IEC 60947-5-5

Edition 1.2 2016-02
CONSOLIDATED VERSION

INTERNATIONAL STANDARD

NORME INTERNATIONALE

colour inside

Low-voltage switchgear and controlgear –
Part 5-5: Control circuit devices and switching elements – Electrical emergency stop device with mechanical latching function

Appareillage à basse tension –
Partie 5-5: Appareils et éléments de commutation pour circuits de commande – Appareil d'arrêt d'urgence électrique à accrochage mécanique

IEC 60947-5-5:1997-11+AMD1:2005-01+AMD2:2016-02 CSV(en-fr)

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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LOW-VOLTAGE SWITCHGEAR AND CONTROLGEAR –

Part 5-5: Control circuit devices and switching elements – Electrical emergency stop device with mechanical latching function

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In this Redline version, a vertical line in the margin shows where the technical content is modified by amendments 1 and 2. Additions and deletions are displayed in red, with deletions being struck through. A separate Final version with all changes accepted is available in this publication.

International Standard IEC 60947-5-5 has been prepared by subcommittee 17B: Low-voltage switchgear and controlgear, of IEC technical committee 17: Switchgear and controlgear.

~~Annex A is for information only.~~

This ~~section 5~~ standard shall be used in conjunction with IEC 60947-1~~:1996~~ and with IEC 60947-5-1~~:1997~~.

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- withdrawn,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
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INTRODUCTION

The present IEC 60947-5-5 deals specifically with electrical emergency stop devices with mechanical latching function and gives additional electrical and mechanical requirements to those given in the following International Standards:

– ISO 13850 giving requirements for the emergency stop function of a machine, whatever be the energy used;

– IEC 60204-1 giving additional requirements for an emergency stop function realized by the electrical equipment of a machine;

– IEC 60947-5-1 specifying electrical characteristics of electromechanical control circuit devices.

LOW-VOLTAGE SWITCHGEAR AND CONTROLGEAR –

Part 5-5: Control circuit devices and switching elements – Electrical emergency stop device with mechanical latching function

1 Scope

This section of IEC 60947-5 provides detailed specifications relating to the electrical and mechanical construction of emergency stop devices with mechanical latching function and to their testing.

This standard is applicable to electrical control circuit devices and switching elements which are used to ~~provide~~ initiate an emergency stop signal. Such devices may be either provided with their own enclosure, or installed according to the manufacturer's instructions.

This standard does not apply to:

– emergency stop devices for non-electrical control circuit, for example hydraulic, pneumatic;

– emergency stop devices without mechanical latching function.

An emergency stop device may also be used to provide an emergency switching off function ~~(see annex A)~~.

This standard does not deal with any specific requirements on noise as the noise emission of electrical emergency stop devices with mechanical latching function is not considered to be a relevant hazard.

NOTE See also 9.2.5.4 of IEC 60204-1:2005.

2 Normative references

~~The following normative documents contain provisions, which through reference in this text, constitute provisions of this section of IEC 60947-5. At the time of publication, the editions indicated were valid. All normative documents are subject to revision, and parties to agreements based on this section of IEC 60947-5 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.~~

The following referenced documents are indispensable for the application 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 60050(441):1984, *International Electrotechnical Vocabulary (IEV) – Chapter 441: Switchgear, controlgear, fuses*
Amendment 1 (2000)

IEC 60068-2-1:~~1990~~ 2007, *Environmental testing – Part 2-1: Tests – Test A: Cold*

IEC 60068-2-2:~~1974~~ 2007, *Environmental testing – Part 2-2: Tests – Test B: Dry heat*

IEC 60068-2-6:~~1995~~ 2007, *Environmental testing – Part 2-6: Tests – Test Fc: Vibration (sinusoidal)*

IEC 60068-2-11:1981, *Environmental testing – Part 2: Tests – Test Ka: Salt mist*

IEC 60068-2-27:~~1987~~ 2008, *Environmental testing – Part 2-27: Tests – Test Ea and guidance: Shock*

IEC 60068-2-30:~~1980~~ 2005, *Environmental testing – Part 2-30: Tests – Test Db ~~and guidance~~: Damp heat, cyclic (12 h + 12 h cycle)*

~~IEC 60073:1996, *Basic and safety principles for man-machine interface, marking and identification – Coding principles for indicating devices and actuators*~~

~~IEC 60204-1:1992, *Electrical equipment of industrial machines – Part 1: General requirements*~~

IEC 60417-DB:2002[1], *Graphical symbols for use on equipment*

IEC 60721-3-3:1994, *Classification of environmental conditions – Part 3: Classification of groups of environmental parameters and their severities – Section 3: Stationary use at weather protected location*
Amendment 1 (1995)
Amendment 2 (1996)

IEC 60947-1:~~1996~~ 2007, *Low-voltage switchgear and controlgear – Part 1: General rules*
IEC 60947-1:2007/AMD1:2010
IEC 60947-1:2007/AMD2:2014

IEC 60947-5-1:~~1997~~ 2016, *Low-voltage switchgear and controlgear – Part 5-1: Control circuit devices and switching elements – Electromechanical control circuit devices*

IEC 61310-1:~~1995~~ 2007, *Safety of machinery – Indication, marking and actuation – Part 1: Requirements for visual, ~~auditory~~ acoustic and tactile signals*

~~ISO 3864:1984, *Safety colours and safety signs*~~

ISO 13850:~~1996~~ 2015, *Safety of machinery – Emergency stop function – Principles for design*

3 Definitions

For the purpose of this section of IEC 60947-5, the following definitions apply in addition to those given in IEC 60947-1 and in IEC 60947-5-1.

Reference

A

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Actuating system (of an emergency stop device) 3.3
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D

Direct opening action (of a contact element) 3.9

E

Emergency stop (function or signal) 3.1
Emergency stop device 3.2

L

[1] "DB" refers to the IEC on-line database, available at: http://www.graphical-symbols.info/equipment.

3.1
emergency stop (function or signal)
function or signal which is intended:

– to avert or to reduce hazards to persons, damage to machinery or to work in progress;

– to be initiated by a single human action.

[ISO~~/IEC~~ 13850:2015, definition 3.1, modified– extended to “emergency stop signal”, no use of E-stop]

3.2
emergency stop device
~~A~~ manually operated control circuit device used to initiate an emergency stop function

NOTE An emergency stop device may also provide auxiliary functions, for example for redundancy and/or for signalling through additional contact element(s). Such additional contact(s) may be normally open and/or normally closed.

~~[ISO/IEC 13850:3.2, modified]~~

3.3
actuating system (of an emergency stop device)
~~The~~ mechanical parts which transmit the actuating force to the contact elements

[IEC 60050-441:1984, 441-15-21, modified – restricted to electromechanical emergency stop devices; the note is not relevant anymore]

3.4
actuator (of an emergency stop device)
~~The~~ part of the actuating system which is actuated by a part of the human body

NOTE 1 Examples of an actuator may be a button, a wire, a rope, a bar, a foot pedal.

~~NOTE 2 This applies to the French text only.~~

[IEC 60050-441:1984, 441-15-22, modified – actuation is intented to be achieved by human only]

3.5
rest position
~~The~~ position of an emergency stop device, or of a part of it, which has not been actuated

NOTE In rest position, the machine (or equipment) may work.

3.6
actuated position
~~The~~ position of an emergency stop device, or of a part of it, after it has been actuated

NOTE In the actuated position of the emergency stop device the machine (or equipment) remains at rest.

3.7
latching (of an emergency stop device)
function or means which engage and maintain the actuating system in the actuated position until reset by a separate manual action

3.8
resetting (of a emergency stop device)
manual action ~~letting~~ to retun the actuating system ~~return~~ of the emergency stop device from the actuated position to ~~its~~ the rest position ~~after it has been moved to the actuated position~~

NOTE Examples of resetting include the rotation of a key, or of the actuator, pulling the actuator or pushing or rotating a special reset button.

3.9
direct opening action ~~(positive opening action)~~ (of a contact element)
DEPRECATED: positive opening action (of a contact element)
~~The~~ achievement of contact separation as a direct result of a specified movement of the switch actuator through non-resilient members (e.g. non dependent upon springs)

[IEC 60947-5-1:2016, K.2.2, modified – addition of a deprecated term]

3.10
trip wire switch
rope pull switch
pull cord operated switch
emergency stop device in which the actuator is a rope, a wire or similar means

4 Marking and product information

4.1 General

Information for installation, operation, maintenance and/or periodic testing shall be provided when necessary on or with the emergency stop device.

The verification of clause 4 shall be conducted according to 7.2.1.

NOTE 1 In certain circumstances, it may be necessary to provide additional information, for example:

– by labels,

– by marker flags attached to wires or ropes to improve their visibility,

– by a graphical symbol ~~60417-IEC-5638~~ (see 4.2.2 or Table ~~6~~ A.1 of IEC 61310-1:2007).

~~NOTE 2 See also 9.2.5.4 of IEC 60204-1.~~

4.2 Indications on buttons

4.2.1 Buttons used as ~~actuators of an~~ emergency stop device actuators shall be coloured red. When a background exists behind the actuator~~, and as far as it is practicable~~, it shall be coloured yellow.

Where a symbol is needed for clarification, the symbol IEC 60417-5638 (DB:2002-10) shall be used (see Figure 2).

Figure 2 – Symbol (5638) for emergency stop

4.2.2 The direction of unlatching shall be ~~clearly~~ identified when resetting is achieved by rotation of the button. This identification shall have the same or nearly the same colour as the actuator in order to avoid misinterpretation.

NOTE See also IEC 60073 and ISO 3864 series.

4.3 Additional requirements for trip wire switches

Information provided by the manufacturer shall include:

– the maximum length of wire or rope;

– the correct tension of wire or rope;

– the distances between supports;

– recommendation to use only straight runs of wire or rope;

– if applicable, guidance on maintenance for pulleys and eyelets, and the measures necessary to ensure that the wire or rope remains in proper position.

4.4 Additional requirements for colour coding

A resetting button, for example where applicable with a trip wire switch, shall be coloured blue.

When ~~a colour coding is used for~~ coloured indicators are provided to assist setting of a trip wire switch:

– green shall indicate the correct setting of the rest position; and

– yellow shall indicate the correct setting of the actuated position.

5 Electrical requirements

5.1 ~~The utilization categories shall be AC-15 and/or DC-13 and/or DC-14 in accordance with IEC 60947-5-1.~~

Depending on the associated devices, the utilization categories shall be one or more categories selected from Table 1 of IEC 60947-5-1:2016.

NOTE For guidance refer to Annex K of IEC 60947-5-1:2016.

5.2 All normally closed contact elements of an emergency stop device shall have a direct opening action ~~(positive opening action), according to~~ in accordance with Annex K of IEC 60947-5-1:2016.

The tests shall be conducted according to Annex K of IEC 60947-5-1:2016.

5.3 The degree of protection provided by the emergency stop device shall be stated by the manufacturer in accordance with annex C of IEC 60947-1.

5.4 Tests for electrical characteristics shall be conducted according to IEC 60947-5-1.