



DRAFT TANZANIA STANDARD

Draught beer – Specification

FOR STAKEHOLDERS' COMMENTS ONLY

TANZANIA BUREAU OF STANDARDS

DRAUGHT BEER – SPECIFICATION

0 FOREWORD

Beer is a common commercial alcoholic beverage in the country. The beer industry and trade is expanding very fast to cater for the increasing demand of the commodity under different kinds/types.

Variations in beer quality do arise mainly due to traditions used or applied in the brewing process; which could also influence the safety parameters of the beer. It is in recognition of that this Tanzania Standard was prepared with a view to guide all those concerned in ensuring the production and marketing of safe and good quality draught beer.

In the preparation of this Tanzania Standard considerable amount of information was sourced from manufacturers of draught beer.

In reporting the results 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*

1 SCOPE

This Tanzania Standard specifies requirements, methods of sampling and test for draught beer.

2 NORMATIVE REFERENCES

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced documents (including any amendments) applies;

TZS 4 Rounding off numerical values

TZS 268 General atomic absorption — Spectrophotometric method for determination of lead in food stuffs

TZS 109 Code of hygiene for food processing units – General

CODEX STAN 192, Codex general standard for food additives

TZS 1495:2016/ ISO 7952-1994 Fruits, vegetables and derived products Sampling and methods of test – Part 9: Determination of copper content – Method using flame atomic absorption spectrometry

TZS 471 Methods of sampling and test for alcoholic beverages

TZS 122 Microbiology – General guidance on methods for the detection of Salmonella

TZS 538 Labelling of pre-packaged foods — General requirements

TZS 1492/ISO 17240, Fruit and vegetable products — Determination of tin content — Method using flame Atomic Absorption Spectrometry

TZS 131 Microbiology of food and animal feeding stuff – General guidance for enumeration of yeasts and moulds – Colony count technique at 25°C

TZS 789/EAS 12 Potable water –specification

TZS 799/ISO 16050:2003 Foodstuffs -- Determination of aflatoxin B1, and the total content of aflatoxins B1, B2, G1 and G2 in cereals, nuts and derived products -- High-performance liquid chromatographic method

TZS 1491/ISO 1842, Fruit and vegetable products — Determination of pH

TZS 729/ISO 4832, Microbiology of food and animal feeding stuffs — Horizontal method for the enumeration of coliforms — Colony-count technique

TZS 118-1/ISO 4833-1, Microbiology of the food chain — Horizontal method for the enumeration of micro-organisms — Part 1: Colony-count at 30 degrees C — Pour plate technique

TZS 1492/ISO 17240, Fruit and vegetable products — Determination of tin content — Method using flame Atomic Absorption Spectrometry

TZS 799/ISO 16050:2003 Foodstuffs -- Determination of aflatoxin B1, and the total content of aflatoxins B1, B2, G1 and G2 in cereals, nuts and derived products -- High-performance liquid chromatographic method

3 TERMS AND DEFINITIONS

For the purpose of this Tanzania Standard the following definitions shall apply.

3.1 beer

beverage, containing ethyl alcohol prepared by fermentation of sugars derived mainly from malted and/or unmalted cereal grains and/or approved adjuncts

3.2 draught beer

beer served from stainless steel cylinders (kegs), casks or other suitable containers pressurized with food grade carbon dioxide or nitrogen gas for dispensing the beer for retail through a tap or faucet; and containing not less than 0.5 % ethyl alcohol volume by volume (See table 1).

3.3 malt

barley or other cereal grains that have been soaked in water and allowed to sprout and kilned used for brewing.

4 REQUIREMENTS

4.1 General Requirement

4.1.1 Description

Draught beer is an alcoholic beverage prepared by alcoholic fermentation of wort of cereal malt and hops by yeast, with or without the addition of sugar or syrup in potable water conforming to TZS 789 (see clause 2). Such beer shall be served from suitable stainless steel cylinders (kegs), casks or other suitable containers which are pressurized with food grade carbon dioxide or nitrogen gas or a combination of such gases; which drives the beer for retail through a dispensing tap or faucet. Such beer may either be pasteurized or remain unpasteurized.

4.1.2 Draught beer shall be free from foreign matter, suspended matter or any substance injurious to health

4.1.3 Draught beer shall be free from non nutritive sweeteners

4.1.4 Draught beer shall be free from artificial colours

4.1.5 Organoleptic requirements

Draught beer shall have the characteristic colour, smell, taste, bouquet and foam of its type according to brand characteristic

4.1.6 Carbonation

Draught beer shall be carbonated either in the fermentation tank or during filtration prior to packing,

4.1.7 Ingredients

4.1.7.1 The following ingredients shall be used in making draught beer;

- (a) malt or un malted grains
- (b) Hops (or hop concentrates) and/or their derivatives
- (c) Potable water conforming to TZS 789 (see clause 2)
- (d) Brewer's yeast (*Saccharomyces spp*)
- (e) Carbon dioxide or nitrogen gas of food grade

4.1.7.2 Optional ingredients

- a) Fermentable adjuncts
- b) caramel produced from sugar

4.2 Specific Requirement

Draught beer shall comply with the physical and chemical requirements given in Table 1.

Table 1: physical and chemical requirements

S/N	Characteristic	Requirement for grade					Method of test refer to
		Non alcoholic	Light	Mild	Medium	Strong	
1.	Ethanol content, per cent v/v at 20°C	< 0.5	0.5 - 2.4	2.5 – 4	4.1 – 5.5	> 5.5	TZS 471
2.	Carbon dioxide, percent v/v	2.4 – 3.0	2.4 – 3.0	2.4 – 3.0	2.4 – 3.0	2.4 – 3.0	TZS 471
3.	pH at 20 °C	4.2 – 4.6	4.2 – 4.6	4.2 – 4.6	4.2 – 4.6	4.2 – 4.6	TZS 1491

5 FOOD ADDITIVES

Only food additives specified in Codex Stan 192 (see clause 2) shall be used

6. CONTAMINANTS

6.1 Heavy metal

Draught beer shall not contain heavy metals at levels exceeding the limits indicated in Table 2.

Table 2 — Limits for heavy metal contaminants in draught beer

S/N o.	Type of heavy metal	Limit	Test method
(i)	Copper as Cu, mg/L, max.	2.0	TZS 1495
(ii)	Lead (as Pb), mg/L, max.	0.1	TZS 268
(iii)	Tin, (as Sn), mg/L, max.	250	TZS 1492

6.2 Mycotoxins limits.

6.2.1 Total aflatoxin in Draught beer shall not exceed 10 ppb and 5 ppb for aflatoxin B1 when tested in accordance with TZS 779

6.2.2 Total fumonisins in Draught beer shall not exceed 2 ppm when tested in accordance with Annex A

7. Hygiene

7.1 Draught beer shall be manufactured in premises built and maintained under hygienic conditions as prescribed in TZS 109 (see clause 2)

7.2 Microbiological limit

Draught beer shall be free from any pathogenic microorganisms and shall comply with the microbiological limit given in Table 3.

Table 3: Microbiological limits for draught beer

S/N	Organism	Maximum limit		Method of test (see clause 2)
		Unpasteurized	Pasteurized	
1.	Total plate count, cfu/ml, max	1 x 10 ⁴	1 X 10 ¹	TZS 118-1
2.	Yeast and mould, cfu/ml., max	1 x 10 ⁴	1 X 10 ¹	TZS 131
3.	Coliforms cfu/ml	Absent	Absent	TZS 729
4.	Salmonella, cfu/ml	Absent	Absent	TZS 122

8 Sampling and test

The methods of sampling and tests shall be conducted as provided in TZS 471 see clause 2 and other relevant Tanzania Standards specified in Tables 1, 2 and 3 of this Tanzania Standard

9 Packing, marking and labelling

9.1 Packing

Draught beer shall be packed in stainless steel cylinders (kegs), casks or any other suitable food grade container

9.2 Marking and labelling

9.2.1 The product shall be marked and labeled in accordance with TZS 538 (see clause 2).

9.2.2 In addition each Container/packet of product shall be marked and/or labeled legibly and indelibly on the label of the container in Swahili and/or English and any other language depending on the designated market.

- a) The common name of the product shall be "Draught beer"
- b) Grade of the beer
- c) Brand or trade name
- d) Name and physical address of the brewer/distributor
- e) Batch number in code or in clear
- f) Storage condition
- g) Country of origin
- h) Date of manufacturing and expiry date
- i) Net volume
- j) The ethyl alcohol content in percent volume by volume
- k) List of ingredients
- l) statutory warnings.

9.3 Certification mark

Each container may also be marked with TBS certification mark of quality.

NOTE - The TBS Mark of Quality may be used by the packers only under licence from TBS. Particulars of conditions under which the licenses are granted, may be obtained from TBS.

ANNEX A:

Determination of fumonisins B1 and B2 in corn/sample by liquid chromatography with immune-affinity column cleanup

Applicability: It applicable to o determination of fumonisins B₁ in corn/sample at total levels from 0.5 to 2µg/g

Caution

Fumonisins are nephrotoxic, hepatotoxic, and carcinogenic to rats and mice, however effects on humans are not fully known. Wear protective gloves to reduce skin contact with extracts. Laboratory spills should be cleaned up by washing with a 5% dilution of commercial bleach (sodium hypochlorite) followed by water.

1. Principle

Fumonisins are extracted from corn with methanol–acetonitrile–water (25 + 25 + 50, v/v/v), the filtered extract is cleaned up by an immunoaffinity column, and the fumonisins are eluted with methanol. The eluate is evaporated just to dryness, and the residue is dissolved in acetonitrile–water (50 + 50, v/v). O- Phthaldialdehyde and 2-mercaptoethanol is added to form fluorescent fumonisin derivatives, which are separated by reversed phase liquid chromatography (LC) with fluorescence detection.

2. Reagents

- a) Methanol. —LC grade.
- b) Acetonitrile. —LC grade.
- c) O-Phthaldialdehyde (OPA). —CAS 643-79-8.
- d) 2-Mercaptoethanol (MCE) —CAS 60-24-2.
- e) Sodium dihydrogen phosphate solution. —0.1M. Dissolve 15.6 g NaH₂PO₄·2H₂O in water and dilute to 1 L.
- f) Sodium tetraborate solution.—0.1M. Dissolve 3.8 g Na₂B₄O₇·10H₂O in water and dilute to 100 mL
- g) Hydrochloric acid.—2M. Dilute HCl (12M) 1+5 with water.
- h) Extraction solvent.—Acetonitrile–methanol–water (25 + 25+ 50, v/v/v).
- i) Acetonitrile–water.—50 + 50, v/v.
- j) Phosphate-buffered saline (PBS).—Dissolve 8.0g NaCl, 1.2g anhydrous Na 2HPO₄,0.2g KH₂PO₄, and 0.2g KCl in approximately 990 mL water. Adjust pH to 7.0 with 2M HCl, and dilute to 1 L. Phosphate-buffered saline tablets can also be used.
- k) Immunoaffinity columns.—Specific for fumonisin cleanup with 100% cross reactivity for both FB1 and FB2. The column must have a total capacity of \$ 10 µg fumonisins B1 and B2 and should give a recovery of \$90% when a calibrant solution of fumonisins B1 and B2 in methanol–PBS containing 5µg fumonisins is applied. Follow the manufacturer's instructions for the type of column used.
- l) LC mobile phase.—Methanol–0.1M NaH₂PO₄ (77 + 23, v/v), adjusted to pH 3.35 with H₃PO₄. Filter mobile phase through 0.45µm membrane, and pump at 1 mL/min flow rate. Adjust composition to conform with individual LC column characteristics.
- m) OPA reagent.—Dissolve 40 mg OPA in 1 mL methanol, and dilute with 5 mL 0.1M Na₂B₄O₇solution. Add 50µL MCE and mix. Store in the dark for up to 1 week at room temperature in a capped amber vial.
- n) Fumonisins B1 and B2.—Crystalline form, purity of >95%
- o) Fumonisin stock solution for LC. —Prepare calibrant solution containing fumonisins B1 and B2 in acetonitrile–water (50 + 50, v/v) at concentration of 100µg/mL for FB1 and 50µg/mL for FB2. Fumonisin calibrant solution is stable up to 6 months when stored at 4°C. Pipet 500µL fumonisin calibrant solution into 5 mL calibrated volumetric flask. Dilute to volume with acetonitrile–water (50 + 50,v/v), and shake well to obtain stock solution containing FB1 at 10 ng/µL and FB2 at 5 ng/µL
- p) Fumonisin working calibrant solutions for LC.—Prepare 4 LC calibrant solutions in separate 5mL volumetric flasks according to Table 2001.04C. Dilute contents of each flask to volume (5 mL) with acetonitrile–water (50 + 50, v/v).

3. Apparatus

- a) Centrifuge bottle.—Plastic, 250 mL, with screw cap.
- b) Centrifuge—Operating up to 2500 xg
- c) Filter papers.—Whatman No. 4, 12 cm.

- d) Glass microfiber filters. —Whatman GF/A, 9 cm.
- e) Reservoir.—25 mL with Luer tip connector for immunoaffinity column.
- f) Calibrated microliter syringe or microliter pipet-25-1000 μL
- g) Vacuum manifold.—To accommodate immunoaffinity columns.
- h) Liquid chromatograph.—LC pump delivering 1 mL/min constant flow rate and with injection system calibrated to deliver 20 μL ; and data system.
- i) LC column. —Stainless steel (150 \times 4.6 mm id), packed with 5 μm C18 deactivated reversed-phase material, preceded by corresponding reversed-phase guard column or guard filter (0.5 μm porosity).
- j) Fluorescence detector.—Fitted with flow cell and set at 335 nm (excitation) and 440 nm (emission).

4. Extraction

Permit materials to reach room temperature before removing test portion. Weigh, to nearest 0.1g, 20g test portion of corn into 250 mL centrifuge bottle, and add 50 mL extraction solvent, 2(h). Cover centrifuge bottle, and shake bottle for 20 min with orbital shaker. Centrifuge for 10 min at 2500 \times g, and filter supernatant through filter paper, 3 (c), avoiding transfer of solid material on filter. Again extract remaining solid material by adding 50 mL extraction solvent, 2 (h), to centrifuge bottle and shaking bottle for 20 min. Centrifuge for 10 min at 2500 \times g, and filter extract through the same filter paper. Collect and combine the 2 filtrates, and pipet 10 mL filtrate into 100 mL flask. Add 40 mL PBS, 2 (j), and mixwell. Filter diluted extract through microfiber filter, C(d), and collect 10 mL filtrate (equivalent to 0.4 g test portion) for cleanup through immune-affinity column.

5. Immunoaffinity Column Cleanup

Follow manufacturer's instructions for the type of column used. Remove top cap from column, and connect column with reservoir. Remove end cap from column and attach column to vacuum manifold. Pipet 10 mL filtrate into reservoir. Let filtrate flow through column at ca 1–2 drops/s and discard eluate. Wash column with 10 mL PBS, 2(j), at rate of 1–2 drops/s until air comes through column Place 4 mL vial under column. Elute fumonisins with 1.5 mL LC grade methanol at 1 drop/s, and collect fumonisins in vial. Evaporate eluate just to dryness under stream of N at ca 60°C. Retain dried residue at ca 4°C for derivatization and LC analysis

6. Calibration Curve

Prepare calibration curves, using working calibrant solutions 2 (p). These solutions cover the range of 0.025–2.000 $\mu\text{g/g}$ for FB1 and the range of 0.0125–1.000 $\mu\text{g/g}$ for FB2. Prepare calibration curves, before LC analysis, according to Table 2001.04C, and check plots for linearity. If curve is not linear, repeat derivatization following instructions carefully and/or reduce the range of the calibrants.

7. Derivatization and LC Analysis

Redissolve purified residue in 200 μL acetonitrile–water (50 + 50, v/v), B(i). Transfer 50 μL aliquots of extract or standards to bottom of 1 mL test tube, and add 50 μL OPA reagent, B(m). Mix solution for 30 s with vortex mixer, and inject 20 μL derivatized solution (equivalent to 20 mg matrix) into LC system exactly 3 min after adding OPA reagent. With the described LC mobile phase, B(l), and column, C(i), satisfactory (baseline) resolution of FB1–OPA and FB2–OPA must be obtained, with expected retention times at ca 6 and 15 min, respectively. If fumonisin content of derivatized extract is higher than calibration range, dilute purified extract with acetonitrile–water (50 + 50, v/v), B(i), derivatize with OPA reagent, and repeat LC analysis.

8. Quantification of Fumonisin B1 and B2

Quantify FB1 and FB2 by measuring peak area (or peak height) at retention time of each fumonisin and comparing measured value with corresponding calibration curve.

From calibration curves determine amounts of FB1 and FB2 (in μg) in aliquot of test solution injected into LC column.

Separately calculate concentrations (CFB) of FB1 and FB2 in micrograms per gram ($\mu\text{g/g}$), as follows:

$$\text{CFB} = 10^3 \frac{M_A}{10^3 M_B} \times \frac{1}{20} \frac{M_A}{20}$$

where

M_A is mass of FB1 or FB2 (in μg) in aliquot of test solution injected on column, as determined from calibration curve,

M_B is mass of matrix (in mg) injected on column (20 mg), obtained as follows:

$$\frac{20 \text{ g (Extraction step)}}{100 \text{ mL}} \times \frac{10 \text{ mL (dilution)}}{50 \text{ mL}} \times \frac{10 \text{ mL (purified aliquot)}}{0.2 \text{ mL}}$$
$$\frac{1 \text{ (reconstitution volume)}}{0.2 \text{ mL}} \times \frac{0.05 \text{ mL (derivatization)}}{0.1 \text{ mL}}$$

0.02 mL (injected aliquot)

And 10^{-3} is a factor to convert M_A and M_B from ng to μg and mg to g, respectively.