



**International  
Standard**

**ISO 24231**

**Protective clothing — Protection  
against rain — Test method for  
ready-made garments against high-  
energy droplets from above**

*Habillement de protection — Protection contre la pluie —  
Méthode d'essai pour les vêtements prêts-à-porter contre les  
fortes précipitations*

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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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see [www.iso.org/directives](http://www.iso.org/directives)).

ISO draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). ISO takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, ISO had not received notice of (a) patent(s) which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at [www.iso.org/patents](http://www.iso.org/patents). ISO shall not be held responsible for identifying any or all such patent rights.

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see [www.iso.org/iso/foreword.html](http://www.iso.org/iso/foreword.html).

This document was prepared by Technical Committee ISO/TC 94, *Personal safety – Personal protective equipment*, Subcommittee SC 13, *Protective clothing*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 162, *Protective clothing including hand and arm protection and lifejackets*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at [www.iso.org/members.html](http://www.iso.org/members.html).

# Protective clothing — Protection against rain — Test method for ready-made garments against high-energy droplets from above

## 1 Scope

This document specifies a test method for determining the liquid tightness of clothing for protection against rain, using a static manikin exposed to large amount of high energy droplets from above. It is applicable to the testing of jackets, trousers, coats and one- or two-piece suits.

This document is not applicable to the testing of garments for resistance to other weather conditions, e.g. snow, hail-, or strong winds.

NOTE For general background of the rain simulation, see [Annex A](#).

## 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.

ISO 11610, *Protective clothing — Vocabulary*

## 3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 11610 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/>

## 4 Principle

A manikin with the shape and size of an adult person wearing long underwear made of absorbent fabric is dressed in the protective garment to be tested and exposed to large amount of high energy droplets from above for a specific period. After the exposure the underwear and the inner side of the protective garment are visually inspected for wet areas. In addition, sensors on the manikin may be used in order to detect the timing of water ingress at individual sites.

## 5 Apparatus

**5.1 Tower device**, (as shown in [Figure 1](#)) comprising a circular tub at least 1 000 mm in diameter supported at least 5 000 mm above the floor and supplied with water from an inflow pipe. The base of the tub shall be fitted with approximately 682 nozzles with a hole diameter of 0,6 mm placed at 34 mm centres to deliver water droplets over a circular area with a diameter of 932 mm at a density of approximately 1 000 droplets/m<sup>2</sup>. The tub shall have an overflow pipe placed to maintain a water depth of (45 ± 5) mm in the tub. The tower device shall be shielded to eliminate the effect of wind on the water droplets.

NOTE The diameter of the water droplets corresponds to those described in ISO 9865, (~5 mm). The amount of water is (450 ± 50) l/(m<sup>2</sup>h) (see [Figure 1](#)).

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To prevent water from the atmosphere condensing inside the garment the water temperature should be the same as the air temperature in the room in which the test is conducted within  $\pm 5$  °C.

To prevent a blockage of the nozzles, water with low calcium content should be used.

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