IEC 60669-2-3

Edition 4.0 2024-03
EXTENDED VERSION

INTERNATIONAL STANDARD

colour inside

This extended version of IEC 60669-2-3:2024 includes the content of the references made to IEC 60669-1:2017

Switches for household and similar fixed electrical installations – Part 2-3: Particular requirements – Time-delay switches (TDS)



IEC 60669-2-3:2024-03 EXV(en)

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Switches for household and similar fixed electrical installations – Part 2-3: Particular requirements – Time-delay switches (TDS)

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 29.120.40

ISBN 978-2-8322-8541-1

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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SWITCHES FOR HOUSEHOLD AND SIMILAR FIXED ELECTRICAL INSTALLATIONS –

Part 2-3: Particular requirements – Time-delay switches (TDS)

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This extended version (EXV) of the official IEC Standard provides the user with the comprehensive content of the Standard.

IEC 60669-2-3:2024 EXV includes the content of IEC 60669-2-3:2024, and the references made to IEC 60669-1:2017.

The specific content of IEC 60669-2-3:2024 is displayed on a blue background.

IEC 60669-2-3 has been prepared by subcommittee 23B: Plugs, socket-outlets and switches, of IEC technical committee 23: Electrical accessories. It is an International Standard.

This fourth edition cancels and replaces the third edition published in 2006. This edition constitutes a technical revision.

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

a) Revision of the present edition with reference to IEC 60669-1:2017 (Edition 4);
b) Introduction of a revision to Annex E "Additional requirements and tests for switches intended to be used at a temperature lower than −5 °C".

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

Draft	Report on voting
23B/1487/FDIS	23B/1501/RVD

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

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

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

This part of IEC 60669-2 is to be used in conjunction with IEC 60669-1:2017. It lists the changes necessary to convert that standard into a specific standard for time-delay switches.

When a particular subclause of IEC 60669-1:2017 is not mentioned in this document, that subclause applies as far as reasonable.

In this document, the following print types are used:

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

Subclauses, figures or tables which are additional to those in IEC 60669-1:2017 are numbered starting from 101.

A list of all parts of IEC 60669 series, under the general title *Switches for household and similar fixed electrical installations*, can be found on the IEC website.

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

- reconfirmed,
- withdrawn, or
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SWITCHES FOR HOUSEHOLD AND SIMILAR FIXED ELECTRICAL INSTALLATIONS –

Part 2-3: Particular requirements – Time-delay switches (TDS)

1 Scope

This part of IEC 60669 applies to time-delay switches (hereinafter referred to as TDS) with a rated voltage not exceeding 440 V AC and a rated current not exceeding 63 A, intended for household and similar fixed electrical installations, either indoors or outdoors, operated by hand and/or by remote control. For the control circuit, the rated control voltage does not exceed 440 V AC or 220 V DC.

TDS are provided with a time-delay device operated by mechanical, thermal, pneumatic, hydraulic or electrical means or by a combination of them.

Electronic TDS are within the scope of IEC 60669-2-1 but not of this document.

TDS including only passive components such as resistors, capacitors, positive temperature coefficient (PTC) and negative temperature coefficient (NTC) components and printed circuit boards are not considered to be electronic TDS.

For switches provided with screwless terminals, the rated current is limited to 16 A.

NOTE 1 The rated current is limited to 16 A for switches provided with insulation piercing terminals (IPT's) according to Annex D.

Switches covered by this document are, where applicable, intended for the control in normal use of all of the following loads:

– a circuit for a tungsten filament lamp load;
– a circuit for an externally ballasted lamp load (for example LED, CFL, fluorescent lamp load);
– a circuit for a self ballasted lamp load (for example LEDi or CFLi);
– a circuit for a substantially resistive load with a power factor not less than 0,95;
– a single phase circuit for motor load with a rated current not exceeding 3 A at 250 V (750 VA) and 4,5 A at 120 V (540 VA) and a power factor not less than 0,6. This applies to both switches rated not less than 10 A that have not undergone additional tests and to momentary switches rated not less than 6 A that have not undergone additional tests.

NOTE 2 In the following country the suitability of a switch intended to control the inrush current of a motor shall be tested: AU.

This document also applies to boxes for switches, with the exception of mounting boxes for flush-type switches.

NOTE 3 General requirements for boxes for flush-type switches are given in IEC 60670-1.

It also applies to switches such as

– switches incorporating pilot lights;
– electromagnetic remote control switches (particular requirements are given in IEC 60669-2-2);

– switches incorporating a time-delay device (particular requirements are given in IEC 60669-2-3);
– combinations of switches and other functions (with the exception of switches combined with fuses);
– electronic switches (particular requirements are given in IEC 60669-2-1);
– switches having facilities for the outlet and retention of flexible cables (see Annex A);
– isolating switches (particular requirements are given in IEC 60669-2-4);
– switches and related accessories for use in home and building electronic systems (particular requirements are given in IEC 60669-2-5);
– firemen's switches (particular requirements are given in IEC 60669-2-6).

Switches complying with this document are suitable for use at ambient temperatures not normally exceeding +40 °C, but their average over a period of 24 h does not exceed +35 °C, with a lower limit of the ambient air temperature of –5 °C.

NOTE 4 For lower temperatures see Annex E.

Switches complying with this document are suitable only for incorporation in equipment in such a way and in such a place that it is unlikely that the surrounding ambient temperature exceeds +35 °C.

In locations where special conditions prevail, such as in ships, vehicles and the like and in hazardous locations, for example where explosions are liable to occur, special construction and/or additional requirements may be required.

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 60038:2009, *IEC standard voltages*

IEC 60068-2-75:2014, *Environmental testing – Part 2-75: Tests – Test Eh: Hammer tests*

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

IEC 60212:2010, *Standard conditions for use prior to and during the testing of solid electrical insulation materials*

IEC 60227-5:2011, *Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V – Part 5: Flexible cables (cords)*

IEC 60228:2004, *Conductors of insulated cables*

IEC 60245-4:2011, *Rubber insulated cables – Rated voltages up to and including 450/750 V – Part 4: Cords and flexible cables*

IEC 60317 (all parts), *Specifications for particular types of winding wires*

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

IEC 60445:2021, *Basic and safety principles for man-machine interface, marking and identification – Identification of equipment terminals, conductor terminations and conductors*

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

IEC 60664-1:2020, *Insulation coordination for equipment within low-voltage supply systems – Part 1: Principles, requirements and tests*

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 60669-1:2017, *Switches for household and similar fixed electrical installations – Part 1: General requirements*

IEC 60669-2-1:2002, *Switches for household and similar fixed electrical installations – Part 2-1: Particular requirements – Electronic switches*
IEC 60669-2-1:2002/AMD1:2008
IEC 60669-2-1:2002/AMD2:2015

IEC 60695-2-10:2000, *Fire hazard testing – Part 2-10: Glowing/hot-wire based test methods – Glow-wire apparatus and common test procedure*

IEC 60695-2-11:2014, *Fire hazard testing – Part 2-11: Glowing/hot-wire based test methods – Glow-wire flammability test method for end-products (GWEPT)*

IEC 60998-1:2002, *Connecting devices for low-voltage circuits for household and similar purposes – Part 1: General requirements*

IEC 60998-2-1, *Connecting devices for low-voltage circuits for household and similar purposes – Part 2-1: Particular requirements for connecting devices as separate entities with screw-type clamping units*

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 60998-2-4, *Connecting devices for low-voltage circuits for household and similar purposes – Part 2-4: Particular requirements for twist-on connecting devices*

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

IEC 61558-2-6:2021, *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*

ISO 1456:2009, *Metallic and other inorganic coatings – Electrodeposited coatings of nickel, nickel plus chromium, copper plus nickel and of copper plus nickel plus chromium*

ISO 2081:2008, *Metallic and other inorganic coatings – Electroplated coatings of zinc with supplementary treatments on iron or steel*

ISO 2093:1986*, Electroplated coatings of tin – Specification and test methods*

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 are rms values unless otherwise specified.

3.1
switch
device designed to make or break the current in one or more electric circuits

3.1.1
on/off switch
switch for alternatively closing and opening one or more electric circuits.

[SOURCE: IEC 60050-151:2001, 151-12-23]

3.1.2
momentary contact switch
switch which returns its contacts automatically to the initial state after operation.

Note 1 to entry: Momentary contact switches are intended to operate, for example, bells, electromagnetic remote control switches, time-delay switches and electronic switches.

3.1.3
push-button switch
switch having a single actuator which moves with a single motion when operated by an external, manual force usually applied by the finger or palm of the hand and having stored energy return

3.1.4
cord-operated switch
switch the operating means of which is a cord which has to be pulled in order to change its contact state

3.1.5
switch of normal-gap construction
switch construction having a clearance between the contacts in the open position of not less than 3 mm

3.1.6
switch of mini-gap construction
switch construction having a clearance between the contacts which is less than 3 mm but is not less than 1,2 mm

3.1.7
switch of micro-gap construction
switch construction having a clearance between the contacts in the open position of less than 1,2 mm

3.2
one operation
transfer of the moving contacts from one operating position to another

3.3
terminal
conductive part of one pole, composed of one or more clamping unit(s) and insulation if necessary

3.4
clamping unit
part or parts of a terminal necessary for the mechanical clamping and the electrical connection of the conductor(s)

3.5
screw-type terminal
terminal intended for the connection, by clamping only, of (an) external rigid or flexible conductor(s)

3.5.1
pillar terminal
screw-type terminal in which the conductor(s) is (are) 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 can be applied directly by the shank of the screw or through an intermediate clamping part to which pressure is applied by the shank of the screw.

Note 2 to entry: Examples of pillar terminals are shown in Figure 1.

[SOURCE: IEC 60050-442:1998, 442-06-22, modified — “or screws” has been added because in some constructions there is more than one screw.]

3.5.2
screw head terminal
screw-type terminal in which the conductor is clamped under the head of the screw

Note 1 to entry: The clamping pressure can be applied directly by the head of the screw or through an intermediate part, such as a washer, clamping plate or anti-spread device.

Note 2 to entry: Examples of screw head terminals are shown in Figure 2.

3.5.3
stud terminal
screw-type terminal in which the conductor is clamped under a nut

Note 1 to entry: The clamping pressure can 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.

Note 2 to entry: Examples of stud terminals are shown in Figure 2.

[SOURCE: IEC 60050-442:1998, 442-06-23]

3.5.4
saddle terminal
screw-type terminal in which the conductor is clamped under a saddle by means of two or more screws or nuts

Note 1 to entry: Examples of saddle terminals are shown in Figure 3.

[SOURCE: IEC 60050-442:1998, 442-06-09, modified — "screw-type" has been added.]

3.5.5
lug terminal
screw head terminal or stud terminal, designed for clamping a cable lug or bar by means of a screw or nut

Note 1 to entry: Examples of lug terminals are shown in Figure 4.

[SOURCE: IEC 60050-442:1998, 442-06-16, modified — "screw-type terminal" is replaced with "screw head terminal or stud terminal" and “directly and indirectly” has been deleted.]

3.5.6
mantle terminal
screw-type 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 by equally effective means for transmitting the pressure from the nut to the conductor within the slot.

Note 2 to entry: Examples of mantle terminals are shown in Figure 5.

[SOURCE: IEC 60050-442:1998, 442-06-14, modified — “screw-type” has been added and the last part of the definition is included in a note.]

3.6
screwless-type terminal
terminal for the connection and subsequent disconnection of a rigid (solid or stranded) or flexible conductor or the interconnection of two conductors capable of being dismantled, the connection being made, directly or indirectly, by means of springs, parts of angled, eccentric or conical form, etc., without special preparation of the conductor concerned, other than removal of insulation

[SOURCE: IEC 60050-442:1998, 442-06-11 , modified]

3.7
thread-forming screw
screw having an uninterrupted thread which, by screwing in, forms a thread by displacing material in the cavity

Note 1 to entry: An example of a thread-forming screw is shown in Figure 6.

[SOURCE: IEC 60050-442:1998, 442-06-04]

3.8
thread-cutting screw
screw having an interrupted thread which, by screwing in, makes a thread by removing material from the cavity

Note 1 to entry: An example of a thread-cutting screw is shown in Figure 7.

Note 101 to entry: This definition is applicable to the switching circuit only.

[SOURCE: IEC 60050-442:1998, 442-06-03]

3.9
mechanical time-delay device
device which, through a mechanical auxiliary, operates some time after the instant at which the conditions which cause it to operate are established

Note 101 to entry: This definition is applicable to the switching circuit only.

3.10
base
part of the switch retaining current-carrying parts and which normally retains the mechanism in position

3.11
rated voltage
voltage assigned by the manufacturer for a specific operating condition of the switch

[SOURCE: IEC 60050-442:1998, 442-01-03, modified — "accessory" has been replaced with "switch".]

3.12
rated current
current assigned by the manufacturer for a specific operating condition of the switch

[SOURCE: IEC 60050-442:1998, 442-01-02, modified — "accessory" has been replaced with "switch".]

3.13
operating member
part of a cord-operated switch which connects the internal mechanism with a pull cord and is usually attached to the actuating member of the switch

3.14
pole of a switching device
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 switching device 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 the poles are or can be coupled in such a manner as to operate together.

[SOURCE: IEC 60050-441:2000, 441-15-01]

3.15
actuating member
part which is pulled, pushed, turned or otherwise moved to cause an operation of the switch

[SOURCE: IEC 60050-442:1998, 442-04-14]

3.16

pilot light
device incorporating a light source either integral or designed to be installed with the switch and intended to give for example an indication of the switch state or to indicate the switch location

3.17
main part
assembly consisting of the base and other parts which is not intended to be dismantled at any time after manufacture

3.18
grommet
component used to support and protect the wires or cable or conduit at the point of entry

Note 1 to entry: A grommet may also prevent the ingress of moisture or contaminants.

Note 2 to entry: Examples are shown in Figure 23.

[SOURCE: IEC 60050-581:2008, 581-27-19, modified — "part of a component or an accessory" has been replaced with "component", "or conduit" has been added and part of the definition is included in a note.]

3.19
entry membrane
component or integral part of the switch used to protect the wires or cable which may be used to support the cable or conduit at the point of entry

Note 1 to entry: An entry membrane may also prevent the ingress of moisture or contaminants and may be part of a grommet.

Note 2 to entry: Examples are shown in Figure 23.

3.20
protecting membrane
component or integral part of the switch that is not intended to be penetrated in normal use and is intended to provide protection against ingress of water or solid objects and/or to allow the operation of an accessory

Note 1 to entry: Examples are shown in Figure 23

3.21
self ballasted lamp
SBL
unit which cannot be dismantled without being permanently damaged, which is provided with a lamp cap or caps and which incorporates a light source and any additional elements necessary for starting and stable operation of the light source

Note 1 to entry: In the text, a self ballasted lamp is also called CFLi or LEDi, where:

- CFL stands for Compact Fluorescent Lamp;
- LED stands for Light Emitting Diode;
- “i” means that the control gear is incorporated in the lamp.

Note 2 to entry: This note applies to the French language only.

3.22
externally ballasted lamp
lamp other than an incandescent lamp which cannot be dismantled without being permanently damaged, which is provided with a lamp cap and which incorporates a light source to be controlled by a separate lamp control gear

Note 1 to entry: For lamp control gear, see definitions in IEC 61347-1.

3.101
time-delay switch
TDS
switch provided with a time-delay device which operates for a certain time (the delay time)

Note 101 to entry: Time-delay switches may be either manually actuated and/or remotely electrically initiated.

3.101.1
electronic TDS
TDS containing electronic component(s)

3.102
rated control voltage
voltage assigned to the control circuit by the manufacturer

3.103
switching circuit
circuit which contains the parts which allow the rated current to flow through the TDS

3.104
control circuit
circuit which includes electrical parts to control the switching circuit in an electrically controlled TDS

3.105
control mechanism
all parts which are intended for the operation of the TDS

3.106
incorporated hand-operated device
device which allows the switching circuit to be operated, directly or indirectly

Note 101 to entry: An incorporated hand-operated device is not intended for the normal operation of the TDS.

3.107
delay time
period during which the switching circuit(s) is (are) kept closed

Note 101 to entry: Any time taken for the decreasing of the voltage (e.g. to reduce the light) at the end of the delay period is included within the delay time.

3.108
delay device
all components which have an influence on the delay time

Note 101 to entry: The delay device is energized by means of an impulse into the control circuit in an electrically controlled TDS.

Note 102 to entry: The delay time may be adjustable.

3.109
disconnectable TDS
TDS consisting of two parts, the first being used as a base and including the terminals, the other being removable and including the switching and the control circuits, the two parts being resiliently connected together using a means which allows joining and/or separating with or without the use of a tool

4 General requirements

Switches and boxes of surface mounting accessories shall be so designed and constructed that, in normal use, their performance is reliable and safety is achieved by reducing risk to a tolerable level as defined in ISO/IEC Guide 51:2014.

The operation of a TDS shall not be impaired when it is mounted at an angle deviating by not more than 5° from the specified position of use.

Compliance is checked by meeting all the relevant requirements and tests specified.

5 General remarks on tests

Tests according to this document are type tests.