

Measurement of the Waterproofness of Gloving Leathers

1 Scope

This method is intended to use with any type of gloving leather.

2 Principle of the method

The specimen is placed on the wetted surface of a metal block. The upper surface of the specimen is pressed intermittently by a hammer which falls on it. The number of taps required to produce penetration of water through the specimen is noted and the specimen is weighed to determine the mass of water it absorbs.

3 Preparation of the specimen

3.1 From the leather to be tested, cut out a square piece of side 50 mm.

3.2 Unless otherwise specified, buff the leather surface lightly, as follows. Place the piece on a table with that surface upwards which will, in use, be on the outside of the glove (normally the grain layer). Press a piece of grade 180 emery paper against the leather and draw it across the leather 10 times in various directions under a load of about 200 gf uniformly applied by hand pressure (see 8.1).

3.3 From the piece of leather so buffed, cut a specimen in the form of a circle of 37 mm diameter and condition it in accordance with the method given in SLP 3.

4 Description of the apparatus

The apparatus consists of the following (see Fig 1):

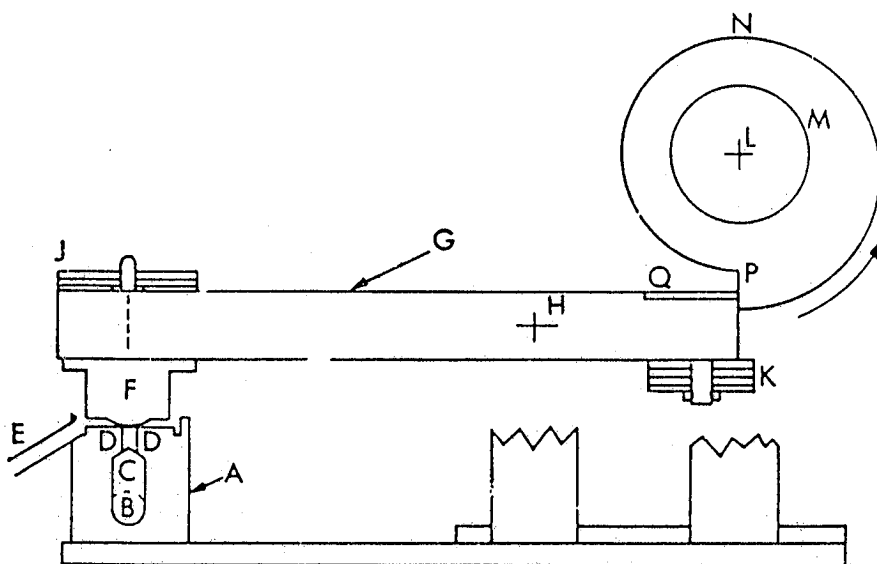


Fig 1 Waterproofness apparatus

- (1) A brass anvil A on which the specimen is placed. The top of the anvil consists of a circular cap of 38 mm diameter with a raised flat and smooth circular base of 32 mm diameter surrounded by an annular channel of 3 mm depth and 3 mm width. Water is supplied by a constant head device (not shown) in which the water level is 4 mm to 6 mm above the level of the raised flat base of the cup. It flows to the chamber C through a tube B, and from C is led up to the base of the cup through four holes D of 0.4 mm diameter, each situated 3 mm from the centre of the base, and on two mutually perpendicular lines through the centre. Surplus water drains away through the tube E.
- (2) A hammer whose head consists of a stainless steel bearing ball of 25 mm diameter, mounted in a brass casing which is rigidly attached to, but is electrically insulated from, an arm G. The arm is pivoted in ball races at H, and when F rests directly on the anvil, the arm is horizontal. The distance from H of a vertical line through the centre of F is then 150 mm, and the distance of H from the other end of the arm G is 75 mm. The arm carries two sets of weights J, K, which are such that F applies a steady force of 100 ± 2 gf, and the moment of inertia about H of the arm and its attachments is 80 ± 5 kgf/cm².
- (3) A shaft whose axis passes through L. The shaft is mounted in ball races and is driven by an electric motor at 30 ± 2 rev/min. A circular plate M is fixed to the shaft and rotates with it. A steel cam is in the form of two semicircles of diameters 86 mm and 102 mm joined along their diameters so that their arcs meet smoothly at N and form a step at P. The cam is attached to M and rotates with it in the direction shown: by its action on a phosphor-bronze plate Q attached to the arm G, it alternately raises the ball F and lets it fall. When the arm G is horizontal, the point L is situated 59.0 ± 0.5 mm above the top surface of Q, and vertically above the end of Q and the arm G. The attachment of the cam to the plate M is such that adjustments can be made to the machine by movement of the cam relative to M along the line NLP. In the mid-position of the cam, the point L is at the mid-point of the diameter of the smaller semicircle.
- (4) A counter which records the number of taps made by the hammer.
- (5) A suitable electrical circuit and auxiliary apparatus which provide an audible or visual signal when penetration of water through the specimen occurs. One lead from the circuit is attached to the anvil A. The other lead consists of a flexible insulated wire which is supported near H on the frame which carries the arm G; this lead makes electrical contact with the casing in which F is mounted. The apparatus is set to provide a signal when the resistance between A and F falls below about 50,000 ohms (see 8.2).
- (6) An automatic, or semi-automatic balance for weighing specimens to the nearest milligram.

5 Adjustment of the machine

- 5.1 Raise the end of G which carries the ball F.
- 5.2 Place a metal block which is 25.0 mm thick on the raised circular base of the cup and lower F until it rests on the block.
- 5.3 Adjust the position of the cam on the plate M until the cam just fails to touch the plate Q when the cam rotates. Clamp the cam in this position and remove the block from the cup. The machine is now ready for use (see 8.3, 8.4, 8.5.).

6 Procedure

- 6.1 Maintain a flow of distilled water to the constant head apparatus, thus keeping the upper surface of the anvil wet.
- 6.2 Weigh the buffed and conditioned specimen. (All weighings are to be made to the nearest milligram.)
- 6.3 Place the specimen in the cup with its roughened surface on the wet surface of the anvil and at once start the motor.
- 6.4 After 20 taps, stop the motor, remove the specimen and blot it lightly with dry blotting paper. Reweigh the specimen, replace it in the cup and restart the motor (see 8.6 and 8.7).
- 6.5 After a further 980 taps (ie, after 1000 taps in all), stop the motor, remove the specimen, blot it lightly, and reweigh it (see 8.6 and 8.7).
- 6.6 Note the number of taps at which penetration of water through the specimen occurs (see 8.8).

7 Reporting results

Report the gain of weight of the specimen in milligrammes for the first 20 taps, and the gain of weight for the first 1000 taps.

Report also the number of taps at which first penetration occurred.

8 Notes

- 8.1 Some leathers have on the grain a surface coat which greatly increases the waterproofness of the leather. If microcracks develop rapidly in this coat during wear, measurements of waterproofness made on the leather as received can be misleading. The specimens should, therefore, generally be buffed lightly before test. The purpose of this is not to remove the surface coat, but merely to scratch it slightly. The load applied in doing this is not critical and the value of 200 gf is merely quoted as a rough guide. Since the leather may be distorted by the buffing, the circular specimen should not be cut until after the leather has been buffed.

- 8.2 When water penetrates a specimen its resistance falls very rapidly from a value of several megohms to a few thousand ohms or less. The resistance at which the circuit provides a signal is not, therefore, critical.
- 8.3 Once the machine has been adjusted to give the correct height of fall of the hammer, it is not likely to need this adjustment again. Nevertheless, the adjustment should occasionally be checked in the manner indicated.
- 8.4 If the height of fall differs by a few millimetres from the standard height of 25 mm, the results obtained on any leather are only slightly modified. For this reason, the apparatus is adjusted without a specimen on the anvil, and no account is taken of the fact that the fall of the hammer is somewhat less for thick leathers than for thin.
- 8.5 To prevent damage to the anvil and the bearing ball, the latter should be dried with a cloth after use and a rubber disk of the same size as a specimen should be put in the cup until the machine is needed again.
- 8.6 The first 20 taps generally produce a relatively rapid water absorption by the leather, and the gain of weight for 20 taps is a measure of this. After 1000 taps, the gain of weight is generally slow, so the gain at 1000 taps is a measure of the final water uptake.
- 8.7 The specimens must not be compressed when they are blotted. It is sufficient to place them on the blotting paper and draw them gently along it for one to two seconds.
- 8.8 For many purposes, the logarithm of the number of taps is a better guide to water resistance than is the number itself, because, when leathers are compared, the ratio of the numbers is more informative than their difference.