KENYA STANDARD

DKS 2838:2021
ICS 97.040.20

Denatured technical alcohol for use as cooking and appliance fuel — Specification

 2nd Edition, 2019

TECHNICAL COMMITTEE REPRESENTATION

The following organizations were represented on the Technical Committee:

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Government Chemist's Department
Ministry of Transport, Infrastructure, Housing, Urban Development and Public Works — Materials Division
Agro Chemical and Food Company
Spectre International
Associated Battery Manufacturers
Kenya Industrial Research and Development Institute (KIRDI)
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Kenya Bureau of Standards — Secretariat

REVISION OF KENYA STANDARDS

In order to keep abreast of progress in industry, Kenya Standards shall be regularly reviewed. Suggestions for improvements to published standards, addressed to the Managing Director, Kenya Bureau of Standards, are welcome.

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Foreword

This Kenya Standard was prepared by the Industrial Solvents and Chemicals Technical Committee under the guidance of the Standards Projects Committee, and it is in accordance with the procedures of the Kenya Bureau of Standards.

This second edition cancels and replaces the first edition (KS 2838:2019), which has been technically revised. During the revision of this standard, Test method for the determination of Acidity (as acetic acid) was revised and test for pH removed.

Denatured technical alcohol offers an affordable clean cooking fuel to low income households that still rely on paraffin for lighting and cooking. Ethanol has no emissions thus it is a fuel that is able to mitigate carbon emissions.

This standard will cover uses, composition, identification, test methods and marking requirements for technical alcohol.

During the preparation of this standard, reference was made to the following sources:

- ASTM E3050, Denatured ethanol for use as cooking and appliance fuel.
- ASTM D7795, Standard Test Method for Acidity in Ethanol and Ethanol Blends by Titration
- Information gathered from the industries.

Acknowledgement is hereby made for their assistance derived from these sources.

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Denatured technical alcohol for use as cooking and appliance fuel — Specification

1 Scope

This Kenya Standard specifies requirements, sampling and test methods for denatured technical alcohol intended to be used as a cooking or appliance fuel, or both.

1.1 Application

This standard applies to all denatured technical alcohol depending on denaturants used in accordance with the current Kenya Customs and Excise Regulations but does not apply to material for oral medical use.

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.

KS 608, *Neutral spirit for manufacture of alcoholic beverages — Specification*

KS 1181, *Specification for methyl isobutyl ketone (4-methyl penta n-2-one)*

KS EAS 38, *Labelling of pre-packaged foods — General requirements*

3 Terms and definitions

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

3.1
denaturant
a completely miscible chemical substance added to alcohol to render it unpalatable and unfit for human consumption

3.2 denatured technical alcohol
technical alcohol made by the addition of denaturants

4 Requirements

Denatured technical alcohol for use as cooking and appliance fuel shall conform to the requirements given in Table 1 when tested in accordance with the test methods prescribed therein.

Table 1 — Requirements for technical alcohol for use as cooking and appliance fuel

S/N	Characteristic	Requirement	Test method
i.	Appearance	Clear and free from suspended matter	Visual
ii.	Density g/ml, at 20 ºC, max.	0.81797	Densimeter/hydrometer
iii.	Alcohol content/ strength as ethanol, % v/v, min.	90.0	Densimeter/hydrometer KS 608
iv.	pH	6.5-7.5	pH meter
v.	Colored dye	Violet/blue	Visual
vi.	Residue on evaporation, %, m/v, max.	0.01	Annex A
vii.	Miscibility	Miscible when mixed with distilled water	Annex B
viii.	Water content, % by mass, max.	10.0	KS 1181
ix.	Acidity (as acetic acid), Mg/Kg, max.	40	ASTM D7795
x.	Aldehydes and Ketones, % by mass, max.	0.2	Annex D
NOTE Denatured technical alcohol shall be denatured as per customs regulation.			

5 Workmanship

The product covered in this standard shall be free of any adulterant or contaminant that can render the material unacceptable for its commonly used applications.

6 Sampling and size sample

The method of drawing representative samples of the material and the containers shall be as prescribed in Annex E.

7 Packaging

7.1.1 Denatured technical alcohol shall be packaged in safe and suitable containers that shall not impart foreign substances and/or odours to the product.

7.1.2 Bulk delivery, packaging and storage of denatured technical alcohol shall be done in containers that shall prevent contamination of the product.

8 Labelling

Labelling of denatured technical alcohol shall be done in accordance with the requirements given in KS EAS 38 and shall include:

a) name of the product;

b) name and address of manufacturer;

c) net contents;

d) name(s) of denaturant;

e) batch/lot number;

f) minimum ethyl alcohol content;

g) year of manufacture;

h) country of origin;

i) the words “highly poisonous”; and

j) the words “highly flammable”.

Annex A
(normative)

Determination of residue on evaporation A.1 Apparatus

A.1.1 Platinum, silica or borosilicate glass basin

A.1.2 Water bath

A.1.3 Desiccator

A.1.4 Oven

A.1.5 Weighing machine

A.2 Procedure

Evaporate 100 ml of the denatured ethanol to dryness in a weighed basin of platinum, silica or borosilicate glass on a boiling water bath. Dry the residue for 30 min in an oven at a temperature of 100 °C ± 2 °C. Cool in a desiccator and weigh.

A.3 Calculation

Percent mass by volume max (%m/v) is calculated as follows:

$$= \frac{W_1}{} \times 100\ S$$

where

W_1 is the mass, in grams of residue; and

S is the volume of the sample.

Annex B
(normative)

Test for miscibility with water

B.1 To 5 ml of the denatured technical alcohol contained in a 100-ml Nessler cylinder, add 95 ml of distilled water, mix thoroughly.

B.2 Examine vertically for opalescence against a black background with side illumination, using as a standard, a similar cylinder containing 100 ml of distilled water.

Annex C
(normative)

Detection of alkalinity or determination of acidity

C.1 Reagents

The reagents used shall be of a recognized analytical reagent quality. Distilled water or water of at least equal purity shall be used throughout.

a) **Sodium hydroxide,** 0.1 M solution.

b) **Phenolphthalein indicator —** Dissolve 0.5 g of phenolphthalein in 100 ml of ethanol (95 % by volume) and make faintly pink by addition of dilute sodium hydroxide solution.

C.2 Procedure

Place 100 ml of water and a few pieces of clean porous pot into a 500-ml conical flask of borosilicate glass and boil gently for 5 min to eliminate carbon dioxide. Cool slightly and add 100 ml of the denatured ethanol. Boil gently for a further 5 min. At the end of this period, close the neck of the flask with a stopper, with soda lime tube to cool the content and to avoid entry of atmospheric carbon dioxide. Add 0.5 ml of the phenolphthalein indicator and examine for alkalinity; if not alkaline, titrate with the sodium hydroxide solution using a micro burette.

C.3 Calculation

Acidity, calculated as acetic acid, CH_3COOH per cent by mass is calculated as follows:

$$\frac{0.006\,0T_1}{S}$$

where

T_1 is the volume, in millilitres, of 0.1 M sodium hydroxide solution used; and

S is the specific gravity of the denatured spirits at 23 °C.

Annex D
(normative)

Determination of aldehydes and ketones

D.1 Reagents

The reagents used shall be of a recognized, or analytical reagent quality. Distilled water, or water of at least equal purity, shall be used throughout.

a) **Sodium hydroxide,** 0.1 M solution.

b) **Bromophenol blue indicator** — Dissolve 0.2 g of bromophenol blue in 3.0 ml of 0.1 M sodium hydroxide solution and dilute to 100 ml with ethanol (95 % by volume).

c) **Hydroxylammonium chloride reagent** — Dissolve 4 g hydroxylammonium chloride in 20 ml of water and heat on a boiling water bath for 30 min, cool and add 5 ml of the bromophenol blue indicator with just sufficient 2 M solution hydroxide solution to impart a dichroic yellow-green colour to the liquid.

D.2 Procedure

Measure 25 ml of the denatured spirits into a 150-ml conical flask, add 25 ml of the hydroxylammonium chloride reagent and after loosely stoppering, heat on a boiling water bath for 10 min.

Cool and titrate with the sodium hydroxide solution until as near a match as possible is obtained with a control made by mixing 25 ml of the reagent in a similar 150-ml conical flask.

D.3 Calculation

Aldehydes and ketones, expressed as acetaldehyde, CH_3CH0, per cent by mass is calculated as follows:

$$= \frac{0.017\ \ 6\ (T_2 - 0.6)}{S}$$

where

T_2 is the volume, in millilitres, of 0.1 M sodium hydroxide solution used; and

S is the specific gravity of the denatured spirits.

NOTE The correction 0.6 is subtracted from the number of millilitres of sodium hydroxide solution used to allow for the effect on the indicator of the different alcohol concentrations in the experiment and control.

Annex E
(nornative)

Sampling

The containers shall be selected at random from a lot. In order to ensure randomness of selection, random number tables shall be used. In case random number tables are not available, the following procedure may be followed.

Arrange all the container's in the lot in a systematic manner and starting from any one, count them as *1, 2, 3 ……..r.* where *r* is the integral part of *N/n (N* and *n* being the lot size and the sample size respectively). Every rth container thus counted shall be included in the sample till the required number of containers specified in Table E.1 is taken out.

Table E.1 — Number of containers to be selected for sampling

Lot size	Number of containers to be selected
N	*n*
Up to 15	2
16 to 25	3
26 to 50	4
51 to 100	5
101 to 300	6
301 to 500	7
501 to 800	8
801 to1 000	9
1 001 and above	10

KENYA BUREAU OF STANDARDS (KEBS)

KEBS CERTIFICATION MARKS

ISO 14001 REGISTERED FIRM
ENVIRONMENTAL MANAGEMENT SYSTEM

ISO 22000 REGISTERED FIRM
FOOD & SAFETY MANAGEMENT SYSTEM

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1. Product Certification Marks

KEBS Standardization Mark (S-Mark) is issued for use on products that comply with the minimum quality requirements prescribed in Kenya standards. It uses standards as a benchmark for quality compliance and aims at giving manufacturers improved market access and also giving consumers an assurance of quality for the products bearing the mark.

Standardization Mark
SYMBOL FOR PRODUCT QUALITY

Diamond Mark of Quality
SYMBOL FOR PRODUCT QUALITY EXCELLENCE

Import Standardization Mark
SYMBOL FOR PRODUCT QUALITY

- Promotion of standardization in commerce and industry
- Provision of testing and calibration facilities
- Control of the use of standardization marks
- Undertaking educational work in standardization
- Facilitation of the implementation and practical application of standards
- Maintenance and dissemination of the International System of Units (SI) of measurements

2. Systems Certification Marks

ISO 9001 REGISTERED FIRM
QUALITY MANAGEMENT SYSTEM

OCCUPATIONAL HEALTH AND SAFETY
OHSAS 18001

- Standards development and harmonization
- Testing services
- Measurement services (Calibration)
- Enforcement of standards
- Product inspection services
- Education and Training in Standardization, Metrology and Conformity Assessment
- Product and Management Systems Certification Services

Standards are documents that provide a common reference point for the assessment of the quality of goods and services. Standards facilitate tranparency in the exchange of products

and enhance market access of Kenyan products into local, regional and international markets.
Information on standards and related documents is available at the KEBS standards information centre.
KEBS houses the WTO-TBT National Enquiry Point (NEP) which disseminates notification likely to affect international trade to the industry.
KEBS also provides technical advice on installation and improvement of quality goods and services to the industry so as to facilitate efficient implementation of standards. Some of the advantages of standards include: enhancement of quality assurance, safety and environmental protection measures, minimization of wastage, reduction of costs and unecessary varieties and promotion of interchangeability and increased productivity in industry.

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