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Edition 4.0 2016-07

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Switches for appliances – Part 1: General requirements

Interrupteurs pour appareils – Partie 1: Exigences générales



IEC 61058-1:2016-07(en-fr)



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INTERNATIONAL STANDARD

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Switches for appliances – Part 1: General requirements

Interrupteurs pour appareils – Partie 1: Exigences générales

INTERNATIONAL ELECTROTECHNICAL COMMISSION

COMMISSION ELECTROTECHNIQUE INTERNATIONALE

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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SWITCHES FOR APPLIANCES –

Part 1: General requirements

FOREWORD

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International Standard IEC 61058-1 has been prepared by subcommittee 23J: Switches for appliances, of IEC technical committee 23: Electrical accessories.

This fourth edition cancels and replaces the third edition published in 2000, Amendment 1:2001 and Amendment 2:2007. This edition constitutes a technical revision.

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

a) requirements for mechanical switches are now given in IEC 61058-1-1;
b) requirements for electronic switches are now given in IEC 61058-1-2.

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

FDIS	Report on voting
23J/401/FDIS	23J/405/RVD

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

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

A list of all parts in the IEC 61058 series, published under the general title *Switches for appliances*, can be found on the IEC website.

In this part, the following print types are used:

- requirements proper: roman type;
- test specifications: *italic type*;
- notes: smaller roman type.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC website 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- withdrawn,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.

SWITCHES FOR APPLIANCES –

Part 1: General requirements

1 Scope

This part of IEC 61058 applies to switches for appliances. The switches are intended to control electrical appliances and other equipment for household or similar purposes with a rated voltage not exceeding 480 V and a rated current not exceeding 63 A.

Switches for appliances are intended to be operated by

– a person via an actuating member,

– indirect actuation,

– an actuating sensing unit.

Transmission of a signal between the actuating member or sensing unit and the switch may be connected by optical, acoustic, thermal, electrical or other relevant connection and may include remote controlled units.

This part of IEC 61058 applies to switches for appliances provided with additional control functions governed by the switch provided with electronic circuits and devices that are necessary for the intended and/or correct operation of the switch.

This part of IEC 61058 applies to circuitry when evaluated with a switch and necessary for the switching function.

This part of IEC 61058 applies in general to switches for appliances in conjunction with the following parts:

– *Part 1-1: Requirements for mechanical switches*, and/or

– *Part 1-2: Requirements for electronic switches*.

This part of IEC 61058 does not apply to devices covered by:

– IEC 60669 (all parts), *Switches for household and similar fixed-electrical installations*, and

– IEC 60730 (all parts), *Automatic electrical controls*.

This part of IEC 61058 does not contain requirements for safety isolating switches (IEC 60050-811:1991, 811-29-17).

NOTE 1 For switches used in tropical climates, additional requirements may be necessary.

NOTE 2 Attention is drawn to the fact that the end product standards for appliances may contain additional or alternative requirements for switches.

NOTE 3 Throughout this part of IEC 61058, the word "appliance" means "appliance or equipment".

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. 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 60060-1, *High-voltage techniques – Part 1: General definitions and test requirements*

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 60112:2003, *Method for the determination of the proof and the comparative tracking indices of solid insulating materials*
Amendment 1:2009

IEC 60127 (all parts), *Miniature fuses*

IEC 60127-2, *Miniature fuses – Part 2: Cartridge fuse-links*

IEC 60269-3, *Low-voltage fuses – Part 3: Supplementary requirements for fuses for use by unskilled persons (fuses mainly for household or similar applications) – Examples of standardized systems of fuses A to F*

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 60417, *Graphical symbols for use on equipment* (available at: http://www.graphical-symbols.info/equipment)

IEC 60529:1989, *Degree of protection provided by enclosures (IP code)*
Amendment 1:1999
Amendment 2:2013

IEC 60617, *Graphical symbols for diagrams* (available at: http://std.iec.ch/iec60617)

IEC 60664-3:2003, *Insulation coordination for equipment within low-voltage systems – Part 3: Use of coating, potting or molding for protection against pollution*
Amendment 1:2010

IEC 60691, *Thermal-links – Requirements and application guide*

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

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

IEC 60695-11-10, *Fire hazard testing – Part 11-10: Test flames – 50 W horizontal and vertical flame test methods*

IEC 60695-11-20, *Fire hazard testing – Part 11-20: Test flames – 500 W flame test method*

IEC 60730 (all parts), *Automatic electrical controls*

IEC 60730-1:2013, *Automatic electrical controls – Part 1: General requirements*

IEC 60730-2-9:2015, *Automatic electrical controls – Part 2-9: Particular requirements for temperature sensing control*

IEC 60738-1, *Thermistors – Directly heated positive temperature coefficient – Part 1: Generic specification*

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 TS 61000-3-5*, Electromagnetic compatibility (EMC) – Part 3-5: Limits – Limitation of voltage fluctuations and flicker in low-voltage power supply systems for equipment with rated current greater than 75 A*

IEC 61000-4-2*, 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, *Electromagnetic compatibility (EMC) – Part 4-5: Testing and measurement techniques – Surge immunity test*

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*

IEC 61032:1997, *Protection of persons and equipment by enclosures – Probes for verification*

IEC 61058-1-1, *Switches for appliances – Part 1-1: Requirements for mechanical switches*

IEC 61058-1-2, *Switches for appliances – Part 1-2: Requirements for electronic switches.*

IEC 61210:2010, *Connecting devices – Flat quick-connect terminations for electrical copper conductors – Safety requirements*

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

CISPR 15:2013, *Limits and methods of measurement of radio disturbance characteristics of electrical lighting and similar equipment*

3 Terms and definitions

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

3.1 General terms and definitions

3.1.1
mechanical switching device
switching device designed to close and open one or more electric circuits by means of separable contacts

Note 1 to entry: In the IEC 61058 series the terms “switching devices” and “switches” are used interchangeably.

[SOURCE: IEC 60050-441:1984, 441-14-02]

3.1.2
conductive part
part which is capable of conducting current although it may not necessarily be used for carrying service current

[SOURCE: IEC 60050-441: 1984, 441-11-09]

3.1.3
live part
conductor or conductive part intended to be energized in normal operation, including a neutral conductor, but by convention not a PEN/PEM/PEL conductor

Note 1 to entry: For appliance switches, “live part” implies a risk of electric shock.

Note 2 to entry: Unless otherwise specified, parts connected to a SELV supply or equal to or less than 24 V are not considered to be live parts.

3.1.4
pole of a switch
portion of a switching device associated exclusively with one electrically separated conducting path of its main circuit and excluding those portions which provide a means for mounting and operating all poles together

Note 1 to entry: A switch is called "single pole" if it has only one pole. If it has more than one pole, it may be called "multipole" (two-pole, three-pole, etc.) provided that the poles are coupled in such a manner as to operate together.

[SOURCE: IEC 60050-441:1984, 441-15-01, modified — Pole of a switching device replaced by pole of a switch]

3.1.5
detachable part
part which is removable without the use of a tool when the switch is mounted as in normal use

3.1.6
tool
screwdriver, coin, or any other object which may be used to operate a nut, a screw or a similar part

3.1.7
normal use
use of the switch for the purpose for which it was made and declared

3.1.8
unique type reference
UT
identification marking on a switch such that by quoting it in full to the switch manufacturer a unique switch model can be identified

Note 1 to entry: This note applies to the French language only.

3.1.9
common type reference
CT
identification marking on a switch which does not require any further specific information additional to that provided by the marking requirements of this part of IEC 61058 for selection, installation and use in accordance with this part of IEC 61058

Note 1 to entry: This note applies to the French language only.

3.1.10
cover
cover plate
protective cover
cover made of insulating material, used to cover live parts in order to avoid accidental electric contact and which is accessible when the switch is mounted as in normal use but which can be removed with the aid of a tool

3.1.11
signal indicator
device associated with a switch to indicate the circuit state visually

Note 1 to entry: The device may or may not be controlled by the switch.

3.1.12
unprepared conductor
a conductor which has been cut and the insulation of which has been removed for insertion into a terminal.

[SOURCE: IEC 60050-442:1998, 442-01-26]

3.1.13
prepared conductor
a conductor the end of which is fitted with an attachment such as eyelet, sleeve or cable lug

[SOURCE: IEC 60050-442:1998, 442-01-27]

3.1.14
polarity reversal
change of the polarity on the terminals connected to the load by a switching action

3.1.15
semiconductor device
SD
device whose essential characteristics are due to the flow of charge carriers within a semiconductor

Note 1 to entry: Previous editions of IEC 61058-1 refer to a semiconductor device as a “semiconductor switching device or solid state device (SD)”.

[SOURCE: IEC 60050-521:2002, 521-04-01]

3.1.16
semiconductor circuit
circuit containing multiple components, where at least one is a semiconductor device

3.1.17
electronic switch
switch for appliances provided with a semiconductor device or a semiconductor circuit in its intended load path

Note 1 to entry: The electronic switch may be provided with series and/or parallel mechanical contacts. See examples in Table 15 in IEC 61058-1-2:2016.

3.1.18
duty
statement of the load to which the switch is subjected, including, if applicable, making, controlling and breaking and including their durations and sequence in time

3.1.19
duty-type
continuous, short-time or periodic duty comprising one or more loads remaining constant for the duration specified, or a non-periodic duty in which generally the load varies within the permissible operating range

[SOURCE: IEC 60050-411:1996, 411-51-13, modified – "speed" is deleted]

3.1.20
protective impedance
component or assembly of components whose impedance and construction are intended to limit steady-state touch current and electric charge to non-hazardous levels

3.2 Terms and definitions relating to voltage and current

3.2.1
rated voltage
voltage assigned by the manufacturer for a specified operating condition

Note 1 to entry: It is measured in r.m.s. unless specifically indicated otherwise.

Note 2 to entry: This value is the maximum value and covers all lower values.

3.2.2
safety extra-low voltage
SELV
voltage which does not exceed 50 V AC r.m.s. or 120 V DC between conductors or between any conductor and earth in a circuit which is insulated from the supply mains

Note 1 to entry: SELV is an unearthed extra low voltage (see IEC 61140).

3.2.3
rated current
current assigned by the manufacturer for a specified operating condition

Note 1 to entry: It is measured in r.m.s. unless specifically indicated otherwise.

Note 2 to entry: This value is the maximum value and covers all lower values.

3.2.4
rated load
type of load assigned by the manufacturer, according to classifications

3.2.5
over-current
current exceeding the rated current

[SOURCE: IEC 60050-441:1984, 441-11-06]

3.2.6
overload
operating conditions in an electrically undamaged circuit, which cause an over-current

[SOURCE: IEC60050-441:1984, 441-11-08]

3.2.7
working voltage
highest r.m.s. value of the AC or DC voltage across any particular insulation which can occur when the switch is supplied at rated voltage

Note 1 to entry: Transients are disregarded.

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

3.2.8
overvoltage
voltage having a peak value exceeding the corresponding peak value of maximum steady-state voltage at normal operating conditions

3.2.9
overvoltage category
numeral defining a transient overvoltage condition

Note 1 to entry: See Annex E.

3.2.10
impulse withstand voltage
highest peak value of impulse voltage of prescribed form and polarity which does not cause breakdown of insulation under specified conditions

3.2.11
minimum load
load at which when declared, the electronic switch still operates correctly

3.2.12
thermal current
continuous resistive current which, under the test conditions declared by the manufacturer (which may also include the ambient temperature), generates, without forced cooling, the same heating as when the electronic switch is operating under specified ambient conditions at rated load in the appliance with forced cooling present, if any

Note 1 to entry: The concept “thermal current” allows simplified testing of electronic switches, which in normal application have complex cooling conditions. The thermal current will always be determined by tests of the switch positioned on a table or in a simple test rig and comparative tests in the appliance in question. Consequently, the thermal current will normally be lower than the rated current. This necessitates additional tests of the terminals, contacts, etc., in order to verify that they will be able to carry the rated current, when the electronic switch is mounted in the appliance. These additional tests are specified in Clauses 16 and 17 in IEC 61058-1-1:2016 or IEC 61058-1-2:2016.

3.3 Terms and definitions relating to the different types of switches

3.3.1
incorporated switch
switch intended for incorporation in or on an appliance, which however can be tested separately

[SOURCE: IEC 60050-442:1998, 442-04-01]

3.3.2
integrated switch
switch, the function of which is depending on its correct mounting and fixing in an appliance, and which can be tested only in combination with the relevant parts of that appliance

[SOURCE: IEC 60050-442:1998, 442-04-02]

3.3.3
rotary switch
switch where the actuating member is a shaft or a spindle which has to be rotated to one or more indexed positions in order to achieve a change in contact state

Note 1 to entry: The rotation of the actuating member may be unlimited or restricted in either direction.

3.3.4
lever switch
switch where the actuating member is a lever which has to be moved (tilted) to one or more indexed positions in order to achieve a change in contact state

3.3.5
rocker switch
switch where the actuating member is a low profile lever (rocker) which has to be tilted to one or more indexed positions in order to achieve a change in contact state

3.3.6
push-button switch
switch where the actuating member is a button which has to be pushed in order to achieve a change in contact state

Note 1 to entry: The switch may be provided with one or more actuating members.

3.3.7
cord-operated switch
switch where the actuating member is a pull-cord which has to be pulled in order to achieve a change in contact state

[SOURCE: IEC 60050-442:1998, 442-04-08, modified — "operating means" changed to "actuating member"]

3.3.8
push-pull switch
switch where the actuating member is a rod which has to be pulled or pushed to one or more indexed positions in order to achieve a change in contact state

3.3.9
biased switch
switch where the contacts and actuating member return to a predetermined position when the actuating member is released from the actuated position

3.4 Terms and definitions relating to the operation of the switch

3.4.1
actuation
movement of the actuating member of the switch by hand, by foot, or by any other human activity

3.4.2
indirect actuation
movement of the actuating member of the switch indirectly by a part of an appliance into which the switch is incorporated or integrated

Note 1 to entry: For example, a switch can be incorporated or integrated in the door of an appliance.

3.4.3
actuating member
part which is pulled, pushed, turned or otherwise influenced to cause an operation

3.4.4
actuating means
part which may be interposed between the actuating member and the contact mechanism in order to achieve contact operation

3.4.5
disconnection
interruption of an electrical circuit in a pole so as to provide insulation between the supply and those parts intended to be disconnected from the supply

3.4.6
micro-disconnection
disconnection that provides correct functional performance by contact separation in the case of long-term temporary overvoltage

3.4.7
electronic-disconnection
disconnection that provides a non-cycling correct functional performance by a semiconductor device (SD) in the case of long-term temporary overvoltage

3.4.8
full-disconnection
disconnection that provides correct functional performance by contact separation in the case of short-term and long-term temporary overvoltage and impulse withstand voltage equivalent to basic insulation

3.4.9
all-pole disconnection single-phase
concurrent disconnection of all supply conductors, except the earthed conductor, by a single switching action for AC and DC appliances

3.4.10
operating cycle
succession of operations from one position to another and back to the first position through all other positions, if any

[SOURCE: IEC 60050-441:1984, 441-16-02]

3.4.11
electronic actuating member
part, component or component group which controls the actuating means or the switching device

Note 1 to entry: An optical or acoustic sensing unit is an example of a component group.

3.4.12
electronic actuating means
part, component or component group which controls electronically the switching device

3.4.13
abnormal conditions
conditions leading to reduced safety, which may occur in the appliance or in the switch during normal operation

Note 1 to entry: These conditions (e.g. rise in temperature, lack of protection against shock) may be the consequence of faults of the switch or related ambient conditions, which in case of defects or deteriorated operation of other components of the application are foreseeable. (Intended) misuse is not covered.

3.4.14
sensing unit
unit adjustable by other than mechanical means containing electronic components and controlling the output via electronic components or unit that is activated by any physical phenomenon or combination of phenomena

3.4.15
fault conditions
abnormal conditions which are caused by a failure within the switch, which can be simulated by modifications of the switch

3.5 Terms and definitions relating to connections to the switch

3.5.1
external conductor
cable, cord or conductor which is external to a switch

3.5.2
integrated conductor
conductor which is either inside a switch or is used to permanently interconnect terminals or terminations of a switch

3.6 Terms and definitions relating to terminals and terminations

3.6.1
terminal
conductive part of a switch, provided for connecting the switch to one or more external conductors

3.6.2
screw type terminal
terminal for the connection and/or interconnection and subsequent disconnection of one or more conductors, the connection being made directly or indirectly by means of screws or nuts of any kind

Note 1 to entry: Examples of screw type terminals include those in Figures 1 through 5.

3.6.3
screwless terminal
terminal for the connection and/or interconnection and subsequent disconnection of one or more conductors, the connection being made, directly or indirectly, by means other than screws

Note 1 to entry: Examples of screwless type terminals are shown in Figure 6.

Note 2 to entry: Push-in terminals, which are wire terminals that lock a stripped conductor when inserted in the terminal, are covered by the definition of screwless terminals.

3.6.4
termination
arrangement provided for making the connections between the switch internal leads and the external conductors

3.6.5
flat quick-connect termination
electrical connection consisting of a male tab and a female connector which can be inserted and withdrawn with or without the use of a tool

[SOURCE: IEC 60050-442:1998, 442-06-07]

3.6.6
tab
portion of a flat quick-connect termination which is inserted into the female connector and is a part integral with the switch

Note 1 to entry: Examples of tabs are shown in IEC 61210.

3.6.7
female connector
portion of a flat quick-connect termination which is pushed onto the tab

Note 1 to entry: An example of a female connector is shown in Figure 7.

3.6.8
solder terminal
conductive part of a switch provided to enable a termination to be made by means of solder

3.7 Terms and definitions relating to insulation

3.7.1
basic insulation
insulation applied to live parts to provide basic protection against electric shock

3.7.2
supplementary insulation
independent insulation applied in addition to the basic insulation in order to provide protection against electric shock in the event of a failure of the basic insulation

3.7.3
double insulation
insulation comprising both basic insulation and supplementary insulation

3.7.4
reinforced insulation
single insulation system applied to live parts which provides a degree of protection against electric shock equivalent to double insulation

Note 1 to entry: The term “insulation system” does not imply that the insulation is one homogeneous piece. It may consist of several layers which cannot be tested separately as supplementary or basic insulation.

3.7.5
functional insulation
insulation between live parts which is necessary only for the proper functioning of the switch

3.7.6
coating
solid insulating material laid on one or both sides of the surface of the printed board

Note 1 to entry: Coating can be varnish, a dry film applied to the printed board or can be achieved by thermal deposition.

Note 2 to entry: Coating and base material of the printed board form an insulating system that may have properties similar to solid insulation.

3.7.7
solid insulation
insulation material interposed between two conductive parts

Note 1 to entry: In the case of a printed board assembly with a coating, solid insulation consists of the printed board itself as well as the coating. In other cases, solid insulation consists of the encapsulating material.

3.7.8
class 0 appliance
appliance in which protection against electric shock relies upon basic insulation, which 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 being placed upon the environment

3.7.9
class I appliance
appliance in which protection against electric 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 conductive parts (which are not live parts) to the protective (earthing) conductor in the fixed wiring in such a way that these parts cannot become live in the event of a failure of the basic insulation

3.7.10
class II appliance
appliance in which protection against electric shock does not rely on basic insulation only, but in which additional safety 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: A class II appliance may be provided with means for maintaining the continuity of protective circuits, provided that such means are within the appliance and are insulated from accessible surfaces according to the requirements of class II.

3.7.11
class III appliance
appliance in which protection against electric shock relies on supply at SELV and in which voltages higher than those of SELV are not generated

3.7.12
comparative tracking index
CTI
numerical value of the maximum voltage in volts which a material can withstand without tracking and without a persistent flame occurring under specified test conditions

[SOURCE: IEC 60050-212: 2010,212-11-59]

3.8 Terms and definitions relating to pollution

3.8.1
pollution
addition of solid, liquid, or gaseous foreign matter that can result in a reduction of dielectric strength or surface resistivity of the insulation

3.8.2
micro-environment
immediate environment of the insulation which particularly influences the dimensioning of creepage distances

Note 1 to entry: For self-produced pollution in arc chambers of switches, see Annex F.

3.8.3
macro-environment
environment of the room or other location in which the switch is installed or used

3.8.4
pollution degree
numeral characterizing the expected pollution of the micro-environment

Note 1 to entry: Pollution degree 1, 2 and 3 are used (see 7.8, 7.9 and Annex F).

3.9 Terms and definitions relating to manufacturers' tests

3.9.1
routine test
test to which each individual switch for appliances is subjected during and/or after manufacture to ascertain whether it complies with the relevant requirements of this part of IEC 61058 (see Annex K).

3.9.2
sampling test
test on a number of switches taken at random from a batch

Note 1 to entry: Sampling tests are specified in Annex L.

[SOURCE: IEC 60050-811:1991, 811-10-06, modified — "devices" replaced by "switches"]

3.9.3
type test
test of one or more switches made to a certain design to show that the design meets certain specifications

[SOURCE: IEC 60050-811:1991, 811-10-04, modified — "devices" replaced by "switches"]

4 General requirements

Switches shall be designed and constructed so that in normal use they function safely so as to cause no danger to persons or surroundings even in the event of such careless use as may occur in normal use, as specified in the IEC 61058-1 series.

Compliance is checked by carrying out all the relevant tests.