भारतीय मानक

Indian Standard

IS 578 : 2023
ISO 20942 : 2019

चमड़ा — पूर्ण क्रोम ऊपरी चमड़ा — विशिष्टि — परीक्षण पद्धतियाँ

(चौथा पुनरीक्षण)

Leather — Full Chrome Upper Leather — Specification — Methods of Test

(Fourth Revision)

ICS 59.140.30

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December 2023 **Price Group 7**

Leather, Tanning Materials and Allied Products Sectional Committee, CHD 17

NATIONAL FOREWORD

This Indian Standard (Fourth Revision) which is identical with ISO 20942 : 2019 'Leather tanning materials and allied products issued by International Organization for Standardization (ISO), was adopted by the Bureau of Indian Standards on the recommendation of the Leather, Tanning Materials and Allied Products Sectional Committee had been approved by the Chemical Division Council.

This document outlines the specifications, test procedures, and sample techniques for full chrome upper leather. This document applies to upper leather used in general-purpose sports shoes, school shoes, casual shoes, men's and women's town shoes, cold-weather shoes, fashionable shoes, infants' shoes, and indoor shoes.

IS 578 was originally published in 1954. The standard was subsequently revised in 1964, 1971 and 1985. During the third revision, in consideration of the needs of the export market, the maximum permitted level of chromium oxide was raised from 3.0 percent to 3.5 percent. It was also decided to replace the requirement of elongation at break with tensile elongation at a specified tension. This revision has been undertaken to harmonize with the latest ISO standard ISO 20942: 2019.

The major changes in this revision are:

a) Normative references updated;

b) Chemical requirement updated; and

c) Title of standard aligned with the ISO title.

The text of ISO standard has been approved as suitable for publication as an Indian Standard without deviations. Certain conventions and terminologies are, however, not identical to those used in Indian Standards. Attention is particularly drawn to the following:

a) Wherever the words ‘document’ appear referring to this standard, they should be read as `Indian Standard’; and

b) Comma (,) has been used as a decimal marker in the International Standard, while in Indian Standards, the current practice is to use a point (.) as the decimal marker.

In this adopted standard, the reference appears to certain International Standards for which Indian Standards also exist. The corresponding Indian Standards, which are to be substituted in their respective places, are listed below along with their degree of equivalence for the editions indicated:

International Standards	*Corresponding Indian Standard*	*Degree of Equivalence*
ISO 3376 Leather — Physical and mechanical tests — Determination of tensile strength and percentage extension	IS 5914 (Part 8) : 2023/ISO 3376 : 2020 Methods of physical testing of leather: Part 8 Determination of tensile strength and percentage elongation	Identical
ISO 3377-2 Leather — Physical and mechanical tests — Determination of tear load — Part 2: Double edge tear	IS 5914 (Part 5/Sec 2) : 2023/ISO 3377-2 : 2016 Methods of physical testing of leather: Part 5 Determination of tear load, Section 2 Double edge tear	Identical

International Standards	*Corresponding Indian Standard*	*Degree of Equivalence*
ISO 4045 Leather — Chemical tests — Determination of pH and difference figure	IS 582 (Part 9) : 2022/ISO 4045 : 2018 Methods of chemical testing of leather: Part 9 Determination of *p*H and difference figure	Identical
ISO 4048 Leather — Chemical tests — Determination of matter soluble in dichloromethane and free fatty acid content	IS 582 (Part 14) : 2022/ISO 4048 : 2018 Methods of chemical Testing of leather: Part 14 Determination of matter soluble in dichloromethane and free fatty acid content	Identical
ISO 5398-1 Leather — Chemical determination of chromic oxide content — Part 1: Quantification by titration	IS 582 (Part 10/Sec 1) : 2022/ISO 5398-1 : 2018 Methods of chemical testing of leather: Part 10 Determination of chromium content, Section 1 Quantification by titration	Identical
ISO 5402-1 Leather— Determination of flex resistance — Part 1: Flexometer method	IS 5914 (Part 6/Sec 1) : 2023/ISO 5402-1 : 2022 Methods of physical testing of leather: Part 6 Determination of flex resistance, Section 1 Flexometer method	Identical
ISO 11640 Leather — Tests for colour fastness — Colour fastness to cycle of to-and-fro rubbing	IS 6191 (Part 4) : 2018/ISO 11640 : 2012 Methods of micro-biological, colour fastness and microscopical tests for leather: Part 4 Colour fastness to cycles of to-and-fro rubbing	Identical
ISO 11642 Leather— Tests for colour fastness — Colour fastness to water	IS 6191 (Part 2) : 2017/ISO 11642 : 2012 Methods of micro-biological, colour fastness and microcopical tests for leather: Part 2 Colour fastness to water	Identical
ISO 17075-1 Leather — Chemical determination of chromium(VI) content in leather — Part 1: Colorimetric method	IS 582 (Part 11/Sec 1) : 2022/ISO 17075-1 : 2017 Methods of chemical testing of leather: Part 11 Determination of chromium(VI) content in leather, Section 1 Colorimetric method	Identical
ISO 17075-2 Leather — Chemical determination of chromium(VI) content in leather — Part 1: Chromatographic method	IS 582 (Part 11/Sec 2) : 2022/ISO 17075-2 : 2017 Methods of chemical testing of leather: Part 11 Determination of chromium(VI) content in leather, Section 2 Chromatographic method	Identical
ISO 17226-1 Leather — Chemical determination of formaldehyde content — Part 1: Method using high performance liquid chromatography	IS 16297 (Part 1) : 2014/ISO 17226-1 : 2008 Leather — Chemical determination of formaldehyde content: Part 1 Method using high performance liquid chromatography	Identical

International Standards	*Corresponding Indian Standard*	*Degree of Equivalence*
ISO 17229 Leather — Physical and mechanical tests — Determination of water vapour absorption	IS 5914 (Part 1) : 2018/ISO 17229 : 2002 Methods of physical testing of leather: Part 1 Determination of water vapour absorption	Identical
ISO 17234-1 Leather — Chemical tests for the determination of certain azo colorants in dyed leathers — Part 1: Determination of certain aromatic amines derived from azo colorants	IS 582 (Part 5/Sec 1) : 2018/ISO 17234-1 : 2015 Methods of chemical testing of leather: Part 5 Determination of certain azo colorants in dyed leathers, Section 1 Determination of certain aromatic amines derived from azo colorants	Identical
ISO 17234-2 Leather — Chemical tests for the determination of certain azo colorants in dyed leathers — Part 2: Determination of 4-aminoazobenzene	IS 582 (Part 5/Sec 2) : 2018/ISO 17234-2 : 2011 Methods of chemical testing of leather: Part 5 Determination of certain azo colorants in dyed leathers, Section 2 Determination of 4-aminoazobenzene	Identical
ISO 23910 Leather — Physical and mechanical tests — Measurement of stitch tear resistance	IS 16257 : 2014/ISO 23910 : 2007 Leather — Physical and mechanical tests — Measurement of stitch tear resistance	Identical

In this adopted standard, the reference appears to certain International Standards for which Indian Standards exists. So, the committee has reviewed the provisions of the following International Standards referred in this adopted standard and has decided that they are acceptable for use in conjunction with this standard:

International Standards	*Title*
ISO 2418	Leather — Chemical, physical and mechanical and fastness tests — Sampling location
ISO 2588	Leather — Sampling — Number of items for a gross sample
ISO 3379	Leather — Determination of distension and strength of surface (Ball burst method)
ISO 14268	Leather — Physical and mechanical tests — Determination of water vapour permeability
ISO 17070	Leather — Chemical tests — Determination of tetrachlorophenol, trichlorophenol, dichlorophenol-, monochlorophenol-isomers and pentachlorophenol content

In this adopted standard, reference appears to certain International Standards here the standard atmospheric conditions to be observed are stipulated which are not applicable to tropical/subtropical countries. The applicable standard atmospheric conditions for Indian conditions are (27 ± 2) °C temperature and (65 ± 5) percent relative humidity and shall be observed while using this standard.

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 shall be the same as that of the specified value in this standard.

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Introduction

Leather is widely used in the footwear industry. Although different tanning agents can be used to produce leather, chromium III is still the most important agent in the tanning of leather for footwear. This document specifies requirements for various types of full chrome upper leather which are used in the footwear industry.

Indian Standard

LEATHER — FULL CHROME UPPER LEATHER — SPECIFICATION AND TEST METHOD

(*Fourth Revision*)

1 Scope

This document specifies requirements, methods of test and methods of sampling for full chrome upper leather. This document is applicable to upper leather which is used in general purpose sports footwear, school footwear, casual footwear, men's town footwear, women's town footwear, cold weather footwear, fashion footwear, infants' footwear and indoor footwear.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

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

ISO 2588, *Leather — Sampling — Number of items for a gross sample*

ISO 3376, *Leather — Physical and mechanical tests — Determination of tensile strength and percentage extension*

ISO 3377-2, *Leather — Physical and mechanical tests — Determination of tear load — Part 2: Double edge tear*

ISO 3379, *Leather — Determination of distension and strength of surface (Ball burst method)*

ISO 4045, *Leather — Chemical tests — Determination of pH and difference figure*

ISO 4048, *Leather — Chemical tests — Determination of matter soluble in dichloromethane and free fatty acid content*

ISO 5398-1, *Leather — Chemical determination of chromic oxide content — Part 1: Quantification by titration*

ISO 5402-1, *Leather — Determination of flex resistance — Part 1: Flexometer method*

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

ISO 11642, *Leather — Tests for colour fastness — Colour fastness to water*

ISO 14268, *Leather — Physical and mechanical tests — Determination of water vapour permeability*

ISO 17070, *Leather — Chemical tests — Determination of tetrachlorophenol-, trichlorophenol-, dichlorophenol-, monochlorophenol-isomers and pentachlorophenol content*

ISO 17075-1, *Leather — Chemical determination of chromium(VI) content in leather — Part 1: Colorimetric method*

ISO 17075-2, *Leather — Chemical determination of chromium(VI) content in leather — Part 2: Chromatographic method*

ISO 17226-1, *Leather — Chemical determination of formaldehyde content — Part 1: Method using high performance liquid chromatography*

ISO 17229, *Leather — Physical and mechanical tests — Determination of water vapour absorption*

ISO 17234-1, *Leather — Chemical tests for the determination of certain azo colorants in dyed leathers — Part 1: Determination of certain aromatic amines derived from azo colorants*

ISO 17234-2, *Leather — Chemical tests for the determination of certain azo colorants in dyed leathers — Part 2: Determination of 4-aminoazobenzene*

ISO 23910, *Leather — Physical and mechanical tests — Measurement of stitch tear resistance*[1)]

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.1
casual footwear
footwear designed and manufactured as suitable for out-of-work leisure and spare time activities

[SOURCE: ISO 19952: 2005, 28]

3.2
cold weather footwear
footwear designed and manufactured to give specific protection to the wearer during use in sub-zero temperatures and in ice or snow or on frozen underfoot surfaces

Note 1 to entry: Also suitable for specific cold environments.

[SOURCE: ISO 19952: 2005, 38]

3.3
fashion footwear
footwear designed and manufactured for light wear in which style is prevalent

[SOURCE: ISO 19952: 2005, 59]

3.4
general purpose sports footwear
footwear designed and manufactured as suitable for wear during a variety of non-specialist sporting activities, e.g. jogging, occasional racket sports or court games such as netball and light general training

[SOURCE: ISO 19952: 2005, 74]

3.5
indoor footwear
footwear designed and manufactured as having adequate durability and comfort for wear indoors, around the house, unsuitable for use as a town shoe and unlikely to offer protection from inclement weather or harsh wear environments

[SOURCE: ISO 19952:2005, 88]

3.6
infants' footwear
footwear designed and manufactured as suitable for everyday wear by children from size 16 to 22

Note 1 to entry: See ISO 19952: 2005, 116, "Paris point".

1) Under preparation. Stage at the time of publication: ISO/FDIS 23910:2019.

[SOURCE: ISO 19952: 2005, 89]

3.7
school footwear
footwear designed and manufactured for everyday wear at school for children and teenagers from size 23 to 38

Note 1 to entry: See ISO 19952: 2005, 116, "Paris point".

[SOURCE: ISO 19952: 2005, 129]

3.8
town footwear
footwear designed and manufactured as suitable for everyday wear at the office, for shopping or similar wear environments

Note 1 to entry: Normally durability and comfort are more important than design or fashion content with this type of footwear.

[SOURCE: ISO 19952: 2005, 161]

3.9
upper leather
leather for making the upper part of footwear

4 Characteristics

4.1 Physical characteristics

The full chrome upper leather shall meet the physical characteristics given in Table 1.

Table 1 — Physical characteristics

	Characteristic	Test method	General purpose sports footwear, school footwear, casual footwear, men's town footwear	Cold weather footwear	Women's town footwear	Fashion footwear, infants' footwear, indoor footwear
1	Tensile strength[a] (N/mm^2)	ISO 3376	Bovine ≥ 15 Goat ≥ 12 Sheep ≥ 10	Bovine ≥ 15 Goat ≥ 12 Sheep ≥ 10	≥ 10	≥ 10
2	Elongation at break[a] (%)	ISO 3376	Bovine: 45–75 Goat: 40–75 Sheep: 35–75	Bovine: 45–75 Goat: 40–75 Sheep: 35–75	Bovine: 45–75 Goat: 40–75 Sheep: 35–75	Bovine: 45–75 Goat: 40–75 Sheep: 35–75
3	Tear strength[a] (N)	ISO 3377-2	Bovine ≥ 70 Goat ≥ 40 Sheep ≥ 20	Bovine ≥ 70 Goat ≥ 40 Sheep ≥ 20	Bovine ≥ 60 Goat ≥ 40 Sheep ≥ 20	Bovine ≥ 50 Goat ≥ 40 Sheep ≥ 20
4	Flex resistance (cycle)[b]	ISO 5402-1	Dry: 80 000 Wet: 20 000	Dry: 20 000 (in –15 °C)	Dry: 50 000 Wet: 20 000	Dry: 12 000
6	Distension of grain at crack (mm)	ISO 3379	≥ 7	≥ 7	≥ 7	≥ 7
7	Grain crack load (N)	ISO 3379	≥ 20	≥ 20	≥ 20	≥ 20

[a] Mean value of each direction (perpendicular and horizontal direction).

[b] Without visible damage (no crack).

[c] If unlined footwear is used inside, staining shall conform ≥ 2/3 after 40 cycles with perspiration and conform ≥ 3 after dry and wet cycles.

Key

WVP water vapour permeability

WVC water vapour coefficient

Table 1 *(continued)*

	Characteristic	Test method	General purpose sports footwear, school footwear, casual footwear, men's town footwear	Cold weather footwear	Women's town footwear	Fashion footwear, infants' footwear, indoor footwear
8	Colourfastness to rubbing (colour change and staining of outside surface)[c]	ISO 11640	Aniline, nubuck or suede: — after 50 cycle dry and 20 cycle wet: ≥ 3 Other finishing: — after 100 cycle dry and 40 cycle wet: ≥ 3	Aniline, nubuck or suede: — after 50 cycle dry and 20 cycle wet: ≥ 3 Other finishing: — after 100 cycle dry and 40 cycle wet: ≥ 3	Aniline, nubuck or suede: — after 50 cycle dry and 20 cycle wet: ≥ 3 Other finishing: — after 100 cycle dry and 40 cycle wet: ≥ 3	Aniline nubuck, or suede: — after 50 cycle dry and 20 cycle wet: ≥ 3 Other finishing: — after 100 cycle dry and 40 cycle wet: ≥ 3
9	Colourfastness to water (colour change and staining of outside surface)	ISO 11642	≥ 3	≥ 3	≥ 3	—
10	WVP and WVC	ISO 14268 ISO 17229	WVP ≥ 0,8 mg/cm^2·h WVC ≥ 15 mg/cm^2	WVP ≥ 0,8 mg/cm^2·h WVC ≥ 15 mg/cm^2	WVP ≥ 0,8 mg/cm^2·h WVC ≥ 15 mg/cm^2	WVP ≥ 0,8 mg/cm^2·h WVC ≥ 15 mg/cm^2
11	Seam strength (N/mm)	ISO 23910	≥ 10	≥ 10	≥ 4	≥ 3

[a] Mean value of each direction (perpendicular and horizontal direction).

[b] Without visible damage (no crack).

[c] If unlined footwear is used inside, staining shall conform ≥ 2/3 after 40 cycles with perspiration and conform ≥ 3 after dry and wet cycles.

Key

WVP water vapour permeability

WVC water vapour coefficient

4.2 Chemical characteristics

The full chrome upper leather shall meet the chemical characteristics given in Table 2.

Table 2 — Chemical characteristics

Characteristic	Requirement	Test method
Chromium III content (Cr_2O_3) (%)	≥ 2,5	ISO 5398-1
Chromium VI content (mg/kg)	< 3	ISO 17075-1 or ISO 17075-2
Soluble material in dichloromethane (%)	2,5–7	ISO 4048
pH and ΔpH	≥ 3,5 If the pH is below 4, ΔpH shall be ≤ 0,7	ISO 4045
Total chlorinated phenol content[a] (%)	< 0,1	ISO 17070
Formaldehyde content (mg/kg)	≤ 150	ISO 17226-1
Azo colorant (mg/kg)	≤ 30	ISO 17234-1 ISO 17234-2

[a] Pentachlorophenol, tetra chlorophenol, tri chlorophenol, di chlorophenol, mono chlorophenol.

5 Sampling

Sampling of leathers shall be as specified in ISO 2588. The location of test pieces shall be as specified in ISO 2418.

6 Packaging and marking

6.1 Packaging

The upper leather shall be packaged suitably as agreed between the interested parties in such a way that it is protected from, for example, humidity, heat and light.

6.2 Marking

The following information shall be clearly and permanently marked on the flesh side of leather:

a) area of leather;

b) manufacturer’s identification mark;

c) month and year of the tanning;

d) reference to this document, i.e. ISO 20942.

Bibliography

[1] ISO 19952:2005, *Footwear — Vocabulary*

Bureau of Indian Standards

BIS is a statutory institution established under the *Bureau of Indian Standards Act*, 2016 to promote harmonious development of the activities of standardization, marking and quality certification of goods and attending to connected matters in the country.

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Review of Indian Standards

Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the website-www.bis.gov.in or www.standardsbis.in.

This Indian Standard has been developed from Doc No.: CHD 17 (21484).

Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

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Published by BIS, New Delhi