

भारतीय मानक
Indian Standard

IS 1593 : 2018

ईंधन तेल — विशिष्टि
(तीसरा पुनरीक्षण)

Fuel Oils — Specification
(Third Revision)

ICS 75.160.20

© BIS 2018



भारतीय मानक ब्यूरो
BUREAU OF INDIAN STANDARDS
मानक भवन, 9 बहादुरशाह ज़फर मार्ग, नई दिल्ली-110002
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI-110002
www.bis.org.in www.standardsbis.in

August 2018

Price Group 2

Petroleum and their Related Products of Synthesis or Biological Origin Sectional Committee, PCD 3

FOREWORD

This Indian Standard (Third Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Petroleum, Lubricants and their Related Products Sectional Committee had been approved by the Petroleum, Coal and Related Products Division Council.

This standard was originally published in 1960 and subsequently revised in 1971. The second revision was formulated in 1982 in which the requirements for pour point, as optional requirements as agreed to between the purchaser and the supplier and relative density have been incorporated.

This third revision is formulated after the review of the standard in light of the present day requirements of fuel oils for various end uses. In this revision, test parameters like asphaltene content, total sediment and cleanliness spot test are incorporated as optional requirement, as agreed to between the purchaser and the supplier and carbon residue in the table. Further, the special requirement for Naval use as mentioned in 4 and Note 2 below Table 1 of second revision, is removed, considering a separate specification ISO 8217 being used for marine fuels. This edition incorporates all amendments.

This standard contains 4.2 to 4.5 which calls for an agreement between the purchaser and the supplier.

The following alternate test methods are also available for the characteristics stated and in case of dispute the corresponding part of IS 1448 (except for sulphur), as given in Table 1 shall be the referee test method.

Characteristics	Alternate Methods of Test
Ash content	ASTM D482
Carbon residue	IP 13/ IP 398 /ASTM D 4530
Density and relative density	ASTM D1298, ASTM D4052, ISO 3675
Flash point	ASTM D 93 (Procedure B), ISO 2719
Kinematic viscosity	ASTM D7042, ASTM D445
Sediment	ASTM D 473
Total sulphur	ASTM D 4294, ASTM D 2622
Water content	ASTM D95

References to various other overseas standards like ASTM, IP, etc, has been mentioned, as presently there is no Indian Standard available for them.

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 latest IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

FUEL OILS — SPECIFICATION

(*Third Revision*)

1 SCOPE

This standard prescribes the requirements and the methods of sampling and test for fuel oils, essentially residual in character, for industrial uses. These fuel oils are primarily intended for oil fired furnaces. The low viscosity grade oil is suitable for use as diluents for creosote.

2 REFERENCES

The following standards contain provisions which through reference in this text, constitute provision of the 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.</i>	<i>Title</i>
1447 (Part 3) : 1992	Petroleum and its products — Methods of sampling Part 3 Method of sampling of semi-solid and solid petroleum products (<i>first revision</i>)
1448	Method of test for petroleum and its products
[P : 4] : 2008/ ISO 6245 : 2001	Petroleum products — Determination of ash (<i>second revision</i>)
[P : 6] : 1984	Heat of combustion of liquid
[P : 7] : 2004	Determination of calorific value by calculation (<i>first revision</i>)
[P : 10/ Sec 1) : 2012/ ISO 3015:1992	Cloud point and pour point: Section 1 Determination of cloud point (<i>second revision</i>)
[P : 16] : 1990	Density, relative density or API gravity of crude petroleum and liquid petroleum products by hydrometer method (<i>third revision</i>)
[P : 21):2012/ ISO 2719:2002	Determination of Flash point — Pensky-Martens closed cup method (<i>third revision</i>)
[P : 22] : 1985	Asphaltene precipitation with normal heptane (<i>second revision</i>)
[P : 25] : 1976	Determination of kinematic and dynamic viscosity (<i>first revision</i>)
[P : 30] : 2013/ ISO 3735 : 1999	Sediment in crude and fuel oils by extraction (<i>first revision</i>)

<i>IS No.</i>	<i>Title</i>
[P : 32] : 1992	Density and relative density (<i>second revision</i>)
[P : 33] : 1991	Sulphur by bomb method (<i>second revision</i>)
[P : 40] : 1987	Water by distillation (<i>third revision</i>)
[P : 122] : 2013 / ISO 6615 : 1993	Determination of carbon residue — Conradson method (<i>first revision</i>)
[P : 143] : 1993	Evaluation of white mineral oils by ultraviolet absorption
ISO 3104 : 1994	Petroleum products — Transparent and opaque liquids — Determination of kinematic viscosity and calculation of dynamic viscosity
ISO 3733 : 1999	Petroleum products and bituminous materials — Determination of water — Distillation method
ISO 4259 : 2006	Petroleum products — Determination and application of precision data in relation to methods of test
ISO 8754 : 2003	Petroleum products — Determination of sulfur content — Energy dispersive X-ray fluorescence spectrometry
ISO 10307-2 : 2009	Petroleum products — Total sediment in residual fuel oils — Part 2: Determination using standard procedures for ageing
ISO 10370 : 2014	Petroleum products — Determination of carbon residue — Micro method
ISO 2719 : 2016	Determination of flash point — Pensky — Martens closed cup method

3 GRADES

There shall be following four grades of the material:

- a) Grade LV : Low viscosity
- b) Grade MV1 : Medium viscosity
- c) Grade MV2 : Medium viscosity and
- d) Grade HV : High viscosity

IS 1593 : 2018

4 REQUIREMENTS

4.1 General

The material shall be hydrocarbon oils derived from petroleum or shale. This, however, shall not preclude the incorporation of small amounts of additives of hydrocarbon or non-hydrocarbon origin-intended to improve ignition, combustion or other characteristics.

4.1.1 The material shall be free from grit and other foreign impurities.

4.2 Pour Point

The requirement for the pour point of the material, when tested according to latest IS 1448 [P: 10], shall be as agreed to between the purchaser and the supplier.

4.3 Asphaltene Content

The requirement for the asphaltene content of the material, when tested according to latest IS 1448 [P:22] / ASTM D 6560 / IP 143, shall be as agreed to between the purchaser and the supplier.

4.4 TOTAL SEDIMENT

The requirement for the total sediment content of the material, when tested according to latest ISO 10307

(Section 1 and 2) / ASTM D 4870, shall be as agreed to between the purchaser and the supplier.

4.5 Spot Test

The requirement for the spot test of the material, when tested according to latest ASTM D 4740, shall be as agreed to between the purchaser and the supplier.

4.6 The material shall also comply with the requirements prescribed in Table 1, when tested according to the appropriate methods, as given in col 7 of Table 1.

5 PACKING AND MARKING

5.1 Packing

The material shall be packed in suitable containers as agreed to between the purchaser and the supplier, and subject to the provisions. *Red Tariff No. 18 rules and rates for the conveyance by rail of explosive and other dangerous goods*, issued by the Indian Railways Conference Association, with any alternations made thereafter.

5.2 Marking

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

Table 1 Requirements for Fuel Oils
(Clause 4.6)

Sl No	Characteristic	Requirement				Method of Test, Ref to [P:] of IS1448/ISO/ASTM/IP)
		Grade LV	Grade MV1	Grade MV2	Grade HV	
(1)	(2)	(3)	(4)	(5)	(6)	(7)
i)	Acidity, inorganic	Nil	Nil	Nil	Nil	ASTM D974 ³⁾ /IP 139
ii)	Ash, percent by mass, <i>Max</i>	0.1	0.1	0.1	0.1	[P : 4]
iii)	Carbon residue, mass percent, <i>Max</i>	14	16	18	20	[P : 122]/ISO 10370 ³⁾
iv)	Gross, calorific value	Not limited, but to be reported ¹⁾				[P : 6] ³⁾ / [P : 7]
v)	Density at 15°C kg/m ³ or Relative density at 15.6/15.6°C	Not limited, but to be reported				[P : 16] or [P : 32]
vi)	Flash point (Pensky Martens (closed), °C, <i>Min</i>	66	66	66	66	[P : 21]
vii)	Kinematic viscosity in centistokes at 50°C	80 (<i>Max</i>)	80 - 125	125 -180	180- 380	[P : 25]/ISO 3104
viii)	Sediment, percent by mass, <i>Max</i>	0.25	0.25	0.25	0.25	[P : 30]
ix)	Sulphur, total, percent by mass, <i>Max</i> ²⁾	3.5	4.0	4.0	4.5	[P : 33]/ISO 8754 ³⁾
x)	Water content, percent by volume, <i>Max</i>	1.0	1.0	1.0	1.0	[P : 40]/ISO 3733

NOTES

- 1 Normally the gross calorific value is of the order of 10 000cal/g.
- 2 Recognizing the necessity for low-sulphur fuel oils in some specialized user, a lower limit may be specified by mutual agreement between the purchaser and the supplier.
- 3 In case of dispute, this method shall be referee method
- 4 All the test method referred to in this standard method 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 ISO 4259 shall be used.

IS 1593 : 2018

5.2.2 Each container shall be marked with the following information:

- a) Name and grade of the material;
- b) Manufacturers' name, initials of trade-mark;
- c) Volume of the contents in litres; and
- d) Year of manufacture or packing.

5.2.3 *BIS Certification Marking*

Each container may also be marked with the Standard Mark.

5.2.4 The use of the Standard Mark is governed by the provisions of *Bureau of Indian Standards Act, 2016* and the Rules and Regulations made thereunder. The details of conditions under which the licence for the

use of Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

6 SAMPLING

6.1 Representative samples of the material shall be drawn as prescribed in IS 1447 (Part 3).

6.2 All the requirements given in this specification shall be tested on the composite sample.

6.3 The lot shall be declared as conforming to the requirements of this specification, if all the test results on the composite sample meet the corresponding specification requirements.

Bureau of Indian Standards

BIS is a statutory institution established under the *Bureau of Indian Standards Act, 2016* to promote harmonious development of the activities of standardization, marking and quality certification of goods and attending to connected matters in the country.

Copyright

BIS has the copyright of all its publications. No part of these publications may be reproduced in any form without the prior permission in writing of BIS. This does not preclude the free use, in the course of implementing the standard, of necessary details, such as symbols and sizes, type or grade designations. Enquiries relating to copyright be addressed to the Director (Publications), BIS.

Review of Indian Standards

Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the latest issue of ‘BIS Catalogue’ and ‘Standards : Monthly Additions’.

This Indian Standard has been developed from Doc No.: PCD 03 (10328).

Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

BUREAU OF INDIAN STANDARDS

Headquarters:

Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110002
Telephones : 2323 0131, 2323 3375, 2323 9402 *Website*: www.bis.org.in

Regional Offices:

	<i>Telephones</i>
Central : Manak Bhavan, 9 Bahadur Shah Zafar Marg NEW DELHI 110002	{ 2323 7617 2323 3841
Eastern : 1/14 C.I.T. Scheme VII M, V. I. P. Road, Kankurgachi KOLKATA 700054	{ 2337 8499, 2337 8561 2337 8626, 2337 9120
Northern : Plot No. 4-A, Sector 27-B, Madhya Marg, CHANDIGARH 160019	{ 26 50206 265 0290
Southern : C.I.T. Campus, IV Cross Road, CHENNAI 600113	{ 2254 1216, 2254 1442 2254 2519, 2254 2315
Western : Manakalaya, E9 MIDC, Marol, Andheri (East) MUMBAI 400093	{ 2832 9295, 2832 7858 2832 7891, 2832 7892

Branches: AHMEDABAD. BENGALURU. BHOPAL. BHUBANESHWAR. COIMBATORE. DEHRADUN. DURGAPUR. FARIDABAD. GHAZIABAD. GUWAHATI. HYDERABAD. JAIPUR. JAMMU. JAMSHEDPUR. KOCHI. LUCKNOW. NAGPUR. PARWANOO. PATNA. PUNE. RAIPUR. RAJKOT. VISAKHAPATNAM.