



SLOVENSKI STANDARD
oSIST prEN ISO 24232:2023
01-marec-2023

Varovalna obleka - Zaščita pred dežjem (ISO/DIS 24232:2023)

Protective clothing - Protection against rain (ISO/DIS 24232:2023)

Schutzkleidung - Schutz gegen Regen (ISO/DIS 24232:2023)

Habillement de protection - Protection contre la pluie (ISO/DIS 24232:2023)

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Protective clothing — Protection against rain

Habillement de protection - Protection contre la pluie

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

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Introduction

In this document the measured properties of materials and seams of protective clothing and their subsequent classification are intended to ensure an adequate protection level. Water proofness and water vapour resistance are the essential properties tested and marked on the label.

Water proofness is the most important property and it is measured on material of the outer garment layer. Tests are made on pre-treated fabric samples and on parts with seams. A test method for an optional readymade garment test after cleaning is described (rain tower test).

A test method for an optional readymade garment test after cleaning is described (rain tower test). Some waterproof materials are impermeable to water vapour transmission. However other materials on the market combine water proofness with water vapour permeability. This property expressed by low water vapour resistance enhances sweat evaporation and significantly contribute to body cooling. This is valuable, because it contributes to better comfort and less physiological strain and prolongs the wearing time in certain climatic conditions (see [Annex A](#)).

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Protective clothing — Protection against rain

1 Scope

This document specifies requirements and test methods for the performance of materials and readymade garments for protection against the effects of precipitation (e.g. rain, snowflakes), fog and ground humidity. Garments for protection against other effects than precipitation (e.g. water splashes, waves) are excluded from this document. The protective effects and requirements of footwear, gloves and separate headwear are excluded from the scope of this document.

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 530:2010, *Abrasion resistance of protective clothing material - Test methods*

ISO 811:2018, *Textiles — Determination of resistance to water penetration — Hydrostatic pressure test*

ISO 1421:2016, *Rubber- or plastics-coated fabrics — Determination of tensile strength and elongation at break*

ISO 1817:2022, *Rubber, vulcanized or thermoplastic — Determination of the effect of liquids*

ISO 4674-1:2016, *Rubber- or plastics-coated fabrics — Determination of tear resistance — Part 1: Constant rate of tear methods*

ISO 7000:2019, *Graphical symbols for use on equipment — Registered symbols*

ISO 7854:1995, *Rubber- or plastics-coated fabrics — Determination of resistance to damage by flexing*

ISO 11092:2014, *Textiles — Physiological effects — Measurement of thermal and water-vapour resistance under steady-state conditions (sweating guarded-hotplate test)*

ISO 12947-1:1998, *Textiles — Determination of the abrasion resistance of fabrics by the Martindale method — Part 1: Martindale abrasion testing apparatus*

ISO 12947-2:2016, *Textiles — Determination of the abrasion resistance of fabrics by the Martindale method — Part 2: Determination of specimen breakdown*

ISO 13688:2013, *Protective clothing — General requirements*

ISO 13688:2013/Amd1:2021, *Protective clothing - General requirements - Amendment 1*

ISO 13934-1:2013, *Textiles — Tensile properties of fabrics — Part 1: Determination of maximum force and elongation at maximum force using the strip method*

ISO 13935-2:2014, *Textiles — Seam tensile properties of fabrics and made-up textile articles — Part 2: Determination of maximum force to seam rupture using the grab method*

ISO 13938-1:2019, *Textiles — Bursting properties of fabrics — Part 1: Hydraulic method for determination of bursting strength and bursting distension*

ISO 13938-2:2019, *Textiles — Bursting properties of fabrics — Part 2: Pneumatic method for determination of bursting strength and bursting distension*

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ISO 24231:202X, *Protective clothing- Protection against rain- Test method for ready-made garments against high energy droplets from above*

ISO 23388:2018, *Protective gloves against mechanical risks*

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:

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

3.1**water vapour resistance**

R_{et}
water-vapour pressure difference between the two faces of a material divided by the resultant evaporative heat flux per unit area in the direction of the gradient

Note 1 to entry: It is a quantity specific to textile materials or composites, which determines the “latent” evaporative heat flux across a given area in response to a steady applied water-vapour pressure gradient. The evaporative heat flux can consist of both diffusive and convective components.

Note 2 to entry: The water-vapour resistance is expressed in square metres pascal per watt.

[SOURCE: ISO 11092:2014, 2.2]

3.2**resistance to water penetration**

WP
hydrostatic pressure supported by a material as a measure of the opposition to the passage of water through material

Note 1 to entry: WP is expressed in pascal.

3.3**outer shell material**

outermost material of which the garment is made

3.4**liner**

insert with a waterproof property

3.5**thermal liner**

layer with a waterproof property providing additional thermal insulation

3.6**lining**

innermost material without waterproof property

4 Performance assessment and requirements

4.1 General requirements and innocuousness

4.1.1 General requirements

All the individual results of the specimens of a test shall meet the performance requirement. If a material exhibits differing behaviour for a property in the length and cross directions of the material, the resultant property value shall be the value obtained in the lesser performing direction. In the event that only one specimen fails, another set of specimens shall be tested and all the individual results of this second set of specimens shall meet the requirements. Otherwise, the sample is considered to have failed the requirement.

When tested in accordance with [5.2.1](#) the requirements according to ISO 13668:2013 and ISO 13688:2013/Amd1:2021, 4.3.1, 4.3.2, 4.4.1 and the following requirements shall be met:

- all pockets shall be constructed to avoid water penetration inside the garment;
- closures, such as slide fasteners, fasteners, buttons etc. shall not open inadvertently.

If the protective clothing claims to have other protective properties, it shall also meet applicable requirements in relevant product standards.

For material testing the application of the single tests to each component is shown in [Table 1](#).

Hoods are not a mandatory part of rain protection clothing. If a hood is part of the rain protection garment, and the rain protection garment claims the optional requirement given in [Table 4](#), wicking length on hood hems shall be tested and reported.

NOTE 1 Protective clothing against rain typically consist of the outermost shell of a garment ensemble containing additional layers underneath. It has been demonstrated that the garment layers underneath can support the overall breathability and comfort if they provide a moisture management capability.

Table 1 — Application of performance tests on the components

Property	Reference Clause	Outer shell material	Liner or thermal liner	Lining
Resistance to water penetration ^{a)} (before and/or after pre-treatment)	4.2	X	X	
Water vapour resistance ^{b)}	4.3	X	X	X
Tensile strength	4.4	X (wovens)		
Tear resistance	4.5	X (wovens)		
Bursting strength	4.6	X (knits)		
Dimensional change ^{c)}	4.7	X	X	X
Seam strength	4.8	X		
^{a)} The outer shell or liner material with any applied waterproof layers shall be tested together. ^{b)} All layers to be tested together. ^{c)} Materials to be tested separately.				

4.1.2 Innocuousness

When tested in accordance with [5.2.2](#) the requirements of ISO 13688:2013 and ISO 13688/Amd1:2021, 4.2, shall be met with regard to innocuousness.