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BUREAU OF INDIAN STANDARDS

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भारतीय मानक मसौदा

तेल सील के लिए चमड़ा — विशिष्टि

(*IS 3020 का तीसरा पुनरीक्षण*)

Draft Indian Standard

Leather for Oil Seals — Specification

(*Third Revision of IS 3020*)

(ICS 59.140.35)

Leather, Tanning Materials and Allied Products Sectional Committee, CHD 17	**Last Date for Comments: 21.01.2025**

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

FOREWORD

(*Formal clause will be added later*)

Oil seal finds application in hydraulic machinery for scaling shafts, axles, rods, or similar moving parts against leakage of fluids and ingress of dust, dirt, steam, gas, etc. This material plays a vital role in hydraulic machinery.

Leather is a unique material that has fibrous packing. Leather's three-dimensional woven fibrous structure is preferable as a primary material for manufacturing oil seals compared to other natural and synthetic materials. Generally, two types of leather are used for the manufacture of oil seals:

a) Chrome tanned leather oil seals can withstand temperatures up to 105°C in the presence of moisture and are also suitable for high-pressure systems.

b) Chrome retanned leather combines the high abrasion resistance of vegetable tanned leather and the compactness of chrome tanned leather. This type of leather is particularly suitable in moisture free high temperature conditions.

This standard was first published in 1964 and subsequently revised in 1976.This revision has been taken up in order to bring out the standard in latest style and format of the Indian Standards. In this revision following new parameters have been incorporated:

a) Chromium content (as Cr_2O_3);

b) Tensile Strength;

c) Elongation at break;

d) Resistance to abrasion;

e) Thickness increase when immersed in Deionized;

f) Thickness increase when immersed in the grease; and

g) Apparent Density

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.

Draft Indian Standard

LEATHER FOR OIL SEALS — SPECIFICATION

(*Third Revision*)

1 SCOPE

1.1 This standard prescribes the requirements and methods of sampling and test for leather for oil seals.

1.1.1 It includes leather suitable for the manufacture of oil seals required for slow moving, fast running or high-speed shafts operating at room temperature or between 60 °C and 100 °C.

2 REFERENCES

The standards listed in Annex A 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 edition of these standards listed in Annex A**.**

3 TERMINOLOGY

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

3.2 Oil Seals

Material generally used as seals and mounted on the ends of shafts or sleeves to retain oil in the bearing. 'Oil seals are used to seal air, fresh water, sea water, chemicals, oils and greases, etc.

4 TYPES

4.1 There shall be two types of leathers for oil seals.

4.1.1 *Type* 1 — Full chrome tanned leather

4.1.2 *Type* 2 — Chrome and vegetable combination tanned leather

5 REQUIREMENTS

5.1 Raw Materials

The material shall be of wet salted or green slaughtered buffalo or cow hides of good substance and free from any visible defects and flaycuts, holes, etc.

5.2 Tanning — Material shall be tanned by

a) Chrome tanning, or
b) Combination tanning of chromium and vegetable tanning agents.

5.3 Finishing

After tanning, shave the material on the flesh side to obtain the required thickness. The material shall be scoured thoroughly on the grain and appropriately dressed with oil and fats to make it suitable to mould into the required shape and design. The material may also be impregnated with a suitable resin or polymer.

5.4 Chemical Requirements

The material shall comply with the requirements given in Table 1 when tested in accordance with the prescribed methods.

Table 1 Chemical Requirements for Leather for Oil Seals

(*Clause* 5.4)

Sl No	Characteristics	Requirement		Method of Test, ref to IS 582
		Type 1	Type 2	
(1)	(2)	(3)	(4)	(5)
i)	Total ash, percent by mass, *Max*	9.0	9.0	Part 3
ii)	Solvent extractable substances, percent by mass	3.5 to 7.0	3.5 to 7.0	Part 14
iii)	Chromium content (as Cr_2O_3), percent by mass, *Min*	3.5	2.0	Part 10/Sec 1
iv)	Water soluble matter, percent by mass, *Max*	7.0	7.0	Part 2
v)	Insoluble ash, percent by mass, *Max*	9.0	7.0	Part 3
vi)	Chromium (VI) after ageing, mg/kg, Max	3.0	3.0	ISO 10195
vii)	pH of water solubles, *Min*	3.5	3.5	Part 9
viii)	Degree of tannage, *Max*	-	60	LC 21 of IS 582

NOTE — Calculation of requirements for characteristics (i) to (vi) are on zero percent moisture basis. The moisture content shall be determined as prescribed in LC: 1 or Part 1 of IS 582

5.5 Physical Requirements

The material shall comply with the requirements given in Table 2, when tested in accordance with the prescribed methods.

Table 2 Physical Requirements for Leather for Oil Seals

(*Clause* 5.5)

Sl No.	Parameter	Requirement	Method of Test, Ref to
(1)	(2)	(3)	(4)
i)	Thickness, *mm*	2.5 ± 0.5 or as per buyer's requirement	LP 1 of IS 5914
ii)	Tensile Strength, kg/cm^2 , *Min*	100	IS 5914 (Part 8)
	Elongation at break, percent	10 to 50	
iii)	Resistance to hot oil at 100 °C for 24 hrs	Shall not shrink more than 10 percent and shall remain soft and flexible	LP 25 of IS 5914

Sl No.	Parameter	Requirement	Method of Test, Ref to
(1)	(2)	(3)	(4)
iv)	Resistance to hot air at 100 °C for 24 h	Shall remain soft and flexible	Annex B
v)	Cracking of the grain at ambient temperature, (-)50 ºC & (+)50 ºC	Shall not crack in Mandrel No 4	IS 5914 (Part 7)
vi)	Resistance to abrasion (Standard cloth) a) Dry b) Wet	Not worse than slight wear after 51,200 cycles Not worse than slight wear after 25,600 cycles	IS 15298 (Part 1)
vii)	Thickness increase when immersed in Deionized water (After 24 h), *Max*	5%	LP 1 of IS 5914
viii)	Thickness increase when immersed in the grease (at 23 ℃ ± 2 ℃ for 24 h), *Max*	5%	LP 1 of IS 5914
ix)	Apparent Density (g/cm^3), *Min*	0.90	IS 5914 (Part 4)
x)	Shrinkage Temperature (℃), *Min*	90	LP 10 of IS 5914

5 PACKING AND MARKING

5.1 Packing

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

5.2 Marking — The packages shall be marked with the following:

a) Name and type of the material;
b) Name of the manufacturer and/or trade-mark, if any;
c) Quantity (number of pieces of the material);
d) Month and year of manufacture; and
e) Batch number.

5.2.1 *BIS Certification Marking*

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 Ac*t, 2016 and the Rules and Regulations framed thereunder, and the products may be marked with the Standard Mark.

6. SAMPLING

The scale of sampling and criteria for conformity of the material shall be as prescribed in IS 5868

ANNEX A

(*Clause* 2)

LIST OF REFERRED STANDARDS

IS/ISO No.	*Title*
IS 582	Method of chemical testing of leather (*first revision*)
(Part 1) : 2017/ ISO 4684 : 2005	Determination of volatile matter (*second revision*)
Part 2: 2024/ ISO 4098 : 2018	Determination of Water-Soluble Matter, Water-Soluble Inorganic Matter and Water-Soluble Organic Matter (*first revision*)
Part 3: 2017 ISO 4047 : 1977	Determination of sulphated total ash and sulphated water - Insoluble ash (*second revision*)
IS 582 (Part 9) : 2022 / ISO 4045 : 2018	Determination of pH and difference figure
Part 10	Determination of chromic oxide content
Sec 1: 2022 ISO 5398-1 : 2018	Quantification by titration
Part 14 : 2022	Determination of matter soluble in dichloromethane and free fatty acid content
IS 1640: 2007	Glossary of terms relating to hides, skins and leather (*first revision*)
IS 5868: 1983	Method of sampling for leather (*first revision*)
IS 5914	Methods of physical testing of leather
Part 4 : 2023 ISO 2420 : 2017	Determination of apparent density and mass per unit area
Part 7 : 2023/ ISO 3378 : 2002	Determination of resistance to grain cracking and grain crack index
Part8 : 2023/ ISO 3376 : 2020	Determination of tensile strength and percentage elongation
IS 15298(Part 1) :2024/ISO 20344:2021	Personal Protective Equipment Part 1 Test methods for footwear
ISO 10195	Leather — Chemical determination of chromium(VI) content in leather — Thermal pre-ageing of leather and determination of hexavalent chromium

ANNEX B

[*Clause* 5.5 *Table 2 Item* (iv)**]**

DETERMINATION OF RESISTANCE TO HOT AIR

A-1 PROCEDURE

A-1.1 Heat the test specimen of 100 mm × 20 mm in size at 100 ℃ ± 2 °C for 100 h in a current of hot air. Cool it to room temperature and compare with the original as regards flexibility and softness.