



DRAFT EAST AFRICAN STANDARD

Ethanol gel for domestic heating and cooking — Specification

EAST AFRICAN COMMUNITY

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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.

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. XXXXXX.

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/ 067

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Ethanol gel for domestic heating and cooking — Specification

1 Scope

This Draft East African Standard specifies the requirements, test methods and sampling for ethanol gel intended for domestic heating and cooking.

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 D 93, *Test method for flash point by Pen sky — Martens closed cup tester*

ASTM D 95, *Test method for water in petroleum products and bituminous materials by distillation*

ASTM D 2386, *Test method for freezing point of aviation fuels*

ASTM D 562, *Test method for consistency of paints measuring Krebs unit (KU) viscosity using a stormer-types viscometer*

ASTM D 4868, *Test method for estimation of net and gross heat of combustion of burner and diesel fuels*

ASTM D 482, *Test method for ash from petroleum products*

ASTM D 4294, *Test method for sulfur in petroleum and petroleum products by energy dispersive X-ray fluorescence spectrometry*

ASTM D1217, *Standard Test Method for Density and Relative Density (Specific Gravity) of Liquids by Bingham Pycnometer*

ISO 3170, *Petroleum liquids — Manual sampling*

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:

- ISO Online browsing platform: available at <http://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

3.1

ethanol gel

a gel-based fuel made by blending industrial grade ethanol, thickeners and essential oils

3.2

industrial grade ethanol

ethanol with impurities (including water but excluding denaturants)

3.3

denaturants

a noxious chemical substance added to ethanol to render it unpalatable and unfit for human consumption

3.4

dye

chemical added to fuel for visual identification

3.5

thickeners

essential oils

4 Requirements

4.1 General requirement

4.1.1 The ethanol gel shall be made from industrial grade ethanol, denaturants, thickeners, soluble dyes with or without essential oils.

4.1.2 The burning flame of the ethanol gel shall be blue to faint yellow.

4.1.3 The ethanol gel shall be clear, homogeneous and free from visible particulate matter and impurities.

4.1.4 Ethanol gel shall possess a characteristic pleasant odour.

4.2 Specific requirement

The ethanol gel shall comply with the specific requirements given in Table 1 when tested in accordance with the test methods specified therein.

Table 1 — Specific requirements for ethanol gel

S/N	Property	Requirements	Test method
i)	Colour	Report	Visual
ii)	Density at 20 °C, Kg/m ³ , min.	850	ASTM D1217
iii)	Viscosity Krebs, min.	120	ASTM D 562
iv)	pH at 30 °C,	6.5 – 7.5	Annex A
v)	Flash point Pensky-Martens Closed Cup (PMCC), (°C), min.	20.5	ASTM D 93
vi)	Freezing point,(°C).	Report	ASTM D 2386
vii)	Calorific value gross, MJ/Kg, min.	18	ASTM D 4868
viii)	Ash content (% mass), max.	1.5	ASTM D 482
ix)	Burning period of 350gm at full power (max) hour half power (max.) hours	1.15 2	Annex B
10	Water contents, (% vol), max.	Report	ASTM D 95

11	Total sulfur contents, (% m/m), max.	0.05	ASTM D 4294
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5 Labelling

The following information shall be legibly and indelibly labelled on the portable container, or on a label affixed to the portable container:

- a) name of the product as "Ethanol gel";
- b) name and physical address of the manufacturers/ distributor and/or trade mark if any;
- c) net quantity;
- d) country of origin;
- e) lot/batch number;
- f) instruction of use;
- g) storage pictorial information on hazard; (Flammability and toxicity symbols);
- h) manufacturing and expiring date; and
- i) Any other information relevant to the product.

6 Packaging

6.1 The ethanol gel shall be packaged in suitable recyclable containers.

6.2 Ethanol gels shall be packaged in tightly sealed containers made from materials resistant to ethanol degradation.

7 Sampling

The sampling shall be done in accordance with ISO 3170 or ISO 3171.

Annex A

(normative)

Determination of pH

A.1 Principal

pH is the unit of measure for acidity and alkalinity. The Proper pH can be measured by several ways such as litmus paper; pH electrodes, colorimetric dyes, or titrations — pH glass electrodes are the preferred method.

A.2 Reagent

Buffer solution for adjusting pH, saline water, saline free water, cleaning solution, storage solution, buffer solution pH 7.01, buffer solution pH 4.01 and buffer solution pH 10

A.3 Apparatus

pH Meter, beaker, sodium electrode and calibration screw driver.

A.4 Conditioning

Activate the electrode by immersing it in storage solution for 2 h.

A.5 Calibration

- a) Immerse the electrode in pH 7.01 buffer solution.
- b) Allow the reading to stabilize and with the supplied screwdriver, adjust the "pH 7" calibration trimmer to read "7.0" pH.
- c) Rinse the electrode with de-ionized water and immerse it into second buffer.
- d) Use pH 4.01 if the solution to be measured is acidic ($\text{pH} < 7$), or pH 10.0 for alkaline samples ($\text{pH} > 7$).
- e) Allow the reading to stabilize and with the screwdriver adjust the "pH 4/10" calibration trimmer to read "4.0" or "10.0" pH.

A.6 Operation

- a) Remove the protective cap; turn the pH meter on, by sliding the ON/OFF switch on the top of the meter.
- b) Immerse it in the solution to be tested without exceeding the maximum immersion level
- c) Stir gently and wait for the reading to stabilize.

- d) After use, switch the meter off, rinse the electrode with de-ionized water and store it with a few drops of storage buffer solution in the protective cap. Always replace the protective cap after use.

A.7 Calculation

If the pH comes under 7, the gel is acidic in nature, if it goes above 7 it is alkaline in nature and if it comes 7 it is neutral.

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Annex B

(normative)

Determination of burning time of ethanol gel

B.1 Scope

This test method covers the determination of the total time (burn time) required for a fixed quantity of ethanol gel, under controlled laboratory conditions, to burn completely (i.e. flame extinguishes). The method is intended for comparative evaluation of gels (different formulations, batches, or additives).

B.2 Apparatus / Equipment

- a) Heat-resistant test container (e.g stainless steel cup)
- b) Precision balance (± 0.01 g or better)
- c) Stopwatch or timer (resolution 1s or better)
- d) Ignition source (electric spark, gas flame, or match)
- e) Draft shield or enclosure to minimize airflow disturbances
- f) Safety equipment (fire extinguisher, ventilation, PPE)

B.3 Procedure

- a) Condition ethanol gel (ambient lab conditions) such that its temperature is within a specified range (e.g 20 – 25 °C) If gels are stored, allow them to reach equilibrium before testing.
- b) Clean, dry, and weigh the test container (tare) to record mass.
- c) Add a known amount of ethanol gel into the container (350 g).
- d) Ignite the gel carefully and start the timer immediately as the flame is sustained.

B.4 Burn monitoring

- a) Observe the burning continuously.
- b) Do not disturb, stir, or move the container.
- c) Allow the gel to burn until the flame self-extinguishes (i.e no more visible flame).

B.5 Stop timer

The moment flame goes out, stop the timer and record the burn time.

B.6 Repeat test

At least 3 replicates should be done for reproducibility.

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Bibliography

TZS 1104, *Ethanol Gel for domestic heating — Specification*

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