BS EN 62192:2009

BSI Standards Publication

# Live working — Insulating ropes

bsi.

...making excellence a habit.™

## National foreword

This British Standard is the UK implementation of EN 62192:2009. It is identical to IEC 62192:2009.

The UK participation in its preparation was entrusted to Technical Committee PEL/78, Tools for live working.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.



ISBN 978 0 580 57283 8

ICS 13.260; 29.240.20; 29.260.99

**Compliance with a British Standard cannot confer immunity from legal obligations.**

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 31 May 2010.

## Amendments issued since publication

| Amd. No. | Date | Text affected |
|---|---|---|

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

# EN 62192

June 2009

ICS 13.260; 29.240.20; 29.260.99

English version

# Live working - Insulating ropes
(IEC 62192:2009)

Travaux sous tension - Cordes isolantes
(CEI 62192:2009)

Arbeiten unter Spannung - Isolierende Seile
(IEC 62192:2009)

This European Standard was approved by CENELEC on 2009-05-01. 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.

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, Bulgaria, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

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

**Central Secretariat: Avenue Marnix 17, B - 1000 Brussels**

## Foreword

The text of document 78/773/FDIS, future edition 1 of IEC 62192, prepared by IEC TC 78, Live working, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 62192 on 2009-05-01.

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) | 2010-02-01 |
| – latest date by which the national standards conflicting with the EN have to be withdrawn | (dow) | 2012-05-01 |

Annex ZA has been added by CENELEC.

---

## Endorsement notice

The text of the International Standard IEC 62192:2009 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following note has to be added for the standard indicated:

IEC 60743 + A1 NOTE Harmonized as EN 60743:2001 + A1:2008 (not modified).

---

# Annex ZA
(normative)

## Normative references to international publications with their corresponding European publications

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.

NOTE When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

| Publication | Year | Title | EN/HD | Year |
|---|---|---|---|---|
| IEC 60060-1 | - [1)] | High-voltage test techniques - Part 1: General definitions and test requirements | HD 588.1 S1 | 1991 [2)] |
| IEC 60212 | 1971 | Standard conditions for use prior to and during the testing of solid electrical insulating materials | HD 437 S1 | 1984 |
| IEC 60417 | Data-base | Graphical symbols for use on equipment | - | - |
| IEC 61318 | 2007 | Live working - Conformity assessment applicable to tools, devices and equipment | EN 61318 | 2008 |
| IEC 61477 | - [1)] | Live working - Minimum requirements for the utilization of tools, devices and equipment | EN 61477 | 2009 [2)] |
| ISO 2307 | - [1)] | Fibre ropes - Determination of certain physical and mechanical properties | EN ISO 2307 | 2005 [2)] |

[1)] Undated reference.

[2)] Valid edition at date of issue.

# CONTENTS

# INTRODUCTION

Insulating ropes designed and manufactured according to this standard contribute to the safety of the users, provided they are used by skilled persons, in accordance with safe methods of work and the instructions for use.

This International Standard defines the required electrical properties of insulating ropes which already meet other specifications relating to mechanical strength, physical and construction properties, for use in live working at the power frequency system voltages up to and including 800 kV r.m.s.

This standard does not propose to address all the safety factors associated with the use of the insulating rope. It is the responsibility of the user to establish appropriate safety practices.

Ropes which meet this standard can bridge two or more live phase conductors, or one phase conductor and earth as required during live working. Effects of the use of insulating ropes on the dielectric strength of the installation have to be evaluated. Depending on the configuration of an installation, the use of insulating ropes will have different effects on its dielectric strength.

Cotton, sisal and hemp ropes are unsuitable for this application, as are any other ropes that exhibit electrical conductivity. Examples of ropes which are able to meet the requirements of this standard are formed from fibres that have been treated with a wax or other chemical which causes the surface of the rope to become hydrophobic.

This document has been prepared according to the requirements of IEC 61477 where applicable.

The product covered by this standard may have an impact on the environment during some or all stages of its life cycle. These impacts can range from slight to significant, be of short-term or long-term, and occur at the global, regional or local level.

Except for a requirement for the selection of a testing dye and the disposal statement in the instructions for use, this standard does not include requirements and test provisions for the manufacturers of the product, or recommendations to the users of the product for environmental improvement. However, all parties intervening in its design, manufacture, packaging, distribution, use, maintenance, repair, reuse, recovery and disposal are invited to take account of environmental considerations.


Licensed copy: Lee Shau Kee Library, HKUST, Version correct as of 03/01/2015, (c) The British Standards Institution 2013

# LIVE WORKING – INSULATING ROPES

## 1 Scope

This International Standard covers insulating ropes that are utilized during live working procedures in contact with parts of installations operating at voltages up to and including 800 kV r.m.s.

Insulating ropes for live working procedure under rain and/or d.c. conditions are not covered by this standard.

## 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.

IEC 60060-1, *High-voltage test techniques – Part 1: General definitions and test requirements*

IEC 60212:1971, *Standard conditions for use prior to and during the testing of solid electrical insulating materials*

IEC 60417, *Graphical symbols for use on equipment*

IEC 61318:2007, *Live working – Conformity assessment applicable to tools, devices and equipment*

IEC 61477, *Live working – Minimum requirements for the utilization of tools, devices and equipment*

ISO 2307, *Ropes – Determination of certain physical and mechanical properties*

## 3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 61318 and the following apply.

**3.1**
**creep**
dimensional change with time in a test section of the rope when subjected to continued working load

**3.2**
**elongation**
initial dimensional change in a test section of the rope subjected to rated working load for a short period of time

**3.3**
**insulating rope**
rope with electrical insulating properties suitable for use in contact with live parts

[IEV 651-09-01, modified]

**3.4**
**rope**
stout cord made from woven or twisted insulating or non-insulating material used for various handling operations

NOTE Ropes, which may come into contact with live conductors, should be insulating. Ropes used to move tools and other equipment into place, which are clear of live parts, may be non-insulating.

[IEC 60743, definition 10.1.1, modified]

## 4 Requirements

### 4.1 Physical and dimensional

#### 4.1.1 Physical

Ropes shall be free of visual manufacturing defects such as incorrect impregnation or faulty stranding or cabling.

Ropes covered by this standard shall demonstrate low water absorption and capillary action.

#### 4.1.2 Dimensional

Diameter and circumference of ropes shall comply with the manufacturer specifications with a tolerance of ± 10 %.

NOTE National or regional standards could specify dimensioning where needed.

### 4.2 Electrical

Ropes covered by this standard shall have appropriate dielectric properties under dry conditions and when exposed to humid conditions.

Splicing of insulating ropes shall be possible, whilst keeping the ropes appropriate dielectric properties and in accordance with the manufacturer's instructions.

Insulating ropes to be used under rain condition, or d.c. stress are not covered by this standard.

### 4.3 Mechanical

In addition to other specifications related to mechanical strength and construction properties, ropes covered by this standard shall demonstrate limit elongation under normal loading conditions.


Licensed copy: Lee Shau Kee Library, HKUST, Version correct as of 03/01/2015, (c) The British Standards Institution 2013

### 4.4 Marking

The insulating ropes shall be properly identified.

Ropes covered by this standard shall be marked with the following permanent items of marking:

- name of the manufacturer, or trade mark,
- year of manufacture, coded with a colour tracer or other means.

The following information shall also be supplied, either by a marking or other means on the rope or on each reel of rope or each smallest shipping container:

- symbol IEC 60417-5216 (2002-10) – Suitable for live working; double triangle (see Annex A),

  NOTE The exact ratio of the height of the figure to the base of the triangle is 1,43. For the purpose of convenience, this ratio can be between the values of 1,4 and 1,5.
- number of the relevant IEC standard immediately adjacent to the symbol with year of publication (four digits) (IEC 62192:2009),
- batch number,
- details of diameter,
- type of lay,
- fibre material,
- minimum breaking force,
- creep,
- recommended working load.

The marking shall be durable, clearly visible and legible to a person with normal or corrected vision without additional magnification.

### 4.5 Instructions for use and care

Each reel of rope or each smallest shipping length shall be supplied with the manufacturer's written information and instructions for use and care. These instructions shall be prepared in accordance with the general provisions given in IEC 61477.

The information and instructions shall include as a minimum:

- any special treatment of the fibres which makes them specially suitable for this application,
- instructions for splicing,
- instructions for handling, cleaning, storage and transportation,
- instructions for periodic testing, repair, and disposal of the rope,
- period of years from the moment of production in which the mechanical characteristics can be guaranteed (storage life).


Licensed copy: Lee Shau Kee Library, HKUST, Version correct as of 03/01/2015, (c) The British Standards Institution 2013

# 5 Tests

## 5.1 General

The present standard provides testing provisions to demonstrate compliance of the product to the requirements of Clause 4. These testing provisions are primarily intended to be used as type tests for validation of the design input. Where relevant, alternative means (calculation, examination, tests, etc.) are specified within the test subclauses, for the purpose of insulating ropes having completed the production phase.

Each type test shall be carried out on test pieces as specified below. If one or more test pieces fail during the type test, the product has not met the requirements of this standard.

The type tests shall be performed according to the chronological order specified in Annex B.

## 5.2 Atmospheric conditions

Unless otherwise stated, the lengths of insulating rope submitted to type tests shall be preconditioned for 4 h ± 0,5 h and tested under the normal atmospheric conditions provided in Table I of IEC 60212, at a temperature of between 15 °C and 35 °C, with a relative humidity between 25 % and 75 % (taking into account Note 5 of Table I of IEC 60212).

## 5.3 Visual verification and dimensional checking

### 5.3.1 Visual verification

Ropes shall be visually verified to check if the requirements of 4.1.1 and 4.4 are fulfilled.

When visual verification is specified, it shall be understood to be visual verification by a person with normal or corrected vision without additional magnification.

### 5.3.2 Dimensional check

Nominal diameter and nominal circumference of ropes shall be measured to check for compliance with 4.1.2.

## 5.4 Electrical tests

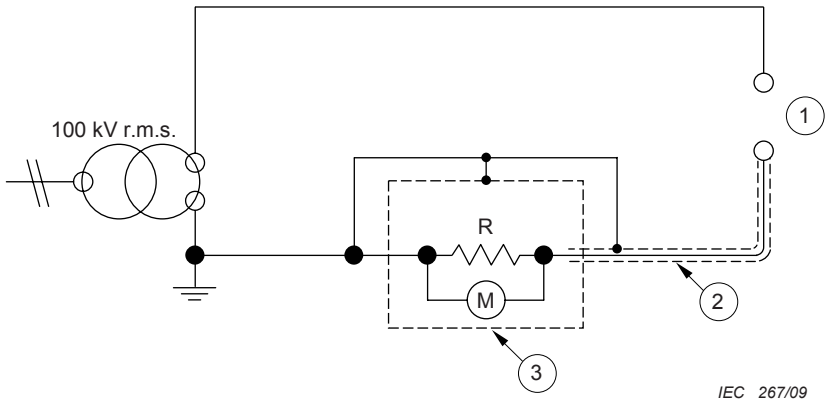
Unless otherwise specified, the electrical tests shall be carried out in accordance with IEC 60060-1.

A total of six test pieces are required for the electrical tests.

### 5.4.1 Leakage current under dry conditions

#### 5.4.1.1 General

The test shall be performed on three test pieces with a length of 2 000 mm each. A voltage of 100 kV r.m.s. shall be applied, across a 300 mm length of rope for 1 min and the leakage current during this period shall be measured (see Figure 1 for example of a test set-up).




**Key**

| | |
|---|---|
| 1 | Test piece |
| 2 | Shielded wire |
| 3 | Faraday box. A shielded container enclosing and guarding the resistor R and the voltmeter M. Both the screen and the shield of the measuring lead by-pass R and M, by providing a path for stray capacitive currents to ground. |
| R | A 100 Ω, 50 W wirewound non-inductive resistor is recommended. A 50 W resistor at a minimum is recommended because a hazardous condition would exist if the resistor should fail and create an open circuit. |
| M | Battery operated, true RMS, solid state voltmeter |

**Figure 1 – Example of test set up to measure leakage current**

#### 5.4.1.2 Test procedure

The test piece shall be mounted in the vertical position with a distance of 1 500 mm between the attachment points, and tensioned at the lower attachment point with a 4,5 kg mass.

Two electrodes shall be formed by wrapping tinned copper wire of a diameter between 0,5 mm and 1 mm tightly around the test piece. The electrodes shall be centred in the test section with a clearance of 300 mm between the electrodes and mounted to provide a good electrical contact. Figure 2 illustrates the connection.

*Dimensions in millimetres*

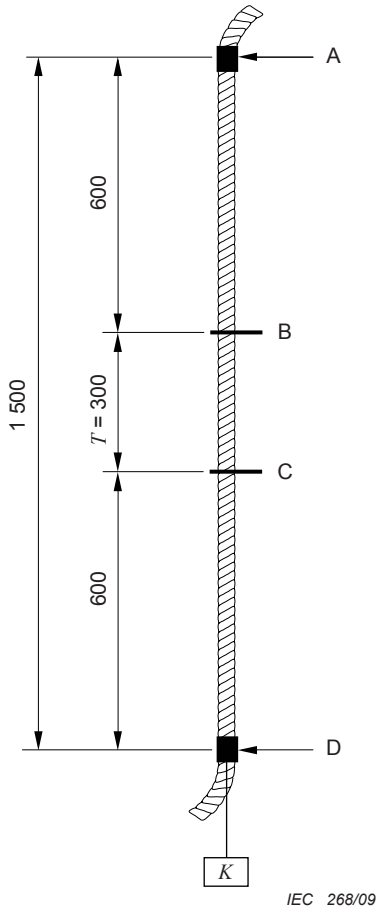



**Figure 2a – Electrode arrangement for test before water conditioning**

*Dimensions in millimetres*

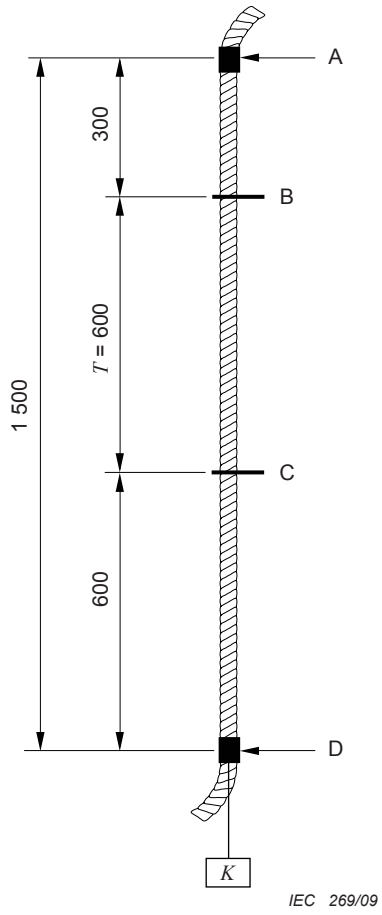



**Figure 2b – Electrode arrangement for test after water conditioning**

**Key**

| | |
|---|---|
| A | Rope attachment point (bracket parallel jaw or equivalent) |
| B | High voltage electrode |
| C | Low voltage electrode |
| D | Weight attachment point |
| *K* | Mass 4,5 kg |
| *T* | Test length |

**Figure 2 – Electrode arrangement on rope test piece**

A power frequency voltage of 100 kV shall be applied to the upper electrode and the lower electrode shall be connected to earth through a micro-ammeter. The voltage shall be raised to 100 kV in a 15 s to 30 s interval and maintained at 100 kV for a period of 1 min. After 1 min, the voltage shall be decreased to zero in not more than 5 s.

The leakage current shall be measured during the 1 min exposure to the 100 kV voltage.

#### 5.4.1.3 Test criteria

The leakage current test under dry conditions shall be considered as passed if

- the maximum leakage current is stable and does not exceed 100 μA (0,1 mA) at the end of the 1 min,
- during the test, the rope does not initiate a flashover, and
- at the end of test, the rope does not show burn marks or other signs of damage after a visual verification.

If the current is fluctuating more than 10 μA at the end of 1 min, and the leakage current has not exceeded 100 μA and there has been no flashover, the test shall be continued for an additional 5 min. If at the end of that time the rope has not flashed over and the current has stabilized at less than 100 μA the test shall be considered as passed.

### 5.4.2 Tests after water conditioning

The tests shall be performed on three other test pieces with a length of 2 000 mm each.

#### 5.4.2.1 Conditioning

Before the tests, the test pieces shall be kept submerged for a period of 15 min in water having a resistivity of (100 ± 15) Ω·m.

#### 5.4.2.2 Leakage current after water conditioning

##### 5.4.2.2.1 Test set-up

Within 1 min after removal from the wetting tank, a mass of 4,5 kg shall be attached to the test piece below the lower electrode to facilitate the parting of any fibres that become weakened by electrical activity. The test piece shall be allowed to dry for 15 min in atmospheric conditions as specified in 5.2. Two electrodes shall be formed 600 mm apart by wrapping tinned copper wire of a diameter between 0,5 mm and 1 mm tightly around rope.

A power frequency voltage of 100 kV r.m.s. shall be applied to the upper electrode, and the lower electrode shall be connected to earth through a micro-ammeter. See Figures 1 and 2.

##### 5.4.2.2.2 Electrical test procedure and criteria

The voltage shall be raised from 0 kV to 100 kV in not less than 15 s nor more than 30 s. When reached, the voltage of 100 kV r.m.s. shall be maintained for 5 min. After 5 min, the voltage shall be decreased to zero in not more than 5 s.

The test shall be considered as passed if

- the measured leakage current does not exceed 500 μA r.m.s. after 1 min and by the end of the test is below 250 μA r.m.s., and
- at the end of the test the insulating rope shows no burn marks or other signs of damage after a visual verification.

#### 5.4.2.3 Mechanical test after water conditioning

Following the electrical test, the mechanical strength of the same test pieces shall be determined by measuring the breaking strength according to ISO 2307.

The test shall be considered as passed if the mechanical strength meets manufacturer specification for the particular type of construction.


Licensed copy: Lee Shau Kee Library, HKUST, Version correct as of 03/01/2015, (c) The British Standards Institution 2013

### 5.5 Mechanical tests

A minimum of three test pieces are required for the mechanical tests.

#### 5.5.1 Water absorption

A rope test piece of a minimum length of 1,5 m shall be conditioned by immersing it for 24 h ± 1 h in water at 23 °C ± 2 °C.

The test shall be considered as passed if after 7 h ± 0,5 h of drying in a place with relative humidity less than 80 %, the water content is less than 2 % by weight.

#### 5.5.2 Capillary

A dye shall be selected in accordance with occupational health and environmental requirements.

A rope test piece of a minimum length of 125 mm shall be used for the test. One end of the test piece shall be cut and 10 mm of the rope dipped in the acceptable aqueous dye solution for 10 s.

The test shall be considered as passed if there is no dye penetration exceeding 3 mm in the rope.

#### 5.5.3 Elongation and creep

##### 5.5.3.1 Elongation

Under 1 % working load condition, a rope test piece of a minimum length of 900 mm shall be measured. The length of the test piece shall be noted. This will be designated as initial length $l_{ei}$.

The load shall then be increased within 1 min to 16,7 % of the working load, and held at that value for 10 min. The load shall then be decreased within 1 min to 1 % of the working load and held at that value for a period of 1 min. The length of the test piece shall then be measured again within 1 min. This will be designated as final length $l_{ef}$.

The elongation shall be expressed as a percentage and given by:

$$(l_{ef} - l_{ei}) \times 100 / l_{ei}$$

where

$l_{ei}$ is the initial length, expressed in mm, under the initial 1 % working load condition;

$l_{ef}$ is the length, expressed in mm, under the final 1 % working load condition at the end of the elongation test.

The test shall be considered as passed if the measured elongation is less than 11 %.

##### 5.5.3.2 Creep

The rope test piece used for the elongation test shall also be used for this test. The load shall then be increased within 1 min to 16,7 % of the working load, and the rope length shall be measured. This length will be designated as initial creep length $l_{ci}$. The test load shall be held at 16,7 % of the working load for 60 min.

The length of the test piece shall be measured at the end of the test without reducing the load. This will be designated as creep length $l_{cf}$.


Licensed copy: Lee Shau Kee Library, HKUST, Version correct as of 03/01/2015, (c) The British Standards Institution 2013

The creep shall be expressed as a percentage and given by:

$$(l_{cf} - l_{ci}) \times 100 / l_{ci}$$

where

$l_{ci}$ is the initial length, expressed in mm, at the start of the test at 16,7 % of the working load;

$l_{cf}$ is the length, expressed in mm, at the end of the test at 16,7 % of the working load.

The test shall be considered as passed if the creep is less than 5 % additional.

### 5.6 Durability of marking

The markings shall be rubbed vigorously for 1 min with a clean cloth soaked in water, then with a clean cloth soaked in isopropanol ($CH_3$-CH(OH)-$CH_3$).

NOTE It is the employer's duty to ensure that any relevant legislation and any specific safety instructions regarding the use of isopropanol are fully observed.

The test shall be considered as passed if the markings are still legible and the characters do not run or smear.

### 5.7 Verification of the required instructions for use

The requirement of 4.5 shall be verified by examination of the information and instructions for use.

## 6 Conformity assessment of insulating ropes having completed the production phase

For conducting the conformity assessment during the production phase, IEC 61318 shall be used in conjunction with the present standard.

Annex C provides the classification of defects and identifies the associated tests applicable in case of production follow-up.

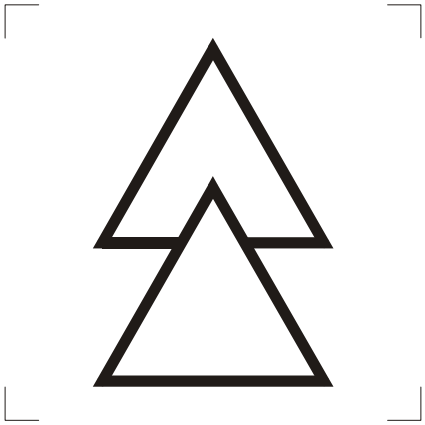
## 7 Modifications

Any modification of the insulating rope shall require additional type tests or that the type tests be repeated, in whole or in part, if it is determined that the modification so justifies and also may require a change in rope reference literature.


Licensed copy: Lee Shau Kee Library, HKUST, Version correct as of 03/01/2015, (c) The British Standards Institution 2013 Licensed copy: Lee Shau Kee Library, HKUST, Version correct as of 03/01/2015, (c) The British Standards Institution 2013

# Annex A
(normative)

## Suitable for live working; double triangle (IEC 60417-5216 (2002-10))



# Annex B
(normative)

## Chronology of type tests

The numbers given in the different test groups of Table B.1 indicate the chronological order in which the tests within a group shall be made. Within a group, tests with the same sequential number can be performed in the more convenient order.

Test groups do not have to be performed in the given order.

**Table B.1 – Chronology of type tests**

| Test description | Test subclause | Groups of test piece | | | | |
|---|---|---|---|---|---|---|
| | | Group 1 | Group 2 | Group 3 | Group 4 | Group 5 |
| Visual verification | 5.3.1 | 1 | 1 | 1 | | |
| Dimensional check | 5.3.2 | 1 | 1 | 1 | | |
| Water absorption | 5.5.1 | 2 | | | | |
| Leakage current under dry conditions | 5.4.1 | | 2 | | | |
| Leakage current after water conditioning | 5.4.2.2 | | | 2 | | |
| Mechanical test after water conditioning | 5.4.2.3 | | | 3 | | |
| Capillary | 5.5.2 | | | | 1 | |
| Elongation and creep | 5.5.3 | | | | | 1 |
| Durability of marking | 5.6 | 1 | | | | |
| Verification of the required instructions for use | 5.7 | 1 | | | | |
| Number of test pieces | | 1 | 3 | 3 | 1 | 1 |

# Annex C
(normative)

## Classification of defects

This annex was developed to address the level of defects of manufactured insulating ropes (critical, major or minor) in a consistent manner (see IEC 61318). For each requirement identified in Table C.1, both the type of defect and the associated test are specified.

**Table C.1 – Classification of defects and associated requirements and tests**

| Requirements | | Type of defects | | | Tests |
|---|---|---|---|---|---|
| | | Critical | Major | Minor | |
| 4.1 | Physical<br>Dimensional | | | X<br>X | 5.3.1<br>5.3.1 |
| 4.1.1 | Water absorption | X | | | Alternative test or alternative means is under consideration |
| 4.2 | Electrical | X | | | Alternative test or alternative means is under consideration |
| 4.3 | Elongation and creep | | X | | Alternative test or alternative means is under consideration |
| 4.4 | Marking<br>- absence<br>- durability | | X | <br>X | <br>5.3.1<br>5.6 |
| 4.5 | Instructions for use (absence) | | X | | 5.7 |

# Annex D
(informative)

# Recommendations for in-service care and periodic testing

## D.1 Identification

Insulating rope needs to be identified as such by the user for control of its use. It may be specified with a special colour and with an identification tracer of a different colour to identify year of manufacture.

## D.2 Storage

### D.2.1 In the field

The insulating rope should be kept dry and clean in a sealed container to protect against contamination. Insulating rope should never be placed directly on the ground.

### D.2.2 In the storage room

Insulating ropes should be stored the same way as insulating sticks with a free flow of air to avoid moisture build-up.

## D.3 Handling

During handling, precautions should be taken to avoid rope contamination.

The rope should be kept in the sealed container until it is used, be taken directly from the container and put back in the container immediately after use to avoid any build up of moisture within the rope core.

## D.4 Periodic testing

### D.4.1 In the field before each use

The rope should be inspected visually to detect defects, signs of tracking and pollution.

### D.4.2 In a test facility

Subject to use, the dry and wet electrical and breaking strength may be checked each year.

## D.5 Application safety factor

The range of mechanical safety factor for material handling and for personnel depends upon the regulations and utility practices. For example, a mechanical safety factor for material handling of 3 to 1 to 5 to 1 and for personnel of 8 to 1 to 10 to 1 is used in North America.


Licensed copy: Lee Shau Kee Library, HKUST, Version correct as of 03/01/2015, (c) The British Standards Institution 2013

## D.6 Use with capstan

The capstan should be sized for the rope being used.

The material of the capstan drum and its surface finish should be selected in the appropriate way to avoid any contamination of the rope during friction (example: polished chromed surface).

## D.7 Cleaning, repair and recycling

The repair of ropes is not recommended, but cleaning is possible if undertaken in accordance with the manufacturer’s instructions.

Recycling for uses not requiring insulation is acceptable.

## Bibliography

IEC 60050-651:1999, *International Electrotechnical Vocabulary – Part 651: Live working*

IEC 60743:2001, *Live working – Terminology for tools, equipment and devices* [1)]
Amendment 1 (2008)

_____

1) There exists a consolidated edition 2.1 (2008) that comprises edition 2 and Amendment 1.

*This page deliberately left blank*

*This page deliberately left blank*

# British Standards Institution (BSI)

BSI is the national body responsible for preparing British Standards and other standards-related publications, information and services.

BSI is incorporated by Royal Charter. British Standards and other standardization products are published by BSI Standards Limited.

## About us

We bring together business, industry, government, consumers, innovators and others to shape their combined experience and expertise into standards -based solutions.

The knowledge embodied in our standards has been carefully assembled in a dependable format and refined through our open consultation process. Organizations of all sizes and across all sectors choose standards to help them achieve their goals.

## Information on standards

We can provide you with the knowledge that your organization needs to succeed. Find out more about British Standards by visiting our website at bsigroup.com/standards or contacting our Customer Services team or Knowledge Centre.

## Buying standards

You can buy and download PDF versions of BSI publications, including British and adopted European and international standards, through our website at bsigroup.com/shop, where hard copies can also be purchased.

If you need international and foreign standards from other Standards Development Organizations, hard copies can be ordered from our Customer Services team.

## Subscriptions

Our range of subscription services are designed to make using standards easier for you. For further information on our subscription products go to bsigroup.com/subscriptions.

With **British Standards Online (BSOL)** you'll have instant access to over 55,000 British and adopted European and international standards from your desktop. It's available 24/7 and is refreshed daily so you'll always be up to date.

You can keep in touch with standards developments and receive substantial discounts on the purchase price of standards, both in single copy and subscription format, by becoming a **BSI Subscribing Member**.

**PLUS** is an updating service exclusive to BSI Subscribing Members. You will automatically receive the latest hard copy of your standards when they're revised or replaced.

To find out more about becoming a BSI Subscribing Member and the benefits of membership, please visit bsigroup.com/shop.

With a **Multi-User Network Licence (MUNL)** you are able to host standards publications on your intranet. Licences can cover as few or as many users as you wish. With updates supplied as soon as they're available, you can be sure your documentation is current. For further information, email bsmusales@bsigroup.com.

**BSI Group Headquarters**

389 Chiswick High Road London W4 4AL UK

## Revisions

Our British Standards and other publications are updated by amendment or revision.

We continually improve the quality of our products and services to benefit your business. If you find an inaccuracy or ambiguity within a British Standard or other BSI publication please inform the Knowledge Centre.

## Copyright



## Useful Contacts:

**Customer Services**
**Tel:** +44 845 086 9001
**Email (orders):** orders@bsigroup.com
**Email (enquiries):** cservices@bsigroup.com

**Subscriptions**
**Tel:** +44 845 086 9001
**Email:** subscriptions@bsigroup.com

**Knowledge Centre**
**Tel:** +44 20 8996 7004
**Email:** knowledgecentre@bsigroup.com

**Copyright & Licensing**
**Tel:** +44 20 8996 7070
**Email:** copyright@bsigroup.com

bsi.

...making excellence a habit.™