



SLOVENSKI STANDARD
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**Osebna varovalna oprema - Ščitniki za kolena za delo v klečečem položaju - 5. del:
Zahteve za podloge za kolena (tip 3)**

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

Persönliche Schutzausrüstung - Knieschutz für Arbeiten in kniender Haltung - Teil 5: Anforderungen an Knienmatten (Typ 3)

Équipements de protection individuelle - Protection des genoux pour le travail à genoux - Partie 5 : Exigences relatives aux tapis pour genoux (type 3)

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13.340.50 Varovanje nog in stopal Leg and foot protection

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EUROPEAN STANDARD
NORME EUROPÉENNE
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English Version

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

Équipements de protection individuelle - Protection
des genoux pour le travail à genoux - Partie 5 :
Exigences relatives aux tapis pour genoux (type 3)

Persönliche Schutzausrüstung - Knieschutz für
Arbeiten in kniender Haltung - Teil 5: Anforderungen
an Knienmatten (Typ 3)

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

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European foreword

This document (prEN 14404-5:2019) 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 Directive(s).

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

This standard “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)

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), (standards.iteh.ai)
- knee pads in combination with garments (type 2), [oSIST prEN 14404-5:2019](https://standards.iteh.ai/catalog/standards/sist/5df8612f-a8e8-405e-9bf8-c502ea4641a7/osist-pren-14404-5-2019)
- knee mats (type 3) and <https://standards.iteh.ai/catalog/standards/sist/5df8612f-a8e8-405e-9bf8-c502ea4641a7/osist-pren-14404-5-2019>
- kneeling systems (type 4)

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

1 Scope

This document specifies the requirements for knee mats (type 3) 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.

prEN 14404-1:2019, *Knee protectors for work in the kneeling position – Test methods*

EN ISO 3758, *Textiles - Care labelling code using symbols*

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

ISO 7000, *Graphical symbols for use on equipment — Registered symbols*

3 Terms and definitions

For the purposes of this document, the following terms and definitions 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>

3.1

knee mat (type 3)

device not attached to the body, but put into place as the user moves around

Note 1 to entry: These may be for each knee or both knees together.

3.2

zone of protection

surface of the knee protector that is intended to provide the user with protection of patellar and infrapatellar areas

4 Performance levels

4 performance levels are defined. The tests for the performance levels are described in 4 of prEN 14404-1:2019:

- **level 0:** knee protectors suitable for use on flat floor surfaces and providing no protection against penetration.
- **level 1:** knee protectors suitable for use on flat floor surfaces and providing protection against penetration at a force of at least 100 N
- **level 1U:** knee protectors suitable for use on even or uneven surfaces providing protection against penetration at a force of at least 100 N.
- **level 2:** knee protectors suitable for use on flat or non-flat floor surfaces in severe conditions and providing protection against penetration at a force of at least 250 N.

5 Requirements

Summary of the requirements given in Clause 5.1 – 7 for knee mats (type 3) and the tests applicable

Table 1 — Summary of requirements for knee mats (type 3) and the tests applicable

Clause number	Subject	Level				Clauses describing the tests applicable
		0	1	1U	2	
5.1	General requirements	X	X	X	X	Part 1: 5.4.1
5.1	Innocuousness	X	X	X	X	Part 1: 5.4.2 EN ISO 13688
5.2	Products for testing	X	X	X	X	Comparison with Clause 5, 5.2
5.3.1	Orientation of the knee protector	X	X	X	X	Comparison with Clause 5, 5.3.1
5.4.1.1	Size designation	X	X	X	X	Part 1: 5.4.3
5.4.1.2	Dimensions	X	X	X	X	Part 1: 5.4.3
5.4.2	Penetration resistance (Performance levels 1, 1U and 2)	n.a.	X	X	X	Part 1: 5.5
5.4.3.1	Force distribution on an even surface	X	X	n.a.	n.a.	Part 1: 5.6.2.1
5.4.3.2	Force distribution on an uneven surface	n.a.	n.a.	X	X	Part 1: 5.6.2.2
5.4.4	Peak transmitted force	X	X	X	X	Part 1: 5.7
5.5	Optional requirement for water resistance	X	X	X	X	Part 1: 5.9.1
5.6	Comfort during use	X	X	X	X	Part 1: 5.11.2.1
6	Marking	X	X	X	X	Comparison with Clause 4
7	Manufacturer information	X	X	X	X	Comparison with Clause 5
NOTE n.a.: non-applicable						

5.1 General requirements for knee mats

Knee mats shall meet the general requirements.

Knee mats shall be safe to use and fit for their intended application defined by the manufacturer.

They shall be designed and manufactured to provide protection when used according to the information supplied by the manufacturer, without endangering the user.

There shall not be hard or sharp edges, seams, buckles or other items on the inner surfaces (especially within the zone of protection) of the products that could harm the user during normal use. Examination shall be made according to 5.4.1 Part 1.

Knee mats shall meet the innocuousness requirements of EN ISO 13688. Construction materials and incorporated substances shall not harm those being in or coming into contact with them.

5.2 Products for testing

The manufacturer shall submit complete and ready-to-use 8 knee mats for testing, at least one mat shall be supplied of each size that is placed on the market. He shall provide the documents and data required for the testing.

5.3 Orientation of the knee mats

The marking below (Figure 1) shall be used on the side facing the knee and pointing forwards.



Figure 1 — Pictogram ISO 7000 - 1861 Indication for alignment

5.4 Specific requirements for knee mats

5.4.1 Size and dimension

5.4.1.1 Size designation

The size system used by the manufacturer shall be based on the knee girth (knee girth range for which the knee mats have been designed, expressed in cm) and explained.

5.4.1.2 Dimension of protection zone

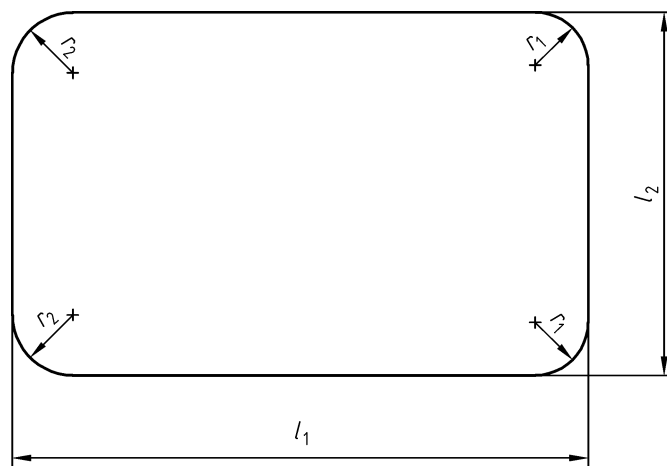
The zone of protection is defined as the foreseen area in contact with the user knee.

The zone of protection identified by the manufacturer (information supplied by the manufacturer) shall be equal to or exceed the minimum dimensions specified in Table 2, when determined as described in 4.4.2 of prEN 14404-1:2019.

The usual form of the possible zones of protection is shown in Figure 2.

Table 2 — Dimensions of the zones of protection of knee mats

Knee protector type	Minimum values for length and width of zones of protection of knee mats [mm]		Maximum values for the radius of curvature of corners of zones of protection [mm]	
	Width, l_1	Length, l_2	Proximal, r_1	Distal, r_2
Type 3	400	240	25	25



a)

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
- b) Type 3 knee protector

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Figure 2 — Shapes of the zones of protection of knee protectors

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5.4.2 Penetration resistance

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<https://standards.iteh.ai/catalog/standards/sist/5df8612f-a8e8-405e-9bf8-c502ca4041d7/osist-prEN-14404-5-2019>

Knee mats of performance level 1 and 1U shall resist penetration at a force of at least 100 N, and knee mats of performance level 2 shall resist penetration at a force of at least 250 N.

5.4.3 Force distribution**5.4.3.1 Force distribution on an even surface**

At each test point, the recorded medium force (mean value of the results for each transducer) shall be less than 30 N.

5.4.3.2 Force distribution on an uneven surface

At each test point, the recorded mean force (mean value of the results for each transducer) shall be less than 30 N.

5.4.4 Peak transmitted force

The peak transmitted forces in test impacts shall not exceed the values in Table 3.

Table 3 — Impact performance requirements

Impact energy J	Mean of all peak transmitted force measurements kN	Highest value of a single peak transmitted force kN
5	3	4