BUREAU OF INDIAN STANDARDS

DRAFT FOR COMMENTS ONLY

(*Not to be reproduced without permission of BIS or used as an Indian Standard*)

भारतीय मानक मसौदा

स्नेहक – प्रशीतन मशीनरी के लिए स्नेहकित तेल – विशिष्ट

(IS 4578 *का तीसरा पुनरीक्षण*)

Draft Indian Standard

LUBRICANTS — LUBRICATING OIL FOR REFRIGERATION MACHINERY – SPECIFICATION

(*Third Revision of* IS 4578)

(ICS No. 75.100; 27.200)

Lubricants and their Related Products Sectional Committee, PCD 25	Last date for receipt of comment is **11 January 2025**

FOREWORD

(*Formal clauses will be added later*)

The primary function of refrigeration oil is to lubricate, either through splash or forced feed, the pistons or rotors and the bearings of the refrigeration compressor and to serve as a sealing medium. It also serves as an additional cooling medium to dissipate heat of motor windings in case of hermetically sealed compressor units. Unavoidably, the oil comes in contact with the refrigerant and is thus exposed to cold as well as relatively hot discharge temperatures in the refrigeration system. There are various kinds of refrigerants used in the present-day refrigerating machinery. Thus, the refrigeration oil should not only be a suitable lubricant for compressor mechanism, but it should also not react with the refrigerant in any way.

The oils should have satisfactory low temperature as well as relative high temperature characteristics, so that these will not tend to reduce heat transfer or produce clogging by congealing, oil-logging or forming waxy deposits in the capillary tube restictor or expansion valve and other passages of the refrigeration system. They should not decompose, react chemically with component parts, motor winding insulations or, flash and fire at relatively higher temperatures normally occurring in the system. Thus, resistance to formation of wax haze at low temperatures, pour point and foaming are some of the important characteristics of refrigeration oils. The exclusion of moisture from these oils is important to prevent corrosion, refrigerant decomposition and any ice formation in the system.

This standard was first published in 1968 and subsequently revised in 1989 in view of adoption of ISO viscosity grades for lubricants by oil industries. In the second revision in 1997, lubricants based on non-petroleum products such as synthetic base refrigeration oils with specified floc points were incorporated. A new viscosity grade VG 100 was also included. In this third revision, Amendment No. 1 dated August 2020 has been incorporated in the standard, vide which requirement of floc point is removed and requirement of type of base fluid is introduced.

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.

1 SCOPE

This standard prescribes the requirements, methods of sampling and test for lubricating oils for refrigeration machinery.

2 NORMATIVE REFERENCES

The following Indian 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:

IS No.	*Title*
1447: 1966	Methods of sampling of petroleum and its products
1448	Methods of test for petroleum and its products:
[P: 2] : 2007	Petroleum products and lubricants - Neutralization number - Potentiometric titration method (Second Revision)
[P: 4/ Sec 1]: 2021	Determination of Ash
[P: 10/ Sec 2] : 2021	Methods of test for petroleum and its products Part 10 Petroleum and related products from natural or synthetic sources Section 2 Determination of pour point
[P:12] : 2013	Determination of colour (Astm Scale) (Second Revision)
[P:15] : 2004	Petroleum products - Corrosiveness to copper - Copper strip test (third revision)
[P:25/ Sec 1] : 2018	Transparent and opaque liquids section 1 determination of kinematic viscosity and calculation of dynamic viscosity (Second Revision)
[P:56] : 2013	calculation of viscosity index from kinematic viscosity (Third Revision)
[P:69] : 2019	Determination of Flash and Fire Points - Cleveland Open Cup Method (Second Revision)
1783 (Part 2) : 2014	Drums large, fixed ends -- Specification: Part 2 Grade B drums (Fourth Revision)
5610 : 1993	Chloro - fluoro hydrocarbons of the methane and ethane series (second revision)

3 GRADES

The material shall be of six grades depending on its kinematic viscosity, namely, VG 15, VG 22, VG 32, VG 46, VG 68, and VG 100.

4 REQUIREMENTS

4.1 Description

The lubricating oil shall be a petroleum or non-petroleum product, with or without additives, possessing a high degree of resistance to corrosion and chemical stability towards refrigerants so as to meet the requirements of this standard. However, pour point depressant shall not be permitted.

4.2 The material shall also comply with the requirements prescribed in Table 1 when tested according to the methods of test as given in co1 9 of Table 1.

4.3 Viscosity Index

If required by the purchaser, viscosity index of the material may also be prescribed as agreed to between the purchaser and the supplier and it shall be tested in accordance with IS 1448 (Part 56).

5 PACKING AND MARKING

5.1 Packing

The packing shall be done in new and sound steel drums/barrels of 200 litres nominal capacity conforming to IS 1783 (Part 2). The drums/barrels shall be properly sealed against water and other contaminants.

Table 1 Requirement for Lubricating Oils for Refrigeration Machinery

Sl No.	Characteristics	Requirements for grade						Methods of test
		VG 15	VG 22	VG 32	VG 46	VG 68	VG 100	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
i)	Kinematic viscosity, cSt at 40°C							IS 1448 (Part 25/Sec 1)
	Max	16.5	24.2	35.2	50.6	74.8	110.0	
	Min	13.5	19.8	28.8	41.4	61.2	90.0	
ii)	Flash point (Cleveland open cup), °C, *Min*	140	140	150	150	160	190	IS 1448 (Part 69)
iii)	Pour point, °C, *Max*	-39	-36	-30	-24	-24	-24	IS 1448 (Part 10/Sec 2)
iv)	Colour, ASTM, *Max*	2.5	2.5	2.5	3.5	3.5	4	IS 1448 (Part 12)
v)	Acidity:							IS 1448 (Part 2)
	a) Total, mg KOH/g, *Max*	0.5	0.5	0.5	0.5	0.5	0.5	
	b) Inorganic	Nil	Nil	Nil	Nil	Nil	Nil	
vi)	Ash content, percent by mass, *Max*	0.01	0.01	0.01	0.01	0.01	0.01	IS 1448 (Part 4/Sec 1)
vii)	Copper corrosion at 100 °C, for 3 h, *Max*	1	1	1	1	1	1	IS 1448 (Part 15)
viii)	Water content	← Shall pass the crackle test →						Annex A
ix)	Type of base fluid	← To be reported →						-

5.2 Marking

5.2.1 The material shall be supplied in accordance with the marking instructions given by the purchaser.

5.2.2 Each drum shall be securely closed and marked with the following:

a) Name and grade of material;
b) Indication of the source of manufacture, initials or trade-mark, if any;
c) Volume of content in litres; and
d) Identification in code or otherwise to enable the lot of consignment or manufacture to be traced back from records

5.3 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 Act*, 2016 and the Rules and Regulations framed thereunder, and the products may be marked with the standard mark.

6 SAMPLING AND CRITERIA FOR CONFORMITY

6.1 Representative samples of the material shall be drawn as prescribed in IS 1447 (Part 1).

6.2 Tests for determining all the characteristics given in Table 1 shall be conducted on the composite sample.

6.3 Criteria for Conformity

The material shall be declared as conforming to the requirements of this standard, if all the test results on the composite sample satisfy the relevant requirements of this standard.

ANNEX A

[Table 1, Sl No. (viii)]

CRACKLE TEST FOR WATER CONTENT

A-l Place a representative sample of the oil in a clean and dry test tube about 125 mm long and 12 mm in diameter, in sufficient quantity to fill the test tube to the quarter of its depth, care being taken that the oil is not in an aerated condition. Heat the test tube containing the oil rapidly in a silent flame until the oil commences to boil and listen for any crackling.

A-2 The oil shall be considered to pass the test if it does not give an audible indication of free water by crackling