INTERNATIONAL STANDARD

ISO 20057

First edition
2017-09

Rubber household gloves — General requirements and test methods

Gants de ménage en caoutchouc — Exigences générales et méthodes d'essai

Reference number
ISO 20057:2017(E)

ISO copyright office
Ch. de Blandonnet 8 • CP 401
CH-1214 Vernier, Geneva, Switzerland
Tel. +41 22 749 01 11
Fax +41 22 749 09 47
copyright@iso.org
www.iso.org

Contents

Page

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 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).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on 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 the following URL: www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 45, *Rubber and rubber products*, Subcommittee SC 4, *Products (other than hoses).*

Rubber household gloves — General requirements and test methods

1 Scope

This document specifies the general requirements and relevant test methods for gloves made of natural rubber latex or synthetic rubber latex or blends of natural rubber and synthetic rubber lattices intended for household use.

This document is intended to serve as a guide to obtain gloves of consistent performance. It does not cover safe and proper application of the gloves with subsequent handling, packaging and storage procedures.

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 37, *Rubber, vulcanized or thermoplastic — Determination of tensile stress–strain properties*

ISO 188, *Rubber, vulcanized or thermoplastic — Accelerated ageing and heat resistance tests*

ISO 2859-1, *Sampling procedures for inspection by attributes — Part 1: Sampling schemes indexed by acceptance quality limit (AQL) for lot-by-lot inspection*

ISO 3071, *Textiles — Determination of pH of aqueous extract*

ISO 23529, *Rubber — General procedures for preparing and conditioning test pieces for physical test methods*

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
hand
part of the body from the tip of the middle finger to the wrist

3.2
glove
equipment which protects the *hand* (3.1) or part of the hand against hazards

Note 1 to entry: It can additionally cover part of the forearm and arm.

3.3
glove palm
part of the *glove* (3.2) which covers the palm of the *hand* (3.1), i.e. from the wrist to the base of the fingers

3.4
glove back
part of the *glove* (3.2) which covers the back of the *hand* (3.1), i.e. from the wrist to the base of the fingers

4 Materials and manufacture

Gloves are generally categorized by materials, designs and surface finishes. Materials include natural rubber latex, synthetic rubber latex and blends. The glove outer surface may be smooth or textured, with or without pattern on the surface while the glove inner surface may be with or without flock lining. In any case, the glove shall be either ambidextrous or in pairs (right hand, left hand), single or multi-layers (laminated).

Any glove made of materials and manufactured with designs and finishes described above that meet the requirements of this document is acceptable.

5 Sampling and selection of test pieces

5.1 Sampling

For reference purposes, unless otherwise stated, gloves shall be sampled and inspected in accordance with ISO 2859-1. The inspection levels and acceptance quality limits (AQLs) shall conform to those specified in Table 1.

Table 1 — Inspection levels and AQLs

Characteristic	Inspection level[a]	AQL[a]
General appearance	S-2	4,0
Dimensions (width, length, thickness)	S-2	4,0
Tensile properties (before and after ageing)	S-2	4,0
Tensile properties after immersion test	N[b] = 3	PASS[c]
pH value	N[b] = 3	PASS[d]

[a] When a lot size cannot be determined, a lot size of 35 001 to 150 000 shall be assumed.
[b] N means a number of gloves.
[c] Median value of each glove meets the requirement.
[d] Average value meets the requirement.

5.2 Selection of test pieces

Where test pieces are required, they shall be taken from the palm or the back or the cuff of glove, the surface being free of embossing.

6 Requirements

6.1 General

The gloves shall have a uniform finish and be free from discoloration, thin spots, air bubbles, embedded particles, tackiness and other blemishes likely to affect serviceability (visual inspection).

6.2 Dimensions

Gloves shall comply with the dimensions for palm width, length and thickness given in Table 2, using the inspection level and AQL given in Table 1.

Table 2 — Dimensions and tolerances

Letter code	Width mm	Minimum length mm	Minimum thickness mm
Extra-small (XS)	< 80	For all sizes: 260	For all sizes: 0,20
Small (S)	90 ± 10		
Medium (M)	100 ± 10		
Large (L)	110 ± 10		
Extra-large (XL)	> 120		

Alternatively for glove sizes in a numeric code, the palm width, length and thickness should follow the dimensions and tolerances as given in Annex A.

6.3 Tensile properties

6.3.1 General

Gloves are classified into class 1A or 1B or 2A or 2B based on their performances, both on their initial and after ageing tensile properties given in Table 3 and tensile properties after immersion in general household liquids given in Table 4, using the inspection level and AQL given in Table 1.

6.3.2 Tensile properties before and after ageing

For class 1 gloves, all the tensile properties shall comply with the requirements given in Table 3, requirement class 1.

For class 2 gloves, the tensile properties shall comply with the requirements given in Table 3, requirement class 2, but some of them may fall into requirement class 1.

Table 3 — Requirements for tensile properties of gloves before and after ageing

Property	Requirement	
	Class 1	Class 2
Tensile strength, MPa	> 15	10–15
Elongation at break, %	> 550	450–550
After ageing		
Tensile strength, MPa	> 12	8–12
Elongation at break, %	> 450	350–450

Testing shall be conducted within two months of the date of receipt by the purchaser of the gloves. For gloves that are older than three months from the date of manufacture or for which the date of manufacture is not known, the tensile properties need only conform to the "after ageing" value in Table 3.

6.3.3 Tensile properties after immersion in test liquids

For class A gloves, all the tensile properties shall comply with the requirements given in Table 4, requirement class A.

For class B gloves, the tensile properties shall comply with the requirements given in Table 4, requirement class B, but some of them may fall into requirement class A.

Table 4 — Requirements for tensile properties of gloves after immersion in test liquids

Property	Requirement	
	Class A	Class B
After immersion in water		
Tensile strength, MPa	> 12	8–12
Elongation at break, %	> 450	350–450
After immersion in diluted surfactant solution		
Tensile strength, MPa	> 12	8–12
Elongation at break, %	> 450	350–450
After immersion in diluted acid solution		
Tensile strength, MPa	> 12	8–12
Elongation at break, %	> 450	350–450

NOTE 1 Performance requirements against test liquids are limited to minimum physical properties, initially, after ageing and after immersion in general chemical liquids used in household application. Other test liquids might be used based on agreement between the manufacturer and purchaser.

NOTE 2 Gloves covered in this document are intended to protect the wearer under the minimal risks circumference which is the risks encountered in the handing of hot components which do not expose the user to a temperature exceeding 50 °C.

6.4 pH value

The pH value for all type of gloves shall be between 5 and 9.

7 Test methods

7.1 Dimensions

7.1.1 The measurement of length shall be the shortest distance between the tip of the middle finger and the middle of the cuff termination.

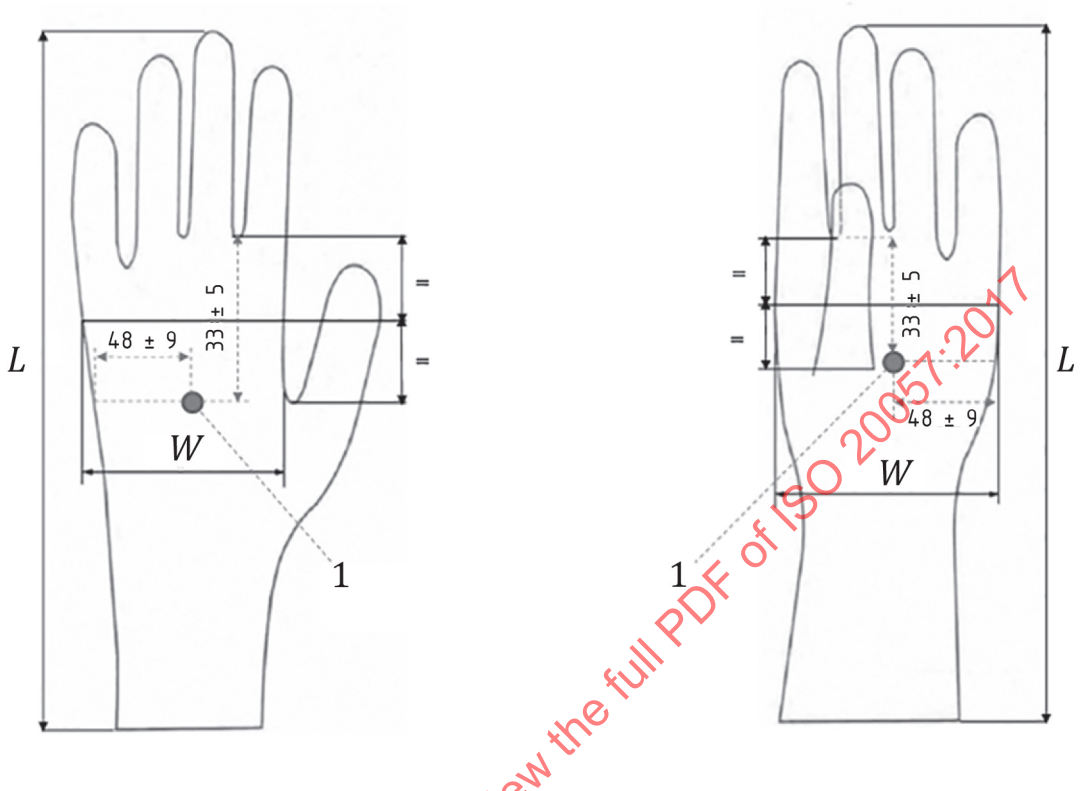
7.1.2 The measurement of width shall be at the midpoint between the base of the index finger and the base of the thumb. The width measurement shall be made with the glove placed on a flat surface.

7.1.3 The thickness of single wall shall be measured in accordance with ISO 23529, with pressure on the foot of 22 kPa ± 5 kPa, at the approximate centre of the palm or the back of the glove avoiding a pattern on the glove surface. Cutting the glove may be necessary to obtain the thickness measurement.

Measurement points for length, width and thickness are shown in Figure 1.

If visual inspection indicates the presence of thin spots or unevenness, the single-wall thickness measurements shall be made in such area. The thickness of this area shall also comply with the dimensions given in Table 2 or Table 3, using the inspection level in Table 1.

Dimension in millimetres



a) Ambidextrous gloves **b) Hand-specific gloves**

Key

L length

W width

1 measurement point for thickness (palm)

NOTE The distance 48 mm ± 9 mm locates the approximate centre of the palm for different glove sizes.

Figure 1 — Measurement points for length, width and thickness

7.2 Tensile properties before and after ageing

Tensile strength and elongation at break shall be measured in accordance with ISO 37 using type 1 or type 2 dumb-bell test pieces. One to three test pieces shall be taken from each glove. If one test piece per glove is used, report an individual value as the test result. If two test pieces are used, report an average value and if three test pieces are used, report a median value as the test result. In case of dispute, dumb-bell type 2 shall be used for the referee test.

7.3 Ageing

The tests shall be conducted in accordance with the method specified in ISO 188. Tensile properties after ageing shall be measured in accordance with ISO 37 on the test pieces cut from the gloves using procedure given in 7.2 and subjected to a temperature of 70 °C ± 2 °C for 168 h ± 2 h or at 100 °C ± 2 °C for 24 h ± 2 h. In case of dispute, test aging at 70 °C ± 2 °C for 168 h ± 2 h shall be used for the referee test.

7.4 Tensile properties after immersion in test liquids

7.4.1 Apparatus

A container with size and dimension that allow test pieces to remain completely immersed and all surfaces completely exposed to the liquid without restriction shall be used. The volume of liquid shall be at least 15 times the combined volume of the test pieces and the volume of air above the liquid shall be kept to a minimum.

The test pieces shall be mounted in jigs, preferably hanging on a rod or wire or non-reactive spacers and separated from any adjacent test piece.

The materials of apparatus shall be inert to the test liquid and to the rubber, for example, materials containing copper shall not be used.

7.4.2 Test pieces

Three gloves shall be used for each batch. Obtain three dumb-bell test pieces (ISO 37 type 1 or type 2) from each glove. Report the median value of each glove as the test result. In case of dispute, dumb-bell type 2 shall be used for the referee test.

7.4.3 Test liquids and test conditions

For the purpose of classification, the test liquids and conditions in Table 5 shall be employed.

Table 5 — Test liquids and test conditions for immersion test

Test liquids	Test conditions
Deionized water	(50 ± 2) °C for (4 ± 0,25) h
n-Laurylbenzenesulfonic acid sodium salt, 2 % mass fraction	(50 ± 2) °C for (4 ± 0,25) h
Hydrochloric acid, 2 % volume fraction	(23 ± 2) °C for (4 ± 0,25) h

For tests intended to simulate service conditions or for other purposes such as quality control, commercial liquids can be used upon agreement between interest parties. The test conditions shall approximate those found in service using the closest standard temperature equal to or higher than the service temperature. In this case, the test report shall include relevant information such as trade name of test liquid, chemically active compositions and test conditions.

7.4.4 Test procedure

Use water bath or normal oven to control the test temperature and ensure that the temperature of test liquid is reached before test pieces are immersed.

Make any identification marks required before immersion. Place the test pieces at a distance of at least 5 mm from the sides of the container and at least 10 mm from the bottom and top surfaces. The test pieces shall be held completely below the surface of test liquid without stretching.

At the end of the period of immersion, rinse the test piece with deionized water, then wipe with a filter paper and leave to dry for a period of 30 min before carrying out the tensile property test.

Tensile properties after immersion test shall be conducted in accordance with ISO 37.

7.5 pH

Three gloves shall be used and the determination of pH shall be carried out in duplicate for each glove.

The glove sample shall be cut into pieces with size approximately 5 mm × 5 mm. If glove is made of more than one layer, all layers shall be tested together.

Weigh 2,00 g ± 0,05 g of the test pieces and place into a flask. Pour 100 ml of distilled water into the flask and agitate for a short period by hand then shake mechanically for 2 h ± 5 min. Filter the extracted sample and decant the aqueous extract into a beaker. The determination of pH value shall be according to ISO 3071.

Calculate the average of two measurements from each glove. Report the average or the median value of three gloves as the results.

8 Packaging

Gloves shall be appropriately packed in order to prevent any damage during transport and storage.

9 Marking

Either pack in bulk or individual packaging, the package shall be legibly marked to include at least the following:

— a reference to this document, i.e. ISO 20057;

— the name or trademark of the manufacturer or supplier;

— the material used;

— the class (1A or 1B or 2A or 2B);

— the size (letter code or numeric code);

— the words “textured” or “smooth”, “with or without flock lining” or words to that effect for the glove finish;

— the date of manufacture;

— the instructions for use and storage;

— the statement “Product made from natural rubber latex which may cause allergic reactions” or words to that effect for gloves made of or containing natural latex;

— the appropriate warnings to avoid contact with the solvents and substances that may degrade the gloves;

— the statement “Gloves shall be protected from exposure to excess heat and light in storage (temperatures below 40 °C are recommended)” or words to that effect.