

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

0 Introduction

This International Standard is concerned with the ability of fabrics coated with rubber or plastics to withstand penetration by water. In order to determine the degree of penetration by water, it is necessary to subject test pieces cut from coated fabrics to known hydrostatic pressures. Tests may be conducted on the coated fabric as received or on test pieces which have been subjected to ageing or other tests.

1 Scope and field of application

1.1 This International Standard specifies methods for determining the resistance to penetration by water of fabrics coated with rubber or plastics when subjected to a low or high hydrostatic pressure.

These methods are applicable to coated fabrics utilized for protective clothing, tarpaulins and all similar applications. Four methods are covered, as follows:

Method A1 or A2: Hydrostatic low pressure — Large specimen methods.

Method B1 or B2: Hydrostatic high pressure — Small specimen methods.

1.2 The choice of methods is optional, but consideration should be given to the nature of service for which correlation test values may be sought.

2 References

ISO 2231, *Fabric coated with rubber or plastics — Standard atmospheres for conditioning and testing*.

ISO 2286, *Rubber- or plastics-coated fabrics — Determination of roll characteristics*.

3 Time-interval between manufacturing and testing

3.1 For all test purposes, the minimum time between manufacturing and testing shall be 16 h.

3.2 For non-product tests, the maximum time between manufacturing and testing shall be 4 weeks, and for evaluations intended to be comparable, the tests, as far as possible, should be carried out after the same time-interval.

3.3 For product tests, whenever possible, the time between manufacturing and testing should not exceed 3 months. In other cases, tests shall be made within 2 months of the date of receipt by the customer.

4 Method A: Hydrostatic low pressure — Large specimen methods

4.1 Apparatus

The apparatus (see figure 1) shall consist of a central well, fitted with a coaxial ring clamp to fasten the test piece over the well. The apparatus shall introduce water at test-room temperature from above or below the test piece over an area 100 cm^2 at the rate of $98 \pm 20 \text{ Pa/s}^*$. The rubber tubing connecting the constant-level device and the well shall have an inside diameter of not less than 6 mm.

NOTE — If necessary, soft rubber sealing gaskets or sealing cement may be employed between the coated fabric test piece and the surfaces of the coaxial ring clamps in order to reduce the risk of damage to the test piece by the clamps.

4.2 Test piece and conditioning

4.2.1 The test piece shall be either circular, of diameter 130 to 200 mm, or of corresponding square shape. It shall be taken at least 0,10 m from the selvage and 1 m from the end of the roll.

* $98 \pm 20 \text{ Pa/s} = 10 \pm 2 \text{ mmHg/s}$

4.2.2 Unless otherwise specified in the material specification, five test pieces shall be tested from each sample unit.

4.2.3 All test pieces shall be conditioned in accordance with ISO 2231.

4.3 Procedure

Conduct the test according to one of the two following methods.

4.3.1 Method A1 — Dynamic pressure method

Wipe all surface water from the clamping surfaces. Lay the test piece smoothly on the face of the lower ring of the clamp and fasten the upper plate in place, ensuring that the coated fabric is in contact with the water and that no air is trapped between the test piece and the water. This shall form a watertight compartment.

If the test piece is coated on only one side, place the coated side next to the water, unless otherwise specified. In the case of double-coated fabrics, place the more heavily coated side next to the water, unless otherwise specified.

With the leveller at the zero position, turn the water on and keep it running at such a rate as to overflow continuously. Raise the constant-level device at a rate of 10 mm/s until the first appearance of water on the underside of the test piece, if visible, or until the pressure given in the relevant product specification is attained. No account shall be taken of droplets of water which are formed at and touching the clamping edge.

Read on the scale the height of the water above the level of the test piece.

4.3.2 Method A2 — Static constant-pressure method

Place the test piece in the clamp, raise the pressure corresponding to a predetermined height of the water column and record the time at which the first drop of water appears on the underside of the test piece, or maintain the height of the water column for 15 min, whichever is the lesser.

4.4 Test report

The test report shall include the following particulars:

- a) a reference to this International Standard;
- b) identification of the material tested;
- c) the method and procedure used;
- d) the number of test pieces tested;
- e) if applicable, the specific conditions used for ageing or other testing;
- f) to which side of the coated fabric the water pressure was applied;

g) with method A1, the height of the water column, in millimetres, at which the first drop of water appeared on the underside of the test piece, and the average value for all test pieces;

h) with method A2, the predetermined height of the water column and the elapsed time before the first drop of water appeared on the underside of each test piece, and the average value for all test pieces.

5 Method B: Hydrostatic high pressure — Small specimen methods

5.1 Apparatus

5.1.1 The apparatus (see figure 2) shall consist of a hydrostatic tester capable of supplying a pressure of 690 kPa* with an accuracy of $\pm 7,0$ kPa.

5.1.2 The apparatus shall be equipped with two concentric ring clamps, having an inner diameter of $31,5 \pm 0,5$ mm, between which the test piece can be clamped. The clamping surfaces shall have concentric grooves of depth not less than 0,15 mm, to prevent the test piece from slipping during the test. The inside edges of the ring clamps that come into contact with the test piece shall be rounded to a radius of 0,3 to 0,5 mm to avoid cutting of the test piece.

5.1.3 The lower clamp shall be fitted with a rubber O-ring to avoid leakage when the pressure is applied to the test piece.

5.1.4 The machine shall have means for applying hydraulic pressure to the underside of the clamped test piece until the test piece fails.

5.1.5 The pressure gauge shall be of the Bourdon maximum-reading type, with graduations which will permit reading for the entire scale within 1,0 % of its maximum capacity. The capacity of this gauge shall be such that the individual readings will be not less than 25 % and not more than 75 % of the total capacity of the gauge.

5.2 Test pieces and conditioning

5.2.1 At least five test pieces shall be cut from the working width of the roll of coated fabric being tested (see ISO 2286). The smallest dimension of the test piece shall be at least 12 mm greater than the outside diameter of the ring clamp mechanism of the testing apparatus.

5.2.2 The test pieces shall be taken at least 0,10 m from the selvage and 1 m from the end of the roll.

5.2.3 All test pieces shall be conditioned in accordance with ISO 2231.

* 1 kPa = 1 kN/m²

5.3 Procedure

Conduct the test according to one of the two following methods.

5.3.1 Method B1 — Dynamic pressure method

Before clamping the test piece into the testing machine, bring the water level up flush with the top of the O-ring so that no air pocket exists between the water surfaces and the test piece. Unless otherwise specified in the case of single-coated fabrics, place the coated side next to the water. In the case of double-coated fabrics or double-textured fabrics, place the more heavily coated side next to the water, unless otherwise specified. The temperature of the water shall be the same as the atmospheric temperature of the testing room, unless otherwise specified.

Increase the pressure at a uniform rate of displacement and take a dial reading at the first appearance of water through the test piece.

5.3.2 Method B2 — Static constant-pressure method

The specimen shall be flexed five times by applying and releasing the specified pressure.

Apply the specified pressure, held constant within $\pm 7,0$ kPa, against the test piece for a period of 5 min. Any appearance of water through the test piece that can be detected during the specified period will indicate failure to pass the test.

5.4 Test report

The test report shall include the following particulars:

- a) a reference to this International Standard;
- b) identification of the material tested;
- c) the method and procedure used;
- d) the number of test pieces tested;
- e) if applicable, the conditions used for ageing the test pieces;
- f) with method B1, all observed and recorded data together with the average value of the hydrostatic resistance, in kilopascals;
- g) with method B2, the specified pressure applied and the number of test pieces that withstood the pressure.

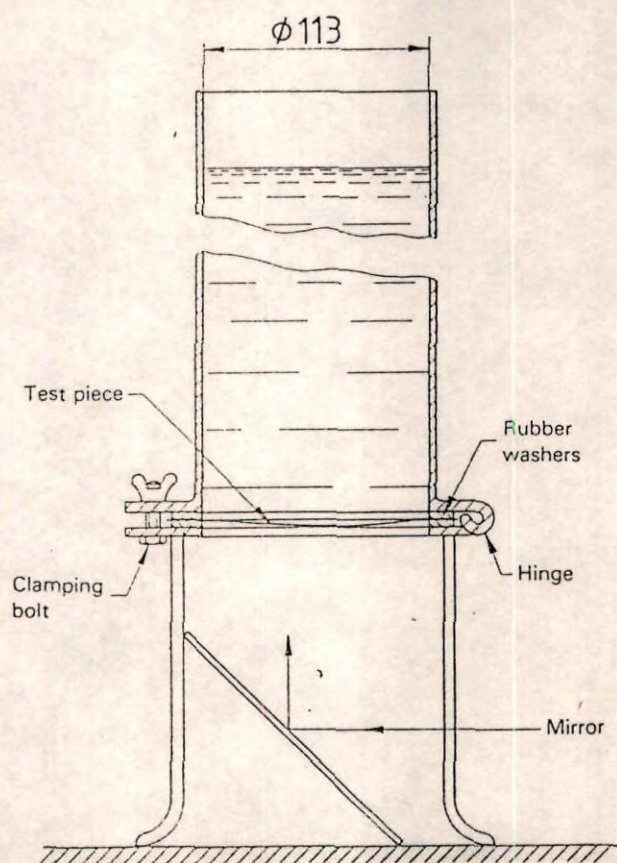
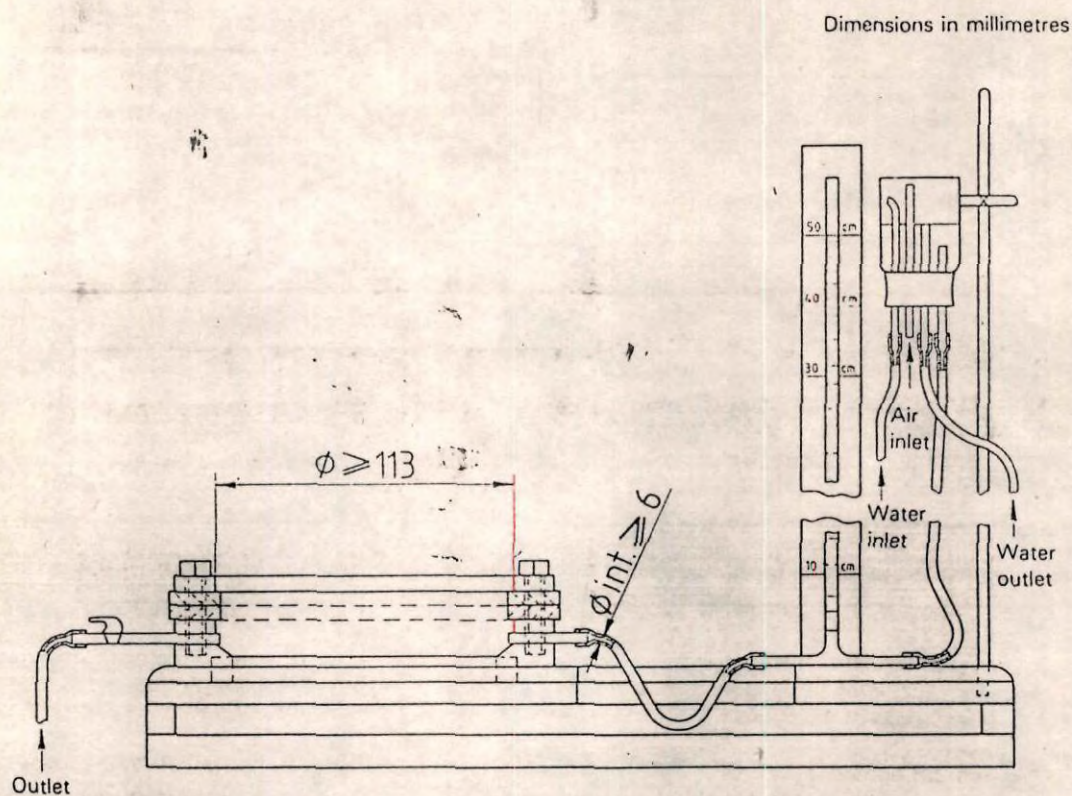


Figure 1 — Alternative arrangements for apparatus for hydrostatic low pressure — Large specimen methods

Dimension in millimetres

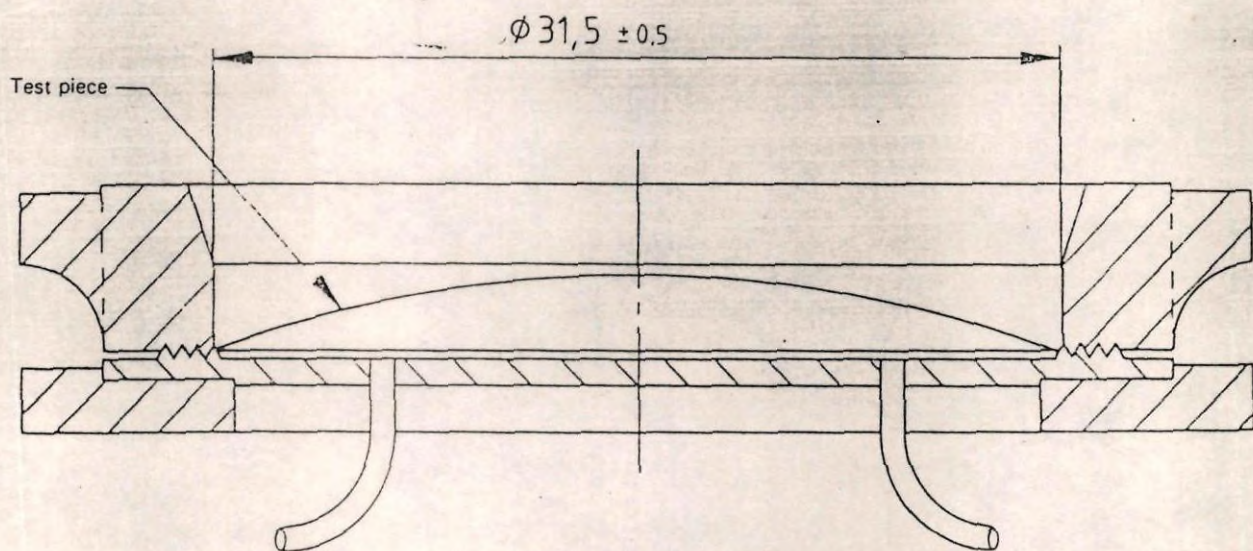


Figure 2 — Apparatus for hydrostatic high pressure — Small specimen methods