BS ISO 8217:2017

BSI Standards Publication

# Petroleum products — Fuels (class F) — Specifications of marine fuels

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## National foreword

This British Standard is the UK implementation of ISO 8217:2017. It supersedes BS ISO 8217:2012 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee PTI/2, Liquid Fuels.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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# INTERNATIONAL STANDARD

# ISO 8217

Sixth edition
2017-03

# Petroleum products — Fuels (class F) — Specifications of marine fuels

*Produits pétroliers — Combustibles (classe F) — Spécifications des combustibles pour la marine*

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# Contents

Page

**Foreword** ..... **iv**
**Introduction** ..... **v**
**1 Scope** ..... **1**
**2 Normative references** ..... **1**
**3 Terms and definitions** ..... **3**
**4 Application and sampling** ..... **3**
**5 General requirements** ..... **3**
**6 Test methods** ..... **4**
6.1 Density ..... 4
6.2 CCAI ..... 4
6.3 Sulfur ..... 4
6.4 Flash point ..... 4
6.5 Hydrogen sulfide ..... 5
6.6 Acid number ..... 5
6.7 Oxidation stability ..... 5
6.8 Total sediment by hot filtration ..... 5
6.9 Total sediment — Aged ..... 5
6.10 Fatty acid methyl ester(s) (FAME) ..... 5
6.11 Pour point/cloud point/cold filter plugging point ..... 5
6.12 Appearance/water ..... 6
6.13 Lubricity ..... 6
6.14 Vanadium ..... 6
6.15 Sodium ..... 6
6.16 Aluminium plus silicon ..... 6
6.17 Used lubricating oil (ULO) ..... 6
**7 Specific energy** ..... **7**
**8 Precision and interpretation of test results** ..... **7**
**Annex A** (informative) **Bio-derived products including fatty acid methyl esters** ..... **12**
**Annex B** (informative) **Deleterious materials** ..... **14**
**Annex C** (informative) **Ignition characteristics of residual marine fuels** ..... **15**
**Annex D** (informative) **Hydrogen sulfide** ..... **17**
**Annex E** (informative) **Acidity** ..... **18**
**Annex F** (informative) **Ash** ..... **19**
**Annex G** (informative) **Used lubricating oil** ..... **20**
**Annex H** (informative) **Specific energy** ..... **21**
**Bibliography** ..... **22**

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# Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 28, *Petroleum products and related products of synthetic or biological origin*, Subcommittee SC 4, *Classifications and specifications*.

This sixth edition cancels and replaces the fifth edition (ISO 8217:2012), which has been technically revised.


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# Introduction

## General

This document was prepared in cooperation with ship owners, ship operators, shipping associations, national standards bodies, classification societies, fuel testing services, engine designers, marine fuel suppliers, fuel additive suppliers and the petroleum industry to meet the requirements for marine fuels supplied on a world-wide basis for consumption on board ships.

The increasing demands of environmental legislation are leading to a transition in the nature of marine fuels supplied from traditional oil products derived from the processing of petroleum crude to the potential inclusion of oil products derived from renewable and/or alternative sources. This document takes into consideration the diverse nature of these fuels and incorporates a number of categories of distillate or residual fuels, even though not all categories may be available in every supply location.

## Classification

The categories of fuel in this document have been classified in accordance with ISO 8216-1[1].

At the time of preparation of this document, a number of unconventional fuels have been offered to the market which do not conform exactly to this particular distillate/residual categorization. In these instances, it is recommended that the fuel characteristics or limits should be agreed between the purchaser and supplier and defined by both a category of fuel as given by this document together with any different or additional fuel characteristics or limits necessary to adequately define that fuel.

## International statutory requirements

This document specifies allowable minimum flash point limits following the provisions given in the SOLAS Convention[2]. MARPOL Annex VI[3], which controls air pollution from ships, includes a requirement that either the fuel shall not exceed a specified maximum sulfur content or an approved equivalent alternative means be used. During the lifetime of this document, regional and/or national bodies may introduce their own local emission requirements, which can impact the allowable sulfur content, for example, the EU Sulphur Directive[4]. It is the purchaser's and the user's responsibility to establish which statutory requirements are to be met and specify on that basis the corresponding maximum fuel sulfur content to the supplier.

## Changes with respect to ISO 8217:2012

This sixth edition reflects important and significant changes. These include substantial amendments to the scope (Clause 1) and to the general requirements (Clause 5).

Changes to the distillate fuels include the following:

— additional grades, DFA, DFZ and DFB have been added with a maximum fatty acid methyl ester(s) (FAME) content of 7,0 volume %;

— the sulfur content of DMA and DMZ has been reduced to a maximum of 1,00 mass %;

— the sulfur content of DMB has been reduced to a maximum of 1,50 mass %;

— requirements for the following characteristics have been added to winter grades of DMA and DMZ: cloud point and cold filter plugging point.

The following annexes, previously included, have been deleted, but the key information is included in the body of this document or is available in referenced industry publications:

— Sulfur content;

— Flash point;

— Catalyst fines;

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— Precision and interpretation of test results.

All other annexes have been reviewed and updated.


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INTERNATIONAL STANDARD ISO 8217:2017(E)

# Petroleum products — Fuels (class F) — Specifications of marine fuels

**WARNING — The handling and use of products specified in this document can be hazardous if suitable precautions are not observed. This document does not purport to address all of the safety and health considerations that can be associated with its use. It is the responsibility of the users of this document to establish appropriate safety and health practices and to determine the applicability of regulatory limitations prior to use.**

## 1 Scope

This document specifies the requirements for fuels for use in marine diesel engines and boilers, prior to conventional onboard treatment (settling, centrifuging, filtration) before use. The specifications for fuels in this document can also be applied to fuels used in stationary diesel engines of the same or similar type as those used for marine purposes.

This document specifies seven categories of distillate fuels, one of which is for diesel engines used for emergency purposes. It also specifies six categories of residual fuels.

For the purposes of this document, the term "fuels" is currently used to include the following:

— hydrocarbons from petroleum crude oil, oil sands and shale;

— hydrocarbons from synthetic or renewable sources, similar in composition to petroleum distillate fuels;

— blends of the above with a fatty acid methyl ester(s) (FAME) component where permitted.

NOTE 1 Appropriate guidance about fuel treatment systems for diesel engines is published by the International Council on Combustion Engines (CIMAC)[5].

NOTE 2 Requirements for gas turbine fuels used in marine applications are specified in ISO 4261[6].

NOTE 3 For the purposes of this document, the terms "mass %" and "volume %" are used to represent the mass and volume fractions respectively.

## 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 2719, *Determination of flash point — Pensky-Martens closed cup method*

ISO 3015, Petroleum products — Determination of cloud point

ISO 3016, *Petroleum products — Determination of pour point*

ISO 3104, *Petroleum products — Transparent and opaque liquids — Determination of kinematic viscosity and calculation of dynamic viscosity*

ISO 3675, *Crude petroleum and liquid petroleum products — Laboratory determination of density — Hydrometer method*

ISO 3733, *Petroleum products and bituminous materials — Determination of water — Distillation method*

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ISO 4259, *Petroleum products — Determination and application of precision data in relation to methods of test*

ISO 4264, *Petroleum products — Calculation of cetane index of middle-distillate fuels by the four-variable equation*

ISO 6245, *Petroleum products — Determination of ash*

ISO 8754, *Petroleum products — Determination of sulfur content — Energy-dispersive X-ray fluorescence spectrometry*

ISO 10307-1, *Petroleum products — Total sediment in residual fuel oils — Part 1: Determination by hot filtration*

ISO 10307-2, *Petroleum products — Total sediment in residual fuel oils — Part 2: Determination using standard procedures for ageing*

ISO 10370, *Petroleum products — Determination of carbon residue — Micro method*

ISO 10478, *Petroleum products — Determination of aluminium and silicon in fuel oils — Inductively coupled plasma emission and atomic absorption spectroscopy methods*

ISO 12156-1, *Diesel fuel — Assessment of lubricity using the high-frequency reciprocating rig (HFRR) — Part 1: Test method*

ISO 12185, *Crude petroleum and petroleum products — Determination of density — Oscillating U-tube method*

ISO 12205, *Petroleum products — Determination of the oxidation stability of middle-distillate fuels*

ISO 12937, *Petroleum products — Determination of water — Coulometric Karl Fischer titration method*

ISO 13739, *Petroleum products — Procedures for transfer of bunkers to vessels*

ISO 14596, *Petroleum products — Determination of sulfur content — Wavelength-dispersive X-ray fluorescence spectrometry*

ISO 14597, *Petroleum products — Determination of vanadium and nickel content — Wavelength-dispersive X-ray fluorescence spectrometry*

ASTM D664, *Standard Test Method for Acid Number of Petroleum Products by Potentiometric Titration*

ASTM D4294, *Standard Test Method for Sulfur in Petroleum and Petroleum Products by Energy Dispersive X-ray Fluorescence Spectrometry*

ASTM D6751, *Standard Specification for Biodiesel Fuel Blend Stock (B100) for Middle Distillate Fuels*

ASTM D7963, *Standard Test Method for determination of the contamination level of Fatty Acid Methyl Esters in middle distillate and residual fuels using flow analysis by Fourier-Transform Infrared spectroscopy-rapid screening method*

EN 14214, *Liquid petroleum products — Fatty acid methyl esters (FAME) for use in diesel engines and heating applications — Requirements and test methods*

IP 309, *Diesel and domestic heating fuels — Determination of cold filter plugging point*

IP 470, *Determination of aluminium, silicon, vanadium, nickel, iron, calcium, zinc and sodium in residual fuel oil by ashing, fusion and atomic absorption spectrometry*

IP 500, *Determination of the phosphorus content of residual fuels by ultra-violet spectrometry*

IP 501, *Determination of aluminium, silicon, vanadium, nickel, iron, sodium, calcium, zinc and phosphorus in residual fuel oil by ashing, fusion and inductively coupled plasma emission spectrometry*


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IP 570, *Determination of hydrogen sulfide in fuel oils — Rapid liquid phase extraction method*

IP 579, *Liquid petroleum products — Determination of fatty acid methyl ester (FAME) content in middle distillates — Infrared spectrometry method*

IP 612,*Diesel and domestic heating fuels — Determination of cold filter plugging point Linear cooling bath method — Linear cooling bath method*

## 3 Terms and definitions

No terms and definitions are listed in this document.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— IEC Electropedia: available at http://www.electropedia.org/

— ISO Online browsing platform: available at http://www.iso.org/obp/

## 4 Application and sampling

This document specifies the required properties for fuels at the time and place of custody transfer. Samples for quality verification may be taken in any location agreed between the parties.

The sampling of fuels for analysis shall be carried out in accordance with the procedures given in ISO 13739 or an equivalent national standard. Where specific sampling requirements are documented in the referenced test methods, these shall be adhered to.

## 5 General requirements

**5.1** The fuel as supplied shall be homogeneous and conform to the characteristics and limits given in Table 1 or Table 2, as appropriate, when tested in accordance with the methods specified.

The fuel composition shall consist predominantly of hydrocarbons primarily derived from petroleum sources while it may also contain hydrocarbons from the following:

— synthetic or renewable sources such as Hydrotreated Vegetable Oil (HVO), Gas to Liquid (GTL) or Biomass to Liquid (BTL);

— co-processing of renewable feedstock at refineries with petroleum feedstock.

The DF grades, as defined in ISO 8216, include up to 7,0 volume % FAME (see Table 1), where FAME at the time of blending shall be in accordance with the requirements of EN 14214 or ASTM D6751.

DMX shall be free of FAME.

The DMA, DMZ, DMB and RM grades shall not include FAME other than a "*de minimis*" level. In the context of this document, "*de minimis*" means an amount that does not render the fuel unacceptable for use in marine applications that are not designed or suited to handling fuels containing FAME.

NOTE See Annex A for more details on the level and impacts of FAME.

**5.2** The fuel shall be free from any material at a concentration that causes the fuel to be unacceptable for use in accordance with Clause 1 (i.e. material not at a concentration that is harmful to personnel, jeopardizes the safety of the ship, or adversely affects the performance of the machinery).

NOTE See Annex B.

**5.3** Subject to the requirements of 5.1 and 5.2, additives that improve some aspects of the fuel's characteristics or performance are permitted.

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