



SLOVENSKI STANDARD
SIST EN 61229:2001

01-september-2001

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Rigid protective covers for live working on a.c. installations

Starre Schutzabdeckungen zum Arbeiten unter Spannung in Wechselspannungsanlagen

Protecteurs rigides pour travaux sous tension sur des installations à courant alternatif

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Ta slovenski standard je istoveten z: **EN 61229:1995**

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ICS:

13.260 Xæ•ç[Á!^áÁ|^\ dā} ā Protection against electric
~ áæ[{ ÉÖ^|[Á[áÁ æ^q •dø shock. Live working

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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 61229

December 1995

ICS 13.340.20

Descriptors: Hot-line works, safety device, rigid protective cover, performance evaluation, tests

English version

**Rigid protective covers for live working on a.c. installations
(IEC 1229:1993, modified)**

Protecteurs rigides pour travaux sous
tension sur des installations à courant
alternatif
(CEI 1229:1993, modifiée)

Starre Schutzabdeckungen zum
Arbeiten unter Spannung in
Wechselspannungsanlagen
(IEC 1229:1993, modifiziert)

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This European Standard was approved by CENELEC on 1995-07-04. 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, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

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

Foreword

The text of the International Standard IEC 1229:1993, prepared by IEC TC 78, Tools for live working, together with common modifications prepared by the Technical Committee CENELEC TC 78, was submitted to the formal vote and was approved by CENELEC as EN 61129 on 1995-07-04.

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) 1996-07-01
- latest date by which national standards conflicting with the EN have to be withdrawn (dow) 1996-07-01

For products which have complied with the relevant national standard before 1996-07-01, as shown by the manufacturer or by a certification body, this previous standard may continue to apply for production until 2001-07-01.

Annexes designated "normative" are part of the body of the standard.

Annexes designated "informative" are given only for information.

In this standard, annexes A to G and ZA are normative and annexes H to K are informative. Annex ZA has been added by CENELEC.

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Endorsement notice

The text of the International Standard IEC 1229:1993 was approved by CENELEC as a European Standard with agreed common modifications as given below.

COMMON MODIFICATIONS**CONTENTS**

Replace the title of clause 6 by:

6 Tests

Add a new clause 11:

11 Quality assurance plan

Add in the list of annexes the word "normative" as follows:

Annex A (normative)

Annex B (normative)

Annex C (normative)

Annex D (normative)

Annex E (normative)

Annex F (normative)

Replace the title of annex G by:

Annex G (normative) Electrical limits for the use of rigid protective covers

Add in the list of annexes the word "informative" as follows:

Annex H (informative)

Annex J (informative)

Annex K (informative)

Add in the list of annexes:

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

2 Normative references

Add at the end of the list:

ISO 9000, series, Quality management and assurance standards

ENV 50196:1995, Live working - Required insulation level and related air distances - Calculation method

4 Classification

a) by type:

Add the following after the types listed:

Other types of rigid cover additional to those listed above can be designed and tested in accordance with this standard.

Change the last sentence into a note, **replace** the colon by a full stop.

b) by class:

Replace the present text, including the note, by:

b) by class, depending on the electrical limits of use as specified in annex G: class 0, class 1, class 2, class 3, class 4 and class 5.

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6 Replace the title by "Tests".

6.4.1 Replace the text of this subclause by:

The following tests shall be performed in accordance with IEC 60-1.

6.4.2.1 Add at the end of the sixth paragraph: "and a relative humidity range of 45 % to 75 %."

6.4.3 Replace the title by:

6.4.3 Dielectric tests on covers

Replace the first two paragraphs by:

Two different groups of dielectric tests shall be carried out:

- Group A, proof tests, comprising the tests A1 and A2 with equal values of test voltage but different outer electrode assemblies;
- Group B, withstand tests, comprising the switching impulse test B1 and the power frequency test B2.

Under the test classification "type" and "sampling" the cover shall be conditioned as in 6.4.3.1, and the following tests shall be performed:

- proof test A1;
- proof test A2;
- withstand test B1 or, alternatively, B2.

Under the test classification "routine" the cover shall not be conditioned. The only test to be performed is the proof test A1. The test shall be carried out with a reduced duration of 1 min.

6.4.3.1 Replace in the fourth paragraph "6.4.2.2 and 6.4.2.3" by "6.4.3.2 and 6.4.3.3".

6.4.3.2 Replace the first paragraph by:

The inner electrode shall be the potential electrode, the outer electrode shall be the earth electrode.

a) Inner electrode

This electrode shall be a tube or rod fitted when specified with a mandrel or wings. These parts shall be metallic but non-corrodible. The diameters of the tubes or rods shall comply with the values given in table 4.

Replace the text after the note of table 4 by:

b) Outer electrode for the proof test A1

This electrode (see figure 1) shall be made of conductive material having a surface resistance less than 100 Ω (for example, conductive foil or stainless wire having a mesh width of less than 2 mm). It shall fit the contour of the tested cover and shall not influence the mechanical strength of the cover under test.

The electrode shall screen the outer surface of the cover; its edges shall be fixed as follows:

- on the sides of the cover, the edge of the electrode shall be positioned so as to provide a leakage path between the inner and the outer electrodes, as given in table 5;
- along the longitudinal opening, the electrode is limited by the border of the points that can be reached by a gauge which consists of a 45° half-angle cone, 65 mm in height, mounted on the end of a cylinder, 130 mm in diameter.

c) Outer electrode for the proof test A2

This electrode (see figure 2) shall consist of a conductive tube 20 mm in diameter and of a length not less than the length of the cover plus 300 mm.

The electrode shall be positioned as follows:

- a gauge which consists of a 45° half-angle cone, 65 mm in height, mounted on the end of a cylinder, 130 mm in diameter, shall be introduced into the longitudinal opening of the cover;
- the gauge shall be moved along the opening. The lines of contact between the gauge and the cover define a plane;
- the centre line of the electrode shall be positioned as close as possible but no closer to the inner electrode than the line of intersection between this plane and the plane of symmetry of the cover.

NOTE: In some cases, the electrode will be in contact with the cover.

d) Outer electrode for the withstand tests B1 and B2

This electrode (see figure 3) shall be a rigid 460 mm x 926 mm conductive plate. This plate shall be placed vertically on the side of the cover and parallel to the axis of the live part to be covered.

6.4.3.3 Replace the text of this subclause by:

The inner electrode shall be the earth electrode, the outer electrode shall be the potential electrode.

a) Inner electrode

This electrode shall consist of either the real part to be protected or a conductive material having the same shape as the part to be protected with a surface resistance less than 100 Ω.

b) Outer electrode for the proof test A1

The requirements of 6.4.3.2 b) apply.

c) Outer electrode for the proof test A2

The requirements of 6.4.3.2 c) apply.

d) Outer electrode for the withstand tests B1 and B2

The requirements of 6.4.3.2 d) apply.

6.4.3.4 Replace the text of this subclause by:

Proof tests A1 and A2

The test voltage shall start at a value not greater than 50 % of the final voltage level. It shall be increased at a uniform rate of approximately 1 000 V/s until the final voltage level given in table 6 is reached.

The test voltage is maintained for a period not less than 3 min for A1 and 1 min for A2. The test voltage shall then be reduced at the same rate of change to a value not greater than 50%.

The test is passed if no excessive audible or visible phenomenon occurs and neither puncture nor flashover takes place.

Withstand tests B1 and B2

a) Switching impulse test B1

The test shall be performed in accordance with IEC 60-1, clause 23, procedure B. The test voltage values are given in table 6.

b) Power frequency test B2

The test voltage shall start at a value not greater than 50% of the final voltage level. It shall be increased at a uniform rate of approximately 1 000 V/s until the final voltage level given in table 6 is reached. Then the test voltage shall be reduced at the same rate of change to a value not greater than 50%.

This cycle of voltage application shall be performed three times and the test is passed if neither puncture nor flashover takes place.

Test B2 is accepted as an alternative to test B1. In case of dispute, test B1 shall be used as the definitive test.

NOTE: When in use, the highest stresses that rigid covers have to withstand are transient overvoltages caused by system faults and switching operations. Therefore, the most appropriate means to prove their withstand capability is a switching impulse withstand test.

However, in standards for live working equipment, it is IEC practice to specify only a.c. tests. Therefore, the option of performing test B2 as an alternative to test B1 is given in this standard.

The voltage values for the test B2 on covers of the classes 0 to 3 are those of IEC 1229. The relationship between the values of B1 and B2 is

$$(\text{value of B2}) = \frac{1}{1,3 \sqrt{2}} \times (\text{value of B1}).$$

This relationship has been established in comparative tests performed in laboratories of various countries in the world.

Table 6 Replace the existing table by:

Table 6 - Test voltages

Class	Tests A1 and A2 [kV r.m.s.]	Test B1 [kV peak]	Test B2 [kV r.m.s.]
0	5	18	10
1	10	28	15
2	20	55	30
3	30	83	45
4	40	114	62
5	50	146	80

6.4.4 Replace in the third paragraph "power frequency test" by "dielectric tests on covers".

7 Tests on covers with special properties

7.6 Replace the text of this subclause by:

Type test and sampling test shall be carried out as specified in 6.4.3 with the following conditioning instead of that specified in 6.4.3.1 for the proof tests A1 and A2.

The cover and the inside electrode shall be pre-wetted for at least 15 min under the specified conditions in accordance with the wet test procedure described in IEC 60:

- average precipitation rate = 1,0 mm/min to 1,5 mm/min;
- resistivity of collected water corrected to 10 °C = 100 Ω.m ± 15 Ω.m.

These conditions shall remain within the specified tolerances throughout the test.

Add a new clause 11:

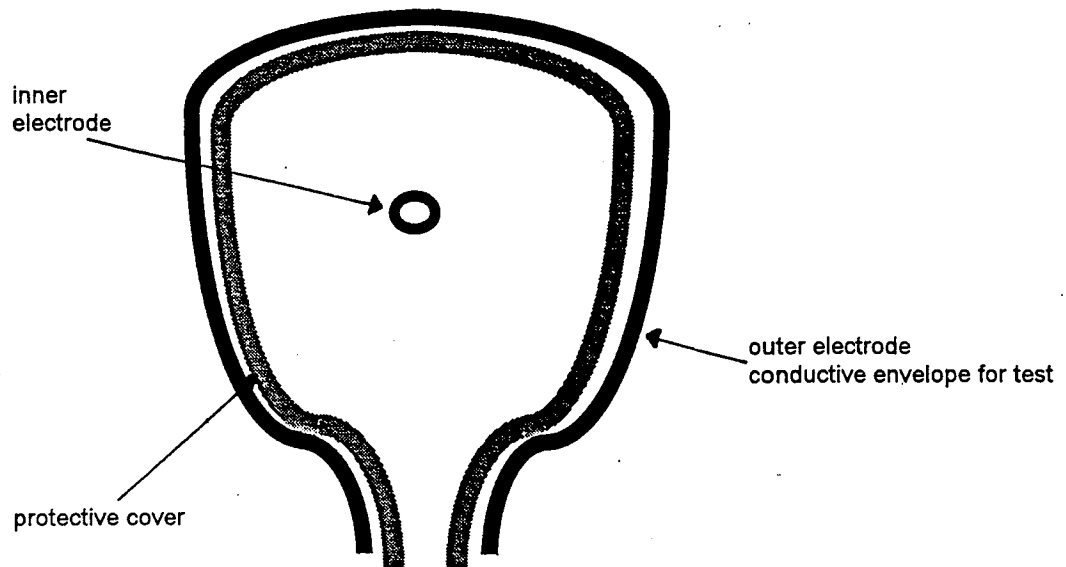
11 Quality assurance plan

In order to assure the delivery of products that meet this standard, 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 standard.

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

Add figures 1, 2 and 3:



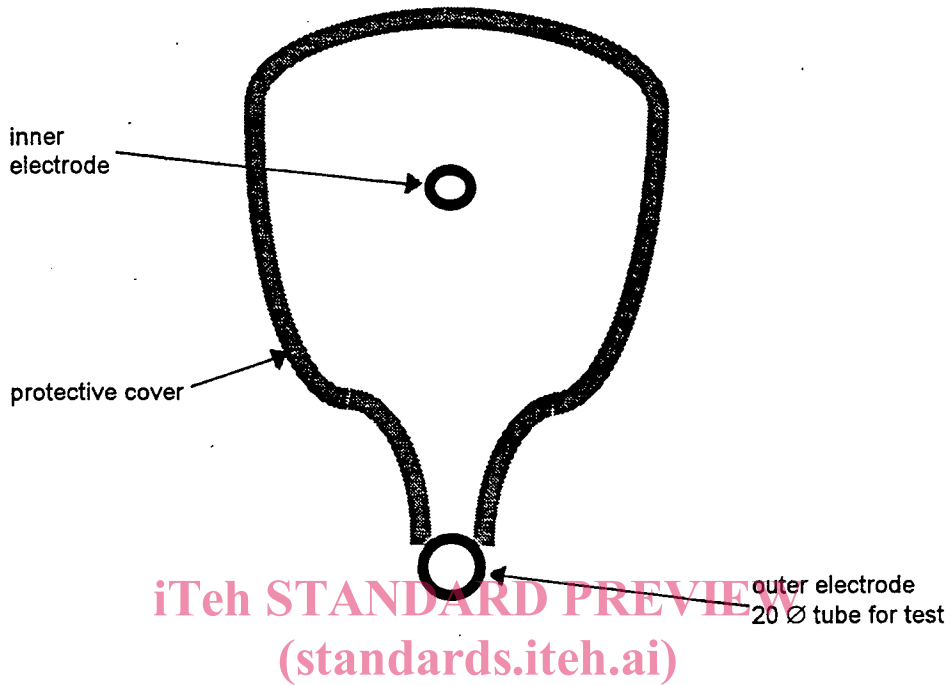
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All dimensions are in millimetres

Figure 1 - Outer electrode design and test arrangement for proof test A1

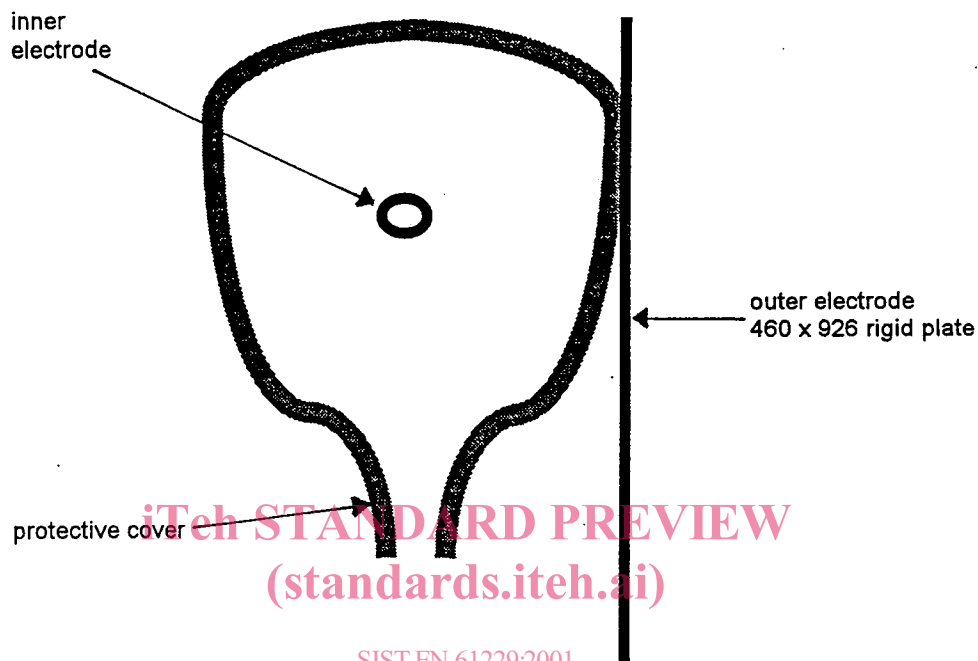


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All dimensions are in millimetres

Figure 2 - Outer electrode design and test arrangement for proof test A2



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All dimensions are in millimetres

Figure 3 - Outer electrode design and test arrangement for withstand tests B1 and B2

Annex B

Replace the title of table B.1 by "Classification of tests".

Replace in table B.1 the wording "Power frequency dielectric test" by "Dielectric tests on covers.

Replace "7" by "7⁶)" in column Lot 2.

Replace "7" by "7², 3) and 6)" in column Clause and subclause.

Add a note 6 as follows:

6 Conditioning modified for category P covers when carrying out test 6.4.3.

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Annex G

Replace the entire annex by:

Annex G
(normative)

Electrical limits for the use of rigid protective covers

The correct use of rigid protective covers is determined by the conditions of the installation, as defined in ENV 50196.

These are:

- the highest voltage of the system, U_s ;
- the required insulation level for live working (RILL), U_{90r} .

G.1 General limit values

Except for cases as specified in G.2, the limit values indicated in table G.1 shall not be exceeded.

Table G.1 - General limit values

Class	Highest voltage of the system U_s ¹⁾ [kV r.m.s.]	RILL U_{90r} ²⁾ [kV peak]
0	1	17
1	7,5	26
2	17,5	52
3	26,5	77
4	36	107
5	46	137

1) U_s is an operational value and as such is specific for the system. If U_s is not known, it shall be considered as equal to the highest voltage for equipment U_m of the equipment installed in the system. In three-phase systems, U_s and U_m are phase-to-phase voltages.
2) The RILL values have been obtained by multiplying the test voltages B1 of table 6, valid at sea level (standard reference atmosphere), with the factor $k_a = 0,938$ given in ENV 50196 for an altitude of 1 000 m above sea level and for a RILL up to 200 kV.

The indicated RILL values are only valid for altitudes of the work location up to 1 000 m above sea level. For higher altitudes see G.2.2.1.