INTER PLANT STANDARD IN STEEL INDUSTRY		
IPSS	**SPECIFICATION FOR ROTARY SHAFT OIL SEAL UNITS**	**IPSS: 1-02-013-18** *(First Revision)*
	BASED ON IS: 5129 – 2003	Formerly: IPSS: 1-02-013-81

0. FOREWORD

0.1 Interplant standardisation in steel industry has been initiated under the aegis of the Indian Standards Institution (ISI) and the Steel Authority of India Limited (SAIL). This Interplant Standards prepared by the Standard Committee on Basic Standards and Hydraulic, Pneumatic and Lubricating Equipment, IPSS 1 : 2 with the active participation of the representatives of all the steel plants, leading consultants and established manufacturers of oil transfer pumps and was first adopted in November 1981 by the approval committee on Consumable Stores and General Equipment, IPSS 1. Thereafter standard was first revised in January, 2018.

0.2 Interplant Standards for steel industry primarily aim at achieving rationalisation and unification of parts and sub-assemblies used in steel plant equipment and accessories and provide guidance in indenting stores or equipment for existing or new installations by individual steel plants. For exercising effective control on inventories, it is advisable to select a fewer number of sizes (or types) from among the products mentioned in this standard for the purpose of company standards of individual steel plants. It is not desirable to make deviations in technical requirements.

1 SCOPE

This Inter Plant standard covers the requirements of oil seal units used in steel plants to prevent leakage of oil or penetration of dust or both or other harmful particles along the surfaces of rotating shaft and is generally based on IS: 5129 'Specification for rotary shaft oil seal units (Part-2) -2003 (Third Revision)'. For convenience of reference, the clause numbers of Indian standard for each requirement are given in Appendix A along with number of the matching clauses of this standard.

2 TYPES

For the purpose of this standard, oil seals shall be of the following types:

Type A – Rubber cased, single lip

Type B – Metal cased, single lip

Type C – Built up, single lip

Type D – Hard rubber body, single lip

Type E – Leather, single lip

Type F – Metal cased, single lip with finger spring

Type G – Metal cased, double lip

Type H – Built up, double lip

Type I – Rubber cased, double lip

Type J – Metal cased, duplex

Type K – Leather, single lip with felt dust seal

Type L – Rubber cased, double lip, both spring loaded.

2.1 For guidance in selection, the applications of oil seals are given in the **Table 1**.

3 MATERIALS OF CONSTRUCTION

3.1 Sealing Lip –Any of the following materials could be used :

Nitrile compound, polyacrylic compound, silicon compound, pressed wool felt conforming to IS: 1719 - 2000 ‘Specification for felt, woolen (fourth revision), vegetable tanned or full chrome tanned or combination tanned leather conforming to IS: 3020-1976 ‘Specification for leather for oil seals (first revision).

Unless otherwise specified by the purchaser, nitrile compound shall be used.

3.1.1 For selection of the material with respect to its application, advantages and limitations, guidance may be taken from **Table 2**.

3.2 Metal Components – The materials of all major components and their surface protection except the garter spring shall be at the discretion of the manufacturer, unless specified otherwise by the purchaser.

3.3 Garter Spring – Garter spring shall conform to the cold drawn steel wire Grade 2 conforming to IS: 4454 (Part I) - 2001 ‘Specification for steel wires for cold formed springs : Part I Patented and cold drawn steel wires – unalloyed (Third revision), unless otherwise specified by the purchaser.

4 DIMENSIONS

The dimensions for the oil seals shall be as given in Table 1 of IS: 5129 – 2003. Dimensions and their tolerances for other types shall be specified by the purchaser.

4.1 Press fit allowance and out of roundness of the outside diameter of the seal shall be as given in Table 3.2 of IS: 5129 – 2003. Press fit allowance and out of roundness for other types shall be as specified by the purchaser.

4.2 The tolerances for radial wall variations for the oil seals shall be as given in Table 3.2 of IS: 5129 – 2003, for other types these shall be as specified by the purchaser.

4.3 The inner diameter of the oil seal and the tolerance thereon shall be corresponding shaft diameter as given in IS: 5129 – 2003.

5. DESIGNATION

The oil seal shall be designated by:

a) Type of oil seal (see 2.1),

b) Diameter of shaft.

c) Normal bore diameter of the housing,

d) Width of the seal,

e) Material of the seal lip, and

f) The number of this standard.

For Example : -The rotary shaft seal of Type A for shaft dia 25 mm, bore dia of housing 40 mm and width 7 mm and having lip of silicon compound shall be designated as :

Oil seal A25 x 40 x 7 = IPSS: 1-02-013-18 (Silicon compound)

Note: Material of sealing lip need not be included if it is nitrile compound.

6. WORKMANSHIP AND FINISH

This will be as stipulated in IS: 5129.

7. MARKING

This will be as stipulated in IS: 5129.

8. TESTS

The tests shall be carried out in accordance with Table 3.5 of IS: 5129.

9. PACKING

Each seal shall be separately packed in a polythene bag and put in cardboard box. The size of oil seal shall be marked on cardboard box.

10. STORAGE

This will be as stipulated in Table-3.4 of IS: 5129.

11. SAMPLING

The sampling inspection shall be done as stipulated in Table-3.3 of IS: 5129.

12. TECHNICAL PERFORMA FOR INDENTING

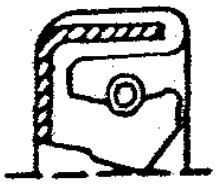
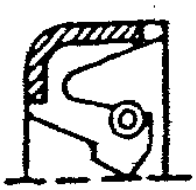
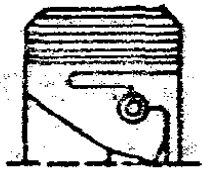
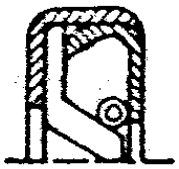
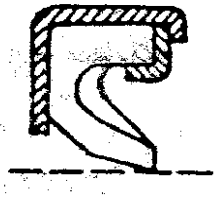
For sending out enquiries for purchase of oil seals in accordance with this standard, the supplier may be provided with the information in the Performa given below:

TECHNICAL PERFORMA FOR INDENTING

1. Designation of oil seal required
2. Shaft / housing speed in rev/min
3. Details of the oil to be sealed
4. Operative temperature of oil

TABLE 1 : GUIDANCE FOR SELECTION OF THE TYPE OF OIL SEALS

(Clause 2.1)

	Type	Application
	Type A Rubber Cased, single lip	For general sealing purposes. This is useful where housings of light alloy of aluminium are used and where the housing may have a higher co-efficient of expansion than that of the metal case of oil seals.
	Type B Metal Cased, Single lip	For general sealing purposes. Generally most economical.
	Type C Built up, Single lip with inner case	For general sealing purposes. Protection for the lip from any external facial object.
	Type D Hard Rubber Body, Single lip	The compressible hard synthetic rubber body gives good seal retention. It is suitable for bore finishes which are rougher than normal. This is also useful for corrosive environments.
	Type E Leather, Single lip	This is useful where shafts are rougher than normal and the seals are exposed to water as in the bearing housings of water pumps.
	Type F Metal cased, Single lip with finger spring	Provide all features of Type B. The uniform pressure on the lip by the finger spring prevents fast wear of the lip and the shaft. This is mainly used to prevent dust and liquids (in the case of pump) entering the bearings.

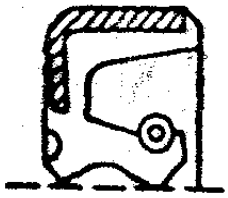
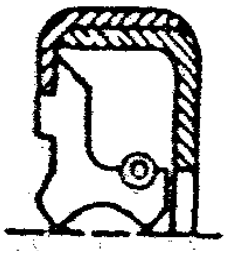
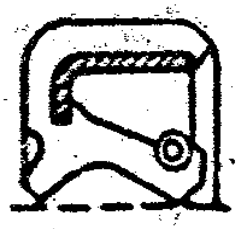
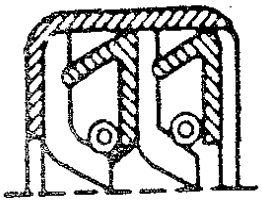
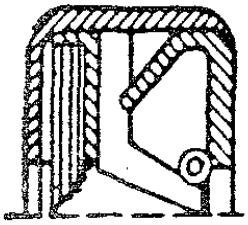
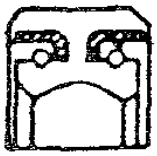
	Type	Application
	Type G Metal Cased, double lip	Providing all features of Type B plus non-spring loaded member for moderate exposure to dust.
	Type H Built up, double lip with inner case	Providing all features of Type C plus non-spring loaded member for moderate exposure to dust.
	Type I Rubber cased, double lip	Providing all features of Type A plus non-spring loaded member for moderate exposure to dust.
	Type J Metal Cased, duplex	This is useful for vertical applications.
	Type K Leather, Single lip with felt dust seal	Provides all features of Type E plus felt for dust sealing.
	Type L Rubber Cased with double lip, both the lips are spring loaded	It is used to separate two different fluids where space does not permit the use of two separate seals ; also used for oil retention and dust expulsion.

TABLE 2 : GUIDANCE FOR SELECTION OF MATERIAL FOR THE SEALING LIP

(Clause 3.1.1)

Sl. No.	Material	Application	Advantages	Limitations
1	Nitrile compounds, polymers of butadiene and acrylonitrile	i. Operating range is 54 deg C to +110 deg C ii. Recommended for general use in retaining lubricants and excluding mud, dirt water etc. iii. Low volume swell in low aniline point oils.	i. Fair dry running characteristics. ii. Good processing iii. Good low temperature and swell characteristics. iv. Low cost range of oil seal compounds v. Good oil resistance	i. Lack exceptional heat resistance. ii. Tendency to harden high temperature and usage.
2.	Polyacrylic compounds	i. Operating range is -18 deg C to + 180 deg. C. It shall run out is low these compounds may be used at lower temperature.	i. Resistance to E P type additive. ii. Good moderate temperature performance iii. Low swell characteristics iv. Good oil resistance v. Medium cost range of oil seal compounds	i. Poor low temperature properties with high shaft run out ii. Poor dry running characteristics
3	Silicon compounds	i. Operating range is -54 deg C to + 177 deg C.	i. Good heat resistance ii. Excellent low temperature properties	i. High swell characteristics in some oils ii. Poor chemical resistance to oxidized oil and some E P additives iii. Poor dry running characteristics iv. Easily damaged during assembly v. High cost

Sl. No.	Material	Application	Advantages	Limitations
				range of seal compounds vi. The maximum usable temperature is limited by the decompositio n temperature at various lubricants
4	Wool felt (Pressed)	Widely used to retain grease in ball and roller bearings in automobile heaters, farm machinery etc. where shaft speed does not exceed 10 m/s, temperature range from -51 deg C to 121 deg C and other conditions are not severe.	i. Generally inexpensive and is relatively easy to install ii. Material lends itself to simple grease or oil retention as well as provide a seal from dual. iii. Seeing resistant, it maintains a constant sealing pressure regardless of wear, play, minor misalignment or out of round.	-
5	Leather	Used for slow moving, fast running or high speed shafts, operating at room temperature or between – 60 deg C and 140 deg C.	-	-
	a. Vegetable tanned leather	Widely used in water system as it is resistant to abrasion when wet	-	-
	b. Full chrome tanned leather	i. Used for oil seals which are required to withstand temperature up to 105 deg C in	It has high tensile strength.	-

Sl. No.	Material	Application	Advantages	Limitations
		the presence of moisture ii. Since it is more compact than vegetable tanned leather, it is suitable for high pressure system		
	c. Combination tanned leather	i. Combines high abrasion resistance of vegetable tanned leather and chrome tanned leather ii. Suitable for temperature conditions up to 145 deg C.	i. Toughness, withstands difficult assembly ii. Accommodation at fairly rough shaft finishes iii. Good dry running characteristics iv. Good low temperature characteristics	i. Poor heat resistance ii. Non-homogeneous make-up, makes consistent quality difficult

APPENDIX A

(Clause 1)

COMPARATIVE STUDY OF

IPSS : 1-02-013-17 'SPECIFICATION FOR ROTARY SHAFT OIL SEAL UNITS'

AND

IS : 5129- 2003'SPECIFICATION FOR ROTARY SHAFT OIL SEAL UNITS

(Third Revision)

Requirement		Clause Reference (IPSS)	Clause Reference (ISS)
Requirements in IPSS which are same as in ISS	Dimensions	4	3.2
	Workmanship and finish	6	--
	Marking	7	--
	Tests	8	3.5
	Storage	10	3.4
	Sampling	11	3.3
Requirements in IPSS which are complementary / supplementary to ISS	Scope	1	1
	Types	2	3.1
	Material	3	--
	Designation	5	--
	Packing	9	-
	Technical Performa for indenting	12	-
Requirements in IPSS selected out of the choice given in ISS	NIL	-	-
Requirements in IPSS which deviate from those in ISS	NIL	-	-