



SLOVENSKI STANDARD

oSIST prEN 14404-1:2019

01-maj-2019

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 - Protection des genoux pour le travail à genoux -
Partie 1 : Méthodes d'essais

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Ta slovenski standard je istoveten z: prEN 14404-1

ICS:

13.340.50 Varovanje nog in stopal Leg and foot protection

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en,fr,de

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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

DRAFT
prEN 14404-1

March 2019

ICS 13.340.50

Will supersede EN 14404:2004+A1:2010

English Version

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

Équipements de protection individuelle - Protection
des genoux pour le travail à genoux - Partie 1 :
Méthodes d'essais

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

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.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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prEN 14404-1:2019 (E)**European foreword**

This document (prEN 14404-1:2019) 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 document is currently submitted to the CEN Enquiry.

This document will supersede EN 14404:2004+A1:2010.

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 Regulation (2016/425).

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

This document “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 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)

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Introduction

Kneeling is a frequently occurring working position, but one which is problematic from an occupational health viewpoint. Without knee protectors, workers may 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 cartilages 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 may 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, as does footwear.

For working in kneeling position exist 4 types of knee protectors:

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

This document describes test methods, specifies requirements for knee protectors and defines performance levels. Requirements for the marking of knee protectors and the information to be supplied by the manufacturer are given. Where protection against additional hazards is claimed, performance requirements from other applicable standards may also be applied.

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

prEN 14404-1:2019 (E)**1 Scope**

This document specifies the test methods for knee protectors intended for use by work in kneeling position.

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 863:1995, *Protective clothing - Mechanical properties - Test method: Puncture resistance*

prEN 14404-2:2019, *Personal protective equipment - Knee protectors for work in the kneeling position - Part 2: Requirements for wearable knee protectors (type 1)*

prEN 14404-3:2019, *Personal protective equipment - Knee protectors for work in the kneeling position - Part 3: Requirements for the combination of knee pads and garments (type 2)*

prEN 14404-4:2019, *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)*

prEN 14404-5:2019, *Personal protective equipment - Knee protectors for work in the kneeling position - Part 5: Requirements for knee mats (type 3)*

prEN 14404-6:2019, *Personal protective equipment - Knee protectors for work in the kneeling position - Part 6: Requirements for kneeling systems (type 4)*

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

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

ISO 4014, *Hexagon head bolts — Product grades A and B*

3 Terms and definitions

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

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

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

4 Test methods

4.1 General

Measuring instruments unless otherwise specified shall be accurate to ± 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 Cleansing of the garments/ Dimensional change of garments

The cleansing of the garments shall be done according to the description in EN ISO 13688.

4.2.2 Condition atmosphere

Unused 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 ± 4) % prior to testing.

4.2.3 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

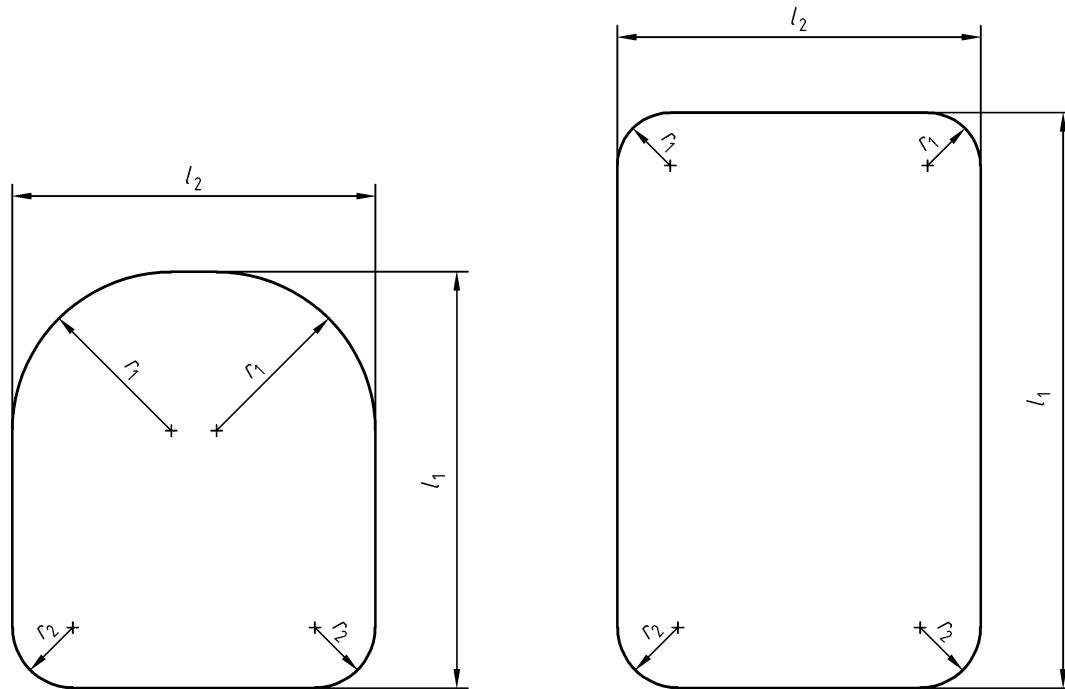
Knee protectors shall be examined visually and by hand to locate any hard or sharp edges, seams, buckles, or other items that might injure the user or others during normal use. Documents supplied by the manufacturer shall be examined to determine whether the claim that the materials are suitable for use in protective garments and equipment is justified.

4.3.2 Sizes and dimension

The dimensions of the product, the defined zone of protection of the restraint systems and settings shall be measured with suitable measuring tapes or other devices. Curved areas shall be determined in their unwound projection 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. At least one knee protector shall be taken apart to verify its construction. Areas with seemingly reduced protection shall be marked for the mechanical test so that tests occur there.

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a)

b)

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 a knee protector r_2 Radius of curvature of a distal (lower) corner of a knee protector

a) Type 1 knee protector

b) Type 2 knee protector

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

4.3.3 Dimension test for shaped, interoperable knee pad using the test pocket

The shaped, 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

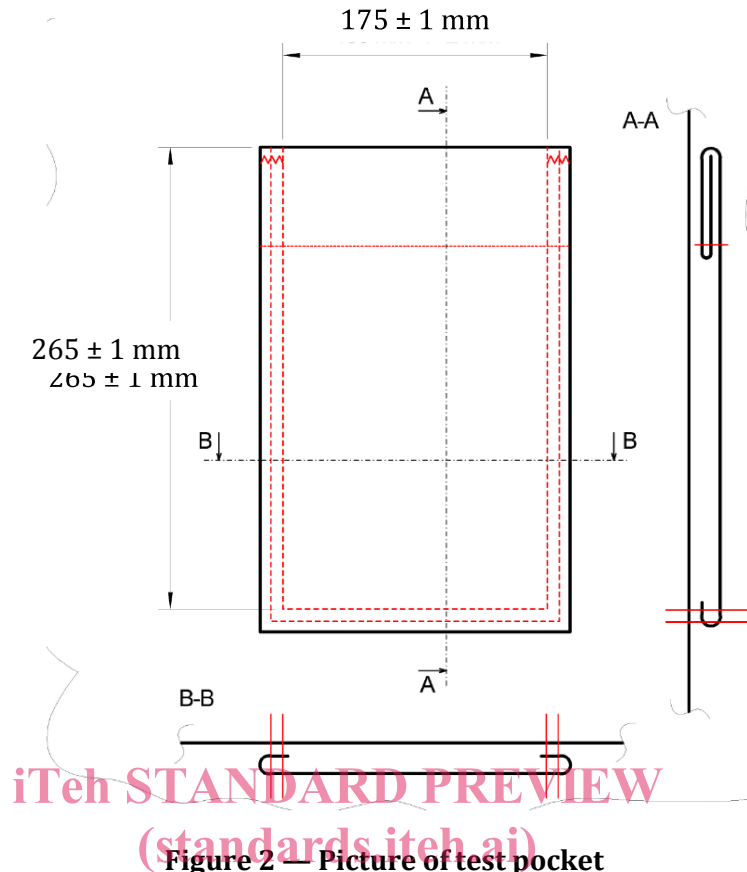


Figure 2 — Picture of test pocket

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

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

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

The test will fail, when the knee pad

- does not fit into the pocket,
- protrudes at the opening of the pocket,
- only fits in, when the pad is deformed at its end position so, that it will fold together while pressing the main sides (Length x Width) together.

4.3.4 Thickness of interoperable knee pad

The thickness of interoperable knee pad shall be tested as per EN ISO 5084:1996.

4.4 Penetration resistance

The penetration resistance shall be measured according to EN 863 at a velocity of (100 ± 10) mm/min. The test spike shall be applied to the outer face of the knee protector so that the spike can reach the zone of protection. Five tests shall be made distributed throughout the zone of protection of the knee protector, including potentially weak points.

For type 1 knee protectors the zone to be tested is restricted to the orthogonal projection area of the zone of protection.