

INTERNATIONAL STANDARD

Live working - Electrical insulating matting

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

Live working - Electrical insulating matting

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IEC 61111 has been prepared by IEC technical committee 78: Live Working. It is an International Standard.

This third edition cancels and replaces the second edition published in 2009. This edition constitutes a technical revision.

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

- a) review of the scope;
- b) introduction of AC/DC use and AC use only;
- c) verification of dated referenced standards;
- d) improvement of the marking;
- e) rewriting of the test for slip resistance;
- f) updating the use of IEC 61318;

- g) creation of an alternative test;
- h) revision and updating of Annexes A, B, C, D, F, G.

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

Draft	Report on voting
78/1559/FDIS	78/1584/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/publications.

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

- reconfirmed,
- withdrawn, or
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INTRODUCTION

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

The product covered by this document can 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 disposal statement in the instructions for use, this document 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.

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1 Scope

This document is applicable to electrical insulating matting made of flexible insulating material for use as a covering of the surface on which the worker is positioned and for worker's electrical protection on electrical installations up to 36 000 V AC for AC use or 36 000 V AC and 54 000 V DC for AC/DC use.

NOTE 1 The electric potential of the surface on which the worker is positioned is usually that of earth.

NOTE 2 See 4.2 for maximum use voltage.

NOTE 3 DC only rated matting is not specified in this document.

NOTE 4 This document does not cover the use of insulating blankets (see IEC 61112)

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 60060-1, *High-voltage test techniques - Part 1: General terminology and test requirements*

IEC 60060-2, *High-voltage test techniques - Part 2: Measuring systems*

IEC 60068-1, *Environmental testing - Part 1: General and guidance*

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

IEC 61318, *Live Working - Methods for assessment of defects and verification of performance applicable to tools, devices and equipment*

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

ISO 2592, *Petroleum and related products - Determination of flash and fire points - Cleveland open cup method*

ISO 2977, *Petroleum products and hydrocarbon solvents - Determination of aniline point and mixed aniline point*

ISO 3104, *Petroleum products - Transparent and opaque liquids - Determination of kinematic viscosity and calculation of dynamic viscosity*

ISO 4649:2017, *Rubber, vulcanized or thermoplastic - Determination of abrasion resistance using a rotating cylindrical drum device*

ISO 23529, *Rubber - General procedures for preparing and conditioning test pieces for physical test methods*

3 Terms and definitions

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

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

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

3.1

disruptive discharge

passage of an electric arc following electric breakdown

Note 1 to entry: The term “sparkover” is used when a disruptive discharge occurs in a gaseous or liquid dielectric.

Note 2 to entry: The term “flashover” is used when a disruptive discharge occurs at least partly along the surface of a solid dielectric surrounded by a gaseous or liquid medium.

Note 3 to entry: The term “puncture” is used when a disruptive discharge occurs through a solid dielectric producing permanent damage.

[SOURCE: IEC 60050-212:2010, 212-11-46, modified – Note to entry deleted and replaced by notes to entry 1,2 and 3]

3.2

elastomer

macromolecular material which returns after substantial deformation by a weak stress and release of the stress rapidly to approximately its initial dimensions and shape

Note 1 to entry: The definition applies to room temperature test conditions.

Note 2 to entry: Elastomer is a generic term that includes rubber, latex and elastomeric compounds that may be natural or synthetic or a mixture or a combination of both. It also includes thermoplastic elastomer (TPE) material.

[SOURCE: IEC 60050-212:2010, 212-14-05, modified – Note 2 to entry has been added.]

3.3

electrical insulating matting

flat protective cover made of flexible insulating material, used to provide electrical insulation between the feet of the worker and the surface on which the worker is standing

Note 1 to entry: The electric potential of the surface on which the worker is standing is usually that of earth.

[SOURCE: IEC 60050-651:2014, 651-22-13, modified – Note 2 to entry has been deleted]

3.4

international rubber hardness degree

IRHD

measure of hardness, the magnitude of which is derived from the depth of penetration of a specified indenter into a test piece under specified conditions

Note 1 to entry: The IRHD scale is such that 0 degrees represents a material showing no measurable resistance to indentation and 100 degrees represents a material showing no measurable indentation. The scale is described fully in ISO 48.

[SOURCE: ISO 1382:2020, 3.264]

3.5**nominal voltage of a system**

suitable approximate value of voltage used to designate or identify a system

[SOURCE: IEC 60050-601:1985, 601-01-21]

3.6**proof test**

<dielectric testing> test to demonstrate the safety of the equipment for work by evaluating the capability of the insulating material or product under prescribed test conditions to conform with applicable rating

Note 1 to entry: An AC proof test typically involves applying a voltage corresponding to a temporary overvoltage higher than the equipment's nominal operating voltage for a specified period.

Note 2 to entry: A DC proof test typically involves applying a voltage value gain from long time in-service testing experience corresponding to DC voltage level able to find harmful physical irregularities in insulating material with sufficient safety margin.

3.7**proof test voltage**

specified voltage that is applied to a device or test piece for the time defined under specified conditions to assure that the electrical strength of the insulation is above the applicable rating

3.8**routine test**

conformity test made on each individual item during or after manufacture

[SOURCE: IEC 60050-151:2001, 151-16-17]

3.9**withstand test**

<dielectric testing> test on insulating material or product made by applying a high voltage across the insulation to determine the adequacy of the dielectric strength

Note 1 to entry: The dielectric strength includes the material integrity.

Note 2 to entry: An AC withstand test typically involves applying a high voltage stress corresponding to a switching overvoltage.

Note 3 to entry: The value of the DC withstand test is gain from the experience testing and the knowledge of the insulating material quality and integrity.

3.10**withstand test voltage**

voltage that a test piece is required to withstand without disruptive discharge or other electric failure when voltage is applied under specified conditions

4 Requirements**4.1 General**

Electrical insulating matting shall be designed and manufactured to 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.

4.2 Electrical classification

The electrical insulating matting covered by this document shall be designated as follows:

- by electrical class as given in Table 1

Table 1 – Classes and maximum use voltages for electrical insulating matting

Class	Maximum use voltages for AC/DC used matting	Maximum use voltage for AC only used matting
0	1 000 V AC / 1 500 V DC	1 000 V
1	7 500 V AC / 11 250 V DC	7 500 V
2	17 000 V AC / 25 500 V DC	17 000 V
3	26 500 V AC / 39 750 V DC	26 500 V
4	36 000 V AC / 54 000 V DC	36 000 V

- by adding the suffix “C” to the class designation, in case of category C matting (resistance to extremely low temperature).

Additional guidance for the selection of electrical class is given in Annex A.

4.3 Physical requirements

4.3.1 Composition

The electrical insulating matting shall be manufactured of flexible insulating material such as elastomer.

Both sides of the electrical insulating matting shall be slip resistant. The slip resistance can be achieved with surface such as corrugated or diamond design.

Any insert shall not adversely affect the dielectric characteristics of the electrical insulating matting.

4.3.2 Shape

There is no requirement for the shape of the electrical insulating matting.

Electrical insulating matting can be supplied in either portable style or stationary style (in roll) to be cut for individual applications.

4.3.3 Dimensions and tolerances

4.3.3.1 Length and width

Electrical insulating matting of class 0, 1 and 2 shall not have length and width less than 600 mm.

Electrical insulating matting of class 3 and 4 shall not have length and width less than 914 mm.

Manufacturers shall provide the dimensions of the matting length and width. These dimensions for each matting shall be within a tolerance up to ± 2 % of the stated dimensions.

Portable matting shall have maximum dimensions of (width x length) less than or equal to 1 220 × 2 000 mm.

Stationary matting shall have longitudinal length above 2 000 mm.