SRI LANKA STANDARD 1025 PART 1: 2022
(IEC 60851-1: 2021)

METHODS OF TEST FOR WINDING WIRES
PART 1: GENERAL
(Second Revision)

SRI LANKA STANDARDS INSTITUTION

Sri Lanka Standard

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(IEC 60851-1: 2021)

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SRI LANKA STANDARDS INSTITUTION
No. 17, Victoria Place,
Elvitigala Mawatha,
Colombo 08.
SRI LANKA

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This Standard does not purport to include all the necessary provisions of a contract

Sri Lanka Standard
METHODS OF TEST FOR WINDING WIRES
PART 1: GENERAL
(Second Revision)

NATIONAL FOREWORD

This standard was approved by the Sectoral Committee on Electric Cables and Conductors and was authorized for adoption and publication as a Sri Lanka Standard by the Council of Sri Lanka Standards Institution on 2022-12-28.

This is the second revision of **SLS 1025: Part 1: 2009** and identical with **IEC 60851: Winding wires - Test Methods, Part 1: 2021 General, Edition 3.0**, published by the International Electrotechnical Commission (IEC).

TERMINOLOGY AND CONVENTIONS

The text of the International Standard has been accepted as suitable for publication, without deviation, as a Sri Lanka Standard. However, certain terminology and conventions are not identical with those used in Sri Lanka Standards; attention is therefore drawn to the following:

a) Wherever the words “International Standard” appear referring to this standard they should be interpreted as “Sri Lanka Standard”.

b) Wherever the page numbers are quoted they are the page numbers of IEC standard.

c) The comma has been used as a decimal marker. In Sri Lanka Standards it is the current practice to use a full point on the base line as a decimal marker.

CROSS REFERENCES

International Standards	**Corresponding Sri Lanka Standards**
IEC 60317: Specification for particular types of winding wires	SLS 1081: Specification for winding wires
IEC 60851: Winding wires – Test methods	SLS 1025: Methods of test for winding wires
Part 2: Determination of dimensions	Part 2: Determination of dimensions
Part 3: Mechanical properties	Part 3: Mechanical properties
Part 4: Chemical properties	Part 4: Chemical properties
Part 5: Electrical properties	Part 5: Electrical properties
Part 6 : Thermal properties	Part 6: Thermal properties

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INTERNATIONAL STANDARD

NORME INTERNATIONALE

Winding wires – Test methods – Part 1: General

Fils de bobinage – Méthodes d'essai – Partie 1: Généralités

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INTERNATIONAL STANDARD

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Winding wires – Test methods – Part 1: General

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WINDING WIRES – TEST METHODS –

Part 1: General

FOREWORD

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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IEC 60851-1 has been prepared by IEC technical committee 55: Winding wires. It is an International Standard.

This third edition cancels and replaces the second edition published in 1996, and its amendment 1:2003 and amendment 2:2009. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

a) revision to Clause 2 to update the list of normative references;
b) revision to 3.2 atmospheric conditions for testing;
c) addition to 3.2 with remarks concerning frequency and management of tests;
d) revision to Annex A to update the contents list of IEC 60851 series of tests.

The text of this International Standard is based on the following documents:

FDIS	Report on voting
55/1913/FDIS	55/1916/RVD

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/standardsdev/publications.

Annex A is for information only.

A list of all parts in the IEC 60851 series, published under the general title *Winding wires – Test methods*, can be found on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "http://webstore.iec.ch" in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

INTRODUCTION

This Part of IEC 60851 forms an element of a series of standards which deals with insulated wires used for windings in electrical equipment. It is composed of the following series:

1) *Winding wires – Test methods* (IEC 60851 series);
2) *Specifications for particular types of winding wires* (IEC 60317 series);
3) *Packaging of winding wires* (IEC 60264 series).

WINDING WIRES – TEST METHODS –

Part 1: General

1 Scope

This part of IEC 60851 specifies the general notes on methods of test for winding wires. It also gives the definitions for terms used in IEC 60851 (all parts). A survey of the contents of IEC 60851-2 to IEC 60851-6 is given in Annex A.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 60317 (all parts), *Specifications for particular types of winding wires*

IEC 60851-2:2009[1], *Winding wires – Test methods – Part 2: Determination of dimensions*
IEC 60851-2:2009/AMD1:2015
IEC 60851-2:2009/AMD2:2019

IEC 60851-3:2009[2], *Winding wires – Test methods – Part 3: Mechanical properties*
IEC 60851-3:2009/AMD1:2013
IEC 60851-3:2009/AMD2:2019

IEC 60851-4:2016, *Winding wires – Test methods – Part 4: Chemical properties*

IEC 60851-5:2008[3], *Winding wires – Test methods – Part 5: Electrical properties*
IEC 60851-5:2008/AMD1:2011
IEC 60851-5:2008/AMD2:2019

IEC 60851-6:2012, *Winding wires – Test methods – Part 6: Thermal properties*

3 Terms, definitions and general notes on methods of test

3.1 Terms and definitions

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

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1 A consolidated version of IEC 60851-2:2009 and its amendments exists.

2 A consolidated version of IEC 60851-3:2009 and its amendments exists.

3 A consolidated version of IEC 60851-5:2008 and its amendments exists.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at http://www.electropedia.org/
- ISO Online browsing platform: available at http://www.iso.org/obp

3.1.1
bonding layer
material which is deposited on an enamelled wire and which has the specific function of bonding wires together

3.1.2
bunched wire
winding wire consisting of a quantity of small diameter insulated wires laid-up together without predetermined geometrical position and with or without additional covering

3.1.3
class
thermal performance of a wire expressed by the temperature index and the heat shock temperature

3.1.4
coating
material which is deposited on a conductor or wire by suitable means and then dried and/or cured

3.1.5
conductor
bare metal after removal of the insulation

3.1.6
covering
material which is wound, wrapped or braided around a bare or insulated conductor

3.1.7
crack
opening in the insulation which exposes the conductor to view at the stated magnification

3.1.8
cure
process of converting a reactive compound into a stable, usable condition by polymerization (polycondensation and polyaddition) and/or crosslinking

[SOURCE: IEC 60050-212:2010, 212-13-07, modified – At the beginning of the definition, "convert a reactive compound" has been replaced by "process of converting a reactive compound" to define the term as a process.]

3.1.9
dual coating
insulation composed of two different materials, an underlying and a superimposed coating

3.1.10
enamelled wire
wire coated with an insulation of cured resin

3.1.11
grade
range of increase in dimension of the wire due to insulation

3.1.12
insulation
coating or covering of the conductor with the specific function of withstanding voltage

3.1.13
nominal conductor dimension
designation of the conductor size in accordance with the specification sheet in the IEC 60317 series

3.1.14
sole coating
insulation composed of one material

3.1.15
winding wire
wire used for winding a coil to provide a magnetic field

3.1.16
wire
conductor coated or covered with an insulation

3.1.17
normal vision
20/20 vision, with corrective lenses, if necessary

3.1.18
zero-defect wire
winding wire that exhibits no electrical discontinuities when tested under specific conditions

3.2 General notes on methods of test

Unless otherwise specified, all tests shall be carried out at a temperature from 15 °C to 40 °C and a relative humidity of 25 % to 75 %. Before measurements are made, the specimens shall be preconditioned under these atmospheric conditions for a time sufficient to allow the wire to reach stability.

The wire to be tested shall be removed from the packaging in such a way that the wire will not be subjected to tension or to unnecessary bends. Before each test, sufficient wire shall be discarded to ensure that any damaged wire is not included in the test specimens.

Normally, all mandatory requirements for a method of test are given in the description, and diagrams are intended only to illustrate one possible arrangement for conducting the test.

In case of inconsistencies between the IEC 60317 specification sheet and this document, the specification sheet shall prevail.

When the test is restricted only to certain types of winding wires, this is specified with the test.

Those tests of IEC 60851-2, IEC 60851-3, IEC 60851-4, IEC 60851-5 and IEC 60851-6 which in Annex A are marked with an asterisk are periodic conformance tests. These tests are carried out at a frequency agreed upon request of the end user.

The test numbers used in IEC 60851-2, IEC 60851-3, IEC 60851-4, IEC 60851-5 and IEC 60851-6 correspond with the clause numbers in the IEC 60317 series.

IEC winding wire standards do not specify how to deal with the management of tests (routine versus non-routine/periodic). These are certification issues not governed by the standards. In some countries, there are local rules that apply, but in general, decisions are taken by agreement between customer and supplier.

The scope of IEC standards encompasses only the product requirements and does not extend to the management of certification matters or supplier-customer agreements.

Annex A
(informative)

Contents of IEC 60851-2 to IEC 60851-6 with indication of tests

A.1 General

The tables of contents as given in Clause A.2 to Clause A.6 are not exhaustive.

A.2 IEC 60851-2

The contents shown below refers to IEC 60851-2:2009, IEC 60851-2:2009/AMD1:2015 and IEC 60851-2:2009/AMD2:2019.

A.3 IEC 60851-3

The contents shown below refers to IEC 60851-3:2009, IEC 60851-3:2009/AMD1:2013 and IEC 60851-3:2009/AMD2:2019.

1 Scope

2 Normative references

3 Test 6: Elongation

3.1 Elongation at fracture

3.2 Tensile strength

4 Test 7: Springiness

4.1 Round wire with a nominal conductor diameter from 0,080 mm up to and including 1,600 mm

4.2 Round wire with a nominal conductor diameter over 1,600 mm and rectangular wire

5 Test 8: Flexibility and adherence

5.1 Mandrel winding test

5.1.1 Round wire

5.1.2 Rectangular wire

5.1.3 Covered bunched wire

5.2 Stretching test (applicable to enamelled round wire with a nominal conductor diameter over 1,600 mm)

5.3 Jerk test (applicable to enamelled round wire with a nominal conductor diameter of up to and including 1,000 mm)

5.4 Peel test (applicable to enamelled round wire with a nominal conductor diameter of over 1,000 mm)

5.5 Adherence test

5.5.1 Enamelled rectangular wire

5.5.2 Impregnated fibre covered round and rectangular wire

5.5.3 Fibre covered enamelled round and rectangular wire

5.5.4 Tape wrapped round and rectangular wire (for adhesive tape only)

6 Test 11*: Resistance to abrasion (applicable to enamelled round wire)

7 Test 18: Heat or solvent bonding (applicable to enamelled round wire with a nominal conductor diameter over 0,050 mm up to and including 2,000 mm and to enamelled rectangular wire)

7.1 Vertical bond retention of a helical coil

7.2 Bond strength of a twisted coil

7.3 Enamelled rectangular wire heat bonding

Annex A (informative) – Bond strength of heat bonding wires

Annex B (informative) – Friction test methods

A.4 IEC 60851-4

The contents shown below refers to IEC 60851-4:2016.

A.5 IEC 60851-5

The contents shown below refers to IEC 60851-5:2008, IEC 60851-5:2008/AMD1:2011 and IEC 60851-5:2009/AMD2:2019.

A.6 IEC 60851-6

The contents shown below refers to IEC 60851-6:2012.

Bibliography

IEC 60264 (all parts), *Packaging of winding wires*

IEC 60851 (all parts), *Winding wires – Test methods*

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INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

3, rue de Varembé
PO Box 131
CH-1211 Geneva 20
Switzerland

Tel: + 41 22 919 02 11
info@iec.ch
www.iec.ch

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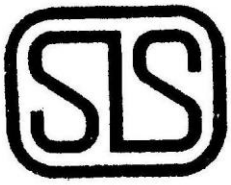

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SRI LANKA STANDARDS INSTITUTION

The Sri Lanka Standards Institution (SLSI) is the National Standards Organization of Sri Lanka established under the Sri Lanka Standards Institution Act No. 6 of 1984 which repealed and replaced the Bureau of Ceylon Standards Act No. 38 of 1964. The Institution functions under the Ministry of Technology.

The principal objects of the Institution as set out in the Act are to prepare standards and promote their adoption, to provide facilities for examination and testing of products, to operate a Certification Marks Scheme, to certify the quality of products meant for local consumption or exports and to promote standardization and quality control by educational, consultancy and research activity.

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In the International field the Institution represents Sri Lanka in the International Organization for Standardization (ISO), and participates in such fields of standardization as are of special interest to Sri Lanka.

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