SLOVENSKI STANDARD
SIST EN 50286:2000

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Električno izolacijska zaščitna oblačila za delo na nizkonapetostnih inštalacijah

Electrical insulating protective clothing for low-voltage installations

Elektrisch isolierende Schutzkleidung für Arbeiten an Niederspannungsanlagen

Vêtements de protection isolants pour installations basse tension

Ta slovenski standard je istoveten z: **EN 50286:1999**

ICS:

13.260	Varstvo pred električnim udarom. Delo pod napetostjo	Protection against electric shock. Live working
13.340.10	Varovalna obleka	Protective clothing

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ICS 13.260; 13.340.10

English version

Electrical insulating protective clothing for low-voltage installations

Vêtements de protection isolants pour installations basse tension

Elektrisch isolierende Schutzkleidung

This European Standard was approved by CENELEC on 1998-08-01. 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.

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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

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Foreword

This European Standard was prepared by the Technical Committee CENELEC TC 78, Equipment and tools for live working. It is submitted to the unique acceptance procedure.

The text of the draft was submitted to the Unique Acceptance Procedure and was approved by CENELEC as EN 50286 on 1998-08-01.

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) 1999-12-01

- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 1999-12-01

This document complies with the electrical insulating requirements set out by CLC/TC 78 and with the non-electrical requirements set out by CEN/TC 162. This insulating clothing is recognised as a PPE according to EEC Directive (89/686/EEC).

Electrical insulating protective clothing was developed primarily for use by workers for work on low-voltage overhead lines.

For the moment , there is no withstand test applicable to products where the principle risk is of unintentional contact with live parts, and such a test is not included in the present standard. However, despite this lack, it is considered that a satisfactory level of electrical protection is provided by compliance with this standard for both the proof tests and the periodic electrical inspections.

For the moment, no test is available in relation to the risk of workers exposure to an electrical arc generated by low voltage installations. This task is presently under study by WG7.

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1 Scope

This standard is applicable to electrical insulating protective clothing used by skilled persons when they are working on or near live parts of low voltage installations at nominal voltages up to 500 V a.c. or 750 V d.c.

The purpose of this clothing when used in conjunction with other PPE, such as boots and gloves etc., is to prevent dangerous current from passing through persons when there is a risk of unintentional contact with several live parts located in and around the working area. Where the risk of unintentional contact with live parts is restricted e.g. with live parts in front of the worker, the wearing of this clothing is not essential.

NOTE: Some restrictions on the use of this clothing may exist in areas with hot climatic conditions, for example.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

EN 340	1993	Protective clothing - General requirements
EN 532	1994	Protective clothing - Protection against heat and flame - method of test for limited flame spread
EN 20811	1992	Textiles - Determination of resistance to water penetration Hydrostatic pressure test
EN 31092	1993	Textiles - determination of physiological properties - Measurement of thermal and water-vapour resistance under steady-state conditions (sweating guarded- hotplate test)
EN 50110	1996	Operation of electrical installations
EN 60529	1991	Degrees of protection provided by enclosures (IP Code) (IEC 529:1989)
HD 588.1 S1	1991	High-voltage test techniques Part 1: General definitions and test requirements (IEC 60-1:1989 + corrigendum March 1992)
IEC 60050-151	1978	International Electrotechnical Vocabulary Chapter 151: Electrical and magnetic devices
IEC 60410	1973	Sampling plans and procedures for inspection by attributes
ISO 3175	1998	Textiles - Dry-cleaning and finishing -- Part 1: Method for assessing the cleanability of textiles and garments

ISO 4674	1977	Textiles - Fabrics coated with rubber or plastics - Determination of tear resistance
ISO 5077	1984	Textiles - Determination of dimensional change in washing and drying
ISO 5081	1977	Textiles - Woven fabrics - Determination of breaking strength and elongation (Strip method)
ISO 6330	1984	Textiles - Domestic washing and drying procedures for textile testing
ISO 9000	series	Quality management and quality assurance standards

3 Definitions

3.1 electrical insulating protective clothing

Electrical insulating protective clothing denotes protective clothing which prevents dangerous current from passing through the human body. Jacket with hood, trousers and overall are articles of the protective clothing.

3.2 seam

The junction of two edges of material which are permanently joined by sewing or any other method.

3.3 tests

3.3.1 type tests

A test performed on one or more articles of clothing made to a certain design to show that the design meets certain specifications [IEV 60151-04-15 mod.].

3.3.2 sampling test

A test performed on a number of articles of clothing taken at a random from a batch [IEV 60151-04-17 mod.].

3.3.3 routine test

A test to which each article of clothing is subjected during or after manufacture to ascertain whether it complies with certain criteria [IEV 60151-04-16 mod.].

3.3.4 acceptance test

A contractual test to prove to the customer that the article of clothing meets certain conditions of its specification [IEV 60151-04-20 mod.].

3.3.5 proof test voltage

A specified voltage that is applied to an article of clothing for the time defined under specified conditions to assure that the electrical strength of the insulation is above a specified value.

4 Requirements

4.1 Non-electrical requirements

4.1.1 Weights, dimensions and design

No metal parts shall be on the outside of the protective clothing.Touch and close fastener shall be used. The protective clothing shall consist of a jacket with hood and trousers or an overall with a hood.

The weight of protective clothing shall comply with values given in table 1. The manufacturing dimensions shall comply with those given in table 1 which is based on EN 340. Other dimensions may be chosen in a similar manner.

All seams, except hem-seams, shall be safe in the electrical environments.

The number of pockets in the protective clothing shall be limited to two. The protective suit shall have one pocket for the jacket and one for the trousers. The protective overall shall have two pockets located in similar positions.

One pocket shall be placed at the chest level to the jacket or the overall. One pocket shall be placed laterally to the thigh to the trousers. The pockets shall be equipped with flaps which shall have close and touch fasteners.

The hood shall be securely fastened to the jacket or overall. The method of fastening shall ensure that:

- the hood cannot become separated or detached, either in part or completely, from the jacket or overall, when the clothing is in use;
- the integrity of the electrical insulation of the clothing is maintained both across and along the length of the means of fastening, when the clothing is in use.

Examples of methods of fastening which meet these requirements are:

- sewn seams which meet the requirements in accordance with 4.2;
- zip-fasteners provided inside and outside with insulating flaps and touch and close fasteners which completely cover all parts of the zip-fastener.

The front edge of the hood shall be designed all around in such a way that a cord made from insulating material can be taken in. The cord shall be taken in the hood, but it shall not be fixed.

The hood shall be designed so that a protective helmet with face shield can be worn inside the hood. The cord of the hood shall allow the hood to fit closely to the protective helmet.

Any zip-fastener necessary to close the jacket, the trousers or the overall shall be made from insulating material. However, if metal parts are used for the slider or for the terminal pieces of the zip-fastener, they shall be covered with insulating material.

The length of the zip-fastener shall correspond to the design of the jacket. The length shall be designed in such a way that the zip-fastener begins (10 ± 2) cm above the hem seam and ends (3 ± 1) cm below the edge of the hood. The zip-fastener shall be covered by a flap which begins at the hem seam and ends at the hood seam. The flap shall be equipped with a touch and close fastener, which covers at least the whole length of the zip-fastener. For the overall, the length of the zip-fastener and the design of the flap shall be chosen in a similar manner.

The cuff of the sleeves shall be adjustable by means of a tab with a touch and close fastener.

The bottoms of the trousers or overall legs shall be wide enough to be worn over footwear. The trousers shall be equipped with a fly which is closed over its length by a zip-fastener. The fly shall be covered by a flap which shall have a touch and close fastener over the whole length.

The trousers shall be equipped with braces which shall be securely connected to the trousers and shall be adjustable or elasticated. The elasticity may be achieved by a complete elastic brace or a piece of elastic in the brace.

The colour shall be bright.

NOTE: The protective clothing should have a unique colour. A red colour is recommended. This colour may differ from colour code marking.

Table 1: Manufacture dimensions and weights of protective clothing

Height *	(cm)	164-170	170-176	176-182	182-188	188-194
Weight (Max.)	(kg)	2,2	2,45	2,7	2,95	3,2
Chest girth *	(cm)	92-96	96-100	100-108	108-116	116-124
Jacket back length (not for overalls)	(cm)	86	88	90	92	94
Trousers and overall waist girth *	(cm)	80-88	88-96	96-104	104-116	116-128
Crotch length	(cm)	77	79	81	83	85

NOTE 1:* These sizes are body sizes according to EN 340. Others sizes are clothing sizes.

NOTE 2: Dimensions as manufactured (cm); tolerances: ± 2 cm.

NOTE 3: The dimensions of the protective clothing shall be selected in such a way that this clothing can be worn over the normal working clothing.

NOTE 4: The accuracy of he weighting equipment shall be ± 5 %.

4.1.2 Limited flame spread

The assembly of layers of fabric shall fulfil the following requirements (testing in accordance with 5.2.2):

- no flaming to the top or either side edge;
- no hole formation in the outer layer;
- no flaming or molten debris;
- the mean value of afterflame shall be ≤ 2s;
- the mean value of afterglow time shall be ≤ 2s.

4.1.3 Tear resistance

The outer fabric shall have a tear resistance of at least 30 N in the longitudinal and the cross direction (testing in accordance with 5.2.3).

4.1.4 Tensile strength

The outer fabric shall have a tensile strength of at least 700 N in the longitudinal and the cross direction (testing in accordance with 5.2.4).

4.1.5 Water-vapour resistance

The R_{et} value shall not exceed 20 Pa m^2/W (testing in accordance with 5.2.5).

4.1.6 Water penetration

The first water drop shall not penetrate below 130 mbar (testing in accordance with 5.2.6).

4.1.7 Dimensional change due to laundering and/or cleaning

The dimensional change of the outer fabric shall not exceed ± 3 % in the longitudinal and the cross direction (testing in accordance with 5.2.7).

4.2 Electrical requirements

The protective clothing shall pass a proof test, in accordance with 5.3.2, of:

- 2,5 kV under dry conditions;
- 2,0 kV under moisture conditions;
- 1,5 kV after rain.

4.3 Marking

4.3.1 General marking

Electrical insulating protective clothing for low voltage installations according to this standard shall be marked according to EN 340.

Each article of protective clothing shall be marked on the inner side of the clothing.

The marking shall be affixed so as to be visible, legible and durable and shall give the following information:

- mark of origin (name or trade mark or other means of identification of the manufacturer or his authorised representative);
- year and month of manufacture;
- serial number;
- type or identification code;
- number of this European standard;
- size designation according to EN 340;
- laundering and/or cleaning instructions.

The marking shall be durable for the appropriate number of laundering and/or cleaning processes.

The height of the letters of the marking shall be at least 2 mm.

4.3.2 Specific marking

The outer side of each of the flaps of the pockets on the jacket, trousers and overall shall be marked with the symbol double triangle with the dimension X = 16 mm or 25 mm assigned to Class 00 or colour code beige for the whole label (see figure 3).

The marking shall not impair the quality of the protective clothing.

A suitable panel shall be placed on the inner side of the protective clothing, at:

- the chest level of the jacket or overall;
- the upper seam of the trousers.

The suitable panel consists of, e.g. a linen strip of at least 60 mm x 80 mm on which marking shall be applied to indicate date of periodic inspections.

The panel may be combined with the marking label according to 4.3.1.

All marking shall be durable for the appropriate number of laundering and/or cleaning processes.

4.4 Instructions for use and periodic inspection

Instructions for use and periodic inspections shall be in accordance with EN 340 and annex A.