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Electric cables — Low voltage energy cables of rated voltages up to and including 450/750 V (U_0/U)

Part 3-41: Cables with special fire performance — Single core non-sheathed cables with halogen-free crosslinked insulation, and low emission of smoke

National foreword

This British Standard is the UK implementation of EN 50525-3-41:2011.

In the UK, the BS EN 50525 series of standards contain complex supersession details. The table below best summarizes the relationships between these standards:

Part 1 together with	Supersedes
2-81	BS 638-4:1996
2-41, 2-42	BS 6007: 2006
2-11 (in part), 2-12, 2-21 (in part), 2-71	BS 6500:2000
2-11 (in part), 2-21 (in part), 2-51 (in part), 2-83, 3-21	BS 7919:2001
2-31, 2-51 (in part)	BS 6004:2000
3-41	BS 7211:1998
2-2, 2-72, 2-82, 3-11, 3-31	None

NOTE All British Standards will remain current until they are withdrawn on 31 December 2012. British Standards in bold are only partially superseded, and new editions of BS 6004 and BS 7211 will be introduced on 1 January 2013.

National Annex NA (informative) gives information on the origins and identification of particular cable types.

The UK participation in its preparation was entrusted to Technical Committee GEL/20/17, Electric Cables - Low voltage.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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Amendments issued since publication

Date	Text affected
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EUROPEAN STANDARD
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EN 50525-3-41

May 2011

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Supersedes IEC 60227-3-3:2007

English version

Electric cables
Low voltage energy cables of rated voltages up to and including 450/750 V
(U_0/U) -
Part 3-41: Cables with special fire performance -
Single core non-sheathed cables with halogen-free crosslinked insulation,
and low emission of smoke

Câbles électriques -
Câbles d'énergie basse tension de tension
assignée au plus égale à 450/750 V
(U_0/U) -
Partie 3-41: Câbles à performances
spéciales au feu -
Conducteurs isolés en matériau
élastomère réticulé sans halogène, à
faible dégagement de fumée

Kabel und Leitungen -
Starkstromleitungen mit Nennspannungen
bis 450/750 V (U_0/U) -
Teil 3-41: Starkstromleitungen mit
verbessertem Verhalten im Brandfall -
Halogenfreie, raucharme Ader- und
Verdrahtungsleitungen mit vernetzter
Isolierung

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Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

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Foreword

This European Standard was prepared by the Technical Committee CENELEC TC 20, Electric cables.

The text of the draft was submitted to the formal vote and was approved by CENELEC as EN 50525-3-41 on 2011-01-17.

This document, which is one of a multipart series, supersedes HD 22 6 33 207.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN and CENELEC shall not be held responsible for identifying any or all such patent rights.

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) 2012-01-17
 - latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2014-01-17
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1 Scope

EN 50525-3-41 applies to non-sheathed single core cables insulated with halogen-free crosslinked compound and having low emission of smoke and corrosive gases when exposed to fire.

NOTE 1 Low emission of smoke is checked in accordance with EN 61034-2. Low emission of corrosive gases is checked as part of the check for absence of halogens (see Annex B of EN 50525-1).

The cables are of rated voltages U_0/U up to and including 450/750 V.

NOTE 2 Cables rated 450/750 V may be used at 600/1 000 V when this cable is used in fixed installations with mechanical protection, within switchgear and control gear. See HD 516.

The cables are intended for fixed wiring applications.

The maximum conductor operating temperature for each of the cables in this standard is 90 °C.

NOTE 3 HD 516 contains extensive guidance on the safe use of cables in this standard.

This EN 50525-3-41 should be read in conjunction with EN 50525-1, which specifies general requirements.

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 One or more references to the standards below are in respect of a specific sub-division of that standard, for instance a clause, a table, a class or a type. Cross-references to these standards are undated and, at all times, the latest version applies.

EN 50363-5	Insulating, sheathing and covering materials for low voltage energy cables - Part 5: Halogen-free, cross-linked insulating compounds
EN 50395	Electrical test methods for low voltage energy cables
EN 50396	Non electrical test methods for low voltage energy cables
EN 50525-1	Electric cables - Low voltage energy cables of rated voltages up to and including 450/750 V (U_0/U) - Part 1: General requirements
EN 60228	Conductors of insulated cables (IEC 60228)
EN 60332-1-2	Tests on electric and optical fibre cables under fire conditions - Part 1-2: Test for vertical flame propagation for a single insulated wire or cable - Procedure for 1 kW pre-mixed flame (IEC 60332-1-2)
EN 60811-1-4	Insulating and sheathing materials of electric and optical cables - Common test methods - Part 1-4: General application - Tests at low temperature (IEC 60811-1-4)
EN 61034-2	Measurement of smoke density of cables burning under defined conditions - Part 2: Test procedure and requirements (IEC 61034-2)

3 Terms and definitions

For the purposes of this document the terms and definitions given in Clause 3 of EN 50525-1 apply.

4 Heat resistant cables (90 °C)

4.1 Cables for fixed wiring – H07Z-U and H07Z-R

4.1.1 Construction

4.1.1.1 Conductor

The conductor shall be class 1 or class 2, according to EN 60228.

4.1.1.2 Sizes of cable

The sizes of cable shall be:

- class 1 – 1,5 mm² to 10 mm²;
- class 2 – 1,5 mm² to 630 mm².

4.1.1.3 Insulation

The insulation shall be a polyolefin cross-linked material of Type EI 5 to EN 50363-5 applied around the conductor.

4.1.1.4 Marking

The cable shall be marked with the CENELEC code H07Z-U for cables with class 1 conductor, or H07Z-R for cables with class 2 conductor. The marking shall comply with Clause 6 of EN 50525-1.

4.1.2 Requirements

Each cable shall comply with the appropriate requirements given in EN 50525-1, and the particular requirements of this Part.

Testing shall be in accordance with Annex A, and the relevant tests indicated in column 6.

The dimensions of the cables shall conform to Table B.1 for the relevant size.

When tested in accordance with the method and procedure given in EN 61034-2, all sizes of cable shall exceed 60 % light transmittance throughout the test.

4.2 Cables for fixed wiring – H07Z-K

4.2.1 Construction

4.2.1.1 Conductor

The conductor shall be class 5, according to EN 60228.

4.2.1.2 Sizes of cable

The sizes of cable shall be 1,5 mm² to 240 mm².

4.2.1.3 Insulation

The insulation shall be a polyolefin cross-linked material of Type EI 5 to EN 50363-5 applied around the conductor.

4.2.1.4 Marking

The cable shall be marked with the CENELEC code H07ZH. The marking shall comply with Clause 6 of EN 50525-1.

4.2.2 Requirements

Each cable shall comply with the appropriate requirements given in EN 50525-1, and the particular requirements of this Part.

Testing shall be in accordance with Annex A, and the relevant tests indicated in column 7.

The dimensions of the cables shall conform to Table B.2 for the relevant size.

When tested in accordance with the method and procedure given in EN 61034-2, all sizes of cable shall exceed 60 % light transmittance throughout the test.

4.3 Cables for internal wiring – H05Z-U

4.3.1 Construction

4.3.1.1 Conductor

The conductor shall be class 1, according to EN 60228.

4.3.1.2 Sizes of cable

The sizes of cable shall be 0,5 mm² to 1 mm².

4.3.1.3 Insulation

The insulation shall be a polyolefin cross-linked material of Type EI 5 to EN 50363-5 applied around the conductor.

4.3.1.4 Marking

The cable shall be marked with the CENELEC code H05Z-U. The marking shall comply with Clause 6 of EN 50525-1.

4.3.2 Requirements

Each cable shall comply with the appropriate requirements given in EN 50525-1, and the particular requirements of this Part.

Testing shall be in accordance with Annex A, and the relevant tests indicated in column 8.

The dimensions of the cables shall conform to Table B.3 for the relevant size.

When tested in accordance with the method and procedure given in EN 61034-2, all sizes of cable shall exceed 60 % light transmittance throughout the test.

4.4 Cables for internal wiring – H05Z-K

4.4.1 Construction

4.4.1.1 Conductor

The conductor shall be class 5, according to EN 60228.

4.4.1.2 Sizes of cable

The sizes of cable shall be 0,5 mm² to 1 mm².

4.4.1.3 Insulation

The insulation shall be a polyolefin cross-linked material of Type EI 5 to EN 50363-5 applied around the conductor.

4.4.1.4 Marking

The cable shall be marked with the CENELEC code H05Z-K. The marking shall comply with Clause 6 of EN 50525-1.

4.4.2 Requirements

Each cable shall comply with the appropriate requirements given in EN 50525-1, and the particular requirements of this Part.

Testing shall be in accordance with Annex A, and the relevant tests indicated in column 9.

The dimensions of the cables shall conform to Table B.4 for the relevant size.

When tested in accordance with the method and procedure given in EN 61034-2, all sizes of cable shall exceed 60 % light transmittance throughout the test.

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Annex A
(normative)

Tests for cables to EN 50525-3-41

Table A.1

1	2	3	4	5	6	7	8	9
Ref No.	Tests ^a	Category of test	Test method described in		Applicability of test – Subclause			
			EN 50525-1	(Sub)clause	4.1	4.2	4.3	4.4
					H07Z-U H07Z-R	H07Z-k	H05Z-U	H05Z-K
1	Electrical tests ^b							
1.1	Resistance of conductors	T, S	50395	5	X	X	X	X
1.2.1	Voltage test at 2 500 V	T, S	50395	6	X	X	-	-
1.2.2	Voltage test at 2 000 V	T, S	50395	6	-	-	X	X
1.3	Insulation resistance at 90 °C	T	50395	8.1	X	X	X	X
1.4	Absence of faults in insulation	R	50395	10	X	X	X	X
2	Constructional and dimensional tests							
2.1	Checking of compliance with constructional provisions	T, S	50525-1	Inspection and manual tests	X	X	X	X
2.2	Measurement of thickness of insulation	T, S	50396	4.1	X	X	X	X
2.3	Measurement of overall diameter	T, S	50396	4.4	X	X	X	X
3	Insulation material tests	T	50363-5 ^c	-	X	X	X	X
4	Impact test at - 5 °C	T	60811-1-4	8.5	X	X	X	X
5	Tests under fire conditions							
5.1	Test on single vertical cable	T	60332-1-2	-	X	X	X	X
5.2	Smoke emission	T	61034-2	-	X	X	X	X
6	Assessment of halogens for all non-metallic materials	T, S	50525-1	Annex B	X	X	X	X

^a The order given does not imply a sequence of testing.

^b Particular test conditions and requirements are given in Table 1 of EN 50525-1.

^c This EN includes all the test methods and requirements for the material. Material to be tested is taken from the finished cable.

Annex B
(normative)

General data

NOTE 1 The overall dimensions of cables have been calculated in accordance with EN 60719.

NOTE 2 Cables designated "-U" have class 1 conductors, "-R" have class 2 conductors and "-L" have class 5 conductors.

Table B.1 – Cables with rigid conductor (450/750 V)

1 Nominal cross-sectional area of conductors mm ²	2 Class of conductor (EN 60228)	3 Thickness of insulation Specified value mm	4 Mean overall diameter		6 Minimum insulation resistance at 90 °C MΩ.km
			Lower limit mm	Upper limit mm	
			1,5	1	
2,5	1	0,8	3,2	4,0	0,010
4	1	0,8	3,6	4,6	0,008 5
6	1	0,8	4,1	5,2	0,007 0
10	1	1,0	5,3	6,6	0,007 0
1,5	2	0,7	2,7	3,4	0,010
2,5	2	0,8	3,3	4,1	0,009
4	2	0,8	3,8	4,7	0,007 7
6	2	0,8	4,3	5,4	0,006 5
10	2	1,0	5,6	7,0	0,006 5
16	2	1,0	6,4	8,0	0,005 0
25	2	1,2	8,1	10,1	0,005 0
35	2	1,2	9,0	11,3	0,004 3
50	2	1,4	10,6	13,2	0,004 3
70	2	1,4	12,1	15,1	0,003 5
95	2	1,6	14,1	17,6	0,003 5
120	2	1,6	15,6	19,4	0,003 2
150	2	1,8	17,3	21,6	0,003 2
185	2	2,0	19,3	24,1	0,003 2
240	2	2,2	22,0	27,5	0,003 2
300	2	2,4	24,5	30,6	0,003 0
400	2	2,6	27,5	34,3	0,002 8
500	2	2,8	30,5	38,2	0,002 8
630	2	2,8	34,0	42,5	0,002 5

Table B.2 – Cables with flexible conductor (450/750 V)

1	2	3	4	5
Nominal cross-sectional area of conductors (Class 5) mm ²	Thickness of insulation Specified value mm	Mean overall diameter		Minimum insulation resistance at 90 °C MΩ.km
		Lower limit mm	Upper limit mm	
1,5	0,7	2,8	3,5	0,010
2,5	0,8	3,4		0,009
4	0,8	3,9	4,9	0,007
6	0,8	4,4	5,5	0,006
10	1,0	5,7	7,1	0,005 6
16	1,0	6,7	8,4	0,004 6
25	1,2	8,4	10,6	0,004 4
35	1,2	9,7	12,1	0,003 8
50	1,4	11,5	14,4	0,003 7
70	1,4	13,2	16,6	0,003 2
95	1,6	15,1	18,8	0,003 2
120	1,6	16,7	20,9	0,002 9
150	1,8	18,6	23,3	0,002 9
185	2,0	20,6	25,8	0,002 9
240	2,2	23,5	29,4	0,002 8

Table B.3 – Cables with rigid conductor (300/500 V)

1	2	3	4	5
Nominal cross sectional area of conductor (Class 1) mm ²	Thickness of insulation specified value mm	Mean overall diameter		Minimum insulation resistance at 90 °C MΩ.km
		Lower limit mm	Upper limit mm	
0,5	0,6	1,9	2,4	0,015
0,75	0,6	2,1	2,6	0,012
1,0	0,6	2,2	2,8	0,011

Table B.4 – Cables with flexible conductor (300/500 V)

1	2	3	4	5
Nominal cross sectional area of conductor (Class 5) mm ²	Thickness of insulation specified value mm	Mean overall diameter		Minimum insulation resistance at 90 °C MΩ.km
		Lower limit mm	Upper limit mm	
0,5	0,6	2,1	2,6	0,013
0,75	0,6	2,2	2,8	0,011
1,0	0,6	2,4	2,9	0,010

Bibliography

- EN 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 60719)
- HD 516 Guide to use of low voltage harmonized cables

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National Annex (informative) Origins and identification of the particular cable types

As an aid to users, the table below shows, in respect of BS EN 50525-3-41:

- the identification of the particular cable types from BS 7211 that are now included in BS EN 50525-3-41;
- the location of the cables within BS EN 50525-3-41;
- any applicable United Kingdom and CENELEC cable codings (see also National Informative Annex B to BS EN 50525-1).

Pre-existing BS		Clause in BS EN 50525-3-41	Cable type – Coding	
Number	Table		United Kingdom (if applicable)	CENELEC
BS 7211	3a)	4.1	6491B	H07Z-U
			6491B	H07Z-R
BS 7211	3b)	4.2	6491B	H07Z-K
BS 7211	4a)	4.3	2491B	H05Z-U
BS 7211	4b)	4.4	2491B	H05Z-K

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