EAST AFRICAN COMMUNITY

EDICT OF GOVERNMENT

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EAS 158 (2011) (English): Motor gasolines, unleaded motor spirit premium — Specification

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Motor gasolines, unleaded motor spirit premium — Specification

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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 158:2011 was prepared by Technical Committee EAS/TC 000, *TC title*, Subcommittee SC 0, *SC title*.

This second edition cancels and replaces the first edition (EAS 158:2000), which has been technically revised.

Motor gasolines, unleaded motor spirit premium — Specification

1 Scope

This East African Standard specifies requirements and methods of test for unleaded motor gasoline of premium grade, (Motor Spirit Premium,MSP).

This standard applies to unleaded motor spirit premium, also commonly known as petrol, for use in spark ignition engines, including those equipped with devices to reduce emitted pollutants. The standard applies to unleaded MSP as manufactured, stored, transported and marketed.

All requirements apply to premium grade motor gasoline and do not apply to aviation gasolines.

2 Normative references

This East African Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this East African Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

ASTM D3237, *Standard test for lead in gasoline by Atomic Absorption Spectroscopy*

ASTM D2622, *Standard test method for sulphur in petroleum products by wave dispersive x- ray fluorescence spectrometry*

ASTM D4815, *Standard method for determination of MTBE, ETBE, TAME, DIPE, Tertiary amyl alcohol and C1 to C4 alcohols in gasoline by gas chromatography*

ASTM D5443, *Standard test method for paraffin, Naphthene and aromatic hydrocarbon type analysis in petroleum distillates through 200 ºC by multi- dimensional gas chromatography*

ASTM D5580, *Standard test method for determination of benzene, toluene, ethylbenzene, p/m- xylene, o-xylene, C_9 and heavier aromatics and total aromatics in finished gasoline by gas chromatography*

ASTM D5599, *Standard test method for determination of oxygenates in gasoline by gas chromatography and oxygen selective flame ionization detection*

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

ISO 3170, *Petroleum liquids — Manual sampling*

ISO 3171, *Petroleum liquids — Automatic pipeline sampling*

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

ISO 5163, *Petroleum products — Determination of knock characteristics of motor and aviation fuels — Motor method*

ISO 5164, *Petroleum products — Determination of knock characteristics of motor fuels — Research method*

ISO 6246, *Petroleum products — Gum content of light and middle distillate fuels — Jet evaporation method*

ISO 7536, *Gasoline — Determination of oxidation stability of gasoline — Induction period method*

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

ASTM D 1613, *Standard test method for acidity in volatile solvents and chemical intermediates used in paint, varnish, lacquer, and related products*

ASTM D 323, *Standard test method for vapour pressure of petroleum products (Reid Method)*

3 Terms and definitions

For the purposes of this standard, the terms and definitions given in ISO 1998 and the following apply.

3.1
additive
material added to another, usually in small amounts, to impart or enhance desirable properties or to suppress undesirable properties

3.2
marketable
acceptable smell for safe handling

3.3
motor gasoline (Gasoline US, Petrol GB)
Gasoline with or without additives, notably antiknock agents and inhibitors, for use as a fuel in automobile, stationary or other spark- ignition engines, except aircraft engines

3.4
marker (tentative definition)
colourless chemicals added to petroleum based products to protect them against theft and to also distinguish between different fuels. They can be detected by either adding a specific reagent to produce a measurable colour or by placing a sample of fuel into a portable spectrophotometer to obtain a quantitative result in the field.

3.5
dye
chemicals majorly added to fuel for tax purposes, marketing and branding

3.6
ullage
empty capacity left in a fixed volume sample receiver/container above the liquid surface

4 Sampling

Samples shall be taken as described in ISO 3170 or ISO 3171 and/or in accordance with the requirements of legal metrology regulations for the sampling of unleaded petrol.

In view of the sensitivity of some of the test methods referred to in this standard, particular attention shall be paid to compliance with any guidance on sampling containers, which is included in the test method standard.

It is essential that for sampling of unleaded petrol the containers used to take and store the samples before testing are not contaminated with lead and/or sulfur.

Guidelines for sampling MSP from retail and commercial site fuel dispensers have been included under Annex A.

5 Pump marking

Information to be marked on dispensing pumps used for delivering unleaded petrol, and the dimensions of the mark shall be in accordance with the requirements of the relevant weights and measures regulations for each member state for the marking of pumps for unleaded petrol.

6 Requirements and test methods

6.1 Dyes and markers

The use of dyes and markers is permitted. The dye content shall be reported and shall not exceed 1.3 mg/m^3.

6.2 Additives

In order to improve the performance quality, the use of additives is permitted. Fuel additives without known harmful side effects are recommended in the appropriate amount, to help avoid deterioration of drive ability and emissions control durability. Other technical means with equivalent effect may be used. It should however be noted that the additive used shall serve the purpose for which it is intended and, shall not deter any parameters of MSP out of the specified ranges as indicated under Table 1 and Table 2.

Table 1 — Distillation

% Evaporated	Temperature, ºC
15 - 36	70
10	Max. 71
36 - 58	100
75 - 90	140
Initial boiling point	32 - 39
Final boiling point	175 - 205

6.3 Phosphorous

In order to protect automotive catalyst systems, phosphorus-containing compounds shall not be included in motor gasolines.

6.4 Oxygenates content

The unleaded petrol shall not contain oxygenated compounds. Persons handling the manufacture, storage, transportation, marketing and importation of the petrol shall make a declaration to this effect.

6.5 Adulteration

The motor gasolines shall not be adulterated with other petroleum products such as kerosene and diesel. This shall be determined through distillation (ISO 3405) as well as relevant methods listed under table 2 and other methods that may be deemed appropriate by the regulatory bodies.

6.6 Generally applicable requirements and test methods

When tested in accordance with the test methods indicated in Table 2, premium grade motor gasolines shall conform to the limits specified in Table 2.

Table 2 — Generally applicable requirements and test methods for premium grade motor gasolines

Property	Units	Requirement		Test method
		Min.	Max.	
Research octane number, RON	–	91	–	ISO 5164 ASTM D2699
Motor octane number, MON	–	81	–	ISO 5163 ASTM D2700
Lead content	g/L	–	0.013	ASTM D3237
Benzene content	% v/v	–	5.0	ASTM D 5580
Density (at 15 ºC)	kg/m^3	0.720	780	ISO 3675 ASTM D4052 ASTM D1298
Sulphur content	% m/m	–	0.15	ISO 8754 ASTM D2622
Oxidation stability	Minutes	360	–	ISO 7536 ASTM D525
Existent gum content (solvent washed)	mg/100 mL	–	5	ASTM D381
Copper strip corrosion (3 h at 50 ºC)	Rating	–	No. 1 strip	ISO 2160 ASTM D130
Appearance		Clear and bright		Visual inspection
Doctor test*	-	To be reported		ASTM D4952
Mercaptan sulphur	% m/m		0.002	ASTM D3227
Colour	–	Red or Orange		Visual inspection
Dye content	mg/m^3		1.3	–
Odour		Marketable		–
Oxygenates	–	NIL		ASTM D 5580, ASTM D 4815
RVP	-	To be reported		-
Volatility (see Clause6.8)	–	–		–
Water Content		nil		

* If negative, there is no need to carry out Mercaptan sulphur test.

6.7 Volatility

For both premium and regular motor gasolines,

FVI = RVP + 0.7 E70 = 93 (RVP + 0.1 E70) = (13.5)

where

FVI is fuel vapour index;

RVP is Reid vapour pressure determined as per ASTM D323; and

E70 is fraction evaporated at 70 °C.

7 Precision and dispute

7.7.1 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.

7.7.2 In cases of dispute

- concerning sulphur, ISO 20847 is unsuitable as an arbitration method
- concerning benzene content, ASTM D 5443 shall be used.
- concerning oxygen and oxygenates content, ASTM D 4815shall be used.
- concerning density, ISO 3675 shall be used.

Annex A
(normative)

Sampling of motor spirit premium

A.1 Sampling from retail site pumps and commercial site fuel dispensers

This clause specifies a procedure for drawing, from fuel dispensers, samples of petrol to be used for the assessment of motor gasoline quality in accordance with EN 14274. This standard does not cover the sampling of Liquefied Petroleum Gas (LPG).

NOTE When petrol is sampled, it is recommended that the pre-treatment of the sample containers and their transportation be set out as in the NOTE in Clause A.4.

WARNING: The use of this standard may involve hazardous materials, operations and equipment. This standard does not purport to address all of the safety problems associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.

A.2 Sample containers and closures

A.2.1 Containers

These shall be unused metallic containers of approximately one litre capacity, constructed from lead-free material, with packing glands or welded joints, able to withstand normal internal pressures encountered during normal operations. The containers shall be equipped with an external fitting to enable them to be sealed. The container shall not have been treated with a petroleum-based rust-preventative.

NOTE Lead solder may be used for the attachment of external fittings.

A.2.2 Closures

These shall be able to retain the integrity of the sample. Insert disks may additionally be used to close the container outlet. Suitable closures include screw caps fitted with a washer resistant to the product being sampled. Cork or rubber washers shall not be used.

A.3 Safety requirements

A.3.1 The following minimum safety requirements shall be read in conjunction with the requirements for safety as given in ISO 3170 and, in addition, any national or local safety, environmental and transportation regulations.

A.3.2 Personnel drawing the samples shall be made aware of the potential hazards and be given instructions in safety precautions to be observed.

A.3.3 Care shall be taken to avoid breathing petroleum vapours during the sampling. Protective gloves of hydrocarbon-insoluble materials, eye, nose and mouth protection and clothing suitable to provide protection against all known hazards associated with the product shall be worn.

A.3.4 In order to avoid static electricity risks, special precautions shall be taken during the sampling operation.

A.3.4.1 Sampling shall not be carried out during periods of atmospheric electrical disturbance or thunderstorms.

A.3.4.2 Foot wear and/or clothing capable of causing sparks shall not be worn in areas where flammable vapours are likely to be present.

A.3.4.3 In order to earth any static charge on their person, the person taking the samples shall touch some part of the fuel dispensing structure immediately before carrying out any sampling operation.

A.3.5 Samples shall not be taken during the supplying of the tank to which the pump to be sampled is connected.

A.3.6 Petrol samples shall be clearly labelled.

A.3.7 Samples shall be transported in accordance with national or local regulations regarding the transport of flammable products.

NOTE When transporting samples of petrol it is recommended that they be placed in an insulated box containing a cooling medium such as solid carbon dioxide or ice. (See NOTE in Clause A.4)

A.3.8 Samples shall be stored in accordance with national and local regulations.

NOTE When storing samples that have flash points below ambient temperature consideration should be given to storing them in a flameproof refrigerator.

A.4 Sampling procedure

NOTE In order to minimise loss of light ends when sampling petrol, the following procedure is recommended. Cool the sample containers in a refrigerator and place them in an insulated box containing a cooling medium such as solid carbon dioxide or ice. Transport them to the sampling site in the insulated box. After filling, sealing and labelling immediately return the filled sample containers to the insulated box and transport them to the laboratory. A suitable insulated box consists of a strong wooden box lined with expanded polystyrene or polyurethane sheeting of approximately 50 mm thickness.

A.4.1 Using a cotton cloth carefully clean the parts of the delivery pipe nozzle that may come into contact with the sample container and/or the product being sampled.

A.4.2 Prior to drawing the samples, run at least four litres of the product through the nozzle into a suitable container.

NOTE This may be either a plastic or metal container approved for use with the product being sampled.

Plastics containers shall not be used for long-term sample storage unless it has been demonstrated that the plastic is suitable (that is, compatible with the sample) so that the integrity of the sample is not compromised. The use of containers made of non-linear polyethylene may lead to sample contamination and/or sample

The flushings shall either be removed from the site in the container and disposed of in a safe manner, or returned to storage on the site.

A.4.3 Inspect the sample container (see A.2.1) for cleanliness and line up the required number of containers alongside the fuel dispenser to be sampled.

A.4.4 Record the reading on the outlet meter display.

A.4.5 Insert the nozzle of the outlet into the sample container (see NOTE). Activate the filling mechanism and run the product into the container in such a way as to prevent splashing, minimise foaming and light end loss and at such a rate to enable air to exhaust from the container without product issuing from the container.

NOTE In order to further minimise light end loss, it is recommended that when taking samples of petrol an extension piece is fitted to the nozzle to enable submerged filling of the container. A description of suitable nozzle extensions and their use is given in Annex B.

A.4.6 Fill the container with a maximum of 1.0 L of product, using the outlet meter display as a guide (leave a minimum of 5 % ullage in the container to allow for expansion).

A.4.7 Immediately after filling, close the container using an appropriate closure (see A.2.2). Check for leaks by inverting the container and holding in an inverted position for 30 s. If a leak is observed replace with a new closure and recheck for leaks. If the leaking continues dispose of the container and its contents in accordance with local regulations. Resample using a new container and closure.

A.4.8 Clearly label the sample container with the following information.

- place, date and time of sampling;
- product and its grade;
- sample identification code.

NOTE This is the minimum information required and other information can also be included as required.

A.4.9 Seal the sample container in such a manner that the closure and sample label cannot be removed without breaking the seal.

A.4.10 Repeat A.4.3 to A.4.9 as many times as necessary to comply with any additional national requirements.

A.4.11 Complete a sampling statement in duplicate.

One copy of the sampling statement shall accompany the analysis sample, the other shall be given to the site representative.

NOTE An example of a suitable sampling statement is given in Annex C.

A.5 Appointed organisations

A.5.1 Organisations carrying out the sampling operation shall be accredited with US ISO 17020 or appointed by a Government Body.

A.5.2 A list of organisations qualified to draw samples shall be compiled and maintained by the national standardization body of the Partner State or its nominated alternate.

A.6 Sampling from storage tanks

Sampling from storage tanks or the purposes of this standard, all sampling shall be carried out in accordance with the relevant procedures of ISO 3170 and ISO 3170.

Annex B
(normative)

Nozzle extensions for sampling petrol and their use

B.1 General

The preferred method of sampling volatile products, such as petrol, into an open-top container is by submerged filling. However, the normal nozzles, are not of sufficient length to reach the bottom of a sample container. In addition, to prevent overfilling, fuel dispenser nozzles are fitted with cut-off devices that will stop the supply of fuel when the end of the nozzle is immersed in a liquid. (The cutting-off of the airflow into the sensing port activates the safety cut-off device.) Therefore to enable submerged filling an extension piece, of sufficient length to reach the bottom of the sample container and allow air to flow into the sensor port of the cut-off safety device, is used.

B.2 Extension pieces

To meet with the principles of B.1 the extension piece can either be:

a) Fitted with an air pipe that will allow air to flow into the sensing port or,

b) Loosely fitting, allowing air to flow down the gap between the nozzle and the extension piece and into the sensing port.

The extension pieces are made of a conducting material to prevent the build-up of static electricity and for this copper piping has been found to be suitable.

The diameter of the nozzle extension will depend on the type of nozzle fixed to the fuel outlet and its other dimensions will depend on the depth of the sample container to be filled.

A 'V-shaped' opening is cut in the base of the extension piece to allow the free flow of petrol when it is resting on the bottom of the sample container, see Figure B.1.

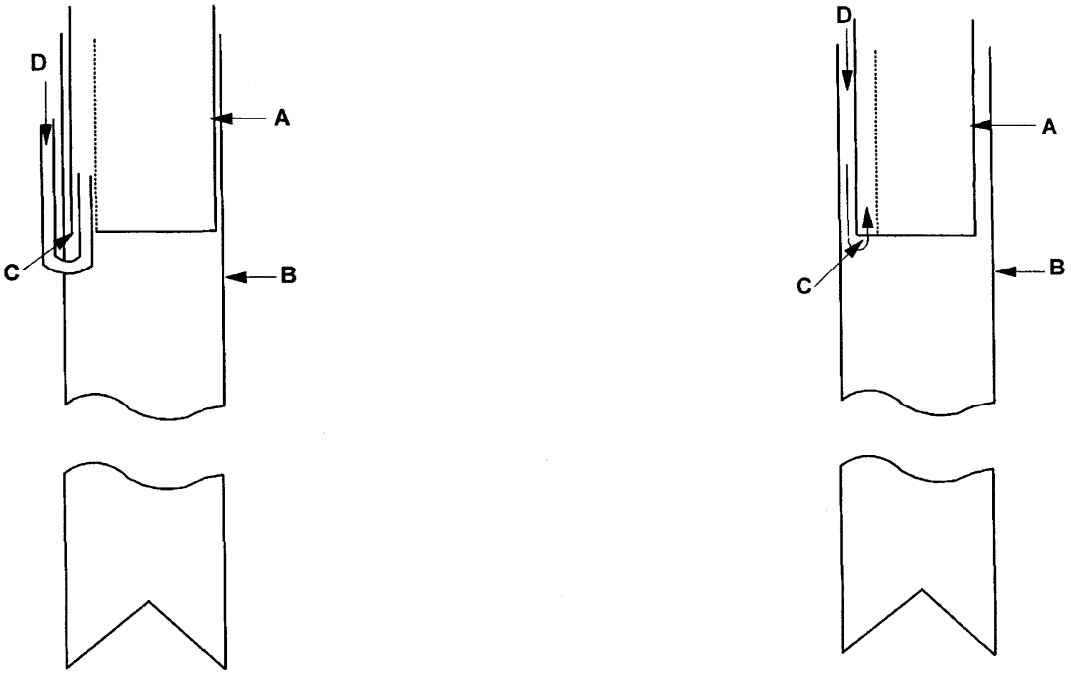
Two examples of suitable designs for extension pieces are shown in Figure B.1. Figure B.2 shows an assembly for sampling using a nozzle extension.

B.3 Procedure

Check that the extension piece is clean and flush with product in accordance with A.4.2. After following the procedure up to A.4.4, place the extension piece into the sample container in an upright position. Insert the nozzle into the extension piece. If the 'air pipe' type is used, ensure that the air pipe is engaged into the sensing port. Activate the filling mechanism.

If a loosely fitting extension piece is used, keep the flow rate to a minimum in order to prevent petrol issuing from around the nozzle due to turbulent flow.

Since the safety cut-off device has been deactivated, take great care not to overfill the container. After filling the sample container with a maximum of 0.75 L, proceed in accordance with A.4.7.



a) Nozzle fitted with extension piece with air pipe **b) Nozzle fitted with extension piece without air pipe**

Key

A Nozzle

B Extension piece

C Safety cut-off sensing port

D Air flow to safety cut-off sensing port

Figure B.1 — Examples of suitable designs for extension pieces

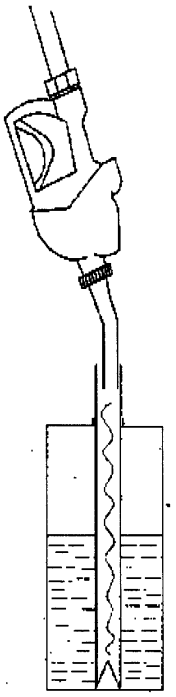


Figure B.2 — Assembly for sampling with a loose fitting nozzle extension

Annex C
(informative)

Sampling statement

Samples have been drawn in accordance with EAS 158

The undersigned: (Surname, forename, title, complete address and, where applicable: identity card or department card number)

Representative of: (Company/body, complete address)

Representative of: (Company/body, complete address)

Responsible for and authorized to: (Company, body, complete address)

The undersigned has taken samples in the following outlet pump(s): (Brand, other identification data: such as station number, name, complete address)

Operated by: (Surname, forename, complete address)

Acting as [1)]) : (Service Station licensee / employee / manager / pump attendant)

[1)] If samples have been drawn from an unmanned 'automatic service station' this will not apply.

Pump Identification	Type and quality of the supplied product	Sample volume	Sample Identification Code [2)] (to be stated on the container label)

Comments: ……..

……..

……..

……..

Name and signature of the person drawing the samples:

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2) The Sample Identification Code should consist of:

year/month/day/ and a unique identification number for the sample (for example 2007/02/28/xxxxxxx/03)

The company or department responsible for the sampling operation provides the unique identification number for the sample.

Date:

Name and signature of the manager of the service station[3)]:

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[3)] If samples have been drawn from an unmanned 'automatic service station' this will not apply.