HARMONIZATION DOCUMENT HD 22.1 S2/A19

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ICS 29.060.20

Descriptors: See HD 22.1 S2:1992

English version

Rubber insulated cables of rated voltages up to and including 450/750 V Part 1: General requirements

Conducteurs et câbles isolés au caoutchouc, de tension assignée au plus égale à 450/750 V
Partie 1: Prescriptions générales

Isolierte Starkstromleitungen mit einer Isolierung aus Gummi mit Nennspannungen bis 450/750 V
Teil 1: Allgemeine Anforderungen

This amendment A19 modifies the Harmonization Document HD 22.1 S2:1992; it was approved by CENELEC on 1995-05-15. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for implementation of this amendment on a national level.

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

This amendment exists in three official versions (English, French, German).

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CENELEC

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

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Ref. No. HD 22.1 S2:1992/A19:1995 E

Foreword

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

The text of the draft was submitted to the Unique Acceptance Procedure and was approved by CENELEC as amendment A19 to HD 22.1 S2:1992 on 1995-05-15.

The following dates were fixed:

– latest date by which the existence of the amendment has to be announced at national level	(doa)	1996-01-01
– latest date by which the amendment has to be implemented at national level by publication of a harmonized national standard or by endorsement	(dop)	1996-07-01
– latest date by which the national standards conflicting with the amendment have to be withdrawn	(dow)	1996-07-01

For products which have complied with HD 22.1 S2:1992 and its amendments A11:1992 to A18:1995 before 1996-07-01, as shown by the manufacturer or by a certification body, this previous standard may continue to apply for production until 1997-07-01.

Sub-clause 5.2.1

Insert new lines:

Type EI 8 for flexible cables insulated with polyolefin-based cross-linked compound having a low level of emission of corrosive gases. 70°C for compound EI 8.

Table 1

Requirements for the non electrical test for vulcanised rubber insulation

Insert new column for EI 8 as attached.

Sub-clause 5.5.1

Insert new lines:

Type EM 8 for flexible cables sheathed with polyolefin-based cross-linked compound, having a low level of emission of corrosive gases.

Table II

Requirements for the non electrical test for vulcanised rubber sheath

Insert new column for EM 8 as attached.

Table III

Add new ref. no. 5 'Long term resistance of insulation to direct current' as attached.

TABLE I

Requirements for the non-electrical tests for vulcanised rubber insulation

1	2	3	4	5	6
Ref. No.	Tests	Unit	Type of compound EI8	Test method described in	
				HD	Clause
	Maximum rated conductor temperatures	°C	70		
1.	Tensile strength and elongation at break				
1.1	Properties in the state as delivered			505.1.1	9.1
1.1.1	Value to be obtained for the tensile strength: - median, min.	N/mm²	5.0		
1.1.2	Value to be obtained for the elongation at break: - median, min.	%	125		
1.2	Properties after ageing in air oven			505.1.2	8.1.3.2a
1.2.1	Ageing conditions: (2)(4) - temperature - duration of treatment	°C h	110 ± 2 7 x 24		
1.2.2	Value to be obtained for the tensile strength: - median, min. - variation (1), max.	N/mm² %	- -30 (3)		
1.2.3	Value to be obtained for the elongation: - median, min. - variation (1), max.	% %	125 ±30		
1.3	(Spare)				
1.4	(Spare)				

TABLE I
(continued)

1	2	3	4	5	6
Ref. No.	Tests	Unit	Type of compound EI8	Test method described in	
				HD	Clause
	Maximum rated conductor temperature	°C	70		
1.5	Properties after ageing in the air bomb		n/a	505.1.2	8.2
1.5.1	Ageing Conditions (4)				
	- temperature	°C			
	- duration of treatment	h			
1.5.2	Value to be obtained for the tensile strength:				
	- median, min.	N/mm²			
	- variation, (1) max.	%			
1.5.3	Value to be obtained for the elongation at break				
	- median, min.	%			
	- variation, max.	%			
2.	Hot set test			505.2.1	9
2.1	Conditions of treatment				
	- temperature	°C	200 ± 3		
	- time under load	min.	15		
	- mechanical stress	N/cm²	20		
2.2	Test requirements				
	- max. elongation under load	%	100		
	- max. elongation under unloading	%	25		
3.	(Spare)				
4.	Ozone resistance test				
4.1	Method A				
	Test conditions			505.2.1	8
	- test temperature	°C	25 ± 2		
	- test duration	h	24		
	- ozone concentration	ppm	250 to 300		
4.2	Method B				
	Test conditions			22.2	7
	- test temperature	°C	40 ± 2		
	- test duration	h	72		
	- ozone concentration	pphm	200 ± 50		
5.	Low temperature tests		n/a	505.1.4	8.1
5.1	Bending test				
5.1.1	Test conditions				
	- temperature	°C			
	- period of application of low temperature			see 505.1.4 sub-clause 8.1.4 and 8.1.5	
5.1.2	Result to be obtained				

TABLE I
(concluded)

1	2	3	4	5	6
Ref. No.	Tests	Unit	Type of compound EI8	Test method described in	
				HD	Clause
	Maximum rated conductor temperature	°C	70		
5.2	Elongation test			505.1.4	8.3
5.2.1	Test conditions				
	- temperature	°C			
	- period of application of low temperature			see 505.1.4 sub-clause 8.3.4 and 8.3.5	
5.2.2	Results to be obtained:				
	- elongation without break, minimum	%			
6.	(Spare)				
7.	Compatibility test(6)				
7.1	Ageing conditions			505.1.2	8.1.4
	- temperature	°C	80 ± 2		
	- duration of treatment	h	7x24		
7.2	Value to be obtained for the tensile strength				
	- median, min.	N/mm²	-		
	- variation (1) max.	%	-30 (3)		
7.3	Value to be obtained for the elongation at break				
	- median, min.		125		
	- variation (1) max.	%	±30		

NOTES

(1) Variation is the difference between the median value after ageing and the median value without ageing, expressed as a percentage of the latter.

(2) Unless otherwise specified in the relevant cable specifications a rotating fan inside the oven is normally permissible when testing rubber compounds. However, in case of dispute, ageing shall be carried out in an oven which is designed to operate without a fan rotating inside it.

(3) No limit for the positive tolerance.

(4) Ageing of Types EI4 and EI7 shall be carried out with the conductor in place; if it is expected that the conductors cannot be removed after ageing without damaging the insulation, then the ageing test shall be carried out with at least 70% of the conductor strands in place.

(6) The compatibility test applies only where specified in the particular cable standard.

TABLE II

Requirements for the non-electrical test for vulcanised rubber sheath

1	2	3	4	5	6
Ref. No.	Test	Unit	Type of compound	Test method described in	
			EM8	HD	Clause
1.	Tensile strength and elongation at break				
1.1	Properties in the state as delivered			505.1.1	9.2
1.1.1	Values to be obtained for the tensile strength: - median, min.	N/mm²	7.0		
1.1.2	Values to be obtained for the elongation at break: - median, min.	%	125		
1.2	Properties after ageing in air oven			505.1.2	8.1.3.1
1.2.1	Ageing conditions: (3) - temperature - duration of treatment	°C h	100±2 7x24		
1.2.2	Value to be obtained for the tensile strength: - median, min. - variation (2) max.	N/mm² %	- -30 (1)		
1.2.3	Values to be obtained for the elongation at break: - median, min. - variation (2) max.	% %	100 ±30		
1.2.4	Continued Ageing Conditions: - temperature - total duration of treatment	°C h	n/a		
1.2.5	Values to be obtained for the tensile strength: - variation (4) max.	%			
1.2.6	Values to be obtained for the elongation at break: - variation (4) max.	%			
1.3	Mechanical properties after immersion in mineral oil			505.2.1	10
1.3.1	Test conditions - temperature of oil - duration of immersion in oil	°C h	100±2 24		
1.3.2	Values to be obtained for the tensile strength - variation (2) max.	%	±40		
1.3.3	Values to be obtained for the elongation at break - variation (2) max.	%	±40		

TABLE II
(continued)

1	2	3	4	5	6
Ref. No.	Test	Unit	Type of compound	Test Method described in	
			EM8	HD	Clause
2.	Hot set test			505.2.1	9
2.1	Conditions of treatment				
	- temperature	°C	200 ± 3		
	- time under load	min.	15		
	- mechanical stress	N/cm²	20		
2.2	Test requirements				
	- max. elongation under load	%	100		
	- max. elongation after unloading	%	25		
3.	Bending test at low temperature			505.1.4	8.2
3.1	Test conditions:				
	- temperature	°C	-15 ± 2		
	- period of application of low temperature		See HD505.1.4 Sub-clause 8.2.3		
3.2	Result to be obtained		Absence of cracks		
4.	Elongation test at low temperature			505.1.4	8.4
4.1	Test conditions				
	- temperature	°C	-15 ± 2		
	- period of application of low temperature		See HD505.1.4 Sub-clauses 8.4.4 and 8.4.5		
4.2	Result to be obtained				
	- elongation without break, min.	%	30		
5.	Impact test at low temperature			505.1.4	8.5
5.1	Test conditions				
	- temperature	°C	-15 ± 2		
	- period of application of low temperature	h	See cols 5/6	505.1.4	8.5.5
	- mass of hammer		See cols 5/6	505.1.4	8.5.4
5.2	Result to be obtained		See cols 5/6	505.1.4	8.5.6
6.	Ozone resistance test			505.2.1	8
6.1	Method A				
	Test conditions				
	- temperature	°C	25 ± 2		
	- duration	h	24		
	- ozone concentration	ppm	250-300		
				22.2	7
6.2	Method B				
	Test conditions				
	- temperature	°C	40 ± 2		
	- duration	h	72		
	- ozone concentration	pphm	200 ± 50		
7.	(Spare)				

TABLE II
(concluded)

1	2	3	4	5	6
Ref. No.	Test	Unit	Type of compound	Test Method described in	
			EM8	HD	Clause
8.	Compatibility test (5)			505.1.2	8.1.4
8.1	Ageing conditions				
	- temperature	°C	80±2		
	- duration of treatment	h	7x24		
8.2	Value to be obtained for the tensile strength				
	- median, min.	N/mm²	-		
	- variation (2) max.	%	-30 (1)		
8.3	Value to be obtained for the elongation at break				
	- median, min.		100		
	- variation (2) max.	%	±30		

(1) No limit for the positive tolerance.
(2) Variation is the difference between the median value after ageing and the median value without ageing, expressed as a percentage of the latter.
(3) Unless otherwise specified in the relevant cable specifications a rotating fan inside the oven is normally permissible when testing rubber compounds. However, in case of dispute, ageing shall be carried out in an oven which is designed to operate without a fan rotating inside it.
(4) Variation in this case is the difference between the median value after ageing for 10 days and the median value after ageing for three days expressed as a percentage of the latter.
(5) The compatibility test applies only where specified in the particular cable standard.

Table III

Requirements for electrical tests for vulcanised rubber insulated cables

1	2	3	4	5	6	7
Ref. No.	Test	Unit	Rated voltage of cables		Test method described in	
			300/500V	450/750V	HD	Clause
5.	Long term resistance of insulation to direct current				22.2	2.5
5.1	Test conditions:					
	- length of sample	m		5		
	- duration of test	h		240		
	- water temperature	°C		60		
	- d.c. voltage applied	V		220		
5.2	Results to be obtained			No break-down and no damage to the surface		