

**Low-voltage switchgear and controlgear -- Part 7-4:  
Ancillary equipment - PCB terminal blocks for copper  
conductors**

## EESTI STANDARDI EESSÕNA

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See Eesti standard EVS-EN 60947-7-4:2013 sisaldab Euroopa standardi EN 60947-7-4:2013 ingliskeelset teksti.	This Estonian standard EVS-EN 60947-7-4:2013 consists of the English text of the European standard EN 60947-7-4:2013.
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**Low-voltage switchgear and controlgear -  
Part 7-4: Ancillary equipment -  
PCB terminal blocks for copper conductors  
(IEC 60947-7-4:2013)**

Appareillage à basse tension -  
Partie 7-4: Matériels accessoires -  
Blocs de jonction pour cartes de circuits  
imprimés pour conducteurs en cuivre  
(CEI 60947-7-4:2013)

Niederspannungsschaltgeräte -  
Teil 7-4: Hilfseinrichtungen -  
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für Kupferleiter  
(IEC 60947-7-4:2013)

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## Foreword

The text of document 17B/1822/FDIS, future edition 1 of IEC 60947-7-4, prepared by SC 17B "Low-voltage switchgear and controlgear" of IEC/TC 17 "Switchgear and controlgear" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 60947-7-4:2013.

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IEC 60512-5-1	NOTE	Harmonized as EN 60512-5-1.
IEC 60512-9-5	NOTE	Harmonized as EN 60512-9-5.
IEC 60529	NOTE	Harmonized as EN 60529.
IEC 60664-1:2007	NOTE	Harmonized as EN 60664-1:2007 (not modified).
IEC 60695-2-10	NOTE	Harmonized as EN 60695-2-10.
IEC 60695-10-2	NOTE	Harmonized as EN 60695-10-2.
IEC 60695-11-5	NOTE	Harmonized as EN 60695-11-5.
IEC 60998-1:2002	NOTE	Harmonized as EN 60998-1:2004 (modified).
IEC 61984	NOTE	Harmonized as EN 61984.

## Annex ZA (normative)

### Normative references to international publications with their corresponding European publications

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.

NOTE When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60068-2-20	-	Environmental testing - Part 2-20: Tests - Test T: Test methods for solderability and resistance to soldering heat of devices with leads	EN 60068-2-20	-
IEC 60352-1	-	Solderless connections - Part 1: Wrapped connections - General requirements, test methods and practical guidance	EN 60352-1	-
IEC 60352-2	-	Solderless connections - Part 2: Crimped connections - General requirements, test methods and practical guidance	EN 60352-2	-
IEC 60352-3	-	Solderless connections - Part 3: Solderless accessible insulation displacement connections - General requirements, test methods and practical guidance	EN 60352-3	-
IEC 60352-4	-	Solderless connections - Part 4: Solderless non-accessible insulation displacement connections - General requirements, test methods and practical guidance	EN 60352-4	-
IEC 60352-5	-	Solderless connections - Part 5: Press-in connections - General requirements, test methods and practical guidance	EN 60352-5	-
IEC 60352-6	-	Solderless connections - Part 6: Insulation piercing connections - General requirements, test methods and practical guidance	EN 60352-6	-
IEC 60352-7	-	Solderless connections - Part 7: Spring clamp connections - General requirements, test methods and practical guidance	EN 60352-7	-
IEC 60512-2-1	-	Connectors for electronic equipment - Tests and measurements - Part 2-1: Electrical continuity and contact resistance tests - Test 2a: Contact resistance - Millivolt level method	EN 60512-2-1	-

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60512-4-1	-	Connectors for electronic equipment - Tests and measurements - Part 4-1: Voltage stress tests - Test 4a: Voltage proof	EN 60512-4-1	-
IEC 60512-5-2	-	Connectors for electronic equipment - Tests and measurements - Part 5-2: Current-carrying capacity tests - Test 5b: Current-temperature derating	EN 60512-5-2	-
IEC 60512-11-7	-	Connectors for electronic equipment - Tests and measurements - Part 11- 7: Climatic tests - Test 11g: Flowing mixed gas corrosion test	EN 60512-11-7	-
IEC 60512-11-9	-	Connectors for electronic equipment - Tests and measurements - Part 11-9: Climatic tests - Test 11i: Dry heat	EN 60512-11-9	-
IEC 60512-11-10	-	Connectors for electronic equipment - Tests and measurements - Part 11-10: Climatic tests - Test 11j: Cold	EN 60512-11-10	-
IEC 60695-2-11	-	Fire hazard testing - Part 2-11: Glowing/hot-wire based test methods - Glow-wire flammability test method for end-products	EN 60695-2-11	-
IEC 60695-2-12	-	Fire hazard testing - Part 2-12: Glowing/hot-wire based test methods - Glow-wire flammability index (GWFI) test method for materials	EN 60695-2-12	-
IEC 60695-2-13	-	Fire hazard testing - Part 2-13: Glowing/hot-wire based test methods - Glow-wire ignition temperature (GWIT) test method for materials	EN 60695-2-13	-
IEC 60947-1 + A1	2007 2010	Low-voltage switchgear and controlgear - Part 1: General rules	EN 60947-1 + A1	2007 2011
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	EN 60998-2-3	-
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)	EN 60999-1	-
IEC 60999-2	-	Connecting devices - Electrical copper conductors - Safety requirements for screw-type and screwless-type clamping units - Part 2: Particular requirements for clamping units for conductors above 35 mm <sup>2</sup> up to 300 mm <sup>2</sup> (included)	EN 60999-2	-
IEC 61210	-	Connecting devices - Flat quick-connect terminations for electrical copper conductors - Safety requirements	EN 61210	-

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
ISO 6988	-	Metallic and other non-organic coatings - Sulfur dioxide test with general condensation of moisture	EN ISO 6988	-

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## CONTENTS

FOREWORD.....	4
INTRODUCTION.....	6
1 General .....	7
1.1 Scope.....	7
1.2 Normative references .....	7
2 Terms and definitions .....	9
3 Classification.....	10
4 Characteristics .....	10
4.1 Summary of characteristics .....	10
4.2 Type of PCB terminal block .....	10
4.3 Rated and limiting values .....	10
4.3.1 Rated voltages .....	10
4.3.2 Rated current .....	10
4.3.3 Standard cross-sections .....	10
4.3.4 Maximum cross-section .....	11
4.3.5 Connecting capacity .....	11
5 Product information .....	12
5.1 Marking .....	12
5.2 Additional information.....	13
6 Normal service, mounting and transport conditions.....	13
7 Constructional and performance requirements.....	13
7.1 Constructional requirements .....	13
7.1.1 Clamping units.....	13
7.1.2 Mounting and installation .....	14
7.1.3 Clearances and creepage distances .....	14
7.1.4 Terminal identification and marking .....	14
7.1.5 Resistance to abnormal heat and fire.....	15
7.1.6 Maximum cross-section and connecting capacity.....	15
7.2 Performance requirements .....	15
7.2.1 Temperature rise .....	15
7.2.2 Dielectric properties.....	15
7.2.3 Short-time withstand current.....	15
7.2.4 Contact resistance.....	16
7.2.5 Ageing test (climatic sequence and corrosion test) .....	16
7.3 Electromagnetic compatibility (EMC) .....	16
8 Tests .....	16
8.1 Kinds of test .....	16
8.2 General .....	16
8.3 Verification of mechanical characteristics .....	17
8.3.1 General .....	17
8.3.2 Attachment of the PCB terminal block on its support.....	17
8.3.3 Vacant.....	17
8.3.4 Verification of the maximum cross-section and connecting capacity.....	17
8.3.5 Verification of maximum cross-section (special test with gauges) .....	17
8.4 Verification of electrical characteristics.....	17
8.4.1 General .....	17



8.4.2	Verification of clearances and creepage distances.....	18
8.4.3	Dielectric tests.....	18
8.4.4	Verification of contact resistance .....	19
8.4.5	Temperature rise test .....	20
8.4.6	Short-time withstand current test .....	22
8.4.7	Ageing test (climatic sequence and corrosion test) .....	23
8.5	Verification of thermal characteristics .....	24
8.6	Verification of EMC characteristics .....	25
8.6.1	General .....	25
8.6.2	Immunity.....	25
8.6.3	Emission.....	25
Annex A (informative)	Structure of a PCB terminal block.....	26
Annex B (informative)	Additional Information to be specified between manufacturer and user .....	27
Annex C (informative)	Examples of PCBs and PCB terminal blocks for high current application .....	28
Bibliography	.....	30
Figure 1	– Test assembly for the measurement of contact resistance and temperature rise .....	20
Figure 2	– Example of wiring structure of a multi-tier PCB terminal block .....	21
Figure 3	– Test assembly for the measurement of short-time withstand current.....	23
Figure 4	– Test sequence .....	24
Figure A.1	– Structure of a PCB terminal block .....	26
Figure C.1	– Structure of a high current PCB .....	28
Figure C.2	– PCB terminal block with soldered connection to the PCB .....	28
Figure C.3	– PCB terminal block with screwed connection to the PCB .....	29
Table 1	– Standard cross-sections of copper conductors .....	11
Table 2	– Relationship between maximum cross-section and connecting capacity of PCB terminal blocks.....	12
Table 3	– Standards for clamping units and connecting methods .....	14
Table 4	– Impulse withstand test voltages.....	19
Table 5	– Dielectric test voltages corresponding to the rated insulation voltage .....	19
Table 6	– Length of connectable conductors and conductor loops.....	21
Table 7	– Examples of cross-sectional distribution of interconnections on printed circuit boards .....	22

## INTRODUCTION

This standard IEC 60947-7-4 for PCB terminal blocks covers not only the terminal block requirements according to IEC 60947-7 series but also takes into account the specifications of connectors according to IEC 61984 as the requirements for both components are highly similar due to equivalent applications.

## LOW-VOLTAGE SWITCHGEAR AND CONTROLGEAR –

### Part 7-4: Ancillary equipment – PCB terminal blocks for copper conductors

#### 1 General

##### 1.1 Scope

This part of IEC 60947 specifies requirements for PCB terminal blocks primarily intended for industrial or similar use.

Mounting and fixing on the printed circuit board is made by soldering, press-in or equivalent methods to provide electrical and mechanical connection between copper conductors and the printed circuit board.

This standard applies to PCB terminal blocks intended to connect copper conductors, with or without special preparation, having a cross-section between 0,05 mm<sup>2</sup> and 300 mm<sup>2</sup> (AWG 30/600 kcmil), intended to be used in circuits of a rated voltage not exceeding 1 000 V a.c. up to 1 000 Hz or 1 500 V d.c.

NOTE 1 Large cross section terminal blocks are dedicated to specific design of high current PCBs. The range up to 300 mm<sup>2</sup> is kept to cover any possible application. Examples of high current PCBs and PCB terminal blocks are shown in Annex C.

NOTE 2 AWG is the abbreviation of “American Wire Gage” (Gage (US) = Gauge (UK));

kcmil = 1 000 cmil;

1 cmil = 1 circular mil = surface of a circle having a diameter of 1 mil;

1 mil = 1/1 000 inch.

This standard may be used as a guide for special types of PCB terminal blocks with components, such as disconnect units, integrated cartridge fuse-links and the like.

If applicable, in this standard the term “clamping unit” is used instead of “terminal”. This is taken into account in case of references to IEC 60947-1.

##### 1.2 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 60068-2-20, *Environmental testing – Part 2-20: Tests – Test T: Test methods for solderability and resistance to soldering heat of devices with leads*

IEC 60352-1, *Solderless connections – Part 1: Wrapped connections – General requirements, test methods and practical guidance*

IEC 60352-2, *Solderless connections – Part 2: Crimped connections – General requirements, test methods and practical guidance*

IEC 60352-3, *Solderless connections – Part 3: Solderless accessible insulation displacement connections – General requirements, test methods and practical guidance*

IEC 60352-4, *Solderless connections – Part 4: Solderless non-accessible insulation displacement connections – General requirements, test methods and practical guidance*

IEC 60352-5, *Solderless connections – Part 5: Press-in connections – General requirements, test methods and practical guidance*

IEC 60352-6, *Solderless connections – Part 6: Insulation piercing connections – General requirements, test methods and practical guidance*

IEC 60352-7, *Solderless connections – Part 7: Spring clamp connections – General requirements, test methods and practical guidance*

IEC 60512-2-1, *Connectors for electronic equipment – Tests and measurements – Part 2-1: Electrical continuity and contact resistance tests – Test 2a: Contact resistance – Millivolt level method*

IEC 60512-4-1, *Connectors for electronic equipment – Tests and measurements – Part 4-1: Voltage stress tests – Test 4a: Voltage proof*

IEC 60512-5-2, *Connectors for electronic equipment – Tests and measurements – Part 5-2: Current-carrying capacity tests – Test 5b: Current-temperature derating*

IEC 60512-11-7, *Connectors for electronic equipment – Tests and measurements – Part 11-7: Climatic tests – Test 11g: Flowing mixed gas corrosion test*

IEC 60512-11-9, *Connectors for electronic equipment – Tests and measurements – Part 11-9: Climatic tests – Test 11i: Dry heat*

IEC 60512-11-10, *Connectors for electronic equipment – Tests and measurements – Part 11-10: Climatic tests – Test 11j: Cold*

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 60695-2-12, *Fire hazard testing - Part 2-12: Glowing/hot-wire based test methods - Glow-wire flammability index (GWFI) test method for materials*

IEC 60695-2-13, *Fire hazard testing – Part 2-13: Glowing/hot-wire based test methods – Glow-wire ignition temperature (GWIT) test method for materials*

IEC 60947-1:2007, *Low-voltage switchgear and controlgear – Part 1: General rules*  
Amendment 1: 2010

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 60999-2, *Connecting devices – Electrical copper conductors – Safety requirements for screw-type and screwless-type clamping units – Part 2: Particular requirements for clamping units for conductors above 35 mm<sup>2</sup> up to 300 mm<sup>2</sup> (included)*

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

ISO 6988, *Metallic and other non-organic coatings – Sulfur dioxide test with general condensation of moisture*

## 2 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60947-1, as well as the following, apply.

### 2.1

#### **printed circuit board PCB**

piece of insulating material with fixed metal traces to connect electronic components

Note 1 to entry: Printed circuit boards are typically subdivided according to:

- their structure (e.g. single- and double-sided, multilayers);
- the nature of the base material (e.g. rigid, flexible).

### 2.2

#### **PCB terminal block**

part intended to be mounted on a printed circuit board and carrying one or more mutually insulated contact units and which provides an electrical and mechanical connection between copper conductor and printed circuit board

### 2.3

#### **rated current**

current value assigned by the manufacturer which the PCB terminal block can carry continuously (without interruption) and simultaneously through all its poles connected with the maximum cross-section, preferably at an ambient temperature of 40 °C, without the upper limiting temperature being exceeded

### 2.4

#### **contact unit**

conductive part establishing the connection between printed circuit board and connectable conductor(s)

Note 1 to entry: See Annex A.

### 2.5

#### **upper limiting temperature**

##### **ULT**

maximum temperature in the PCB terminal block as outcome (sum) of the ambient temperature and the temperature rise due to current flow, at which the PCB terminal block is intended to be still operable

Note 1 to entry: At ambient temperature = ULT the available temperature rise due to current flow is zero, thus the current carrying capacity of the PCB terminal block is zero.

### 2.6

#### **lower limiting temperature**

##### **LLT**

minimum temperature of a PCB terminal block assigned by the manufacturer, at which a PCB terminal block is intended to operate