

This document is a preview generated by EVS

**Madalpingelised lülitusaparaadid. Osa 7-1: Abiseadised.
Vaskjuhtide riviklemmid**

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

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

Käesolev Eesti standard EVS-EN 60947-7-1:2009 sisaldab Euroopa standardi EN 60947-7-1:2009 ingliskeelset teksti.

Standard on kinnitatud Eesti Standardikeskuse 31.07.2009 käskkirjaga ja jõustub sellekohase teate avaldamisel EVS Teatajas.

Euroopa standardimisorganisatsioonide poolt rahvuslikele liikmetele Euroopa standardi teksti kättesaadavaks tegemise kuupäev on 26.06.2009.

Standard on kättesaadav Eesti standardiorganisatsioonist.

This Estonian standard EVS-EN 60947-7-1:2009 consists of the English text of the European standard EN 60947-7-1:2009.

This standard is ratified with the order of Estonian Centre for Standardisation dated 31.07.2009 and is endorsed with the notification published in the official bulletin of the Estonian national standardisation organisation.

Date of Availability of the European standard text 26.06.2009.

The standard is available from Estonian standardisation organisation.

ICS 29.130.20

Standardite reprodutseerimis- ja levitamiseõigus kuulub Eesti Standardikeskusele

Andmete paljundamine, taastekitamine, kopeerimine, salvestamine elektroonilisse süsteemi või edastamine ükskõik millises vormis või millisel teel on keelatud ilma Eesti Standardikeskuse poolt antud kirjaliku loata.

Kui Teil on küsimusi standardite autorikaitse kohta, palun võtke ühendust Eesti Standardikeskusega:
Aru 10 Tallinn 10317 Eesti; www.evs.ee; Telefon: 605 5050; E-post: info@evs.ee

Right to reproduce and distribute Estonian Standards belongs to the Estonian Centre for Standardisation

No part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying, without permission in writing from Estonian Centre for Standardisation.

If you have any questions about standards copyright, please contact Estonian Centre for Standardisation:
Aru str 10 Tallinn 10317 Estonia; www.evs.ee; Phone: +372 605 5050; E-mail: info@evs.ee

English version

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

Appareillage à basse tension -
Partie 7-1: Matériels accessoires -
Blocs de jonction
pour conducteurs en cuivre
(CEI 60947-7-1:2009)

Niederspannungsschaltgeräte -
Teil 7-1: Hilfseinrichtungen -
Reihenklempen für Kupferleiter
(IEC 60947-7-1:2009)

This European Standard was approved by CENELEC on 2009-06-01. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

Central Secretariat: Avenue Marnix 17, B - 1000 Brussels

Foreword

The text of document 17B/1654/FDIS, future edition 3 of IEC 60947-7-1, 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 was approved by CENELEC as EN 60947-7-1 on 2009-06-01.

This European Standard supersedes EN 60947-7-1:2002.

The main technical modifications of EN 60947-7-1:2009 since EN 60947-7-1:2002 are listed below:

- added in the scope that EN 60947-7-1:2009 may be used as a guide for special types of terminal blocks, for example with diodes or varistors or similar component holders;
- the conventional free air thermal current added in 5.2 in the list of information to be stated by the manufacturer;
- update of 7.1.4 that the colour combination green-yellow is not allowed for terminal blocks;
- the consequences in case of failed single tests and failed tests within test sequences specified in 8.2;
- requirements regarding clearances and creepage distances replaced by reference to Annex H of EN 60947-1, Annex A deleted;
- requirements for tightening torques for the tests improved and referenced to Table 4 of EN 60947-1, Annex C deleted;
- in 8.3.3.3 changed reference for pull-out force to EN 60947-1;
- the wording of the test of the voltage drop improved in 8.4.4;
- the wording of the short-time withstand current test improved in 8.4.6;
- Annex D with additional requirements for test disconnect terminal blocks added. The scope has been modified accordingly.

This standard shall be read in conjunction with EN 60947-1. The provisions of the general rules dealt with in EN 60947-1 are applicable to this standard, where specifically called for. Clauses and subclauses, tables, figures and annexes thus applicable are identified by reference to EN 60947-1, e.g. 1.2 of EN 60947-1, Table 4 of EN 60947-1 or Annex A of EN 60947-1.

The following dates were fixed:

- latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2010-03-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2012-06-01

Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 60947-7-1:2009 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following notes have to be added for the standards indicated:

IEC 60228 NOTE Harmonized as EN 60228:2005 (not modified).

IEC 60715 NOTE Harmonized as EN 60715:2001 (not modified).

This document is a preview generated by EVS

Annex ZA
(normative)

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

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.

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 60695-11-5	2004	Fire hazard testing - Part 11-5: Test flames - Needle-flame test method - Apparatus, confirmatory test arrangement and guidance	EN 60695-11-5	2005
IEC 60947-1	2007	Low-voltage switchgear and controlgear - Part 1: General rules	EN 60947-1	2007
ISO 4046-4	2002	Paper, board, pulps and related terms - Vocabulary - Part 4: Paper and board grades and converted products	-	-

This document is a preview generated by EVS

CONTENTS

FOREWORD.....	4
1 General.....	6
1.1 Scope.....	6
1.2 Normative references.....	6
2 Definitions.....	7
3 Classification.....	7
4 Characteristics.....	7
4.1 Summary of characteristics.....	7
4.2 Type of terminal block.....	7
4.3 Rated and limiting values.....	8
4.3.1 Rated voltages.....	8
4.3.2 Short-time withstand current.....	8
4.3.3 Standard cross-sections.....	8
4.3.4 Rated cross-section.....	8
4.3.5 Rated connecting capacity.....	9
5 Product information.....	9
5.1 Marking.....	9
5.2 Additional information.....	9
6 Normal service, mounting and transport conditions.....	10
7 Constructional and performance requirements.....	10
7.1 Constructional requirements.....	10
7.1.1 Clamping units.....	10
7.1.2 Mounting.....	10
7.1.3 Clearances and creepage distances.....	10
7.1.4 Terminal identification and marking.....	10
7.1.5 Resistance to abnormal heat and fire.....	11
7.1.6 Rated cross-section and rated connecting capacity.....	11
7.2 Performance requirements.....	11
7.2.1 Temperature-rise.....	11
7.2.2 Dielectric properties.....	11
7.2.3 Short-time withstand current.....	11
7.2.4 Voltage drop.....	12
7.2.5 Electrical performance after ageing (for screwless-type terminal blocks only).....	12
7.3 Electromagnetic compatibility (EMC).....	12
8 Tests.....	12
8.1 Kinds of test.....	12
8.2 General.....	12
8.3 Verification of mechanical characteristics.....	13
8.3.1 General.....	13
8.3.2 Attachment of the terminal block on its support.....	13
8.3.3 Mechanical properties of clamping units.....	14
8.4 Verification of electrical characteristics.....	15
8.4.1 General.....	15
8.4.2 Verification of clearances and creepage distances.....	16
8.4.3 Dielectric tests.....	16

8.4.4	Verification of the voltage drop	16
8.4.5	Temperature-rise test	18
8.4.6	Short-time withstand current test	19
8.4.7	Ageing test (for screwless-type terminal blocks only)	19
8.5	Verification of thermal characteristics	20
8.6	Verification of EMC characteristics	22
8.6.1	Immunity	22
8.6.2	Emission	22
Annex A	vacant	23
Annex B (informative)	Items subject to agreement between manufacturer and user	24
Annex C	vacant	25
Annex D (normative)	Additional requirements for test disconnect terminal blocks	26
Bibliography	34
Figure 1	– Arrangement for test according to 8.3.2	13
Figure 2	– Arrangement for tests according to 8.4.5 and 8.4.7, and for the verification of voltage drop	18
Figure 3	– Arrangement for test according to 8.5	21
Figure 4	– Point of test flame contact (view from the layer placed below the terminal block)	22
Figure D.1	– Test requirements according to D.8.4.4 for verification of the voltage drop	30
Table 1	– Standard cross-sections of round copper conductors	8
Table 2	– Relationship between rated cross-section and rated connecting capacity of terminal blocks	9
Table 3	– Attachment test parameters	14
Table 4	– Values of test current for temperature-rise test, ageing test and voltage drop verification for metric wire sizes	17
Table 5	– Values of test current for temperature-rise test, ageing test and voltage drop verification for AWG or kcmil wire sizes	18
Table D.1	– Operating cycles	28
Table D.2	– Values of test current for temperature-rise test, ageing test and voltage drop verification for metric wire sizes	30
Table D.3	– Values of test current for temperature-rise test, ageing test and voltage drop verification for AWG or kcmil wire sizes	30
Table D.4	– Short-time withstand current and corresponding wire sizes in mm ²	31
Table D.5	– Short-time withstand current and corresponding wire sizes in AWG	32

LOW-VOLTAGE SWITCHGEAR AND CONTROLGEAR –

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

1 General

1.1 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 0,2 mm² and 300 mm² (AWG 24/600 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 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

- terminal blocks requiring the fixing of special devices to the conductors, for example quick connect terminations or wrapped connections, etc.;
- terminal blocks providing direct contact to the conductors by means of edges or points penetrating the insulation, for example insulation displacement connections, etc.;
- special types of terminal blocks, for example with diodes or varistors or similar component holders, 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.

1.2 Normative references

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 60695-11-5:2004, *Fire hazard testing – Part 11-5: Test flames – Needle-flame test method – Apparatus, confirmatory test arrangement and guidance*

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

ISO 4046-4:2002, *Paper, board, pulp and related terms – Vocabulary – Part 4: Paper and board grades and covered products*

2 Definitions

For the purposes of this document, the definitions given in IEC 60947-1, together with the following definitions, apply.

2.1

terminal block

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

2.2

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

2.3

rated connecting capacity

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

2.4

terminal assembly

two or more clamping units fixed to the same conductive part

3 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 2.3.27 of IEC 60947-1);
- terminal assemblies with identical or dissimilar clamping units;
- number of clamping units on each terminal assembly;
- service conditions.

4 Characteristics

4.1 Summary of characteristics

The characteristics of a terminal block are as follows:

- type of terminal block (see 4.2);
- rated and limiting values (see 4.3).

4.2 Type of terminal block

The following shall be stated:

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