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Part 7-2: Ancillary equipment - Protective conductor terminal blocks for copper conductors

Please notify the secretary if you are aware of any keywords that might assist in classifying or identifying the standard or if the content of this standard

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- iii) requires additional national guidance or information

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Introduction

This draft standard is based on national and international discussions. Your comments on this draft are invited and will assist in the preparation of the consequent standard.

For international standards, comments will be reviewed by the relevant UK national committee before sending the consensus UK vote and comments to the international committee, which will then decide appropriate action. If the international standard is approved, it is usual for the text to be published as a British Standard.

For national standards, comments will be reviewed by the relevant UK national committee and the resulting standards published as a British Standard.

UK Vote

Please indicate whether you consider the UK should submit a negative (with supporting technical reasons) or positive vote on this draft. Please indicate if you are aware of any reason why this draft standard should not be published as a British Standard.

Submission of Comments

- **Annotated drafts are not acceptable and will be rejected.**
- All comments should be submitted online at <https://standardsdevelopment.bsigroup.com/>. You will need to register in order to comment.

Template for comments and secretariat observations

Date: xx/xx/20xx	Document: ISO/DIS xxxx
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1	2	(3)	4	5	(6)	7
MB	Clause No./ Subclause No./Annex (e.g. 3.1)	Paragraph/Figure/ Table/Note	Type of comment	Commend (justification for change) by the MB	Proposed change by the MB	Secretariat observations on each comment submitted
	3.1	Definition 1	ed	Definition is ambiguous and needs clarifying.	Amend to read '...so that the mains connector to which no connection...'	
	6.4	Paragraph 2	te	The use of the UV photometer as an alternative cannot be supported as serious problems have been encountered in its use in the UK.	Delete reference to UV photometer.	



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SECRETARIAT:

France

SECRETARY:

Mr Michaël LAHEURTE

OF INTEREST TO THE FOLLOWING COMMITTEES:

TC 121, SC 121B

HORIZONTAL FUNCTION(S):

ASPECTS CONCERNED:

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Recipients of this document are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

Recipients of this document are invited to submit, with their comments, notification of any local regulations or technical reasons that may exist and should be considered should this proposal proceed, recognizing that failure to address such requirements could result in the need for new or existing "In Some Countries" clauses. (SEE [AC/22/2007](#) OR [NEW GUIDANCE DOC](#)).

TITLE:

Low-voltage switchgear and controlgear – Part 7-2: Ancillary equipment - Protective conductor terminal blocks for copper conductors

NOTE FROM TC/SC OFFICERS:

SC121A officers are supporting CD1 of IEC 60947-7-2 ED4.

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

LOW-VOLTAGE SWITCHGEAR AND CONTROLGEAR - PART 7-2: ANCILLARY EQUIPMENT - PROTECTIVE CONDUCTOR TERMINAL BLOCKS FOR COPPER CONDUCTORS –

FOREWORD

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International Standard [IEC 60947-7-2](#) has been prepared by subcommittee 121A: Low-voltage switchgear and controlgear, of IEC technical committee 121: Switchgear and controlgear.

This third edition of [IEC 60947-7-2](#) cancels and replaces the [second edition](#), published in 2002, and constitutes a technical revision.

The main technical modifications of this standard since this previous publication are listed below:

- Scope extension for larger conductor cross-sections;

- Implementation of a contact pressure via insulation material (CoPI) test;
- ...

This standard shall be read in conjunction with [IEC 60947-1](#) and [IEC 60947-7-1](#). The provisions of the general rules dealt with in [IEC 60947-1](#) and the requirements for terminal blocks of [IEC 60947-7-1](#) are applicable to this standard, where specifically called for. Clauses and subclauses, tables, figures and annexes thus applicable are identified by reference to [IEC 60947-1](#) or [IEC 60947-7-1](#), e.g. [1.2 of IEC 60947-1](#) or [Annex A of IEC 60947-1](#).

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

Table 1

FDIS	Report on voting

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 the parts in the [IEC 60947 series](#), under the general title *Low-voltage switchgear and controlgear*, can be found on the IEC website.

The committee has decided that the contents of this publication will remain unchanged until the maintenance result 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.

LOW-VOLTAGE SWITCHGEAR AND CONTROLGEAR - PART 7-2: ANCILLARY EQUIPMENT - PROTECTIVE CONDUCTOR TERMINAL BLOCKS FOR COPPER CONDUCTORS –

1 Scope

This part of IEC 60947 specifies requirements for protective conductor terminal blocks with PE function up to 150 mm²/300 kcmil and for protective conductor terminal blocks with PEN function equal to and above 10 mm²/ 8 AWG with screw-type or screwless-type clamping units, primarily intended for industrial applications.

NOTE 1: 1 No IP degree listing for terminal blocks is required, but possible.

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

Protective conductor terminal blocks are used to form the electrical and mechanical connection between copper conductors and the fixing support.

It is applicable to protective conductor terminal blocks for the connection of round copper conductors with or without special preparation having a cross-section between 0,2 mm²/24 AWG and 150 mm²/300 kcmil, intended to be used in circuits of a rated voltage not exceeding 1 000 V AC up to 1 000 Hz or 1 500 V DC, most commonly in conjunction with terminal blocks according to IEC 60947-7-1:2025.

This standard may be used as guide for

- protective conductor terminal blocks requiring the fixing of special devices to the conductors, for example quick connect terminations or wrapped connections, etc.;
- protective conductor terminal blocks providing direct contact to the conductors by means of edges or points penetrating the insulation, for example insulation displacement connections, etc.

Where applicable in this standard, the term "clamping unit" has been used instead of the term "terminal". This is taken into account in case of reference to IEC 60947-1:2020.

Where applicable in this standard, the term "protective conductor terminal blocks" replaces the term "terminal block" when referring to IEC 60947-7-1:2025.

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 60439-1:1999, *Low-voltage switchgear and controlgear assemblies – Part 1: Type-tested and partially type-tested assemblies*

IEC 60439-1:1999/Amendment 1 (2004), *Low-voltage switchgear and controlgear assemblies – Part 1: Type-tested and partially type-tested assemblies*

IEC 60715:1981, *Dimensions of low-voltage switchgear and controlgear – Standardized mounting on rails for mechanical support of electrical devices in switchgear and controlgear installations*

IEC 60715:1981/Amendment 1 (1995), *Dimensions of low-voltage switchgear and controlgear – Standardized mounting on rails for mechanical support of electrical devices in switchgear and controlgear installations*

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

IEC 60947-1:2020, *Low-voltage switchgear and controlgear - Part 1: General rules*

IEC 60947-7-1:2009, *Low-voltage switchgear and controlgear – Part 7-1: Ancillary equipment – Terminal blocks for copper conductors*

IEC 61439-1:2020, *Low-voltage switchgear and controlgear assemblies - Part 1: General rules*

3 Definitions

For the purposes of this document, definitions given in [IEC 60947-7-1](#), together with the following definitions, apply.

3.1

protective conductor terminal block

device with one or more clamping units for connecting and/or joining protective earth conductors (PE and PEN conductors) with conducting connection to their supports, which may be designed with screw-type or screwless-type fixing means

Note 1 to entry: Supports are, for example, mounting rails, sheet metal cut-outs, mounting plates, etc.

Note 2 to entry: A protective conductor terminal block can be either partially insulated or not at all. It does not require any functional insulation.

3.2

partially insulated protective conductor terminal block

device which is only insulated against live parts of other devices but not against the support itself

3.3

PEN conductor

earthed conductor combining the functions of both protective conductor and neutral conductor

Note 1 to entry: The acronym PEN results from the combination of both symbols PE for the protective conductor and N for the neutral conductor (see 3.3.29 of [IEC 60947-1:2020](#)).

3.4

connection to conductor [CC]

wire conducting connection of protective conductor terminal blocks

3.5

connection to support [CS]

conducting connection to support of protective conductor terminal blocks

Note 1 to entry: Supports are, for example, mounting rails, sheet metal cut-outs, mounting plates, etc

4 Classification

Distinction is made between various types of protective conductor terminal blocks as follows:

- method of fixing the protective conductor terminal block to the support;
- type of clamping units: screw-type clamping units or screwless-type clamping units;
- ability to receive conductors with or without special preparation (e.g. cable lugs);
- terminal assemblies with identical or dissimilar clamping units;
- number of clamping units on each terminal assembly;
- service conditions;
- PE or PEN functions.

5 Characteristics

5.1 Summary of characteristics

Subclause 5.1 of IEC 60947-7-1:2025 applies.

5.2 Type of protective conductor terminal block

Subclause 5.2 of IEC 60947-7-1:2025 applies.

5.3 Rated and limiting values

5.3.1 Void

5.3.2 Short-time withstand current

Subclause 5.3.2 of IEC 60947-7-1:2025 applies.

5.3.3 Standard cross-sections

Subclause 5.3.3 of IEC 60947-7-1:2025 applies with the following addition.

In accordance with the scope of this standard, Table 1 of IEC 60947-7-1:2025 applies only up to 150 mm²/300 kcmil.

5.3.4 Rated cross-section

Subclause 5.3.4 of IEC 60947-7-1:2025 applies.

5.3.5 Rated connecting capacity

Subclause 5.3.5 of IEC 60947-7-1:2025 applies with the modification for one conductor per clamping unit only.

NOTE: Further information is provided in subclause 8.8 paragraph 12 of [IEC 61439-1:2020](#).

6 Product information

6.1 Marking

A protective conductor terminal block shall be marked in a durable and legible manner with the following:

- a) the name of the manufacturer or a trade mark by which the manufacturer can be readily identified;
- b) a type reference permitting its identification in order to obtain relevant information from the manufacturer or his catalogue.

6.2 Additional information

The following information shall be stated by the manufacturer, if applicable, e.g. in the product documentation (e.g. machine-readable code with reference to internet, electronic catalogues, web-link on the package unit or product inserts, etc.):

- a) IEC 60947-7-2, if the manufacturer claims compliance with this document;
- b) the rated cross-section;
- c) the rated connecting capacity, if wider than in Table 1 of IEC 60947-7-1:2025;
- d) service conditions, if different from those of Clause 7;
- e) following information for non-universal terminal blocks, depending on the classification, shall be used:– for clamping units declared for solid conductors “solid” or the abbreviations “s” or “sol”; – for clamping units declared for rigid stranded conductors “rigid stranded” or the abbreviation “r”; – for clamping units declared for flexible conductors “flexible” or the abbreviation “f”;
- f) special preparation of the end of the conductor;
- g) the manufacturer’s declared tightening torque, either from Table 4 of IEC 60947-1:2020 or higher;
- h) installation instructions;
- i) safety instructions;
- j) partially insulated protective conductor terminal blocks shall be coloured green and yellow;
- k) symbol for protective earth  or "PE" according to IEC 60417-5019: 2006-08.

NOTE 1: No marking indicates suitability for use in both PE + PEN functions.

NOTE 2: In some countries tightening torque values lower than those as listed in Table 4 of IEC 60947-1:2020 are allowed according to their national product standards: United States of America and Canada.

NOTE 3: Material declarations according to IEC TS 63058 or equivalent can be provided. IEC TS 63058 provides methods for assessing the environmental impact of switchgear and controlgear, guidance on environmentally conscious design and on information required for end-of-life treatments.

7 Normal service, mounting and transport conditions

Clause 7 of [IEC 60947-1:2020](#) applies with the following additions.

Protective conductor terminal blocks are electrical components, which are typically installed in enclosures according to [IEC 60947-1:2020](#) clause 3.3.16 enclosure: part providing a specified degree of protection of equipment against certain external influences and a specified degree of protection against approach to or contact with hazardous live parts and hazardous mechanical part. For this kind of components IEC Guide 116 states that there are "however, other electrical components that are intended to be incorporated into other electrical equipment".

8 Constructional and performance requirements

8.1 Constructional requirements

8.1.1 Clamping units

Subclause 8.1.1 of IEC 60947-7-1:2025 applies with the following additions.

The protective conductor terminal block shall permit a reliable connection between the conductor clamping units and the clamping unit to the support.

The clamping units shall be able to withstand the forces that can be applied through the connected conductors and the connected support.

Compliance is checked by inspection, by the test of 9.3.3.1 and by the tests of 9.3.3.2 and 9.3.3.3 of IEC 60947-7-1:2025.

8.1.2 Connection of support

Protective conductor terminal blocks shall be provided with means for secure attachment to the corresponding support without risk of galvanic corrosion.

The design of the protective conductor terminal block shall clearly show how the fixation has to be made to ensure the correct conducting connection to the appropriate support.

The clamping connection to the support shall only be released by means of tools.

Contact pressure via insulating material (CoPI) is not allowed for connection to support.

The test shall be carried out in accordance with 9.3.2 of IEC 60947-7-1:2025.

NOTE: Information on mounting rails can be found in [IEC 60715](#).

8.1.3 Clearance and creepage distances

Clearance and creepage distances do not apply to protective conductor terminal blocks.

NOTE: The value of the clearance and creepage distances between protective conductor terminal blocks and terminal blocks according to IEC 60947-7-1:2025 should be as stated in 8.1.3 of IEC 60947-7-1:2025.

8.1.4 Terminal block identification and marking

Subclause 8.1.4 of IEC 60947-7-1:2025 applies with the following addition.

Any partially insulated protective conductor terminal block shall be coloured green and yellow.

8.1.5 Resistance to abnormal heat and fire

Subclause 8.1.5 of IEC 60947-7-1:2025 applies.

8.1.6 Rated cross-section and rated connecting capacity

Subclause 8.1.6 of IEC 60947-7-1:2025 applies.

8.1.7 Protective conductor mounting rails

Mounting rails may be used as protective conductor busbars, provided the values specified in [Table A.1](#) for thermal short-time withstand current and the thermal rated current are not exceeded.

Other types of mounting rails may be used for this purpose if the values of [Table A.1](#) are comparable.

[Table A.1](#) gives examples of standardized mounting rails meeting these requirements.

Steel protective conductor busbars are not allowed to be used as a PEN conductor.

NOTE: Special tests may be necessary for protective conductor terminal blocks involving connection of aluminium to copper or aluminium to copper alloy.

8.2 Performance requirements

8.2.1 Temperature-rise

When protective conductor terminal blocks for PEN functions are tested in accordance with [9.4.5](#), the temperature rise of the terminals shall not exceed 45 K.

8.2.2 Dielectric properties

Protective conductor terminal blocks which shall be arranged directly beside terminal blocks in accordance with [IEC 60947-7-1](#) shall pass the dielectric tests according to [9.4.3](#).

8.2.3 Short-time withstand current

Protective conductor terminal blocks shall be capable of withstanding three applications of 1 s duration each of the short-time withstand current which corresponds to 120 A/mm^2 of its rated cross-section. The test shall be made in accordance with 9.4.6.

8.2.4 Voltage drop

The voltage drop caused by the conductor connection and by the connection to the support of a protective conductor terminal block, measured according to 9.4.4, shall not exceed the values specified in 9.4.4 and, where applicable, in 9.4.7.

8.2.5 Electrical performance after ageing (for screwless-type protective conductor terminal blocks only)

Protective conductor terminal blocks shall be capable of withstanding the ageing test comprising 192 temperature cycles in accordance with 9.4.7.

Screwless-type protective conductor terminal blocks with contact pressure via ceramic or pure mica shall be capable of withstanding the ageing test comprising 192 temperature cycles in accordance with 9.4.7.

Screwless-type protective conductor terminal blocks with contact pressure via insulating material (CoPI) other than ceramic or mica shall fulfil the requirements of clause 8.2.6.

8.2.6 Contact pressure via insulating material (CoPI)

Protective conductor terminal blocks with contact pressure via insulating material other than ceramic or pure mica, shall be capable of withstanding the ageing test sequence including preconditioning and comprising 384 temperature cycles in accordance with 9.4.8.

Performance requirements for connection to support are under considerations.

8.3 Electromagnetic compatibility (EMC)

Clause 8.3 of IEC 60947-1:2020 applies.

Compliance is checked by the tests described in 9.6.

9 Tests

9.1 Kinds of test

Subclause 9.1 of IEC 60947-7-1:2025 applies.

9.2 General

Subclause 9.2 of IEC 60947-7-1:2025 applies.