IEC 60502-2

Edition 3.0 2024-05

INTERNATIONAL STANDARD

AMENDMENT 1

Power cables with extruded insulation and their accessories for rated voltages from 1 kV (U_m = 1,2 kV) up to 30 kV (U_m = 36 kV) –
Part 2: Cables for rated voltages from 6 kV (U_m = 7,2 kV) up to 30 kV (U_m = 36 kV)

IEC 60502-2:2014-02/AMD1:2024-05(en)

IEC Secretariat
3, rue de Varembé
CH-1211 Geneva 20
Switzerland

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

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POWER CABLES WITH EXTRUDED INSULATION AND THEIR ACCESSORIES FOR RATED VOLTAGES FROM 1 kV (U_m = 1,2 kV) UP TO 30 kV (U_m = 36 kV) –

Part 2: Cables for rated voltages from 6 kV (U_m = 7,2 kV) up to 30 kV (U_m = 36 kV)

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Amendment 1 to IEC 60502-2:2014 has been prepared by IEC technical committee 20: Electric cables.

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

Draft	Report on voting
20/2166/FDIS	20/2181/RVD

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this Amendment is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/standardsdev/publications/.

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- reconfirmed,
- withdrawn, or
- revised.

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2 Normative references

Add the following new references:

IEC 60332-3-24, *Tests on electric and optical fibre cables under fire conditions – Part 3-24: Test for vertical flame spread of vertically-mounted bunched wires or cables – Category C*

IEC 60684-2, *Flexible insulating sleeving – Part 2: Methods of test*

IEC 60754-1, *Test on gases evolved during combustion of materials from cables – Part 1: Determination of the halogen acid gas content*

IEC 60754-2, *Test on gases evolved during combustion of materials from cables – Part 2: Determination of acidity (by pH measurement) and conductivity*

IEC 60754-3, *Test on gases evolved during combustion of materials from cables – Part 3: Measurement of low level of halogen content by ion chromatography*

IEC 61034-2, *Measurement of smoke density of cables burning under defined conditions – Part 2: Test procedure and requirements*

4.3 Sheathing compounds

Table 4

Add, in the existing Table 4, under item a) Thermoplastic, below "polyethylene", the following two new types of halogen free compound, as follows:

Table 4 – Maximum conductor temperatures for different types of sheathing compound

Sheathing compound	Abbreviated designation	Maximum conductor temperature in normal operation °C
halogen free	ST_8	90
	ST_{12}	90

13 Metal armour

13.1 Types of metal armour

Add, after item c), the following new item d):

d) interlock metal tape armour.

13.2 Materials

Add, after the second paragraph, the following new note:

NOTE Other metal materials can be used upon agreement between the manufacturer and customer.

13.4 Dimensions of the armour wires and armour tapes

Replace the existing title of 13.4 and, consequently, the existing first paragraph with the following new title and paragraph:

13.4 Dimensions of the armour wires, armour tapes and armour strips

The nominal dimensions of the armour wires, armour tapes and armour strips shall be one of the following values:

Add, at the end of 13.4, the following new text:

strips of the interlocked armour:

0,65 – 0,90 – 1,05 mm thickness (before forming).

13.5 Correlation between cable diameters and armour dimensions

Replace the existing first paragraph with the following new paragraph:

The nominal diameters of round armour wires, nominal thickness of armour tapes and the thickness of armour strips, shall not be less than the values given in Table 9, Table 10 and Table 24 respectively.

Add, at the end of the existing Table 10, the following new Table 24:

Table 24 – Nominal thickness of armour strips

Fictitious diameter under interlock armour		Nominal thickness of strip (before forming)
		mm
Above	Up to and including	
mm	mm	
-	20	0,65
20	40	0,90
40	-	1,05

Add, at the end of 13.7, the following new Subclause 13.8:

13.8 Interlock metal tape armour

Interlocking armour is the process of continuously forming a metal strip(s) into helical coil(s) in which the leading edge of the formed strip engages with the trailing edge of the adjacent strip to form a continuous flexible tube which is applied over the underlying cable layer (assembly of cores, bedding, or separation sheath).

The interlocked metal tape armour shall, with the oversheath removed, allow bending without opening at any point or damaging the cable when bent around a mandrel having a diameter not more than 10 times the diameter over the armour.

14 Oversheath

14.1 General

Replace the existing text of 14.1 with the following new text:

All cables shall have an oversheath.

The oversheath is normally black but a colour other than black may be provided by agreement between the manufacturer and customer, subject to its suitability for the particular conditions under which the cable is to be used.

If there is concern that the oversheath will be deteriorated by UV radiation, the oversheath shall be protected against UV radiation, which will be mutually agreed with the customer. Black polyethylene oversheaths containing the required amount of a suitable and well-dispersed grade of carbon black (see Table 22) can provide protection against UV radiation depending on geographical regions and meteorological conditions.

NOTE 1 For some applications the oversheath can be covered by a functional layer (e.g. semi-conductive).

NOTE 2 Halogen free fire retardant oversheaths are not intended for installations outdoors and are not normally considered as UV protected.

14.2 Material

Replace the existing text of 14.2 with the following new text:

The oversheath shall consist of an extruded compound selected from the types listed in Table 4.

Halogen free sheathing material ST_8 or ST_{12} shall be used on cables which exhibit properties of reduced flame spread, low levels of smoke emission and halogen free gas emission when exposed to fire. The oversheath (ST_8 or ST_{12}) of halogen free cables shall meet the requirements given in Table 20 and Table 25.

These two oversheath material grades have different mechanical requirements. They depend on installation conditions and cable designs, and on which of these two are suitable. Further guidance on selection can be given in regional or national standards.

The sheathing material shall be suitable for the operating temperature in accordance with Table 4.

NOTE Chemical additives can be requested for use in the oversheath for special purposes, for example termite protection.

17 Sample tests

17.1 General

Add, after item d), the following new item e):

e) bending test on interlock armour cable followed by examination (see 17.11).

17.7 Measurement of armour wires and tapes

Replace the existing title of 17.7 with the following new title:

17.7 Measurement of armour wires, tapes and armour strips

17.7.2 Measurement on tapes

Replace the existing title of 17.7.2 and paragraph with the following new title and paragraphs:

17.7.2 Measurement on tapes and armour strips

The measurements shall be made with a micrometer having two flat noses of approximately 5 mm in diameter for measuring tapes, or having two ball noses of maximum 2 mm in diameter for measuring armour strips. The accuracy of the micrometer shall be ±0,01 mm.

For tapes up to 40 mm in width the thickness shall be measured at the centre of the width. For wider tapes the measurements shall be made 20 mm from each edge of the tape and the average of the results taken as the thickness.

For armour strips the thickness shall be measured in a position that allows a measurement without disturbance by the shape of the formed strip.

17.7.3 Requirements

*Replace, in the first sentence, "*and tapes*" with "*, tapes and armour strips*".*

Add, after the last dashed item, the following new dashed item:

– 5 % for armour strips.

Add, at the end of 17.10, the following new Subclause 17.11:

17.11 Bending test on interlock armour cable followed by examination

The interlocked metal tape armour cable, with the oversheath removed, shall be bent at a 180° turn around a mandrel having a diameter not more than 10 times the diameter over the armour. The examination shall not reveal any opening at any point of the interlocking armour nor mechanical damages caused by the armour on the underlying cable layer (assembly of cores, bedding, or separation sheath).

18.2.4 Bending test

Add, above the existing last paragraph, the following new paragraph:

After bending sequences are completed, a visual examination of the cable oversheath shall not show cracks, or plastic deformation of oversheath in such a way that the thickness of the oversheath at the stretched point goes below the minimum value t_{min} allowed.

19.9.1 Procedure

*Replace, in the existing paragraph, "*Tables 18, 21 and 22*" with "*Table 18, Table 21, Table 22 and Table 25*".*

19.10 Test on PVC insulation and sheaths at low temperatures

Replace the existing title of 19.10 with the following new title:

19.10 Test on PVC insulation, PVC sheaths and halogen free sheaths at low temperatures

19.10.1 Procedure

Replace, in the existing paragraph of 19.10.1, "Tables 18 and 21" *with* "Table 18, Table 21 and Table 25".

19.16 Flame spread test on single cables

Replace the existing Subclause 19.16, including its title, with the following new Subclause 19.16:

19.16 Test under fire conditions

19.16.1 General

The test in 19.16.2 shall be carried out on ST_1, ST_2 or SE_1 oversheathed cables, as specified in the relevant subclause.

The tests in 19.16.3 to 19.16.8 shall be carried out on ST_8 or ST_{12} oversheathed cables, as specified in each relevant subclause.

19.16.2 Flame spread test for single cables

This test shall be carried out on ST_1, ST_2 or SE_1 oversheathed cables only when such a fire performance is specially required or declared.

The test method and requirements shall be those specified in IEC 60332-1-2.

19.16.3 Flame spread test for bunched cables

This test shall be carried out on ST_8 or ST_{12} oversheathed halogen free cables.

The test method and requirements shall be those specified in IEC 60332-3-24.

NOTE Higher performance to meet the requirements of IEC 60332-3-22 or IEC 60332-3-23 can be agreed between the manufacturer and customer.

19.16.4 Measurement of smoke density of cables burning under defined conditions

This test shall be carried out on ST_8 or ST_{12} oversheathed halogen free cables.

The test method and requirements shall be those specified in IEC 61034-2. The results shall comply with the requirements given in Table 25.

19.16.5 Determination of acidity (by pH measurement) and conductivity of gases evolved during combustion of the non-metallic materials in the cable

This test shall be carried out on the non-metallic components of ST_8 or ST_{12} oversheathed halogen free cables.

The test specified in IEC 60754-2 shall be carried out on the non-metallic components of the cable. It is not necessary to test non-metallic components if their mass is less than or equal to 1 % of the total non-metallic mass.

The weighted values of pH and conductivity of the non-metallic components of the cable shall be calculated according to IEC 60754-2 and shall comply with the requirements given in Table 25.

19.16.6 Fire performance tests on halogen free oversheath material ST_8

19.16.6.1 Acid gas emission test

19.16.6.1.1 General

This test shall be carried out on the non-metallic components of ST_8 oversheathed halogen free cables.

19.16.6.1.2 Procedure

The test method shall be that specified in IEC 60754-1.

19.16.6.1.3 Requirements

The results of the test shall comply with the requirements of Table 25.

19.16.6.2 Fluorine content test

19.16.6.2.1 General

This test shall be carried out on the non-metallic components of ST_8 oversheathed halogen free cables.

19.16.6.2.2 Procedure

The test method shall be that specified in IEC 60684-2.