



SLOVENSKI STANDARD

SIST HD 480 S1:1998

01-oktober-1998

Test method for evaluating thermal endurance of flexible sheet materials using the wrapped tube method (IEC 60795:1984)

Test method for evaluating thermal endurance of flexible sheet materials using the wrapped tube method

Bestimmung des thermischen Langzeitverhaltens von flexiblen, blattförmigen Wasserstoffen - Prüfung nach dem Wickelrohr-Verfahren

Méthode d'essai pour évaluer l'endurance thermique des matériaux sous forme de feuille souple par la méthode de l'enroulement sur tube

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Ta slovenski standard je istoveten z: **HD 480 S1:1987**

ICS:

29.035.01	Izolacijski materiali na splošno	Insulating materials in general
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CENELEC

Rue Bréderode 2, Bte 5 - 1000 BRUXELLES
 Tél.: (+32.2) 519 68 71 - Télex: 26257 Cenelec b
 Fax: (+32.2) 519 68 19 - Télex: 206 2210097 CENCEL

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ENGLISH VERSION

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 wrapped tube method

TEST METHOD FOR EVALUATING THERMAL ENDURANCE OF
 FLEXIBLE SHEET MATERIALS USING THE WRAPPED TUBE
 METHOD

Méthode d'essai pour évaluer
 l'endurance thermique des
 matériaux sous forme de feuille
 souple par la méthode de
 l'enroulement sur tube

Prüfverfahren zur Bestimmung
 des thermischen
 Langzeitverhaltens von flexiblen
 blattförmigen Werkstoffen mit
 dem Wickelrohrverfahren

BODY OF THE HD

 The Harmonization Document consists of:

- IEC 795 (1984) ed 1; IEC/SC 15B, not appended

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This Harmonization Document was approved by CENELEC on 1986-09-10.

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.

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to announce the existence of this Harmonization Document at national level by or before 1987-03-15

to publish their new harmonized national standard by or before 1987-09-15

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

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NORME DE LA CEI

INTERNATIONAL ELECTROTECHNICAL COMMISSION
IEC STANDARD

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1984

Méthode d'essai pour évaluer l'endurance thermique
des matériaux sous forme de feuille souple
par la méthode de l'enroulement sur tube

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Test method for evaluating thermal endurance
of flexible sheet materials
using the wrapped tube method



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Bureau Central de la Commission Electrotechnique Internationale

3, rue de Varembe

Genève, Suisse

INTERNATIONAL ELECTROTECHNICAL COMMISSION

**TEST METHOD FOR EVALUATING THERMAL ENDURANCE
OF FLEXIBLE SHEET MATERIALS
USING THE WRAPPED TUBE METHOD**

FOREWORD

- 1) The formal decisions or agreements of the IEC on technical matters, prepared by Technical Committees on which all the National Committees having a special interest therein are represented, express, as nearly as possible, an international consensus of opinion on the subjects dealt with.
- 2) They have the form of recommendations for international use and they are accepted by the National Committees in that sense.
- 3) In order to promote international unification, the I E C expresses the wish that all National Committees should adopt the text of the I E C recommendation for their national rules in so far as national conditions will permit. Any divergence between the I E C recommendation and the corresponding national rules should, as far as possible, be clearly indicated in the latter.

PREFACE

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This standard has been prepared by Sub-Committee 15B, Endurance Tests, of IEC Technical Committee No. 15: Insulating Materials.

The text of this standard is based upon the following documents:

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Six Months' Rule	Report on Voting
15B(CO)54	15B(CO)57

Further information can be found in the Report on Voting indicated in the table above.

The following I E C publications are quoted in this standard:

- | | |
|-------------------|---|
| Publications Nos. | 216: Guide for the Determination of Thermal Endurance Properties of Electrical Insulating Materials. |
| | 243 (1967): Recommended Methods of Test for Electric Strength of Solid Insulating Materials at Power Frequencies. |

TEST METHOD FOR EVALUATING THERMAL ENDURANCE OF FLEXIBLE SHEET MATERIALS USING THE WRAPPED TUBE METHOD

1. Scope

This test method is for the evaluation of the thermal endurance of flexible sheet materials used for electrical insulation.

2. General

This method follows the guidance given in the following IEC publications:

Publication 216: Guide for the Determination of Thermal Endurance Properties of Electrical Insulating Materials.

Publication 243: Recommended Methods of Test for Electric Strength of Solid Insulating Materials at Power Frequencies.

This method, with modifications such as the use of enamelled winding wire instead of aluminium foil for the electrodes, or the application of varnish, may be useful for compatibility testing.

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3. Preparation of test specimens

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Take 27 copper tubes*, each at least 310 mm long and polish with grade 00 carborundum paper to a finished outer diameter of 15 ± 0.2 mm. The polished surface shall be free from defects visible to the naked eye. Remove the metal and carborundum dust by wiping the tubes and finally clean with a non-flammable low toxicity solvent of high volatility such as 1,1,1-trichloroethane. An additional set of specimens may be prepared for testing at any other temperature, if required.

Cut sheets, each of width 65 ± 1 mm and length 5 mm less than that of the copper tube, from the specimen under test so that the longer dimension is at right angles to the length of the material. Wrap a sheet around each cleaned tube to give a single wrap with about 18 mm overlap. Wind ten equally spaced electrodes, each consisting of four fully overlapping turns of clean aluminium foil 13 ± 0.5 mm wide by 0.1 ± 0.025 mm thick on the tube. Secure the outer end of each aluminium strip with the minimum quantity of an adhesive**. Finally, secure the electrodes by a wrap of heat cleaned fibre glass tape*** 12 mm to 15 mm wide by 0.06 mm to 0.08 mm thick. Wrap the tape with about 3 mm overlap, but leave gaps to give access to the electrodes.

* In some cases the use of copper tubes may not be suitable due to the occurrence of oxidation and corrosion at high temperature. In these cases tubes of a corrosion resistant metal may be substituted.

** Shellac in alcohol or a silicone adhesive are suitable.

*** The aluminium strip may be secured by a wrap of annealed 0.4 mm copper wire.

Throughout assembly the cleaned tubes, test specimens, clean aluminium and glass tape shall not be touched with bare hands or otherwise contaminated. Clean polythene or rubber gloves may be used.

Identify each tube by means of a wired-on tag or by other means.

Adjust the temperature of each oven to each of three exposure temperatures selected from those in Table I under the heading of the range to which the temperature corresponding to an extrapolated 20 000 h time to failure is assumed to belong. Place one set of nine specimens in each of the ovens and leave them there for the appropriate period indicated in the table.

The minimum life at the lowest exposure temperature shall be 5 000 h and at the highest 100 h. If these minima are not achieved, additional specimens shall be exposed at different temperatures to achieve the minimum times specified.

At the end of the first exposure period at each temperature remove all specimens from the ovens, condition them and measure the breakdown voltage for one electrode from each specimen.

Return the specimens to the ovens for additional periods and repeat the above procedure. Note that a breakdown voltage need not be measured at the end of each exposure period. By omitting breakdown measurements during the early stages of exposure, the measurements can be grouped more economically about the required end-point.

Measure the breakdown voltages of remaining specimens at the end of exposure periods chosen so that the time to decrease the breakdown voltage to 50% of the initial value can be most accurately interpolated.

From a plot of breakdown voltage against total time of heating interpolate the time to reach 50% of the initial voltage at each temperature.

4. Heating of specimens

Use ovens with forced air circulation and sufficient ventilation to prevent accumulation of degradation products. Place the specimens in an oven at the required temperature for the required time in such a way that their outer surfaces are not in contact with any part of the oven or with other specimens, for example this may be achieved by supporting the tubes on rods threaded through them.

5. Conditioning

a) Initial

After manufacture, heat all specimens for 48 ± 1 h at the lowest of the three exposure temperatures selected.

b) General conditioning

Prior to any breakdown measurements, condition all specimens for 16 h to 18 h at $23 \pm 2^\circ\text{C}$ and $50 \pm 5\%$ relative humidity. Make all breakdown measurements within 3 min of removal from this atmosphere.