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## DRAFT EAST AFRICAN STANDARD

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Automotive gas oil (automotive diesel) — Specification

EAST AFRICAN COMMUNITY

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DRAFT EAST AFRICAN STANDARD

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## 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.

In order to achieve this objective, the Community established an East African Standards Committee mandated to develop and issue East African Standards.

The Committee is composed of representatives of the National Standards Bodies in Partner States, together with the representatives from the private sectors and consumer organizations. 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 procedures of the Community.

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.

EAS 177 was prepared by Technical Committee EAS/TC 068, *Petroleum and petroleum products*.

This third edition cancels and replaces the second edition (EAS 158:2012) which has been technically revised.



## Automotive gas oil (automotive diesel) — Specification

### 1 Scope

This Draft East African Standard specifies the requirements and methods of sampling and test for automotive gas oil, AGO (automotive diesel) as manufactured, stored, transported and marketed.

### 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 D86, *Standard Test Method for Distillation of Petroleum Products at Atmospheric Pressure*

ASTM D93, *Standard Test Methods for Flash Point by Pensky-Martens Closed Cup Tester*

ASTM D95, *Standard Test Method for Water in Petroleum Products and Bituminous Materials by Distillation*

ASTM D130, *Standard Test Method for Corrosiveness to Copper from Petroleum Products by Copper Strip Test*

ASTM D189, *Standard Test Method for Conradson Carbon Residue of Petroleum Products*

ASTM D473, *Standard Test Method for Sediment in Crude Oils and Fuel Oils by the Extraction Method*

ASTM D482, *Standard Test Method for Ash from Petroleum Products*

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

ASTM D976, *Standard Test Method for Calculated Cetane Index of Distillate Fuels*

ASTM D1298, *Standard Test Method for Density, Relative Density, or API Gravity of Crude Petroleum and Liquid Petroleum Products by Hydrometer Method*

ASTM D1500, *Standard Test Method for ASTM Colour of Petroleum Products (ASTM Color Scale)*

ASTM D1552, *Standard Test Method for Sulphur in Petroleum Products (High-Temperature Method)*

ASTM D2500 [IP 309], *Standard test method for cloud point of petroleum products*

ASTM D6078, *Standard Test Method for Evaluating Lubricity of Diesel Fuels by the Scuffing Load Ball-on-Cylinder Lubricity Evaluator (SLBOCLE)*

EN 12916, *Petroleum products — Determination of aromatic hydrocarbon types in middle distillates — High performance liquid chromatography method with refractive index detection*

IP 13, *Petroleum products — Determination of carbon residue — Conradson method*

IP 34, *Determination of flash point — Pensky-Martens closed cup method*

IP 53, *Crude petroleum and fuel oils — Determination of sediment — Extraction Method*

IP 71 Sect 1, *Petroleum products — Transparent and opaque liquids — Determination of kinematic viscosity and calculation of dynamic viscosity*

IP 74, *Petroleum products and bituminous materials — Determination of water — Distillation method*

IP 123, *Petroleum products — Determination of distillation characteristics at atmospheric pressure*

IP 154, *Petroleum products — Corrosiveness to copper — Copper strip test*

IP 160, *Crude petroleum and liquid petroleum products — Laboratory determination of density — Hydrometer method*

ISO 2049, *Petroleum products — Determination of colour (ASTM scale)*

ISO 2160, *Petroleum products — Corrosiveness to copper — Copper strip test*

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

ISO 3015, *Petroleum products — Determination of cloud point*

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

ISO 3405, *Petroleum products — Determination of distillation characteristics at atmospheric pressure*

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*

ISO 3735, *Crude petroleum and fuel oils — Determination of sediment — Extraction method*

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 5165, *Petroleum products — Determination of the ignition quality of diesel fuels — Cetane engine method*

ISO 6245, *Petroleum products — Determination of ash*

ISO 6615, *Petroleum products — Determination of carbon residue — Conradson method*

ISO 6619, *Petroleum products and lubricants — Neutralization number — Potentiometric titration method*

ISO 7537, *Petroleum products — Determination of acid number — Semi-micro colour-indicator titration method*

ISO 10370, *Petroleum products — Determination of carbon residue (micro method)*

ISO 12156-1, *Diesel fuels — Assessment of lubricity by HFRR*

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

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

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

ISO 20846, *Petroleum products — Determination of sulfur content of automotive fuels — Ultraviolet fluorescence method*

ISO 20847, *Petroleum products — Determination of sulfur content of automotive fuels — Energy dispersive X-ray fluorescence spectrometry*

ISO 20884, *Petroleum products — Determination of sulfur content of automotive fuels — Wavelength-dispersive X-ray fluorescence spectrometry*

### 3 Terms and definitions

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

#### 3.1

##### **automotive gas oil (AGO)**

fuel that is used in high-speed diesel engines

#### 3.2

##### **additive**

material added to AGO usually in small amounts, to impart or enhance desirable properties or to suppress undesirable properties

#### 3.3

##### **dyes**

chemicals added to fuel for visual identification

#### 3.4

##### **markers**

substances added to petroleum based products for traceability to protect them against theft or adulteration and also to distinguish between different fuels

#### 3.5

##### **polycyclic aromatic hydrocarbon**

total aromatic hydrocarbon content less the mono-aromatic hydrocarbon content

### 4 Requirements

#### 4.1 General requirements

Automotive diesel fuel shall have an appearance that is clear, bright and free from suspended particles on visual inspection.

#### 4.2 Specific quality requirements

Automotive diesel fuel shall comply with the limits specified in Table 1, when tested in accordance with the test methods specified therein.



**Table 1 — Specific quality requirements for automotive diesel fuel**

Property	Limit		Test method <sup>a</sup>
	Minimum	Maximum	
Cetane number <sup>b</sup>	51.0	—	ISO 5165
Cetane index	48.0	—	ISO 4264 ASTM D976
Density at 15 °C <sup>c</sup> , kg/m <sup>3</sup>	820	870	ISO 3675 ISO 12185
Density at 20 °C	817	867	ASTM D1298 IP 160
ASTM colour	—	3.5	ISO 2049 ASTM D1500
Polycyclic aromatic hydrocarbons, % (v/v)	—	11	EN 12916
Sulphur content <sup>d</sup> , mg/kg	—	50.0	ISO 20884 ASTM D1552
Flash point, °C	66 60	—	ISO 2719 ASTM D93 IP 34
Carbon residue (on 10 % distillation residue), % (m/m)	—	0.15	ISO 10370 ISO 6615 ASTM D189 IP 13
Ash content, % (m/m)	—	0.01	ISO 6245 ASTM D482
Water content, mg/kg	—	200	ISO 12937 ASTM D95 IP 74/82 ISO 3733
Copper strip corrosion (3 h at 50 °C), rating	Class 1		ISO 2160 ASTM D130 IP 154
Oxidation stability, g/m <sup>3</sup>	—	25	ISO 12205
Lubricity, corrected wear scar diameter (wsd 1.4) at 60 °C, µm	—	450	ISO 12156-1 ASTM D6078
Viscosity at 40 °C, mm <sup>2</sup> /s	2.0	5.3	ISO 3104 ASTM D445 IP 71

**Table 1 (continued)**

Property	Limit		Test method <sup>a</sup>
	Minimum	Maximum	
Cloud point, °C	To be reported		ISO 3015 ASTM D2500
Cold filter plugging point (CFPP), °C	—	12	IP 309
Sediment, % m/m	—	0.01	ISO 3735 ASTM D473 IP 53
Neutralization value: Strong acid No., KOH, mg/g Total acid No., KOH, mg/g	Nil	Nil 0.5	ISO 6619 ASTM D974 ISO 7537
Distillation <sup>e</sup> <ul style="list-style-type: none"> <li>• Initial boiling point, °C</li> <li>• % (V/V) recovered at 250 °C</li> <li>• % (V/V) recovered at 350 °C</li> <li>• 95% (V/V) recovered at °C</li> <li>• Final boiling point, °C</li> </ul>	To be reported  85	To be reported  65  360 400	ISO 3405 ASTM D86 IP 123
<sup>a</sup> See also 7.1. <sup>b</sup> See also 7.4. <sup>c</sup> See also 7.2. <sup>d</sup> See also 7.3. <sup>e</sup> For the calculation of the cetane index the 10 %, 50 % and 90 % (V/V) recovery points are also needed.			

## 5 Dyes and markers

The use of dyes and markers is allowed.

The dye content shall be reported and shall not alter any parameters of AGO out of the specified range as indicated under Table 1.

## 6 Additives

In order to improve the performance quality, the use of additives is allowed. Suitable fuel additives without known harmful side-effects are recommended in the appropriate amount, to help to avoid deterioration of drivability and emissions control durability.

## **7 Precision and dispute**

**7.1** All test methods referred to in this East African Standard include a precision statement. In cases of dispute, the procedures for resolving the dispute and interpretation of the results based on test method precision, described in ISO 4259, shall be used.

**7.2** In cases of dispute concerning density, ISO 3675 shall be used.

**7.3** In cases of dispute concerning sulfur content, ISO 20847 is unsuitable as an arbitration method.

**7.4** 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 using an alternative method, shall also have a demonstrable relationship to the result obtained when using the referenced method.

## **8 Packing and marking**

### **8.1 Packing**

The condition of the containers, rail tankers and road tank vehicles shall be such as not to be detrimental to the quality of the fuel during normal transportation and storage. The containers shall be acceptably sealed or leak proof, clean, and free from materials soluble in diesel.

### **8.2 Marking**

**8.2.1** The following information shall appear in legible and indelible marking on each container or in case of diesel fuel filled into bulk storage tanks, in the storage and consignment documents of each road tank wagon or rail tank wagon.

- a) the supplier's and receiver's name and address;
- b) the name "AUTOMOTIVE GASOIL" or "DIESEL, or GASOIL";
- c) .the quantity in litres or metric tonnes;
- d) the batch/lot number;
- e) the word "FLAMMABLE MATERIAL"; and
- f) the warning "DANGER DIESEL".

**8.2.2** Stickers shall be used in labelling in case of vehicles which have compartments and transport more than one type of fuels.

## **9 Sampling**

### **9.1 Sampling from storage tanks**

For the purposes of this East African Standard, all sampling shall be carried out in accordance with the relevant sections and additionally as detailed in 9.2.

## **9.2 Sampling from fuel lines**

### **9.2.1 Sampling cans**

Two containers of 1 l each and attention is drawn to the fact that sampling cans shall comply with the statutory safety requirements for the classification, packaging and labelling of dangerous substances for the respective Partner States.

### **9.2.2 Preparation of cans**

A stock of cans shall be kept solely for the purpose of taking fuel samples. Before use, all cans shall be checked to ensure they are sound and free from leaks. A fuel-resistant sealing washer in good condition shall be in position in the cap.

### **9.2.3 Procedure**

From the off take point, 1 l of the fuel to be tested shall be carefully drawn into a 5-l can using a clean dry funnel. The screw cap shall be fully tightened and the can checked to ensure that there are no leaks.

If more than 1 l is needed, the operation should be repeated immediately and before the pump has been used for any other purpose.

## **9.3 Labelling and transport**

Full and legible information relating to the source of the sample shall be attached to the can in such a manner that it will not easily become detached subsequently.

NOTE 1 If required, the sample may be sealed and labelled to maintain its legal integrity.

NOTE 2 If the sample has to be sent to the laboratory by public transport, it will be necessary to comply with the general regulations covering transportation of flammable materials, where appropriate, and with the requirements of the transport authority concerned, information on the appropriate procedures and type of packaging required should be obtained from the relevant transport authority involved.

## Bibliography

- [1] BS EN 590:2004, *Automotive fuels — Diesel — Requirements and test methods*
- [2] EN 12662, *Liquid petroleum products — Determination of contamination in middle distillates*
- [3] EN 14274 [IP 508], *Methods of test for petroleum and its products — Automotive fuels — Assessment of petrol and diesel quality — Fuel quality monitoring system (FQMS)*
- [4] ISO 13759, *Petroleum products — Determination of alkyl nitrate in diesel fuels — Spectrometric method*
- [5] ISO 17020, *General criteria for the operation of various types of bodies performing inspection*
- [6] SANS 342:2006, *Automotive diesel fuel*

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