

Blankets of insulating material for electrical purposes

ICS 29.035.01

National foreword

This British Standard reproduces verbatim IEC 61112:1992, including Corrigendum May 2000 and amendment 1:2002, and implements it as the UK national standard.

The start and finish of text introduced or altered by IEC amendment 1 is indicated in the text by tags **A1** **A1**.

The UK participation in its preparation was entrusted to Technical Committee PEL/78, Tools for live working, which has the responsibility to:

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pour travaux électriques**

**Blankets of insulating material
for electrical purposes**



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INTERNATIONAL ELECTROTECHNICAL COMMISSION

BLANKETS OF INSULATING MATERIAL FOR ELECTRICAL PURPOSES

FOREWORD

- 1) The IEC (International Electrotechnical Commission) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of the 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, the IEC publishes International Standards. 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. The 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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International Standard IEC 61112 has been prepared by IEC technical committee 78: Tools for live working.

This consolidated version of IEC 61112 is based on the first edition (1992) [documents 78(CO)64/FDIS and 78(CO)68/RVD], its corrigendum May 2000 and its amendment 1 (2002) [documents 78/437/FDIS and 78/458/RVD].

It bears the edition number 1.1.

A vertical line in the margin shows where the base publication has been modified by corrigendum and amendment 1.

Annexes A, B, C and D form an integral part of this International Standard.

Annexes E, F and G are for information only.

The committee has decided that the contents of the base publication, its corrigendum and its amendment will remain unchanged until 2004. At this date, the publication will be

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- withdrawn;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

BLANKETS OF INSULATING MATERIAL FOR ELECTRICAL PURPOSES

1 Scope

This International Standard is applicable to insulating blankets for the protection of workers from accidental contact with live or earthed electrical conductors, apparatus or circuits and avoidance of short circuits on a.c. and d.c. installations.

1.1 Classes

Five classes of blankets, differing in electrical characteristics, are provided and designated as class 0, class 1, class 2, class 3 and class 4.

1.2 Categories

Six categories of blankets different in properties related to acid, oil, ozone, mechanical puncture and a combination of oil and ozone are provided and designated categories A, H, Z, M, S respectively, and also extreme low temperature designated category C.

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 60050(121):1978, *International Electrotechnical Vocabulary (IEV) Chapter 121: Electromagnetism*

IEC 60050(151):1978, *International Electrotechnical Vocabulary (IEV) Chapter 151: Electrical and magnetic devices*

IEC 60050(601):1985, *International Electrotechnical Vocabulary (IEV) Chapter 601: Generation, transmission and distribution of electricity – General*

IEC 60060-1:1989, *High-voltage test techniques – Part 1: General definitions and test requirements*

IEC 60060-3:1976, *High-voltage test techniques – Part 3: Measuring devices*

IEC 60160:1963, *Standard atmospheric conditions for test purposes*

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

Ⓐ IEC 60417 (all parts), *Graphical symbols for use on equipment* Ⓐ

IEC 61318:1994, *Live working – Guidelines for quality assurance plans*

ISO 472:1988, *Plastics – Vocabulary. Bilingual edition*

ISO 2592:1973, *Petroleum products – Determination of flash and fire points – Cleveland open cup method*

ISO 2859-1:1999, *Sampling procedures for inspection by attributes – Part 1: Sampling schemes indexed by acceptance quality limit (AQL) for lot-by-lot inspection*

ISO 2977:1989, *Petroleum products and hydrocarbon solvents – Determination of aniline point and mixed aniline point*

ISO 3104:1976, *Petroleum products – Transparent and opaque liquids – Determination of kinematic viscosity and calculation of dynamic viscosity*

ISO 9000:1987, *Quality management and quality assurance standards – Guidelines for selection and use*

ISO 9001:1987, *Quality systems – Model for quality assurance in design/development, production, installation and servicing*

ISO 9002:1987, *Quality systems – Model for quality assurance in production and installation*

ISO 9003:1987, *Quality systems – Model for quality assurance in final inspection and test*

3 Definitions

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

3.1

elastomer

a generic term that includes rubbers, latex and elastomeric compounds that may be natural, or synthetic, or a mixture, or a combination of both

3.2

plastic

a material which contains as an essential ingredient a high polymer and which at some stage of its processing into finished products can be shaped by flow

[ISO 472]

3.3

electrode clearance

the shortest path from the energized electrode to the ground electrode

3.4

electrical puncture

a disruptive breakdown through a solid insulant

[IEV 121-03-13]

3.5

flashover

an arc by-passing an insulating body [IEV 121-03-14] and occurring between electrodes and over or around, but not through, the equipment being tested

3.6**nominal voltage**

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

[IEV 601-01-21]

3.7**acceptance test**

a contractual test to prove to the customer that the device meets certain conditions of its specification

[IEV 151-04-20]

3.8**proof test voltage**

the specified voltage that is applied to a device for the time defined under specified conditions to assure that the electrical strength of the insulation is above a specified value

3.9**type test**

a test of one or more devices made to a certain design to show that the design meets certain specifications

[IEV 151-04-15]

3.10**routine test**

a test to which each individual device is subjected during or after manufacture to ascertain whether it complies with certain criteria

[IEV 151-04-16]

3.11**sampling test**

a test performed on a number of devices taken at random from a batch

[IEV 151-04-17]

3.12**withstand test voltage**

the voltage that the device must withstand without flashover, disruptive discharge, puncture or other electric failure when voltage is applied under specified conditions

4 Composition

The blankets shall be manufactured of elastomer or plastics and produced by seamless process. Where eyelets are provided in blankets they shall be non-conductive and shall be nominally 8 mm in diameter.

5 Classification

The blankets covered under this standard shall be designated as follows:

- by class as class 0, class 1, class 2, class 3 and class 4;
- by category by the addition of a suffix as shown in table 1.

Guidance as to use of blankets in relation to nominal voltage of a system is given in annex E.

Guidance as to temperature range at which blankets can be used is given in annex G.

Table 1 – Designation of special properties

Category	Characteristics
A	Resistant to acid
H	Resistant to oil
Z	Resistant to ozone
M	Resistant to mechanical puncture (higher level reinforced)
S	Resistant to oil and ozone
C	Resistant to extreme low temperatures
NOTE 1 Category S combines the characteristics of categories H and Z.	
NOTE 2 Any combination of categories may be used.	

6 Physical requirements

6.1 Shape

Blankets may be either of specific shapes or in rolls to be cut for individual requirements.

Those of specific shapes may be plain (see figure 1) or of the slotted design (see figure 2).

6.2 Dimensions

Dimensions and tolerances are indicated in table 2.

Table 2 – Recommended dimensions and tolerances

Dimensions**				
Plain		Slotted		Rolls
Length mm	Width mm	Length mm	Width mm	Width mm
910	305	—	—	60*, 90*, 1 000, 1 300, 2 000
560	560	560	560	
910	690	910	910	
910	910	—	—	
2 280	910	1 160	1160	
* To be produced in class 0 only.				
** Permissible variations in length and width shall be ±15 mm except for the 1 160 mm × 1 160 mm slotted size for which the permissible variation shall be ±25 mm. Permissible variations for rolls of 60 mm and 90 mm in width shall be ±2 mm.				

6.3 Thickness

6.3.1 The maximum thickness of a blanket shall be as given in table 3 in order to obtain appropriate flexibility.

Table 3 – Maximum thickness

Class	Maximum Elastomere mm	Maximum Plastic mm
0	2,2	1,0
1	3,6	1,5
2	3,8	2,0
3	4,0	1) ¹⁾
4	4,3	1)
1) Under consideration.		

6.3.2 The minimum thickness shall be determined only by the ability to pass the tests defined in clauses 7 and 8.

6.3.3 Blankets of categories A, H, M, S and Z may require additional thickness which shall not exceed 0,6 mm.

6.4 Workmanship and finish

Blankets shall be free on both surfaces from harmful physical irregularities that can be detected by thorough test and inspection.

Harmful physical irregularities shall be defined as any feature that disrupts the uniform, smooth surface contour, such as pinholes, cracks, blisters, cuts, conductive embedded foreign matter, creases, pinch marks, voids (entrapped air), prominent ripples and prominent mould marks.

Non-harmful physical irregularities shall be defined as surface irregularities present on either surface of the blanket due to imperfections on forms or moulds or other imperfections inherent to the manufacturing process. These irregularities appear as mould marks that look like cuts even though they are actually a raised ridge of elastomer, indentations, or protuberances that are acceptable provided that:

- a) the depression is not larger than 1,6 mm in diameter, has rounded edges and no visible break in the surface, and cannot be seen on the opposite side when stretching over the thumb;
- b) there are not more than five depressions as described in a) anywhere on the blanket or on the roll section under test and any two are separated by at least 15 mm;
- c) the indentations, protuberances or mould marks tend to blend into a smooth surface upon stretching of the material;
- d) the small projections or protuberances represent only a small amount of excess material that cannot be readily removed with the finger and these projections do not appreciably affect the stretching of the material.

6.5 Marking

6.5.1 Each blanket which is claimed to comply with the requirements of this standard shall be marked with the following:

- a)  symbol IEC-60417-5216 – Suitable for live working; double triangle (see annex A);
- b) number of the relevant IEC standard immediately adjacent to the symbol;
- c) name, trademark, or identification of the manufacturer;
- d) category, if applicable;
- e) size (length and width);
- f) class;
- g) month and year of manufacture. 

In addition each blanket shall have a group of rectangles or other suitable means to identify when the blanket was put into service and the dates of periodic inspection and testing.

In the case of rolls and sheets, they shall be marked on one border at least every metre with the category and class.

6.5.2 The marking shall be clearly visible, durable and shall not impair the quality of the blanket.

The durability of the marking is checked by rubbing the marking for 15 s with a piece of lint-free cloth soaked in soapy water and then rubbing it for further 15 s with a piece of lint-free cloth soaked in ethylated alcohol. At the end of the test, the marking must remain legible.

6.5.3 Any additional marking shall be subject to agreement between the manufacturer and the customer.

6.5.4 When a colour code is used, the colour of the symbol (double triangle) shall correspond to the following code:

Class 0 – red

Class 1 – white

Class 2 – yellow

Class 3 – green

Class 4 – orange

6.6 Packaging

Blankets shall be packaged in an individual container or package of sufficient strength to properly protect the blankets from damage. The outside of the container or package shall be marked with the name of the manufacturer or supplier, classification, category, size and quantity.

At the request of the customer, information contained in annex G and any additional or amended instructions shall be included in the package.

7 Tests on blankets

7.1 General

There are four kinds of tests: type, routine, sampling and acceptance. These are defined in clause 3.

Each of the following clauses defines whether type, routine or sampling tests are required.

In order to carry out the type tests, it is necessary to have:

- eight blankets to cover all tests common to all categories of blankets and those for categories C and M;
- four additional blankets for those of category A;
- four additional blankets for those of category H;
- one additional blanket for those of category Z;
- thirteen blankets to cover all tests of those of category S.

The allotment of these blankets in various testing lots and the order in which these tests are carried out are given in annex B.

The test location conditions shall be in accordance with IEC 60160, clause 4.