SLOVENSKI STANDARD
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Vodniki za nadzemne vode – Preskusni postopki lezenja za pletene vodnike

Overhead electrical conductors - Creep test procedures for stranded conductors

Leiter für elektrische Freileitungen - Kriechprüfungen für verseilte Leiter

Conducteurs pour lignes électriques aériennes - Procédures d'essai de fluage pour conducteurs câblés

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English version

Overhead electrical conductors
Creep test procedures for stranded conductors
(IEC 61395:1998)

Conducteurs pour lignes électriques aériennes - Procédures d'essai de fluage pour conducteurs câblés (CEI 61395:1998)

Leiter für elektrische Freileitungen Kriechprüfungen für verseilte Leiter (IEC 61395:1998)

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

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

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CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
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Foreword

The text of document 7/515/FDIS, future edition 1 of IEC 61395, prepared by IEC TC 7, Overhead electrical conductors, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 61395 on 1998-04-01.

The following dates were fixed:

- latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 1999-01-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2001-01-01

Annexes designated "normative" are part of the body of the standard.
Annexes designated "informative" are given for information only.
In this standard, annex ZA is normative and annex A is informative.
Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 61395:1998 was approved by CENELEC as a European Standard without any modification.

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OVERHEAD ELECTRICAL CONDUCTORS – CREEP TEST PROCEDURES FOR STRANDED CONDUCTORS

1 Scope

This International Standard is primarily applicable to non-interrupted creep-testing of stranded conductors for overhead lines such as those specified by IEC 61089. Procedures for interpreting the results are also included.

The object of the test is principally to calculate creep for any purpose and to compare creep of different conductors.

The requirement of this standard aims at an accuracy of 1 %. However, it should be recognized that due to variations occurring in the manufacturing process, the creep obtained in the test is not a precise value for all conductors of the type tested.

2 Normative reference

The following normative document contains provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the edition indicated was valid. All normative documents are subject to revision, and parties to agreements made on this International Standard are encouraged to investigate the possibility of applying the most recent edition of the normative document indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

IEC 61089:1991, *Round wire concentric lay overhead electrical stranded conductors*

3 Definitions

For the purpose of this International Standard, the following definitions apply.

3.1
sample length
total length of the conductor between the end fittings

3.2
gauge length
distance of the conductor over which the creep is measured

3.3
test temperature
mean temperature taken at the three pre-specified positions along the gauge length or, when more than three measuring positions are used, the mean temperature taken at equal distances along the gauge length

3.4
test load
constant load acting on the conductor during the test

NOTE – This causes the permanent time dependent elongation known as creep.

3.5
loading time
time required either from preload when preload is applied to test load or from no load to test load

3.6
duration of test
time span between reaching test load and the end of the test

3.7
creep test machine
complete equipment by means of which the conductor sample is tensioned during the test

3.8
end fitting
hardware that maintains the electrical and/or the mechanical continuity of the conductor

4 Units, instrumentation and calibration

Units of the International System of Units (SI-units) shall be used.

To ensure traceable accuracy of the test, calibration records of all instruments used in the test shall be kept. The equipment shall be calibrated in accordance with nationally recognized standards. Where no such standards exist, the basis used for calibration shall be documented.

5 Sample selection and preparation

5.1 Sample selection

The sample shall be taken at least 20 m from the end of the conductor on the drum. It shall be undamaged during removal and preparation. At least three strong hoseclips shall be placed on both ends of the sample to prevent interlayer movement, before it is cut from the drum.

The minimum sample length between the end fittings shall be:

$$100 \times d + 2 \times a$$

where

$100 \times d$ is the minimum gauge length;

d is the conductor diameter;

a is the distance between the end fitting and the gauge length. [1)]

[1)] These minimum specifications are only correct when the ends are placed in resin.

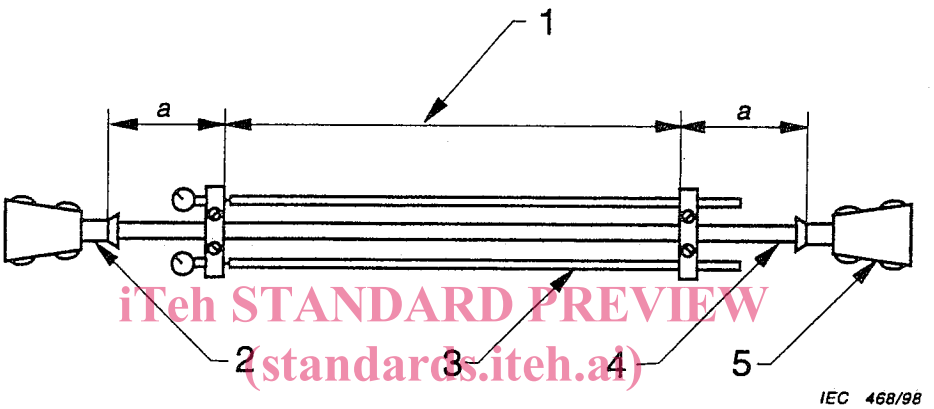
The distance, *a*, shall be at least 25 % of the gauge length or 2 m whichever is the smaller. The total length cut from the conductor shall include the necessary length to provide for the grips at the two ends of the sample. Figure 1 shows a typical set-up.

The sample and the gauge lengths have been chosen with due weight being given to the greater accuracy with which creep tests are conducted in comparison with tensile tests.

Once the sample has been taken from the drum, it shall be kept as straight as possible. If this is impractical the following procedure shall be adopted.

a) Twice the sample length shall be removed from the drum, and the central part shall be used as the sample length.

b) When recoiling for transportation, a coil diameter of 1,5 m minimum shall be used.



Key

1 Gauge length
2 End fitting
3 Reference bar
4 Sample
5 Grip

Figure 1 – Typical creep test arrangement

5.2 Sample preparation

End fittings, such as low melting point metals and resin bonding etc., attached to test samples shall not allow slippage or interlayer movement.

These end fittings shall be installed when the strands of the conductor are concentric. Where grease is applied to the conductor, the part of the conductor which is held in the grips shall be degreased prior to the installation of the end fittings.

6 Temperature and temperature variations

The conductor temperature shall be measured in the middle and at both ends of the gauge length, during the test. The measuring devices shall be in good contact with the conductor sample and be insulated against the effects of air movements outside the conductor. If not otherwise specified, the temperature of the test shall be 20 °C.

6.1 Temperature variations

Conductor temperature variation along the gauge length shall be less than 2,0 °C. Conductor temperature variation during the test shall be less than ±2,0 °C. It is important to ensure that greater deviations than those stated above do not take place. A means of continuously monitoring the air or conductor temperature is recommended.

6.2 Accuracy of temperature measuring devices

The accuracy of the equipment used for temperature measurements shall be within ±0,5 °C. The accuracy of the temperature measuring device used on the gauge length shall be clearly stated in the test report. The method used for temperature control and measurement shall also be fully documented.

6.3 Temperature compensation

Temperature variations shall be compensated, either by using a thermal reference with the same coefficient of thermal expansion as the sample, called reference bars in figure 1, or by using a thermocouple reference. In the latter case, the strain variation is calculated and subtracted from the elongation measurements. Three temperature measuring devices are used, the accuracy of which shall be within 0,5 °C. It shall be clearly understood that the temperature compensation is to reduce the scatter in the measurement arising from the length change of the conductor sample due to thermal elongation only. The effect of temperature change on the creep rate cannot be compensated.

7 Load

7.1 Test load

The accuracy of the test load shall be within ±1 % or ±120 N whichever is the greater. Load cells shall be used during the test.

7.2 Strain measurement

The accuracy and the set up of the strain measuring device shall be sufficient to determine the conductor sample strain to the nearest 5×10^{-6}. The measuring devices may be of any suitable type such as micrometer dial gauges, low voltage displacement transducers or optical systems. Uncontrolled rotation during the test, especially of long samples may take place and shall be avoided or compensated for.

8 Test procedure

The sample prepared in accordance with the procedure described in clause 5 shall be placed in the creep test machine. Some machines may require a preload in order to attach the strain measuring devices. In such cases a preload of up to 2 % of the rated tensile strength of the conductor may be allowed. Prolonged period at preload shall be avoided in order not to influence the shape of the creep curve. Usually not more than 5 min at preload can be accepted.