
Komunikacijski kabli - 2-33. del: Skupna pravila načrtovanja in konstrukcija - Polietilenska izolacija za večelementne kovinske podatkovne kable za notranjo uporabo

Communication cables - Part 2-33: Common design rules and construction - Polyethylene insulation for multi element metallic data cables for indoor application

Kommunikationskabel - Teil 2-33: Gemeinsame Regeln für Entwicklung und Konstruktion - Polyethylen-Isoliermischungen für mehradrige metallische Datenkabel zur Anwendung im Innenbereich

Câbles de communication - Partie 2-33: Règles de conception communes et construction - Pe pour enveloppes isolantes pour des câbles métalliques multi éléments pour utilisation intérieure

Ta slovenski standard je istoveten z: EN 50290-2-33:2016

ICS:

29.035.20	Plastični in gumeni izolacijski materiali	Plastics and rubber insulating materials
33.120.10	Koaksialni kabli. Valovodi	Coaxial cables. Waveguides

SIST EN 50290-2-33:2016 en

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EUROPEAN STANDARD

EN 50290-2-33

NORME EUROPÉENNE

EUROPÄISCHE NORM

May 2016

ICS 33.120.10

English Version

Communication cables - Part 2-33: Common design rules and construction - Polyethylene insulation compounds for multi element metallic cables for indoor installation (data cable)

Câbles de communication - Partie 2-33: Règles de conception communes et construction - Pe pour enveloppes isolantes pour des câbles métalliques multi éléments pour utilisation intérieure

Kommunikationskabel - Teil 2-33: Gemeinsame Regeln für Entwicklung und Konstruktion - Polyethylen-Isoliermischungen für mehradrige metallische Kabel zur Anwendung im Innenbereich (Datenkabel)

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Comité Européen de Normalisation Electrotechnique
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EN 50290-2-33:2016 (E)

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European foreword

This document (EN 50290-2-33:2016) has been prepared by CLC/TC 46X "Communication cables".

The following dates are fixed:

- latest date by which this document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2017-03-14
- latest date by which the national standards conflicting with this document have to be withdrawn (dow) 2019-03-14

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EN 50290-2-33:2016 (E)

1 Scope

This Part 2-33 of EN 50290 gives specific requirements for Polyethylene (PE) compounds to be used for multi element metallic data cables for indoor application. The standard includes Low Density (LD), Medium Density (MD) and High Density (HD) Polyethylene compounds.

It is to be read in conjunction with EN 50290-2-20, the product standard EN 50288 and other applicable product standards.

Using compound and type test data as outlined in this standard, the compound supplier will have sufficient data to demonstrate compliance and warrant that the material is suitable for the specified application.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 50289-3-17, *Communication cables - Specifications for test methods - Part 3-17: Mechanical test methods - Adhesion of dielectric and sheath*

EN 50290-2-20, *Communication cables - Part 2-20: Common design rules and construction - General*

EN 60216 (all parts), *Electrical insulating materials – Thermal endurance properties (IEC 60216)*

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

<https://standards.iteh.ai/catalog/standards/sist/ebb3d7d4-7e8c-4f65-a278-8a00e2aca793/sist-en-50290-2-33-2016>

EN 60811-401, *Electric and optical fibre cables - Test methods for non-metallic materials - Part 401: Miscellaneous tests - Thermal ageing methods - Ageing in an air oven (IEC 60811-401)*

EN 60811-501, *Electric and optical fibre cables - Test methods for non-metallic materials - Part 501: Mechanical tests - Tests for determining the mechanical properties of insulating and sheathing compounds (IEC 60811-501)*

EN 60811-502, *Electric and optical fibre cables - Test methods for non-metallic materials - Part 502: Mechanical tests - Shrinkage test for insulations (IEC 60811-502)*

EN 60811-510, *Electric and optical fibre cables - Test methods for non-metallic materials - Part 510: Mechanical tests - Methods specific to polyethylene and polypropylene compounds - Wrapping test after thermal ageing in air (IEC 60811-510)*

EN ISO 527 (all parts), *Plastics – Determination of tensile properties (ISO 527)*

EN ISO 868, *Plastics and ebonite - Determination of indentation hardness by means of a durometer (Shore hardness) (ISO 868:2003)*

EN ISO 1133 (all parts), *Plastics – Determination of the melt mass-flow rate (MFR) and the melt volume-flow rate (MVR) of thermoplastics (ISO 1133)*

EN ISO 1183 (all parts), *Plastics – Methods for determining the density of non-cellular plastics (ISO 1183)*

EN ISO 11357-6, *Plastics - Differential scanning calorimetry (DSC) - Part 6: Determination of oxidation induction time (isothermal OIT) and oxidation induction temperature (dynamic OIT) (ISO 11357-6)*

ISO 974, *Plastics — Determination of the brittleness temperature by impact*

3 Raw material requirements

The tests are to be carried out on granules or moulded plaques produced from granules of compound. This data shall be provided by the compound supplier. For compounds intended for foam application the properties shall be measured on unexpanded compound or base polymer without blowing agent. Relevant test methods, requirements and limits shall be included in any supply specification of the compound.

Specific requirements are shown in Table 1, Table 2 and Table 3. In the case of special applications, additional requirements could be specified.

4 Cable test requirements

The anticipated performance assumes standard cable design and conventional process technology and is specified (Table 4). Using type test data the compound supplier is expected to demonstrate compliance and warrant that the material is suitable for the specified application.

In the case of special applications, additional requirements could be specified.

5 Health, Safety and Environmental Regulations

The compounds are subject to Health, Safety and Environmental requirements as defined in EN 50290-2-20. Any deviations or compliance failures shall be identified by the compound supplier and necessary corrective actions agreed with the cable maker.

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Table 1 – Insulation compound - physical properties of granules

Characteristics ¹⁾		Test method	Unit	Solid		Foam
				LD/MD	HD	
1	Density ²⁾	EN ISO 1183	g/cm ₃	≤ 0,940	> 0,940	> 0,940
2a	Melt flow index ³⁾ (190 °C/2,16 kg)	EN ISO 1133	g/10 min	≤ 0,5 ≤ 2,5 ⁴⁾	≤ 1,0	≤ 1,0 ⁵⁾
2b	Melt flow index ³⁾ (140 °C/5,0 kg)	EN ISO 1133	g/10 min			To be recorded ⁶⁾
3	Hardness Shore D ⁷⁾ (1 s)	EN ISO 868	[-]	> 50	> 58	> 58
4	Low Temperature brittleness	ISO 974	°C	< -76	< -76	< -76
5	Mechanical characteristics	EN ISO 527				
5.1	Tensile strength- median, min.		MPa	12	18	12
5.2	Elongation at break- median, min.		%	300	300	300
6	Oxidative Induction Time (200 °C)	EN ISO 11357-6	min	> 30	> 30	> 30

1) All values of Table 1 shall be provided by the compound supplier, see Clause 3.

2) Median; value limits ± 0,003 g/cm³.

3) Median; value limits ± 25 %.

4) For LLDPE or MDPE.

5) PE (non nucleated or passive nucleant). [SIST EN 50290-2-33:2016](https://standards.iteh.ai/catalog/standards/sist/ebb3d7d4-7e8c-4f65-a278-8a0f0e2aed19/sist-en-50290-2-33-2016)

6) PE (active nucleant). <https://standards.iteh.ai/catalog/standards/sist/ebb3d7d4-7e8c-4f65-a278-8a0f0e2aed19/sist-en-50290-2-33-2016>

7) Median value to be specified by supplier. Specification limits ± 3[-].

Table 2 – Insulation compound - dielectric properties

Characteristics ¹⁾		Test method	Unit	Solid		Foam
				LD/MD	HD	
1	Dielectric constant (f1), 1MHz ^{2,4)}	IEC 60250	[-]	≤ 2,35	≤ 2,35	≤ 2,35
2	Dissipation factor (f1), 1MHz ^{3,4)}	IEC 60250	[-]	< 0,000 3	< 0,000 3	< 0,000 3

1) All values of Table 2 shall be provided by the compound supplier, see Clause 3.

2) Median value to be specified by supplier. Specification limits ± 0,02.

3) Median value to be specified by supplier. Specification limits ± 10 %.

4) Alternative frequencies maybe used. Frequency (f1) should be in range 1–10 MHz.

Table 3 – Insulation compound - combustion properties¹⁾

Characteristics ²⁾		Test method	Unit	Values
1	Acidity pH Conductivity	EN 60754–2	[–] µS/mm	> 4,3 < 10
2	Toxicity	Under consideration		

1) To be performed if specified in the relevant product standard.
2) All values of Table 3 shall be provided by the compound supplier, see Clause 3.

Table 4 – Wire insulation properties

Characteristics	Test method	Unit	Solid		Foam ¹⁾	
			LD/MD	HD		
1	Maximum rated temperature of cable for which the compound can be used	EN 60216 ²⁾	° C	70	80	70
2a	Mechanical characteristics ³⁾	EN 60811–501				
2.1	Tensile strength- median,min.		MPa	10	18	3,5
2.2	Elongation at break- median,min.		%	300	300	125
3	Thermal ageing - temperature - duration	EN 60811–401	° C h	100 ± 2 7 × 24	100 ± 2 7 × 24	100 ± 2 7 × 24
3a	Elongation at break after ageing ³⁾ Result to be obtained- median,min.	EN 60811–501	%	300	300	125
or 3b	Wrapping after ageing - test temperature - duration Result to be obtained	EN 60811–510	° C h	100 ± 2 14 × 24 No crack	100 ± 2 14 × 24 No crack	100 ± 2 14 × 24 No crack
4	Shrinkage - temperature - duration Result to be obtained- max.	EN 60811–502	° C h %	100 ± 2 1 5	100 ± 2 1 5	100 ± 2 1 5
5	Strip force ^{4, 5)}	EN 50289–3-17	N	> 5	> 5	n.a.

1) Includes Foam skin.

2) Informative. Any procedure based on the Arrhenius principals which can predict a greater than 20 000 h life expectancy at the indicated temperature. See EN 50290–2-20 for guidance.

3) If elongation at break cannot be done(i.e. if the insulation cannot be removed from the conductor without damage), wrapping test according to EN 60811–510 shall be performed.

4) Conductor skin permitted if needed to achieve required result.

5) Test length (L) = 25mm unless otherwise specified in cable product standard