SLOVENSKI STANDARD
SIST ENV 61112:2002

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Blankets of insulating material for electrical purposes

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Abdecktücher aus isolierendem Material zum Arbeiten unter Spannung

Nappes en matériau isolant pour travaux électriques

Ta slovenski standard je istoveten z: **ENV 61112:2001**

ICS:

13.260	Varstvo pred električnim udarom. Delo pod napetostjo	Protection against electric shock. Live working

SIST ENV 61112:2002 **en**

EUROPEAN PRESTANDARD **ENV 61112**

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ICS 13.260

English version

Blankets of insulating material for electrical purposes
(IEC 61112:1992 + corrigendum 2000, modified)

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(IEC 61112:1992 + Corrigendum 2000, modifiziert)

This European prestandard was approved by CENELEC on 2001-03-24 as a prospective standard for provisional application. The period of validity of this ENV is limited initially to three years. After two years the members of CENELEC will be requested to submit their comments, particularly on the question whether the ENV can be converted into a European Standard (EN).

CENELEC members are required to announce the existence of this ENV in the same way as for an EN and to make the ENV available promptly at national level in an appropriate form. It is permissible to keep conflicting national standards in force (in parallel to the ENV) until the final decision about the possible conversion of the ENV into an EN is reached.

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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

Ref. No. ENV 61112:2001 E

Foreword

The text of the International Standard IEC 61112:1992 + corrigendum May 2000, prepared by IEC TC 78, Tools for live working, together with the common modifications prepared by the Technical Committee CENELEC TC 78, Equipment and tools for live working, was submitted to the CENELEC questionnaire and vote procedure and was approved by CENELEC as ENV 61112 on 2001-03-24.

The following date was fixed:

- latest date by which the existence of the ENV has to be announced at national level (doa) 2001-07-01

Annexes designated "normative" are part of the body of the prestandard.
Annexes designated "informative" are given only for information.
In this prestandard, annexes A, B, C, D, E and ZA are normative, annexes F, and G are informative.
Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 61112:1992 + corrigendum May 2000 was approved by CENELEC as a European Prestandard with agreed common modifications as given below.

COMMON MODIFICATIONS

Contents

Add "and tolerances" to the title of 6.2.

Replace the title of 8.5 by "Category M: Mechanical puncture resistance".

Add "(normative)" after annex A, annex B, annex C, annex D and annex E.

Add "(informative)" after annex F and annex G.

Add a new annex ZA

Annex ZA (normative) - Normative references to international publications with their corresponding European publications

1 Scope

1.1 **Replace** the text by:

Six classes of blankets differing in electrical characteristics, are provided and designated as class 00, class 0, class 1, class 2, class 3 and class 4.

2 Normative references

Replace by:

NOTE Normative references to International publications are listed in annex ZA (normative).

3 Definitions

3.6 **Replace** "*nominal voltage" by "nominal voltage of a system".*

3.8 **Replace** by:

3.8
proof test
a test during which a specified voltage is applied to a device for the time defined under specified conditions to assure that the electrical strength of the insulation is above the specified value

3.12 **Replace** by:

3.12
withstand test
a test during which the device must withstand without flashover, disruptive discharge, puncture or other electric failure a voltage applied under specified conditions

Add:

3.13
usable area
the blanket area that protects the worker against electric shock and that is verified by the proof test

4 **Add** at the end of the paragraph: « They should not reduce the electrode clearance ».

5 **Classification**

Replace the first line starting with a dash by:

- by class as class 00, class 0, class 1, class 2, class 3 and class 4;

Replace the second paragraph by:

Guidance for the selection of class is given in annex E.

Delete in Table 1, for M, "(higher level reinforced)".

6 **Physical requirements**

Replace 6.2, 6.3, including Table 3, and 6.4 by:

6.2 *Dimensions and tolerances*

Recommended dimensions for blankets are indicated in Table 2.

Table 2 - Recommended dimensions for blankets

Plain blanket		Slotted blanket		Blanket in 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	1 160	
* To be produced in class 00 and class 0 only				

Permissible variations in length and width shall be ± 15 mm except for the 1 160 mm x 1 160 mm slotted size for wich the permissible variation is ± 25 mm. Permissible variations for rolls of 60 mm and 90 mm in width shall be ± 2 mm

For blankets with dimensions different from those recommended in Table 2, tolerances of ± 2 % are required.

6.3 *Thickness*

6.3.1 The maximum thickness of a blanket shall be limited in order to obtain appropriate flexibility and in order to pass the test defined in 7.6.2 (low temperature test).

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

6.4 *Workmanship and finish*

Blankets shall be free on both surfaces from harmful physical irregularities that can be detected by the tests carried out according to this prestandard.
Harmful and non-harmful physical irregularities are described in annex G (In-service recommendations).

Add at the end of the subclause:

« Where eyelets are present, they should not reduce the electrode clearance ».

6.5 **Replace** 6.5.1 by:

6.5.1 Each blanket which is claimed to comply with the requirements of this Prestandard shall be marked at least on one surface with the following:

a) symbol (double triangle) (see annex A);
b) name, trademark, or identification of the manufacturer;
c) category, if applicable;
d) size (length and width);
e) class designation;
f) month and year of manufacture;
g) usable area (see Figures 1 and 2), except for class 00 and class 0. (On rolls the usable area shall be marked along the two sides only).

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.

The usable area shall be visibly and permanently identified, for example by a line around the usable area which has a minimum thickness of 3 mm.

In the case of rolls, they shall bear on one border at least every metre all the above markings, except d).

6.5.2 **Delete** the second paragraph.

6.5.4 **Add** "and of the limit of usable area" after "(double triangle)".

Add in the second paragraph "Class 00 - beige".

6.6 **Replace** in the first paragraph "an individual container or package" by "containers or packages".

Add after the first paragraph:

Instructions for use shall be included in the package.

7 **Tests on blankets**

7.1 **Replace** in the second paragraph the word "clauses" by "subclauses".

Replace the last three paragraphs by:

The test location conditions shall be in accordance with IEC 60160, clause 4 (temperature from 15 °C to 35 °C and relative humidity from 45 % to 75 %).

Unless otherwise specified, blankets shall be conditioned for a period of 2 h ± 0,5 h at a temperature of 23 °C ± 2 °C and relative humidity of 50 % ± 5 % (see IEC 60212, standard atmosphere B).

Conditioning shall be performed on complete blankets or on test pieces.

Unless otherwise specified, the tolerances for any measured value shall be ± 5 %.

In case of rolls having a width less than 150 mm, the test piece shall have one dimension equal to the width.

Samples, units and test pieces submitted to non destructive tests can be re-used for other tests. Samples, units and test pieces submitted to destructive tests shall be scrapped.

7.2.3 **Replace** by "Void".

7.2.5 **Replace** the text by:

Type test and routine test (see 6.5)

The marking shall be verified by visual inspection and durability test for type test. (« visual inspection » means inspection by a person with normal vision without additional magnification). No durability test is required for routine test.

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 a further 15 s with a piece of lint-free cloth soaked in ethyl alcohol. At the end of the test, the marking shall remain legible.

7.3.2 **Replace** the last paragraph before the notes by:

The average of the four test pieces shall not be less than 150 %.

7.3.3 **Add** in the first paragraph "(max. 25 mm)", after "6 mm".

Replace in the last paragraph "class 0" by "class 00 or class 0".

Add a note at the end of the subclause:

NOTE The test procedure and the proposed values are under consideration.

7.3.4 **Replace** the first sentence by:

This test applies only to blankets made of elastomer.

7.3.5 **Delete** the second sentence of the second paragraph.

7.4.1 **Replace** the text by:

Dielectric testing shall be carried out either at a.c. or d.c. voltage. The choice of a.c. or d.c. shall be made between manufacturer and customer.

NOTE The equivalence of d.c. tests and a.c. tests is under consideration. The values of d.c. test voltages are under consideration.

For type tests three blankets are used. For routine tests one blanket is sufficient. For sampling tests the number is given in annex D (sample size).

The peak (crest) or r.m.s. value of the a.c. voltage shall be measured with an error of not more than 3 % (IEC 60060-3).

For type and sampling tests the blankets shall be conditioned for moisture absorption by total immersion in a bath of tap water at room temperature, as specified in 7.1, for a period of 16 h ± 0,5 h. Insulating compounds used in the finishing process (e.g. paraffin and talcum powder) should be removed before the test is commenced with suitable solvents. After the conditioning the blanket shall be wiped and immediately submitted to the dielectric test.

For routine tests such conditioning is not required.

Electrodes shall be of such design so as to apply the electrical stress uniformly over the test area without producing corona at any point or mechanical strain in the material.

Table 4 **Delete**.

7.4.2.1 **Replace** by:

7.4.2.1 *For proof test*

The ground electrode is a metal plate having dimensions exceeding at least by 20 mm on each side the dimensions of the blanket under test.

In case of tests on rolls the ground electrode shall be able to contain at least a length of blanket equal to its width.

The live electrode is a conductive plate, having smoothly rounded edges (3 mm radius) and corners (4,5 mm radius), of a size that covers and maximizes the usable area.

The blanket under test is placed over the ground electrode, while the live electrode is placed over the usable area. The full usable area shall be tested.

In case of tests on class 00 and class 0 blankets clearance around the live electrode not exceeding 10 mm is permitted.

7.4.2.2 **Replace** by "Void".

7.4.2.3 **Replace** by:

7.4.2.3 *For withstand test*

The electrode shall consist of two metal cylinders with the sharp edges removed to give a radius of 3 mm. One electrode shall be 25 mm in diameter and 25 mm high.

The other electrode shall be 75 mm in diameter and 15 mm high. These electrodes shall be arranged coaxially as in Figure 7.

7.4.4 **Replace** by "Void".

7.4.5 **Replace** by:

7.4.5 *Electrical test procedures*

7.4.5.1 *Test equipment*

The test equipment shall comply with IEC 60060-1.

7.4.5.2 *Proof test procedure*

Type test, routine test and sampling test

Each blanket shall be given a voltage test as specified in Table 3 using electrodes as specified in 7.4.2.1. The a.c. voltage shall be initially applied at a low value and gradually increased at a constant rate-of-rise of approximately 1 000 V/s until the specified test voltage level is reached. The test period shall be considered to start at the instant the specified test voltage is reached. The test is deemed successful if the specified test voltage is reached and maintained for 3 min for the type and sampling tests and 1 min for the routine test without the occurrence of flashover, disruptive discharge, electrical puncture or other electrical failure.

NOTE 1 At the end of the test period the applied voltage should be reduced at the above mentioned constant rate to approximately half value before opening the test circuit unless an electrical failure has already occured.

NOTE 2 For continuous testing of blankets in roll form, the rate of voltage-rise and reduction should apply to the beginning and end of the roll under test.

7.4.5.3 *Withstand test procedure*

Type test and sampling test

Five test pieces having dimensions of 150 mm x 150 mm are cut from each blanket.

NOTE In case of rolls having a width less than 150 mm, the test pieces will have the two dimensions equal to the width.

The test pieces are placed between metallic electrodes as specified in 7.4.2.3 and the whole arrangement is dipped in a liquid insulant (for instance, insulating oil). The test pieces shall not touch the wall of the tank.

Only one voltage rise is applied to each test piece. The voltage shall be applied to each test piece at a constant rate-of-rise of approximately 1 000 V/s until the withstand voltage value given in Table 5 is reached. The voltage is immediately reduced at the above mentioned constant rate to approximately half value and then the test circuit is opened. The test is deemed successful if no electrical puncture occurs.

7.4.6 **Replace** by “Void”.

Replace Table 5 by:

Table 3 - Test voltage

Class of blankets	AC voltage r.m.s. kV	
	Proof test	Withstand test
00	2,5	5
0	5	10
1	10	20
2	20	30
3	30	40
4	40	50

7.5 **Replace** the first two paragraphs by:

For elastomer, eight dumb-bell test pieces shall be cut as shown in Figure 3.

For plastics, four dumb-bell test pieces shall be cut as shown in Figure 3 and four more test-pieces as shown in Figure 5.

Replace in the sixth paragraph "three test pieces" by "four test pieces".

7.6.2 **Replace** the first sentence by:

For the type test, three blankets or three units from the roll are used. For rolls the unit is a square with the side equal to the width of the roll itself.

Replace in the last paragraph "proof voltage test" by "proof test".

Add a new subclause:

7.6.3 *Compression test at high temperature*

(under consideration)

8 **Tests on blankets with special properties**

8.2 **Replace** the second and the third paragraphs by:

Four test pieces of 150 mm x 150 mm shall be cut from the blankets of category A and shall be conditioned by immersing in 32 ° Baumé sulphuric acid solution at a temperature of 23 °C ± 2 °C for 8 h ± 0,5 h. Following acid conditioning, the tests pieces shall be rinsed in water and dried for 2 h ± 0,5 h at approximately 70 °C.

Time elapsed between end of drying and start of testing shall be 45 min ± 15 min. Tests shall then be carried out on three test pieces for withstand tests according to 7.4.2.3 but without conditioning for moisture absorption and on one test piece for tensile strength and elongation at break of the mechanical tests (see 7.3.2). The values obtained for the mechanical tests shall not be less than 75 % of values obtained in the tests carried out on a sample from the same batch without acid conditioning.

8.3 **Replace** the second and the fifth paragraphs by:

Four test pieces of 150 mm x 150 mm shall be cut from the blankets of category H and shall be preconditioned in air for not less than 3 h ± 0,5 h at 23 °C ± 2 °C, and 50 % ± 5 % relative humidity, then shall be conditioned by immersing in oil N° 1 (see annex B) at a temperature of 70 °C ± 2 °C for 24 h ± 0,5 h.

Tests shall then be carried out on three test pieces for withstand tests according to 7.4.2.3 but without conditioning for moisture absorption and on one test piece for tensile strength and elongation at break of the mechanical tests (see 7.3.2). The values obtained for the mechanical tests shall not be less than 50 % of values obtained in the tests carried out on a sample from the same batch without acid conditioning.

8.4 **Replace** by:

A test piece from the blanket of category Z of 12 mm x 100 mm shall be conditioned at an extension of 20 % in an oven for 8 h ± 0,5 h at a temperature of 40 °C ± 2 °C and an ozone concentration of 1 mg/m³ ± 0,01 mg/m³ (0,54 ppm ± 10 % by volume) at standard atmospheric pressure of 1 013 mbar (101,3 kPa).

After completion of this test, the test piece shall exhibit no cracks under visual inspection.

8.5 **Replace** the title by "*Category M: Mechanical puncture resistance*".

8.7 **Replace** in the last paragraph "(see 7.4)" by "(see 7.4.5.2)".

9 Quality assurance plan and acceptance test

Replace by:

9.1 *General*

In order to assure the delivery of products that meet this Prestandard, the manufacturer shall employ an approved quality assurance plan that complies with the provisions of the ISO 9000 series.

The quality assurance plan shall ascertain that the products meet the requirements contained in this Prestandard.

In the absence of an accepted quality assurance plan as specified above the sampling procedure detailed in annex D shall be carried out.

9.2 *Acceptance tests*

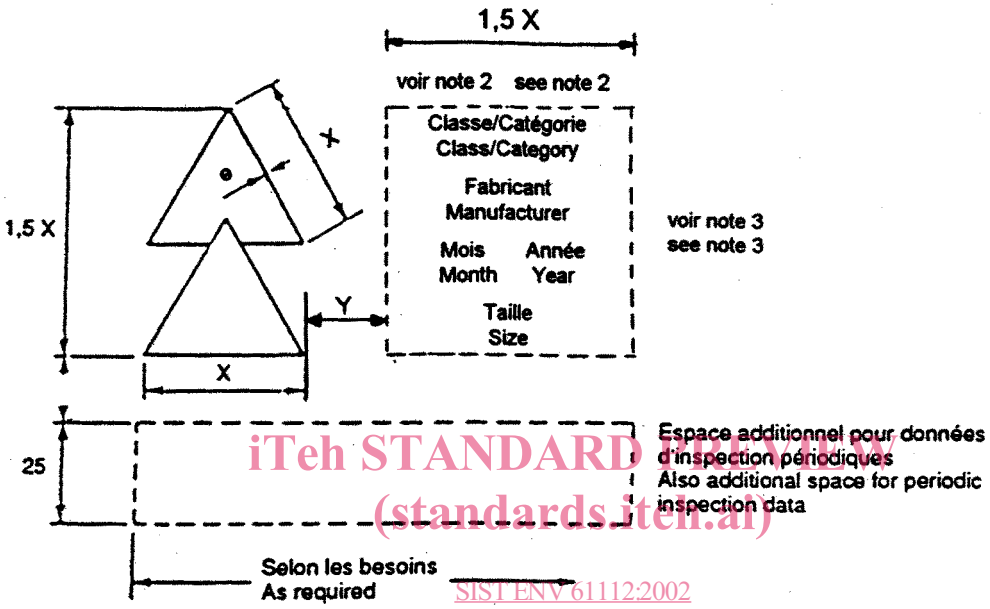
The manufacturer shall keep for inspection by the customer, all test results in accordance with the manufacturer's quality control procedures (see annex F).

Annex A **Replace** the annex by:

Annexe A / Annex A
(normative)

Symbole de marquage
double triangle

Marking symbol
double triangle



NOTES

1 - Toutes les dimensions sont en millimètres;
Les tolérances sont 10 %.

2 - L'emplacement des données dans l'espace d'inscription est donné à titre indicatif.
Un emplacement additionel est aussi prévu sous le symbole graphique.

3 - Au maximum 32 lettres.

4 - Dimensions:
X peut valoir 16, 25 ou 40
Y = X/2
e = épaisseur minimale du trait = 1 mm.

5 - L'emplacement des symboles peut être à l'intérieur de la zone d'utilisation mais pas plus près que 2,5 mm du trait matérialisant la zone d'utilisation (ou du bord pour la classe 0).

NOTES

1 - All dimensions are in millimetres;
tolerances are ± 10 %.

2 - The position of information inside the space provided is for information only. Additional space is also provided below the graphical symbol.

3 - Maximum is 32 letters.

4 - Dimensions:
X may be 16, 25 or 40
Y = X/2
e = minimum thickness of the line = 1 mm.

5 - Location of symbols should be inside the usable area and not closer than 2,5 mm from the line detecting the usable area (or from the border for class 0)

Figure A.1 - Symboles et emplacement des symboles
Symbols and symbols location

Annex B **Replace** the annex by:

Annex B
(normative)

General test procedure

Table B.1 - List and classification of tests

Description of test	Subclause	Type tests							Routine tests
		Lot 1	Lot 2	Lot 3	Lot 4	Lot 5 A	Lot 6 H	Lot 7 Z	
Visual (7.2)									
Shape	7.2.1	1							
Dimensions	7.2.2	2							
Workmanship and finish	7.2.4	3	1	1	1	1	1	1	
Marking	7.2.5	4							1
Packaging	7.2.6	5							
Mechanical (7.3)									
Tensile strength and elongation	7.3.2	6							
Puncture resistance	7.3.3	7 a)							
Tension set	7.3.4	8 a)							
Tear resistance	7.3.5	8 a)							
Dielectric (7.4)									
Proof	7.4.5.2		2 b)						2 b)
Withstand	7.4.5.3		2 b)						2 b)
Ageing (7.5)	7.5			2					
Thermal (7.6)									
Flame retardance test	7.6.1	9							
Low temperature	7.6.2				2 d)				
Special properties (8)									
Category A: Acid resistance	8.2					2			
Category H: Oil resistance	8.3						2 e)		
Category Z: Ozone resistance	8.4							2 f)	
Category M: Mechanical	8.5	7 c)							
Category S: Oil, ozone resistance	8.6						2 e)	2 f)	
Category C: Extreme low temperature resistance	8.7				2 d)				
Size of each lot (unit is the blanket)		1	3	1	3	4	4	1	

The numbers given in the table indicate the order in which the tests are to be made.

a) The applicability of the test depends on the material from which the blankets are made of.

b) By agreement between the manufacturer and the customer, either the a.c. tests or the d.c. tests shall be used. In routine tests, only the proof test is carried out.

c) Values specified are different in case of blankets of category M.

d) Values specified are different in case of blankets of category C.

e) Test is performed according to 8.3 for category H or 8.6 for category S.

f) Test is performed according to 8.4 for category Z or 8.6 for category S.

NOTE 1 The rules governing the acceptance tests are given in annex F.

NOTE 2 The sampling tests are the same as those for type tests.

NOTE 3 The size of each lot for sampling tests is given in annex D.

NOTE 4 Blankets which have been subjected to destructive type tests or sampling tests shall not be re-used.

Annex D

D.1 **Replace** by:

The quality assurance system shall integrate the requirements of the sampling plan as given in annex F. The sampling procedure does not follow the guidance provided in IEC 60410, because the nature of the product, the safety of the personnel involved and the quantity produced do not lend themselves to the application of this Prestandard in its entirety. Since these important distinctions exist, special individual quality assurance measures are herein incorporated.

Every lot consists of blankets of the same class and category.

D.2 **Replace** the first sentence by:

Defects are classified as to whether they are critical, major or minor.

a) Defects of critical nature - For this condition, each unit shall be tested (routine test).

b) Defects of a major and minor nature - In this case, tests (whether they are destructive or not) shall be carried out on samples only (sampling test). The acceptable quality level is selected depending on whether the defects are major or minor.

Table D.1 - Classification of defects

Add a column under "Type of defect" : "Critical".

Replace the lines of "Visual" by:

Type of test	Subclause	Minor	Major	Critical
Visual (7.2)				
Shape	7.2.1	X		
Dimensions	7.2.2	X		
Workmanschip and finish	7.2.4	X		
Marking	7.2.5	X		
Packaging	7.2.6	X		

Move for all tests under "Mechanical" the "X" mark from "Major" to "Minor".

Replace the lines of "Dielectric" by:

Type of test	Subclause	Minor	Major	Critical
Dielectric (7.4)				
proof (1 min)	7.4.5.2			X
proof (3 min)	7.4.5.2		X	
withstand	7.4.5.3		X	

D.3.1 **Add** to the title of Table D.2: "(AQL 10)".

Replace in Table D.2 the line for lot size "2 to 90" by:

Lot size	Sample size	Number of defects for acceptance	Number of defects for rejection
2 to 90	5	0	1

D.3.2 **Add** to the title of Table D.3: "(AQL 4)".

D.5 **Delete** in the last paragraph "in accordance with 7.4".