INTERNATIONAL STANDARD

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Protective gloves against dangerous chemicals and micro-organisms —

Part 2: Determination of resistance to penetration

Gants de protection contre les produits chimiques dangereux et les micro-organismes —

Partie 2: Détermination de la résistance à la pénétration

Reference number
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Foreword

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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 documents 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).

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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.

This document was prepared by Technical Committee ISO/TC 94, *Personal safety — Protective clothing and equipment*, Subcommittee SC 13, *Protective clothing*.

This document has been transferred from EN 374-2 without technical changes.

A list of all parts in the ISO 374 series can be found on the ISO website.

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.

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Protective gloves against dangerous chemicals and micro-organisms —

Part 2:
Determination of resistance to penetration

1 Scope

This document specifies a test method for the penetration resistance of gloves that protect against dangerous chemicals and/or micro-organisms.

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 374-1, *Protective gloves against dangerous chemicals and micro-organisms — Part 1: Terminology and performance requirements for chemical risks*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 374-1 apply.

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

— ISO Online browsing platform: available at http://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

4 Test principles

4.1 Air leak test

A glove is immersed in water, and its interior is pressurised with air. A leak is detected by a stream of air bubbles from the surface of the glove.

4.2 Water leak test

A glove is filled with water. A leak is detected by the appearance of water droplets on the outside of the glove.

4.3 Remarks

The air leak procedure is not suitable for all gloves. For example, parts of some gloves can be overinflated while other parts of the same gloves can only be partially inflated. If the air leak test proves unsuitable, then only the water penetration test is carried out.

For both methods disregard leaks within the area of 40 mm from the edge of the liquid proof area.

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5 Sampling

For the purpose of testing, the test sample will be one glove of each size, with an overall minimum of 4 samples per performed test.

For certain reasons, some gloves cannot be tested, e.g. non-homogenous overinflating of the samples or thickness of the liners disables the fitting on the mandrel.

If one sample fails the penetration test, the test shall be reported as having failed.

For the purpose of production control, e.g. by the manufacturer or auditing organisation, see Annex A.

6 Apparatus

6.1 Air leak test

6.1.1 Circular fixing mandrel, tapered with an appropriate diameter range to effect an airtight seal with the glove to be tested. It should be capable of rotation through 180°.

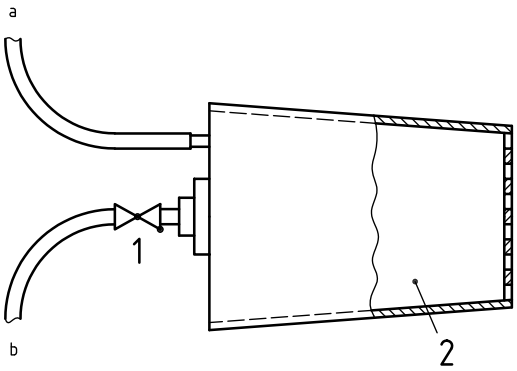
6.1.2 Means of air inflation.

6.1.3 Water tank.

6.1.4 Pressure gauge, reading 0 kPa to 10 kPa.

6.1.5 Means of regulating the desired pressure.

Figure 1 and Figure 2 show an example of a suitable apparatus.



Key

1 non-return valve
2 circular fixing mandrel
a To pressure gauge.
b To instrument panel.

Figure 1 — Enlarged detail of the circular fixing mandrel

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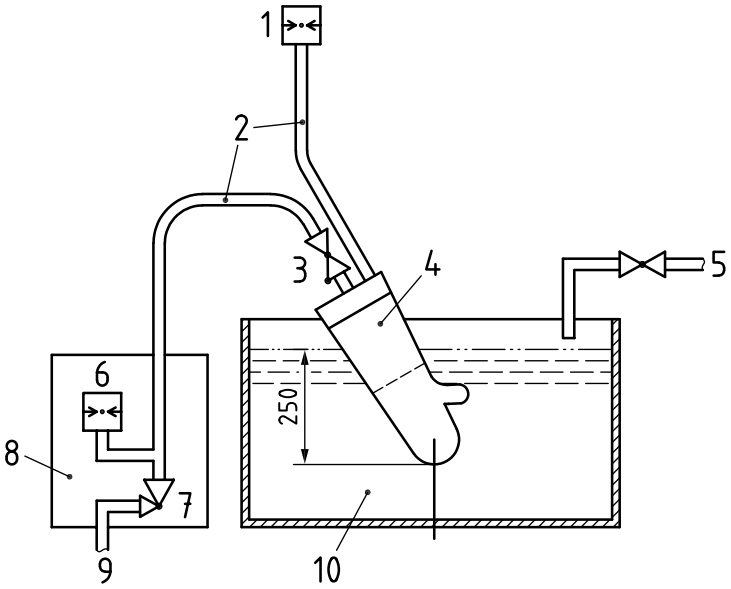
Dimension in millimetres



Key

1	pressure gauge	6	pressure gauge
2	flexible pipes	7	pressure regulator
3	non-return valve	8	instrument panel
4	circular fixing mandrel	9	compressed air supply
5	water supply	10	tank

Figure 2 — Typical arrangement of air pressure testing apparatus

6.2 Water leak test

6.2.1 A clear open-ended plastic tube is fitted with a hook at the upper end. The tube measures 380 mm in length and has a diameter wide enough to fit the gloves under test. It has a mark 40 mm from the lower end (see Figure 3).

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Dimensions in millimetres

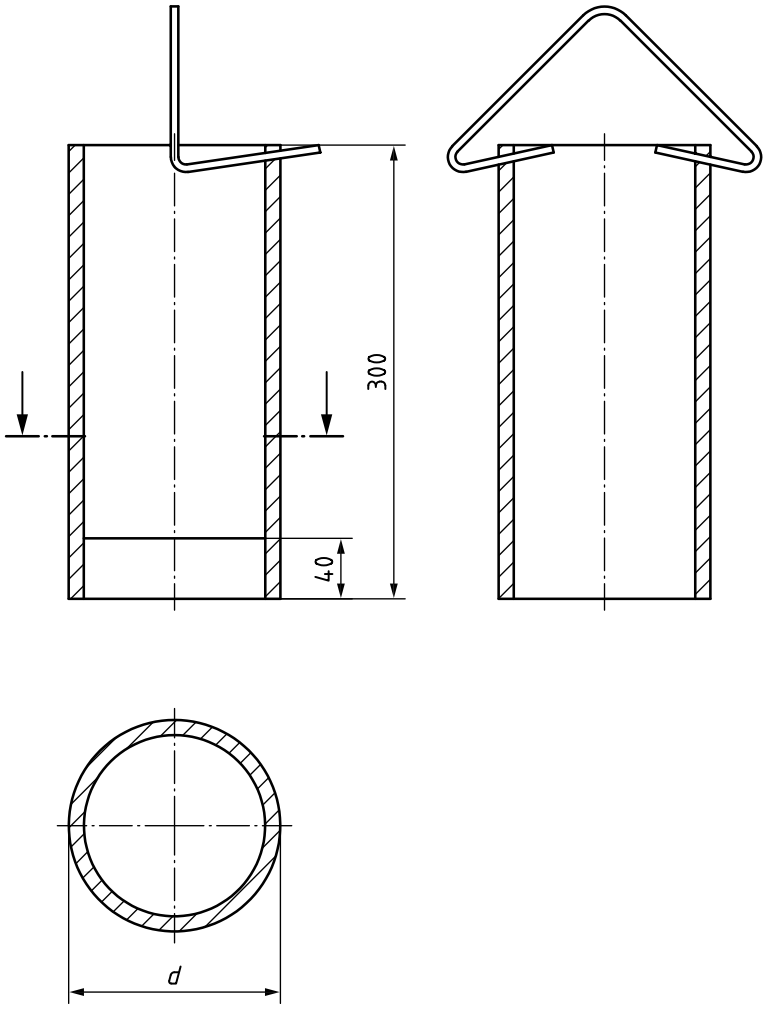

Figure 3 — Fill tube with a hook

6.2.2 Elastic strapping with a "touch and close" fastener or other fastening material.

6.2.3 Stand with horizontal rod for hanging the hook end of the tube (see Figure 4). The supported rod shall be capable of taking the weight of the total number of gloves that will be suspended at any one time.

6.2.4 A device capable of delivering a minimum of 1 000 ml water.

6.2.5 An alternative means of holding the glove can be used. The apparatus shall be capable of securing the glove on a mandrel, with a diameter appropriate to fit the glove, so that it can be filled with water to

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within 40 mm from the edge of the liquid proof area. It shall be capable of holding water in excess of that required to fill the glove.

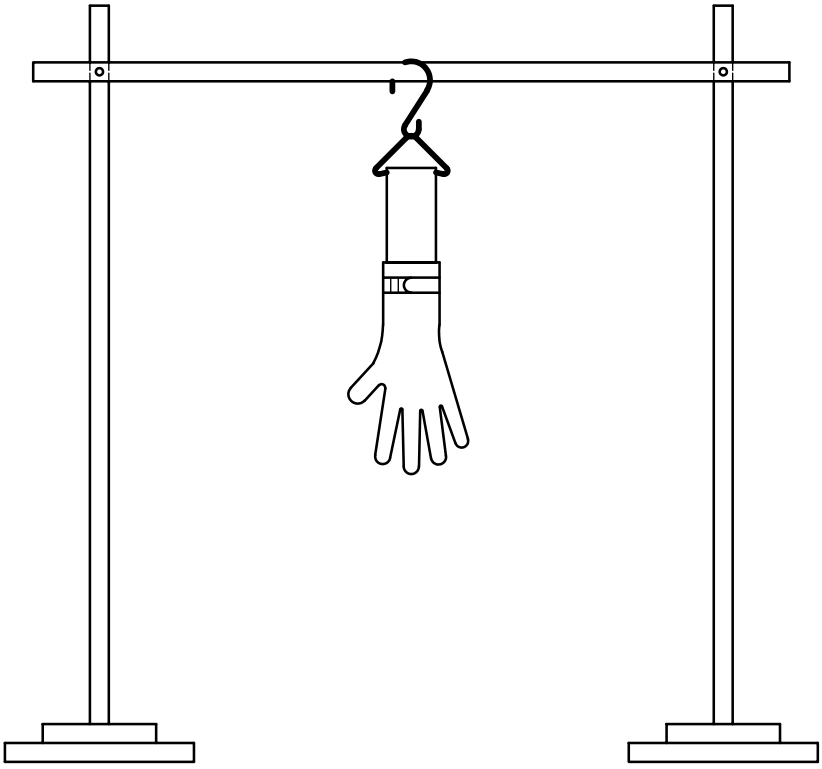

Figure 4 — Stand for suspending the fill tube

7 Procedure

7.1 General

Carefully remove the glove from the wrapper, box or its packaging. Record the identity code, lot number, size and brand of samples. Visually examine for tears, rips and holes. If these are present, the gloves shall be reported as having failed the visual inspection.

7.2 Air leak test

7.2.1 The glove is fastened to the circular mandrel and, after immersion in water at ambient temperature, is inflated with air, to a gauge pressure of *X* kPa (see Table 1) plus an overpressure of 1 kPa per 100 mm of immersion measured at the fingertips closest to the bottom of the water tank. For example, for 250 mm of immersion at the fingertips, 2,5 kPa shall be added to the air pressure specified in Table 1.

The inflation pressure shall be reached with a ±10 % limit deviation within 2 min and the control of possible air bubbles shall take an additional (30 ± 5) s.

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Table 1 — Air pressure

Nominal glove thickness *e* mm **As provided by the manufacturer**	**Air pressure** *X* kPa
$e \leq 0{,}3$	0,5
$0{,}3 < e \leq 0{,}5$	2,0
$0{,}5 < e \leq 1{,}0$	5,0
$e > 1{,}0$	6,0

7.2.2 For gloves up to 250 mm in length the immersion shall be carried out with the hand vertically downwards so that the water covers the maximum possible surface of the glove.

For gloves over 250 mm in length the immersion is to be carried out with the hand at a downward angle, to a vertical depth of (250 ± 10) mm above the tip of the middle finger and so that the water covers the maximum possible surface of the glove. Rotate the mandrel and examine the whole glove surface for the emergence of air bubbles (see Figure 2).

7.3 Water leak test

7.3.1 The glove is attached to an open-ended plastic tube by bringing the edge of the cuff to the 40 mm mark (see Figure 3) and fastening it with the elastic strap to make a watertight seal.

7.3.2 A minimum of 1 000 ml of water is added through the tube to fill the glove completely and reach at least the 40 mm mark level of the liquid proof area of the glove. The water shall be at ambient temperature.

Some of the 1 000 ml of water can remain in the fill tube depending on the glove being tested.

If it is required, the glove can be supported by some suitable means in order to avoid excessive distortion under the weight of water.

7.3.3 The gloves are examined immediately for water leaks. The glove should not be squeezed. Only minimal handling is required to detect leaks. Water droplets can be blotted to confirm leakage, or talcum powder can be used to enhance droplet visibility.

7.3.4 If the glove does not leak immediately, the tube with the glove attached is suspended vertically (see Figure 4) and re-examined 2 min (±10 s) after the initial addition of water. Again, using minimum handling, the glove surface is checked for leaks.

8 Test report

The test report shall include:

— A reference to this document, i.e. ISO 374-2:2019;

— Full identity of the tested glove;

— Visual inspection: pass or fail;

— Air leak test and water leak test: pass or fail;

— For the air leak test: air pressure used;

— Reason of non-testing of any of the penetration tests;

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— Reporting of any deviation to the present document.

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Annex A
(informative)

Informative annex to be used for quality assurance during production

Gloves from a single lot or batch should be sampled and inspected in accordance with ISO 2859 (all parts). The inspection levels and acceptable quality levels (AQL) should comply with those given in Table A.1 or as agreed between the purchaser and the seller, if the latter is more stringent.

Table A.1 — Inspection levels and acceptable quality levels

Performance level	Acceptable quality level unit	Inspection levels
Level 3	<0,65	G1
Level 2	<1,5	G1
Level 1	<4,0	S4

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Bibliography

[1] ISO 2859 (all parts), *Sampling procedures and tables for inspection by attributes*

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ICS 13.340.40

Price based on 9 pages

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