

SLOVENSKI STANDARD

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Varovalna obleka pred nevarnimi trdnimi, tekočimi in plinastimi kemikalijami, vključno s tekočimi aerosoli in trdnimi delci - 1. del: Varnostne zahteve za varovalno oblačilo tipa 1 (neprepustno za plin) pred kemikalijami

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

(standards.iteh.ai)

Schutzkleidung gegen gefährliche feste, flüssige und gasförmige Chemikalien, einschließlich Flüssigkeitsaerosole und feste Partikel - Teil 1: Leistungsanforderungen für Typ 1 (gasdichte) Chemikalienschutzkleidung

Vêtements de protection contre les produits chimiques dangereux solides, liquides et gazeux, y compris les aérosols liquides et les particules solides - Partie 1: Exigences de performance pour Type 1 (étanches au gaz) des combinaisons de protection chimique

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ICS:

13.340.10 Varovalna obleka Protective clothing

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EUROPEAN STANDARD

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

Vêtements de protection contre les produits chimiques
dangereux solides, liquides et gazeux, y compris les
aérosols liquides et les particules solides - Partie 1:
Exigences de performance des combinaisons de protection
chimique étanches aux gaz (type 1)

Schutzkleidung gegen gefährliche feste, flüssige und
gasförmige Chemikalien, einschließlich
Flüssigkeitsaerosole und feste Partikel - Teil 1:
Leistungsanforderungen für Typ 1 (gasdichte)
Chemikalienschutzkleidung

This European Standard was approved by CEN on 27 June 2015.

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COMITÉ EUROPÉEN DE NORMALISATION
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EN 943-1:2015 (E)**European foreword**

This document (EN 943-1:2015) 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 February 2016, and conflicting national standards shall be withdrawn at the latest by February 2016.

This document supersedes EN 943-1:2002.

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.

For details of the significant changes made since EN 943-1:2002 please refer to Annex E.

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 Type 1 (gas-tight) chemical protective suits*

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

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

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

1 Scope

This European Standard specifies the minimum requirements, test methods, marking and information supplied by the manufacturer for ventilated and non-ventilated gas-tight chemical protective suits.

It specifies full body personal protective ensembles to be worn for protection against solid, liquid and gaseous chemicals, including liquid and solid aerosols.

This standard does not establish minimum criteria for protection for non-chemical hazards, e.g. radiological, fire, heat, explosive, infective agents. 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. This standard specifies only supplementary requirements for components. The basic performance criteria for the components gloves, boots or respiratory protective equipment are given in other European Standards.

Particulate protection is limited to physical penetration of the particulates only.

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 136:1998, *Respiratory protective devices - Full face masks - Requirements, testing, marking*

EN 388, *Protective gloves against mechanical risks*

EN 1073-2, *Protective clothing against radioactive contamination - Part 2: Requirements and test methods for non-ventilated protective clothing against particulate radioactive contamination*

EN 12021, *Respiratory equipment - Compressed gases for breathing apparatus*

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

EN 14593-1:2005, *Respiratory protective devices - Compressed air line breathing apparatus with demand valve - Part 1: Apparatus with a full face mask - Requirements, testing, marking*

EN 14594:2005, *Respiratory protective devices - Continuous flow compressed air line breathing apparatus - Requirements, testing, marking*

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

CEN ISO/TR 11610, *Protective clothing - Vocabulary (ISO/TR 11610)*

EN ISO 13688:2013, *Protective clothing - General requirements (ISO 13688:2013)*

EN ISO 13982-2, *Protective clothing for use against solid particulates - Part 2: Test method of determination of inward leakage of aerosols of fine particles into suits (ISO 13982-2:2004)*

EN ISO 17491-3, *Protective clothing - Test methods for clothing providing protection against chemicals - Part 3: Determination of resistance to penetration by a jet of liquid (jet test) (ISO 17491-3:2008)*

EN ISO 20345:2011, *Personal protective equipment - Safety footwear (ISO 20345:2011)*

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ISO 17491-1:2012, *Protective clothing — Test methods for clothing providing protection against chemicals — Part 1: Determination of resistance to outward leakage of gases (internal pressure test)*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in CEN ISO/TR 11610 and EN 132 together with the following apply.

3.1
assemblage
permanent fastening between two or more different garments, or between the protective clothing and accessories obtained for example by sewing, welding, vulcanizing, gluing

[SOURCE: EN 1073-1:1998]

3.2
join
non-permanent fastening between two different garments, or between protective clothing and accessories

3.3
bootees
sock like gastight extension of the suit leg that encapsulates the entire foot

Note 1 to entry: Intended to be worn inside separate (i.e. not attached) protective boots or protective shoes.

3.4
cleaning
removal of contamination or soiling

Note 1 to entry: There are several separate types of cleaning that may be applicable to chemical protective clothing. The purpose of each type of cleaning is distinct, though the same operation may, under some circumstances, fulfil the requirements of more than one type of cleaning.

3.4.1
hygienic cleaning
operation to remove soiling that originates from the body of the wearer of the suit

Note 1 to entry: The purpose of this type of cleaning is to render the inside of the suit sufficiently clean that another wearer can then safely and comfortably wear it. Hygienic cleaning can consist of rinsing or wiping the inside of the suit with a disinfectant solution.

Note 2 to entry: An example of soiling intended to be removed by hygienic cleaning is perspiration.

3.4.2
washing
operation to remove general soiling that does not originate from either the wearer of the suit or the chemical hazards against which the suit is worn as protection

Note 1 to entry: An example of soiling intended to be removed by washing is mud.

3.4.3**decontamination**

operation to remove chemical contamination from the outside of the suit

Note 1 to entry: The primary purpose of decontamination is to render the outside of the suit sufficiently clean that the wearer can remove the suit without coming into contact with those chemicals from which the suit has been protecting him or her. A secondary aim of decontamination may be to render the suit sufficiently chemically clean that it will not contaminate future wearers or personnel involved in the maintenance and/or storage of the suit before it is next used. Decontamination may involve wiping or rinsing the suit with copious amount of water, or treatment with a solution, liquid or solid in order to neutralize the contamination or otherwise render it harmless.

3.5**disinfection**

purposeful reduction of the number of certain unwanted microorganisms by physical or chemical inactivation, so that they can cause no more infection under the given circumstances

3.6**external ventilating hose**

hose that is used to supply a type 1 suit with breathable air providing internal ventilation

3.7**integral overshoe**

gas-tight integrated footwear, connected to the chemical protective suit and intended to be worn with personal footwear inside thus protecting the wearer's feet and footwear

Note 1 to entry: The integral overshoe and the personal footwear together fulfil the requirements of footwear. An overshoe may have either a permanent or detachable outsole.

3.8**Type 1 - gas-tight chemical protective suit****(type 1 suit)**

one-piece garment with hood, gloves and boots which, when worn with appropriate respiratory protective devices, provides the wearer a high degree of protection against harmful liquids, particles and gaseous or vapour-phase contaminants

3.8.1**Type 1a - gas-tight chemical protective suit****(type 1a suit)**

gas-tight chemical protective suit to be used in conjunction with a breathable air supply which is both independent of the ambient atmosphere and worn inside the suit

Note 1 to entry: e.g. a self-contained open-circuit compressed-air breathing apparatus.

3.8.2**Type 1b - gas-tight chemical protective suit****(type 1b suit)**

gas-tight chemical protective suit to be used in conjunction with a breathable air supply independent of the ambient atmosphere supplied from or worn outside the suit

Note 1 to entry: e.g. a self-contained open circuit compressed air breathing apparatus.

Note 2 to entry: As chemical protective suits are 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 respirators should be taken into consideration.

EN 943-1:2015 (E)**3.8.3****Type 1c - gas-tight chemical protective suit****(type 1c suit)**

gas-tight chemical protective suit to be used in conjunction with breathable air providing positive pressure where the suit is the face piece

Note 1 to entry: e.g. air lines where the wearer breathes from the suit.

3.8.4**Ventilated suit**

Type 1a, 1b, or 1c which includes the provision of air for comfort, or dehumidification purposes

4 Performance requirements**4.1 General**

This European Standard requires that various materials of construction and components of the suit be tested for resistance to chemical permeation. In cases where more than one chemical is tested, each component and material of construction shall be tested against each chemical.

4.2 Materials

Chemical protective clothing materials of construction (i.e. materials used in the construction of the garment, booties, boots, gloves, and (if fitted) visor) shall fulfil all the non-optional test requirements given in Table 1. The optional tests listed in Table 1 may be carried out at the discretion of the manufacturer in accordance with intended use. Components such as integral overshoes or boots, integral gloves shall also fulfil the minimum performance requirements of the respective product standard.

Pre-conditioning and conditioning shall be carried out in accordance with EN 14325:2004, 4.2 and 4.3.

Materials of construction shall comply with all subsections of EN ISO 13688:2013, 4.2.

Table 1 — Minimum performance requirements of Type 1 chemical protective clothing

Clothing component	Performance requirement	Test method reference	Minimum performance class (as defined in the relevant table in EN 14325:2004 unless otherwise stated)
Garment	Abrasion resistance	4.4 of EN 14325:2004	3
	Flex cracking resistance	4.5 of EN 14325:2004	1
	Flex cracking at -30 °C (optional)	4.6 of EN 14325:2004	2
	Trapezoidal tear resistance	4.7 of EN 14325:2004	3
	Tensile strength	4.9 of EN 14325:2004	3
	Puncture resistance	4.10 of EN 14325:2004	2
	Resistance to permeation by chemicals (liquids and gases)	4.11 of EN 14325:2004	3
	Resistance to ignition	4.14 of EN 14325:2004	See B.2

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Clothing component	Performance requirement	Test method reference	Minimum performance class (as defined in the relevant table in EN 14325:2004 unless otherwise stated)
Bootees (If made from different material than the suit)	Abrasion resistance	4.4 of EN 14325:2004	3
	Flex cracking resistance	4.5 of EN 14325:2004	1
	Flex cracking at -30 °C (optional)	4.6 of EN 14325:2004	2
	Resistance to permeation by chemicals (liquids and gases)	4.11 of EN 14325:2004	3
Integral overshoe (upper)	Abrasion resistance	4.4 of EN 14325:2004	3
	Trapezoidal tear resistance	4.7 of EN 14325:2004	3
	Puncture resistance	4.10 of EN 14325:2004	2
	Resistance to permeation by chemicals (liquids and gases)	4.11 of EN 14325:2004	3
Integral overshoe (outsole)	Puncture resistance	6.2.1 of EN ISO 20345:2011	6.2.1 of EN ISO 20345:2011
Boots	Resistance to permeation by chemicals (liquids and gases)	4.11 of EN 14325:2004	3
Gloves	Resistance to permeation by chemicals (liquids and gases)	4.11 of EN 14325:2004	3
	Mechanical resistance ^a	EN 388	See table footnote a
Visor, face mask, face seal (if fitted)	Resistance to permeation by chemicals (liquids and gases) ^b	4.11 of EN 14325:2004	3
	Mechanical strength	5.6.5 of EN 943-1	comply
<p>^a To select the suitable gloves or boots see the SUCAM document or perform a risk assessment to choose the product with the necessary properties.</p> <p>^b Visor materials tested shall be inspected for visible degradation. If the material shows change of optical clarity or transparency, 5.6.3 shall be done. This test shall be carried out for all the chemicals the manufacturer applies for, where an optical change of the material is visible (see 4.2, Table 1).</p>			

4.3 Seams, joins, and assemblages

The requirements of this clause apply to the component parts, such as visor or face piece, bootees, gloves or boots that are integral to the garment.

Seams (suit to suit, bootee to bootee, etc.), joins or assemblages (visor to suit, glove to suit, booties to suit, boots to suit, etc.) shall fulfil the performance requirements listed in Table 2. If it is not possible to test adjacent seams or assemblages separately, they may be tested together.

When the strength of a seam is tested, the value shall be taken regardless of where the break occurs.

For each chemical tested, the permeation test shall be carried out using the same diameter cell, the same collection medium and the same collection system (open or closed loop) as used for testing the suit fabric.

Closure assemblies (e.g. zipper) shall be tested without any cover.

Table 2 — Minimum performance requirements for seams, joins and assemblages

Clothing component (seams, joins, assemblages)	Performance requirement	Test method reference	Minimum performance class (as defined in the relevant table in EN 14325:2004 unless otherwise stated)
Suit material to suit material	Resistance to permeation by chemicals (liquids and gases)	EN 14325:2004 4.11	3
	Seam strength	EN 14325:2004 5.5	5
Closure assembly (e.g. zipper)	Resistance to permeation by chemicals (liquids and gases) ^a	EN 14325:2004 4.11	5 minutes ^d
	Closure strength ^b	EN 14325:2004 5.5	3
Assemblages	Resistance to permeation by chemicals (liquids and gases)	EN 14325:2004 4.11	3
Visor to suit	Resistance to permeation by chemicals (liquids and gases)	EN 14325:2004 4.11	3
Glove to suit (permanent)	Resistance to permeation by liquids and gases	EN 14325:2004 4.11	3
	Mechanical strength	EN 14325:2004 5.5	3
Bootee to suit (permanent)	Resistance to permeation by chemicals (liquids and gases)	EN 14325:2004 4.11	3
Boots to suit (permanent)	Resistance to permeation by chemicals (liquids and gases)	EN 14325:2004 4.11	3
	Mechanical strength	EN 14325:2004	4