INTERNATIONAL STANDARD

ISO 1420

Fourth edition
2016-07-01

Rubber- or plastics-coated fabrics — Determination of resistance to penetration by water

Supports textiles revêtus de caoutchouc ou de plastique — Détermination de la résistance à la pénétration de l'eau

Reference number
ISO 1420:2016(E)

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Foreword

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The committee responsible for this document is ISO/TC 45, *Rubber and rubber products*, Subcommittee SC 4, *Products (other than hoses)*.

This fourth edition cancels and replaces the third edition (ISO 1420:2001), which has been technically revised.

Introduction

The resistance to penetration by water is often used as a measure of the water-proofing of rubber- or plastics-coated fabrics when a product made from the coated fabric is exposed to various service conditions in the field. There are some environmental factors that affect the resistance to water penetration such as temperature, pressure or chemicals in water, however, the methods in this International Standard only measure the property at a low to high hydrostatic pressure level at ambient temperature.

Rubber- or plastics-coated fabrics — Determination of resistance to penetration by water

WARNING — Persons using this International Standard should be familiar with normal laboratory practice. This International Standard does not purport to address all of the safety problems, if any, associated with its use. It is the responsibility of the user to establish appropriate safety and health practices and to ensure compliance with any national regulatory conditions.

1 Scope

This International Standard specifies two methods for the determination of the resistance of rubber- or plastics-coated fabrics to water penetration (hydrostatic resistance) when subjected to a specific hydrostatic pressure over a fixed period of time. Method A specifies the procedure for a low and high hydrostatic pressure and Method B for a low hydrostatic pressure.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 2231:1989, *Rubber- or plastics-coated fabrics — Standard atmospheres for conditioning and testing*

ISO 2286-1, *Rubber- or plastics-coated fabrics — Determination of roll characteristics — Part 1: Methods for determination of length, width and net mass*

3 Principle

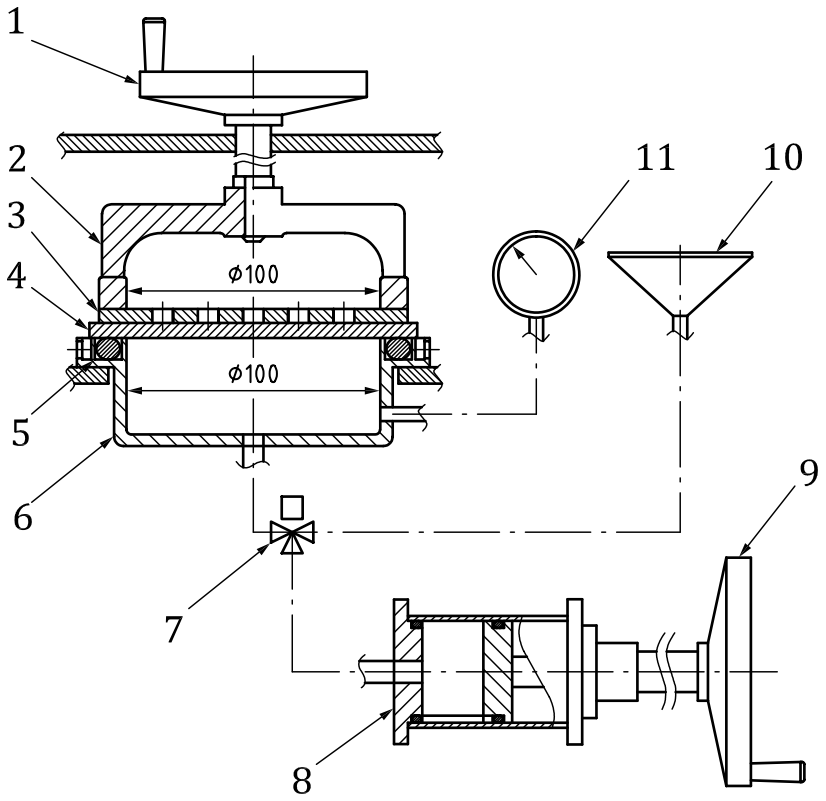
A test piece of coated fabric is subjected to an increasing pressure of water on one face, under standard conditions, until a predetermined pressure specified in the coated-fabric specification is obtained. The required pressure is maintained for a specified time or until penetration occurs, whichever is the sooner.

4 Apparatus

4.1 Method A

4.1.1 The apparatus shall consist of a test piece supporting plate fitted with a clamp tightening ring to fasten the test piece over the mouth by use of an upper screw handle. The lower part of the vessel shall have a pressure gauge and a nozzle connected with a cylinder that has a mechanical system delivering high pressure water. The other side of the cylinder shall be connected with a water inlet pipe through a three-way valve. The whole system shall have a capability of holding a hydrostatic pressure of 500 kPa at an ambient temperature for a certain period of time. Illustrative examples of the parts of apparatus are given in Figures 1, 2 and 3.

Dimensions in millimetres



Key

1	upper screw handle	7	three-way-valve
2	clamp tightening ring	8	cylinder
3	test piece supporting plate (see Figure 2)	9	piston handle
4	test piece	10	water inlet
5	seal ring	11	pressure gauge
6	vessel		

Figure 1 — An example of the apparatus for Method A

Dimensions in millimetres

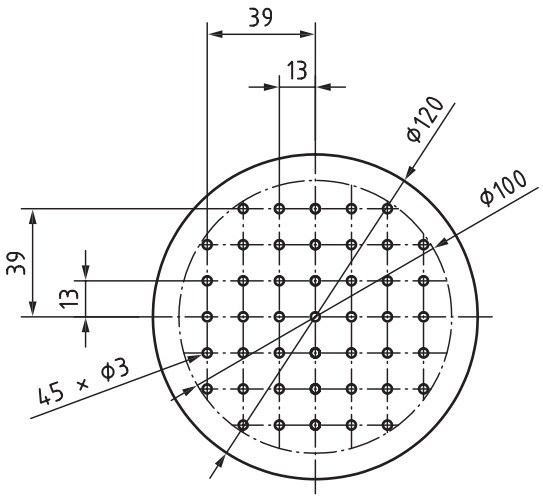
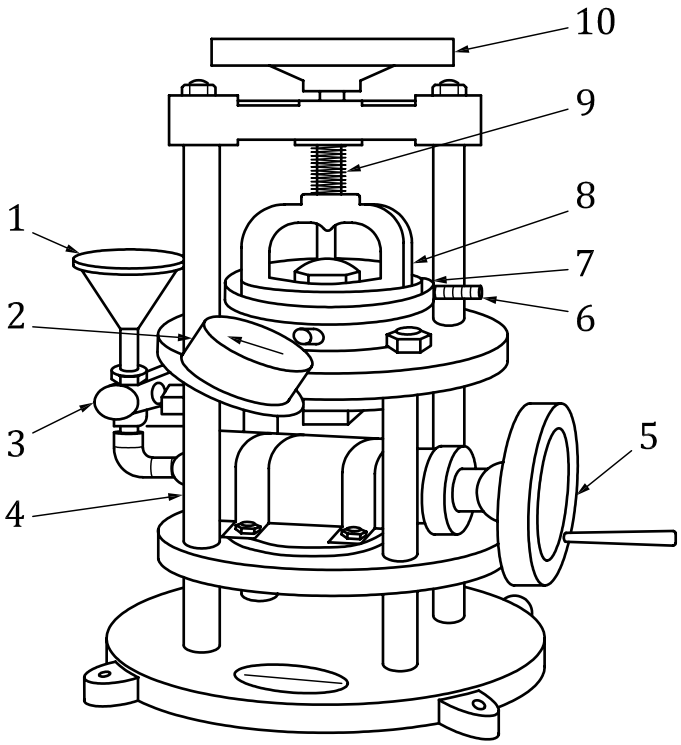


Figure 2 — Test piece supporting plate



Key

1	water inlet	6	water exit
2	pressure gauge	7	vessel
3	three-way-valve	8	clamp tightening ring
4	cylinder	9	screw
5	piston handle	10	upper screw handle

Figure 3 — An example of the apparatus for Method A

4.1.2 Pressure gauge, capable of 600 kPa with direct connection with the vessel in order to measure the hydrostatic pressure inside the vessel.

4.1.3 Test area, an open circle of diameter 100 mm in the mouth of the vessel. The surface of the mouth end and the clamp tightening ring, which contact the test piece on each side shall be covered with a rubber seal such as an o-ring or an equivalent to prevent the test piece rupturing when a high hydrostatic pressure is applied.

4.1.4 Test piece supporting plate, a metallic plate of 5 mm thickness equidistantly perforated with 45 small holes of 3 mm diameter, which directly pushes the test piece over the plate using the clamp tightening ring. See Figure 2.

4.2 Method B

4.2.1 The apparatus shall consist of an open-mouthed vessel fitted with a clamp to fasten the test piece over the mouth. The lower part of the vessel shall have a nozzle allowing it to be connected to a water inlet pipe to fill it with water at room temperature. A retaining mesh is fitted over the test piece. This mesh shall comprise wires of 1 mm to 1,2 mm diameter forming squares of side not greater than 30 mm.

4.2.2 Means of measuring water pressure, either a manometer, connected to the test head, allowing water pressures up to 19,6 kPa (200 cmH_2O) to be read to an accuracy of ± 1 %, or a pressure gauge,

graduated in kilopascals (centimetres head of water) and with a maximum reading of at least 100 kPa (1 020 cmH_2O) to measure the water pressure applied to the test piece.

4.2.3 Test area, the open mouth of the vessel over which the test piece is clamped. The test piece shall be either a square of side 100 mm or a circle of diameter 113 mm, giving an area of 100 cm^2 in each case. If necessary, soft rubber sealing gaskets can be employed between the coated-fabric test piece and the surfaces of the clamps in order to reduce the risk of damage to the test piece by the clamps and to facilitate the testing of seams. In this respect, rubber having a hardness of approximately 40 IRHD (International Rubber Hardness Degrees) and approximately 0,5 cm thick or 1 cm in diameter can be useful. Alternatively, a closed-cell, cross-linked-polyethylene foam having a density of 45 kg/m^3 to 55 kg/m^3 and approximately 1 cm thick can also be used.

5 Test pieces

5.1 Taking test pieces

Take test pieces from an area with no functional or visible defects and located within the usable width of the coated fabric as defined in ISO 2286-1.

5.2 Number

Unless otherwise specified in the material specification, test the specimens in each series of tests as follows.

a) For Method A: three test pieces.

b) For Method B: five test pieces.

5.3 Shape and dimensions

5.3.1 Square piece

The test piece in each method shall have the dimension as follows.

a) For Method A: a square with sides measuring approximately 150 mm.

b) For Method B: a square with sides measuring approximately 200 mm.

5.3.2 Circular piece

The test piece in Method A and B shall have a diameter of 130 mm to 200 mm.

6 Atmosphere for conditioning

The atmosphere shall be the method of conditioning “1” specified in ISO 2231:1989.

For fabrics coated on one side only, a minimum of 16 h exposure is recommended.

For fabrics coated on both sides, a minimum of 24 h exposure is recommended.

7 Time-interval between manufacture and testing

For all test purposes, the minimum time between manufacture and testing shall be 16 h. For non-product tests, the maximum time between manufacture and testing shall be 4 weeks, and for evaluations intended to be comparable, the tests, as far as possible, shall be carried out after the same time-interval.

For products, unless otherwise agreed between the interested parties, the time between manufacture and testing shall not exceed 3 months.

8 Procedure

8.1 Method A (for hydrostatic pressure less than 500 kPa)

8.1.1 Open the clamp tightening ring, open the three-way valve and pour water into the vessel, let it overflow from the vessel mouth and fill the cylinder with water. Then close the three-way valve.

8.1.2 Place the test piece facing the side to be tested on to the vessel mouth. Then place the test piece supporting plate (4.1.4) on top of the specimen and tighten the clamp tightening ring by rotating the upper screw handle.

8.1.3 Start to supply water to apply the specified hydrostatic pressure by rotating the piston handle.

8.1.4 Once the required pressure has been reached, adjust the piston handle and maintain the pressure for 1 min. In the case of apparel product use, the pressure to be maintained is 200 kPa. In the case of industrial product use, the pressure to be maintained is 300 kPa. By agreement between the interested parties, the pressure and the time to be maintained may be changed.

8.1.5 Examine the visible part of the test piece over the test piece supporting plate to see if there are any signs of water leakage or other abnormalities before releasing the pressure.

8.1.6 Release the hydrostatic pressure, open the clamp tightening ring and the test piece supporting plate. Remove the test piece and examine it again to see if water leakage or any abnormality has occurred. If there are any, record it in the test report, otherwise repeat the procedure for the rest of test pieces.

8.2 Method B (for hydrostatic pressure less than 100 kPa)

8.2.1 With the vessel connected to the water inlet pipe, open the inlet valve and allow the water to run into the vessel until it overflows. Check that the top of the vessel is horizontal by ensuring that the water is uniformly flush with all edges. Ensure that the inlet pipe is totally purged of air, and also that the level of water in the vessel corresponds to the zero on the manometer tube or pressure gauge (see 4.2.2).

8.2.2 Place the test piece on the vessel with the face to be tested (moistened prior to the test) in contact with the water, without trapping any air under the test piece.

8.2.3 Fit the retaining mesh (see 4.2.1). Secure the test piece and the mesh firmly on the vessel using the clamp, taking care to ensure that the edges of the clamp are completely parallel with those of the vessel.

8.2.4 Open the inlet valve so that the pressure in the vessel gradually increases at the required rate. Pressures less than or equal to 30 kPa shall be attained in 1 min ± 10 s; pressures of more than 30 kPa shall be attained in 2 min ± 20 s. Verify the pressure.

8.2.5 Once the required pressure has been reached, adjust the inlet valve, if necessary, and maintain the pressure for the required time. Pressures less than or equal to 30 kPa shall be maintained for 2 min. Pressures of more than 30 kPa shall be maintained for 5 min. The test duration will therefore be 3 min in the former case and 7 min in the latter.

8.2.6 Then examine the visible part of the test piece in order to detect whether any water droplets have passed through the coated fabric.

8.2.7 Close the water inlet valve and return the pressure to zero by opening the evacuation valve. If a leak is detected in the test piece clamping zone during the test, begin again.

9 Expression of results

The visible face of the coated fabric shall not have any “water penetration points”, nor any trace of moisture, on any of the test pieces. A “water penetration point” is considered to be any spot in which a drop appears as a pin prick. Penetration occurring exactly on the edges of the clamp shall not be considered to be a “water penetration point”.

10 Test report

The test report shall include the following:

a) a reference to this International Standard, i.e. ISO 1420, and the method (Method A or B) used;

b) a description of the coated fabric tested;

c) the conditioning and test atmosphere used;

d) the number of test pieces tested;

e) whether the test pieces were square or circular;

f) which side(s) of the coated fabric were subjected to water pressure;

g) the pressure and the time the pressure was applied;

h) whether the coated fabric passed or failed the test;

i) details of any difference from the standard test procedure;

j) the date of the test.

ICS 59.080.40

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