

---

---

**Metode za preskušanje električnih lastnosti nizkonapetostnih energetskih kablov**

Electrical test methods for low voltage energy cables

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

[SIST EN 50395:2005](https://standards.iteh.ai/catalog/standards/sist/6d2fb0fe-eeb5-418a-a144-43acc3e10528/sist-en-50395-2005)

<https://standards.iteh.ai/catalog/standards/sist/6d2fb0fe-eeb5-418a-a144-43acc3e10528/sist-en-50395-2005>

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

SIST EN 50395:2005

<https://standards.iteh.ai/catalog/standards/sist/6d2fb0fe-eeb5-418a-a144-43acc3e10528/sist-en-50395-2005>

EUROPEAN STANDARD

**EN 50395**

NORME EUROPÉENNE

EUROPÄISCHE NORM

August 2005

ICS 29.060.20

Partly supersedes HD 21.2 S3:1997 + A1:2002 &  
HD 22.2 S3:1997 + A1:2002

English version

## **Electrical test methods for low voltage energy cables**

Méthodes d'essais électriques  
pour les câbles d'énergie basse tension

Elektrische Prüfverfahren  
für Niederspannungskabel und -leitungen

### **iTeh STANDARD PREVIEW** **(standards.iteh.ai)**

This European Standard was approved by CENELEC on 2005-07-01. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

<https://standards.iteh.ai/catalog/standards/sist/6d2fb0fe-eeb5-418a-a144-6acc3c10526/sist-418a-2005>

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.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, 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 European Standard was prepared by the Technical Committee CENELEC TC 20, Electric cables. In accordance with the decision of TC 20 at its Setubal meeting (June 2004), the text of the draft was submitted to the formal vote. It was approved by CENELEC as EN 50395 on 2005-07-01.

This European Standard, together with EN 50396:2005, supersedes HD 21.2 S3:1997 + A1:2002 and HD 22.2 S3:1997 + A1:2002.

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) 2006-07-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2008-07-01

---

## iTeh STANDARD PREVIEW (standards.iteh.ai)

[SIST EN 50395:2005](https://standards.iteh.ai/catalog/standards/sist/6d2fb0fe-eeb5-418a-a144-43acc3e10528/sist-en-50395-2005)

<https://standards.iteh.ai/catalog/standards/sist/6d2fb0fe-eeb5-418a-a144-43acc3e10528/sist-en-50395-2005>

## Contents

	Page
<b>Introduction</b> .....	<b>5</b>
<b>1 Scope</b> .....	<b>5</b>
<b>2 Normative references</b> .....	<b>5</b>
<b>3 General requirements</b> .....	<b>6</b>
3.1 Pre-conditioning.....	6
3.2 Test temperature .....	6
3.3 Test voltage .....	6
3.4 Test values .....	6
<b>4 Definitions</b> .....	<b>6</b>
<b>5 Electrical d.c. resistance of conductor</b> .....	<b>6</b>
<b>6 Voltage test on completed cable</b> .....	<b>6</b>
<b>7 Voltage test on cores in water</b> .....	<b>7</b>
7.1 Test sample .....	7
7.2 Procedure .....	7
7.3 Requirement .....	7
<b>8 Insulation resistance test</b> .....	<b>7</b>
8.1 Insulation resistance for cables having maximum conductor temperatures not exceeding 90 °C .....	7
8.1.1 Test sample .....	7
8.1.2 Procedure .....	8
8.1.3 Requirement .....	8
8.2 Insulation resistance for cables with maximum conductor temperatures exceeding 90 °C .....	8
8.2.1 Test sample .....	8
8.2.2 Procedure .....	8
8.2.3 Requirement .....	8
<b>9 Long term resistance of insulation to d.c.</b> .....	<b>9</b>
9.1 Test sample .....	9
9.2 Procedure .....	9
9.3 Requirement .....	10
<b>10 Check for the absence of faults in insulation</b> .....	<b>10</b>
10.1 General .....	10
10.2 Spark test.....	10
10.2.1 Procedure .....	10
10.2.2 Requirement .....	10
10.3 Voltage test.....	10
10.3.1 Procedure .....	10

iTech STANDARD PREVIEW  
(standards.itech.ai)

SIST EN 50395:2005

https://standards.itech.ai/catalog/standards/sist/6d2fb0fa-eeb5-418a-a144-43acc3e10528/sist-en-50395-2005

10.3.2 Requirement .....	10
<b>11 Surface resistance of sheath .....</b>	<b>11</b>
11.1 Test samples .....	11
11.2 Procedure .....	11
11.3 Requirement .....	11
<b>12 Transfer impedance .....</b>	<b>11</b>
<b>Annex A .....</b>	<b>12</b>
A.1 Basic formula .....	12
A.2 Rounding .....	12
A.3 Examples of calculation .....	12
Annex B (informative) <b>Source of electrical test methods in EN 50395</b> .....	<b>13</b>
<b>Bibliography .....</b>	<b>14</b>
Figure 1 – Positioning of electrodes .....	9

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

[SIST EN 50395:2005](https://standards.iteh.ai/catalog/standards/sist/6d2fb0fe-eeb5-418a-a144-43acc3e10528/sist-en-50395-2005)

<https://standards.iteh.ai/catalog/standards/sist/6d2fb0fe-eeb5-418a-a144-43acc3e10528/sist-en-50395-2005>

## Introduction

EN 50395 contains the electrical test methods that are used for harmonized low voltage energy cables. These electrical test methods include all those previously contained in HD 21 and HD 22. Annex B gives a comparison between the original location of each test method and its place in this new European Standard.

The content of EN 50395 is not, and will not be, restricted only to test methods for cables to HD 21 and HD 22. Other test methods for harmonized LV cables may be included. Furthermore, the use of test methods in EN 50395 for cables outside HD 21 and HD 22 is not prohibited, but it is strongly recommended that expert advice be taken before such use, or before any proposal for incorporation into another standard.

## 1 Scope

EN 50395 contains electrical test methods required for the testing of harmonized low voltage energy cables, especially those rated at up to and including 450/750 V.

NOTE 1 A description of the origin of these test methods and the background to this European Standard is given in the Introduction and in Annex B.

The particular cable standard dictates the tests which need to be performed on the relevant cable type. It also specifies whether the specific test is a type test (T), a sample test (S) or a routine test (R) for the particular cable type.

NOTE 2 T, S and R are defined in the relevant cable standard.

The requirements to be met during or after the test are specified for the particular cable type in the relevant cable standard. However, some test requirements are obvious and universal, such as the fact that no breakdown shall occur during voltage tests, and these are stated in the particular test method.

Test methods for use specifically in utility power cables are not covered by this European Standard. They can be found in HD 605.

Test methods for use specifically in communications cables are the responsibility of the Technical Committee CENELEC TC 46X, Communication cables. At present such test methods are given in EN 50289 series.

## 2 Normative references

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

EN 50289-1-6	2002	Communication cables – Specifications for test methods - Part 1-6: Electrical test methods – Electromagnetic performance
EN 50356	2002	Method for spark testing of cables
EN 60228	2005	Conductors of insulated cables

### 3 General requirements

#### 3.1 Pre-conditioning

All the tests shall be carried out not less than 16 h after the extrusion or cross-linking, if any, of the insulating or sheathing compounds.

#### 3.2 Test temperature

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

#### 3.3 Test voltage

Unless otherwise specified in the individual clause of this European Standard or in the product standard, the test voltage shall be a.c. of approximately sine-wave form and of frequency between 49 Hz and 61 Hz. The ratio of peak value to r.m.s. value shall be equal to  $\sqrt{2}$  with a tolerance of  $\pm 7\%$ .

The values quoted are r.m.s. values.

#### 3.4 Test values

Full test conditions (such as temperatures, durations, etc.) and full test requirements are not specified in this European Standard; it is intended that they should be specified by the standard dealing with the relevant type of cable.

Any test requirements which are given in this European Standard may be modified by the relevant cable standard to suit the needs of a particular type of cable.

### 4 Definitions

For the purposes of this document, the following terms and definitions apply.

#### 4.1

##### median value

when several test results have been obtained and ordered in an increasing or decreasing succession, the median value is the middle value if the number of available values is odd, and is the mean of the two middle values if the number is even

### 5 Electrical d.c. resistance of conductor

The test shall be carried out in accordance with Annex A of EN 60228.

### 6 Voltage test on completed cable

If the cable has no metallic layer, a sample of the cable as manufactured shall be immersed in water. The length of the sample, the temperature of the water and the period of immersion shall be as specified in the cable standard. A voltage shall be applied between conductor(s) and groups of conductors in such a way that the insulation on each core is tested against all adjacent cores and the water.



If the cable has a metallic layer, a sample of the cable shall be taken of the length specified in the cable standard. A voltage shall be applied between conductor(s) and groups of conductors in such a way that the insulation on each core is tested against all adjacent cores and the metallic layer, which shall be earthed.

If the cable has a metallic strain-bearing member, this shall be connected to the water or to the metallic layer, as appropriate.

In each case, the voltage and the duration of its application shall be as specified in the cable standard. The voltage shall be increased gradually on each occasion to the specified value.

No breakdown of the insulation shall occur during the test.

## 7 Voltage test on cores in water

The test applies to sheathed cables, braided cables and flat unsheathed cords.

NOTE For 1-core unsheathed cables, the test in Clause 6 generally applies, in which case this test on cores is not required.

### 7.1 Test sample

Prepare a sample of cable 5 m long, by carefully removing, without damaging the cores, the sheath or the overall braid and any other covering or filling from a length of completed cable.

In the case of flat unsheathed cord, make a cut in the insulation between the cores, and separate the cores by hand for a length of 2 m.

[SIST EN 50395:2005](https://standards.iteh.ai/catalog/standards/sist/6d2fb0fe-eeb5-418a-a144-43acc3e10528/sist-en-50395-2005)

### 7.2 Procedure

<https://standards.iteh.ai/catalog/standards/sist/6d2fb0fe-eeb5-418a-a144-43acc3e10528/sist-en-50395-2005>

Immerse the sample in water at the temperature, and for the period, specified in the cable standard. Ensure that the ends of the cores protrude above the water by a distance sufficient to prevent excessive surface leakage when the test voltage is applied. Apply a voltage, of the magnitude specified in the cable standard, between the conductors and the water for the time specified in the cable standard.

### 7.3 Requirement

No breakdown of the insulation shall occur during the test.

## 8 Insulation resistance test

### 8.1 Insulation resistance for cables having maximum conductor temperatures not exceeding 90 °C

#### 8.1.1 Test sample

Make the test on a sample of cable 5 m long, previously submitted to the test specified in Clause 7 or, in the case of 1-core unsheathed cable, to the test described in Clause 6.