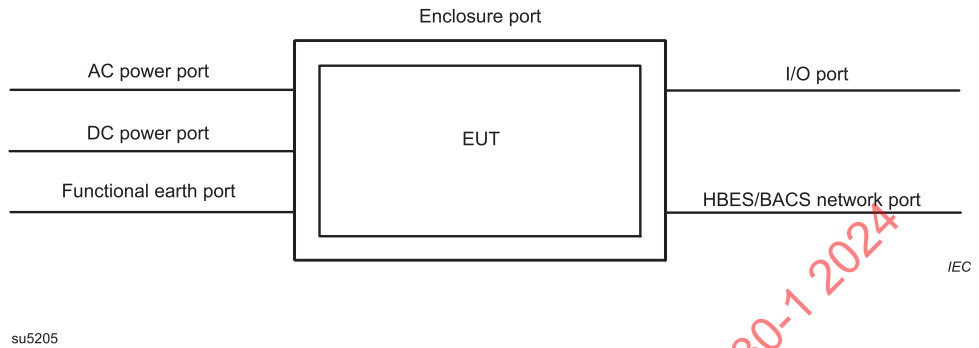
See [H.3.23](#).

**3.24 Definitions related to EMC performance****3.24.1****PORT**

particular interface of the equipment which couples this equipment with or is influenced by the external electromagnetic environment

Note 1 to entry: See [Figure 1](#).

Note 2 to entry added: I/O ports are input, output or bi-directional, measurement, control, or data ports.



**Figure 1**  
**Example of ports**

[SOURCE: IEC 61000-6-1:2016: 3.1, modified – Note 1 to entry, modified Figure 1]

### 3.24.2

#### ENCLOSURE PORT

physical boundary of the equipment through which electromagnetic fields can radiate or impinge

[SOURCE: IEC 61000-6-1:2016: 3.2, modified – "may" changed to "can"]

### 3.24.3

#### I/O PORT

port at which a conductor or cable intended to carry signals is connected to the equipment

EXAMPLE Analog/digital inputs, outputs and control lines, data buses, communication networks other than HBES/BACS networks ([3.24.10](#)), etc

[SOURCE: IEC 61000-6-1:2016: 3.3; modified – "signal/control port" changed to "I/O port", example added with digital inputs/outputs and the exclusion for HBES/BACS networks]

### 3.24.4

#### DC POWER PORT

port used to connect to a low voltage DC power generating SYSTEM, energy storage or DC distribution network to power the equipment

[SOURCE: IEC 61000-6-3:2020, 3.1.13, modified – Note 1 to entry is removed]

### 3.24.5

#### DC DISTRIBUTION NETWORK

local DC electricity supply network in the infrastructure of a certain site or building intended for flexible use by one or more different types of equipment and ensuring continuous power supply independently from the conditions of the public mains network

Note 1 to entry: Connection to a remote local battery is not regarded as a DC distribution network, if such a link comprises only supply for a single piece of equipment

[SOURCE: IEC 61000-6-1:2016, 3.10]

### 3.24.6

EUT

equipment under test

### 3.24.7

RESIDENTIAL ELECTROMAGNETIC ENVIRONMENT

electromagnetic environment at a location including commercial, public and light-industrial locations where there is a level of electromagnetic interference normally expected in houses, shops, and business premises, cinemas, sports centres, workshops and laboratories for example

EXAMPLE 1 of residential locations are: houses, apartments, farm buildings used for living.

EXAMPLE 2 of commercial, public or light industrial are:

- retail outlets, for example shops, supermarkets;
- business premises, for example offices, banks, hotels, data centres;
- areas of public entertainment, for example cinemas, public bars, dance halls;
- places of worship;
- general public locations, for example parks, amusement facilities, public offices;
- hospitals, educational institutions, for example schools, universities, colleges;
- public traffic area, railway stations, and public areas of an airport;
- light-industrial locations, for example workshops, laboratories, service centres.

### 3.24.8

INDUSTRIAL ELECTROMAGNETIC ENVIRONMENT

location where the totality of electromagnetic phenomena is characterized by a separate power network, supplied from a high- or medium-voltage transformer, dedicated for the supply of the installation

EXAMPLE Metalworking, pulp and paper, chemical plants, car production, farm building, high-voltage areas of airports.

Note 1 to entry: Industrial locations can generally be described by the existence of an installation with one or more of the following characteristics:

- items of equipment installed and connected together and working simultaneously;
- significant amount of electrical power generated, transmitted and/or consumed;
- frequent switching of heavy inductive or capacitive loads;
- high currents and associated magnetic fields;
- presence of industrial, high power scientific and medical (ISM) equipment (for example, welding machines).

The electromagnetic environment at an industrial location is predominantly produced by the equipment and installation present at the location. There are types of industrial locations where some of the electromagnetic phenomena appear in a more severe degree than in other installations.

Note 2 to entry: In general, the electromagnetic environment is time-dependent and its description may need a statistical approach.

Note 3 to entry: It is very important not to confuse the electromagnetic environment and the location itself.

[SOURCE: IEC 61000-6-2:2016, 3.7 and 3.8 combined and modified to one definition]

### 3.24.9

#### LONG-DISTANCE LINES

lines within a building which are longer than 30 m, or which leave the building (including lines of outdoor installations)

[SOURCE: IEC 61000-6-1:2016, 3.6, modified – definition extended to all lines instead of lines connected to signal/control ports]

### 3.24.10

#### HBES/BACS NETWORK PORT

port at which a conductor or cable intended to carry communication signals between the different devices of the HBES/BACS network is connected to the apparatus

Note 1 to entry: For test purposes, the HBES/BACS network port is equivalent to the telecommunications/network port according to IEC 61000-6-3.

Note 2 to entry: (HBES) Home and Building Electronic Systems and (BACS) Building Automation and Control Systems

[SOURCE: IEC 63044-5-1:2017, 3.1.5, modified – Note 2 to entry has been added]

## 4 General

### 4.1 General structure of the document

The clauses of this document are grouped into two sections of requirements, where

- the first section consists of Clauses [5](#) to [13](#) that, in general, addresses the construction of the product. It is noted that certain construction requirements have verification requirements integrated within the clause to facilitate usage of the document, and
- the second section consists of the of Clauses [14](#) to [26](#) that addresses the verification requirements.

NOTE For explanation of the word "Verification", see IEC 60050-192:2015,192-01-17.

The above structure is also applied to Annex [H](#), Annex [I](#) and Annex [J](#).

The requirements of this document have been structured based on two basic safety principles – inherent safety and functional safety.

Inherent safety is related to the potential risk of electric shock, fire and personal injury that exists within the design of the control, under normal and abnormal operation of the control and independent of any declaration to output functions. All controls, independent of their classification, shall comply with the requirements for inherent safety.

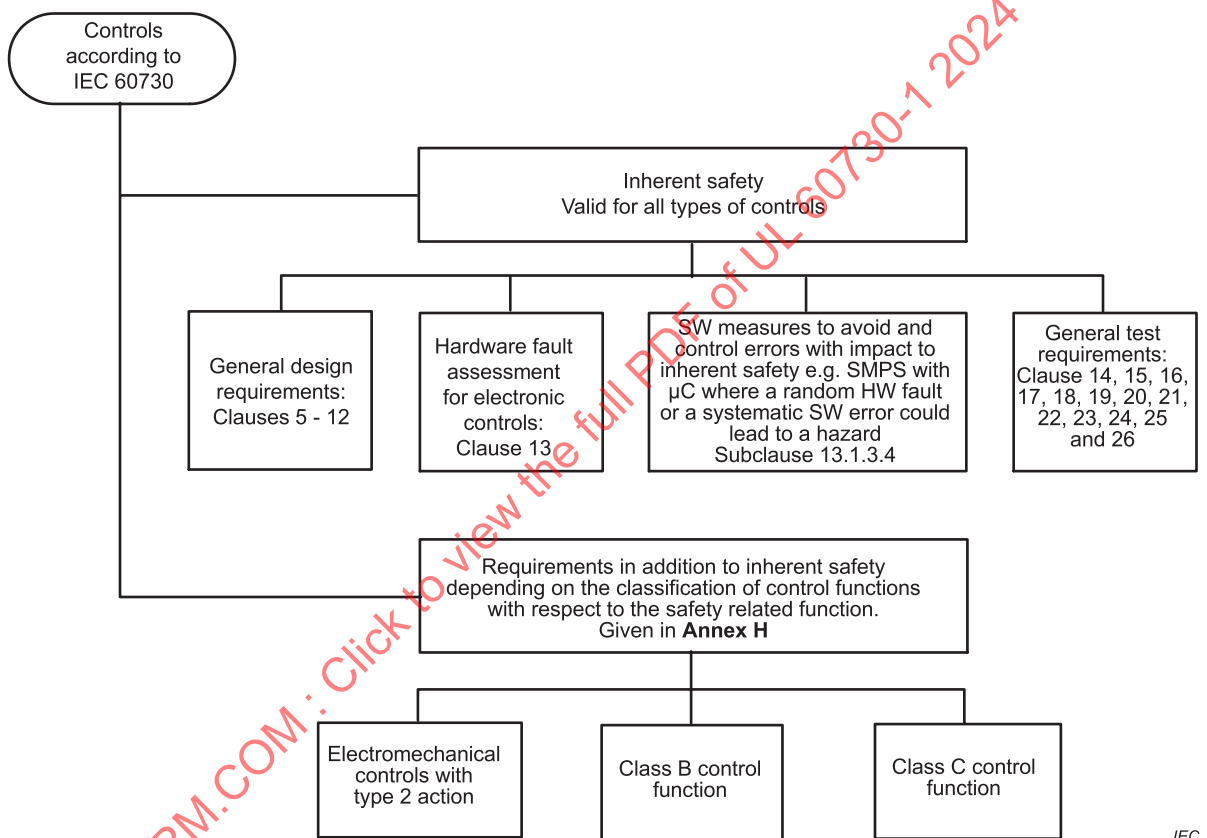
Requirements that relate to the inherent safety of all products covered under the scope of this document are located in the main body of the document.

Functional safety is related to the correct operation of the declared safety related function(s), failure or malfunction of which can cause a hazard. The hazard could result from a loss of protective function (output function) leading to a risk of explosion, excessive temperature, electric shock, fire and/or personal injury,

etc. The requirements for functional safety, which are relevant for a control, depend on the classification of the output function.

Requirements that relate to functional safety are specified in Annex H of this document and shall be used in conjunction with the requirements of the main part, when applicable. Since some requirements are applicable for both inherent and functional safety, e.g. Table 14 showing the FAULT modes for electronic components used for the FAULT assessment, the place for those requirements were chosen as appropriate.

A pictorial representation of the document structure and applicable requirements are noted below in Figure 2:



su5206

IEC

**Figure 2**

**Structure of the document with respect to inherent safety and functional safety**

## 4.2 General requirements

CONTROLS shall be so designed and constructed that in NORMAL USE, they function so as not to cause injury to persons or damage to surrounding property, even in the event of such carelessness as can occur in NORMAL USE.

*In general, compliance is checked by carrying out the relevant tests specified in this document and the appropriate part 2, if any.*

**4.2DV DR Modification of Clause 4.2 by adding the following after "the appropriate part 2, if any.":**

***In addition, controls shall be constructed so as to be installable in accordance with the National Electrical Code, NFPA 70.***

## 4.3 General notes on tests

### 4.3.1 General

Tests according to this document are type tests.

NOTE If the results of any of the prescribed tests can be determined beyond doubt by assessment, then the test or tests need not be performed.

### 4.3.2 Conditions of test

4.3.2.1 Unless otherwise specified in this document, the samples are tested as delivered, having been mounted as declared by the manufacturer, but, when significant, in the most unfavourable position.

4.3.2.2 If the test results are influenced by the room temperature, this shall be maintained at  $(20 \pm 5)$  °C, except that in cases of doubt, it shall be maintained at  $(23 \pm 2)$  °C, unless otherwise specified in a particular clause.

4.3.2.3 ACTUATING MEMBERS are placed in the most unfavourably LOCATED POSITION, INTERMEDIATE POSITION or position of SETTING BY THE USER, unless other instructions are given in a particular clause.

4.3.2.4 Unless otherwise specified in this document or evident from the construction of the control (in general for ELECTRONIC CONTROLS), the tests are carried out in the order of the clauses of this document.

*For ELECTRONIC CONTROLS, the tests of Clauses [24.1](#), [25](#) and [13.1](#) are carried out before the tests of Clause [21](#).*

4.3.2.5 During the tests of this document, actuation is performed by test equipment if so desired, except for the high-speed tests of [19.12](#).

4.3.2.6 During and for the purpose of the tests of this document, other than for the tests of [19.12](#), the actuating means can be used to actuate the control, if an actuating member is not supplied by the manufacturer.

4.3.2.7 The rates of temperature change declared in [5.2](#) and used in Clause [19](#) (that are  $\alpha_1$ ,  $\beta_1$ ,  $\alpha_2$  and  $\beta_2$ ) shall have test tolerances of  $\pm 12$  K/h.

For other activating quantities, the minimum and/or maximum rates of change declared in [Table 1](#), requirement 31 and used in [Clause 19](#) (that is  $\alpha_1$ ,  $\beta_1$ ,  $\alpha_2$  and  $\beta_2$ ) shall have test tolerances as specified in the appropriate part 2.

#### **4.3.2.7DV D2 Modification of Clause 4.3.2.7 to add the following:**

Throughout the standard, the symbol K used to denote temperature values represents the Kelvin scale ( $T_K = T_c + 273$ ). Therefore, when the Fahrenheit scale is used in tests or measurements, the values shall be converted to °F such that the thermal energy of the entity under consideration is the same irrespective of the temperature scale used in the test or measurement.

4.3.2.8 In all tests, the measuring instruments or the measuring means shall be such as not to affect appreciably the value being measured.

NOTE Principles for uncertainty of measurements can be found in various sources, e.g. in OD-5014 under IECCE.

### **4.3.3 Samples required**

4.3.3.1 Unless otherwise specified, one sample is used for the tests in [Clauses 6](#) to [26](#), including the relevant annexes. For electromechanical controls, one sample shall be used for verification of [Clauses 5](#) to [13](#) and another sample for [Clauses 14](#) to [26](#), while for ELECTRONIC CONTROLS different samples can be used unless tests are required to be carried out on the same sample.

If the sample does not comply with one or more of the tests, the cause of the non-compliance shall be identified and corrective action shall be taken. The test which caused the non-compliance, and those preceding which could have influenced the result of that test, are repeated on two other sets of identical samples, all of which shall then comply with the repeated tests. Also any tests where the corrective action has influence on the initial test result shall be repeated.

4.3.3.2 Additional samples can be required for some destructive tests of this document.

4.3.3.3 Controls which are intended to meet the requirements of more than one part 2 document shall, in general, be tested to each part 2 separately.

NOTE By agreement between manufacturer and test house, requirements and tests which are common to more than one part 2, need only be checked once, unless the common tests can influence the results of any specific tests.

### **4.3.4 Instructions for test**

#### **4.3.4.1 According to submission**

4.3.4.1.1 Controls for use in or with an equipment can either be tested with the equipment or separately. When tested in or with an equipment, the type of load controlled is classified as for declared specific load. When tested separately as an individual control, the type of load controlled is classified for the declared specific load, resistive load or resistive and inductive load. In both cases, the current in the appropriate circuit when the equipment is operating under normal load is regarded as the rated current of the circuit.

4.3.4.1.2 For all controls submitted, in, on or with an equipment, all other relevant information as required by [5.2](#) can be obtained by inspection and measurement of the submitted equipment.

4.3.4.1.3 Integrated controls are classified as for declared specific load and are tested in the equipment, or part thereof, for which they are intended.

4.3.4.1.4 Controls not submitted in or with an equipment are tested separately.

4.3.4.1.5 Controls for use with non-detachable cords are tested with the appropriate cord connected.

#### 4.3.4.2 According to rating

4.3.4.2.1 Controls for AC only are tested with AC at rated frequency if declared; those for DC only are tested with DC and those for AC/DC at the more unfavourable supply.

4.3.4.2.2 Controls for AC only, which are not declared for a rated frequency, are tested at either 50 Hz or 60 Hz, whichever is the more unfavourable. Controls with a rated frequency within a declared range other than 50 Hz to 60 Hz are tested at the most unfavourable frequency within the marked or declared range.

4.3.4.2.3 When testing controls intended for DC only, the possible influence of polarity on the operation of the control is taken into consideration.

4.3.4.2.4 For controls with different AC and DC ratings, the tests for Clauses [14](#), [15](#), [16](#) and [19](#), are made on two sets of samples, one being tested according to the AC rating, and the other according to the DC rating.

NOTE At the option of the test house, a reduced number of tests can be made to cover the various ratings.

4.3.4.2.5 Unless otherwise specified, controls declared for one or more voltage ranges shall be tested at the most unfavourable voltage within the declared range, and this voltage being multiplied by the factor indicated in the appropriate clause (see [4.3.4.2.7](#)).

4.3.4.2.6 For controls marked or declared for more than one rated voltage or rated current, the tests of Clause [19](#) are made on sets of samples for each combination of RATED VOLTAGE and rated current.

NOTE At the option of the test house, a reduced number of tests can be made to cover the various ratings.

4.3.4.2.7 For controls declared for a voltage range, tests are made on one set of samples at each limit of the range, unless the difference between the limits does not exceed 10 % of the mean value of the range, in which case the tests are made on one set of samples at the upper limit of the range.

4.3.4.2.8 Controls intended to be operated from a specific supply are tested with that specific supply.

4.3.4.2.9 A circuit for connection to the DC mains supply is classified as either a SELV/PELV circuit, ELV circuit or mains voltage circuit depending on the maximum operating voltage of the supply. This maximum operating voltage shall include consideration of the battery charging "float voltage" associated with the intended supply SYSTEM, regardless of the marked voltage rating of the equipment.

NOTE Float voltage is the constant voltage that is applied continuously to a voltaic CELL to maintain the CELL in a fully charged condition. Float voltage varies significantly with the chemistry and construction of the battery and ambient temperature.

4.3.4.2.10 Operation of the control powered by secondary batteries (rechargeable) is under the following conditions:

– the CONTROL, supplied by its fully charged battery, is operated as specified in this document;

– if possible, the CONTROL is supplied from the supply mains through its battery charger, the battery being initially discharged to such an extent that the CONTROL cannot operate;

– if the CONTROL incorporates inductive coupling between two parts that are detachable from each other, the CONTROL is supplied from the supply mains with the DETACHABLE PART removed.

4.3.4.2.11 See [J.4.3.4.2.11](#).

#### 4.3.4.3 According to protection against electric shock

4.3.4.3.1 If in class 0 control, class 0I control or class I control, or in controls for class 0, class 0I or class I equipment, it is necessary to have parts with double insulation or REINFORCED INSULATION, such parts are checked for compliance with the appropriate requirements specified for class II controls.

4.3.4.3.2 In any class I control, and in any control used in a class I equipment, unearthed accessible metal or accessible insulating surfaces shall be provided with insulation complying with the requirements for a class II control (see [7.1.1](#)).

4.3.4.3.3 If in class 0 control, class 0I control, class I control or class II controls, or controls for class 0, class 0I, class I or class II equipment, it is necessary to have parts using SELV-circuits, such parts are also checked for compliance with the appropriate requirements specified for protection by use of SELV in [9.2.6](#).

*If in CLASS I CONTROLS or CONTROLS for class I equipment it is necessary to have parts using PELV-circuits, such parts are also checked for compliance with the appropriate requirements specified for protection by use of PELV in [9.2.6](#).*

NOTE By definition ([3.7.6](#)) CLASS II CONTROLS cannot use PELV-circuits.

#### 4.3.4.4 According to manufacturing variants

4.3.4.4.1 Controls which are otherwise identical but which can produce varying operating values, operating times or operating sequences due to the setting by the manufacturer or inclusion of alternate components or parts at the manufacturing stage, are treated as a single submission. Normally, controls set to the most arduous condition will be sufficient. However, the test house may require extra samples, set to other values, where it can be clearly shown that these are necessary to allow approval of the whole range.

4.3.4.4.2 In these cases, due attention shall be paid to possible variations in manufacturing deviation and drift of any operating value, operating time or operating sequence, and, for sensing controls, to the minimum and maximum acceptable rates of rise and fall of the appropriate activating quantity which could be applicable to different parts of the range.

#### 4.3.4.5 According to purpose

4.3.4.5.1 Multi-purpose controls shall, in general be tested for each purpose separately. During the tests for any one purpose, the activating quantities and prime movers applicable to all other purposes, shall be maintained constant at the most arduous value or position within the declared range or ranges.

4.3.4.5.2 Such controls without an appropriate section of Clause [19](#) shall be tested in a manner agreed between the manufacturer and the test house so that the essential intended operating values, operating times and operating sequences are tested.

4.3.4.5.3 Any control with a purpose not defined in [3.2](#), or in the appropriate part 2, can be tested and approved to this document, except for Clause [19](#). A test schedule for Clause [19](#) shall be based, wherever possible, on the intent of that clause and shall be agreed between the manufacturer and the test house.

4.3.4.5.4 See [J.4.3.4.5](#).

## 5 Required technical information

### 5.1 General requirements

The CONTROL MANUFACTURER shall provide adequate information to confirm:

- that a suitable CONTROL can be selected;
- that the CONTROL can be mounted and used in a manner that will enable it to meet the requirements of this document; and
- that the relevant tests can be performed to determine compliance with this document.

### 5.2 Methods of providing technical information

5.2.1 Information shall be provided using one or more of the following methods. The information required for CONTROLS and the appropriate method for providing this information shall be as declared in [Table 1](#).

NOTE It is not intended that [Table 1](#) itself necessarily be the actual form used to communicate between manufacturer and test house.

– By marking (C) – this information shall be provided by marking on the CONTROL itself, except that, in the case of an INTEGRATED CONTROL, such marking can be on an adjacent part of the equipment, provided that it is clear that it refers to the CONTROL.

– By documentation on hard copy (D) – this information shall be provided for the USER or INSTALLER of the CONTROL, and shall consist of legible instructions. Each CONTROL shall be accompanied by such instructions. Instruction sheets and other texts required by this document shall be written in the official language(s) of the country in which the CONTROL is to be sold.

– For CONTROLS intended to be exclusively delivered to the EQUIPMENT MANUFACTURER, the instruction sheet is replaced by a leaflet, letter or drawing, etc. It is not necessary for each CONTROL to be accompanied by such a document.

– By documentation on electronic media on internal or external memory or on web pages (e.g. by QR code) (E) – this information is as alternative to (D).

– By declaration (X) – this information shall be provided for the test house for purposes of test and in a manner agreed between test house and manufacturer. It can, for example, be provided by a marking on the CONTROL, by a leaflet, letter or drawing or, in the case of a CONTROL submitted in, on or with an equipment, by measurement or inspection of the submitted equipment. This information should also be provided to the EQUIPMENT MANUFACTURER, as appropriate.

5.2.2 Information which is indicated as being required by marking (C) or by documentation (D,E) shall also be provided for the test house in an agreed manner if so requested by the test house.

5.2.3 For CONTROLS submitted in, on or with an equipment, the requirement for documentation (D,E) is replaced by declaration (X).

5.2.4 For an INTEGRATED CONTROL forming part of a more complex CONTROL, the marking relating to the INTEGRATED CONTROL can be included in the marking of the more complex CONTROL.

5.2.5 The requirement for documentation (D,E) is considered to be met if such information has been provided by marking (C).

5.2.6 The requirement for declaration (X) is considered to be met if such information has been provided by either documentation (D,E) or by marking (C).

5.2.7 Except as indicated in 5.4, for INTEGRATED CONTROLS all information is provided by means of declaration (X). Unless otherwise indicated in a part 2, for INCORPORATED CONTROLS, the only marking required is the manufacturer's name or trade mark and the UNIQUE TYPE REFERENCE, if other required marking is provided by documentation (D,E). For INCORPORATED CONTROLS as declared in Table 1, requirement 45, see the explanation of documentation (D,E) contained in 5.2.1.

5.2.8 For CONTROLS that are neither integrated nor incorporated, where lack of space prevents legible marking as specified, the CONTROL shall be marked with the manufacturer's name (or trade mark) and the UNIQUE TYPE REFERENCE only. The other marking required shall be included in documentation (D,E).

5.2.9 Additional marking or information is allowed, provided that it does not give rise to misunderstanding.

5.2.10 When symbols are used, they shall be as follows:

Amperes .....	A
Volts .....	V
Watts .....	W
Volts-amperes .....	VA
Alternating current (single-phase) .....	~ IEC 60417-5032 (2002-10)
Alternating current (three-phase) .....	3~ IEC 60417-5032-1 (2002-10)
Alternating current (three-phase with neutral) .....	3N~ IEC 60417-5032-2 (2002-10)
Direct current .....	 IEC 60417-5031 (2002-10)
CLASS II CONTROL .....	 IEC 60417-5172 (2003-02)
CLASS III CONTROL .....	 IEC 60417-5180 (2003-02)
Ambient temperature limits of SWITCH HEAD .....	T (The letter T preceded by a minus sign and the numerical value of the lower temperature if $T_{\min}$ less than 0 °C, or followed by the numerical value of the higher temperature if $T_{\max}$ other than 55 °C.)
Rated current of the appropriate fuse in amperes .....	 IEC 60417-5016 (2002-10)
Frequency .....	Hz
Protective earth .....	 IEC 60417-5019 (2006-08)
FUNCTIONAL EARTHING .....	 IEC 60417-5018 (2011-07)
Caution .....	 ISO 7000-0434B (2004-01)
Read operator's manual .....	 ISO 7000-0790 (2004-01)

For identification of the degree of protection provided by enclosures, the symbols shown in Table 1, requirement 9 shall be used.

NOTE 1 Information about rated current and rated voltage can be provided by using figures alone, the figure for the rated current preceding or above that for the rated voltage and separated from it by a line. For circuits for resistive load and inductive loads, the rated current for inductive load is placed between parentheses and immediately following the rated current for resistive load. The symbol for the nature of the supply is placed after the current and voltage.

Current, voltage and nature of supply can be indicated as follows:

$$16 (3)A 240V \sim \text{or } 16 (3) / 240 \sim \text{or } \frac{16 (3)}{240} \sim$$

NOTE 2 The following are examples of ways to provide information about the temperature limits of a CONTROL:

- 20T 30 (meaning minus 20 °C up to plus 30 °C);
- T85 (meaning 0 °C up to plus 85 °C).

NOTE 3 Information concerning declared specific loads can be given by reference to drawings or to types, for example:

"Electric motor, drawing No. ..., part list No. ..., made by..." or "5 × 80 W fluorescent".

**5.2.10DV.1 D2 Modification of Clause 5.2.10 by adding the following to the list of symbols:**

Alternating current (single phase) .....	 "or a.c."
Direct current.....	 "or d.c."

**5.2.10DV.2 D2 Modification of Clause 5.2.10 by adding the following paragraphs:**

**5.2.10DV.2.1** Symbols for alternating current (single phase), alternating current (three phase), alternating current (three phase with neutral) and ambient temperature limits of SWITCH HEAD are not applicable.

**5.2.10DV.2.2** Letter type abbreviations (FLA for full load amperes, HP for horsepower) which clearly convey the assigned rating may be used.

**5.2.10DV.2.3** For INDEPENDENTLY-MOUNTED, FREE STANDING and IN-LINE CONTROLS, information regarding the connection of specific loads shall be on a wiring diagram or label attached to the control.

**Table 1  
Required technical information and methods of providing these information**

	Information	Clause or subclause	Method
1	Manufacturer's name or trade mark	<a href="#">5.2.7</a>	C
2	UNIQUE TYPE REFERENCE <sup>a</sup>	<a href="#">3.13.1</a> , <a href="#">5.2.7</a>	C
3	Rated voltage or rated voltage range in volts (V)	<a href="#">3.1.2</a> , <a href="#">4.3.4.2</a> <a href="#">16.4</a> ,	C

**Table 1 Continued on Next Page**

Table 1 Continued

	Information	Clause or subclause	Method
4	Nature of supply AC, DC, both AC and DC, battery powered, specific supplies or multiple supplies	<a href="#">4.3.4.2</a>	C
5	Frequency if other than for range 50 Hz to 60 Hz inclusive	<a href="#">4.3.4.2</a>	C
6	Purpose of CONTROL	<a href="#">3.2</a> , <a href="#">4.3.4.2</a> , <a href="#">4.3.4.5</a> , <a href="#">19.15</a>	D or E
7	Type of CONTROL according to construction and whether the CONTROL is electronic	<a href="#">3.5</a> , <a href="#">3.5.7</a>	X
8	The type of load controlled by each circuit <sup>b</sup> such as substantially resistive, resistive or inductive, declared specific load, 20 mA load, declared motor load and PILOT DUTY load	<a href="#">16</a> , <a href="#">19</a> , <a href="#">Table 18</a> , <a href="#">Table 19</a> , <a href="#">Table 20</a> , <a href="#">23.2.2</a> , <a href="#">26.2.3</a>	C
9	Degree of protection provided by enclosure <sup>c</sup> (IP classification according IEC 60529)	<a href="#">9.5</a> , <a href="#">14.1</a>	C
10	Marking of terminals for external connections	<a href="#">5.4.2</a>	C
11	Which of the terminals for EXTERNAL CONDUCTORS are for a wider range of conductor sizes than those indicated in <a href="#">Table 2</a> .	<a href="#">8.1</a>	D or E
12	For SCREWLESS TERMINALS, the method of connection and disconnection <sup>d</sup> , if not readily identifiable	<a href="#">8</a>	D
13	Details of any special conductors which are intended to be connected to the terminals for INTERNAL CONDUCTORS	<a href="#">8.2.1</a>	D or E
14	Maximum temperature of terminals for INTERNAL CONDUCTORS and terminals for EXTERNAL CONDUCTORS of INCORPORATED and INTEGRATED CONTROLS, if higher than 85 °C	<a href="#">16</a>	X
15	Temperature limits of the SWITCH HEAD, if the minimum value ( $T_{min}$ ) lower than 0 °C or the maximum value ( $T_{max}$ ) other than 55 °C Preferred values of $T_{max}$ are 30 °C, 55 °C, 70 °C, 85 °C, 105 °C, 125 °C, 150 °C. Preferred values of $T_{min}$ are 0 °C, -10 °C, -20 °C, -30 °C, and -40 °C	<a href="#">16.5</a> , <a href="#">16.7</a> , <a href="#">19.3</a>	C
16	Temperature limits of mounting surfaces ( $T_s$ ) Maximum temperature of mounting surface ( $T_{s max}$ ) if it is more than 20K above $T_{max}$	<a href="#">16.5 a)</a> , <a href="#">19.3</a>	C
17	Type of CONTROL according to protection against electric shock	<a href="#">3.7.3</a> , <a href="#">3.7.4</a> , <a href="#">3.7.5</a> , <a href="#">3.7.6</a> , <a href="#">3.7.7</a> , <a href="#">6</a> , <a href="#">7</a>	X
18	For CLASS II CONTROLS, the symbol for Class II construction	<a href="#">5.3</a>	C
19	Number of cycles of ACTUATION (M) for each MANUAL ACTION Preferred values are: 100 000 cycles; 30 000 cycles; 10 000 cycles; 6 000 cycles; 3 000 cycles <sup>i</sup> ; 300 cycles <sup>i</sup> ; 30 cycles <sup>i</sup> NOTE For controls with more than one manual action, a different value can be declared for each. If a control has more than one intended "OFF" position, then a cycle of actuation is regarded as a movement from one "OFF" position to the next "OFF" position.	<a href="#">19.10</a> , <a href="#">19.11</a>	X
20	Number of automatic cycles (A) for each automatic action.	<a href="#">13.1.3.3</a> , <a href="#">Table 14</a> ,	X

Table 1 Continued on Next Page

Table 1 Continued

	Information	Clause or subclause	Method
	<p>Preferred values are: 300 000 cycles; 200 000 cycles; 100 000 cycles; 30 000 cycles; 20 000 cycles; 10 000 cycles; 6 000 cycles; 3 000 cycles<sup>1)</sup>; 1 000 cycles<sup>1)</sup>; 300 cycles<sup>2)</sup>; 30 cycles<sup>2)4)</sup>; 1 cycle<sup>3)</sup>.</p> <p>1) Not applicable to thermostats or to other fast cycling actions.</p> <p>2) Applicable only to manual reset.</p> <p>3) Applicable only to actions which require the replacement of a part after each operation.</p> <p>4) Can only be reset during manufacturer servicing.</p> <p>NOTE For controls having more than one automatic action, a different value can be declared for each.</p>	<a href="#">19.7.6</a> , <a href="#">19.8.4</a> ,	
21	Ageing period (Y) for CONTROLS with type 1.M or 2.M action Preferred values are: 60 000 h; 30 000 h; 10 000 h; 3 000 h; 300 h; 15 h	<a href="#">19.6</a>	X
22	Type of disconnection or interruption provided by each circuit	<a href="#">3.4.1</a> , <a href="#">3.4.2</a> , <a href="#">3.4.3</a> , <a href="#">3.4.4</a>	X
23	PTI of materials used for insulation	<a href="#">11.3.1</a> , <a href="#">Table 12</a> , Footnote <sup>c</sup> , <a href="#">Table 13</a> , Footnote <sup>d</sup> , <a href="#">21.2.9</a>	X
24	Method of mounting CONTROL <sup>d</sup>	<a href="#">9.6</a> , <a href="#">9.11</a> , <a href="#">10.1</a> , <a href="#">16</a> , <a href="#">19</a> and <a href="#">20</a>	D
25	Marking and method of providing earthing of CONTROL	<a href="#">5.4.2.3</a> , <a href="#">7</a> , <a href="#">7.1.1</a> , <a href="#">7.1.2</a>	D
26	Method of attachment for NON-DETACHABLE CORDS <sup>e</sup>	<a href="#">8.1</a> , <a href="#">9.7</a>	D or E
27	Range of allowed outer diameter for cords used in controls with type X attachment method when relevant for the compliance with Clause <a href="#">14</a>	<a href="#">14.1.4</a>	D or E
28	Intended transportation condition of CONTROL <sup>f</sup>	<a href="#">18.1</a>	X
29	Details of any limitation of OPERATING TIME <sup>g</sup>	<a href="#">16</a> , <a href="#">19</a>	D or E
30	Limits of ACTIVATING QUANTITY for any SENSING ELEMENT over which MICRO-DISCONNECTION or ELECTRONIC DISCONNECTION is secure	<a href="#">9.3.2</a> , <a href="#">9.4.16</a> , <a href="#">19.14</a> , <a href="#">20.1.5</a> , <a href="#">13.1.1</a>	X
31	Minimum and/or maximum rates of change of activating quantity, or minimum and/or maximum cycling rates for a SENSING CONTROL <sup>h</sup>	<a href="#">4.3.2.7</a> , <a href="#">H.17</a> , <a href="#">19</a>	X
32	Values of overshoot of ACTIVATING QUANTITY for SENSING CONTROLS which are necessary for correct action, or which can be used for test purposes	<a href="#">19</a>	X
33	TYPE 1 ACTION or TYPE 2 ACTION	<a href="#">3.6</a>	D or E
34	Additional features of TYPE 1 ACTION or TYPE 2 ACTIONS	<a href="#">9.4</a>	D or E

Table 1 Continued on Next Page

Table 1 Continued

	Information	Clause or subclause	Method
35	MANUFACTURING DEVIATION and condition of test (electrical, mechanical and thermal) appropriate to deviation	<a href="#">3.11.1</a> , <a href="#">9.4.3</a> , <a href="#">H.17</a> , <a href="#">19.14</a>	X
36	DRIFT	<a href="#">3.11.2</a> , <a href="#">9.4.3</a> , <a href="#">H.17</a> , <a href="#">18.2.4</a>	X
37	Reset characteristics for cut-out action <sup>1</sup>	<a href="#">9.4.11</a> , <a href="#">9.4.12</a>	D or E
38	If a CONTROL is either to be hand-held or is intended for a hand-held equipment	<a href="#">21</a> <a href="#">9.12.4.4.1</a>	X
39	Any limitation to the number or distribution of flat push-on RECEPTACLES which can be fitted	<a href="#">8.2.4.4</a>	D or E
40	For any TYPE 2 ACTION the MANUFACTURING DEVIATION and DRIFT of its OPERATING VALUE, OPERATING TIME or OPERATING SEQUENCE (declared in <a href="#">Table 1</a> , requirement 35, and requirement 36)	<a href="#">9.4.3</a>	D or E
41	Extent of any SENSING ELEMENT	<a href="#">3.8.1</a>	X
42	OPERATING VALUE (or values) or OPERATING TIME	<a href="#">3.3.11</a> , <a href="#">3.3.12</a> , <a href="#">9</a> , <a href="#">16</a> , <a href="#">H.17.6</a> , <a href="#">19</a>	D
43	Installation class (surge immunity) and operating modes	<a href="#">12.2</a> <a href="#">H.25.8.1</a> <a href="#">H.25.8.3</a> Annex <a href="#">N</a>	X
44	Intended POLLUTION DEGREE of the CONTROL	Annex <a href="#">E</a>	D or E
45	CONTROL intended to be delivered exclusively to the EQUIPMENT MANUFACTURER	<a href="#">5.2.1</a> , <a href="#">5.2.7</a>	X
46	Glow wire test temperatures	<a href="#">21.2.5</a> , <a href="#">21.2.6</a> , <a href="#">21.2.7</a> , and <a href="#">21.2.8</a>	X
47	The minimum parameters of any heat dissipator (for example, heat sink) not provided with an ELECTRONIC CONTROL but essential to its correct OPERATION	<a href="#">16</a>	D
48	Type of output waveform if other than sinusoidal	<a href="#">24.1</a>	X
49	Details of the TOUCH CURRENT waveform produced after FAILURE of the BASIC INSULATION	<a href="#">13.1</a>	X
50	The relevant parameters of those ELECTRONIC DEVICES or other circuit components considered as unlikely to fail (see paragraph 1 of <a href="#">13.1.3.1</a> )	<a href="#">13.1</a>	X
51	Type of output waveform(s) produced after FAILURE of an ELECTRONIC DEVICE or other circuit component (see item g) of <a href="#">13.1.3.8</a> )	<a href="#">13.1</a>	X
52	The effect on controlled output(s) after electronic circuit component FAILURE if relevant (item c) of <a href="#">13.1.3.8</a> )	<a href="#">13.1</a>	X
53	Any component on which reliance is placed for ELECTRONIC DISCONNECTION which is disconnected as required by footnote n to <a href="#">Table 16</a>	<a href="#">15.2</a> <a href="#">13.1</a>	X
54	External load and emission control measures to be used for test purposes	<a href="#">23.3</a>	X
55	RATED IMPULSE VOLTAGE	<a href="#">3.1.10</a> , <a href="#">11.2</a>	D or E
56	Type of printed circuit board protection	Annex <a href="#">L</a> or	X

Table 1 Continued on Next Page

Table 1 Continued

	Information	Clause or subclause	Method
		Annex <a href="#">M</a>	
57	Temperature for the ball pressure test	<a href="#">21.2.5</a> , <a href="#">21.2.6</a> and <a href="#">21.2.7</a>	X
58	Maximum declared torque on single bush mounting using thermoplastic material	<a href="#">Table 9</a> , Footnote <sup>a</sup>	D or E
59	POLLUTION DEGREE in the MICRO-ENVIRONMENT of the CREEPAGE DISTANCE or CLEARANCE if cleaner than that of the CONTROL, and how this is designed	<a href="#">Table 14</a>	X
60	RATED IMPULSE VOLTAGE for the CREEPAGE DISTANCE or CLEARANCE if different from that of the CONTROL, and how this is ensured	<a href="#">Table 14</a>	D or E
61	The values designed for tolerances of distances for which the exclusion from FAULT mode "short" is claimed	<a href="#">13.1.3.3</a> , <a href="#">Table 14</a> , <a href="#">13.1.3.5</a>	X
62	For CLASS III CONTROLS, the symbol for Class III construction	<a href="#">5.4.2.5</a>	C
63	For SELV or PELV circuits, the ELV limits realized	<a href="#">3.1.5</a> , <a href="#">6.1.1</a> , <a href="#">P.3.2</a>	X
64	Value of accessible voltage of SELV/PELV circuit, if different from <a href="#">6.1.1</a> , and the product standard(s) referred to for the application of the CONTROL, in which the accessible SELV/PELV level(s) is (are) given	<a href="#">3.1.4</a> , <a href="#">6.1.1</a>	X
65	Emission tests and groups as declared according to CISPR 11	<a href="#">23.2</a>	X
66	Immunity tests for PROTECTIVE CONTROLS for use in accordance with IEC 60335 appliances	<a href="#">Table H.12</a>	X
67	Maximum short circuit current as declared	<a href="#">9.3.5.2.1</a> b)	X
68	Overcurrent protective device external to the CONTROL	<a href="#">9.2.8</a> , <a href="#">26.2</a>	D or E
69	Marking for the type of replaceable battery	<a href="#">5.4.3.3</a>	C
70	For INCORPORATED CONTROLS or INTEGRATED CONTROLS, whether the overload test shall be done at control level	<a href="#">26.2.2</a>	X
71	Maximum altitude at which the CONTROL can be used if greater than 2 000 m	<a href="#">11.2</a>	X
72	Maximum number of RESET actions within a time period	<a href="#">9.12.4.4.5</a>	D
73	Number of remote RESET actions	<a href="#">19.1.6.5</a>	X
74	Resistance to heat and fire for controls intended for use in IEC 60335 appliances	<a href="#">21.2.4</a>	X
75	Type of electromagnetic environment of one of the two EMC emission limits RESIDENTIAL ELECTROMAGNETIC ENVIRONMENT or INDUSTRIAL ELECTROMAGNETIC ENVIRONMENT	<a href="#">23</a> , <a href="#">Table 23</a> or <a href="#">Table 24</a>	D or E
76	Type of electromagnetic environment of one of the two EMC immunity levels	<a href="#">25.3.2</a>	D or E
77	RESIDENTIAL ELECTROMAGNETIC ENVIRONMENT	<a href="#">Table 26</a> or	
78	INDUSTRIAL ELECTROMAGNETIC ENVIRONMENT	<a href="#">Table 27</a>	
79	Cable length up to or equal to 30 m (if not for LONG-DISTANCE LINES)	<a href="#">25.3.2</a> , <a href="#">Table 26</a> or <a href="#">Table 27</a>	D or E
80	Cable length up to or equal to 3 m (if not for LONG-DISTANCE LINES)	<a href="#">25.3.2</a> , <a href="#">Table 26</a> or <a href="#">Table 27</a>	D or E
81	Applicable of test and frequency	<a href="#">25.3.2</a> , <a href="#">Table 26</a> or <a href="#">Table 27</a>	D or E

Table 1 Continued on Next Page

Table 1 Continued

	Information	Clause or subclause	Method
82	Additional requirements for HBES/BACS <sup>k</sup> controls in RESIDENTIAL ELECTROMAGNETIC ENVIRONMENT according to IEC 63044-5-2 or INDUSTRIAL ELECTROMAGNETIC ENVIRONMENT according to IEC 63044-5-3	<a href="#">25.3.2</a> , <a href="#">Table 26</a> or <a href="#">Table 27</a>	D or E
83	Control susceptible to magnetic fields (see footnote e in both tables)	<a href="#">25.3.2</a> , <a href="#">Table 26</a> or <a href="#">Table 27</a>	D or E
84	Controls declared for EMC performance	<a href="#">25.1</a> , <a href="#">Table 25</a>	D
85	Minimum and maximum battery voltage	<a href="#">24.2</a>	X
86	ELECTRONIC CONTROLS of class A control function, which are additionally complying with <a href="#">25.7</a> to <a href="#">25.10</a>	<a href="#">25.1</a> , <a href="#">Table 25</a>	D
87	Type of DC supply for non-stationary applications	Annex J, I.1	D
<p><sup>a</sup> The UNIQUE TYPE REFERENCE shall be such that, when it is quoted in full, the manufacturer of the CONTROL can supply a replacement which will be fully interchangeable with the original electrically, mechanically, dimensionally, and functionally. It may comprise a series type reference with other marking, such as voltage rating or an ambient temperature marking, which together provide a unique type reference.</p>			
<p><sup>b</sup> For CONTROLS with more than one circuit, the current applicable to each circuit and to each terminal. If these are different from each other, then it shall be made clear to which circuit or terminal the information applies. For circuits for resistive and inductive loads, the rated current, or the rated load in VA, at power factors as indicated in the appropriate table of <a href="#">19.2</a>.</p>			
<p><sup>c</sup> The marking (C) requirement does not apply to CONTROLS or parts thereof classified as IP00, IP10, IP20, IP30 and IP40.</p>			
<p><sup>d</sup> If, for INDEPENDENTLY MOUNTED CONTROLS, it is necessary to take special precautions when installing or using the CONTROL, these details shall be given in an instruction sheet accompanying the CONTROL.</p> <p>Special precautions may be necessary, for example, for flush mounting INDEPENDENTLY MOUNTED CONTROLS. In order to ensure that, after building-in, the conditions necessary to meet the requirements of this document are achieved, the instruction sheet for such CONTROLS shall include clear information concerning:</p> <ul style="list-style-type: none"> <li>– the dimensions of the space to be provided for the CONTROL;</li> <li>– the dimensions and position of the means for supporting and fixing the CONTROL within this space;</li> <li>– a minimum clearance between the various parts of the CONTROL and the surrounding parts of the fitment;</li> <li>– the minimum dimensions of ventilating openings and their correct arrangements;</li> <li>– the connection of the CONTROL to the supply and the interconnection of separate components, if any.</li> </ul> <p>If the supply conductors of a CONTROL can come into contact with parts of a terminal block or a compartment for FIXED WIRING, and these parts have, under conditions of NORMAL USE, a temperature exceeding that specified in <a href="#">Table 17</a>, the instruction sheet shall also state that the CONTROL shall be connected by means of conductors having the appropriate T rating (see Footnote h of <a href="#">Table 17</a>).</p> <p>For CONTROLS with wiring between a sensor, sensing or actuating element and the rest of the CONTROL where part of this wiring is, or is intended to be, also part of the fixed installation, the manufacturer shall give in the documentation the relevant information for proper installation and the appropriate type of cable or cord required for that part of the fixed installation.</p>			
<p><sup>e</sup> IN-LINE CORD, FREE-STANDING and INDEPENDENTLY MOUNTED CONTROLS, if fitted with NON-DETACHABLE CORDS using TYPE Y ATTACHMENTS or TYPE Z ATTACHMENTS, shall have documentation (D) containing the substance of one of the following statements, whichever is appropriate:</p> <ul style="list-style-type: none"> <li>– "The supply cord of this control cannot be replaced; if the cord is damaged, the control should be discarded" (Z)</li> </ul> <p>or</p> <ul style="list-style-type: none"> <li>– "The supply cord of this control can be replaced only by the manufacturer or his accredited service agent" (Y).</li> </ul>			
<p><sup>f</sup> The method of packaging does not have to be declared.</p>			
<p><sup>g</sup> For IN-LINE CORD, FREE-STANDING and INDEPENDENTLY MOUNTED CONTROLS, this information shall be provided by method C.</p>			
<p><sup>h</sup> <math>\alpha_1</math> = minimum rising rate</p>			

Table 1 Continued on Next Page

**Table 1 Continued**

	Information	Clause or subclause	Method																				
	<p><math>\beta_1</math> = minimum falling rate</p> <p>The rate of change (<math>\alpha_1</math> and <math>\beta_1</math>) of the ACTIVATING QUANTITY are those applicable to NORMAL USE.</p> <p><math>\alpha_2</math> = maximum rising rate (for TYPE 2 ACTIONS only)</p> <p><math>\beta_2</math> = maximum falling rate (for TYPE 2 ACTIONS only)</p> <p>For test purposes, <math>\alpha_1</math> and <math>\beta_1</math> shall be as declared but not lower than the limit(s) indicated in the appropriate part 2 standards for TYPE 1 ACTIONS and/or TYPE 2 ACTIONS. The values <math>\alpha_2</math> and <math>\beta_2</math> are for test purposes only, and may alternatively be declared as a maximum cycling rate. The rates of change for the purpose of this document shall be expressed in the units as shown in the following table*:</p>																						
	<table border="1"> <thead> <tr> <th>Activating quantity</th> <th>Unit for rate of change</th> </tr> </thead> <tbody> <tr> <td>Pressure</td> <td>Pa/s</td> </tr> <tr> <td>Temperature</td> <td>K/h</td> </tr> <tr> <td>Position</td> <td>mm/s</td> </tr> <tr> <td>Illumination</td> <td>lux/s</td> </tr> <tr> <td>Velocity</td> <td>mm/s<sup>2</sup></td> </tr> <tr> <td>Liquid level</td> <td>mm/s</td> </tr> <tr> <td>Current</td> <td>A/s</td> </tr> <tr> <td>Humidity</td> <td>%/s</td> </tr> <tr> <td>Air flow</td> <td>m<sup>3</sup>/s<sup>2</sup></td> </tr> </tbody> </table>			Activating quantity	Unit for rate of change	Pressure	Pa/s	Temperature	K/h	Position	mm/s	Illumination	lux/s	Velocity	mm/s <sup>2</sup>	Liquid level	mm/s	Current	A/s	Humidity	%/s	Air flow	m <sup>3</sup> /s <sup>2</sup>
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Air flow	m <sup>3</sup> /s <sup>2</sup>																						
	<p>* When using other activating quantities, the units shall be expressed in SI-units.</p>																						
	<p><sup>i</sup> The manufacturer may declare a time before which, or a specific value of ACTIVATING QUANTITY above which, manual reset shall not occur.</p>																						
	<p><sup>j</sup> Applicable only to actions of CONTROLS for specific equipment and applications such as voltage-tap CONTROLS, summer/winter CONTROLS for water heaters and where permitted by the appropriate equipment standard.</p>																						
	<p><sup>k</sup> Home and Building Automation and Control (HBES/BACS) products.</p>																						

**Table 1DV.1 D2 Modification of Table 1 as follows:**

- 1) Add row 2ADV and row 4ADV:

**Table 1DV**  
**Required technical information and methods of providing these information**

	Information	Clause or subclause	Method
2ADV	Date code of manufacturing	<a href="#">R31DV.1.5</a>	C
4ADV	Class 2 power source or circuit	<a href="#">R32DV.1</a>	C

- 2) Modify row 11 column 3 by adding "[R31DV.1.1.21](#)".

- 3) Modify row 65 by replacing "CISPR 11" with "FCC Part 15 and/or 18."

- 4) Replace note (e) with the following, "This note does not apply. Attachment or replacement of NON-DETACHABLE CORDS is not considered a user function."