

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Rubber insulated cables – Rated voltages up to and including 450/750 V –
Part 8: Cords for applications requiring high flexibility

Conducteurs et câbles isolés au caoutchouc – Tension assignée au plus égale à
450/750 V –
Partie 8: Câbles pour applications nécessitant une flexibilité élevée



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IEC Central Office
3, rue de Varembe
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
Fax: +41 22 919 03 00
info@iec.ch
www.iec.ch

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

RUBBER INSULATED CABLES – RATED VOLTAGES UP TO AND INCLUDING 450/750 V –

Part 8: Cords for applications requiring high flexibility

FOREWORD

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International Standard IEC 60245-8 has been prepared by subcommittee 20B: Low-voltage cables, of IEC technical committee 20: Electric cables.

This consolidated version of IEC 60245-8 consists of the first edition (1998) [documents 20B/259/FDIS and 20B/269/RVD], its amendment 1 (2003) [documents 20/580/CDV and 20/662/RVC] and its amendment 2 (2011) [documents 20/1261/FDIS and 20/1271/RVD].

The technical content is therefore identical to the base edition and its amendments and has been prepared for user convenience.

It bears the edition number 1.2.

A vertical line in the margin shows where the base publication has been modified by amendments 1 and 2.

IEC 60245 consists of the following parts, under the general title: *Rubber insulated cables – Rated voltages up to and including 450/750 V*:

- Part 1:1994, General requirements
- Part 2:1994, Test methods
- Part 3:1994, Heat resistant silicone insulated cables
- Part 4:1994, Cords and flexible cables
- Part 5:1994, Lift cables
- Part 6:1994, Arc welding electrode cables
- Part 7:1994, Heat resistant ethylene-vinyl-acetate rubber insulated cables
- Part 8:1997, Cords for applications requiring high flexibility

Parts 3 to 8 are for particular types of cables and should be read in conjunction with part 1 and part 2. Further parts may be added as other types are standardised.

Annexes A and B form an integral part of this standard.

The committee has decided that the contents of the base publication and its amendments will remain unchanged until the stability 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

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RUBBER INSULATED CABLES – RATED VOLTAGES UP TO AND INCLUDING 450/750 V –

Part 8: Cords for applications requiring high flexibility

1 General

1.1 Scope

This part of IEC 60245 details the particular specifications for rubber insulated and textile braid covered cords of rated voltage 300/300 V, for use in applications where high flexibility is required, for example iron cords.

All cables should comply with the appropriate requirements given in IEC 60245-1 and the individual types of cables should each comply with the particular requirements of this part.

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.

NOTE The IEC 60811 series is currently undergoing a revision, which will lead to a restructuring of its parts. A description of this, as well as a cross-reference table between the current and planned parts is given in IEC 60811-100.

IEC 60228, *Conductors of insulated cables* AMD1:2003+AMD2:2011 CSV
<https://standards.iteh.ai/catalog/standards/sist/464b35ac-062a-4ee1-8f4b-74a6c0e10355/iec-60245-8-1998-amd1-2003-amd2-2011-csv>

IEC 60245-1:2003, *Rubber insulated cables – Rated voltages up to and including 450/750 V – Part 1: General requirements*
Amendment 1: 2007

IEC 60245-2:1994, *Rubber insulated cables – Rated voltages up to and including 450/750 V – Part 2: Test methods*
Amendment 1:1997
Amendment 2:1997

IEC 60719, *Calculation of the lower and upper limits for the average outer dimensions of cables with circular copper conductors and of rated voltages up to and including 450/750 V*

IEC 60811-1-1:1993, *Common test methods for insulating and sheathing materials of electric cables and optical cables – Part 1-1: Methods for general application – Measurement of thickness and overall dimensions – Tests for determining the mechanical properties*
Amendment 1:2001

IEC 60811-1-2:1985, *Common test methods for insulating and sheathing materials of electric cables – Part 1: Methods for general application – Section Two: Thermal ageing methods*
Amendment 1:1989
Amendment 2:2000

IEC 60811-2-1:1998, *Insulating and sheathing materials of electric and optical cables – Common test methods– Part 2-1: Methods specific to elastomeric compounds – Ozone resistance, hot set and mineral oil immersion tests*
Amendment 1:2001

2 Spare

3 Spare

4 Spare

5 EPR insulated and braided cord for applications requiring high flexibility

5.1 Code designation

60245 IEC 89

5.2 Rated voltage

300/300 V

5.3 Construction

5.3.1 Conductor

Number of conductors: 2 or 3.

The conductors shall comply with the requirements given in Table IV, IEC 60228 for Class 6 conductors, except that the maximum resistance of conductors at 20 °C shall be increased by 3 %. The wires may be plain or tinned.

5.3.2 Separator

A separator of suitable material may be applied around each conductor.

5.3.3 Insulation

The insulation shall be an EPR compound of type IE 4 applied around each conductor.

The insulation shall be applied by extrusion.

The insulation thickness shall comply with the specified value given in Table 8, Column 2.

5.3.4 Fillers

The fillers shall be of textile material.

5.3.5 Assembly of cores and fillers

The cores and textile fillers shall be twisted together.

The maximum length of lay shall not exceed 7,5 times the diameter of the assembly of cores. The direction of lay shall be the same for the conductors and for the cores.

A centre filler may be used.

5.3.6 Overall textile braid

The assembly of cores and fillers shall be covered by a textile braid:

- minimum number of threads: 60;

- minimum crossings per metre: 700;
- minimum number of carriers: 24.

5.3.7 Overall diameter

The mean overall diameter shall be within the limits given in Table 8, Columns 3 and 4.

5.4 Tests

Compliance with the requirements of 5.3 shall be checked by inspection and by the tests given in Table 9.

5.4.1 Checking of compliance with constructional provisions

For 5.3.5, the length of lay shall be determined by measuring the length of 10 pitches of a sample and dividing this length by 10. The result is the length of lay of the laid-up cores.

5.4.2 Three pulley flexing test

This test shall be carried out in accordance with 3.5 of IEC 60245-2.

The number of cycles required shall be 2 000, i.e. 4 000 single movements and the test voltage shall be as specified in Table 2.

5.4.3 Kink test

This test shall be carried out in accordance with 3.6 of IEC 60245-2.

5.4.3.1 Sample

In order to prevent the tensioning weight reaching the top of its guide and either hitting an end-stop or rising clear of the guide, the following sample preparation shall be carried out:

- The three twists shall be set in the sample and temporarily secured with adhesive tape before presenting the sample to the equipment.
- The ends of the sample shall be located in the fixing clamps and the adhesive tape shall then be removed.
- The fixing clamps shall be slowly moved apart to ensure that the sample achieves a straight orientation when the clamps are fully extended, with the tensioning weight still in the guide and satisfying the 50 mm lift specified in 3.6.4 of IEC 60245-2. When the fully extended position is reached, the tensioning weight shall not make contact with any end-stop in the guide.
- If this straight orientation is not achieved, up to 30 slow test cycles shall be performed during which the sample shall be manipulated so that the twists are distributed more evenly over the sample length and so that a knot does not occur during the initial phase of the test procedure.

5.4.3.2 Requirements

A total of 1 500 cycles.

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Table 7 – Test current and tensile force exerted by weight

Nominal cross-sectional area of conductor mm ²	Test current A	Tension force exerted by weight for cords:	
		2-core N	3-core N
0,75	6	15	20
1,0	10	20	25
1,5	16	25	30

5.5 Guide to use (informative)

Maximum conductor temperature in normal use: 60 °C.

NOTE Other guidelines are under consideration.

Table 8 – Dimensions for type 60245 IEC 89

1	2	3		4
Number and nominal cross-sectional area of conductors mm ²	Thickness of insulation, specified value mm	Mean overall diameter		
		Lower limit mm	Upper limit mm	
2 × 0,75	0,8	5,5	7,2	
2 × 1	0,8	5,7	7,6	
2 × 1,5	0,8	6,2	8,2	
3 × 0,75	0,8	5,9	7,7	
3 × 1	0,8	6,2	8,1	
3 × 1,5	0,8	6,7	8,8	

Table 9 – Tests for type 60245 IEC 89

1	2	3	4	5
Ref No.	Tests	Category of test	Test method described in IEC	Clause/subclause
1	<i>Electrical tests</i>			
1.1	Resistance of conductors	T,S	60245-2	2.1
1.2	Voltage test on completed cable at 2 000 V	T,S	60245-2	2.2
1.3	Voltage test on cores at 2 000 V	R	60245-2	2.3
2	<i>Provisions covering constructional and dimensional characteristics</i>			
2.1	Checking of compliance with constructional provisions	T,S	60245-1	Inspection and manual test
2.2	Measurement of insulation thickness	T,S	60245-2	1.9
2.3	Coverage by textile braid	T,S	60245-8	Annex B
2.4	Measurement of overall dimensions:			
2.4.1	- Mean value	T,S	60245-2	1.11
2.4.2	- Ovality	T,S	60245-2	1.11
2.5	Solderability test (plain conductors)	T	60245-2	1.12
3	<i>Mechanical properties of insulation</i>			
3.1	Tensile test before ageing	T	60811-1-1	9.1
3.2	Tensile test after ageing in an air oven	T	60245-2	4
3.3	Tensile test after ageing in an air bomb	T	60811-1-2	8.2
3.4	Hot set test	T	60811-2-1	9
4	<i>Mechanical strength of completed cable</i>			
4.1	Wear resistance test	T	60245-2	3.3
4.2	Three pulley flexing test	T	60245-2	3.5
4.3	Kink test	T	60245-2	3.6
5	<i>Resistance to heat of textile braid</i>	T	60245-2	6
6	<i>Ozone resistance test</i>	T		
	Method A		60811-2-1	8