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Varovalne rokavice za zaščito pred ionizirnim sevanjem in radioaktivno kontaminacijo

Protective gloves against ionizing radiation and radioactive contamination

Schutzhandschuhe gegen ionisierende Strahlung und radioaktive Kontamination

Gants de protection contre les rayonnements ionisants et la contamination radioactive

Ta slovenski standard je istoveten z: EN 421:2010

ICS:

13.280	Varstvo pred sevanjem	Radiation protection
13.340.40	Varovanje dlani in rok	Hand and arm protection

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Protective gloves against ionizing radiation and radioactive contamination

Gants de protection contre les rayonnements ionisants et la contamination radioactive

Schutzhandschuhe gegen ionisierende Strahlung und radioaktive Kontamination

This European Standard was approved by CEN on 22 April 2010.

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 CEN Management Centre 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 CEN Management Centre has the same status as the official versions.

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Foreword

This document (EN 421:2010) 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of an identical text or by endorsement, at the latest by November 2010, and conflicting national standards shall be withdrawn at the latest by November 2010.

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.

This document supersedes EN 421:1994.

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 D provides details of significant technical changes between this European Standard and the previous edition EN 421:1994.

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

1 Scope

This European Standard specifies requirements and test methods for gloves to protect against ionizing radiation and radioactive contamination. The standard is applicable to gloves offering protection to the hand and various parts of the arm and shoulder. It applies also to gloves to be mounted in permanent containment enclosures.

This European Standard also applies to intermediary sleeves used between a glove and a permanent containment enclosure (report to 4.7.2.3).

The requirements of this European Standard do not apply to protective gloves against X-ray radiation.

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 374-1:2003, *Protective gloves against chemicals and micro-organisms — Part 1: Terminology and performance requirements*

EN 374-3, *Protective gloves against chemicals and micro-organisms — Part 3: Determination of resistance to permeation by chemicals*

EN 388:2003, *Protective gloves against mechanical risks*

EN 420:2003+A1:2009, *Protective gloves — General requirements and test methods*

EN 61331-1:2002, *Protective devices against diagnostic medical X-radiation — Part 1: Determination of attenuation properties of materials (IEC 61331-1:1994)*

ISO 1431-1, *Rubber, vulcanised or thermoplastic — Resistance to ozone cracking — Part 1: Static and dynamic strain testing*

ISO 7000:2004, *Graphical symbols for use on equipment — Index and synopsis*

ISO 11933-1, *Components for containment enclosures — Part 1: Glove/bag ports, bungs for glove/bag ports, enclosure rings and interchangeable units*

ISO 11933-2, *Components for containment enclosures — Part 2: Gloves, welded bags, gaiters for remote - handling tongs and for manipulators*

CEN ISO/TR 11610:2004, *Protective clothing — Vocabulary (ISO/TR 11610:2004)*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in CEN ISO/TR 11610:2004 and the following apply.

3.1
radioactive contamination
presence of radioactive substances in or on a material or in a place where they are undesirable or could be harmful

3.2
ionizing radiation
radiation constituted by particles directly or indirectly ionizing (photons included) or by a mixture of both

3.3
irradiation
exposure of a living being or matter to ionizing radiation by external sources (X, Alpha, Beta, Gamma or Neutron radiations)

3.4
water vapour permeability
weight of water vapour in grams transmitted through a material per square metre per 24 h time, under specified conditions of temperature and humidity ($gm^{-2}d^{-1}$)

3.5
containment enclosure
enclosure that prevent from the spreading of products contained in the inside medium towards the outside medium, or the penetration of outside atmosphere towards the inside medium or both

3.6
glove box
containment enclosure in which material or products can be manipulated being isolated from the operator, which is realized thanks to gloves fixed in a tightness way to openings that are designed in walls of the enclosure (glove port or cell ring)

3.7
glove for glove box or for containment enclosure
glove with a long cuff constituted in flexible elastomeric material, intended to enable a tight clamping on the circumference or the extremity of a glove port or on any other component and enabling at the same time a good mechanical resistance

3.8
glove port
cylindrical collar fitted with a bead or a groove, fixed on the wall of a glove box or a containment enclosure in order to receive a glove or any other flexible accessory finished with a bead of same diameter

3.9
cell ring
sectional ring in plastic or metal fixed on the enclosure, that receive interchangeable tightness accessories by pushing and which can be replaced without breaking the containment

3.10
support ring
interchangeable tightness ring, in metallic alloy or plastic, fitted with grooves, fixed on a cell ring and equipped with a glove or other plastic component, finished by a bead, a toric joint or a lip joint of same diameter

3.11
protective glove material
material or combination of materials used in a glove for the purpose of preventing the user from direct contact with radioactive contamination or of minimizing the radiation dose to the user from external radiation sources

4 Requirements

4.1 General

Table 1 gives the requirements for gloves and gloves for containment enclosures for protection against radioactive contamination and protection against ionizing radiation.

Table 1 — Requirements for gloves and gloves for containment enclosures

		Gloves		Gloves for containment enclosures	
		Protection against radioactive contamination	Protection against radioactive contamination and protection against ionizing radiation	Protection against radioactive contamination	Protection against radioactive contamination and protection against ionizing radiation
Requirements	4.2.1	X	X	X	X
	4.2.2	X	X		
	4.3		X		X
	4.4	X	X		
	4.5	X	X	X	X
	4.6	✶	✶	✶	✶
	4.7.2			X	X
	4.7.3			X	X
	4.7.4			♦	♦

✶ : optional requirement

♦ : mandatory if the gloves are used in an atmosphere containing ozone

4.2 Design principles

4.2.1 General principles

The glove shall comply with the relevant requirements defined in EN 420, with the following specific additions.

The glove may be constructed from a single or multiple material layers. The choice of material is defined by the end use requirements.

In the case of protection against external ionizing radiation the glove may contain lead (PbO, Pb_3O_4) or other heavy metallic elements to act as attenuation medium in one or more of the layers. Metallic element distribution may be uniform or designed.

4.2.2 Glove sizing and dimensions

Gloves shall be sized following prescriptions of EN 420:2003+A1:2009, 5.1.

NOTE In case where specific use identified, special tests can be identified according to Annex B.

4.3 Attenuation efficiency and uniformity of distribution of protective material

The lead equivalent thickness shall be measured by one of the methods described in 5.1. The test methods give equivalent results.

The efficiency of the glove material to absorb radiation is quoted as lead equivalent thickness. The gloves shall have at least a lead equivalence thickness of 0,05 mm.

Except for special design (see 4.7.2) the uniformity shall be such that no single measurement shall be below the specified value of the stated lead equivalent thickness. A minimum of four measurements shall be taken for each test condition (see 5.1.3) and the minimum value obtained is taken as the lead equivalence in millimetres.

The lead equivalent thickness shall always be linked with the nature and energy of the radiation used during tests (see Clauses 6 and 7).

4.4 Glove integrity

The purpose of the glove to protect against ionizing radiation or radioactive contamination is to isolate the user from the potential hazard. This is only possible if the integrity of the glove is proven.

Gloves shall pass an integrity test: the integrity shall comply with the requirements of EN 374-1:2003, 5.2.

4.5 Mechanical requirements

For each protective glove against radioactive contamination and/or ionizing radiation, the obtained performance level shall be indicated in the information supplied by the manufacturer for the following mechanical tests:

— abrasion resistance;

— blade cut resistance;

— tearing resistance;

— puncture resistance.

According to the test methods described in EN 388:2003, at least level 1 shall be reached for one of the four mechanical properties. For special purposes, dexterity is the most important parameter, in this case no level of protection of EN 388 has to be reached, but the following sentence shall be written in the user notice of the gloves: “This gloves does not protect against mechanical risks."

4.6 Chemical requirements

If required, the chemicals properties of the gloves shall be determined following the requirements defined in EN 374-1:2003, 5.3.1. The test method for permeation is described in EN 374-3.

Two possibilities are acceptable:

— The glove fulfills EN 374-1:2003, 5.3.2; In this case the pictogram of EN 374-1:2003, Figure 1 shall be used.

— The chemicals to be tested are defined taking into account the use of the glove at the work place. In this case the pictogram of EN 374-1:2003, Figure 2 shall be used.

4.7 Specific requirements for gloves for containment enclosures

4.7.1 General requirement for gloves for containment enclosures

Gloves for containment enclosures shall comply with 4.1, 4.2, 4.3 and 4.4.

NOTE Annex A provides an optional test method for water vapour permeability.

4.7.2 Design for gloves for containment enclosures

4.7.2.1 General

The glove shall comply with the relevant requirements defined in ISO 11933-2.

When the metallic element distribution is not uniform over the glove, the manufacturer shall mark the equipment and provide the information accordingly (see Clauses 6 and 7).

4.7.2.2 Glove sizing and dimensions

In the case of gloves to be mounted in containment enclosures, prescriptions of ISO 11933-1 and ISO 11933-2 shall be followed.

Gloves used in containment enclosures are often used with under gloves. The user will have to take into account this parameter for the choice of an adapted size of equipment.

NOTE ISO 11933-1 and ISO 11933-2 detail a list of characteristics of standardized gloves, glove ports, support rings, cell rings, etc.

4.7.2.3 Accessories used with gloves

4.7.2.3.1 Gloves equipped with a support ring

In a few permanent containment enclosures, gloves can be equipped with a support ring. The support ring is considered as an integral part of the glove, and the whole equipment shall be tested according to the air leak test using a test bench equipped with a cell ring (see 4.7.3).

4.7.2.3.2 Sleeve

Gloves mounted in permanent containment enclosures can be used with an intermediary sleeve, fixed between the glove and the containment enclosure. This sleeve is not considered as an integral part of the glove. It shall fulfill all requirements of this European Standard and shall be compatible with the glove used.

The way of fixation between the glove and the sleeve and between the sleeve and the containment enclosure shall be detailed in the information supplied by the manufacturers.

The sleeve shall be tested with one compatible glove as regards the integrity using the air leak test (see 4.7.3)

Such an assemblage shall resist to a tensile strength test of 100 N according to 5.4.

4.7.3 Specific integrity test for gloves for containment enclosures

The integrity of gloves used in containment enclosures shall be tested by the air leak test described in 5.2. The pressure shall not decrease by more than half the initial pressure. The initial pressure shall be mentioned in the instructions supplied by the manufacturer if it is different from 3 000 Pa.

4.7.4 Resistance to ozone cracking (static strain)

When gloves can be exposed to ozone, the resistance to ozone cracking shall be determined.

NOTE Powders emitting alpha particles can generate ozone containment enclosures.

The performance level shall be determined by the method described in 5.3; at least level 1 of Table 2 shall be achieved.