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**Varovalna obleka pred tekočimi in plinskimi kemikalijami, vključno s tekočimi aerosoli in trdnimi delci - 2. del: Varnostne zahteve za kemijsko varovalno obleko, neprepustno za plin (tip 1), za reševalne ekipe**

Protective clothing against solid, liquid and gaseous chemicals, including liquid and solid aerosols - Part 2: Performance requirements for gas-tight (Type 1) chemical protective suits for emergency teams (ET)

Schutzkleidung gegen feste, flüssige und gasförmige Chemikalien, einschließlich Flüssigkeitsaerosole und feste Partikel - Teil 2: Leistungsanforderungen für gasdichte (Typ 1) Chemikalienschutzanzüge für Notfallteams (ET)

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Vêtements de protection contre les produits chimiques solides, liquides et gazeux, y compris les aerosols liquides et les particules solides - Partie 2: Exigences de performance des combinaisons des protection chimiques étanches aux gaz (Type 1) destinés aux équipes de secours (ET)

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English Version

**Protective clothing against solid, liquid and gaseous chemicals,  
including liquid and solid aerosols - Part 2: Performance  
requirements for gas-tight (Type 1) chemical protective suits for  
emergency teams (ET)**

Vêtements de protection contre les produits chimiques solides, liquides et gazeux, y compris les aérosols liquides et les particules solides - Partie 2: Exigences de performance des combinaisons des protection chimiques étanches aux gaz (Type 1) destinés aux équipes de secours (ET)

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**iTeh STANDARD PREVIEW**

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 162.

If this draft becomes a European Standard, 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.

This draft European Standard was established by CEN 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 CEN-CENELEC Management Centre has the same status as the official versions.

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Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

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## Foreword

This document (prEN 943-2:2012) 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 document is currently submitted to the CEN Enquiry.

This document will supersede EN 943-2:2002.

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(s).

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

Annex B includes significant technical changes between this document and the previous edition of this European Standard.

EN 943 consists of the following parts:

EN 943-1: *Protective clothing against solid, liquid and gaseous chemicals, including liquid and solid aerosols — Part 1: Performance requirements for ventilated and non-ventilated gas-tight (Type 1) suits*

EN 943-2: *Protective clothing against solid, liquid and gaseous chemicals, including aerosols — Part 2: Performance requirements for gas-tight (Type 1) chemical protective suits for emergency teams (ET)*

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## 1 Scope

This European Standard specifies the minimum requirements, test methods, marking and information supplied by the manufacturer, for chemical protective suits for use by emergency teams (ET), including component parts such as gloves, bootees and boots which may be specified elsewhere.

It describes personal protective ensembles to be worn during hazardous materials activities involving solid, liquid, gaseous and particulate hazards only.

This standard does not establish minimum criteria for protection for non-chemical hazards, e.g. radiological, fire, heat, explosive hazards. This type of equipment is not intended for total immersion in liquids.

The seams, joins and assemblages attaching the 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.

**NOTE** Gas-tight suit, a one piece garment with hood, gloves and boots which, when worn with self-contained breathing apparatus provides the wearer a high degree of protection against harmful liquids, particles and gaseous or vapour contaminants.

## 2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 132, *Respiratory protective devices. Definitions of terms and pictograms.*

EN 374-1, *Protective gloves against chemicals and micro-organisms —Part 1: Terminology and performance requirements.*

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EN 651, *Resilient floor coverings - Polyvinyl chloride floor coverings with foam layer - Specification*

EN 653, *Resilient floor coverings - Expanded (cushioned) polyvinyl chloride floor coverings - Specification*

EN 943-1:2013, *Protective clothing against solid, liquid and gaseous chemicals, including liquid and solid aerosols - Part 1: Performance requirements for ventilated and non-ventilated gas-tight (Type 1) suits*

EN 1817, *Resilient floor coverings - Specification for homogeneous and heterogeneous smooth rubber floor coverings*

ISO/TR 11610, *Protective clothing – Vocabulary*

EN 13274-2:2001, *Respiratory protective devices - Methods of test - Part 2: Practical performance tests*

EN 13274-4:2001, *Respiratory protective devices - Methods of test - Part 4: Flame tests*

EN 14325:2004, *Protective clothing against chemicals - Test methods and performance classification of chemical protective clothing materials, seams, joins and assemblages*

EN 15090, *Footwear for firefighters*

FprEN 61672-1, *IEC 61672-1: Electroacoustics - Sound level meters - Part 1: Specifications*

### 3 Terms and definitions

For the purposes of this European Standard, the terms and definitions in CEN ISO/TR 11610, EN 132 and in EN 943-1 together with the following apply.

#### 3.1

##### **Type 1a-ET**

gas-tight chemical protective suit for use by emergency teams with breathable air supply independent of the ambient atmosphere, e. g. a self contained open-circuit compressed air breathing apparatus, worn inside the chemical protective suit

#### 3.2

##### **Type 1b-ET**

gas-tight chemical protective suit for use by emergency teams with a breathable air supply, e. g. a self contained open-circuit compressed air breathing apparatus, worn outside the chemical protective suit

#### 3.3

##### **Attachment point**

fixing to the outside of the chemical protective suit to enable equipment required to be fitted, e.g. a torch

### 4 General requirements

The chemical protective suits type 1a-ET and type 1b-ET shall fulfil the requirements of EN 943-1. Beyond that the additional or restrictive requirements of this European Standard shall be fulfilled. The performance class requirements given below are the minimum performance requirements.

NOTE As these chemical protective suits are intended for use in emergency situations it is recommended that the use of a "pass-thru" on type 1a-ET suits is considered, even though this is an optional requirement.

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## 5 Performance requirements of chemical protective clothing materials

### 5.1 General

The chemical protective clothing shall meet the requirements given in Table 1, when tested in preconditioned condition against the appropriate clause of EN 943-1.

**Table 1 — Minimum performance requirements of chemical protective clothing materials**

Property	Testing reference	Robustness I	Robustness II
Abrasion resistance	EN 943-1	class 4	class 6
Flex cracking resistance	EN 943-1	class 1	class 4
Flex cracking resistance at low temperatures (-30°C)	EN 943-1	class 2	class 2
Trapezoidal tear resistance	EN 943-1	class 3	class 3
Tensile strength	EN 943-1	class 4	class 6
Puncture resistance	EN 943-1	class 2 <sup>a</sup>	class 3 <sup>a</sup>
Resistance to flame	EN 943-2 8.3	class 3	class 3

<sup>a</sup> If only Class 2 is achieved for puncture resistance the instructions for use shall identify that the chemical protective clothing may not be suitable for use where there is a high risk of puncture.

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Pressure pot end point test shall be used for abrasion, flex cracking and flame resistance testing.

### 5.2 Resistance to permeation by chemicals

The chemical protective clothing materials refer to EN 943-1, (seams, safety footwear, bootees, gloves and visor or face piece) if fitted, shall be tested for resistance to permeation against the following liquid and gaseous standard test chemicals given in table 2.

**Table 2 — Chemicals for permeation tests**

Type	CAS No EG-No	Physical state under standard environmental condition	Generic representation
1	Dichloromethane CAS 75-09-2 EINECS 200-838-9	Liquid	Chlorinated hydrocarbon
2	Methanol CAS 67-56-1 EINECS 200-659-6	Liquid	Primary alcohol
3	n-Heptane CAS 142-82-5 EINECS 205-563-8	Liquid	Saturated hydrocarbon
4	Toluene CAS 108-88-3 EINECS 203-625-9	Liquid	Aromatic hydrocarbon



Table 2 (continued)

Type	CAS No EG-No	Physical state under standard environmental condition	Generic representation
5	Diethylamine CAS 109-89-7 EINECS 203-716-3	liquid	Amine
6	Sodium Hydroxide 40% CAS 1310-73-2 EINECS 215-185-5	liquid	Inorganic base
7	Sulphuric Acid 96% CAS 7664-93-9 EINECS 231-639-5	liquid	Inorganic mineral acid
8	Ammonia CAS 7664-41-7 EINECS 231-635-3	gas	Basic gas
9	Chlorine CAS 7782-50-5 EINECS 231-959-5	gas	Halogen gas
10	Hydrogen Chloride CAS 7647-01-0 EINECS 231-595-7	gas	Inorganic acid gas
11	Acetone CAS 67-64-1 EINECS 200-662-2	liquid	Ketone
12	Acetonitrile CAS 75-05-8 EINECS 200-835-2	liquid	Nitrile compound
13	Ethyl Acetate CAS 141-78-6 EINECS 2005-500-4	liquid	Ester
14	Carbon Disulphide CAS 75-15-0 EINECS 200-843-6	liquid	Sulphur containing organic compound
15	Tetrahydrofuran CAS 109-99-9 EINECS 203-726-8	liquid	Heterocyclic and ether compound

Any material, seams or component shall achieve class 2, not more than 3 chemicals of 15 (table 2) shall have class 1.

If class 2 is not achieved for any material or component part tested, the instructions for use shall identify that this chemical protective suit is not suitable for use for this chemical under continuous exposure.

Where safety footwear also provides the chemical permeation resistance, the test specimen shall be taken from the thinnest point of the footwear according to EN 15090 above the join to the sole.

**NOTE** The test chemicals identified above have been selected to represent a range of aggressive chemicals so as to ensure that chemical protective suit which meets the requirements of this European Standard will offer protection against a wide range of chemicals (Classes and Properties). However, it should be recognised that this approach only provides basic guidance against groups represented by these chemicals and that the performance against chemicals other than those listed can only be determined by individual tests. See Annex A.

**prEN 943-2:2012 (E)****5.3 Protective gloves and safety footwear****5.3.1 Protective gloves**

Protective gloves shall also meet the requirements of EN 374-1.

NOTE As EN 374-1 has only very limited mechanical and thermal requirements it may be necessary to use an over-glove e.g. according to EN 659 to provide greater mechanical or thermal protection.

**5.3.2 Safety footwear**

Where safety footwear is fitted, it shall also meet the requirements of EN 15090:2012, type 3.

Where safety footwear is not permanently fitted to the chemical protective suit, any external bootie supplied by the manufacturer shall comply with the requirements of EN 15090:2012, type 3.

NOTE This standard does not require the performance of booties to match the chemical protective clothing material and users should be aware that the performance of a bootie may differ from that of the chemical protective clothing material. Consequently it may be necessary to specify the required levels of performance specifically for the booties when procuring chemical protective clothing.

**5.4 Visor**

The visor shall meet the requirements of EN 943-1:2013, 5.6, as well as the requirements given below.

When tested in accordance with 8.2 the visor shall pass for each chemical listed in 5.2. This test shall only be carried out with those test chemicals for which the test according to 5.2 has led to any indication of harm to the visibility.

**6 Performance requirements for seams, joins and assemblages****6.1 Resistance to permeation of closures by chemicals**

Closures or closure assemblies shall be tested in accordance with 5.2 for each chemical listed in Table 2.

The basic requirement of this clause is for the main closure component (usually a zipper) to be tested for resistance to permeation. In many cases the closure system includes one or two outer protective flaps. The requirements shall also be met if such flaps exist. In order to avoid too high permeation breakthrough times which may result when clamping a zipper covered by a flap in a permeation test cell, the main closure component (e.g. zipper) itself shall be tested for permeation without any flaps, covers etc.

NOTE The test cell is specified in EN 943-1:2013, Annex F.

If the closure or closure assembly fails to meet level 2 the closure or closure assembly shall be protected by a flap or cover to reduce the risk of liquid chemical contact.

**6.2 Attachment points**

Where an attachment point for a lifeline is fitted it shall withstand a pull of not less than 1 000 N.

The attachment point for other items of equipment shall withstand a pull of not less than 250 N.

Testing according to EN 14594:2005, clause 7.6 with a pull of 1 000 N or 250 N.

## 7 Performance requirements for the whole chemical protective suit

### 7.1 General

Chemical protective suits shall fulfil the following requirements when tested as a complete assembly.

The outside of the chemical protective suit shall not have any pockets or features similar to pockets.

Pockets and/or features inside the chemical protective suit are allowed.

Type 1a-ET:

Chemical protective suits with a facemask according to EN 943-1:2013, 5.7, or a visor shall be used.

The chemical protective suit shall allow wearing of the compressed air breathing apparatus and a head protection if required inside.

NOTE 1 To protect the chemical protective suit against mechanical damage from the compressed air breathing apparatus, reinforcement should be provided in the back part (hump).

Type 1b-ET:

Chemical protective suit with a built-in full face mask or joined full face mask according to EN 943-1:2013, 5.7, shall be used.

NOTE 2 As chemical protection is used with respiratory devices, special attention should be given to the adequate selection and fit of respiratory protective equipment. The limiting factors for the use of filters (e.g. oxygen deficiency) should be taken into consideration.

### 7.2 Leak tightness

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The complete suit shall pass before and after practical performance test when tested according to EN 464. The pressure drop shall not be greater than 300 Pa (3 mbar) in 6 min.

## 8 Test methods

### 8.1 Practical performance test

#### 8.1.1 General

All tests shall be carried out by two test subjects at temperature  $(20 \pm 5)$  °C, and shall be recorded. The background noise shall not be greater than 75 dBA. Suitable sound level meters are specified for example in EN 61672-1.

For the test, persons shall be selected who are familiar with using such or similar equipment and whose medical history is known to be satisfactory. The subjects shall be medically examined and certified fit to undertake the test procedures. The necessity of medical supervision during the tests shall be at the testing officers discretion.

Prior to testing, the test devices shall be stored at room temperature of  $(20 \pm 3)$  °C.

Prior to the tests there is an examination that the device is in good working order and that it can be used without hazard. If more than one size of the suit is manufactured the subjects are asked to select the appropriate size.

For re-usable suits two devices shall be tested, each being tested on two subjects. For single use suits four devices shall be tested, each being tested on one subject.