

DRAFT TANZANIA STANDARD

White spirit (mineral turpentine) – Specification

Draft for Comments Only

TANZANIA BUREAU OF STANDARDS

Introduction

White spirit is a flammable, clear, colourless liquid. It is a mixture of chemicals known as petroleum hydrocarbons. Other common names for white spirit are Stoddard solvent, turpentine substitute, mineral spirit and paint thinner. It is a mixture of aliphatic, open-chain or alicyclic C₇ to C₁₂ hydrocarbons,

White spirit is commonly used in paints, coatings, waxes, varnishes, adhesives, printing inks and liquid photocopier toners. In industry it is also used as a solvent for, cleaning, degreasing and substance extraction. In households, white spirit is commonly used to clean paint brushes or thin paint.

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Foreword

This Draft Tanzania Standard is being developed by the Industrial and Laboratory Chemicals Technical Committee under supervision of the Chemicals Division Standards Committee and it is in accordance with the procedures of the Bureau.

In the preparation of this Tanzania Standard assistance has been drawn from:

KS 666:2011 White spirit — Specification, published by Kenya Bureau of Standards.

Acknowledgement is hereby made for the assistance derived from these sources:

In reporting the result of a test or analysis made in accordance with this Tanzania Standard, if the final value, observed or calculated is to be rounded off, it shall be done in accordance with TZS 4 *rounding off numerical values*.

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1 Scope

This Draft Tanzania Standard prescribes the requirements, sampling and test methods for white spirit (mineral turpentine) used in paints, varnishes, lacquers, resins, thinners and cleaning solvents.

2 Normative references

The following referenced documents are indispensable for the application of this document. The latest edition of the referenced document (including any amendments) applies.

TZS 77/ISO 760, Determination of water - Karl Fischer method (General method)

ASTM D86, Test for distillation of petroleum products

ASTM D4052, Standard test method for density and relative density of liquids by digital density meter

ASTM D1218, Standard test method for refractive index and refractive dispersion of hydrocarbon liquids

ASTM D1319, Standards test method for hydrocarbon types in liquid petroleum products by fluorescent indicator adsorption

ASTM D1266, Test for sulfur in petroleum products (lamp method).

ASTM D56, Standard Test Method for Flash Point by Tag Closed Cup Tester

ASTM D156, Standard Test Method for Saybolt Color of Petroleum Products (Saybolt Chromometer Method)

ASTM D2622 Standard Test Method for Sulfur in Petroleum Products by Wavelength Dispersive X-ray Fluorescence Spectrometry

ASTM D5453 Standard Test Method for Determination of Total Sulfur in Light Hydrocarbons, Spark Ignition Engine Fuel, Diesel Engine Fuel, and Engine Oil by Ultraviolet Fluorescence

ASTM D7039 Standard Test Method for Sulfur in Gasoline, Diesel Fuel, Jet Fuel, Kerosine, Biodiesel, Biodiesel Blends, and Gasoline-Ethanol Blends by Monochromatic Wavelength Dispersive X-ray Fluorescence Spectrometry

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

3. Terms and definitions

There are no terms defined in this document.

4. Requirements

4.1 General requirements

The white spirit shall consist of a mixture of aliphatic hydrocarbons (C₇ to C₁₂), clear, colourless and free from solid matter.

4.2 Specific requirements

The white spirit shall also comply with the specific requirements given in Table 1.

Table 1 Specific requirements for white spirit.

S/N	Characteristic	Requirement (on dry basis)	Method of test
1.	Appearance	Clear, no solid matter present	Visual inspection
2.	Odour	Free from kerosene smell	Olfactorily
3.	water content % m/m, max	0.05	TZS 77/ISO 760
4.	Colour (Saybolt), min	+25	ASTM D 156
5.	a) Initial boiling point (IBP), °C	145 – 175	ASTM D 86
	b) Dry point (D.P), °C	166 – 237	
	c) Distillation range for 50 percent distillate, °C	162 – 172	
6.	Density (20°C ± 2°C) g/mL	0.775 – 0.785	ASTM D4052
7.	Refractive index (R.I.) at 20°C ± 2°C, min.	1.434	ASTM D1218
8.	Aromatic content, % (v/v) max.	20	ASTM D1319
9.	Residue on evaporation, mg/100 mL, max	5	Annex A
10.	Sulphur content, ppm max.	5	ASTM D1266 ASTM D2622 ASTM D5453 ASTM D7039
11.	Flash point. °C, min.	40	ASTM D56 ASTM D93
12.	Neutrality	To pass the test	When 50 mL of sample is shaken with 20 mL of distilled water, the water layer shall be neutral, to methyl orange

5. Packaging and marking

5.1 Packaging

The white spirit shall be supplied in clean, dry and air tight containers, without faults, made of material which do not affect the contents. The method of closing the containers shall prevent the contents from contamination and evaporation.

5.2 Marking

Each container shall bear the following information given in visibly, legible and durable marked in English or Kiswahili:

- the name of the product
- manufacturer's name
- registered trade mark if any;
- net content;
- batch/code number;
- cautionary statement/symbols with the words: "Inflammable liquid";
- country of origin;
- date of manufacture and best before date;
- instructions for use, storage and disposal and
- safety precautions.

6. Sampling

Representative samples, each having a volume of not less than 500 mL, shall be taken in triplicate from one or more original and unopened containers or from the bulk during packaging and shall be packed in clean, dry, airtight containers. The containers shall be of such a size that they are nearly filled by the sample. Each sample container shall be sealed with a material unaffected by the contents.

7. Storage

The material shall be stored in suitable container which shall not affect integrity of the product in terms of quality.

Annex A

(normative)

Determination of residue on evaporation

A.1 Note

Residue on evaporation: The amount of non-volatile residue obtained under the conditions of test.

A.2 Apparatus

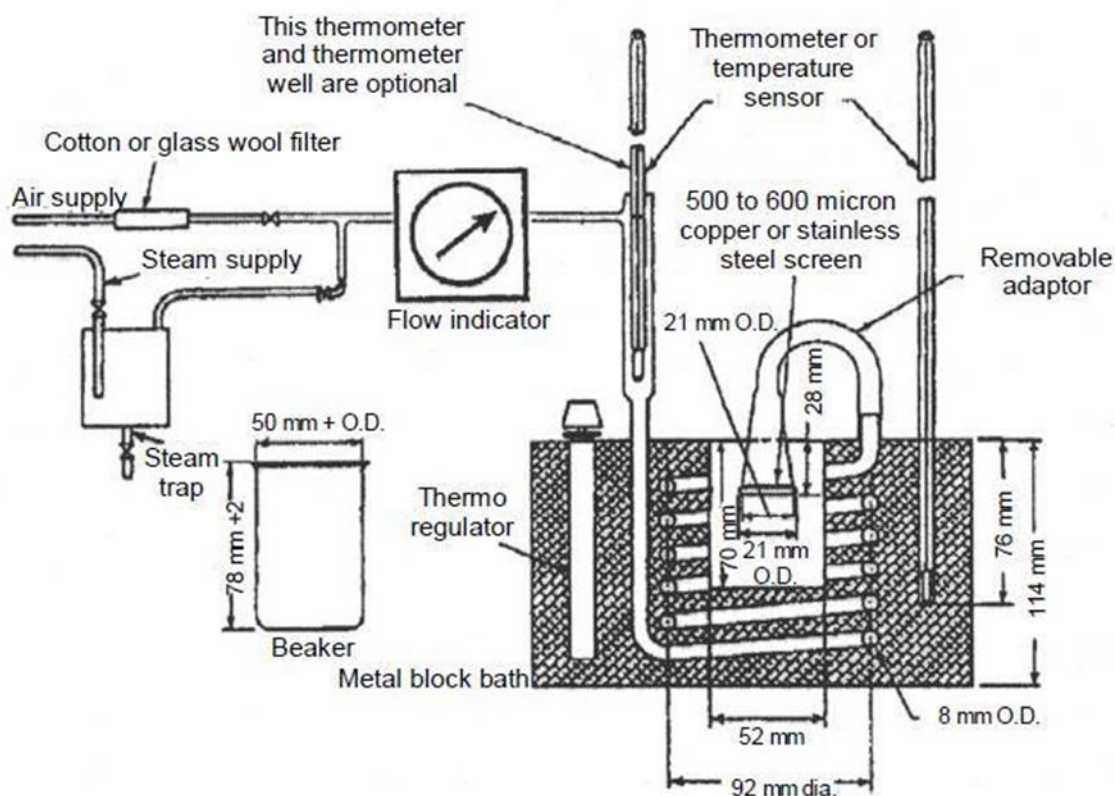


Figure. 1 — Distillation apparatus

A.2.1 Evaporation bath, either a solid metal-block bath using a metal of high thermal conductivity, or a liquid bath fitted with a reflux condenser, electrically heated and constructed in accordance with the general principles shown in Figure.1. The electric supply to the liquid bath shall be sufficient to keep the Liquid boiling through the preheating coil at the specified rate. The evaporation bath shall be provided with wells and air jets for three or more beakers and be insulated. The preheaters, manifolds, and air outlets shall be so constructed as to allow the required rate of air flow (see Clause A.2.2). The beaker wells shall be made sufficiently deep to allow insertion of the 100 ml beakers to a depth of 70 mm. If a liquid bath is used, it shall be filled to within 25 mm of the top with a stable liquid having a boiling point within 160 °C and 165 °C; (ethylene glycol) containing approximately 3 per cent of water is suitable for this purpose.

A.2.2 Air supply apparatus, capable of supplying filtered air at a pressure not greater than 34.5 kN/m² (0.35 kgf/cm²) to the inlet of the preheating coil of the bath, and at a rate sufficient to provide a flow from each outlet of 1 000 ± 150 mL/s at a temperature of 155 ± 5°C.

A.2.3 Flowmeter, capable of metering a flow of air equivalent to 1 000 mL/s for each outlet of the evaporation bath at the operating temperature. The use of a calibrated flowmeter allowing a flow of 600 ± 90 mL/s, measured at room temperature, will ensure delivery of 1 000 ± 90 mL/s at the operating temperature, provided that the pressure at the outlet of the flowmeter is not greater than 34.5 kN/m² (0.35kgf/cm²).

A.2.4 Beakers, of 100 mL capacity, flat bottomed as shown in Figure 1. The beakers shall be arranged in sets, the number in each set depending on the number of beaker wells in the evaporation bath

A.2.5 Cooling vessel, suitable covered vessel for cooling the beakers before weighing, such as a glass desiccator or a tightly covered metal vessel for each set of beakers. A drying agent is not to be used in the cooling vessel.

A.2.6 Balance, having a sensitivity of at least 0.1 mg, preferably with no drying agent in the case.

A.2.7 Thermometer, of the mercury-in-glass type, nitrogen-filled, graduated on the stem, enamel-baked, adjusted for 76 mm immersion and allowing temperature in the range 150 °C to 160 °C to be measured with an accuracy of ± 1 °C at an average temperature of the emergent mercury column of 65 °C (see note below).

NOTE: It is far more important that the greatest volume of mercury be immersed in the refluxing zone than that the immersion mark on the thermometer be placed at any specific point.

A.3 Cleaning liquids

A.3.1 A mixture of equal volumes of toluene and acetone, of analytical reagent quality.

A.3.2 Chromic/sulphuric acid solution.

E.4 Preparation of apparatus

A.4.1 Assemble the apparatus as shown in Figure 1. With the apparatus at room temperature, adjust the air flow to a rate of 600 mL/s at one of the outlets. Measure the flow at the remaining outlets and make any necessary adjustments so that the rate at each outlet is 600 ± 90 mL/s (see A.2.3). Heat the bath and when its temperature reaches 160°C to 165°C, place a beaker in each well (A.2.1). Submit air at the rate required with the conical jets in position. Check the temperature in each well by placing the bulb of the thermometer on the bottom of the beaker in the well. Do not use any well where the temperature does not lie between 150 °C and 160 °C.

A.4.2 Clean new beakers by immersion in the chromic/sulphuric acid solution (A.3.2) for at least 6 h. Remove the beakers from the solution by means of stainless-steel forceps and handle only with forceps thereafter. Wash the beakers thoroughly, first with tap water, then with distilled water.

NOTE: Protective clothing such as gloves and goggles must be worn by operators using chromic/sulphuric acid solution.

Clean beakers which have been used in previous determinations by removing the residue with the mixture (A.3.1), then immerse them for at least 6 h in chromic/sulphuric acid cleaning solution followed by washing as described above. Clean the tare beakers in a similar manner. Dry the beaker for 1 h in an oven at 150 °C and allow them to cool for at least 2 h in the cooling vessel placed in the vicinity of the balance.

A.5 Procedure

For each sample, weigh to the nearest 0.1 mg two test beakers for a duplicate determination, using analytical balance. Repeat the weighing without changing the order in which the beakers are

weighed, until consecutive masses for the beakers agree within 0.1 mg, and record the masses. If suspended or solid matter is present, mix the contents of the sample container thoroughly. Immediately filter, at atmospheric pressure, the necessary quantity of the sample through a sintered-glass funnel of porosity grade p.100 (pore size index 40 mm to 100 mm).

Using a graduated measuring cylinder, pour 50 mL of the sample into each test beaker. Place the full beakers and also the empty tare beaker in the evaporation bath, previously heated to the specified temperature (160°C to 165°C). Replace the conical jet as each beaker is filled, centre the jet vertically above the surface of the liquid. The time elapsing between filling the first and second beakers shall be as short as possible. Supply air at the required rate.

After 30 min evaporation, remove the beakers from the bath place them in the cooling vessel and allow to cool in the vicinity of the balance for at least 2 h. Weigh the beakers in the same manner and in the same sequences as was followed previously, repeating the weighing until consecutive masses agree within 0.1mg. If the results of the two evaporations differ by more than 1.0 mg, repeat the determinations.

A.6 Expression of results

A.6.1 Calculate the residue on evaporation A, in milligrams per 100 mL, by the formula.

$$A = 2\,000 (m_1 - m_0)$$

where,

m_1 = the mass, in grams, of the test beaker plus residue; and

m_0 = the mass, in grams, of the empty test beaker.

A.6.2 Report the mean of the sum of the results of the duplicate determinations to the nearest milligram per 100 ml as the residue on evaporation. After the numerical value designated by the word 'filtered' if the sample has been so treated.

A.7 Precision

For results of the order of 10 mg/100 mL (i.e. the maximum permitted residue), duplicate results shall not be considered suspect unless they differ by more than 3 mg/100 mL (repeatability) or 6 mg/100 mL (reproducibility).