



SLOVENSKI STANDARD

SIST HD 21.2 S2:1998

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Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V - Part 2: Test methods

Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V -- Part 2: Test methods

Polyvinylchlorid-isolierte Leitungen mit Nennspannungen bis 450/750 V -- Teil 2:
Prüfverfahren

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Conducteurs et câbles isolés au polychlorure de vinyle, de tension assignée au plus égale à 450/750 V -- Partie 2: Méthodes d'essais

<https://standards.iteh.ai/catalog/standards/sist/6ac12e34-3fc1-49d7-a79f-0a765e72566c/sist-hd-21-2-s2-1998>

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Descriptors: Conductor, cable, flexible cable, rigid cable, single core cable, multicore cable, conductor material, flat cable, tinsel cord, compound, polyvinyl chloride, insulation compound, type test, sample test, routine test, nominal voltage, mark, common marking, identification, colour scheme, construction, insulation, filler, sheath, covering, internal covering, extruded covering, thickness, mean value, specified value, electrical resistance, test, tensile strength, elongation at break, ageing, loss of mass, non contamination, heat shock, pressure, high temperature, low temperature, elongation at low temperature, complete cable, overall dimensions, bending, flexing, voltage test, insulation resistance, absence of short circuits, spark (test), snatch (test), separation of cores, test (under) fire (conditions), guide to use, test method, frequency of test

POLYVINYL CHLORIDE INSULATED CABLES OF RATED
VOLTAGES UP TO AND INCLUDING 450/750 V
PART 2: TEST METHODS

Conducteurs et câbles isolés au
polychlorure de vinyle, de tension
nominale au plus égale à 450/750 V
Deuxième partie: Méthodes d'essais

Polyvinylchlorid-isolierte
Leitungen mit Nennspannungen
bis 450/750 V
Teil 2: Prüfverfahren

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REPUBLIKA SLOVENIJA
MINISTRSTVO ZA ZNANOST IN TEHNOLOGIJO
Urad RS za standardizacijo in meroslovje
LJUBLJANA

BODY OF THE HD

The Harmonization Document consists of: <https://standards.iteh.ai/catalog/standards/sist/6ac12e34-3fc1-49d7-a79f-0a765e72566c/sist-hd-21-2-s2-1998>

- IEC 227-2 (1979) ed 1, modified; IEC/SC 208, not appended

SIST... HD 21.2 S2
PREVZET PO METODI RAZGLASITVE

This Harmonization Document was approved by CENELEC on 1989-12-05.

-02- 1998

The English and French versions of this Harmonization Document are provided by the text of the IEC publication and the German version is the official translation of the IEC text.

According to the CENELEC Internal Regulations the CENELEC member National Committees are bound:

to announce the existence of this Harmonization Document at national level by or before 1990-06-01

to publish their new harmonized national standard by or before 1990-12-01

to withdraw all conflicting national standards by or before 1990-12-01.

Harmonized national standards are listed on the HD information sheet, which is available from the CENELEC National Committees or from the CENELEC Central Secretariat.

The CENELEC National Committees are the national electrotechnical committees of Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxemburg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

FOREWORD

HD21 was originally adopted by CENELEC on 9th July 1975.

Edition 2 of HD21 was implemented on 1st January 1984, and at that time contained 5 parts.

Since 1984, new parts have been published, original parts amended, and in addition HD 505 has superseded HD 385 as the cross-reference for test methods.

This reprint of the 5 parts of Edition 2 of HD21 incorporates all ratified amendments and the change to HD 505.

The new parts 8 and 9 of HD 21, which are Edition 1 versions, are reprinted to incorporate the change to HD 505. The issue of new Part 7 coincides with this reprint.

HD21 now has the following parts:

- HD21.1 S2 - General Requirements (with AM1, AM2, AM3 and AM4)
- HD21.2 S2 - Test Methods (with AM1)
- HD21.3 S2 - Non Sheathed Cables for Fixed Wiring (with AM1)
- HD21.4 S2 - Sheathed Cables for Fixed Wiring
- HD21.5 S2 - Flexible Cables (Cords) (with AM1 and AM2)
- HD21.6 - (Spare)
- HD21.7 S1 - Single core Non-Sheathed Cables for Internal Wiring (90°C conductor temperature)
- HD21.8 S1 - Single Core Non-Sheathed Cables for Decorative Chains
- HD21.9 S1 - Single Core Non-Sheathed Cables for Installation at Low Temperatures

This Edition 2 of part 2 of HD 21 now incorporates:

AM 1 - dop 1989-07-01

In accordance with the guidance given by CENELEC the dop for this Reprint is 1990-12-01.

References are made, in this Part 2 of HD21, to other parts of this HD and to other Harmonisation Documents as follows:

- HD 405.1 Tests on Electric Cables Under Fire Conditions. Part 1: Test on a single vertical cable (Endorsing IEC 332-1)
- HD 505 Common test methods for insulating and sheathing materials of Electric Cables (Endorsing IEC 811)

In all cases a reference to another HD implies the latest edition of that document



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POLYVINYL CHLORIDE INSULATED CABLES
OF RATED VOLTAGES UP TO AND INCLUDING 450/750V

Part 2 : Test Methods

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1. General

1.1 Scope

HD21 applies to rigid and flexible cables with insulation and sheath, if any, based on polyvinyl chloride, of rated voltages U_0/U up to and including 450/750V used in power installations of nominal voltage not exceeding 450/750V A.C.

This Part 2 specifies the methods of carrying out the tests specified in HD21 in conjunction with harmonised documents HD405 Part 1 and HD505. General Requirements are specified in Part 1 of HD21. Particular types of cable are specified in Part 3 onwards of HD21, and are hereafter referred to as "the particular specifications".

1.2 Applicable Tests

The tests applicable to the types of cables are given in the particular specifications.

1.3 Classification of Tests according to the frequency with which they are carried out

The tests specified are type tests (Symbol T) and/or sample tests (Symbol S) and/or routine tests (Symbol R) as defined in Part 1, Sub-clause 2.2. The Symbols T, S and R are used in the relevant tables of the particular specifications.

1.4 Sampling

If a marking is indented in the insulation or sheath, the samples used for the tests shall be taken so as to include such marking.

For multicore cables, except for the test specified in Part 2, Sub-clause 1.9, not more than three cores (of different colours, if available) shall be tested unless otherwise specified.

1.5 Pre-conditioning

All the tests shall be carried out not less than 16 h after the extrusion of the insulation or sheathing compounds.

1.6 Test Temperature

Unless otherwise specified, tests shall be made at ambient temperature.

1.7 Test Voltage

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

1.8 Checking of the Durability of colours and markings

Compliance with this requirement shall be checked by trying to remove the marking of the manufacturer's name or trademark and the colours of cores or numerals by rubbing lightly ten times with a piece of cotton wool or cloth soaked in water.

1.9 Measurement of Insulation Thickness

1.9.1 Procedure

The thickness of insulation shall be measured in accordance with Sub-clause 8.1 of HD 505.1.1. One sample of cable shall be taken from each of three places, separated by at least 1m.

Compliance shall be checked on each core of cable.

If withdrawal of the conductor is difficult, it shall be stretched in a tensile machine or the piece of core shall be immersed in mercury until the insulation becomes loose.

The cores of flat non-sheathed cords shall not be separated.

1.9.2 Evaluation of results

The mean of the 18 values (expressed in millimetres) obtained from the three pieces of insulation from each core shall be calculated to two decimal places and rounded off as given below, and this shall be taken as the mean value of the thickness of insulation.

If in the calculation the second decimal figure is 5 or more, the first decimal figure shall be raised to the next number; thus for example, 1.74 shall be rounded to 1.7 and 1.75 to 1.8.

The lowest of all values obtained shall be taken as the minimum thickness of insulation at any place.

This test may be combined with any other measurements of thickness which are carried out to comply with the requirements of Part 1 Sub-clause 5.2.4.

1.10 Measurement of Sheath Thickness

1.10.1 Procedure

The thickness of the sheath for circular cables shall be measured in accordance with Sub-clause 8.2 of HD 505.1.1.

For flat cords the measurements shall be carried out in accordance with Appendix 2 of this Part 2.

One sample of cable shall be taken from each of three places, separated by at least 1m.

1.10.2 Evaluation of results

The mean of all the values (expressed in millimetres) obtained from the three pieces of sheath shall be calculated to two decimal places and rounded off as given below, and this shall be taken as the mean value of the thickness of sheath.

If in the calculation the second decimal figure is 5 or more, the first decimal figure shall be raised to the next number; thus for example, 1.74 shall be rounded to 1.7 and 1.75 to 1.8.

The lowest of all values obtained shall be taken as the minimum thickness of sheath at any place.

This test may be combined with any other measurements of thickness which are carried out to comply with the requirements of Part 1, Sub-clause 5.5.4.

1.11 Measurement of Overall Dimensions and Ovality

The three samples taken in accordance with Part 2, Sub-clause 1.9 or 1.10 shall be used.

The measurement of the overall diameter of any circular cable and of the overall dimensions of flat cables with a major dimension not exceeding 15mm shall be carried out in accordance with Sub-clause 8.3 of HD 505.1.1.

For the measurement of flat cables with a major dimension exceeding 15mm, a micrometer, a profile projector or similar equipment shall be used.

The mean of the values obtained shall be taken as the mean overall dimensions.

For checking the ovality of circular sheathed cables, two measurements shall be made at the same cross-section of the cable, covering the maximum and minimum values.

2. Electrical Tests

2.1 Electrical Resistance of Conductors

In order to check the electrical resistance of conductors, the resistance of each conductor shall be measured from a sample of cable of at least 1m in length, and the length of each sample shall be measured.

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

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

where :

- t = Temperature of the sample at the moment of measurement, in degrees Celsius
 R₂₀ = Resistance at 20°C, in ohm/kilometre
 R_t = Resistance of L metres of cable at t°C in ohms
 L = Length of the sample of cable, in metres (length of the complete sample and not of the individual cores or wires)

2.2 Voltage Test carried out on completed cables

A sample of cable as delivered shall be immersed in water. The length of the sample, the temperature of the water and the duration of immersion are given in Part 1, Table III.

A voltage shall be applied in turn between each conductor and all the others connected together and to the water; and then between all conductors connected together and the water.

The voltage and the duration of its application are given for each case in Part 1, Table III.

2.3 Voltage Test on Cores

The test applies to sheathed cables and to flat non-sheathed cords but not to flat tinsel cords.

The test shall be made on a sample of cable of 5m length. The sheath and any other covering or filling shall be removed without damaging the cores.

In the case of flat non-sheathed cord, a short cut shall be made in the insulation between the cores, and the cores shall be separated by hand for a length of 2m.

The cores shall be immersed in water as specified in Part 1, Table III and a voltage shall be applied between the conductors and the water.

The voltage and the duration of its application are given for each case in Part 1, Table III.