0 Foreword

Cardamoms are the dried, nearly ripe fruits of Elettaria cardamomum (L) Maton perennial plant.

This standard was prepared so as to enhance and improve the safety and quality of cardamom which is produced or traded in the country.

This Tanzania Standard is a revision of the second version published in 2015. This third edition cancels and replaces the second edition (TZS 358:2015) which has been technically revised.

In the preparation of this Tanzania Standard, assistance was derived from ISO 882-1 and ISO 882-2: Cardamoms — Specification, published by the International Organization for Standardization (ISO).

In reporting the results of a test or analysis made in accordance with this 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 the requirements, sampling and test methods for cardamom, Elettaria cardamomum (L) Maton var. cardamomum. This standard does not cover the capsules or seeds of genus Amomum.

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 document (including any amendments) applies.

TZS 4, Rounding off numerical values
TZS 33, Spices and condiments — Sampling
TZS 109, Codes of hygiene for food processing units — General
TZS 538/EAS 38, Labelling of prepackaged foods — General requirements
TZS 1315, Spices and condiments — Determination of extraneous matter and foreign matter content
TZS 1316, Spices and condiments — Determination of total ash
TZS 1318, Spices and condiments — Determination of moisture content — Entrainment method
TZS 1320, Spices and condiments — Determination of volatile oil content (hydrodistillation method)
TZS 1492, Fruits and vegetables — Determination of tin content
TZS 1495, Fruits and vegetables — Determination of copper content
TZS 1500, Fruits and vegetables — Determination of zinc content
TZS 1501, Fruits and vegetables — Determination of mercury content
TZS 1502, Fruits and vegetables — Determination of Arsenic content
3 Terms and Definitions
For the purposes of this standard, the following terms and definitions shall apply.

3.1 capsule;
a dry fruit that release its seeds by busting open when ripe

3.2 empty and malformed capsules;
capsules which have no seeds or are scantily filled with seeds

3.3 immature and shriveled capsules;
capsules which are not fully developed

3.4 blacks
capsules having visible blackish to black colour

3.5 splits
capsules which are open at the corners for more than half the length

3.6 unclipped capsules
capsules with tips which have not been trimmed

3.7 bleached and/or half bleached capsules
capsules, fully developed and dried, which have been bleached and/or half bleached by sulfur dioxide. The colour of such capsules ranges from pale cream to white.

4 Requirements
4.1 General requirements

4.1.1 The capsules should be well formed and with sound cardamom seeds inside. The cardamoms shall be the graded type on the basis of colour, clipping, size, weight per litre, bleaching or otherwise proportions of extraneous matter.

4.1.2 Odour and taste
The odour and taste of cardamom in capsules and cardamom seeds shall be fresh and characteristic of cardamom. The products shall be free from foreign odours and taste, including those of rancidity and mustiness.
4.1.3 Freedom from pests and diseases, etc.

Cardamoms in capsules and cardamom seeds shall be free from live insects and practically free from moulds, dead insects, insect fragments and rodent contamination visible to the naked eye (corrected, if necessary, for abnormal vision) with such magnification as may be necessary in any particular case. If the magnification exceeds x 10, this fact shall be stated in the test report.

**NOTE** — Thrip marks alone on capsules should not lead to the conclusion that the capsules have been infested with insects.

4.2 Specific requirements

4.2.1 Extraneous matter

Cardamom capsules and seeds shall be free from visible dirt or dust. The proportion of pieces of calyx and stalk shall be not more than 5 % for cardamom capsules and 2 % (m/m), for cardamom seeds when tested in accordance to TZS 1315 (see clause 2) as specified in Table 1.

**Table 1 — Grade designation of cardamom seeds and their requirements**

<table>
<thead>
<tr>
<th>S/N</th>
<th>Grade designation</th>
<th>Extraneous matter, per cent by mass, max</th>
<th>Light seeds, per cent by mass, max</th>
<th>Mass in g/l max</th>
<th>General characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>A</td>
<td>0.5</td>
<td>3.0</td>
<td>675</td>
<td>Decorticated and dry seeds of any variety of <em>Elettaria cardamom</em></td>
</tr>
<tr>
<td>2</td>
<td>B</td>
<td>1.0</td>
<td>5.0</td>
<td>660</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>C</td>
<td>2.0</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4.2.2 Immature and shriveled capsules

The proportion of immature and shriveled capsules shall not be more than 7 % (m/m) when determined after separation, as under TZS 1315 (see clause 2).

4.2.3 Empty and malformed capsules

The proportion of empty and malformed capsules shall not be more than 5 % by count. For this purpose, 100 capsules, taken at random from the sample, shall be opened and the number of empty and malformed capsules counted.

4.2.4 Light seed

Light seeds include seeds that are brown or red in colour, and broken, immature and shriveled. The proportion of light seeds in cardamom seeds shall not be more than 5 % (m/m) when determined as under TZS 1315 (see clause 2).

4.3 Chemical requirements

Cardamoms with capsules and cardamom seeds shall comply with the requirements given in Table 3.

**Table 3 — Chemical requirements for cardamom capsules and seeds**

<table>
<thead>
<tr>
<th>S/N</th>
<th>Characteristics</th>
<th>Requirements</th>
<th>Method of test</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Moisture content per cent (m/m), max</td>
<td>13.0</td>
<td>TZS 1318</td>
</tr>
</tbody>
</table>
Note: The determination of the moisture content and total ash shall be made on whole capsules. The determination of volatile oil shall be made on seeds after separating them from the husk.

4.3 Grades

The cardamoms with capsules may be graded on the basis of colour, clipping, size and whether they are bleached or unbleached and as a function of the proportion of extraneous matter or their place of origin. Cardamom seeds may be graded as a function of the proportion of extraneous matter and light seeds present. For the purpose of this standard, cardamom capsules and seeds shall be graded according to the criteria given in Table 1 and Table 3.

<table>
<thead>
<tr>
<th>S/N</th>
<th>Trade name</th>
<th>Grade designation</th>
<th>Extraneous matter (dirt, dust) percent by mass, max</th>
<th>Empty and malformed capsules, percent by count, max</th>
<th>Uncropped capsules, percent by count, max</th>
<th>Immature and shriveled capsules, percent by mass, max</th>
<th>Black split, percent by count, max</th>
<th>Size (diameter of holes in mm of the sieve on which retained)</th>
<th>Mass in one litre (g/l), min</th>
<th>General characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Green</td>
<td>A-1, A-2, A-3</td>
<td>Nil</td>
<td>Nil</td>
<td>Nil</td>
<td>Nil</td>
<td>2.0</td>
<td>4.0</td>
<td>2.0</td>
<td>6.0</td>
</tr>
<tr>
<td>2</td>
<td>Gold/Brown</td>
<td>DI-1, DI-2, DI-3</td>
<td>Nil</td>
<td>Nil</td>
<td>Nil</td>
<td>Nil</td>
<td>3.0</td>
<td>5.0</td>
<td>4.0</td>
<td>7.0</td>
</tr>
<tr>
<td>3</td>
<td>Bleached</td>
<td>AI-1, AI-2</td>
<td>Nil</td>
<td>Nil</td>
<td>Nil</td>
<td>Nil</td>
<td>7.5</td>
<td>5.0</td>
<td>7.5</td>
<td>10.0</td>
</tr>
</tbody>
</table>

Table 3 — Grade designation of cardamoms with capsules and their requirement
5 Contaminants

5.1 Heavy metals
Cardamoms shall comply with the limits prescribed by Codex stan 193
Cardamoms shall not contain any metallic contaminants in excess of levels specified in Table 4.

Table 4 — Limits for metallic contaminants for cardamoms

<table>
<thead>
<tr>
<th>S/N</th>
<th>Characteristics</th>
<th>Maximum (mg/kg)</th>
<th>Method of test (see clause 2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Arsenic (As)</td>
<td>0.2</td>
<td>TZS 1502</td>
</tr>
<tr>
<td>2</td>
<td>Tin (Sn)</td>
<td>250</td>
<td>TZS 1492</td>
</tr>
<tr>
<td>3</td>
<td>Copper (Cu)</td>
<td>5.0</td>
<td>TZS 1495</td>
</tr>
<tr>
<td>4</td>
<td>Lead (Pb)</td>
<td>0.3</td>
<td>TZS 268</td>
</tr>
<tr>
<td>5</td>
<td>Cadmium</td>
<td>0.1</td>
<td>TZS 1581-Part 1</td>
</tr>
<tr>
<td>6</td>
<td>Mercury</td>
<td>0.1</td>
<td>TZS 1501</td>
</tr>
</tbody>
</table>

5.2 Pesticide residues
Cardamoms shall comply with those maximum pesticide residue limits established by the Codex Committee on Pesticide Residues for this commodity.

5.3 Mycotoxins
Aflatoxin B1 5 ppb
Total Aflatoxin 10 ppb

6 Hygiene
The product covered by this standard shall be processed and packed under Good Hygienic Practices as stipulated in TZS 109 (see clause 2).

Table for microbiological limits
TPC - $10^5$
Total coliforms $10^2$
E.coli – Absent
Yeast and moulds - $10^3$

7 Sampling and test methods
Sampling of cardamoms in capsules and seeds shall be carried out as prescribed in TZS 33 (see clause 2) and tests according to methods specified in 4.1 and 4.2 and in Table 1, 2, 3 and 4.

8 Storage and transport of cardamoms

8.1 Storage
The packed cardamoms shall be stored in premises well protected from the sun, rain, excessive heat and contamination.
The store room shall be dry, free from objectionable odours and proofed against entry of insects and other vermin. The ventilation shall be controlled so as to give good air circulation under dry conditions and to be fully closed under damp conditions. In storage warehouse, suitable facilities shall be available for fumigation.

8.2 Transport

The containers shall be transported in such a manner that they are protected from the rain, sun or other sources of excessive heat, objectionable odours and cross infestation, especially in holds of ships.

9 Packaging, marking and labeling

9.1 Packaging

Cardamom capsules and seeds shall be packed in clean, sound and dry tin plate containers, or in wooden cases or new jute bags or any other suitable food grade container, suitably lined with, for example, water proof paper, craft paper or plastic material which does not affect safety and quality of the product.

9.2 Marking and labelling

9.2.1 In addition to requirements stipulated in TZS 538 (see clause 2), the following particulars shall legibly and indelibly be marked or labelled on each container:

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

9.2.2 The packages may also be marked with TBS standards mark of quality.

   NOTE — The TBS Standards Mark of Quality may be used by the manufacturers only under licence from TBS. Particulars of conditions under which the licences are granted may be obtained from TBS.