INTER PLANT STANDARD – STEEL INDUSTRY		
IPSS	**SPECIFICATION FOR LITHIUM BASE MULTIPURPOSE GREASE FOR STEEL APPLICATION**	**IPSS:1-09-005-20 (Third Revision)**
	Corresponding to IS 7623: 2019	Formerly: IPSS:1-09-005-99 (Second Revision)

0.0 FOREWORD

0.1 This Inter Plant Standard has been prepared by the Standards Committee on Oils & Lubricants, IPSS 1:9 with the active participation of the representatives of the steel plants and established manufacturers of greases and was adopted in January 1977. It was first revised in January 1986, with second revision in January, 1999 and further it revised with third revision in **January, 2020**.

0.2 In this revised Standard, a number of characteristics and requirements have been included or modified after careful review in the light of the experience gained. This will enable Lithium EP grease to acquire excellent pumpability to take care of long leads and resistance to water washout and heat.

1. SCOPE

1.1 This Inter Plant Standard covers requirements of Lithium EP (extreme pressure) Greases used in steel industry at centralized systems serving severely loaded bearings and friction surface of all types. It also covers semi-fluid lithium EP grease (NLGI 00 to 0 grade) being used for lubrication of gears and various other applications in steel plants, but not covered in the IS 7623:2019.

1.2 This standard is generally based on IS 7623:2019 `Specification for lithium base grease for industrial purposes (second revision)' with respect to the EP type greases as covered therein (except grade 3). The requirements of composition, sampling, number of tests and criteria of conformity as specified in the Indian Standard are applicable as such. The other technical aspects required for meeting the special needs of the steel industry are given in this document.

2. COMPOSITION

2.1 For ease of reference, the ingredients of lithium soap grease as specified in IS 7623:2019 are given below:

a) Refined mineral oil
b) Lithium soap
c) Antioxidants, rust inhibitor, etc and
d) Extreme pressure additives (in case of EP grades only)

Note: Grease will be without lead.

2.2 TYPES AND GRADES

2.2.1 Types

The material shall be of following types:

a) Regular, and

b) Extreme pressure (EP).

2.2.2 Grades

a) Regular type shall have three grades namely: Grade 1, Grade 2 and Grade 3; and
b) Extreme pressure type shall have five grades namely: Grade 1, Grade 2, Grade 3, Grade 4 and Grade 5.

3. TECHNICAL REQUIREMENTS

3.1 The material shall be smooth and homogenous preparation, free from objectionable odor, visible impurities and abrasive particles. It shall be free from resins, resin oil, rosinate, tar oil, grit and failure such as clay, asbestos, talc, etc and from products gelled with bentonite and silica gel.

3.2 The technical requirements shall be as given in Table-1 for regular grades and Table 2 for EP grades.

3.3 The keeping quality of the material shall be such that when stored in original sealed containers under normal conditions, it shall retain the properties given in the specification for not less than one year from the date of manufacture.

4. PACKING

4.1 The packing shall be done in new and sound steel drums of 200 litres (182 kg) nominal capacity conforming to:

i) IS 1783:1993 Part II `Specification for drums, large fixed ends Part 2 Grade-B Drums (third revision)'

OR

ii) IS 13997:1994 `Drums, large open top'.

The drums / barrels shall be properly sealed against water and other contaminants.

4.2 In case of smaller lots, the grease can be supplied in smaller size containers as agreed to between purchaser and supplier.

5. MARKING

5.1 The containers shall be securely closed and marked with the following:

a) Indication of the source of manufacture;
b) Name, type and grade of the material;
c) Net mass of the material
d) Date of manufacture;
e) Recognized trade mark, if any;
f) Identification in code or otherwise to enable the lot of consignment or manufacture to be traced back; and
g) Standard mark

6. SAMPLING

6.1 The representative samples of the material shall be drawn as prescribed in IS 1447:` 2000 Method of sampling of petroleum and its products'.

6.2 Number of Tests and Criteria for Conformity

6.2.1 Individual containers selected according to IS 1447:1966 shall be opened and examined for the general requirements given in 3.1. Tests for the consistency, free organic acidity and free alkalinity shall be done on individual samples.

Tests for copper strip corrosion shall be conducted on two of the individual samples.

6.2.2 Tests for all the remaining characteristics shall be done on the composite sample prepared by mixing small portions from individual containers selected in the sample.

TABLE-1

REQUIREMENTS OF LITHIUM MULTIPURPOSE GREASE

(Clause 3.2)

Sl. No.	Characteristics	Requirement			Method of Test. Ref to Part of IS 1448*
		Grade 1	Grade 2	Grade 3	
1.	Worked Penetration at 25°± 0.5°C a) 60 double stokes	310-340	265-295**	220-250	P:60 (1994)
	b) After 100,000 strokes	Shall not differ by more than 30 units from the values at (a) above			
	Free organic acidity (as oleic acid), per cent by mass, Max	0.1			P:53
	Free alkalinity (as LioH) per cent by mass, Max	0.1			P:53
2.	Drop point, °C, Min	180	180	180	P:52
3.	Mineral oil extracted from the grease# a) Kinematic viscosity in cst at 40 °C	90-100 200-240	90-100 200-240	90-100 200-240	P:25 (1976)
	b) Flash point °C (COC), Min	200	200	200	P:69 (2013)
	c) Viscosity Index, Min	90 (without VI improver)	90 (without VI improver)	90 (without VI improver)	P:56 (2013)
4.	Copper strip corrosion at 100 deg C, for 24 hours	Negative			P:51 (1963)
5.	Resistance to water washout at 80deg C, per cent loss by mass, Max	15.0	10.0	10.0	P:90 (2008)
6.	Thermal stability, per cent loss by mass, Max	6.0	5.0	5.0	P:89 (1979)
7.	Oil separation at elevated temperature	6.0	5.0	5.0	ASTM D 6184 - 2017
8.	Oxidation stability (100 h) drop in pressure kg/sq cm, Max	0.5	0.5	0.5	P:94 (2019)
9.	Leakage and deposit forming tendencies (wheel bearing test): a) Leakage by mass(g), Max	5.0	5.0	5.0	ASTM D1263-1999
	b) Deposit in the wheel bearing races or the rollers	-Shall be free from deposits			-
	c) Evidence of abnormal	Observations to be reported			

	changes in the consistency or structure of the material d) Indication of dry running of races	No dry running of races			- -
10.	Emcor rust test, Max	0,0	0,0	0,0	IP 220- 2017
11.	Roll stability test, penetration change, percent after 16 hours, Max	25.0	25.0	25.0	ASTM D 1831-2019
12.	Corrosion preventive test	Shall pass the test			ASTM D 1743-2015
13.	Low temperature torque At -20° C*** Starting torque , gm/cm Running torque, gm/cm	5000 1000			IP 186
14.	Elastomer Compatability				ASTM D 4289 - 2014
	Vol Change, percent	← -5 to + 30 →			
	Hardness change, durometer-A points	← -15 to + 2 →			
15.	Oil separation in storage condition, max	5%			ASTM D 1742 - 2018

* Methods of test for petroleum and its products.

** If required for centralized lubrication system of steel plants worked penetration at 25 ^{o}C (60 strokes) may change from 265-295 to 280-300 for Grade 2.

*** Not applicable for VG 220 grade

For steel plants viscosity may be VG 220 grade

TABLE-2

REQUIREMENTS OF LITHIUM EP GREASE

(Clause 3.2)

Sl. No.	Characteristics	Requirement					Method of Test. Ref to Part of IS 1448*
		Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	
1.	Worked Penetration at 25°± 0.5°C a) 60 double stokes	310-340	265-295**	220-250	355-385	400-430	P:60 (1994)
	b) After 100,000 strokes	Shall not differ by more than 30 units from the values at (a) above			Not applicable	Not applicable	
2.	Drop point, °C, Min	180	180	180	160	150	P:52
3.	Mineral oil extracted from the grease						
	e) Kinematic viscosity in cst at 40 °C	198-242	198-242	198-242	198-242		P:25 (1976)
	f) Flash point °C (COC), Min	200	200	200	200		P:69 (2013)
	g) Viscosity Index, Min	90 (without VI improver)	90 (without VI improver)	90 (without VI improver)	90 (without VI improver)		P:56 (2013)
4.	Copper strip corrosion at 100 deg C, for 24 hours	Negative					P:51 (1963)
5.	Resistance to water washout at 80deg C, per cent loss by mass, Max	15.0	10.0	10.0	Not applicable	Not applicable	P:90 (2008)
6.	Thermal stability, per cent loss by mass, Max	6.0	5.0	5.0	Not applicable	Not applicable	P:89 (1979)
7.	Oil separation at elevated temperature	6.0	5.0	5.0	Not applicable	Not applicable	ASTM D 6184 - 2017
8.	Oxidation stability (100 h) drop in pressure kg/sq cm, Max	0.7	0.7	0.7	0.7	0.7	P:94 (2019)
9.	Timken OK load, kg, min	22	22	22	22	22	ASTM D 2509-2015
10.	Leakage and deposit forming tendencies (wheel bearing test):	5.0	5.0	5.0	Not applicable	Not applicable	ASTM D1263-1999
	c) Leakage by mass(g), Max	-Shall be free from deposits			Not applicable	Not applicable	
	d) Deposit in the wheel bearing races or the rollers	Observations to be reported			Not applicable	Not applicable	-
	c) Evidence of abnormal changes in the consis-tency or structure of the material	No dry running of races			Not applicable	Not applicable	-
	h) Indication of dry						

	running of races						-
11.	Four ball wear test, scar diameter, mm, Max	0.6	0.6	0.6	0.6	0.6	ASTM D 2266-2015
12.	Emcor rust test, Max	0,0	0,0	0,0	Not applicable	Not applicable	IP 220- 2017
13.	Roll stability test, penetration change, percent after 16 hours, Max	25.0	25.0	25.0	Not applicable	Not applicable	ASTM D 1831-2019
14.	Four ball weld test, weld load, kg, Min	250	250	250	250	250	IP 239 -2014
15.	Corrosion preventive test	Shall pass the test			Not applicable	Not applicable	ASTM D 1743-2015
16.	Elastomer Compatability						ASTM D 4289 - 2014
	Vol Change, percent	← -5 to + 30 →					
	Hardness change, durometer-A points	← -15 to + 2 →					
17.	Oil separation in storage condition, max	5%			Not applicable	Not applicable	ASTM D 1742 - 2018

* Methods of test for petroleum and its products.

** If required for centralized lubrication system of steel plants worked penetration at 25 ^{o}C (60 strokes) may change from 265-295 to 280-300 for Grade 2.