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Draft Indian Standard

KEROSENE— SPECIFICATION

(Fifth Revision of IS 1459)

(ICS 75.160.20)

Petroleum and their related products of synthetic
or biological origin Sectional Committee, PCD 03

Last date for receipt of
comment is **8 December 2023**

FOREWORD

(Formal clauses to be added later)

This standard was first published in 1959 and subsequently revised in 1968, 1974, 2016, and 2018.

It was first revised to include two grades of kerosene, namely, SK grade and 1K grade. It was amended in 1972 in order to modify the requirements of 1K grade kerosene. The second revision was prepared in 1974 in light of the market requirement of kerosene in the country and since the production of 1K grade kerosene in the country was discontinued, it was deleted from the specification and only SK grade was retained.

Further, the colour requirement of SK grade kerosene was reduced from +21 Saybolt to +10 Saybolt through an amendment in 1993. In accordance with the decision taken by Government of India that kerosene to be supplied through Public Distribution System (PDS) would be coloured blue, requirements for suitable blue dye, its concentration range, and its colour requirements in case of coloured kerosene were included.

In the third revision, sulphur limit was reduced to address environmental concerns. Further, for the burning quality test it was specified that it is applicable only for supply made to railways and is to be done at refinery end. Further, all the amendments issued were incorporated and test methods were updated.

In the fourth revision, a new grade of low sulphur kerosene (Grade A) was included besides the existing grade (Grade B), considering the request received from Ministry of Environment, Forest and Climate Change, Government of India, to support reduction of indoor air pollution. Amendment issued after third revision was also incorporated.

In this fifth revision, the following major changes have been made:

- a) Grade B high sulfur kerosene has been removed since production of this grade was stopped in 2020 as per MOPNG guidelines; and
- b) Aromatics content parameter has been introduced as an alternate parameter to burning quality test parameter.

Reference to alternate overseas standards like ASTM, IP etc. has been given for few parameters. The alternate test methods are provided in Annex B and in case of dispute, the referee method shown in the Table 1 shall be followed.

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 specified value in this standard.

1 SCOPE

This standard prescribes requirements and methods of sampling and test for kerosene intended for use as an illuminant and as a fuel.

2 REFERENCES

The standards given below 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:

<i>IS No. / International Standard</i>	<i>Title</i>
IS 1260 (Part 1) : 1973	Pictorial marking for handling and labeling of goods: Part 1 Dangerous good (<i>first revision</i>)
IS 1447 (Part 1) : 2021	Petroleum and its products — Methods of sampling: Part 1 Manual sampling (<i>second revision</i>)
IS 1448 (Part 5) : 1970	Method of test for petroleum and its products: Burning quality (<i>first revision</i>)
(Part 13) : 2023	Colour by Lovibond Tintometer (<i>first revision</i>)
(Part 14) : 2019	Colour by Saybolt Chromometer (<i>first revision</i>)

(Part 15) : 2004/ ISO 2160 : 1998	Petroleum products — Corrosiveness to copper — copper strip test (<i>third revision</i>)
(Part 16) : 2014/ ISO 3675 : 1998	Crude petroleum and liquid petroleum products — Laboratory determination of density—Hydrometer method (<i>fourth revision</i>)
(Part 20) : 2019/ ISO 13736 : 2013	Determination of flash point — Abel closed — Cup method (<i>third revision</i>)
(Part 23) : 2004/ ISO 3837 : 1993	Liquefied petroleum gases — Determination of hydrocarbon types — Fluorescent indicator adsorption method (<i>fourth revision</i>)
(Part 31) : 2017	Determination of smoke point (<i>second revision</i>)
(Part 34) : 1979	Determination of sulphur in petroleum products (lamp method) (<i>second revision</i>)
(Part 167) : 2018 ISO 12185 : 1996	Determination of density — Oscillating U - tube method
(Part 183) : 2021/ ISO 14935 : 2020	Determination of wick flame persistence of fire-resistant Fluids
Part 188 : 2021/ ISO 6618 : 1997	Determination of acid or base number colour-indicator titration method
IS 4905 : 2015 / ISO 24153 : 2009	Random sampling and randomization procedures (<i>first revision</i>)
IS 17315 (Part 1) : 2019/ ISO 4259-1 : 2017	Petroleum and related products — Precision of measurement methods and results Part 1 Determination of precision data in relation to methods of test
ISO 3014 :1993	Petroleum products — Determination of the smoke point of kerosene
ISO 3405 : 2019	Petroleum and related products from natural or synthetic sources — Determination of distillation characteristics at atmospheric pressure
ISO 8754 : 2003	Petroleum products — Determination of sulfur content — Energy-dispersive X-ray fluorescence spectrometry

3 REQUIREMENTS

3.1 The material shall consist of refined petroleum distillates. It shall be free from visible water, sediment and suspended matter. A suitable blue dye of appropriate concentration may also be added, wherever required.

3.1.1 Dye

A suitable blue dye of alkyl amino anthraquinone type shall be added to kerosene required to be dyed for the purpose of easy product identification. Such dye shall be added in the concentration range of 4 to 6 ppm of active ingredient (*see Annex A for the test method*) to the kerosene and the dyed kerosene shall also comply with the requirements given in **3.2**

3.2 The material shall also comply with the requirements given in Table 1, when tested according to appropriate methods prescribed in col 4 of the Table 1.

3.3 All the test methods referred to in this standard include a precision statement. The interpretation of results based on test method/precision shall be used, whenever applicable. In case of dispute, the procedure described in IS 17315 (Part 1) shall be used.

Table 1 Specification for Kerosene
(Clause 3.2)

SI No.	Characteristic	Requirement	Test Method, Refer to Parts of IS 1448/ISO/ASTM/IP/Annex IS 1459
(1)	(2)	(3)	(5)
i)	Appearance	Clear and bright. Free from undissolved water, foreign matter and other visible impurities	Visual
ii)	Acidity, inorganic	Nil	Part 188
iii)	Burning quality ¹⁾		Part 5
	a) Char Value, mg/kg of oil consumed, <i>Max</i> b) Bloom on glass chimney Or Aromatics Content ²⁾ , v/v, <i>Max</i>	20 Not darker than grey 30.0	 Part 23
iv)	Colour		Part 14
	a) Saybolt (in case of undyed Kerosene) ²⁾ , <i>Min</i> b) Visual (in case of dyed Kerosene)	10 Blue	 Visual/Annex A ³⁾
v)	Copper strip corrosion, for 3 h at 50 °C, <i>Max</i>	1a	Part 15
vi)	Density at 15 °C, kg/m ³	Not limited, but to be reported	Part 16 ³⁾ / Part 167
vii)	Distillation		Part 18 ³⁾ / ISO 3405

	a) Percent recovered below 200 °C, percent (v/v), <i>Min</i>	20	
	b) Final boiling point, °C, <i>Max</i>	300	
viii)	Flash point (Abel), °C, <i>Min</i>	35	Part 20
ix)	Smoke point ⁴⁾ , mm, <i>Min</i>	18	Part 31 / ISO 3014 ³⁾
x)	Total sulphur content, percent (m/m), <i>Max</i>	0.10	Part 34 / ISO 8754 ³⁾

NOTES

¹⁾ This test is to be done at refinery end.

²⁾ Where Saybolt chromometer is not available, Lovibond colour of the sample kept in an 18 cell may be measured according to IS 1448 (Part 13) in which case the colour shall not be deeper than standard white (IP 4.0). However, in case of dispute IS 1448 (Part 14) shall be referee method.

³⁾ In case of dispute, this method shall be referee method

⁴⁾ For supplies to Defence and Railways signal lamps the smoke point of the product shall be 22 mm, *Min*.

4 PACKING AND MARKING**4.1 Packing**

The material shall be packed in suitable tinplate containers or as agreed to between the purchaser and the supplier and subject to the provision of Red Tariff No.17, Rules and Rates for the Conveyance by Rail of Explosives and Other Dangerous Goods, issued by Indian Railway Conference Association, with any alterations or additions made thereafter.

4.2 Marking

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

Each container shall be marked with the following information:

- a) Name and colour of the material;
- b) Manufacturer's name, initials, or trade-mark, if any;
- c) Volume of the material in litres;
- d) Year of packing; and
- e) The caution label 'FLAMMABLE' together with the corresponding symbol for labeling dangerous goods as given in Fig. 5 of IS 1260 (Part 1).

4.3 BIS Certification Marking

The product may also be marked with standard mark.

4.3.1 The use of the standard mark is governed by the provisions of the *Bureau of Indian Standards Act, 2016* and the Rules and Regulations made there under. The details of the conditions under which the licence for use of the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

5 SAMPLING

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

5.2 Test on flash point shall be conducted on individual samples and the rest of the tests, on the composite samples.

ANNEX A

[Table 1 Sl. No. (iv) and Clause 3.1.1]

MEASUREMENT OF CONCENTRATION OF DIALKYL AMINO- ANTHRAQUINONE DYE IN KEROSENE BY UV-VISIBLE SPECTROSCOPY

A-1 GENERAL

This method is for the determination of concentration of dialkyl amino-anthraquinone type dye in kerosene.

A-2 OUTLINE OF THE METHOD

The ultraviolet absorption spectrum of the kerosene sample having dialkyl amino-anthraquinone type dye in the range of 1 to 20 ppm is recorded and a baseline correction technique is used to compensate for background absorption of the sample. The maximum value of absorption obtained in the 645 to 655 nm range is fitted in a standard curve of concentration of dialkyl amino-anthraquinone dye versus absorption and to find out the concentration of dye in the sample under test.

A-3 APPARATUS

A-3.1 UV-Visible Spectrophotometer — Capable of operation in the range of 200 to 800 nm with a special slit width of 1 nm and capable of 0.01 percent precision in absorbance measurement at 1.0 level at this resolution.

A-3.2 Absorption Cells — Quartz, 10 mm path length, polytetrafluoroethylene (PTFE) cover.

A-3.3 Millipore Microfiltration Assembly

A-3.4 PTFE Filters — Of 0.8 μm size.

A-4 SAMPLING

About 100 ml sample is filtered through PTFE (0.8 μm) membrane to make the sample free from any insoluble particles.

A-5 PROCEDURE

Wash the absorption cells properly and dry them. Fill one 10 mm absorption cell with the filtered dyed sample. Fill an identical cell with sample without dye to be used as a reference. Measure the absorbance at 645 to 655 nm range. Make successive dilutions with kerosene without dye, as required, if the absorbance is greater than 1.0 at 645 to 655 nm range. Determine the maximum absorption value of the single peak in this region. Fit the absorption value in the standard curve of absorption versus concentration of dye (*see* Fig. 1) and find out the concentration of dye in the unknown sample.

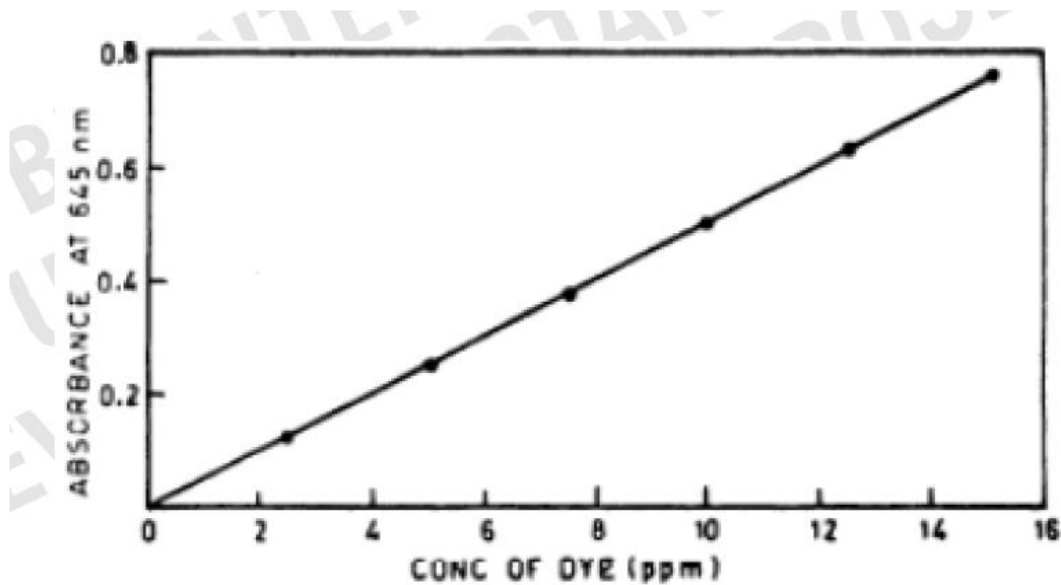


FIG. 1 STANDARD CURVE OF ABSORBANCE VS. CONC OF DYE

ANNEX B*(Foreword)***ALTERNATE TEST METHODS**

<i>Characteristic</i>	<i>Alternate Method of Test</i>
Acidity, inorganic	IP 139
Burning quality	IP 10
Aromatic content	ASTM D1319 / IP 156 / ASTM D6379 / IP 436
Colour Saybolt	ASTM D156
Copper strip corrosion	ASTM D130 / IP 154
Density at 15 °C	ASTM D1298/ASTM D4052
Distillation characteristics	ASTM D86 / ASTM D7345 / IP 123
Flash point (Abel)	IP 170
Smoke point	ASTM D1322 / IP 598
Total sulphur content	ASTM D4294 / ASTM D 2622 / ASTM D5453