DRAFT TANZANIA STANDARD

Malting barley – Specification

TANZANIA BUREAU OF STANDARDS
0 Foreword

Barley is an important crop in Tanzania associated with production of beer and other malting purposes. Acceptability of this product is determined by its overall malting performance.

This Tanzania Standard therefore has been prepared to provide guidance in evaluating good quality barley for malting purposes.

In preparation of this Tanzania Standard, assistance was drawn from the following publications:

IS 6894, Malting barley – Specification (First Revision) published by the Bureau of Indian Standards.

ISO/DIS 10520.2, Native starches - Determination of starch content – Ewers polarimetric method Published by the International Organization for Standardization.

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 (see clause 2).
1 Scope

This Tanzania Standard prescribes requirements, methods of sampling and test for barley for preparing malt for brewing and other malting purposes.

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 329/EAS 900, Cereals – Sampling of grain;
TZS 441, Cereals – Determination of moisture content.
TZS 4, Rounding off numerical values.
TZS 799, Agricultural food products – Determination of aflatoxins.
TZS 331/EAS 901, Cereals – Milled products – Methods of test:
TZS 331/EAS 901, Cereals grains – Methods of test.
TZS 59:., Water – Distilled quality – Specification

3 Terms and Definition

For the purpose of this Tanzania Standard, the following terms and definitions shall apply:

3.1 sound barley
Kernel of barley remaining after removal of foreign matter and damaged kernel

3.2 foreign matter
includes inorganic and organic matter. The inorganic matter includes sand, gravel, dirt, pebbles, stones, glass and metallic pieces, lumps of earth, clay and mud. Organic matter includes husk, chaff, straw, weed, seeds and extraneous matter including foreign grains.

3.3 foreign grains
other edible grains other than the grain under consideration.

3.4 damaged kernels
pest damaged, discoloured, stained, rotten and diseased, immature and shrivelled grains and broken kernel.

3.5 broken kernels
pieces of sound kernels that are less than three fourths of the size of full kernel.

3.6 skinned kernels
kernels of barley from which one third or more of the hull has been loosened or removed over the germ.

3.7 mealy barley
kernels which when cut transversely, show a white endosperm having an opaque and mealy appearance.

3.8 fine appearance
characteristic appearance of grain not stained and withered.

3.9 steely barley
kernels which when cut transversely, show a vitreous endosperm.

Define smutty, garlicky, weevily, ergot or bleached

3.10 shrivelled or immature kernels
kernels or pieces of kernel which are not fully developed
3.11 malting
Is a biological process that turns barley into malt in three stage process including soaking or steeping the grain in water to bring the kernels to 45% moisture, germination under cool humid conditions and drying (kilning).

3.12 malt
is the germinated cereal grain that has been dried in a process known as malting

3.13 food grade packaging material
material, made of substances which are safe and suitable for their intended use and which will not impart any toxic substance or undesirable odour or flavour to the product

4 Requirements

4.1 General requirements

Barley for malting purposes shall be free from living insects, moulds, dead insects, insect fragments and rodent contamination visible to eyes with the aid of a suitable magnification (not exceeding x 10).

When cut transversely, the kernels shall be mealy and not steely. The barley shall not be smutty, garlicky, weevily, ergot or bleached.

4.2 Size

The size of barley kernels shall be such that not less than 30 percent by mass of kernels are retained on a sieve of aperture 2.8 mm, not less than 80 percent by mass are retained on a sieve of aperture 2.2 mm.

The proportion of kernels passing through a 2.2 mm aperture sieve shall not exceed 2 per cent by mass.

4.3 Barley for malting purposes shall also conform to the requirements prescribed in table 1.

Table 1 – Requirements for barley for malting purposes. (Rearrange the table)

<table>
<thead>
<tr>
<th>S/N</th>
<th>Characteristics</th>
<th>Requirements</th>
<th>Methods of Test</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Brewing</td>
<td>Other purposes</td>
</tr>
<tr>
<td>1</td>
<td>Moisture, percent by mass, max.</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>2</td>
<td>Foreign matter, percent by mass, max</td>
<td>1.0</td>
<td>1.5</td>
</tr>
<tr>
<td>3</td>
<td>Other edible grain, percent by mass, max</td>
<td>0.5</td>
<td>1.0</td>
</tr>
<tr>
<td>4</td>
<td>Damaged grains, percent by mass, max.</td>
<td>1.5</td>
<td>2.0</td>
</tr>
<tr>
<td></td>
<td>Description</td>
<td>Value 1</td>
<td>Value 2</td>
</tr>
<tr>
<td>---</td>
<td>-------------------------------------------------------------------------------</td>
<td>---------</td>
<td>---------</td>
</tr>
<tr>
<td>5</td>
<td>Immature and shrivelled grains, percent by mass, <em>max.</em></td>
<td>2.0</td>
<td>2.5</td>
</tr>
<tr>
<td>6</td>
<td>Hectolitre mass, in kg/HL min.</td>
<td>65</td>
<td>60</td>
</tr>
<tr>
<td>7</td>
<td>Specific gravity, <em>max.</em></td>
<td>1.3</td>
<td>1.2</td>
</tr>
<tr>
<td>8</td>
<td>Protein, percent by mass, <em>max.</em></td>
<td>9.0</td>
<td>9.0</td>
</tr>
<tr>
<td>9</td>
<td>Extract yield on dry basis, percent by mass, <em>min.</em></td>
<td>75</td>
<td>80</td>
</tr>
<tr>
<td>10</td>
<td>Starch content, percent by mass, <em>min.</em></td>
<td>50</td>
<td>55</td>
</tr>
<tr>
<td>11</td>
<td>Germination capacity, percent <em>min.</em></td>
<td>98</td>
<td>95</td>
</tr>
<tr>
<td>12</td>
<td>Germination energy, per cent <em>min.</em></td>
<td>92</td>
<td>90</td>
</tr>
<tr>
<td>13</td>
<td></td>
<td>5.0</td>
<td>5.0</td>
</tr>
<tr>
<td>14</td>
<td></td>
<td>10.0</td>
<td>10.0</td>
</tr>
</tbody>
</table>

### 5.0 Contaminants

Aflatoxin B1 and Total aflatoxin (ppb), *max.*(ppb), *max.*Pesticides residues, Other contaminants, statement refer codex stan 193

### 6.0 Sampling

Sampling shall be done in accordance with TZS 330/EAS 900.

### 7.0 Testing

Tests shall be carried out in accordance with the appropriate methods specified in table 1.

### 8.0 Packaging and marking

#### 8.1 Packaging

Barley for malting purposes shall be packed in moisture proof, sound and clean food grade packaging material.

#### 8.2 Marking and labelling

Put statements which refer TZS 538

Each container shall be marked or labelled with the following particulars:
a) name and type of the barley;
b) variety of the barley (2-rowed or six rowed);
c) net mass;
d) country of origin

e) date of harvesting.
f) name, address and physical location of the producer/packer/importer;

g) storage instruction as “Store in a cool dry place away from any contaminants” and

h) declaration that malting barley is not genetically modified,

8.3 The containers shall also be marked with the TBS Standard Mark of Quality

NOTE – the TBS Mark of quality may be used by the manufactures only under licence from TBS. Particular of conditions under which the licences are granted may be obtained from TBS.
ANNEX A

Determination of germination capacity and germination energy

A.1 Apparatus

A.1.1 Soil and Sand Boxes – Paraffined cardboard boxes of suitable sizes (preferably 115 mm x 115 mm x 40 mm or 215 mm x 215 mm x 45 mm).

A.1.2 Sprinkling Devices – A suitable sprinkling device for moistening the substrata

A.1.3 Thermometers.

A.1.4 Germinator – Any kind of germinator in which it is possible to maintain the necessary conditions of temperature and moisture.

A.2 Germination substrata

A.2.1 Sand

A.2.2 Germination paper

A.3 Procedure

A.3.1 Take 100 grains of malting barley and place them on moistened germination paper or sand and keep in the germinator maintained at temperature between 15°C to 20°C. The first count of germinating shall be made after 3 days and final count after 6 days. Note the percent grains germinated at the time of each count.

Carry out the tests in either duplicate or triplicate.

A.3.2 The percentage of barley grains germinating on first count represent the germinative energy.

A.3.3 The percentage of barley grains germinating at the final count represent the germination capacity of the sample under test.

ANNEX B

Determination of yield of extract

B.1 Apparatus

B.1.1 Grinding mills – Miag – Seck type. For fine grinding use cone type, 300 rev/min and for coarse grinding roll type 150 rev/min.

B.1.2 Mash beakers and counter weights. Made of either pure nickel stainless steel or brass and of such dimensions as to assure tight connection between beakers and grinding mill. If counter weights are used for mash beakers, their tare should be checked frequently.

B.1.3 Mashing apparatus – The beakers, stirrers and solders used should be of the same metal. Each stirrer should be provided with a blade which during operation has clearance of about 2 mm from bottom and 5 mm from wall of the mash beaker. The blade is approximately 8 mm wide and each side has 45 pitch, arranged as in a propeller, to force mash upward. Speed of the mash stirrer shall be so to 100 rev/min, each stirrer of each beaker shall have the same speed. Stir water in the bath thoroughly by mechanical means to assure uniformity of temperature and have level of water above maximum mash level.

B.1.4 Filter paper, Whatman No. 1 or equivalent.

B.1.5 Funnels, Short-stem glass funnels having approximately a diameter of 20 cm. The stem shall extend 3 cm to 5 cm into the receiving flask.
B.1.6 Flasks, Erlenmeyer’s of 500 ml capacity.

B.1.7 Pyknometers

B.1.8 Water Bath, Automatically controlled

B.2 Procedure

B.2.1 Grinding

Weigh approximately 55 g of sample at room temperature into a tared mash beaker and grind through mill set for standardized fineness of grind. Collect finely ground barley in same mash beaker. Mix and without delay place mash beaker with contents on balance and adjust mass of the barley to 50.00 g ± 0.05 g by removing excess.

B.2.2 Mashing procedure

Mash in ground barley with 200 ml water at 46°C and mix well with glass rod to prevent formation of lumps. Carefully rinse glass rod and wall of beaker with small quantity of water. Promptly place mash beaker in mashing apparatus containing water previously heated to 46°C and set the stirrer in motion. Place thermometer in the mash beaker. Keep temperature at 45°C exactly for 30 minutes from the time the beaker was placed in the mashing apparatus. Raise mash temperature at the rate of 1°C per minute till it reaches 70°C to 71°C and mash for 60 minutes at 70°C. Care should be taken that temperature deviations during mashing procedure do not exceed 0.5°C.

B.2.3 Cooling and filtration

After 60 minutes, cool mash promptly (within 10 to 15 minutes) to the prevailing room temperature. Stop stirring. Remove thermometer after adhering mash particles are rinsed into the beaker with water. Remove the beaker with its stirrer from the mashing apparatus. Rinse mash particles adhering to the stirrer into the beaker with water. Dry outside of the beaker taking care to remove the moisture adhering to the rim. Without delay adjust the mass of contents of mash beaker to 450.00 g ± 0.5 g by adding water.

Stir the mash thoroughly with glass rod once when removing the beaker from balance pan and again immediately before pouring mash into filter (stirring shall be not less than 5 minutes and not more than 15 minutes part). While stirring cooled mash, take care to prevent splashing or spilling. Mix drops adhering to beaker wall into mash by rotary stirring with glass rod.

Pour entire contents of beaker into funnel provided with specified filter paper. Cover funnel with approximately 20 cm diameter watch-glass during entire filtration. In case of slow running works, stop filtration after 2 hours. In case of coarse ground malt mash collect exactly 200 ml ± 2 ml wort. When filtration is complete mix wort in receiving flask thoroughly by rotary motion. Speed of filtration is normal if filtration is complete within one hour after returning the filtrate to filter bed; slow if filtration takes longer.

B.2.4 Specific gravity

Rinse empty pyknometer twice with about 10 ml wort. Fill with wort, place in water bath maintained at 20°C. Weigh filled pyknometer within 3 hours of completed filtration. The difference between this mass and that of empty pyknometer represents wort capacity of pyknometer at 20°C. Calculate specific gravity of wort to 5 decimal places rounding off to 0.00005 to 0.00010 by dividing mass of wort by mass of water.

B.3 Calculation

B.3.1 Determine extract yield of wort by reference to specific gravity values given in table 2.

B.3.2 Calculate yield of extract of barley (on dry basis) as given below:
a) Extract as – is basis $P \frac{(800 + M)}{(100 - P)}$

where

$P = \text{g extract in 100 g wort (as calculated from table 2).}$

$M = \text{percentage moisture in the barley}$

b) Extract (on dry basis) = $\frac{(E \times 100)}{(100 - M)}$

where

$E = \text{Extract as is basis}$

$M = \text{percent moisture in barley.}$

ANNEX D

**Determination of starch content** (ewers polarimetric methods) refer to TZS962.