
**Leather for garments – Performance
requirements**

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Foreword

This Ethiopian Standard has been prepared under the direction of Technical Committee for Leather- and Leather products(TC 74) and published by the Ethiopian Standards Agency(ESA).

In preparing this Ethiopian Standard reference has been made to the following:
IS 12718:2013, "Leather for garments – Performance requirements ", published by the Bureau of Indian standards.

Acknowledgement is made for the use of information from the above publication.

DRAFT

Leather for garments – Performance requirements

1. Scope

This Ethiopian's standard prescribes the requirements for leathers to be used in the manufacture of garments. It is applicable to suede leather, grain leather and wool sheep skins but excludes furs.

2. Normative references

The following Ethiopian Standards are necessary adjuncts to this standard. All standards are subject to revision, and parties to agreement based on the Ethiopian standards are encouraged to investigate the possibility of applying the most recent editions of the Ethiopian standard indicated below. Registers of currently valid standards are maintained in the Ethiopian Standards Agency.

ES 1180 , Leather -Terminology

ES ISO 17072,Leather — Chemical determination of metal content

CES 37, cotton sewing thread requirements

ES ISO11642, Leather- Tests for colour fastness- Colour fastness to water

ES ISO11641, Leather — Tests for colour fastness — Colour fastness to perspiration

ES ISO 105 A02, Textiles- Tests for color fastness Part A02: Grey scale for assessing change in color

ES ISO 105-A03, Textiles Tests for color fastness Part A03: Grey scale for assessing staining

ES ISO 11640, Leather- Tests for colour fastness-Colour fastness to cycles of to-and-fro rubbing

ES ISO 15700, Leather- Tests for color fastness -Color fastness to water spotting ,

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

ES ISO 2419, Leather — Physical and mechanical tests — sample preparation and conditioning

ES ISO 2588, Leather — Sampling — number of items for a gross sample

ES ISO 4044, Leather — Chemical tests — preparation of chemical test samples

3. Terms and definitions

For the purpose of this Standard ES 1180 and the following definitions shall apply.

3.1.

Cold Crack Temperature

The highest temperature at which the finish of leather will crack when the leather is folded quickly once grain outwards.

3.2.

Aniline leather

A type of leather dyed exclusively with soluble dyes without covering the surface with topcoat paint or insoluble pigments.

4. Material requirements

4.1. Leather

- The leather shall have been tanned with either organic or inorganic tanning agent:
- The colour and finish of the leather shall be an acceptable match to the colour and finish.
- The leather shall be well tanned and of an acceptable quality. It shall be free from defects that affect its appearance or that may affect its serviceability (or both); it shall not be pipy or loose grained and it shall be well fleshed and free flay marks.
- When leather is tested according to the relevant methods of test, the leather shall conform to the requirement specified in Table 1 and Table 2.

4.2. Water Repellency

The leather shall not show any sign of stain or spot when tested according to the method prescribed in Annex F.

4.3. Threads

Sewing threads shall be glaze cotton, linen, polyester or polyamide, or a polyester and cotton core – spun thread and shall comply with the relevant requirements of CES 37. The colour shall be uniform and, unless a contrasting seam is an intended feature, shall be an acceptable match to that of the component with the threads used.

Note: Synthetic thread is much stronger than cotton and does not absorb moisture so readily,

4.4. Adhesives

The adhesive used shall in all cases be compatible with the materials with which they are used and shall be capable for producing an adequate bond between the components concerned. Adhesive plays a dominant role in the fabrication of leather joints and testing of emblem. Invariably, the closing of joints is first secured by adhesives and later by means of stitching.

4.5. Grindery and Hardware

These are known as metal grindery or hardware and some of the embellishments and fittings are also grouped in this category. All functional or decorative metal components, shall be of an intrinsically corrosion resistant or shall have been so coated as to render them resistant to corrosion. When plastics accessories have been coated they show no sign of cracks or pit marks. All accessories shall be of an acceptable design and of adequate size and strength for their intended function.

4.6. Closure fittings

Closure fittings or clasps shall be of acceptable design.

4.7. Zip Fasteners

The zip fasteners should be duly tested as per given in TZS 1136: 2010, Zippers specifications.

5. Performance requirement

The essential performance characteristics, test methods, and recommended values for different types of garment leathers shall be shown in table 1 and table 2 below.

Table 1 - Performance Requirements for all garment Leathers

Characteristic	Requirement	Method of Test
Tear strength, N	20	
Dimensional stability to dry cleaning, percent, Max.		Reference to Annex
a) Maximum area shrinkage	6	
b) Maximum area extension	3	
Colour fastness to and fro rubbing, contrast grading: maximum change in shade and felt pad		ES ISO 105 AO2, ES ISO 105-AO3, ES ISO 11640 , ES ISO 15700
a) after 100 cycles of wet rubbing, in gey scale, min.	5	
b) after 50 cycles of dry rubbing, in grey scale, min.	5	
Colour fastness to perspiration, contrast grading:		ES ISO11641
a) maximum change in shade	3	
b) maximum stain	3	
Colour fastness to water, contrast grading:		ES ISO11642
a) maximum change in shade	3	
b) maximum stain	3	

Colour fastness to dry cleaning, grey scale	3 or better No finish lost	Refer to Annex
Colour fastness to light, contrasting grading: maximum change in shade	3	

Table 2- additional performance requirement for grain garment leather

characteristic	Requirement	Method of test
Fastness of finish to dry cleaning*	No significance change in appearance	Refer to Annex B
Adhesion of finish to leather (only for pigmented leathers) N/10mm a) Dry condition, min, b) Wet condition, min,	2 1	Refer to Annex D
Cold crack resistance (only for pigmented leathers), temperature, °C, max.	-5	Refer to Annex E

* This requirement has been included to ensure that grain leathers which are in accordance with colour fastness to dry cleaning requirement specified in Table 1 do not comply with the standard if the dry-cleaning procedure results in partial or complete loss of finish.

6. Design and Construction requirement.

6.1. General

The garments shall be constructed in accordance with acceptable manufacturing practice. The leather garment may be acceptably lined and shall be incorporated with closure fitting. The style, fittings, size and stitching shall be agreed to seller conforming to sample held by buyer.

6.2. Design

The leather garment design is the matter of agreement between buyer and seller. However, the design should be comfortable that the user can enjoy usability at the highest level.

6.3. Construction

The strength of materials and components used for making leather garments shall be such that the overall performance of the garments is per this Ethiopian Standard.

6.3.1. Skiving

For the leather, skiving shall be done in such a way that it will ensure the strength of the seam due to slippage and formation of hard ridges.

6.3.2. Lining and Interlining

The lining shall be appropriate to the type of leather and of an acceptable quality as per given in **ES 6273**, Lining fabric specification.

6.4. Seams and Stitching

For seams strength there should be 6 to 10 stitches per 25mm with the end of all stitching securely back stitched. No seam slippage shall be allowed and all seams shall be free from twist, pleats and manufacturing practice.

7. Workmanship and finish

7.1. The appearance, workmanship and finish in all other aspect not mentioned in this specification shall be of acceptable quality for trading practice. Sewing shall be uniform and double rows of stitching shall be uniform unless intended to be otherwise.

7.2. The leather garments shall be free from any defect that affects their appearance relevant to the approved sample.

8. Packing

8.1. The leather shall be packed as agreed to between the purchaser and the supplier.

8.2. The package shall be marked of the manufacturer and recognized trade – mark, if any, number of pieces of leather, total area, month and year of manufacturer.

9. Marking

9.1. The leather shall be legibly marked on the flesh side of each piece with the area in square decimeter

NOTE – The marking should not cause any disfiguration to the leather or migrates itself to the grain surface of the leather coming in contact with it.

9.2. Each leather garment shall be legibly stamped or labeled with the following information

- a) Manufactures name or recognized trade mark.
- b) Type of outer materials used i.e. leather or non – leather.
- c) Batch number.
- d) Size.
- e) Care label.

10. Sampling and criteria for conformity

The scale of sampling and criteria for conformity of the material shall be as prescribed in accordance with ES ISO 2418, ES ISO 2419 ES ISO 2588 and ES ISO 4044

Annex A (Normative)

Dimensional stability to dry cleaning

A – 1 Scope

This annex specifies a procedure for determination of dimensional stability of leather to dry cleaning in tetrachloroethylene. The method is intended only for the assessment of dimensional changes undergone by a specimen subjected to a single dry cleaning and finishing operation; when it is desired to determine the amount of progressive dimensional change, the method may be repeated for a specified number of cycles normally not exceeding five.

A - 2 Principle

Conditioned leathers are marked and measured, subjected to a dry cleaning procedure, followed by an appropriate finishing procedure. They are afterwards conditioned and measured. The dimensional change is expressed as a percentage of the original dimensions.

A – 3 Reagents

A – 3.1 Tetrachloroethylene, Dry cleaning Grade

A – 3.2 Sorbitan Mono Oleate

A – 4 Apparatus

A – 4.1 Dry Cleaning Machine

This shall consist of a commercial rotating cage type, totally enclosed, machine for use with tetrachloroethylene. The diameter of the rotating cage shall be not less than 600mm and not more than 1080mm. its depth shall be not be less than 300mm. it shall be fitted with three or four filters. The speed shall be such as to give a radial acceleration of between 0.5 and 0.8 for cleaning and between 60 and 120 for extraction [see Note 1 under A – 9.1(g)]. The machine shall be equipped with a thermometer for the measurement of solvent temperature. The machine shall have suitable facilities permitting the emulsion to be introduced gradually into the solvent between the cage and the casting, below the level of the solvent, in such a way that it does not fall directly on to the load. The machine shall be equipped with the temperature control of either the incoming or the outgoing air during the drying cycle. [For general guidance, see Note 2 under A – 9.2(g)]

A – 4.2 Apparatus for Applying Appropriate Finishing Treatment to the Test specimen

A – 4.3 Make – Weights Consisting of Cleaning Textile pieces or Garments

These shall be white or a light colour and consist of approximately 80 percent wool and 20 percent cotton or viscose.

A - 4.4 Means of Marking the Test Specimen

Pen and indelible ink or other suitable marking device can be used.

A – 4.5 Stable Measuring Scale of Dimensions Suitable for the article being tested, graduated in millimetres.

- A – 4.6 A smooth Flat Surface, of such dimensions that the article being tested can be laid flat for measurement.
- A – 5 Atmospheres for conditioning and testing
- A – 5.1 For pre – conditioning, an atmosphere of relative humidity not more than 10 percent and a temperature not greater than 50°C.
- A – 5.2 For conditioning and measuring, the standard atmosphere for leathers that is relative humidity of $65 \pm 2^\circ$ C percent and a temperature of $27 \pm 2^\circ$ C.
- A – 6 Preparation of test pieces and Make - Weights
- A – 6.1 When testing leather pieces lay out the piece without tension on a flat, smooth surface, taking care to see that it is free from wrinkles and creases. Make three pairs of marks, each at least 250mm apart, along the length and three similar pairs of marks along the width of the leather.
- A – 6.2 Condition the test piece and make – weight in the standard atmosphere for testing leather for at least 24 hours.
- A – 6.3 Lay the test piece out as detailed in A – 6.1 and measure the distance between marks to the nearest millimeter. Make all measurements in the standard atmosphere for conditioning and testing leathers.
- A – 7 Procedure
- A – 7.1 the total mass of the complete load shall be 50 ± 2 kg for each cubic metre of the volume of the cage. Ensure that the test piece(s) do not weigh more than 10percent of the total load, the remainder consisting of make – weights unless the test piece(s) as such weight(s) more. When loaded into the machine, the piece(s) and the make – weights shall be in equilibrium with the standard atmosphere for testing leathers. Equilibrium is deemed to be attained after exposure for 24hours.
- A – 7.2 Place the conditioned load in the machine and introduce tetrachloroethylene containing 1g/l of sorbitan mono oleate so that the liquor ratio, calculated on the volume of solvent in the cage and casing is 6.5 ± 0.5 litre for each kilogram of load (this corresponds to a solvent level of approximately 30 percent of the cage diameter). Maintain the solvent at $30 \pm 3^\circ$ C throughout the cleaning operation.
- A – 7.3 Prepare an emulsion by mixing one part (by volume) of the sorbitant mono – oleate with three parts of water (by stirring). Start the machine with the filter circuit shut off and slowly (over a period of not less than 2 minutes and not more than 12 minutes) add an amount emulsion, corresponding to 2 percent of water calculated on the mass of the load, to the machine between the inner and outer cages below the level of the solvent.
- A – 7.4 Keep the machine running for 15minutes after switching it on. Do not use the filter circuit for the duration of the test.
- A – 7.5 Drain the solvent and centrifugally extract the solvent from the load for 2 minutes (at least 1 minute at full extraction speed)
- A – 7.6 Introduce pure dry solvent at the same liquor ratio (see A – 7.2) and rinse for 5 minutes. Drain and extract again for 3 minutes (at least for 2 minutes at full extraction speed).
- A – 7.7 Dry the load in the machine by tumbling in circulating warm air for an appropriate time, preferably using an automatic solvent dryness control. Either the outlet air temperature shall not exceed 60° C, or the inlet temperature shall not exceed 80° C. After drying, blow air at ambient temperature through the rotating load for 3 to 5 minutes.
- A – 7.8 Immediately take the test piece(s) from the machine. Place garments individually on hangers and place fabric specimens on a flat surface, for not less than 30 minutes before finishing.

NOTE – If additional information on stability to dry cleaning only is required condition and re measure the test piece at this stage before completing the test and include details of this procedure in the report.

A-7.9 Carry out a finishing treatment by the method appropriate for the type of garments or fabric under test [see Note 3 under A-9.1 (g) 1. In most cases, this will involve pressing on a garment (steam) press supplied with steam at a pressure of 370 to 490 KPa (over pressure): or on a steam/air garment former for 5 to 20 seconds followed by drying with warm air for 5 to 20 seconds. (1 KPa = 10⁻³ bar, 1 bar = 1 kgf/ cm²).

A-7.10 Condition the test piece as detailed in A-6.2 and measure to the nearest millimeter each test piece using the procedure referred to in A-6.3.

A-8 Calculations and expression of results

Calculate the average dimensional changes along the length and width of leather test pieces separately or in the principal dimensions of a garment. Express dimensional changes as a percentage rounded to the nearest 0.1 percent, using a minus sign to indicate shrinkage and a plus sign to indicate an increase in dimensions.

A-9 Test report

Report the following information:

- (a) Whether the procedure for normal materials or the procedure for sensitive materials was conducted;
- (b) Results obtained according to A-8.1;
- (c) Number of treatments given;
- (d) Details of finishing treatment used, stating nil if this is appropriate
- (e) Details of dimensions of the garment or fabric specimen;
- (f) Percentage by mass of test piece(s) in the load, and the type of articles comprising the make-weights; and Maximum inlet or outlet air temperature during drying.

NOTES :-

1 The radial acceleration is calculated according to the following formula:

$$\frac{5.6n^2}{1000000} gn$$

Where

n = number of revolutions per minute

d = diameter acceleration of free fall (9.81m/ s²)

gn = standard acceleration of free fall (9.81m/ s²)

2 When using commercial dry cleaning equipment official regulations and normal safety precautions should be observed.

3 The dimensional changes allowed do not imply that garments in wear will have this tolerance after dry cleaning. Experiments have shown that leathers giving the degree of area changes in the test when processed as garments by normal commercial procedures with recoiling can be restored to their original dimensions.

Annex B

[Table 1, Item (iv) and Table 2, Item (i)

Colour fastness to dry cleaning

B-1 Scope and field of application

B-1.1 This method is intended for determining the resistance of colour of leather to dry cleaning.

B-1.2 This method is not suitable for evaluation of durability of leather finishes nor is it intended for USC in evaluating the resistance of colours to spot and stain removal procedures used by the drycleaner (see Notes 1 and 2 under B-7.5).

B-2 Principle

B-2.1 A specimen of the leather in contact with a cotton fabric bag, along with non-corrodible steel discs, is agitated in tetrachloroethylene also known as perchloroethylene (see Notes 2 and 3 under B-7.5), then squeezed or centrifuged, and dried in hot air. The change in colour of the specimen is assessed with the grey scale.

B-2.2 At the conclusion of the test, the coloration of the solvent is assessed by comparing the filtered solvent with unused solvent by trans- mitted light, by means of the grey scale for assessing staining.

B-3 Apparatus

B-3.1 A suitable mechanical device (see Note 4 under B-7.5) consisting of a water bath containing a rotatable shaft that radially supports, glass or stainless steel containers (75 ± 5 mm diameter and 125 ± 10 mm high) of approximately 550 ± 50 ml capacity, the bottom of the containers being 45 ± 10 mm from the centre of the shaft. The shaft/containers assembly is rotated at a speed of 40 ± 2 rev/min. The temperature of the water bath is thermostatically controlled to maintain the test solvent at $30 \pm 2^\circ\text{C}$.

B-3.2 Glass or Stainless Steel Containers, of approximately 550 ml capacity which shall be closed using solvent resistant gaskets.

B-3.3 Non Corrodible (Stainless) Steel Discs, 30 ± 2 mm by 30 ± 0.5 mm, smooth and free from rough edges, of mass 20 ± 2 g.

B-3.4 Undyed Cotton Twill Cloth, of mass per unit area 270 ± 70 g/m², free from finishes and cut into samples 12 cm X 12 cm. 1

B-3.5 Grey Scales, for assessing the change in colour

B-3.6 Glass Tubes, of diameter 2.5 cm.

B-4 Reagent

B-4.1 Tetrachloroethylene (also known as per chloroethylene) which must be stored over anhydrous sodium carbonate to neutralize any hydrochloric acid formed.

B-5 Test piece

B-5.1 Cut a strip of the leather approximately 100 mm X 40 mm.

B-6 Conditioning of test piece

B-6.1 Condition test pieces at $27 \pm 2^{\circ}\text{C}$ and 65 ± 2 percent relative humidity.

B-7 Procedure

B-7.1 Prepare a bag with inside dimensions of 100 mm x 100 mm using the undyed cotton twill cloth by sewing together two squares or this cloth around three sides. Place the test pieces and 12 steel discs inside the bag. Close the bag by any convenient means.

B-7.2 Place the bag containing the test pieces and the steel discs in the container and add 200 ml of tetrachloroethylene at $30 \pm 2^{\circ}\text{C}$. Treat the test pieces for 30 minutes at $30 \pm 2^{\circ}\text{C}$ in the specified equipment.

B-7.3 Remove the bag from the container, withdraw the test pieces, place them between absorbent paper or cloth and squeeze or centrifuge to remove surplus solvent. Dry the test pieces by hanging them in air at a temperature of $60 \pm 5^{\circ}\text{C}$.

B-7.4 Assess the change in colour of the test pieces with the grey scale.

B-7.5 At the conclusion of the test, the solvent remaining in the container is filtered through filter paper. The colour of filtered solvent is compared with that of the unused solvent in 25 cm diameter glass tubes that are placed in front of a white card and examined by transmitted light, by means of the grey scale for assessing staining.

NOTES :-

1. This test covers colour fastness to dry cleaning only: no numerical dry cleaning practice normally involves other operation, such as, water spotting solvent spotting, steam pressing, etc, for which other standard test methods are available if the fully dry clean ability of the leather is to be assessed.

2. The presence of absorbed water in the leather or dry cleaning solution, or the presence of a detergent and water in the dry cleaning solution, has not been found to be a critical factor in assessing the colour fastness. This test gives results which correlate satisfactorily with those obtained in commercial dry cleaning.

3. Fastness to dry cleaning, without further qualification, means fastness to dry cleaning in tetrachloroethylene. However, if required, other solvents may be used and this should be indicated in the test report.

4. Other mechanical devices may be used for the test provided that the results are identical with those obtained by the apparatus described in B-3.1.

B-8 REPORT

B-8.1 Report the numerical rating for change in color of the test pieces and for staining of the solvent.

Annex C
[Table 1, Item (vii)]
Colour fastness to water

C-1 Scope and field of application

C-1.1 This method is intended for determining the resistance of colour of the leather to the prolonged action of water.

C-2 Principle

C-2.1 A wetted piece of specified undyed textile is placed on the surface of the test piece to be tested. The composite specimen is then left under pressure for a specified time in an appropriate apparatus. The test piece and the textile are dried. The change in colour of the test piece and the staining of the textile are assessed with the grey scales.

C-2.2 Leathers bearing finish may be tested in- tact or with the finish broken. In the latter case, this shall be stated in the test report.

C-3 Apparatus and materials

C-3.1 Testing Device In shall consist of a frame of stainless steel into which a weight-piece of mass 5 kg and base 11.5 cm X 6 cm is closely fitted so that a pressure of 12.5 kPa can be applied on test pieces measuring 10 cm x 4 cm placed between glass or acrylic resin plates. If the weight piece is removed during the test, the testing device shall be so constructed that the pressure of 12.5 kPa remains unchanged (see Note 1 under C-5.4.3).

C-3.2 Oven, maintained at $37 \pm 2^{\circ}\text{C}$.

C-3.3 Undyed Clothes of Cotton and of Wool, each 10 cm X 4 cm, of plain weave and having a mass per unit area of about 250 g/m^2 (see Note 2 under C-5.4.3).

C-3.4 Distilled Water, pH 6 to 7.

C-3.5 Fine Grained Abrasive Paper, Grade 180 (see Note 3 under C-5.4.3).

C-3.6 Grey Scales, for assessing change in colour and

C-4 Test pieces

C-4.1 Two test pieces of leather, each measuring 10 cm X 4 cm, are normally required (see Note 2 under C-5.4.3). If the grain is to be tested with the finish broken, the breaking of the finish is to be carried out using abrasive paper (see Note 3 under C-5.4.3).

C-4.2 Wet out the undyed clothes of cotton and of wool by immersing them in boiling water contained in a beaker. Stir occasionally until both clothes are completely wetted out (the wool cloth must have sunk to the bottom of the beaker). Pour off the hot water and refill the beaker with cold distilled water.

C-4.3 Remove the clothes from the water and immediately place smoothly on the surface of the test pieces to be tested. Use a plate of the apparatus as support for each test piece. Gently stroke the clothes to remove any air bubbles trapped between them and the test piece.

C-5 Procedure

C-5.1 Cover the composite test piece which is already resting on one plate, with another plate and then load it in the apparatus with 5 kg, which corresponds to a pressure of 12.5 kPa on the leather surface under test. In order to allow excess water to run off, incline the apparatus about 30° towards the horizontal on each side for a few seconds. When several composite test pieces are being tested simultaneously, take care to ensure that each is placed centrally between two plates in such a way that the pressure is exerted evenly on each.

C-5.2 Place the charged apparatus in the oven at $37 \pm 2^\circ\text{C}$ for 3 hours. The loading weight shall be preheated in the oven for at least 1 hour. Where no oven is available, the test may be carried out at room temperature. In such a case, the duration of the test shall be adjusted to give results equivalent to these at 37°C (16 hours at 20°C correspond approximately to 3 hours at 37°C). If the test has been carried out at room temperature, this shall be stated in the report.

C-5.3 At the end of the test, take off the load, remove the composite test piece from the apparatus, stitch it loosely together in one corner and dry under normal conditions ($27 \pm 2^\circ\text{C}$ and 65 ± 2 percent relative humidity) so that each specimen and its accompanying textile are freely suspended. C-5.4 When dry, and after treatment as in C-5.4.1 to C-5.4.3, assess the change in colour of the surface of the test piece under test and the staining of the accompanying textile with the appropriate grey scale.

C-5.4.1 Soft Leathers

The surface of soft leathers, such as, gloving, may be more or less marked by the texture of the accompanying textile. Manipulate such leather lightly to soften, after drying but before assessment. -5.4.2 Leathers Bearing a Finish

After drying but before assessment, apply to leathers bearing a finish, intact or broken, a colour less shoe polish (see Note 4 under -5.4.3) and polish lightly with a WOOL cloth. -5.4.3 Suede Leathers after drying but before assessment, brush suede leathers in the direction of the nap with a brush hat has bristles with a length of the trim about 3 5 cm.

C-6 Report

C-6.1 State the type of leather under test.

C-6.2 Specify which surface of the specimen was tested.

C-6.3 For leather bearing a finish, state whether the finish was broken

C-6.4 Where the test was not carried out at 37°C , state the temperature and duration of test.

C-6.5 For every composite test piece, state the nature of the accompanying textile and report the numerical ratings for the: change in the colour of the leather and for the staining of accompanying textile.

Annex D [Table 2, Item (ii)]

Method for measurement of adhesion of finish to leather

D-1 Principle

D-1.1 One end of a piece of leather under test is stuck finish side down, to a metal strip, by a selected adhesive, chosen to give an adequate bond between the finish and the metal without affecting the adhesion of finish to the leather. When the adhesive is fully set or cured, increasing force is applied to the loose end of the leather until the finish peels away from the leather. The load required to peel the finish is recorded.

D-2 Apparatus and reagents

D-2.1 Metal Plates

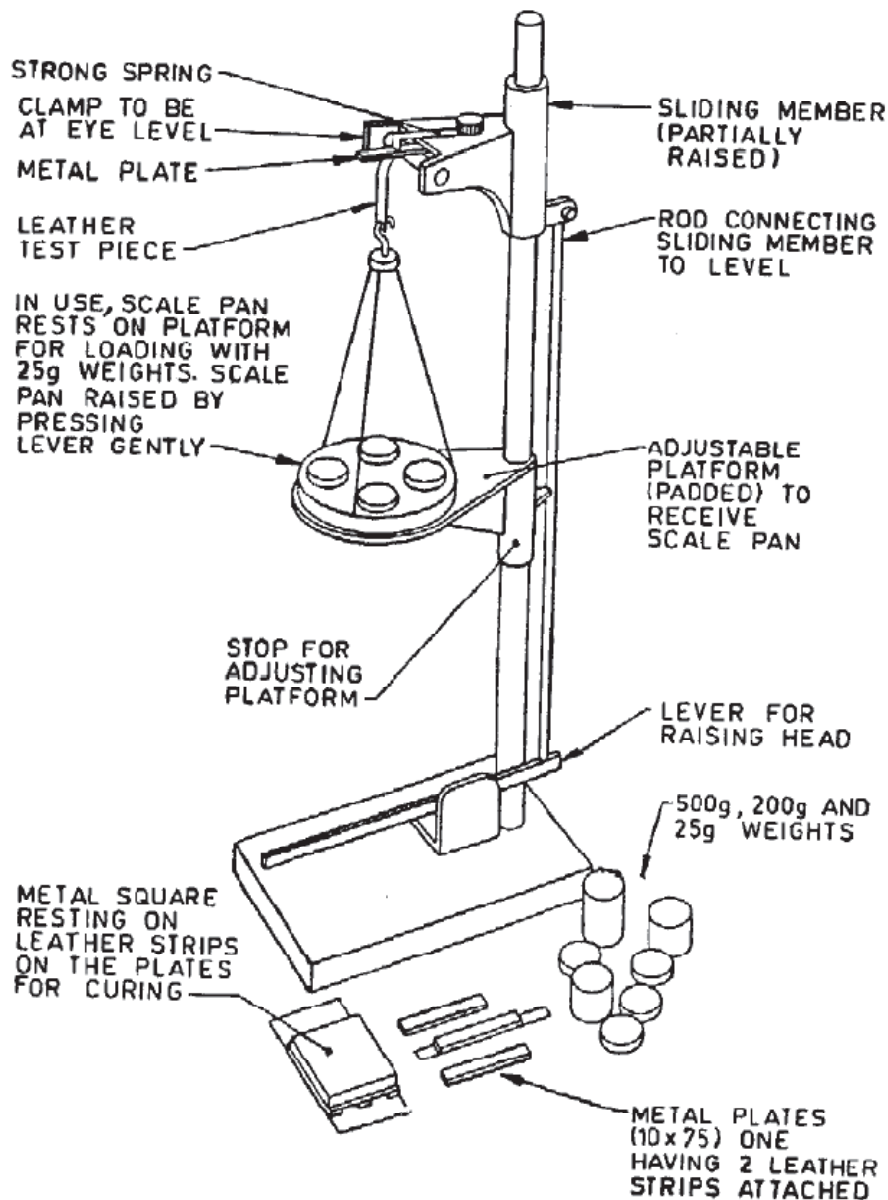
The plate shall be measuring 10 ± 0.5 mm wide and approximately 75 mm long and 3-3.5 mm thick. One plate is required for each pair of leather test pieces.

D-2.2 Metal square with sides 65 mm long and a mass of 150 g, covered on one side with a soft rubber sheet 2 mm thick.

D-2.3 Clamp and Stand These are required to hold the metal strip and test specimens and strong enough to support loads of up to 2 kg.

D-2.4 Means of Applying Small Successive Additions of Load

The addition of load shall be without shock, to a holder attached to the loose end of the leather. For example, weights of 25 or 50 g can be placed on a simple scale pan of known mass (preferably 50 g) attached to the leather by means of a hook. A suitable apparatus of this type is shown in Fig. 1.



All dimensions in millimeters.

FIG. 1 Leather finish adhesion tester

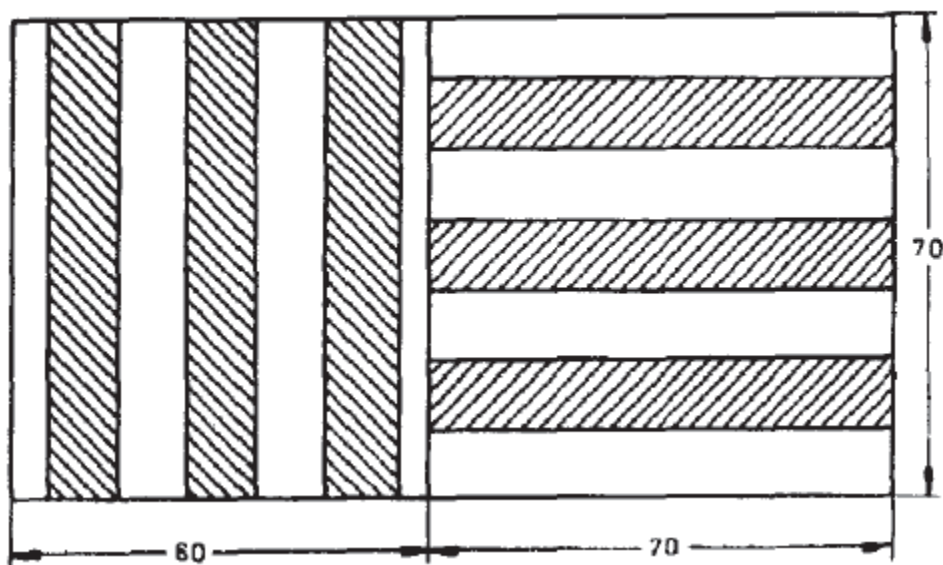
D-2.5 Adhesive

Different adhesives give different results on the same leather. For most leather finishes, an epoxy resin adhesive with a pot life of about 1 hour at 20°C mixed with an equal part by mass of a curing agent and having a cure time of 48 hours has been found suitable.

D-2.6 Pure Light Petroleum Ether, boiling point range of 60 to 80°C.

D-3 Test pieces

D-3.1 Cut a sample of leather measuring 130 mm in length and 70 mm in width from the official sampling position. Cut one piece for dry tests and another piece for wet tests. Fig. 2 shows the sample of leather taken for testing and the shaded areas show the actual area of test pieces required.



All dimensions in millimeters,

Fig. 2 Position of test pieces on leather sample

D-4 Preparation of test pieces

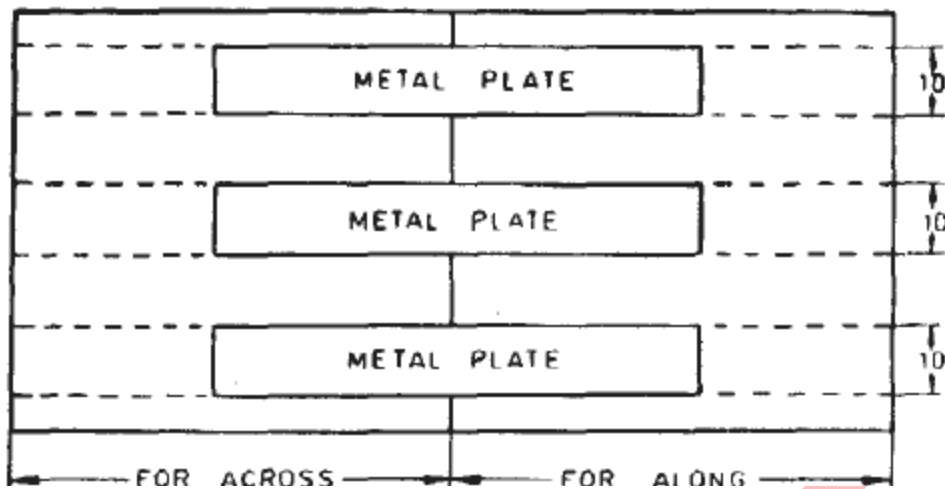
D-4.1 Scour the metal plates with 'A' weight grade P 400 abrasive so that the surface is clean and flat with a fine matt finish. Immerse them in petroleum ether for a few seconds to remove grease and wipe with a piece of grease-free cotton wool (medical quality) to remove all the dirt.

D-4.2 Cut the leather into two pieces for three test pieces 'along' and three 'across' (see Fig. 2). Turn the 'across' sample through a right angle and place it against the 'along' sample, Soak a piece of grease-free cotton wool (medical quality) in petroleum ether and then wring it almost dry. Wipe this gently over the grain surface of leather test specimens and the surfaces of the metal plates being careful not to contaminate the cleaned surfaces, for example, with grease from the fingers.

D-4.3 When the petroleum ether has evaporated, smear the adhesive lightly over the cleaned surface of the metal plates and the area of leather to be tested, applying the thinnest possible continuous film of adhesive.

NOTE - A glass or nylon scraper is a suitable tool.

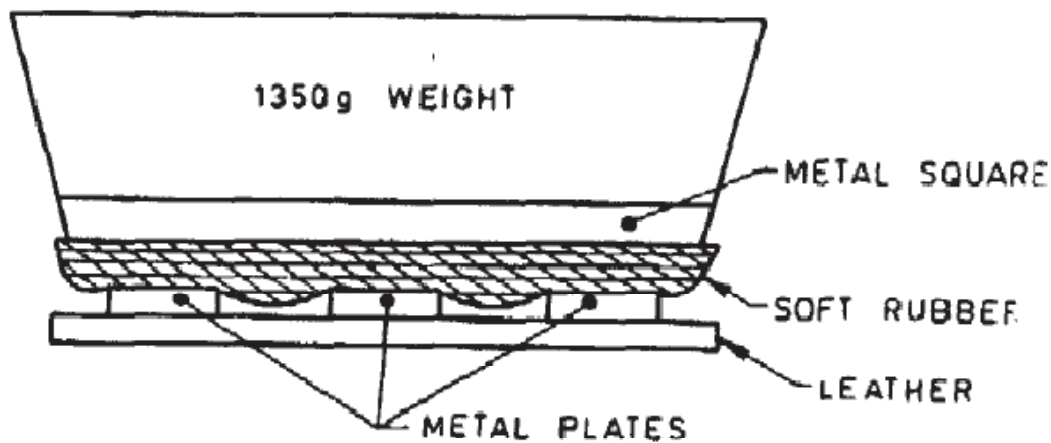
D-4.4 Place, three metal plates, adhesive side down, on to the two pieces of leather as shown in Fig. 3. Press the plates firmly down and ensure that sufficient adhesive has been used by noting slight exudation at the edges of the plates. It is important that there should be not more than 3 minutes between coating of the metal strip with adhesive and combination with the leather to prevent exposure to moisture and dust.



All dimensions in millimeter

Fig. 3 Arrangement of metal plates on test pieces

D-4.5 Place the metal square on the metal plates (see Fig. 4). Place a weight having a mass of approximately 1 350 g centrally on the metal square so that the total load of approximately 1 500 g (500 g per plate > is applied evenly to all the adhesive bonds.



Fro. 4 BONDING OF METAL PLATS TO LEATHER TEST PIECES

NOTE - D-4.2, D-4.4 and D-4.5 describe the use of one piece of leather to provide six test pieces. If separate test pieces are used, these should be at least 50 mm long and 13 mm wide but the method is essentially the same.

D-4.6 When the joints are fully set or cured, remove the weight and the metal square, trim the leather test specimens to the width of the metal plate by cutting along the edges of the plate with a pair of sharp scissors or a scalpel. To avoid edge effects, make sure that no adhesive is left on the edges of the metal plate. Gently sever the bond between the short edge of the metal plate and each test piece, that is at 'A' in Fig. 5, separating leather and the metal for about 1'5 mm.

D-4.7 Punch a small hole of sufficient diameter to accommodate an S-hook in the free end of the test pieces and about 5 mm from the end.

D-5 Procedure

D-5.1 Adhesion of Finish Under Dry Conditions

D-5.1.1 Place the metal plate horizontally in the stand over the supporting rod so that the affixed leather is on the underside (see Fig. 5). Insert an S-hook in the hole at the end of the leather strip to be tested and attach the scale pan of known mass to the hook. Depress the lever at the base of the stand slowly to allow the mass of the pan to pull on the leather strip. This re- presents the first test equal to 50 g (mass of the pan assembly).

D-5.1.2 Release the lever slowly until the pan rests on its plate form. Carefully, add successive additional weights centrally to prevent swinging, freeing the pan for each addition by means of the lever until the leather shows signs of beginning to peel away from the metal plate. Up to this stage, the weights may be added as quickly as is convenient. Continue adding weights at 10 s intervals until separation has occurred over at least two-thirds of the area of the bond. Use 250 g increments until the total load reaches 400 g and thereafter use 50 g increments.

D-5.1.3 When separation has occurred, add together the total mass of the weights on the pan and the mass of the scale pan. Calculate from this, the force (in N/IO mm) and express the result as the adhesion of the finish.

D-5.1.4 Note the type of separation which occurred and describe it as one of the following:

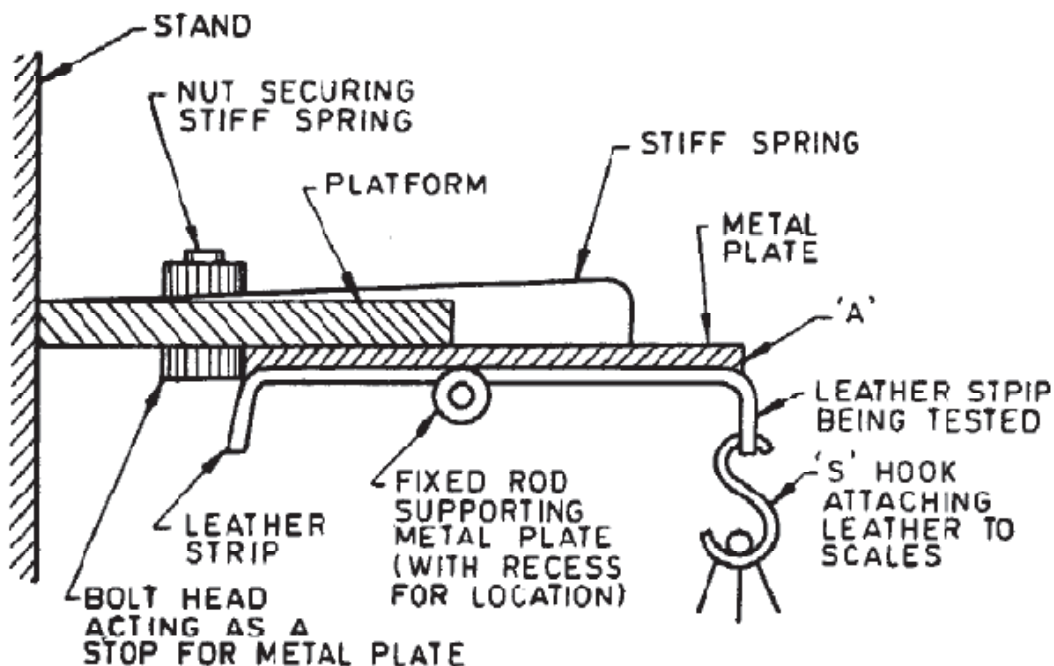


FIG. 5 PREPARED TEST PIECES IN TEST POSITION

- Normal peeling, that is, for a length not less than 10 mm and covering 90 percent of the width of the test specimen;
- Plate to adhesive failure;
- Adhesive to finish failure;
- Finish coats separating;
- Adhesion of finish failing in patches; or
- Leather torn (grain coming away or tearing into corium).

If adhesion failure (b) or (c), indicating an unsatisfactory adhesive or poor preparation of test specimens occurs, repeat the entire procedure using a different adhesive or a new sample of leather.

D-5.2 Adhesion of Finish Under Wet Conditions

D-5.2.1 After preparation and trimming (see D-4), immerse the metal plates and attached leather strips in distilled water for 20 minutes rubbing the flash side with the finger to facilitate penetration. Remove the plate and blot off excess moisture from the metal and the leather. Allow to stand in air for 10 minutes in the laboratory. D-5.2.2 Proceed as in D-5.1.1 to D-5.2.4.

D-6 Test report

D-6.1 The test report shall state either : a) the adhesion of the finish on the individual test pieces with the type of failure

(see D-5.1.4 >, or b) the average adhesion in each direction (and for each location > together with the lowest individual value and the type of failure.

Annex E [Table 2, Item (iii)]

Method for determination of cold crack temperature

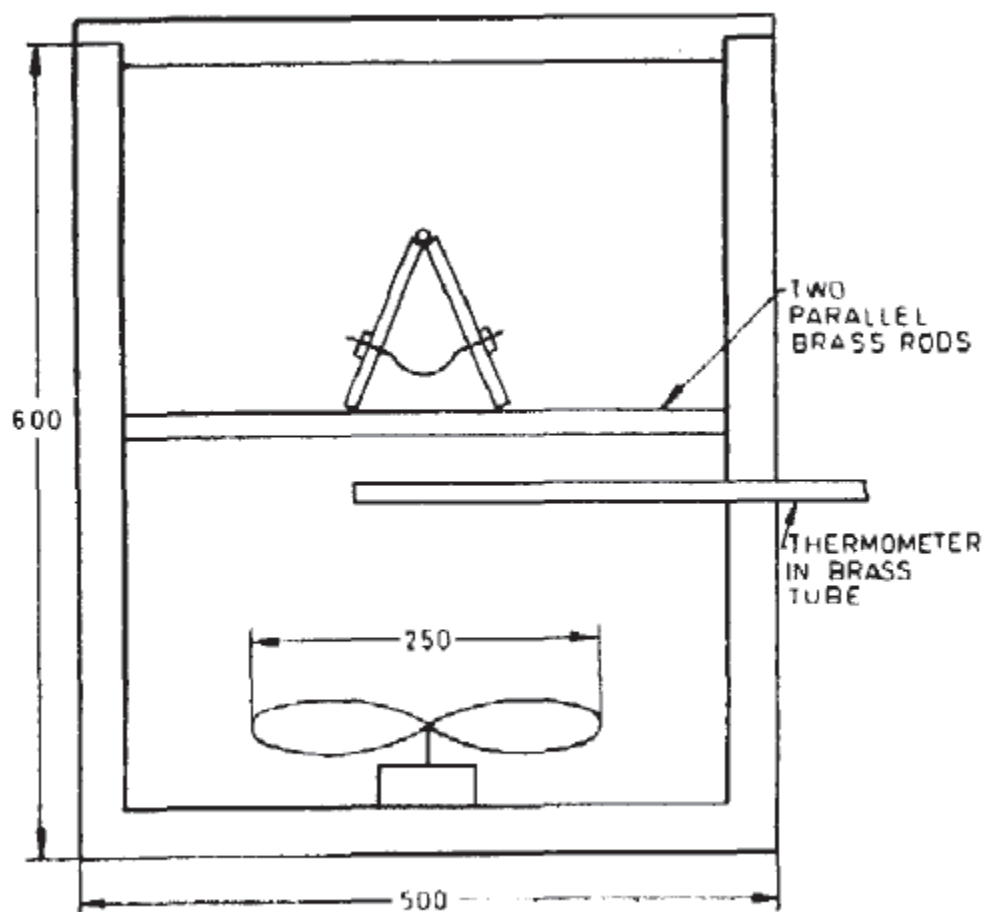
E-1 Principle

E-1.1 A strip of leather is held between two pieces of wood forming a hinged apparatus. The leather is cooled and then creased, grain outwards.

E-2 Apparatus

E-2.1 Refrigerated Cabinet (see Fig. 6) The dimensions of the cabinet are not critical but the dimensions 500 mm x 300 mm X 600 mm have been found suitable. It is essential that the cabinet has forced air circulation. NOTE - In Fig. 6, this is provided by a fan set at the bottom of the cabinet. Cooling can be provided either by solid carbon dioxide placed in triangular trays in the corners of the cabinet or by an independent cooling unit so that the air is forced in near the base of the cabinet and exhausted near the top. Temperature is controlled in the first case by intermittent manual switching of fan to maintain the required temperature. In the latter case, a thermostat can be incorporated in the effluent air stream and set to the required temperature.

If a deep freeze cabinet is used, it is again essential to incorporate a fan for air movement over the test pieces and a thermostat to maintain the required temperature.



All dimensions in millimetres.

FIG. 6 REFRIGERATED CABINET

E-2.2 Hinged Apparatus for Mounting the Test Pieces (see Fig. 7)

It shall be provided with holes of 5 mm diameter set 40 mm in from the free edge. These are countersunk on the inside so that the fixing screws for the samples fit flush with the surface and the apparatus can be closed flat. The position of the samples in the open position is shown in Fig. 8 and that in the closed position in Fig. 9. This enables the cracks (if any) to be examined. The hinged apparatus is placed 0.1 t h'.) parallel brass rods 125 mm apart as shown in Fig. 6. Between the brass rods, at the same level, a thermometer is placed in a brass tub: for safety. This can b: read externally.

E-3 Test pieces

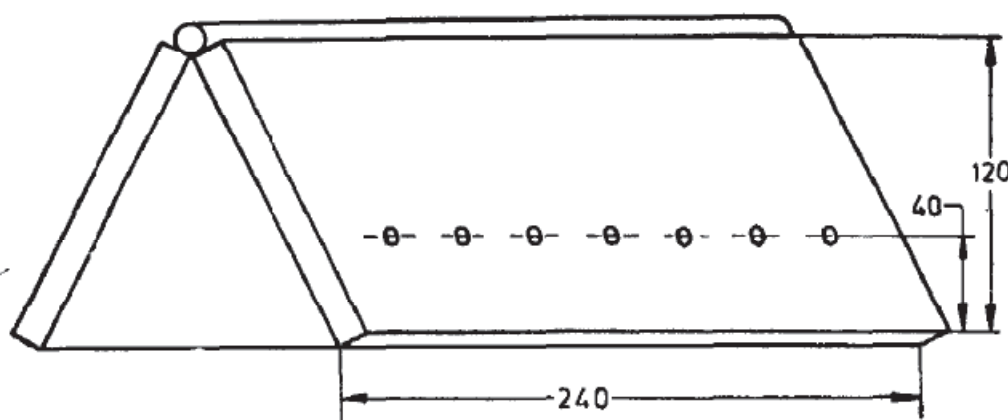
E-3.1 Test pieces of leather which measure 90 mm X 12.5 mm with a 5 mm hole punched 5 mm from each end of the sample are taken for testing.

E-4 Procedure

E-4.1 Cut eight test pieces of the leather, one to be tested at each temperature from + 5°C to- 30°C at 5°C intervals.

E-4.2 Fix the test piece in the hinged apparatus. If more than one leather is to be tested at the same time in the hinged apparatus, ensure that all leathers are of approximately the same thickness. Thicker test pieces will prevent the thinner one from being folded flat.

E-4.3 With the hinged apparatus in the open position, place it on the brass rods with the open part facing downwards (set: Fig. 8). Close the refrigerated cabinet and run until the temperature is +5°C. Maintain this temperature for 5 minutes. This is the minimum time with air movement which is required for the sample to reach equilibrium in a refrigerated cabinet. Then open the cabinet and snap shut the hinged apparatus by hand inside the cabinet. Remove the apparatus from the cabinet and examine the test piece for cracks. If the test piece has not cracked, replace it by a further test piece and replace the apparatus in the cabinet. Lower the temperature to 0°C and maintain for 5 minutes before snapping shut once more. Repeat the test at -5, -10, -15, -20, -25 and -30°C or until the finish shows cracks. The lowest temperature that can be conveniently reached is - 30°C.



All dimensions in millimetres.

Fig. 7 Hinged apparatus

E-5 Expression of results

E-S.1 Record the highest temperature at which the finish cracks and report it as the cold crack temperature.

NOTE - Some finishes do not show straight line cracks. Some show small fine crack, and their examination with a magnifying glass may be desirable. If a test piece has very fine cracks initially,

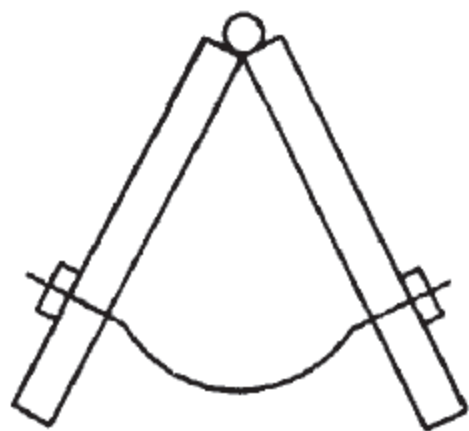


Fig.8 Hinged Apparatus

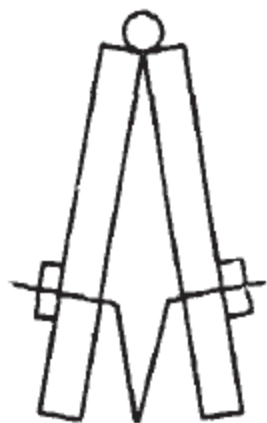


Fig. 9 Hinged Apparatus (Closed Position)

DRAFT

Annex F (Clause 4.2)

Method of test for water repellency

F-1 Principle

F-1.1 Few drops of distilled water are sprinkled on the leather test piece laid flat on a smooth and flat surface and allowed to rest for 10 minutes. The test piece is then checked for any stain or spot.

F-2 Procedure

F-2.1 Lay the leather test piece on a smooth and flat surface with grain side up. Sprinkle a few drops of distilled water on the surface of leather and allow the water drop to rest for 10 minutes, Take out the leather and remove the water drops by shaking the test piece. Lay the leather test piece again on the flat surface and observe for any stains or spots left over by distilled water drops. The leather shall be considered to have passed the requirement for water repellency if no stains or spots are observed on the test piece surface.

Organization and Objectives

The Ethiopian Standards Agency (ESA) is the national standards body of Ethiopia established in 2010 based on regulation No. 193/2010. ESA is established due to the restructuring of Quality and Standards Authority of Ethiopia (QSAE) which was established in 1998.

ESA's objectives are:-

- ❖ Develop Ethiopian standards and establish a system that enable to check whether goods and services are in compliance with the required standards,
- ❖ Facilitate the country's technology transfer through the use of standards,
- ❖ Develop national standards for local products and services so as to make them competitive in the international market.

Ethiopian Standards

The Ethiopian Standards are developed by national technical committees which are composed of different stakeholders consisting of educational institutions, research institutes, government organizations, certification, inspection, and testing organizations, regulatory bodies, consumer association etc. The requirements and/or recommendations contained in Ethiopian Standards are consensus based that reflects the interest of the TC representatives and also of comments received from the public and other sources. Ethiopian Standards are approved by the National Standardization Council and are kept under continuous review after publication and updated regularly to take account of latest scientific and technological changes. Orders for all Ethiopian Standards, International Standard and ASTM standards, including electronic versions, should be addressed to the Documentation and Publication Team at the Head office and Branch (Liaisons) offices. A catalogue of Ethiopian Standards is also available freely and can be accessed in from our website.

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More Information?

Contact us at the following address.

The Head Office of ESA is at Addis Ababa.

☎ 011- 646 06 85, 011- 646 05 65

☎ 011-646 08 80

✉ 2310 Addis Ababa, Ethiopia

E-mail: info@ethiostandards.org,

Website: www.ethiostandards.org



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