



DRAFT EAST AFRICAN STANDARD

Biodiesel (B100) fuel – Specification

EAST AFRICAN COMMUNITY

Copyright notice

This EAC document is copyright-protected by EAC. While the reproduction of this document by participants in the EAC standards development process is permitted without prior permission from EAC, neither this document nor any extract from it may be reproduced, stored or transmitted in any form for any other purpose without prior written permission from EAC.

Requests for permission to reproduce this document for the purpose of selling it should be addressed as shown below or to EAC's member body in the country of the requester:

© East African Community 2026 — All rights reserved
East African Community
P.O. Box 1096,
Arusha
Tanzania
Tel: + 255 27 2162100
Fax: + 255 27 2162190
E-mail: eac@eachq.org
Web: www.eac-quality.net

Reproduction for sales purposes may be subject to royalty payments or a licensing agreement. Violators may be prosecuted.

Foreword

Development of the East African Standards has been necessitated by the need for harmonizing requirements governing quality of products and services in the East African Community. It is envisaged that through harmonized standardization, trade barriers that are encountered when goods and services are exchanged within the Community will be removed.

The Community has established an East African Standards Committee (EASC) mandated to develop and issue East African Standards (EAS). The Committee is composed of representatives of the National Standards Bodies in Partner States, together with the representatives from the public and private sector organizations in the community.

East African Standards are developed through Technical Committees that are representative of key stakeholders including government, academia, consumer groups, private sector and other interested parties. Draft East African Standards are circulated to stakeholders through the National Standards Bodies in the Partner States. The comments received are discussed and incorporated before finalization of standards, in accordance with the principles and procedures for development of East African Standards.

East African Standards are subject to review, to keep pace with technological advances. Users of the East African Standards are therefore expected to ensure that they always have the latest versions of the standards they are implementing.

The committee responsible for this document is Technical Committee EASC/TC 067, *Biofuels*.

Attention is drawn to the possibility that some of the elements of this document may be subject of patent rights. EAC shall not be held responsible for identifying any or all such patent rights.

Biodiesel (B100) fuel – Specification

1 Scope

This Draft East African Standard specifies requirements, test methods and sampling for biodiesel (B100) intended for use as fuel in diesel engines operating on B100 or as a blend component for automotive gas oil.

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.

ASTM D974, Standard Test Method for Acid and Base Number by Color-Indicator Titration

ASTM D2500, Standard Test Method for Cloud Point of Petroleum Products and Liquid Fuels

ASTM D4057, Standard Practice for Manual Sampling of Petroleum and Petroleum Products

ASTM D4177, Standard Practice for Automatic Sampling of Petroleum and Petroleum Products

ASTM D4951, Standard Test Method for Determination of Additive Elements in Lubricating Oils by Inductively Coupled Plasma Atomic Emission Spectrometry

ASTM D6371, Standard Test Method for Cold Filter Plugging Point of Diesel and Heating Fuels

ASTM D6584, Standard Test Method for Determination of Total Monoglycerides, Total Diglycerides, Total Triglycerides, and Free and Total Glycerin in B-100 Biodiesel Methyl Esters by Gas Chromatography

DEAS 1334, Fuel Additives — Specification

EN 12662, Liquid petroleum products — Determination of total contamination — Part 1: Middle distillates and diesel fuels

EN 14103, Fat and oil derivatives – Fatty acid methyl esters (FAME) – Determination of ester and linolenic acid methyl ester contents

EN 14105, Fat and oil derivatives – Fatty acid methyl esters (FAME) – Determination of free and total glycerol and mono-, di-and triglyceride content (Reference method)

EN 14108, Fat and oil derivatives - Fatty Acid Methyl Esters (FAME) - Determination of sodium content by atomic absorption spectrometry

EN 14110, Fat and oil derivatives – Fatty acid methyl esters (FAME) – Determination of methanol content

EN 14111, Fat and oil derivatives – Fatty acid methyl esters (FAME) – Determination of iodine value

EN 14538, Fat and oil derivatives — Fatty acid methyl ester (FAME) — Determination of Ca, Mg, Na, K and P content by optical emission spectral analysis with inductively coupled plasma (ICP OES)

ISO 2160, Petroleum products – Corrosiveness to copper – Copper strip test

ISO 3104, Petroleum products – Transparent and opaque liquids – Determination of Kinematic viscosity and calculation of dynamic viscosity

ISO 3170, Petroleum products – Petroleum liquids – Manual sampling

ISO 3171, Petroleum products – Automatic pipeline sampling

ISO 3675, Crude petroleum and liquid petroleum products – Laboratory determination of density or relative density – Hydrometer method

ISO 3961, Animal and vegetable fats and oils — Determination of iodine value

ISO 3679, Petroleum product – Determination of flash point – Rapid equilibrium closed cup method

ISO 3987, Petroleum products – Lubricating oils and additives – Determination of sulphated ash

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

ISO 5165, Petroleum products – diesel fuel – Determination of the ignition quality of fuels – Cetane engine method

ISO 10370, Petroleum products – Determination of Carbon residual – Micro 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 Fisher titration method

ISO 13759, Petroleum products – Determination of Alkyl nitrate in diesel fuels – Spectrometric method

ISO 20846, Petroleum products – Determination of sulphur content of automotive fuels – Ultraviolet fluorescence method

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

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>

3.1**Additives**

substance added to biodiesel usually in small amounts, to impart or enhance desirable properties, or to suppress undesirable properties

3.2**biodiesel**

fuel comprised of mono-alkyl esters of long chain fatty acids derived from plant oils, animal fats, or a combination of these feedstocks. It can also be referred to as pure biodiesel, B100 or neat biodiesel

3.3

biodiesel blend

pure biodiesel blended with automotive diesel

3.4**dyes**

substance added to fuels for visual identification

4 Requirements**4.1 General requirements**

4.1.1 The biodiesel fuel shall contain mono-alkyl methyl esters of long-chain fatty acids derived from plant oils and/or animal fats.

4.1.2 Suitable additives may be used to enhance the performance characteristics of the fuel, and shall be in accordance with the requirements of DEAS 1334.

4.1.3 The fuel may contain suitable dyes to impart a distinctive colour.

4.1.4 The fuel shall be clear and free of visible water, sediment, suspended matter and any other contaminant.

4.1.5 The fuel shall remain homogeneous during storage and not exhibit phase separation.

4.2 Specific requirements

Biodiesel fuel shall comply with the requirements given in Table 1 when tested in accordance with the test methods prescribed therein.

NOTE 1 – In case of a need for identification of biodiesel, it is recommended that a method for the characterization of fatty acid methyl ester (FAME) by Liquid Chromatograph (LC)/ Gas Chromatograph (GC), in accordance with EN 14331, be used.

Table 1 – Requirements for Biodiesel (B100) fuel

S/No.	Property	Requirements	Test methods
i.	Density, kg/m ³ at 15 °C	860 - 900	ISO 12185
ii.	Ester content, % (m/m), <i>min.</i>	96.5	EN 14103
iii.	Kinematic viscosity at 40 °C ^d , mm ² /s.	3.5 – 5.0	ISO 3104
iv.	Flash point, °C, <i>min.</i>	120	ISO 3679
v.	Sulphur content, mg/kg, <i>max.</i>	10.0	ISO 20846
vi.	Carbon residue (10% distillation residue), % (m/m), <i>max.</i>	0.3	ISO 10370
vii.	Cetane Number, <i>min.</i>	51.0	ISO 5165
viii.	Sulphated ash, % (m/m), <i>max.</i>	0.02	ISO 3987
ix.	Water content, % (m/m), <i>max.</i>	0.05	ISO 12937
x.	Total contamination, mg/kg, <i>max.</i>	24	EN 12662
xi.	Copper corrosion (3 h at 50 °C), rating, <i>max.</i>	Class 1	ISO 2160
xii.	Oxidation stability, at 110 °C, h, <i>min.</i>	6	ISO 12205
xiii.	Total acid number, mg KOH/g, <i>max.</i>	0.5	ASTM D974
xiv.	Iodine value of Iodine g/100 g of FAME, <i>max.</i>	120	ISO 3961 EN 14111
xv.	Linolenic acid methyl ester, % mass fraction, <i>max.</i>	12	EN 14103
xvi.	Polyunsaturated (>= 4 double bonds) methyl ester, %, mass fraction, <i>max.</i>	1	EN 14103
xvii.	Methanol content, % mass fraction, <i>max.</i>	0.2	EN 14110
xviii.	Monoglyceride content, % mass fraction, <i>max.</i>	0.8	EN 14105
xix.	Diglyceride content, % mass fraction, <i>max.</i>	0.2	EN 14105
xx.	Triglyceride content, % mass fraction, <i>max.</i>	0.2	EN 14105
xxi.	Free glycerol, % mass fraction, <i>max.</i>	0.02	ASTM D6584
xxii.	Total glycerol, % mass fraction, <i>max.</i>	0.25	ASTM D6584
xxiii.	Group I metals (total of Na and K), mg/kg, <i>max.</i>	5.0	EN 14538
xxiv.	Group II metals (total of Ca and Mg), mg/kg, <i>max.</i>	5.0	EN 14538
xxv.	Phosphorus content, mg/kg, <i>max.</i>	5.0	ASTM D4951
xxvi.	Cold Filter Plugging Point (CFPP), °C <i>max.</i>	+12	ASTM D6371

xvii.	Cloud Point, °C	Report	ASTM D2500
NOTE 1 – The precision data shall be computed as per the requirements of the respective test methods NOTE 2 – Density may be measured by ISO 3675 over a range of temperatures from 20 °C to 60 °C. A temperature correction shall be made according to the formula given in Annex C. NOTE 3 – If CFPP is –20 °C or lower, the viscosity measured at -20°C shall not exceed 48 mm²/s. In this case, ISO 3104 is applicable without the precision data owing to non-Newtonian behaviour in a two-phase system.			

5. Packaging, transportation and storage

5.1 The fuel shall be packaged, transported and stored in suitable containers.

5.2 The containers shall be acceptably sealed, leakproof, clean and free from materials soluble in the product.

5.3 Due to the hygroscopic and oxidative nature of biodiesel, appropriate precautions shall be taken to minimize moisture ingress into transportation, storage, and handling systems to prevent fuel degradation.

5.4 The fuel shall be accompanied with safety data sheet (SDS) in accordance with the globally harmonized system of classification and labelling of chemicals (GHS).

6 Labelling

The following information shall be legibly and indelibly labelled on each container. For bulk transportation, the information shall be in the documentation accompanying the fuel.

- the manufacturer's (or the supplier's) name or and physical address the brand name of the product or both;
- a description of the product, i.e. PURE BIODIESEL FUEL, (B100)
- batch identification; and
- the quantity of the contents.
- the warning, "DANGER"
- date of manufacture;
- country of origin

7 Methods of test

7.1 General

7.1.2 For all properties, use the applicable test method or, when relevant, one of the applicable test methods listed in column 3 of Table 1.

7.1.3 The limiting value for the carbon residue given in Table 1 is based on the product prior to the addition of ignition improver, if used. If a value exceeding the limit is obtained on finished fuel in the market, use ISO 13759 to determine the presence of a nitrate-containing compound. If an ignition improver is thus proved present, the limit value for carbon residue of the product under test cannot be applied. The use of additives does not exempt the manufacturer from meeting the requirement of a maximum 0.30% mass fraction of carbon residue prior to the addition of additives.

7.2 Precision and dispute

7.2.1 All test methods referred to in this East African Standard include a precision statement according to ISO 4259. In case of dispute, use the procedure described in ISO 4259 for resolving the dispute, and the interpretation of the results based on the test method precision shall be used. However, the methods currently available for total contamination, ester content, tri- glyceride content, free glycerol and alkaline metals (total amount of Na and K) do not meet the 2R requirement of ISO 4259 at the limit in Table 1.

7.2.2 Test methods for petroleum products may contain precision data specific to these products. When the same methods are used to test biodiesel fuel, the precision data might differ; such data are given in Annex A.

7.2.3 In case of dispute concerning density, use ISO 3675 with the determination carried out at 15 °C.

NOTE – Available conversion Tables are not applicable to biodiesel.

7.2.4 In case of dispute concerning free glycerol, the reference method is EN 14105.

7.2.5 For the determination of Cetane Number, alternative methods may also be used in cases of dispute, provided that these methods originate from a recognized method series, and have a valid precision statement, derived in accordance with ISO 4259, which demonstrates precision at least equal to that of the referenced method. The test result, when an alternative method is used, shall also have a demonstrable relationship to the result obtained when using the reference method.

9 Sampling

Sampling shall be done in accordance with ASTM D4057, ASTM D4177, ISO 3170 or ISO 3171.

Annex A (Informative)

Precision data

Table A.1 – Table of precision data

S/N	Property	Test Method	Data for pure FAME ^{a, b, c}
1	Kinematic viscosity at 40 °C, mm ² /s	ISO 3104	$r = 0.0011X$ $R = 0.018X$
2	Sulphur content, mg/kg	ISO 20846	$r = 0.0285X + 2$ $R = 0.1088X + 2$ $r = 0.0226X + 1.356$ $R = 0.0567X + 1.616$
3	Distillation °C	ASTMD 1160	$r = 2.0$ $R = 3.0$ (90% v/v distilled)
4	Cetane Number	ISO 5165	$r = 2.4$ $R = 5.5$
5	Sulphated ash content, % mass fraction	ISO 3987	$r = 0.06 X^{0.85}$ $r = 0.142 X^{0.85}$
6	Total contamination, mg/kg	EN 12662 ^d	$r = 2.24$ $R = 13.6$
7	Total of Na and K, mg/kg	EN 14108, 14109	$r = 0.017X + 0.512$ $R = 0.305X + 1.980$
^a r is the repeatability in accordance with ISO 4259 ^b R is the reproducibility accordance with ISO 4259 ^c X is the mean of two results being compared ^d The precision of EN 12662 is for biodiesel			

Annex B
(Informative)

Correction factor for calculation of density of biodiesel

The following equation shall be used for the calculation of density of biodiesel at 15 °C.

$$P(15) = P(T) + 0.723(T - 15)$$

where,

$P(15)$ is density of biodiesel at 15 °C.

$P(T)$ is density at any other temperature in the range of 20 °C to 60 °C. T is any temperature in the range of 20 °C to 60 °C.

Bibliography

1. KS 2227: 2023 *Petroleum and petroleum products— Automotive biodiesel fuel — Specification*
2. TJS 1099: 2012 *Automotive biodiesel fuel – Specification*
3. ASTM D6751-20a *Standard Specification for Biodiesel Fuel Blend Stock (B100) for Middle Distillate Fuels*
4. EN 14214:2012 with A2:2019 *Liquid petroleum products - Fatty acid methyl esters (FAME) for use in diesel engines and heating applications - Requirements and test methods*