



SLOVENSKI STANDARD
SIST EN 342:2004

01-oktober-2004

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SIST ENV 342:1999

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Protective clothing - Ensembles and garments for protection against cold

Schutzkleidung - Kleidungssysteme und Kleidungsstücke zum Schutz gegen Kälte

(standards.iteh.ai)

Vêtements de protection - Ensembles vestimentaires et articles d'habillement de protection contre le froid

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Ta slovenski standard je istoveten z: EN 342:2004

ICS:

13.340.10 Varovalna obleka Protective clothing

SIST EN 342:2004 en

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English version

Protective clothing - Ensembles and garments for protection against cold

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zum Schutz gegen Kälte

This European Standard was approved by CEN on 16 April 2004.

CEN 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 CEN 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 CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

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CEN members are the national standards bodies of Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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Contents

	page
Foreword.....	3
Introduction	4
1 Scope	5
2 Normative references	5
3 Terms and definitions	5
4 Performance assessment and requirements	7
5 Testing methods	8
6 Sizes	9
7 Marking and care labelling.....	9
8 Information supplied by the manufacturer	9
Annex A (normative) Standard reference clothing for use with protective clothing against cold.....	11
Annex B (informative) Levels of performance.....	13
Annex C (normative) Calibration and measurements for resultant effective thermal insulation.....	15
Annex D (informative) Garment design features.....	17
Annex ZA (informative) Relationship between this European Standard and the Essential Requirements of EU Directive 89/686/EEC Personal Protective Equipment	18
Bibliography	19

Foreword

This document (EN 342:2004) has been prepared by Technical Committee CEN/TC 162 “Protective clothing including hand and arm protection and lifejackets”, the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by January 2005, and conflicting national standards shall be withdrawn at the latest by January 2005.

This document supersedes ENV 342:1998.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive 89/686/EEC Personal Protective Equipment.

For relationship with EU Directive, see informative Annex ZA, which is an integral part of this document.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

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Introduction

This European Standard is published to achieve a common basis in Europe for requirements and test methods for protective clothing ensembles and garments against cold in the interest of especially manufacturers, test institutes and end-users. The measured properties and their subsequent classification are intended to ensure an adequate protection level under different user conditions. Thermal insulation of the ensemble or garment and the air permeability are the essential properties to be tested and marked on the label.

Thermal insulation is the most important property and it is measured by using a full-sized thermal manikin with the ensemble or garment and accompanying reference clothing in order to account for the effect of layers, fit, drape, coverage and shape. In this respect this standard differs from many other standards specifying only material properties. The insulation is tested with new ensembles and garments. It should be recognized that ensembles and garments in frequent use may lose significant insulation capacity due to laundering and wear. In general high quality products and well maintained clothing are less affected in this respect.

Wind may considerably increase convective heat losses. Therefore, the air permeability of the outer garment material is an important factor to be taken into account in relation to the protection of the wearer against cold.

The insulation requirements and air effects for given conditions can be assessed by methods given in ENV ISO 11079.

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By this method the resultant effective thermal insulation value I_{cler} can be determined and used to define temperature ranges (see Tables B.1 and B.2). Therefore the protective value of a clothing ensemble is evaluated by comparing its measured insulation value and the calculated required insulation value (*IREQ*). This comparison is the basis of Tables B.1 and B.2. [SIST EN 342:2004](https://standards.iteh.ai/catalog/standards/sist/830a0e2e-25ac-42e9-b3c3-1761ad635f0e/en-342-2004)

This guidance information for the selection of the appropriate cold protective garment(s) is one of the benefits, if the resultant effective thermal insulation value I_{cler} of the garment(s) has been measured on a thermal manikin.

Sweating should be avoided in continuous cold exposure, since moisture absorption will progressively reduce insulation. This is best controlled by selecting optimal rather than maximal insulation and flexible, adjustable garments rather than fixed and closed ensembles. It is more efficient to get rid of heat and moisture by ventilation of clothing through adjustable openings and button-up, than by passive diffusion through layers of garments. When the environment is below freezing, very little, if any, water vapour escapes through the material because of condensation and, eventually, it can freeze in clothing. In some conditions with intermittent exposures (e.g. cold store work) or in conditions close to and above 0 °C the water vapour resistance value of fabrics become increasingly important and fabrics with a low value may contribute to improved heat balance and thermal comfort.

For protection of a specific part of the body, EN 14058 applies.

1 Scope

This European Standard specifies requirements and test methods for performance of clothing ensembles (i.e. two piece suits or coveralls) and of single garments for protection against cold environment.

It does not include specific requirements for head wear, footwear and gloves intended to prevent local cooling.

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.

EN 340, *Protective clothing — General requirements*.

EN 20811, *Textiles — Determination of resistance to water penetration — Hydrostatic pressure test*.

EN 31092, *Textiles — Determination of physiological properties — Measurement of thermal and water-vapour resistance under steady-state conditions (sweating guarded-hotplate test) (ISO 11092:1993)*.

EN ISO 9237, *Textiles — Determination of permeability of fabrics to air (ISO 9237:1995)*.

EN ISO 15831, *Clothing — Physiological effects — Measurement of thermal insulation by means of a thermal manikin (ISO 15831:2004)*. **iTeh STANDARD PREVIEW (standards.iteh.ai)**

EN ISO 4674-1, *Rubber- or plastics-coated fabrics — Determination of tear resistance — Part 1: Constant rate of tear methods (ISO 4674-1:2003)*. [SIST EN 342:2004
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3 Terms and definitions

For the purposes of this European Standard, the following terms and definitions apply.

3.1

cold environment

environment characterized by the combination of humidity and wind at air temperature below – 5 °C

NOTE See ENV ISO 11079.

3.2

garment

individual component of a clothing ensemble, the wearing of which provides protection to the part of the body that it covers

3.3

ensemble

clothing consisting of a two-piece suit or one-piece suit (coverall) or a number of garments covering the body, except head, hands and feet

3.4

outer shell material

outermost material of which the protective clothing is made

**3.5
liner**

insert with a watertight property

**3.6
thermal lining**

non-watertight layer providing thermal insulation

**3.7
thermal liner**

layer with a watertight property providing additional thermal insulation

**3.8
lining**

innermost material without watertight property

**3.9
thermal resistance (insulation) R_{ct}**

temperature difference between the two faces of a material divided by the resultant heat flux per unit area in the direction of the gradient. The dry heat flux may consist of one or more conductive, convective and radiant components. Thermal resistance R_{ct} , expressed in square metres kelvin per watt, is a quantity specific to textile materials or composites which determines the dry heat flux across a given area in response to a steady applied temperature gradient

**3.10
water vapour resistance R_{et}**

water vapour pressure difference between the two faces of a material divided by the resultant evaporative heat flux per unit area in the direction of the gradient. The evaporative heat flux may consist of both diffusive and convective components.

Water vapour resistance R_{et} , expressed in square metres pascal per watt, is a quantity specific to textile materials or composites which determines the "latent" evaporative heat flux across a given area in response to a steady applied water vapour pressure gradient

**3.11
effective thermal insulation I_{cle}**

thermal insulation from skin to outer clothing surface under defined conditions measured with a stationary manikin.

The effective thermal insulation value, I_{cle} , is determined in relation to the naked body surface area.

The value is given in $m^2 \cdot K/W$

**3.12
resultant effective thermal insulation I_{cler}**

thermal insulation from skin to outer clothing surface under defined conditions measured with or calculated for a moving manikin.

The resultant effective thermal insulation value, I_{cler} , is determined in relation to the naked body surface area.

The value is given in $m^2 \cdot K/W$

3.13 insulation required $IREQ$

required resultant thermal insulation calculated on the basis of the thermal parameters of the environment (e.g. air temperature, mean radiant temperature, air velocity, relative humidity) and the body metabolism

NOTE See ENV ISO 11079.

3.14**resistance to water penetration *WP***

hydrostatic pressure supported by a material as a measure of the opposition to the passage of water through the material

4 Performance assessment and requirements**4.1 General**

The ergonomic requirements of EN 340 shall be applied.

4.2 Thermal insulation, I_{cle} and I_{cler}

Requirements for thermal insulation of the human body in a specific cold environment are assessed on the basis of ENV ISO 11079.

To be within the scope of this standard, the resultant effective thermal insulation I_{cler} shall have a minimum value of 0,310 m². K/W, when measured in accordance with 5.1. Optionally, the effective thermal insulation I_{cle} value can be measured according to 5.1.

Thermal insulation of a clothing ensemble or garment is classified on the basis of measured insulation values. Performance of a clothing ensemble or garment in terms of preserving heat balance at normal body temperature depends on internal body heat production. Therefore the protective value of a clothing ensemble or garment is evaluated by comparing its measured insulation value and the calculated required insulation value (*IREQ*). This comparison is the basis of Tables B.1 and B.2.

4.3 Air permeability, *AP*

When tested in accordance with 5.2, the air permeability *AP* shall be in accordance with Table 1.

Table 1 — Classification of air permeability *AP*

<i>AP</i> mm/s	Class
100 > <i>AP</i>	1
5 < <i>AP</i> ≤ 100	2
<i>AP</i> ≤ 5	3

Air permeability shall be measured in accordance with 5.2.

4.4 Resistance to water penetration, *WP* (optional)

When tested in accordance with 5.3, resistance to water penetration of the outer shell material together with any incorporated watertight layer and its seams shall be in accordance with Table 2, if required.

Table 2 — Classification of resistance to water penetration *WP*

<i>WP</i> Pa	Class
8 000 ≤ <i>WP</i> ≤ 13 000	1
<i>WP</i> > 13 000	2

4.5 Water vapour resistance, R_{et}

If water penetration resistance is required as in 4.4 then water vapour resistance R_{et} shall be measured in accordance with 5.4. In this case, the water vapour resistance R_{et} of the combination of all layers of the garment together (without underwear) shall be less than $55 \text{ m}^2 \cdot \text{Pa/W}$.

4.6 Tear resistance of outer shell material

When tested in accordance with 5.5, the tearing force of the outer shell material (with the exception of vests and excluding elasticated and knitted materials) shall be at minimum 25 N in both orthogonal directions of the material.

5 Testing methods

5.1 Thermal insulation, I_{cle} and I_{cler}

The effective thermal insulation shall be measured with a stationary manikin calibrated according to Annex C with the test procedure as given in EN ISO 15831. The resultant effective thermal insulation is measured with a moving manikin calibrated according to Annex C with the test procedure as given in EN ISO 15831.

For complete ensembles, but not for single garments, the resultant effective thermal insulation I_{cler} is obtained either with a moving manikin or by correcting the value obtained with the stationary manikin. The correction formula is given in Annex C.

The effective as well as resultant effective thermal insulation of the protective clothing ensemble are measured in combination with underwear B (see Table A.1) and optionally with underwear C as specified by the manufacturer. Single garments are tested with reference clothing R as specified in Table A.2.

In the test with underwear B or a single garment the manikin shall not be dressed with any hood not attached to the garment, gloves or boots other than the reference items.

5.2 Air permeability, AP

Air permeability shall be measured in accordance with EN ISO 9237.

In case that the composite material cannot be tested in one piece because of technical reasons, it is necessary to separate the individual components and measure the component with the lowest value.

Measurements shall be carried out at a pressure differential of 100 Pa and a test area of 20 cm^2 .

5.3 Resistance to water penetration, WP

Testing of resistance to water penetration of the material and seams shall be in accordance with EN 20811, but with an increase of water pressure of $(980 \pm 50) \text{ Pa/min}$ and the following deviations:

Number of specimens:

- 5 specimens for the testing of the seams;
- 5 specimens for the testing of material.

Size of specimens: at least 130 mm diameter.

5.4 Water vapour resistance, R_{et}

Testing shall be in accordance with EN 31092.

5.5 Tear resistance

Testing shall be in accordance EN ISO 4674-1, method A. Testing speed of the moving jaw (100 ± 10) mm/min.

6 Sizes

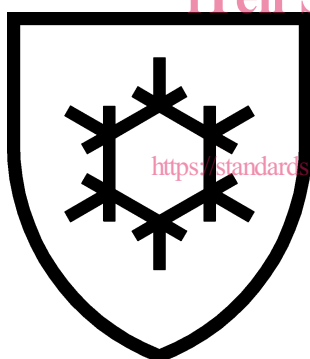
The size designation shall be in accordance with EN 340.

7 Marking and care labelling

Marking and care labelling shall be in accordance with EN 340.

The pictogram indicating that protection against cold is offered shall be as follows with the appropriate performance levels added:

EN 342



Y(B)/Y(C)/Y(R) I_{cle} in $m^2 \cdot K/W$ of the ensemble (with underwear B and optionally with underwear C of the manufacturer) or of the single garment (with standard reference clothing R);

SIST EN 342:2004

<https://standards.iteh.ai/catalog/standards/sist/830a0e2e-25ac-42e9-b3c3-290cbca057c/sist-en-342-2004>

Y(B)/Y(C)/Y(R) I_{cle} in $m^2 \cdot K/W$ of the ensemble (with underwear B and optionally with underwear C of the manufacturer) or of the single garment (with standard reference clothing R); optional

Y	Air permeability class
Y	Resistance to water penetration class; optional

NOTE X indicates, that the garment has not been submitted to testing.

8 Information supplied by the manufacturer

The information supplied with the protective clothing shall be in accordance with EN 340 and shall provide the following additional information:

- product designation;
- how to put on and take off, if relevant;
- provide basic information on possible uses, e.g. the temperature values given in Tables B.1 and B.2 as related to the garment's I_{cle} or I_{cler} , and where detailed information is available, state the source;