

**BUREAU OF INDIAN STANDARDS**

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भारतीय मानक मसौदा  
कपड़ों के लिए चमड़ा – निष्पादन आवश्यकता  
(पहला पुनरीक्षण)

*Draft Indian Standard*

**LEATHER FOR GARMENTS – PERFORMANCE REQUIREMENTS**  
(*First Revision*)

(ICS. 59.140. 30)

Leather, Tanning Materials and Allied Products, CHD 17

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(*Formal clause shall be added later*)

Leather has been a high fashion garment material for centuries and fashion designers have used grain and suede leathers as an attractive clothing material for many design themes. Leather used for garments has to meet stringent requirements of the consumer for certain characteristics, such as, color fastness, dimensional stability and cold crack resistance which are unique to apparatus only.

This standard was first published in 1989. This revision has been taken up in order to bring out the standard in latest style and format of the Indian Standards. The relevant clauses and test methods have been added and the references have been updated.

This standard has been formulated to help the leather industry which is faced with the problem of producing leather for new increasing markets with no defined standards of performance. It is hoped that this standard would greatly help boost the export of garment leathers.

For the purpose of deciding whether a particular requirement of this standard is complied with the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2: 2022. 'Rules for rounding off numerical values (*second revision*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

*Indian Standard*

**LEATHER FOR GARMENTS – PERFORMANCE REQUIREMENTS**

**1 SCOPE**

This 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 REFERENCES**

**2.1** The following standards contain provisions which, through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below.

<i>IS No.</i>	<i>Title</i>
IS 1640 : 1960	Glossary of terms relating to hides, skins and leather
IS 5868 : 1983	Methods of sampling for leather ( <i>first revision</i> )
IS 5914 : 1970	Methods for physical testing of leather
IS 6191 : 1971	Methods of micro-biological colour fastness and microscopical tests for leather
Part 2 : 2017	Colour Fastness to Water
Part 4 : 2018	Colour Fastness to Cycles of to-and-fro Rubbing
Part 5 : 2018	Test for Adhesion of Finish
Part 6:2023	Colour Fastness to Perspiration

**3 TERMINOLOGY**

**3.1** For the purpose of this standard, the definitions given in IS 1640: 1960 and the following shall apply.

**3.1.1** *Cold Crack Temperature*

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

**4 REQUIREMENTS**

**4.1** Leathers shall meet the requirements given in Tables 1 and 2 as appropriate, when tested by the methods specified. For wool sheep skins, both surfaces shall comply with the requirements.

NOTE – Table 1 is applicable to all leathers. Table 2 gives additional requirements for grain leather.

**4.2 Water Repellency**

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

**Table 1 Performance Requirements for All Garment Leathers**

(Clause 4.1)

Sl. No.	Characteristics	Requirements	Method of Test		Ref to Annex
(1)	(2)	(3)	Ref to Cl. No. of		(6)
(1)	(2)	(3)	IS 5914	IS 6191	(6)
i)	Tear strength (N)	13 – 17	LP : 7	-	-
ii)	Dimensional stability* to dry cleaning, percent, max:		-	-	A
	a) Maximum area shrinkage	6			
	b) Maximum area extension	3			
iii)	Colour fastness to light, contrast grading, maximum change in shade	Grade 3	-	LF: 4	-
iv)	Colour fastness to dry cleaning, contrast grading, maximum change in shade	Grade 3	-	-	B
v)	Colour fastness to rubbing, contrast grading:		-	(Part 4)	-
	a) after 50 cycles of wet rubbing, maximum change in shade	Grade 3			
	b) after 200 cycles of dry rubbing, maximum change in shade	Grade 3			
vi)	Colour fastness to perspiration, contrast grading:		-	(Part 6)	-
	a) Maximum change in shade	Grade 3			
	b) Maximum staining	Grade 3			
vii)	Colour Fastness to water, contrast grading:		-	(Part 2)	-
	a) Maximum change in shade	Grade 3			
	b) Maximum staining	Grade 3			

**NOTE -**

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

**Table 2 Additional Performance Requirements for Grain Garment Leathers**

(Clause 4.1)

Sl. No.	Characteristics	Requirement	Method of Test, Ref to Annex
(1)	(2)	(3)	(4)
i)	Fastness of finish to dry cleaning*	No significant change in appearance	B
ii)	Adhesion of finish to leather, N/10 mm, <i>Min</i> :		IS 6191 (Part 5)
	a) Dry condition	2	
	b) Wet condition	1	
iii)	Cold crack temperature, -5°C, <i>Max</i>	No Crack in finish	C

**NOTE -**

\* 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.

## 5 MARKING

**5.1** The leather shall be legibly marked on the flesh side of each piece with the area in square decimeters.

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

## 5.2 BIS Certification Marking

**5.2.1** The product(s) conforming to the requirements of this standard may be certified as per the conformity assessment schemes under the provisions of the *Bureau of Indian Standards Act, 2016* and the Rules and Regulations framed thereunder, and the products may be marked with the standard mark.

## 6 PACKING

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

**6.2** The package shall be marked with the name of the manufacturer and recognized trade-mark, if any; number of pieces of leather; total area; month and year of manufacture.

## 7 SAMPLING AND CONFORMITY

**7.1** The scale of sampling and criteria for conformity of the material shall be as prescribed in IS 5868: 1983.

## ANNEX A

[Table 1, *Item (ii)*]

### DIMENSIONAL STABILITY TO DRY CLEANING

#### A-1 SCOPE

**A-1.1** 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

**A-2.1** 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 600 mm and not more than 1 080 mm. Its depth shall be not less than 300 mm. It shall be fitted with three or four lifters. The speed shall be such as to give a radial acceleration of between  $0.5 g_n$  and  $0.8 g_n$  for cleaning and between  $60 g_n$  and  $120 g_n$  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 temperature control of either the incoming or the outgoing air during the drying cycle. [For general guidance, see Note 2 under **A-9.1 (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 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 of temperature not greater than 50°C.

**A-5.2** For conditioning and measuring, the standard atmosphere for leathers, that is relative humidity of  $65 \pm 2$  percent and a temperature of  $27 \pm 2^\circ\text{C}$ .

## 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 250 mm 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  $50 \pm 2$  kg for each cubic metre of the volume of the cage. Ensure that the test piece(s) do not weigh more than 10 percent of the total load, the remainder consisting of make-weights unless the test piece(s) as such weigh(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 24 hours.

**A-7.2** Place the conditioned load in the machine and introduce tetrachloroethylene containing 1 g/l of sorbitan mono-oleate so that the liquor ratio, calculated on the volume of solvent in the cage and casing is  $6.5 \pm 0.5$  litre for each kilogram of load ( this corresponds to a solvent level of approximately 30 percent of the cage diameter ). Maintain the solvent at  $30 \pm 3^\circ\text{C}$  throughout the cleaning operation.

**A-7.3** Prepare an emulsion by mixing one part (by volume) of the sorbitan mono-oleate with three parts of tetrachloroethylene and then adding two 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 of 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 15 minutes 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  $60^\circ\text{C}$ , or the inlet temperature shall not exceed  $80^\circ\text{C}$ . 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)]. 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 –  $10^{-2}$  bar, 1 bar = 1 kgf/cm<sup>2</sup>).

**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 CALCULATION AND EXPRESSION OF RESULTS

**A-8.1** 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

A-9.1 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
- g) Maximum inlet or outlet air temperature during drying.

### NOTES

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

$$\frac{5.6n^2d}{10000000} g_n$$

Where,

$n$  = number of revolution per minute,

$d$  = diameter of rotating cage in millimetres, and

$g_n$  = standard acceleration of free fall ( 9.81 m/s<sup>2</sup> ).

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 reoiling 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 use 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 transmitted 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 (  $75 \pm 5$  mm diameter and  $125 \pm 10$  mm high ) of approximately  $550 \pm 50$  ml capacity, the bottom of the containers being  $45 \pm 10$  mm from the centre of the shaft. The shaft/containers assembly is rotated at a speed of  $40 \pm 2$  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**,  $30 \pm 2$  mm by  $30 \pm 0.5$  mm, smooth and free from rough edges, of mass  $20 \pm 2$  g.

**B-3.4 Undyed Cotton Twill Cloth**, of mass per unit area  $270 \pm 70$  g/m<sup>2</sup>, free from finishes and cut into samples 12 cm × 12 cm.

**B-3.5 Grey Scales**, for assessing the change in colour in accordance with LF: 1 of IS 6191: 1971.

**B-3.6 Glass Tubes**, of diameter 2.5 cm.

#### B-4 REAGENT

**B-4.1** Tetrachloroethylene (also known as perchloroethylene) 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 × 40 mm.

#### B-6 CONDITIONING OF TEST PIECE

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

#### B-7 PROCEDURE

**B-7.1** Prepare a bag with inside dimensions of 100 mm × 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; commercial 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 cleanability 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 colour of the test pieces and for staining of the solvent.

ANNEX C

[Table 2, *Item* (iii)]

**METHOD FOR DETERMINATION OF COLD CRACK TEMPERATURE**

**C-1 PRINCIPLE**

**C-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.

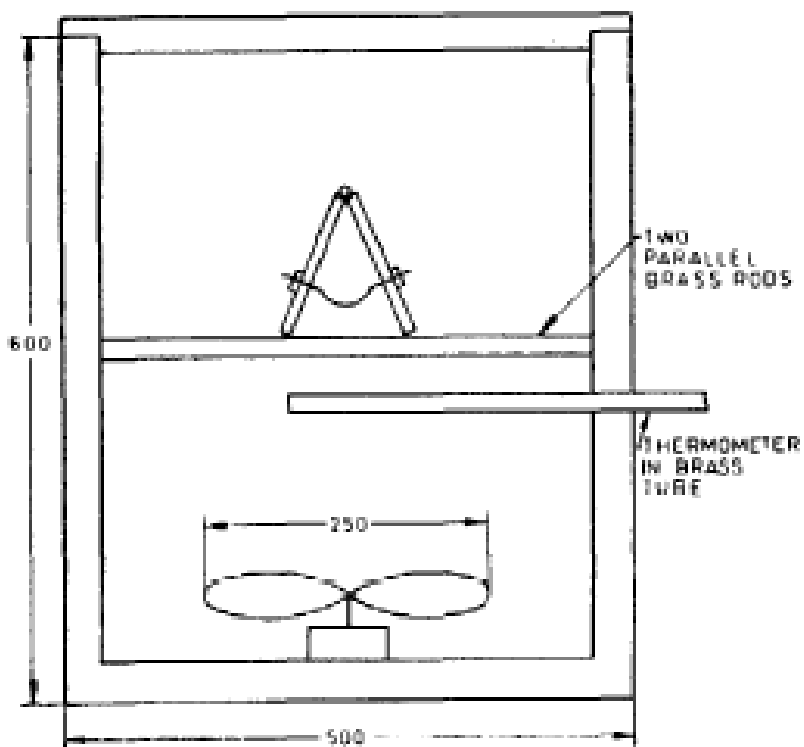
**C-2 APPARATUS**

**C-2.1 Refrigerated Cabinet (see Fig. 1)**

The dimensions of the cabinet are not critical but the dimensions 500 mm × 300 mm × 600 mm have been found suitable. It is essential that the cabinet has forced air circulation.

NOTE - In Fig. 1, 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 1 REFRIGERATED CABINET**

### C-2.2 Hinged Apparatus for Mounting the Test Pieces (see Fig. 2)

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. 3 and that in the closed position in Fig. 4. This enables the cracks (if any) to be examined. The hinged apparatus is placed on two parallel brass rods 125 mm apart as shown in Fig. 1. Between the brass rods, at the same level, a thermometer is placed in a brass tube for safety. This can be read externally.

### C-3 TEST PIECES

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

### C-4 PROCEDURE

**C-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.

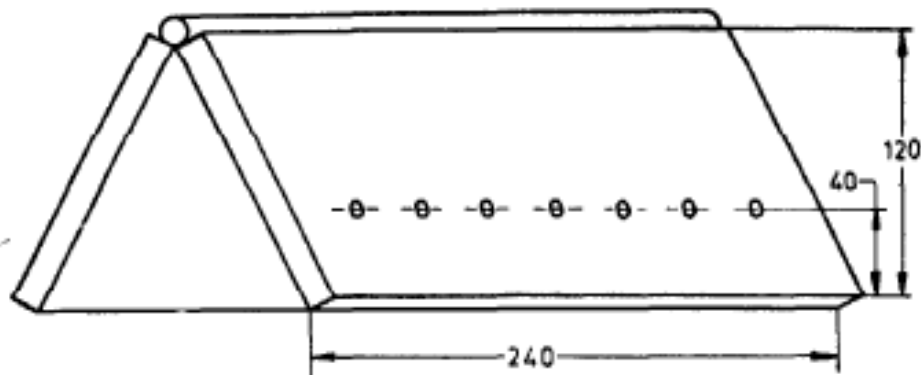
**C-4.2** Fix the test piece in the hinged apparatus. If more than one leather is to be tested at the same time in the hinged apparatus, ensure that all leathers are of approximately the same thickness. Thicker test pieces will prevent the thinner one from being folded flat.

**C-4.3** With the hinged apparatus in the open position, place it on the brass rods with the open part facing downwards (see Fig. 3). 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.

### C-5 EXPRESSION OF RESULTS

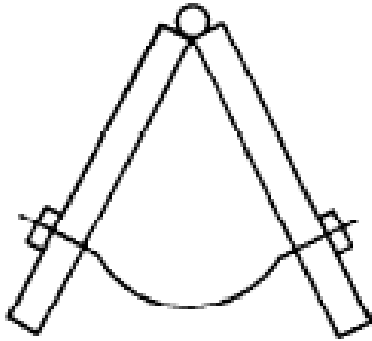
**C-5.1** Record the highest temperature at which the finish cracks and report it as the cold crack temperature.

NOTE – Some finishes do not show straight line crack. Some show small fine crack, and their examination with a magnifying glass may be desirable. If a test piece has very fine cracks initially, then end point may not be clear or may be missed.

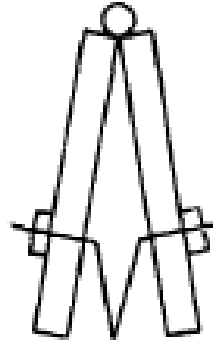


All dimensions in millimetres.

FIG. 2 HINGED APPARATUS



**Fig. 3 Hinged Apparatus (Open Position)**



**Fig. 4 Hinged Apparatus (Closed Position)**

**ANNEX D**

(Clause 4.2)

**METHOD OF TEST FOR WATER REPELLENCY**

**D-1 PRINCIPLE**

**D-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.

**D-2 PROCEDURE**

**D-2.1** Lay the leather test piece on a smooth and hat 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 strains or spots are observed on the test piece surface.