



SLOVENSKI STANDARD
SIST HD 586.1 S1:1998

01-februar-1998

Mineral insulated cables with a rated voltage not exceeding 750 V - Part 1: Cables

Mineral insulated cables with a rated voltage not exceeding 750 V -- Part 1: Cables

Mineralisierte Leitungen mit einer Nennspannung bis 750 V -- Teil 1: Leitungen

Câbles à isolant minéral de tension assignée ne dépassant pas 750 V -- Partie 1:
Câbles

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Ta slovenski standard je istoveten z: HD 586.1 S1:1994

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HARMONIZATION DOCUMENT

HD 586.1 S1

DOCUMENT D'HARMONISATION

HARMONISIERUNGSDOKUMENT

January 1994

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Descriptors: Electric installation, insulated conductor, insulated cable,
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REPUBLIKA SLOVENIJA

ENGLISH VERSION

MINISTRSTVO ZA ZNANOST IN TEHNOLOGIJO

Urad RS za standardizacijo in meroslovlje Mineral insulated cables with a rated voltage not
LJUBLJANA exceeding 750 V

SIST. HD 586.1 S1 Part 1: Cables

PREVZET PO METODI RAZGLASITVE

-02- 1998

Câbles à isolant minéral, de
tension assignée ne dépassant
pas 750 V
Partie 1: Câbles

Mineralisolierte Leitungen mit
einer Nennspannung bis 750 V
Teil 1: Leitungen

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may be obtained on application to the Central Secretariat or to any CENELEC member.

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

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Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

CENELEC

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

Central Secretariat: rue de Stassart 35, B-1050 Brussels

FOREWORD

This Harmonization Document was prepared by CENELEC Technical Committee TC 20, Electric Cables.

The text of the draft was submitted to the CENELEC Unique Acceptance Procedure (UAP) in January 1993 and was approved by CENELEC as HD 586.1 S1 on 22 September 1993.

The following dates were fixed:

- latest date of announcement
of the HD at national level (doa) 1994-02-01
- latest date of publication of
a harmonized national standard (dop) 1994-08-01
- latest date of withdrawal of
conflicting national standards (dow) 1994-08-01

For products which have complied with the relevant national standard before 1994-08-01, as shown by the manufacturer or by a certification body, this previous standard may continue to apply for production until 1995-08-01.

NOTE: Requirements for terminations for use with the cables described in this Part 1 of HD 586 are given in Part 2: Terminations.

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NORMATIVE REFERENCES

References are made, in this HD 586.1 to other Harmonisation Documents and International Standards as follows:

- HD21 Polyvinyl chloride insulated cables of voltages up to and including 450/750V
- HD405.1 Tests on Electric Cables Under Fire Conditions. Part 1: Test on a single vertical cable (Endorsing IEC 332-1)
- HD505 Common test methods for insulating and sheathing materials of Electric Cables (Endorsing IEC 811)
- HD602 Test on gases evolved during combustion of materials from cables: Determination of Degree Acidity (Corrosivity) of gases by measuring pH and conductivity (Endorsing IEC 754-2)
- HD606 Measurement of smoke density of electric cables burning under defined conditions (Endorsing IEC 1034)
- IEC331 Fire resisting characteristics of electric cables.



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Appendix A - Test Methods for Type and Sample Tests
Appendix B - Test Methods for Routine Tests

Tables 1-11

Figures 1-2

MINERAL INSULATED CABLES WITH A RATED VOLTAGE NOT EXCEEDING 750V

1. Scope

This standard applies to mineral insulated general wiring cables with copper sheath and copper conductors with rated voltages up to 750V. Provision is made for a corrosion resistant outer covering over the sheath, when required. This outer covering is not specified for the purposes of electrical insulation of the metal sheath.

2. Object

The object of this standard is to specify mineral insulated cables that are safe and reliable when properly used, to state the manufacturing requirements and characteristics to achieve this, and to specify methods for checking conformity with those requirements.

3. Voltage Rating

Cables shall be rated as follows:

3.1 500V mineral insulated cable (light duty grade)

For use where the voltage between conductors and sheath and between conductors does not exceed 500V r.m.s. or 500V d.c.

3.2 750V mineral insulated cable (heavy duty grade)

For use where the voltage between conductors and sheath and between conductors does not exceed 750V r.m.s. or 750V d.c.

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4. Conductors

4.1 Material and Form

Conductors shall be of plain, annealed high conductivity copper. The cross section shall be approximately circular.

4.2 Resistance

The resistance of all conductors of each finished cable, corrected if necessary to 20°C shall not be greater than the appropriate values given in Tables 1 and 2.

Compliance shall be checked by measuring the resistance of each conductor of each complete coil of completed cable and measuring the length of the cable.

If necessary, correction to 20°C and to a length of 1km shall be made by applying the formula:

$$R_{20} = R_t \times \frac{254.5}{234.5 + t} \times \frac{1000}{L}$$

in which:

- t is the temperature of the cable at the time of measurement in °C
 R₂₀ is the resistance at 20°C, in Ohms per kilometre
 L is the length of the cable in metres
 R_t is the resistance in Ohms of L metres of cable at t°C

The resistance measurement also checks the continuity of the conductors.

5. Insulation

5.1 Material

The insulation shall be of compressed powdered mineral or minerals which form a compact body.

5.2 Resistance

The product of the insulation resistance in megohms, measured in accordance with appendix B1, and the cable length in kilometres shall be not less than 1000MΩ.km except for cable lengths shorter than 100m when the measured insulation resistance shall be not less than 10000 MΩ.

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5.3 Thickness

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The minimum thickness of insulation between conductors and between each conductor and the sheath, measured in accordance with appendix A1, shall not be less than the nominal thickness given in Tables 1 and 2 by more than 0.1mm plus 20% of the nominal value.

5.4 Dielectric Strength

The dielectric strength shall be such that no breakdown of the insulation occurs when samples of finished cables are tested in accordance with Appendix A2, using the appropriate test voltage.

6. Sheath

6.1 Material

The sheath shall be of plain or alloyed annealed copper.

6.2 Thickness

The mean sheath thickness in accordance with Appendix A3 shall be not less than the appropriate value given in Tables 3 and 4. The minimum sheath thickness shall be not less than 90% of the specified mean value.

6.3 Integrity

The sheath integrity shall be such that the insulation resistance shall comply with 5.2 and no electrical breakdown shall occur when finished cables are tested in accordance with Appendix B3, using the appropriate test voltage.

6.4 Diameter over copper sheath

The diameter of the cable over the copper sheath measured in accordance with Appendix B2 shall comply with the appropriate values given in Tables 1 and 2 ± 0.05 mm.

6.5 Electrical Resistance

The electrical resistance of the copper sheath of samples of finished cables shall not be greater than the appropriate maximum values given in Tables 5 and 6.

7. Outer Covering

7.1 General

A thermoplastic or other covering may be applied over the copper sheath for corrosion protection, identification or aesthetic appeal. This covering may be of any colour appropriate for the country of use.

7.2 Material

The material shall be such that it shall comply with all the requirements given below. In addition optional extra requirements for cables which produce low corrosive gas emission, and low smoke emission under fire conditions are given in 7.3.

7.2.1

Thickness

The mean and minimum outer covering thickness determined in accordance with Appendix A4 shall be not less than the appropriate values given in Table 7.

7.2.2

Integrity

No fault shall be detected when the cable, complete with outer covering, is spark tested in accordance with Appendix B4, using the test voltage given in Table 7 based on mean thickness of the outer covering.

7.2.3

Low Temperature Impact

When samples of cable with outer covering are tested in accordance with Clause 8.5 of HD 505.1.4 S1, the samples shall not crack at a temperature of $-15 \pm 2^\circ\text{C}$.

7.2.4

Heat shock

When samples of cable with outer covering are tested in accordance with Clause 9.2 of HD505.3.1 S1, the samples shall not crack at a temperature of $150 \pm 3^\circ\text{C}$.

7.2.5 Performance under Fire Conditions

When a cable with an outer covering is tested in accordance with HD405.1 S1, the charred or affected portion shall not reach within 50mm of the top clamp.

7.3 Optional Performance Requirements under Fire Conditions

7.3.1 Emission of acidic and corrosive gases

When samples of covering material removed from finished cables designated as having low emission of corrosive gases are tested in accordance with HD602 S1, the pH shall not be less than 4.3 and the conductivity shall not be greater than 10 μ s/mm.

7.3.2 Low Smoke emission

When samples of finished cables designated as having low smoke emission under fire conditions are tested in accordance with HD606.2 S1, the smoke produced shall be such that the light transmittance meets the requirements given in Table 8. The sample requirements shall be in accordance with Table 8.

8. Complete Cable

8.1 Bending

Cable samples shall withstand applied voltages of 750V for 500V grade cable and 1250V for 750V grade cable after bending tests are carried out in accordance with appendix A5 with the mandrel diameter given in Table 9.

8.2 Flattening <https://standards.iteh.ai/catalog/standards/sist/01b4e9c1-568a-4458-b5fc-4e7484e64a11/sist-hd-586-1-s1-1998>

Cable samples shall withstand applied voltages of 750V for 500V cable and 1250V for 750V grade cable after flattening tests are carried out in accordance with Appendix A6 and the flattening factors in Table 10.

8.3 Fire Resistance

Completed cables shall comply with the requirements of IEC Publication 331.

8.4 Voltage

No breakdown shall occur when cables are tested in accordance with Appendix A7.

9. Marking

All cable shall be identified with the rated voltage and a means of identifying the manufacturer. Marking shall comply with the requirements of HD21.1 S2 Clause 3 except that for cable without an outer covering the information may be marked on a label attached to each length of cable.

10. Cable Tests

10.1 General

The following three categories of test are used in this standard.

10.1.1 Type Tests (T)

Tests required to be made before supplying a type of cable covered by this standard on a general commercial basis, in order to demonstrate satisfactory performance characteristics to meet the intended application. These tests are of such a nature that, after they have been made, they need not be repeated unless changes are made in the cable materials or design which might change the performance characteristics.

10.1.2 Sample Tests (S)

Tests made on samples of completed cable, or components taken from a completed cable adequate to verify that the finished product meets the design specifications.

10.1.3 Routine Tests (R)

Tests made on all completed lengths of cable or as appropriate during manufacturing.

Table 11 lists the range of tests applicable to the cables covered by this standard.

10.2 Test conditions**10.2.1 Test Temperatures**

Unless otherwise specified tests shall be made at an ambient temperature of $20 \pm 15^\circ\text{C}$. (standards.iteh.ai)

10.2.2 Test Voltage

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Unless otherwise specified test voltages shall be either a.c. 49Hz to 61Hz of approximately sine wave form, the ratio peak value/r.m.s. value being equal to $\sqrt{2}$ with a tolerance of $\pm 7\%$, or d.c. at $\sqrt{2}$ times the a.c. r.m.s. value.

APPENDIX ATEST METHODS FOR TYPE AND SAMPLE TESTSTYPE TESTSA1 Insulation ThicknessA1.1 Sampling and Preparation

A sample shall be cut from one end of the cable after discarding, if necessary, the end portion. The ends of the sample shall be cut in a plane at right angles to the cable axis and all burrs removed.

The minimum insulation thickness shall be measured at each end of the sample. The cable shall be accepted if both measurements meet the requirement. If only one measurement fails to comply with the requirement the sample shall be discarded and a new sample prepared from the other end of the coil of cable and the measurement of insulation thickness repeated. The cable shall be accepted if both measurements from the new sample meet the requirement.

A1.2 Measurement

The measurements shall be carried out using a microscope or profile enlarger at a magnification of at least 10 times. In cases of dispute, measurement made with a microscope shall be the reference method.

The minimum distance between adjacent conductors and between the sheath and adjacent conductors shall be measured. The smallest of these distances shall be taken as the minimum insulation thickness.

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A2 Dielectric Strength

A sample of completed cable 5m ± 1m, shall be stripped to expose the conductors and temporarily sealed at each end. The voltages specified below shall be applied with a minimum rate of rise of voltage of 150V/second and maintained for 15 minutes between conductors and between conductors and sheath.

Rated Voltage	Test Voltage
500V	2.0kV r.m.s.
750V	2.5kV r.m.s.

A3 Sheath Thickness

A circumferential strip shall be cut from a cable sample taken not more than 150mm from the end of a coil. The strip shall be flattened and six equi-spaced thickness measurements made using a micrometer having a flat nose for the outside of the sheath and a ball nose for the inside of the sheath. The average of the values obtained shall be rounded to two decimal places. For this purpose if the third decimal is five or more, the second figure shall be rounded up.

The rounded average value shall be taken to be the mean sheath thickness.

The lowest measured value shall be the minimum sheath thickness.