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Title: BS EN 60947-7-1 Ed. 4.0 Low-voltage switchgear and controlgear

Part 7-1: Ancillary equipment - Terminal blocks for copper conductors

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Responsible Committee Secretary: **Mr Simon Bounds (BSI)**Direct tel: **0208 996 7281**E-mail: simon.bounds@bsigroup.com

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.

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UK Vote

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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.	



121A/468/CD

COMMITTEE DRAFT (CD)

PROJECT NUMBER:
IEC 60947-7-1 ED4

DATE OF CIRCULATION:
2022-01-14

CLOSING DATE FOR COMMENTS:
2022-04-08

SUPERSEDES DOCUMENTS:
121A/458/RR

IEC SC 121A : LOW-VOLTAGE SWITCHGEAR AND CONTROLGEAR

SECRETARIAT:
France

SECRETARY:
Mr Michaël LAHEURTE

OF INTEREST TO THE FOLLOWING COMMITTEES:

PROPOSED HORIZONTAL STANDARD:



Other TC/SCs are requested to indicate their interest, if any, in this CD to the secretary.

FUNCTIONS CONCERNED:

☐ EMC

☐ ENVIRONMENT

☐ QUALITY ASSURANCE

☒ SAFETY

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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.

TITLE:

Low-voltage switchgear and controlgear - Part 7-1: Ancillary equipment - Terminal blocks for copper conductors

NOTE FROM TC/SC OFFICERS:

SC121A Officers support circulation of CD1 for project IEC 60947-7-1 ED4.

Secretary Note: NC experts are kindly requested to refer their comments to line number.

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

LOW-VOLTAGE SWITCHGEAR AND CONTROLGEAR –

**Part 7-1: Ancillary equipment –
Terminal blocks for copper conductors**

FOREWORD

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International Standard IEC 60947-7-1 has been prepared by subcommittee 121A: Low-voltage switchgear and controlgear, of IEC technical committee 121: Switchgear and controlgear.

This fourth edition cancels and replaces the third edition published in 2009. This edition constitutes a technical revision.

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

- Scope extension for smaller and larger Conductor Cross-sections
- Implementation of a new test contact pressure via insulation material (CoPI)
- ...

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

FDIS	Report on voting
XX/XX/FDIS	XX/XX/RVD

174

175 Full information on the voting for the approval of this International Standard can be found in the
176 report on voting indicated in the above table.

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

178 The committee has decided that the contents of this document will remain unchanged until the
179 stability date indicated on the IEC website under "<http://webstore.iec.ch>" in the data related to
180 the specific document. At this date, the document will be

- 181 • reconfirmed,
- 182 • withdrawn,
- 183 • replaced by a revised edition, or
- 184 • amended.

185

186 The National Committees are requested to note that for this document the stability date
187 is 20XX..

188 THIS TEXT IS INCLUDED FOR THE INFORMATION OF THE NATIONAL COMMITTEES AND WILL BE DELETED
189 AT THE PUBLICATION STAGE.

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LOW-VOLTAGE SWITCHGEAR AND CONTROLGEAR –

Part 7-1: Ancillary equipment – Terminal blocks for copper conductors

1 Scope

This part of IEC 60947 specifies requirements for terminal blocks with screw-type or screw-less-type clamping units primarily intended for industrial or similar use and to be fixed to a support to provide electrical and mechanical connection between copper conductors. It applies to terminal blocks intended to connect round copper conductors, with or without special preparation, having a cross-section between 0,05 mm² and 500 mm² (AWG 30/1000 kcmil), intended to be used in circuits of a rated voltage not exceeding 1000 V AC up to 1000 Hz or 1500 V DC. The tests on terminal blocks are made with AC or DC supply as required in relevant clauses of this document.

NOTE 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 document may be used as a guide for

- terminal blocks requiring the fixing of special devices to the conductors, for example quick connect terminations or wrapped connection, etc.;
- terminal blocks providing wire-binding screw (see IEC 60947-1:2020, Annex D, Figure D.2), stud and nut terminations (see IEC 60947-1:2020, Annex D, Figure D.4 and Figure D.5), lug terminations (see IEC 60947-1:2020, Annex D, Figure D.6) and terminal blocks providing direct contact to the conductors by means of edges or points penetrating the insulation, for example insulation displacement connection (IDC) (see IEC 60352-4:2020, Figure 2), etc.;
- special types of terminal blocks, for example with diodes or varistors or similar component holders, etc.

Where applicable in this document, 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.

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 60352-4: 2020, *Solderless connections - Part 4: Non-accessible insulation displacement (ID) connections - General requirements, test methods and practical guidance*

IEC 60695-11-5: 2016, *Fire hazard testing – Part 11-5: Test flames – Needle-flame test method – Apparatus, confirmatory test arrangement and guidance*

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

ISO 4046-4: 2016, *Paper, board, pulp and related terms – Vocabulary – Part 4: Paper and board grades and covered products*

3 Terms and definitions

For the purposes of this document, the definitions given in IEC 60947-1:2020, together with 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>

3.1 terminal block

insulation part carrying one or more mutually insulated terminal assemblies and intended to be fixed to a support

3.2 rated cross-section

value of the maximum cross-section of all connectable types of conductors, rigid (solid and stranded) and flexible, stated by the manufacturer, and to which certain thermal, mechanical and electrical requirements are referred

3.3 rated connecting capacity

range of cross-section and, if applicable, the number of connectable conductors, for which the terminal block is designed

3.4 terminal assembly

two or more clamping units fixed to the same conductive part

4 Classification

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

- method of fixing the terminal block to the support;
- number of poles;
- type of clamping units: screw-type clamping units or screwless-type clamping units;
- ability to receive prepared conductors (see 3.5.28 of IEC 60947-1:2020);
- terminal assemblies with identical or dissimilar clamping units;
- number of clamping units on each terminal assembly;
- service conditions;

- ability to receive different types of conductors, e.g. solid, rigid stranded or flexible conductors.

5 Characteristics

5.1 Summary of characteristics

The characteristics of a terminal block are as follows:

- type of terminal block (see 5.2);
- rated and limited values (see 5.3).

5.2 Type of terminal block

The following shall be stated:

- type of clamping units (e.g. screw-type, screwless-type);
- number of clamping units.

5.3 Rated and limiting values

5.3.1 Rated voltages

Subclauses 5.3.1.2 and 5.3.1.3 of IEC 60947-1:2020 apply.

5.3.2 Short-time withstand current

A specified RMS value of current which a terminal block shall be able to withstand during a specified short-time under prescribed conditions of use and behaviour (see 8.2.3 and 9.4.6)

5.3.3 Standard cross-section

The standard values of cross-sections of round copper conductors to be used are contained in Table 1.

Table 1 – Standard cross-section of round copper conductors

Metric size ISO mm ²	Comparison between AWG/kcmil and metric sizes	
	Size AWG/kcmil	Equivalent metric area mm ²
0,05	30	0,055
0,08	28	0,079
0,13	26	0,124
0,2	24	0,205
0,34	22	0,324
0,5	20	0,519
0,75	18	0,82
1	-	-
1,5	16	1,3
2,5	14	2,1
4	12	3,3

6	10	5,3
10	8	8,4
16	6	13,3
25	4	21,2
35	2	33,6
50	0	53,5
70	00	67,4
98	000	85
-	0000	107,2
120	250 kcmil	127
150	300 kcmil	152
185	350 kcmil	177
240	500 kcmil	253
300	600 kcmil	304
-	700 kcmil	355
-	750 kcmil	380
400	-	-
-	800 kcmil	405
-	900 kcmil	456
500	-	-
-	1000 kcmil	507

5.3.4 Rated cross-section

The rated cross-section shall be selected from the standard cross-sections given in Table 1.

5.3.5 Rated connecting capacity

For terminal blocks with a rated cross-section between 0,05 mm² and 35 mm² inclusive, the minimum range contained in Table 2 applies. The conductors may be rigid (solid or stranded) or flexible. The manufacturer shall state the types and the maximum and minimum cross-sections of conductors that can be connected and, if applicable, the number of conductors simultaneously connectable to each clamping unit. The manufacturer shall also state any necessary preparation of the end of the conductor.

Table 2 – Relationship between rated cross-section and rated connecting capacity of terminal blocks

Rated cross-section		Rated connection capacity	
mm ²	AWG	mm ²	AWG
0,05	30	0,05	30
0,08	28	0,05 – 0,08	30 – 28
0,13	26	0,05 – 0,08 – 0,13	30 – 28 – 26
0,2	24	0,08 – 0,13 – 0,2	28 – 26 – 24
0,34	22	0,13 – 0,2 – 0,34	26 – 24 – 22
0,5	20	0,2 – 0,34 – 0,5	24 – 22 – 20
0,75	18	0,34 – 0,5 – 0,75	22 – 20 – 18
1	-	0,5 – 0,75 – 1	-

1,5	16	0,75 – 1 – 1,5	20 – 18 – 16
2,5	14	1 – 1,5 – 2,5	18 – 16 – 14
4	12	1,5 – 2,5 – 4	16 – 14 – 12
6	10	2,5 – 4 – 6	14 – 12 – 10
10	8	4 – 6 – 10	12 – 10 – 8
16	6	6 – 10 – 16	10 – 8 – 6
25	4	10 – 16 – 25	8 – 6 – 4
35	2	16 – 25 – 35	6 – 4 – 2

309

310 6 Product information

311 6.1 Marking

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

- 313 a) the name of the manufacturer or a trade mark by which the manufacturer can be readily
314 identified;
- 315 b) a type referenced permitting its identification in order to obtain relevant information from
316 the manufacturer or his documentation (e.g. QR-codes with reference to internet, electronic
317 catalogues, web-link on the package unit or delivery papers, etc.).

318 Very small terminal blocks with a surface that cannot be marked shall be marked only in
319 accordance with a). In those cases, information of b) shall be marked on the smallest packing
320 unit.

321 6.2 Additional information

322 The following information shall be stated by the manufacturer, if applicable, e.g. in the
323 manufacturer's documentation (e.g. QR-codes with reference to internet, electronic catalogues,
324 web-link on the package unit or delivery papers, etc.):

- 325 a) IEC 60947-7-1, if the manufacturer claims compliance with this document;
- 326 b) the rated cross-section;
- 327 c) the rated connection capacity, if different from Table 2;
- 328 d) the rated insulation voltage (U_i);
- 329 e) the rated impulse withstand voltage (U_{imp}), when determined;
- 330 f) service conditions, if different from those of Clause 7;
- 331 g) conventional free air thermal current (I_{th})
- 332 h) following information for non-universal terminal blocks, depending of the classification, shall
333 be used:
 - 334 – for clamping units declared for solid conductors "solid" or the abbreviations "s" or "sol" ;
 - 335 – for clamping units declared for rigid stranded conductors "rigid stranded" or the
336 abbreviation "r";
 - 337 – for clamping units declared for flexible conductors "flexible" or the abbreviation "f";
- 338 i) special preparation of the end of the conductor;
- 339 j) simultaneously connectable number of conductors, if different from one.

340