



SLOVENSKI STANDARD

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Osebna varovalna oprema - Ščitniki za kolena za delo v klečečem položaju - 1. del: Preskusne metode

Personal protective equipment - Knee protectors for work in the kneeling position - Part 1: Test methods

Persönliche Schutzausrüstung - Knieschutz für Arbeiten in kniender Haltung - Teil 1: Prüfverfahren

Équipements de protection individuelle - Protecteurs de genoux pour le travail à genoux - Partie 1 : Méthodes d'essai

Ta slovenski standard je istoveten z: **EN 14404-1:2024**

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ICS:

13.340.50 Varovanje nog in stopal Leg and foot protection

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English Version

Personal protective equipment - Knee protectors for work in the kneeling position - Part 1: Test methods

Équipements de protection individuelle - Protecteurs
de genoux pour le travail à genoux - Partie 1 :
Méthodes d'essai

Persönliche Schutzausrüstung - Knieschutz für
Arbeiten in kniender Haltung - Teil 1: Prüfverfahren

This European Standard was approved by CEN on 20 June 2022.

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-CENELEC 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-CENELEC Management Centre has the same status as the official versions.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
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EN 14404-1:2024 (E)

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European foreword

This document (EN 14404-1:2024) has been prepared by Technical Committee CEN/TC 162 "Protective clothing including hand and arm protection and life jackets", 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of an identical text or by endorsement, at the latest by November 2024 and conflicting national standards shall be withdrawn at the latest by November 2024.

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

This document, together with EN 14404-2 to EN 14404-6, supersedes EN 14404:2004+A1:2010.

EN 14404 "Personal protective equipment — Knee protectors for work in the kneeling position" is split into 6 parts:

- *Part 1: Test methods;*
- *Part 2: Requirements for wearable knee protectors (type 1);*
- *Part 3: Requirements for the individual combination of knee pads and garments (type 2);*
- *Part 4: Requirements for the combination of interoperable knee pads and garments (type 2);*
- *Part 5: Requirements for knee mats (type 3);*
- *Part 6: Requirements for kneeling systems (type 4).*

With the splitting of the standard, the following changes were made:

- definition of the protection zone;
- new combination of interoperable knee pads with interoperable garments (EN 14404-4);
- a bend test for interoperable knee pad was introduced;
- normative references were updated, further normative references were included;
- an uneven test surface and test was introduced;
- no more "UNISIZE" size; adjustment of size designation;
- additional markings were added.

Any feedback and questions on this document should be directed to the users' national standards body. A complete listing of these bodies can be found on the CEN website.

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, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye and the United Kingdom.

EN 14404-1:2024 (E)

Introduction

Kneeling is a frequently occurring working position, but one which is problematic from an occupational health viewpoint. Without knee protectors, workers can suffer immediate injuries from hard surfaces and small stones and similar objects lying on the surfaces. However, no knee protector can ensure that workers will not suffer medical complications if they are required to kneel for long periods.

It is important that knee protectors do not compromise venous drainage in the leg while kneeling or standing up. Therefore, it is important that it is easy for workers to change position and to stand up to re-establish a normal blood circulation at frequent intervals while wearing knee protectors.

Work in a kneeling position involves the risk of chronic diseases such as prepatellar bursitis and cartilage injuries caused by continuous pressure on the knees. Knee protection is therefore recommended for all work in the kneeling position. The protection should distribute forces evenly and prevent small hard objects on the ground causing injuries. Many workers have pre-existing damage to their knees, particularly to their cartilage from sports injuries and from previous work. These injuries will be made worse by further kneeling. Wearing knee protectors cannot correct existing damage but should slow down further damaging effects.

Work in a kneeling position can expose the skin of the shins, knees and thighs to toxic and corrosive materials normally kept off the body while walking and standing by waterproof or water-resistant footwear. Knee protectors and trousers for use with such wet materials and particularly wet cement, should take this into account and provide adequate protection.

For working in a kneeling position, four types of knee protectors exist:

- wearable knee protectors (type 1),
- knee pads in combination with garments (type 2),
- knee mats (type 3), and
- kneeling systems (type 4).

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1 Scope

This document specifies the test methods for knee protectors intended to protect the knee while working in a kneeling position.

This document does not apply to knee protectors that are medical devices or are intended for sports and motorcycles.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 863, *Protective clothing - Mechanical properties - Test method: Puncture resistance*

EN 14404-2, *Personal protective equipment - Knee protectors for work in the kneeling position - Part 2: Requirements for wearable knee protectors (type 1)*

EN 14404-3, *Personal protective equipment - Knee protectors for work in the kneeling position - Part 3: Requirements for the individual combination of knee pads and garments (type 2)*

EN 14404-4:2024, *Personal protective equipment - Knee protectors for work in the kneeling position - Part 4: Requirements for the combination of interoperable knee pads and garments (type 2)*

EN 14404-5, *Personal protective equipment - Knee protectors for work in the kneeling position - Part 5: Requirements for knee mats (type 3)*

EN 14404-6, *Personal protective equipment - Knee protectors for work in the kneeling position - Part 6: Requirements for kneeling systems (type 4)*

EN ISO 4014, *Hexagon head bolts - Product grades A and B (ISO 4014)*

EN ISO 5084, *Textiles - Determination of thickness of textiles and textile products (ISO 5084:1996)*

3 Terms and definitions

For the purposes of this document, the terms and definitions in EN 14404-2, EN 14404-3, EN 14404-4, EN 14404-5 and EN 14404-6 apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp/>
- IEC Electropedia: available at <https://www.electropedia.org/>

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4 Test methods

4.1 General

Measuring instruments unless otherwise specified shall be accurate to $\pm 2\%$ of the pass/fail level of the characteristic being measured.

The test specimen shall at least attain the required requirement value.

4.2 Preparation of the test specimens

4.2.1 Condition atmosphere

Knee protectors (and garments) shall be conditioned for at least 24 h at a temperature of (20 ± 2) °C and a relative humidity of $(65 \pm 5)\%$ prior to testing.

4.2.2 Testing atmosphere

The tests shall be carried out at (20 ± 2) °C or within 30 min after removal from the conditioning atmosphere.

4.3 Examination

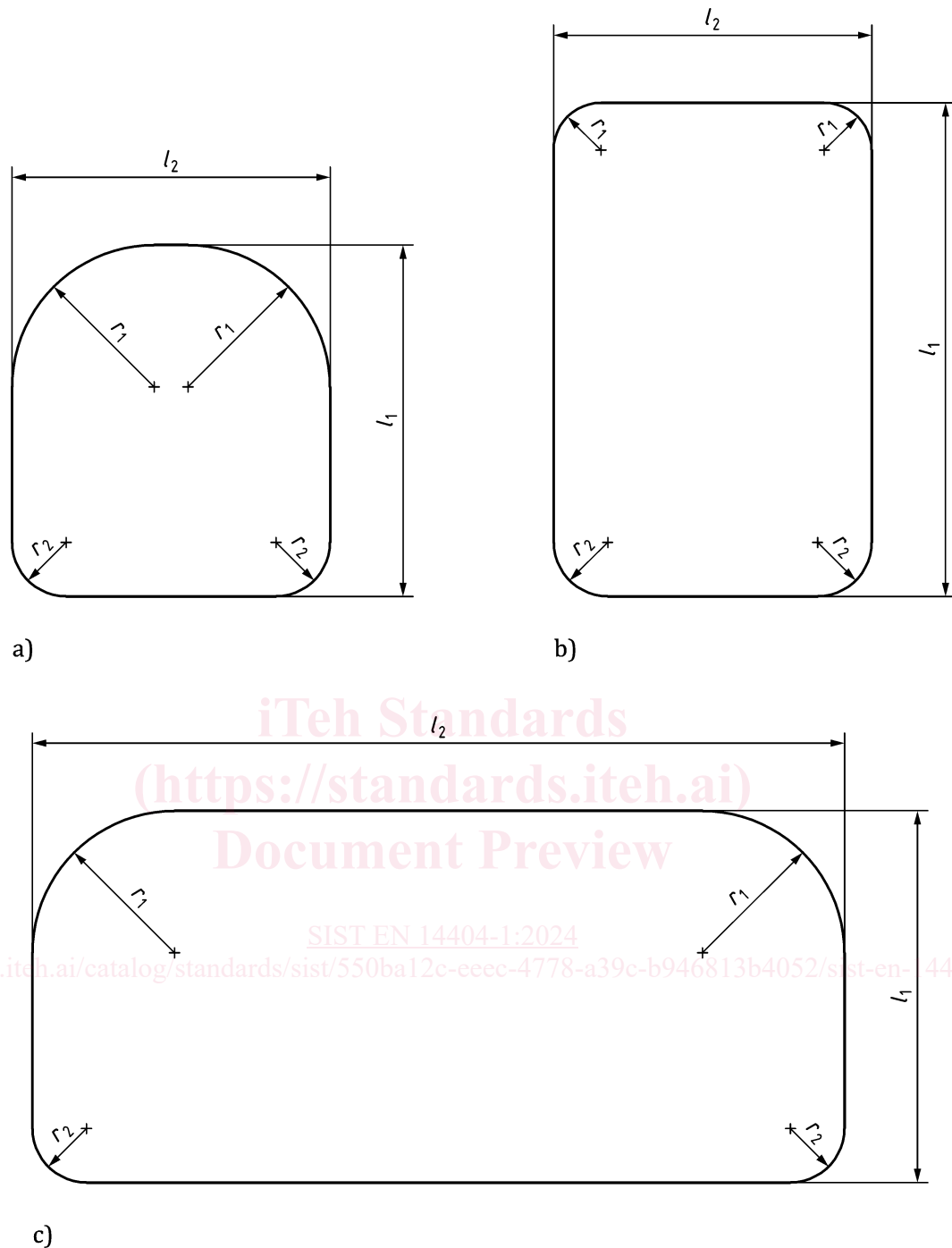
4.3.1 Visual and tactile examination

Knee protectors shall be examined visually and by hand to locate any hard or sharp edges, seams, buckles, or other items that might injure the user or others during normal use (innocuousness). The marking of the orientation needs to be checked, if applicable.

4.3.2 Sizes and dimension

The dimensions of the product, the defined zone of protection, the restraint systems and settings shall be measured with suitable measuring tapes or other devices. Curved areas shall be determined in their unwound length and width within the inner edges of the knee protector. The shape of the minimum protection zone is shown in Figure 1 (top view). The results shall be recorded in the test report.

All sizes shall be examined to determine whether their construction appears to provide similar protection throughout the required zone of protection. Areas with seemingly reduced protection shall be marked for the mechanical test so that tests occur there.

**Key**

- l_1 length of the zone of protection
- l_2 width of the zone of protection
- r_1 radius of curvature of a proximal (upper) corner of the zone of protection
- r_2 radius of curvature of a distal (lower) corner of the zone of protection
- a) wearable knee protector (type 1)
- b) knee protector (type 2)
- c) knee mat (type 3)

Figure 1 — Shapes of the zones of protection of knee protectors

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The dimensions of the zone of protection are given in EN 14404-2 to EN 14404-6.

4.3.3 Fitting test for interoperable knee pad using the test pocket

The interoperable knee pad has to fit into the test pocket.

The inner dimensions of the test pocket have to be:

Length: (265 ± 1) mm

Width: (175 ± 1) mm as described in Figure 2

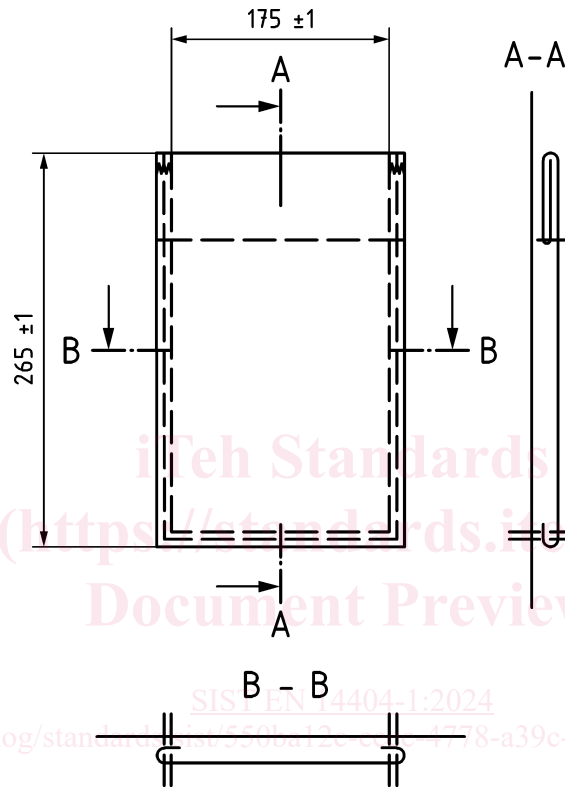


Figure 2 — Picture of test pocket

The woven fabric of the test pocket shall be made of a single material and shall be non-stretchable.

NOTE A 100 % Polyamide woven fabric covered with a PU-coating (PU: Polyurethan) with a mass per unit area of about 265 g/m² has been found suitable.

The test pocket has to be a separate unit that is not sewed up a trouser leg or other clothes. Three sides of the test pocket have to be sewn up; the top width side has to be open. The seams shall be at the nooks.

The test shall be evaluated as “fail”, when the knee pad

- does not fit into the test pocket,
- protrudes at the opening of the test pocket,
- is unable to return to its original shape when placed in the test pocket.

4.3.4 Thickness of interoperable knee pad

The thickness of interoperable knee pad shall be tested according to EN ISO 5084.