



# SLOVENSKI STANDARD

## SIST EN 467:1996

01-december-1996

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**Varovalna obleka - Varovanje pred učinki tekočih kemikalij - Zahteve za izdelavo oblačil, ki zagotavljajo zaščito delov telesa**

Protective clothing - Protection against liquid chemicals - Performance requirements for garments providing protection to parts of the body

Schutzkleidung - Schutz gegen flüssige Chemikalien - Leistungsanforderungen an Kleidungsstücke, die für Teile des Körpers einen Schutz gegen Chemikalien gewähren

Vêtements de protection - Protection contre les produits chimiques liquides - Exigences de performance des articles d'habillement offrant une protection chimique a certaines parties du corps

<https://standards.iteh.ai/catalog/standards/sist/169067be-4d3f-4049-80ef-a5a4e46d73b6/sist-en-467-1996>

**Ta slovenski standard je istoveten z: EN 467:1995**

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**ICS:**

13.340.10      Varovalna obleka      Protective clothing

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EUROPEAN STANDARD

EN 467

NORME EUROPÉENNE

EUROPÄISCHE NORM

March 1995

ICS 13.340.10

Descriptors: Personal protective equipment, protective clothing, drip proof protection, chemical compounds, liquids, leaktightness, specifications, mechanical strength, marking, instructions

English version

**Protective clothing - Protection against liquid  
chemicals - Performance requirements for  
garments providing protection to parts of the body**

Vêtements de protection - Protection contre les produits chimiques liquides - Exigences de performance des articles d'habillement offrant une protection chimique à certaines parties du corps

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Schutzkleidung - Schutz gegen flüssige Chemikalien - Leistungsanforderungen an Kleidungsstücke, die für Teile des Körpers einen Schutz gegen Chemikalien gewähren

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# CEN

European Committee for Standardization  
Comité Européen de Normalisation  
Europäisches Komitee für Normung

Central Secretariat: rue de Stassart, 36 B-1050 Brussels

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## Foreword

This European Standard has been prepared by the 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 has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EC Directive(s).

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 September 1995, and conflicting national standards shall be withdrawn at the latest by September 1995.

According to the CEN/CENELEC Internal Regulations, the following countries are bound to implement this European Standard: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom.

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### NOTE OF THE SECRETARY:

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For the specified "Martindale Abrasion Test" in accordance with EN 530, required in "4.4 Abrasion resistance" the method and the pressure between the test piece holder and top plate are needed.

Method 2 with a downward pressure of 9 kPa shall be chosen in the opinion of CEN/TC 162/WG 3.

## 1 Scope

This standard specifies the minimum requirements for garments providing protection against liquid chemicals for parts of the body, e.g. aprons, sleeves, and hoods. It specifies the performance requirements for the materials of construction of the protective clothing but not for the complete chemical protective clothing, as each individual garment may be worn with other garments.

## 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 reference the latest edition of the publication referred to applies.

- EN 340 Protective clothing - General requirements.
- EN 369 Protective clothing - Protection against liquid chemicals - Test method: Resistance of materials to permeation by liquids
- EN 374-3 Protective gloves against chemicals and micro-organisms - Part 3: Determination of resistance to permeation by chemicals
- EN 530 Abrasion resistance of protective clothing material - Test method
- prEN 863 Protective clothing - Mechanical properties - Test method: Puncture resistance
- ISO 2411:1991 Fabrics coated with rubber or plastics - Determination of coating adhesion  
<https://standards.iteh.ai/catalog/standards/sist/169067be-4d3f-4049-80ef-4d467d451031/en-467-1996>
- ISO 4674:1977 Fabrics coated with rubber or plastics - Determination of tear resistance
- ISO 5082:1982 Textiles - Woven fabrics - Determination of breaking strength - Grab Method
- ISO 5978 Fabrics coated with rubber or plastics - Determination of blocking resistance
- ISO 7854:1984 Rubber or plastics coated fabrics - Determination of resistance to damage by flexing (dynamic method)
- BS 871:1981 Specification for abrasive papers and cloths

## 3 Definitions

For the purposes of this standard the following definitions apply:

- 3.1 **assemblage:** A permanent joining obtained, e.g. by sewing, welding, vulcanizing, gluing.
- 3.2 **coating adhesion strength:** The force necessary to effect a separation of the coating from its substrate under defined conditions.
- 3.3 **connection:** An assemblage or join.
- 3.4 **garment:** An individual component (of protective clothing), the wearing of which affords protection to the body against contact with chemicals.
- 3.5 **join:** The connection or joining, which is not permanent, between two different pieces of clothing.

**3.6 penetration:** The process by which chemical flows through holes or essential openings in the material. The holes may be the result of mechanical damage.

**3.7 permeation:** The process by which a chemical moves through a protective clothing material on a molecular level.

Permeation involves:

- a) sorption of the molecules of the chemical into the contacted (outside) surface of a material;
- b) diffusion of the sorbed molecules in the material, and;
- c) desorption of the molecules from the opposite (inner) surface of the material.

**3.8 chemical protective clothing:** The combined assembly of those garments, the wearing of which is intended to afford protection to the skin against exposure to or contact with chemicals.

**3.9 chemical protective clothing material:** Any material or combination of materials used in an item of protective clothing for the purpose of isolating parts of the body from direct contact with a chemical.

**3.10 chemical protective suit:** Suit protecting against chemicals which can be injurious to health. A suit may have various types of additional protection such as hood/helmet, boots and gloves.

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## **4 Materials of Construction (standards.iteh.ai)**

### **4.1 General**

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The materials of construction shall fulfil all the test requirements given in 4.4 to 4.10, when tested in accordance with the test method specified.

Materials of construction shall not cause skin irritation or have any adverse effect to health.

**NOTE:** The material of construction should be as light and as flexible as possible in order to ensure wearer comfort as well as providing effective protection.

### **4.2 Pre-conditioning**

Before testing the samples shall undergo 5 cycles of cleaning according to the manufacturer's instructions.

### **4.3 Conditioning**

All samples shall be conditioned by storage at  $(20 \pm 2) ^\circ\text{C}$  and  $(65 \pm 5)\%$  r.h. for at least 24 h. Start each of the following tests within 5 min of removing the sample from the conditioning atmosphere.

### **4.4 Abrasion resistance**

When tested in accordance with EN 530 (Martindale Abrasion Test) using 00 abrasive paper (according to British Standard BS 871:1981), the chemical protective clothing material shall be classified according to the levels of performance given in table 1.

Table 1: Classification of abrasion resistance

Class	Number of Cycles
6	> 2 000
5	> 1 500
4	> 1 000
3	> 500
2	> 100
1	> 10

#### 4.5 Stability to Heat (Resistance to Blocking)

When tested in accordance with ISO 5978, the chemical protective clothing material shall be classified according to the levels of performance given in table 2.

Table 2 : Classification of stability to heat

Class	Level of performance
1	No blocking
2	Slight blocking

#### 4.6 Flex Cracking Resistance

When tested in accordance with method B of ISO 7854 until damage is apparent, the chemical protective clothing material shall be classified according to the levels of performance given in table 3.

Table 3 : Classification of flex cracking resistance

Class	Number of cycles
5	> 300 000
4	> 250 000
3	> 150 000
2	> 50 000
1	> 25 000

NOTE: Methods A and D of ISO 7854 may also be suitable for testing chemical protective clothing materials but no supporting data has been available for correlation with Method B of ISO 7854.

#### 4.7 Puncture Resistance

When tested in accordance with prEN 863 the chemical protective clothing material shall be classified according to the levels of performance given in table 4.

Table 4: Classification of puncture resistance

Class	Puncture resistance N
5	> 150
4	> 100
3	> 50
2	> 10
1	> 5

#### 4.8 Tear Resistance

When tested in accordance with A1 of ISO 4674 the chemical protective clothing material shall be classified according to the levels of performance given in table 5, for test samples cut at 90° to each other:

Table 5: Classification of tear resistance

Class	Tear resistance N
5	> 150
4	> 80
3	> 40
2	> 20
1	> 10

#### 4.9 Coating adhesion strength

When tested in accordance with ISO 2411 the chemical protective clothing material shall be classified according to the levels of performance given in table 6.

Table 6: Classification of coating adhesion strength

Class	Adhesion strength N/m
5	> 1 250
4	> 750
3	> 500
2	> 250
1	> 50



Chemical protective clothing material which is not coated shall not be tested in accordance with this clause and the test report shall be marked NOT APPLICABLE against coating adhesion strength.

#### 4.10 Resistance to permeation by liquids

When tested in accordance with EN 369 or EN 374-3, the material of construction of the chemical protective clothing shall be classified according to the levels of performance given in table 7 for each chemical tested, and the results shall be reported in the manufacturer's instructions (see item e) of clause 8).

Table 7: Classification of permeation resistance

Class	Breakthrough time min
6	> 480
5	> 240
4	> 120
3	> 60
2	> 30
1	> 10

NOTE: Chemical protective clothing material may be susceptible to attack by chemicals over a period (or repeated periods) of exposure, leading to degradation and eventual failure of the protective layer e.g. by brittle cracking. No suitable test method has been found to test resistance to chemical degradation, but one is being sought.

## 5 Seams and Assemblages

NOTE: The requirements of this clause apply to the garment as a whole including component parts, such as gloves or boots, that are integral to the garment. The seams and assemblages attaching these accessories are included within the scope of this standard. The performance criteria for the accessories gloves, boots or respiratory protective equipment are given in other European Standards.

### 5.1 General

Seams shall be constructed and sealed to prevent penetration of liquid through stitch holes or, by penetration, through other components of a seam. The performance in these respects shall not be inferior to that of the material from which it is made.

### 5.2 Seam Strength

A sample of each type of straight seam construction shall be tested in accordance with Annex A2 of ISO 5082 (Constant-rate-of-traverse). Three specimens of each type of seam shall be tested and the mean of each set of three samples calculated. The garment seam performance shall be classified according to the levels of performance given in table 8 using the worst mean result.