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DRAFT TANZANIA STANDARD

Black and white pepper (whole or ground) — Specification

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0 Foreword

Pepper is one of the commonly used spices in Tanzania. It is the berry of the vine/climber of *Piper nigrum*. Pepper from this vine has different forms, including black pepper and white pepper which are traded as whole or ground.

This Tanzania Standard has been prepared to ensure the safety and quality of black pepper and white pepper produced and or traded in the country.

This Tanzania Standard is a revision of the third version finalized in 2018. This fourth edition cancels and replaces the third edition TZS 30: 2018 which has been technically revised.

In the preparation of this Tanzania Standard considerable assistance was derived from spice manufacturers in the country together with the following:

ESA 2007 (Revision 1), Quality *Minima Document,* published by European Spice Association;

ISO 959-1:1998, *Pepper (Piper nigrum* L.*), whole or ground — Specification- Part 1,* published by the International Organization for Standardization; and

ISO 959-2: 1998, *Pepper (Piper nigrum* L.*), whole or ground — Specification — Part 2,* published by the International Organization for Standardization.

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 (see clause 2).

1 Scope

This Tanzania Standard specifies requirements, sampling and test methods for black pepper and white pepper; of the species *Piper nigrum* L. in whole form and also in ground form.

2 Normative references

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

TZS 4, *Rounding off numerical values*

TZS 33, *Spices and condiments — Sampling*

TZS 109, *Food processing units — Code of hygiene*

TZS 118/ISO 4833, *Microbiology of food and animal feeding stuffs — Horizontal method for the enumeration of microorganisms — Colony-count technique at 30 °C*

TZS 122, *Food stuffs — Microbial examination for Salmonella*

TZS 2426-2/ ISO 21527-2:2008 Microbiology of food and animal feeding stuffs — Horizontal method for the enumeration of yeasts and moulds Part 2: Colony count technique in products with water activity less than or equal to 0,95

TZS 538, *Labelling of pre-packaged foods — General requirements*

TZS 730-2, *Microbiology of Food and animal feeding Stuffs — Horizontal Method for the Enumeration of B-Glucuronidase —Positive Escherichia Coli — Part 2: Colony-count Technique at 44 °C Using 5-Bromo4-Chloro-3-Indolyl B-D-Glucuronide*

TZS 1315, *Spices and condiments — Determination of extraneous matter and foreign matter content*

TZS 1316, *Spices and condiments — Determination of total ash*

TZS 1317, *Spices and condiments — Determination of acid insoluble ash*

TZS 1318, *Spices and condiments — Determination of moisture content — Entrainment method*

TZS 1319, *Spices and condiments — Determination of non-volatile ether extract*

TZS 1320, *Spices and condiments — Determination of volatile oil content (hydrodistillation method)*

TZS 1446, *Black pepper and white pepper, whole or ground- determination of piperine content — spectrophotometric method*

CXS 193, *Codex general standard for contaminants and toxins in food and feed*

TZS 799/ISO 16050, *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 standard, the following terms and definitions shall apply:

3.1 black pepper

dried whole berries of pepper of the species *Piper nigrum* L., generally picked before they are ripe, brown to black in colour having unbroken pericarp

3.2 white pepper

obtained by removing the outer skin pericarp and outer portion of mesocarp of mature green berries or dried black pepper

3.3 ground pepper

pepper obtained by grinding white or black pepper berries without adding any foreign matter to the pepper and that conforms to the requirements of this Tanzania Standard

3.4 light berries

berries that have reached an apparently normal stage of development but the kernels do not exist

3.5 pinhead

berry of very small size that has not developed

3.6 broken berries

berries that have been broken in two or more pieces

3.7 extraneous matter

all materials other than white or black pepper berries, irrespective of whether they are of vegetative (example stems and leaves) or mineral (example sand) origin

NOTE – Light berries, pinheads or broken berries are not considered as extraneous matter.

4 Requirement

4.1 General requirements

4.1.1 *Description*

4.1.1.1 Whole black pepper shall be dried whole berries of species *Piper nigrum* L. generally picked before complete ripening. Berries of black pepper generally have a diameter of 3 mm to 6 mm and are brown, grey or black in colour with a wrinkled pericarp.

4.1.1.2 White pepper shall be obtained in two ways, as follows:

a) from whole ripe berry of *Piper nigrum* L., removing the outer pericarp by the same procedure as described above.

b) from black pepper using the whole dry berry of species *Piper nigrum* L., generally picked before complete ripening, and removing the outer pericarp, with or without preliminary soaking in water; if necessary, drying is carried out afterwards.

4.1.1.3 The colour of white pepper varies from matt brownish to pale ivory white.

4.1.1.4 Ground pepper is obtained by grinding pepper berries of species *Piper nigrum* L. without adding any foreign matter to the pepper.

4.1.2 *Odour and flavour*

4.1.2.1 Black or white pepper shall have odour and flavour characteristic of the product and be free from foreign odours and flavour.

4.1.2.2 Ground black pepper shall be very aromatic, and strongly sharp.

4.1.2.3 White pepper shall be slightly sharp and very aromatic.

NOTE – The size of berries has no direct relation to their flavour. Smaller berries can be more aromatic than berries of larger size.

4.1.3 *Freedom from mould, insects etc.*

Black pepper and white pepper, whole or ground shall be free from fungi, insect infestation, dead insects, insect fragments and rodent contamination visible to the naked eye.

4.2 Specific requirements

4.2.1 Physical characteristics

4.2.1.1 Ground pepper shall be free from coarse particles and shall be of such fineness that whole of it passes through a sieve of 1.00 mm aperture size when tested in accordance with the methods prescribed under TZS 1315 (see clause 2).

4.2.1.2 The proportion of extraneous matter in whole black or white pepper shall not exceed the limits given in Table 1 when tested in accordance with the methods prescribed under TZS 1315 (see clause 2). The proportion of foreign matter not coming from the plant shall not be more than 1.0 % m/m in whole black pepper or 0.5 % m/m in white pepper.

4.2.1.3 Whole black and white pepper shall comply with the requirements prescribed in Table 1.

Table 1 – Physical characteristics of whole black and white pepper

S/N	Parameter	Requirements		Test method
		Black pepper	White pepper	
1)	Extraneous matter, % (m/m) max.	1.5	0.8	TZS 1315
2)	Light berries, % (m/m) max	10	-	Annex A
3)	Pinhead/ broken berries, % (m/m) max.	4	-	Physical separation and weighing
4)	Bulk density, g/l, min.	490	600	Annex B

4.3 Chemical requirements

4.3.1 Whole Black or white pepper shall comply with the requirements prescribed in Table 2 when tested by the methods specified therein.

Table 2 – Chemical requirements for whole pepper

S/N	Characteristics	Requirement		Test method (see clause 2)
		Black pepper	White pepper	
1	Moisture content, % m/m max.	12	12	TZS 1318
2	Total ash, % (m/m) max.	6.0	3.5	TZS 1316
3	Non volatile ether extract, % (m/m), min.	6.0	6.5	TZS 1319

4	Volatile oils, % (m/m), min.	2.0	1.0	TZS 1320
5	Piperine content, % (m/m), min.	4.0	4.0	TZS 1446
NOTE – Item 2 to 5 are on dry basis				

4.3.2 Ground black and white pepper shall comply with all chemical requirements given in Table 3.

Table 3 – Chemical requirements for ground pepper

S/No	Characteristics	Requirement		Test method (see clause 2)
		Black pepper	White pepper	
1	Moisture content ,% m/m, max.	12	12	TZS 1318
2	Total ash, % (m/m), max.	6.0	3.5	TZS 1316
3	Non volatile ether extract, % (m/m), min.	6.0	6.5	TZS 1319
4	Volatile oils, % (m/m), min.	1	0.7	TZS 1320
5	Acid-insoluble ash, % (m/m), max.	1.2	0.3	TZS 1317
6	Piperine content, % (m/m), min.	4.0	4.0	TZS 1446
7	Crude fibre, insoluble index, % (m/m), max.	17.5	6.5	Annex C
NOTE – Item 1 to 4 are on dry bases, volatile oil content should be determined immediately after grinding				

5 Contaminants

5.1 Pesticide residues

Black pepper and white pepper, whole or ground shall not have pesticides residues exceeding the maximum residual limits established in the Codex pesticide residues in food online data base.

5.2 Heavy metals

Black pepper and white pepper, whole or ground shall not have heavy metals in amounts exceeding the maximum residual limits as stipulated by CXS 193 (see clause 2).

5.3 Mycotoxin

Black pepper and white pepper, whole or ground shall comply with those maximum mycotoxin limits established by the CXS 193. In particular, total aflatoxin levels in black pepper and white pepper, whole or ground shall not exceed 10 µg/kg (ppb) and B_1 not exceeding 5 µg/kg (ppb) when tested according to TZS 799

6 Hygiene

6.1 Black and white pepper whole and ground shall be prepared under Good Hygienic Practices as stipulated in TZS 109.

6.2 Black and white pepper whole and ground shall be free from pathogenic microorganisms and shall comply with the microbiological requirements as prescribed in Table 4.

Table 4 – Microbiological requirements

S/No	Characteristic	Requirement	Test method (See clause2)
1)	Total plate count, cfu/g, *max.*	$1*10^5$	TZS 118
2)	Yeast and mould, cfu/g, *max.*	$1*10^3$	TZS 2426-2
3)	*Salmonella* per 25 g	Absent	TZS 122
4)	*E. coli* MPN/g	Absent	TZS 730-2

7 Sampling and test methods

7.1 Sampling

Sampling shall be done in accordance with TZS 33 (see clause 2).

7.2 Tests

Tests shall be done in accordance with Table 1, Table 2, Table 3 and Table 4.

8 Packaging, marking and labelling

8.1 Packaging

8.1.1 Whole pepper shall be packed in clean, gunny-bags, paper bags or food grade polythylene bags. The bags or containers for whole pepper shall, be free from any fungal or insect infestation and shall, be free from any undesirable smell.

8.1.2 Ground pepper shall be packed in clean, sound, dry food grade packages made of material which does not affect the product but protect it from the ingress of moisture or loss of volatile matter.

8.2 Marking and labelling

8.2.1
In addition to the provisions of the TZS 538 (see clause 2), the following particulars shall legibly and indelibly be marked or labeled on each bag/container:

a) Common name of the product;
b) Trade name or brand name, if any;
c) Name and address of the manufacturer and/or packer;
d) Batch or code number;
e) Date of packing;
f) Net weight;
g) Country of origin;
h) Year of harvest;
i) Best before date; and
j) Storage condition.

8.2.2 The language on the label shall be “Kiswahili” or “Kiswahili and English”. Any other language may be used depending on the designated market.

8.2.3 Labelling relating to storage and transport of black pepper or white pepper.

8.2.3.1 The packs of pepper shall be stored in covered premises, well protected from the sun, rain excessive heat and well ventilated.

8.2.3.3 The store room shall be dry, free from objectionable odour, and proofed against entry of insects and vermin.

8.2.3.4 The ventilation shall be controlled so as to give good ventilation under dry conditions and to be fully closed under damp conditions. In a storage warehouse suitablefacilities shall be available for phosphine gas fumigation.

8.2.3.5 The packs shall be so handled and transported that they are protected from the rain and sun, from objectionable odours and from cross contamination (especially in the holds of ships).

8.3 The packages may also be marked with the “tbs” Certification Mark.

NOTE – The TBS Standards Mark of Quality may be used by the manufacturers only under license from TBS. Particulars of conditions under which the licenses are granted may be obtained from TBS

Annex A
(normative)

Determination of percentage of light berries in black pepper

A.1 Reagent

A.1.1 Alcohol-water solution, of relative density d^{20}_{20} = 0.80 to 0.82 If the temperature is different from 20 °C, a corrective factor shall be used.
The alcohol used in the preparation of this solution can be ethanol, denatured alcohol previously rectified, or propan-2-ol

A.2 Procedure

A.2.1 Test portion

Weigh to the nearest 0.01 g, 50.0 g of sample from which the extraneous matter has been previously removed, into a 600 ml glass beaker.

A.2.2 Determination

Add 300 ml of the alcohol-water solution to the glass beaker and mix the contents with spoon. Leave the product standing for 2 min, and then remove the floating berries with the spoon. Only berries floating on the surface shall be removed and not those that remain in suspension some distance below the surface of the alcohol-water solution. Repeat the stirring, standing and removal operations until no more berries float after two successive stirrings.

Dry the berries removed on blotting paper to eliminate the excess liquid, then spread them in dry air on a piece of paper, textile or other absorbent material. Leave the berries for 1 h, then weigh to the nearest 0.01 g.

A.3 Expression of results

The percentage by mass of light berries in the sample is equal to;

$$\frac{m_1}{m_0} \times 100$$

where

m_0 is the mass, in grams of the test portion; m_1 is the mass, in grams of the light berries removed

Annex B
(normative)

Whole black pepper and white pepper: Determination of apparent bulk density

B.1 Scope

This annex specifies a method for the determination of the apparent bulk density of whole black pepper and white pepper.

B.2 Principle

Weighing a volume exactly measured of 1 L of pepper.

B.3 Apparatus

B.3.1 Apparatus for measuring bulk density consisting of;

B.3.1.1 cylinder, of capacity 1 L or a cylinder of greater capacity but equipped with apparatus allowing leveling of the product to the 1 L level.

B.3.1.2 hopper, of capacity greater than 1 L and equipped with a gate.

B.3.1.3 device, for fixing the hopper above the cylinder at a certain distance, to allow free fall of the product into the cylinder from a constant height.

B.3.2 Balance

A special balance allowing the cylinder to be hooked to one side of the beam and equipped on the other side with a suitable plate serving as tare.

B.4 Procedure

B.4.1 Determination

Weigh the empty cylinder, if necessary

Place the cylinder on a horizontal plane and set the hopper on it with a fixing device. Pour the pepper into the hopper until it is filled. Open the gate and allow the pepper berries to flow freely into the cylinder until the level slightly exceeds the upper level or the 1 L level according to the apparatus used.

Level the pepper according to the case to the upper level of the cylinder with a ruler or to the 1-L level with a suitable device with which the cylinder is equipped. In the latter case, remove the excess berries. Remove the hopper and its support then weigh the cylinder filled with the pepper.

B.4.2 Number of determinations

Carry out three determinations

B.5 Expression of results

B.5.1 Method of calculation

The apparent bulk density of pepper expressed in grams per litre, is given by the mass of pepper contained in the cylinder.

Take as the result the arithmetic mean of the three determinations if the repeatability conditions (see B.5.2) are satisfied. Otherwise, carry out three further determinations. If the former conditions are still not satisfied, take the arithmetic mean of the six determinations as the result.

B.5.2 Repeatability

The difference between the results of two determinations carried out in rapid succession by the same analyst using the same apparatus shall not exceed 5 g per litre.

B.6 Test report

The test report shall specify the method used and the result obtained. It shall also mention all operating details not specified in this annex or regarded as optional together with details of any incidents which may have influenced the results.

The test report shall include all information necessary for the complete identification of the sample.

Annex C
(normative**)**

Determination of crude fibre

C.1 Reagents

C.1.1 Petroleum ether

C.1.2 **Dilute sulphuric acid:** 1.25 % *(m/v)* accurately prepared.

C.1.3 Sodium hydroxide solution: 1.25 % *(m/v)* accurately prepared.

C.1.4 **Ethanol:** 95 % (v/v).

C.2 Procedure

Weigh accurately about 2.5 g of the ground material into a thimble and extract for about 1 h with petroleum ether using a Soxhlet apparatus. Transfer the material in the thimble to a 1-L flask. Take 200 ml of the dilute sulphuric acid in a beaker and bring to boil. Transfer the whole of the boiling acid to the flask containing the fat-free material and immediately connect the flask with a water-cooled reflux condenser and heat so that the contents of the flask begin to boil within 1 min. Rotate the flask frequently taking care to keep the material from remaining on the sides of the flask and out of contact with the acid. Continue boiling for exactly 30 min. Remove the flask and filter through fine linen (about 18 thread to the centimetre) or through a coarse acid washed hardened filter paper, held in a funnel and wash with boiling water until the washings are no longer acidic to litmus paper. Bring some quantity of sodium hydroxide solution to boil under reflux condenser. Wash the residues on the filter into the flask with 200 ml of boiling sodium hydroxide solution. Immediately connect the flask with the reflux condenser and boil for exactly 30 min. Remove the flask and immediately filter through the linen or the filter paper.

Thoroughly wash the residue with boiling water and transfer to a Gooch crucible prepared with a thin but compact layer of ignite asbestos. Wash the residue thoroughly first with hot water and then with about 15 ml of ethyl alcohol and with three successive washings of 15 ml of petroleum ether each. Dry the Gooch crucible and contents at 105 °C ± 1 °C in an air-oven for 3 h, cool and weigh. Repeat the process of drying for 30 min, cooling and weighing until the difference between two consecutive weighings is less than 1 mg. Incinerate the contents of the Gooch crucible in the muffle furnace at 550 °C ± 20 °C until all the carbonaceous matter is burnt. Cool the Gooch crucible containing the ash in a desiccator and weigh.

C.3 Calculation

Crude fibre (on dry basis), per cent by mass

$$= \frac{100\,(M_1 - M_2)}{M} \times \frac{100}{(100-H)}$$

Where: M_1 = mass in g of Gooch crucible and contents before ashing.
M_2 = mass in g of Gooch crucible containing asbestos and ash, and
M = mass in g of the material taken for the test
H= Moisture content of the sample as received in percent