भारतीय मानक **IS/IEC 60947-7-2 : 2009**

Indian Standard

निम्न-वोल्टेज के स्विचगियर और नियंत्रण गियर

भाग 7 सहायक उपकरण

अनुभाग 2 तांबे के कंडक्टर के लिए सुरक्षात्मक कंडक्टर टर्मिनल ब्लॉक

Low-Voltage Switchgear and Controlgear

Part 7 Ancillary Equipment

Section 2 Protective Conductor Terminal Blocks for Copper Conductors

ICS 29.120.99; 29.130.20

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BUREAU OF INDIAN STANDARDS
मानक भवन, 9 बहादुर शाह ज़फर मार्ग, नई दिल्ली - 110002
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI - 110002
www.bis.gov.in www.standardsbis.in

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Low Voltage Switchgear and Controlgear Sectional Committee, ETD 07

NATIONAL FOREWORD

This Indian Standard (Part 7/Sec 7) which is identical to IEC 60947-7-2 : 2009 'Low-voltage switchgear and controlgear — Part 7-2: Ancillary equipment — Protective conductor terminal blocks for copper Conductors' issued by the International Electrotechnical Commission (IEC) was adopted by the Bureau of Indian Standards on the recommendation of the Low Voltage Switchgear and Controlgear Sectional Committee and approval of the Electrotechnical Division Council.

This standard is published in various parts. Other parts in this series are:

Part 1	General rules
Part 2	Circuit-Breakers
Part 3	Switches disconnectors switch-disconnectors and fuse-combination units
Part 4	Contactors and motor-starters
Part 5	Control circuit devices and switching elements
Part 6	Multiple function equipment

The text of IEC standard has been approved as suitable for publication as an Indian Standard without deviations. Certain terminologies and conventions are, however, not identical to those used in Indian Standards. Attention is particularly drawn to the following:

a) Wherever the words 'International Standard' appear referring to this standard, they should be read as 'Indian Standard'; and

b) Comma (,) has been used as a decimal marker, while in Indian Standards the current practice is to use a point (.) as the decimal marker.

In this adopted standard, reference appears to International Standards for which Indian Standards also exist. The corresponding Indian Standards, which are to be substituted, are listed below along with their degree of equivalence for the editions indicated:

International Standard	*Corresponding Indian Standard*	*Degree of Equivalence*
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	IS/IEC 60715 : 2017 Dimensions of low-voltage switchgear and controlgear — Standardized mounting on rails for mechanical support of switchgear, controlgear and accessories (*first revision*)	Identical to IEC 60715 : 2017
Amendment 1 (1995)		
IEC 60947-1 : 2007 Low-voltage switchgear and controlgear — Part 1: General rules	IS/IEC 60947-1 : 2020 Low-voltage switchgear and controlgear: Part 1 General rules (*second revision*)	Identical to IEC 60947-1 : 2020

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Indian Standard

LOW-VOLTAGE SWITCHGEAR AND CONTROLGEAR

PART 7 ANCILLARY EQUIPMENT

SECTION 2 PROTECTIVE CONDUCTOR TERMINAL BLOCKS FOR COPPER CONDUCTORS

1 General

1.1 Scope

This part of IEC 60947 specifies requirements for protective conductor terminal blocks with PE function up to 120 mm^2 (250 kcmil) and for protective conductor terminal blocks with PEN function equal to and above 10 mm^2 (AWG 8) with screw-type or screwless-type clamping units, primarily intended for industrial applications.

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

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 mm^2 and 120 mm^2 (AWG 24 and 250 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., most commonly in conjunction with terminal blocks according to IEC 60947-7-1.

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.

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

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*
Amendment 1 (1995)

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

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

2 Definitions

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

2.1
protective conductor terminal block
device with one or more clamping units for connecting and/or joining protective 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 Supports are, for example, mounting rails, sheet metal cut-outs, mounting plates, etc.

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

2.2
partially insulated protective conductor terminal block
device which is only insulated against live parts of other devices but not against the support itself

2.3
PEN conductor
earthed conductor combining the functions of both protective conductor and neutral conductor

NOTE The acronym PEN results from the combination of both symbols PE for the protective conductor and N for the neutral conductor (see 2.1.15 of IEC 60947-1).

3 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.

4 Characteristics

4.1 Summary of characteristics

Subclause 4.1 of IEC 60947-7-1 applies.

4.2 Type of protective conductor terminal block

Subclause 4.2 of IEC 60947-7-1 applies.

4.3 Rated and limiting values

4.3.1 Void

4.3.2 Short-time withstand current

Subclause 4.3.2 of IEC 60947-7-1 applies.

4.3.3 Standard cross-sections

Subclause 4.3.3 of IEC 60947-7-1 applies with the following addition.

In accordance with the scope of this standard, Table 1 of IEC 60947-7-1 applies only up to 120 mm^2 (250 kcmil).

4.3.4 Rated cross-section

Subclause 4.3.4 of IEC 60947-7-1 applies.

4.3.5 Rated connecting capacity

Subclause 4.3.5 of IEC 60947-7-1 applies with the modification for one conductor per clamping unit only, as for 7.4.3.1.6 of IEC 60439-1, and with the following Table 1.

Table 1 – Relationship between rated cross-section and rated connecting capacity of protective conductor terminal blocks

Rated cross-section		Rated connecting capacity	
mm^2	AWG/kcmil	mm^2	AWG/kcmil
0,2	24	0,2	24
0,34	22	0,2 – 0,34	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
50	0	25 – 35 – 50	4 – 2 – 0
70	00	35 – 50 – 70	2 – 0 – 00
95	000	50 – 70 – 95	0 – 00 – 000
120	250	70 – 95 – 120	00 – 000 – 250

5 Product information

5.1 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.

5.2 Additional information

The following information shall be stated by the manufacturer, if applicable, e.g. in the manufacturer's data sheet or his catalogue or on the packing unit:

a) IEC 60947-7-2, if the manufacturer claims compliance with this standard;

b) the rated cross-section;

c) the rated connecting capacity if different from Table 1;

d) service conditions, if different from those of Clause 6.

The manufacturer shall declare if the protective conductor terminal block rated equal to or above 10 mm^2 (AWG 8) is intended for PE function only.

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

6 Normal service, mounting and transport conditions

Clause 6 of IEC 60947-1 applies.

7 Constructional and performance requirements

7.1 Constructional requirements

7.1.1 Clamping units

Subclause 7.1.1 of IEC 60947-7-1 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 8.3.3.1 and by the tests of 8.3.3.2 and 8.3.3.3 of IEC 60947-7-1.

7.1.2 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.

The test shall be carried out in accordance with 8.3.2 of IEC 60947-7-1.

NOTE Information on mounting rails can be found in IEC 60715.

7.1.3 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 should be as stated in 7.1.3 of IEC 60947-7-1.

7.1.4 Terminal block identification and marking

Subclause 7.1.4 of IEC 60947-7-1 applies with the following addition.

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

7.1.5 Resistance to abnormal heat and fire

Subclause 7.1.5 of IEC 60947-7-1 applies.

7.1.6 Rated cross-section and rated connecting capacity

Subclause 7.1.6 of IEC 60947-7-1 applies.

7.1.7 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.

7.2 Performance requirements

7.2.1 Temperature rise

When protective conductor terminal blocks for PEN functions are tested in accordance with 8.4.5, the temperature rise of the terminals shall not exceed 45 K.

7.2.2 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 8.4.3.

7.2.3 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 8.4.6.

7.2.4 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 8.4.4, shall not exceed the values specified in 8.4.4 and, where applicable, in 8.4.7.

7.2.5 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 8.4.7.

7.3 Electromagnetic compatibility (EMC)

Subclause 7.3 of IEC 60947-7-1 applies.

8 Tests

8.1 Kinds of test

Subclause 8.1 of IEC 60947-7-1 applies.

8.2 General

Subclause 8.2 of IEC 60947-7-1 applies.

8.3 Verification of mechanical characteristics

Subclause 8.3 of IEC 60947-7-1 applies with the modification of 8.3.3.1 which is replaced by the following.

8.3.3.1 Test of mechanical strength of clamping units

Subclauses 8.2.4.1 and 8.2.4.2 of IEC 60947-1 apply with the following addition.

The test shall be made first on two conductor clamping units at the centre terminal block out of five protective conductor terminal blocks mounted as in normal use on the appropriate support according to the manufacturer's instructions.

After verification of the voltage drop U_{cc} according to 8.4.4 with a connected rigid conductor of the rated cross-section stated by the manufacturer and subsequently, if applicable, with a connected flexible conductor of the minimum cross-section stated by the manufacturer, rigid conductors of the rated cross-section shall be connected and disconnected five times each.

At the end of this test, the protective conductor terminal blocks shall pass the voltage drop test (U_{cc}) according to 8.4.4 with a connected rigid conductor of the rated cross-section and subsequently, if applicable, with a connected flexible conductor of the minimum cross-section.

Subsequently the voltage drop U_{cs} is verified on the protective conductor terminal block with a connected rigid conductor of the rated cross-section.

The protective conductor terminal blocks are then mounted and dismounted from their support five times.

At the end of this test, the protective conductor terminal blocks shall pass the voltage drop test (U_{cs}) according to 8.4.4.

8.4 Verification of electrical characteristics

8.4.1 General

The verification of electrical characteristics includes the following:

– dielectric tests (see 8.4.3);

– verification of the voltage drop (see 8.4.4);
– temperature-rise test (see 8.4.5);
– short-time withstand current test (see 8.4.6);
– ageing test (for screwless protective conductor terminal blocks only) (see 8.4.7).

8.4.2 Void

8.4.3 Dielectric tests

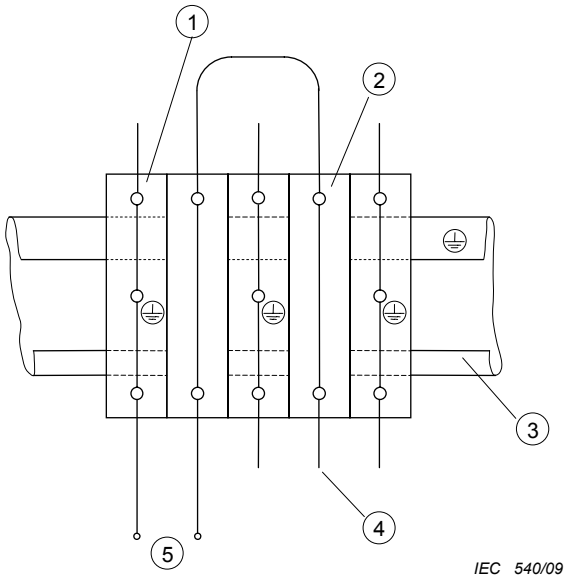
This test applies only if partially insulated protective conductor terminal blocks are intended to be arranged directly beside terminal blocks according to IEC 60947-7-1.

The test is made on protective conductor terminal blocks installed with terminal blocks of the same series and size according to the manufacturer's instructions.

a) If the manufacturer has declared a value for the rated impulse withstand voltage (U_{imp}), the impulse withstand voltage test shall be made in accordance with 8.3.3.4.1, item 2), of IEC 60947-1, except item 2) c) which does not apply.
b) The power-frequency withstand verification of solid insulation shall be made in accordance with 8.3.3.4.1, item 3), of IEC 60947-1. The value of the test voltage shall be as stated in Table 12A of IEC 60947-1 (see 8.3.3.4.1, item 3) b) i), of IEC 60947-1).

The protective conductor terminal blocks and terminal blocks shall be wired and installed on a metal support as shown in Figure 1 and under the conditions a), b) and c) of 8.4.2.1 of IEC 60947-7-1.

The test voltage shall be applied between the protective conductor terminal blocks and the terminal blocks.



Key
1 Protective conductor terminal block
2 Terminal block
3 Metal support
4 Conductor end
5 Test voltage

Figure 1 – Arrangement for the dielectric test

8.4.4 Verification of the voltage drop

The voltage drop shall be verified

a) before and after the test of mechanical strength of clamping units (see 8.3.3.1);

b) before and after the temperature-rise test (see 8.4.5);

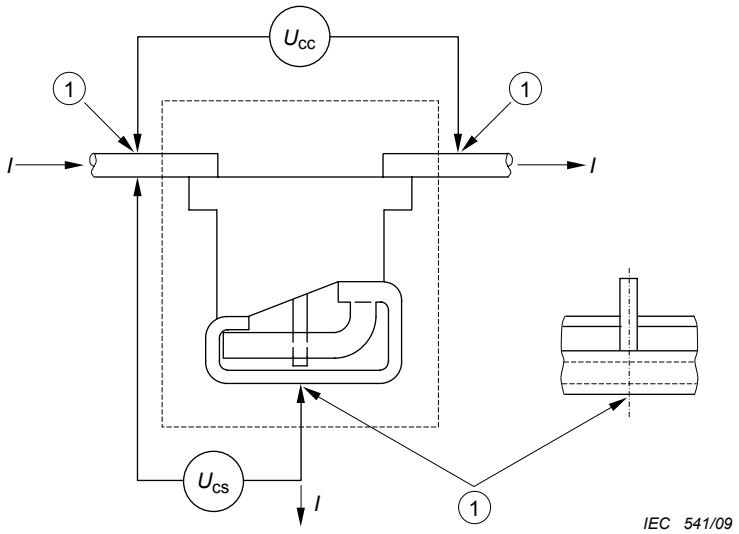
c) before and after the short-time withstand current test (see 8.4.6);

d) before, during and after the ageing test (see 8.4.7).

The verification is made as specified in 8.3.3.1, 8.4.5, 8.4.6 and 8.4.7.

If the protective conductor connection is made to steel supports with a chromated surface, the chromate coat shall be removed at the contact points prior to the connection, except for the short-time withstand current test in accordance with 8.4.6, for which the voltage drop shall be measured only after the test.

The voltage drop is measured on each protective conductor terminal block as indicated in Figure 2. The measurement is made with a direct current of 0,1 times the value given in Table 4 or Table 5 of IEC 60947-7-1.



Key

1 Measurement point

Figure 2 – Arrangement for the voltage drop test

Before the tests according to a), b), c) and d), the voltage drop U_{cc} shall not exceed 3,2 mV; and the voltage drop U_{cs} shall not exceed 6,4 mV with the exception of test c) for which the voltage drop test is performed after the test only, if steel supports with a chromated surface are used.

If the measured value of U_{cc} or U_{cs} exceeds 3,2 mV or 6,4 mV respectively, the voltage drop is determined on each individual clamping unit separately, which shall not exceed 1,6 mV or 4,8 mV respectively.

After the tests according to a), b) and c), voltage drops U_{cc} and U_{cs} shall not exceed 4,8 mV or 9,6 mV respectively, or 150 % of the values measured before the tests, whichever is the lower.

During and after the test according to d), voltage drops U_{cc} and U_{cs} shall not exceed the values specified in 8.4.7.

8.4.5 Temperature-rise test

This test is only applicable for protective conductor terminal blocks with PEN function equal to and above 10 mm^2 (AWG 8) rated cross-section. To this effect, the thermal rated current values allotted to the rail profiles in Table A.1 are to be seen as limit values.

Steel supports are not permissible. The test circuit shall be located horizontally as shown in figures 3 and 4 on a wooden surface (e.g. tabletop or floor). The conductors shall lie freely on the surface.

The test shall be made with PVC-insulated conductors having the rated cross-section.

If applicable, the conductor connection and the connection to the support shall be made with the tightening torque according to Table 4 of IEC 60947-1 or alternatively in accordance with the higher torque value stated by the manufacturer.

The minimum conductor length *L* shall be 1 m for the cross-section of 10 mm^2 (AWG 8) and 2 m for larger cross-sections.

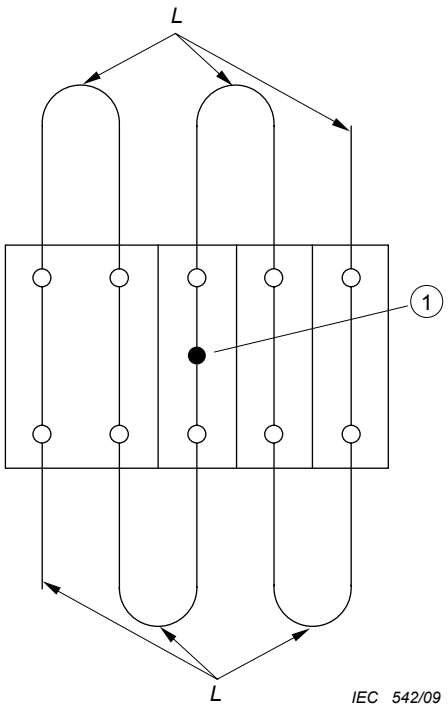
The conductors shall be rigid stranded.

During the test, screws of clamping units shall not be re-tightened.

Two different test groups shall be provided:

a) five insulated protective conductor terminal blocks shall be arranged adjacently without support (see Figure 3). The temperature shall be measured on the middle protective conductor terminal block;

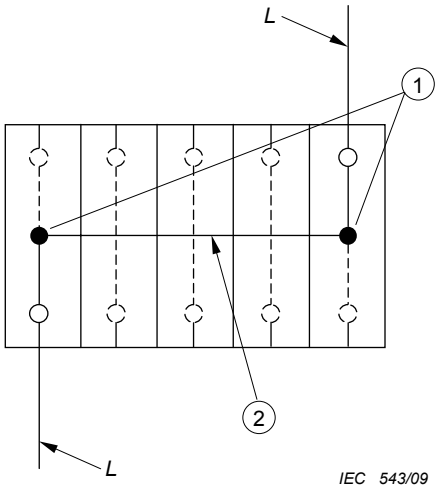
b) five protective conductor terminal blocks shall be arranged adjacently on their support (see figure 4), the two outer protective conductor terminal blocks being linked through their support. The temperature shall be measured on the two outer protective conductor terminal blocks.



Key

1 Measurement point

Figure 3 – Arrangement for the temperature-rise test for test group a)



Key

1 Measurement points

2 Support

Figure 4 – Arrangement for the temperature-rise test for test group b)

After verification of the voltage drop according to 8.4.4, the test is made with an a.c. single-phase current as specified in Table 4 or Table 5 of IEC 60947-7-1, according to the rated cross-section, and is continued until steady temperature is reached. A variation of less than 1 K between any two out of three consecutive measurements made at an interval of 5 min is considered as a steady temperature.

The temperature rise shall not exceed the limit given in 7.2.1.

At the end of the test, after cooling to ambient air temperature, the protective conductor terminal blocks shall pass the voltage drop test according to 8.4.4 with measurement points in accordance with Figure 2.

8.4.6 Short-time withstand current test

The purpose of this test is to verify the ability to withstand a thermal shock.

The test is performed on one protective conductor terminal block installed according to the manufacturer's instructions. It is wired with a conductor of the rated cross-section, tightened with the torque according to Table 4 of IEC 60947-1 or alternatively in accordance with the higher torque value stated by the manufacturer.

If the rated cross-section is below 10 mm^2 (AWG 8), the conductors shall be solid. For rated cross-sections equal to or higher than 10 mm^2 (AWG 8), the conductors shall be rigid stranded.

After verification of the voltage drop according to 8.4.4, the value and the duration of the test current shall be in accordance with 7.2.3.

The maximum short-time withstand currents allocated to the rail profiles in Table A.1 shall be considered as limit values.

The test current is applied once through the current path 1-1 and then through the current path 2-2, in accordance with Figure 5.

A pause of 6 min minimum shall be allowed between the current surges.

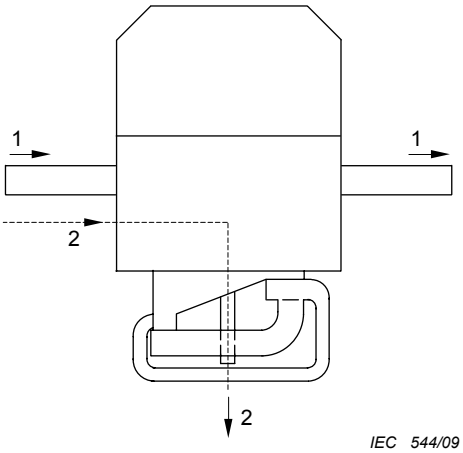


Figure 5 – Arrangement for the thermal short-time withstand current test

At the end of the test, continuity shall exist on the test sample assembly and the terminal blocks shall not show any cracking, breakage or other critical damage. After cooling down to ambient temperature, and without any change in the arrangement, the protective conductor terminal block shall pass the voltage drop test according to 8.4.4.

8.4.7 Ageing test (for screwless-type terminal blocks only)

Five protective conductor terminal blocks shall be arranged adjacently without support (see Figure 3).

If the rated cross-section is below 10 mm^2 (AWG 8), the conductors shall be solid. For rated cross-sections equal to or higher than 10 mm^2 (AWG 8), the conductors shall be rigid stranded.

The minimum length of the conductor bridges shall be 300 mm.

If the connection to the support is also made screwless, five further protective conductor terminal blocks are arranged adjacently on their support (see Figure 4).

The test is made with heat-resistant insulated or non-insulated conductors having the rated cross-section.

The protective conductor terminal blocks are placed in a heating cabinet, which is initially kept at a temperature of (20 ± 2) °C and then submitted to the verification of the voltage drop test according to 8.4.4.

The whole test arrangement, including the conductors, shall not be moved until all the voltage drop tests have been completed.

The protective conductor terminal blocks are submitted to 192 temperature cycles as follows.

For protective conductor terminal blocks intended for use under “normal service conditions” (maximum 40 °C), the temperature in the heating cabinet is increased to 85 °C.

For protective conductor terminal blocks for which the manufacturer has specified “maximum service conditions above 40 °C”, the temperature in the heating cabinet is increased to the temperature specified by the manufacturer plus 45 K.

The temperature is maintained within ± 5 °C of this value for approximately 10 min.

The protective conductor terminal blocks are then cooled down to a temperature of approximately 30 °C, forced cooling being allowed; they are kept at this temperature for approximately 10 min and, if necessary for measuring the voltage drop, it is allowed to cool down further to a temperature of (20 ± 5) °C.

NOTE As a guide, a value for the heating and cooling rate of the heating cabinet of approximately 1,5 °C/min may be taken as a basis.

The voltage drop on each protective conductor terminal block is also determined according to 8.4.4 after each of the 24 temperature cycles and after the 192 temperature cycles have been completed, each time at a temperature of (20 ± 5) °C.

In no case the voltage drop U_{cc} at the clamping units for the copper conductors shall exceed 4,8 mV or 1,5 times the value measured after the 24^{th} cycle, whichever is the lower.

At the clamping units to the support, the voltage drop U_{cs} shall not exceed 9,6 mV or 1,5 times the value measured after the 24^{th} cycle, whichever is the lower.

After this test, a visual inspection shall show no changes impairing further use as cracks, deformations or the like.

Furthermore, the pull-out test according to 8.3.3.3 of IEC 60947-7-1 shall be carried out.

8.5 Verification of thermal characteristics

Subclause 8.5 of IEC 60947-7-1 applies.

8.6 Verification of EMC characteristics

Subclause 8.6 of IEC 60947-7-1 applies.

Annex A
(normative)

Maximum short-time withstand currents allocated to the rail profile and thermal rated current of a PEN busbar

Table A.1 – Maximum short-time withstand currents allocated to the rail profile and thermal rated current of a PEN busbar

Rail profile	Material	Equivalent E-Cu cross-section	Short-time withstand current 1 s	Thermal rated current of a PEN busbar
		mm^2	kA	A
"Top hat" rail	Steel	10	1,2	–
IEC 60715/TH 15-5,5	Copper [a]	25	3	101
	Aluminium [a]	16	1,92	76
G-type rail	Steel	35	4,2	–
IEC 60715/G32	Copper [a]	120	14,4	269
	Aluminium [a]	70	8,4	192
"Top hat" rail	Steel	16	1,92	–
IEC 60715/TH 35-7,5	Copper [a]	50	6	150
	Aluminium [a]	35	4,2	125
"Top hat" rail	Steel	50	6	–
IEC 60715/TH 35-15	Copper [a]	150	18	309
	Aluminium [a]	95	11,4	232

[a] Copper or aluminium alloys selected by the manufacturer of the terminal block assembly to achieve the values in the table.

(*Continued from second cover*)

The Committee has reviewed the provisions of the following international standards referred in this adopted standard and decided that they are acceptable for use in conjunction with this standard.

International Standard	*Title*
IEC 60439-1 : 1999	Low-voltage switchgear and controlgear assemblies — Part 1: Type-tested and partially type-tested assemblies Amendment 1 (2004)
IEC 60947-7-1	Low-voltage switchgear and controlgear — Part 7-1: Ancillary equipment — Terminal blocks for copper conductors

Only the English language text has been retained while adopting it in this Indian Standard, and as such, the page numbers given here are not the same as in the IEC publication.

For the purpose of deciding whether a particular requirement of this standard is complied with the final value, observed or calculated expressing the result of a test or analysis shall be rounded off in accordance with IS 2 : 2022 ‘Rules for rounding of numerical values (*second revision*)’. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Bureau of Indian Standards

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Review of Indian Standards

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BUREAU OF INDIAN STANDARDS

Headquarters:

Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110002
Telephones: 2323 0131, 2323 3375, 2323 9402 *Website*: www.bis.gov.in

Regional Offices:		*Telephones*
Central	: 601/A, Konnectus Tower -1, 6th Floor, DMRC Building, Bhavbhuti Marg, New Delhi 110002	2323 7617
Eastern	: 8th Floor, Plot No 7/7 & 7/8, CP Block, Sector V, Salt Lake, Kolkata, West Bengal 700091	2367 0012 2320 9474
Northern	: Plot No. 4-A, Sector 27-B, Madhya Marg, Chandigarh 160019	265 9930
Southern	: C.I.T. Campus, IV Cross Road, Taramani, Chennai 600113	2254 1442 2254 1216
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