



Leather — Determination of water resistance of flexible leather —

Part 2: Repeated angular compression (Maeser)

Cuir — Détermination de l'imperméabilité à l'eau des cuirs souples —

Partie 2: Compression angulaire répétée (Maeser)

ICS 59.140.30; 61.060

ISO/CEN PARALLEL PROCESSING

This draft has been developed within the European Committee for Standardization (CEN), and processed under the **CEN-lead** mode of collaboration as defined in the Vienna Agreement.

This draft is hereby submitted to the ISO member bodies and to the CEN member bodies for a parallel five-month enquiry.

Should this draft be accepted, a final draft, established on the basis of comments received, will be submitted to a parallel two-month approval vote in ISO and formal vote in CEN.

This draft International Standard is submitted to all ISO member bodies for voting, as a standard prepared by an international standardizing body in accordance with Council Resolution 42/1999. The proposer, *International Union of Leather Technologists and Chemists (IUP Commission, IULTCS)*, has been recognized by the ISO Council as an international standardizing body for the purpose of Council Resolution 42/1999.

To expedite distribution, this document is circulated as received from the committee secretariat. ISO Central Secretariat work of editing and text composition will be undertaken at publication stage.

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Foreword

ISO (the International Organisation for Standardisation) 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 organisations, 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 standardisation.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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.

ISO 5403-2 was prepared by the Physical Tests Commission of the International Union of Leather Technologists and Chemists Societies (IUP Commission, IULTCS) and the Working Group 2 of CEN TC 289 Leather, the Secretariat of this Technical Committee is held by UNI. This method is a commonly used method in the leather industry to test for dynamic water resistance of shoe upper leathers.

The IULTCS, originally formed in 1897, is a world-wide organisation of professional leather societies to further the advancement of leather science and technology. IULTCS has 3 Commissions, which are responsible for establishing international methods for sampling and the testing of leather. ISO recognises IULTCS as an International Standardising Body for the preparation of test methods for leather.

ISO 5403 consists of the following parts, under the general title *Leather — Determination of water resistance of flexible leather*:

- *Part 1: Repeated linear compression (penetrometer)*
- *Part 2: Repeated angular compression (Maeser)*

Leather — Determination of water resistance of flexible leather —

Part 2:

Repeated angular compression (Maeser)

1 Scope

This Standard specifies a method to determine the dynamic water resistance of leather by means of repeated angular compression. It is applicable to all flexible leathers but is particularly suitable for leathers intended for footwear applications. It uses a Maeser-type machine and includes an option for electronic detection.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

ISO 2418 Leather - Chemical, physical and mechanical and fastness tests - Sampling location

ISO 2419 Leather - Physical and mechanical tests – Sample preparation and conditioning

ISO 5403-1:2010 Leather - Water resistance of flexible leather - Part 1: Repeated linear compression (penetrometer)

ISO 3696:1987 Water for analytical laboratory use – Specification and test methods

3 Principle

A square test specimen is folded and secured in two V-shaped clamps which have closed ends so as to form a trough. The trough is then immersed in water and the clamps oscillate at a constant speed so that the specimen is repeatedly flexed. The test is stopped at the first sign of water penetration through the test specimen or by means of electronic detection..

NOTE This test method uses a folding type of flexing, whereas the test method EN ISO 5403-1 *Leather - Water resistance of flexible leather - Part 1: Repeated linear compression (penetrometer)* for water resistance imparts a compression type flexing on the leather specimens. As a result of the two completely different flexing actions, it is not possible to compare the results obtained from these two test methods.

4 Apparatus and materials

Usual laboratory apparatus is required and, in particular the following:

4.1 A Maeser-type machine, which has pair(s) of V-shaped clamps, which are 63 mm ± 3 mm apart and in the same horizontal plane, into which the test specimen can be clamped.

4.1.1 Each clamp shall have;

4.1.1.1 A "V" form with an internal angle of $31^\circ \pm 1^\circ$ and an internal tip radius of $7,5 \text{ mm} \pm 0,5 \text{ mm}$.

4.1.1.2 A closed back to the "V" which is impermeable to water.

4.1.2 One clamp is stationary.

4.1.3 One clamp shall pivot about a point X which is midway ($31,5 \text{ mm} \pm 1,5 \text{ mm}$) between the clamps such that the lower end of the clamps move together (see Figure 1).

4.1.4 The pivot point X (see Figure 1) shall be $54,0 \pm 0,5 \text{ mm}$ above the internal face of the clamp at the tip of the "V" and the flexing angle through which the clamp moves shall be $32^\circ \pm 1^\circ$.

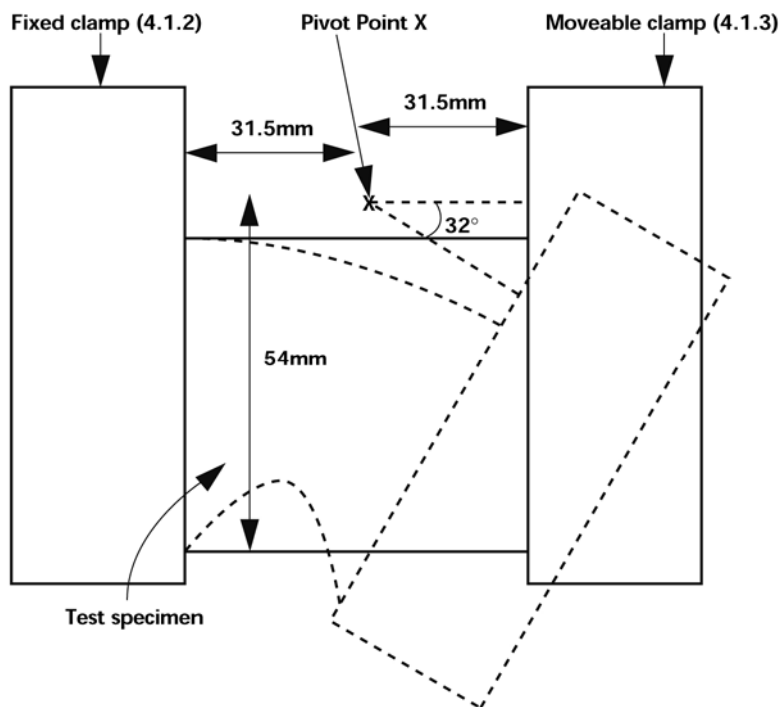


Figure 1 — Side view of test specimen in "V" shaped clamps

4.1.5 A method of applying a simple harmonic motion to the moveable clamp (4.1.3) so that it pivots toward the stationary clamp (4.1.2) and back to its original position at a rate of (90 ± 5) cycles / minute.

4.1.6 A means of counting the number of cycles of the moveable clamp (4.1.3).

4.1.7 A method of containing a fixed quantity of water or electrolyte (4.3) (around the two clamps (4.1.2 and 4.1.3) so that the water level can be adjusted to the recommended height.

4.2 A **press knife**, or other cutting device, capable of cutting square test specimens $114 \text{ mm} \pm 2 \text{ mm} \times 114 \text{ mm} \pm 2 \text{ mm}$.

4.3 **Distilled or deionised water** at $(20 \pm 5)^\circ\text{C}$, according to Grade 3 in ISO 3696, or, if electronic detection is used, an electrolyte comprising **1g/L Sodium Chloride Solution** at $(20 \pm 5)^\circ\text{C}$,

4.4 **Thin strips of compressible impermeable material**, such as soft rubber or plasticine, width approximately 10 mm and thickness approximately 1 mm may be necessary to prevent water seeping between the test specimen and the clamps (4.1.3) and (4.1.4).

4.5 Rubber solution, or a similar type of compound, may be necessary for sealing the edges of the test specimens.

4.6 If electronic detection is used:

4.6.1 An electrical system that uses a high and a common electrode, and which shall stop the test when water penetration is detected as a fall in resistance between the electrodes to below 50 000 ohms. An electrolyte (4.3) in contact with the leather specimen shall form the common electrode. The high potential electrode shall be in electrical contact with the steel balls (4.6.2)

4.6.2 Magnetic stainless steel balls approx. 3mm in diameter, to be maintained so that they're free of grease, oil, silicone and rust. Balls to be kept clean using a 5% Nitric acid solution, by rinsing with tap water, and allowing to air-dry.

4.8 Magnet, used to remove steel balls from sample.

4.9 Balance, with accuracy of 0,01g if water absorption required

5 Sampling and sample preparation

5.1 Sample in accordance with ISO 2418. Use the knife (4.2) to cut two square test specimens 114 mm ± 2 mm x 114 mm ± 2 mm so that one side of each specimen is parallel to the principal direction of the material. .

5.2 Mark the principal direction of the material on each test specimen.

5.3 If it is considered that the test specimens are virtually impermeable through their thickness but may be prone to wicking along their length, then seal all four edges of both test specimens with the rubber solution (4.5).

5.4 Store the test specimens in a standard controlled environment according to ISO 2419 for at least 48 hours. It is not necessary to carry out the test in this atmosphere.

6 Pre-treatments to simulate wear

If considered appropriate, samples can also be tested after light buffing with an abrasive paper using the technique described in clause 5.2 of ISO 5403-1:2010.

7 Procedure

7.1 Adjust the test machine (4.1) so that a pair of clamps (4.1.3) and (4.1.4) have their tips at their maximum separation and in the same horizontal plane.

7.2 If it is considered that the test specimens are virtually impermeable through their thickness but may be prone to wicking along their length, then place a thin strip of compressible impermeable material (4.4) in each of the clamps (7.1) in the area where the test specimen will be bedded down. This will help to prevent water seeping between the test specimen and the clamps (4.1.3) and (4.1.4) during the test.

7.3 Weigh the test specimens if water absorption is required

7.4 Fold, without creasing, one test specimen in half so that the outer surface is facing outwards and the fold is parallel to the principal direction of the material.

7.5 Place the folded test specimen (7.4) between the pair of clamps (7.1) so that the fold runs between the tips of the "V"s.

7.6 Fully tighten one of clamps, ensure that the test specimen is not slack, and then fully tighten the other clamp.

7.7 Slowly move the clamps together and watch the specimen to ensure that the centre section folds upwards. If this is not the case gently apply pressure to the underside at the centre of the fold as the clamps move together to form an upward fold.

7.8 If the test machine (4.1) has a second pair of clamps repeat the procedure in sections 7.1 to 7.7 for the other test specimen but this time fold the specimen at 90° to the principal direction of the material.

7.9 If electronic detection is used, place approximately 150 g of steel balls (4.6.2) inside the 'V' formed by the test specimen and insert the high potential electrode ensuring that electrical contact is made with the steel balls.

7.10 Fill the container (4.1.6) with water or electrolyte (4.3) and adjust the level so that it is above the centre of the upward fold (see section 7.7). During this stage it is recommended that a wad of absorbent tissue is put in the trough formed by the clamped test specimen as a precaution against accidentally splashing water onto the reverse surface of the specimen. This wad should be removed from the specimen after the water level has been adjusted.

7.11 Immediately zero the counter, activate the electronic detection system and start the test machine (4.1).

7.12 If electronic detection is used, go to 7.16, otherwise inspect the interior of the clamped test specimen(s) for signs of water penetration. It is usual for this to occur initially at the two ends of the centre fold and take the form of a damp patch at the surface of the material, or a globule of water exuding from it.

7.13 If water starts to seep between the test specimen(s) and the clamps, this is invalid and should be discounted and the test continued until valid penetration through the test specimen occurs. If the amount of seepage through the clamps is enough to put the test at risk, stop the machine and mop it up using an absorbent tissue. Check the clamps and if necessary tighten them further.

7.14 At the first sign of valid water penetration through the test specimen record the number of cycles completed by the movable clamp.

7.15 Continue to inspect the test specimens as in sections 7.11 to 7.13 for approximately 15 minutes or until the test specimen(s) show signs of initial water penetration. Do not stop the machine when making the inspections.

7.16 If penetration has not occurred after approximately 15 minutes, then repeat the procedure in sections 7.11 to 7.13 but gradually increasing the inspection intervals from every few minutes to every quarter of an hour or more should the material continue to resist penetration. When penetration occurs during a period of intermittent inspections, record both the number of cycles of the last inspection stage before penetration and the first inspection stage after penetration.

7.17 Continue the test until penetration of all test specimens has occurred and record the number of cycles to penetration for each specimen

7.18 If no penetration has occurred after 24 hours stop the test.

7.19 If the test machine has only one pair of clamps then repeat the procedure in sections 7.1 to 7.17 with the second test specimen folded in section 7.4 at 90° to the principal direction of the material.

7.20 The water or electrolyte (4.3) shall be changed after each test

7.21 To determine water absorption, remove the test specimens from the machine, blot with absorbent paper, and weigh to the nearest 0,01 g.

8 Calculation and expression of results

8.1 Initial water penetration. The penetration of water is reported as the number of flexes when the water penetration is visually noted.

8.2 Water Absorption. If water absorption is required, calculate the percentage water absorption as follows:

$$\text{Water absorption (\%)} = [(A - B)/B] \times 100$$

Where:

A = mass of specimen after flexing and,

B = mass of specimen before flexing.

9 Test report

The test report shall include the following information:

- a) a reference to this Standard, i.e. ISO 5403-2:2XXX;
- b) a description of the type of leather used;
- c) the conditions in ISO 2419 used to condition the test specimens, if different from reference standard conditions;
- d) details of any pre-treatment;
- e) the method of detection of water penetration: visual or electronic;
- f) for each test specimen;
 - the test direction
 - the number of cycles (flexes) when water penetration first occurred
- g) details of any deviations from the procedure, or special circumstances which may have affected the results;
- h) mass, or percentage of water absorbed, if requested.