DRAFT EAST AFRICA STANDARD

Fortified food grade salt — Specification

EAST AFRICAN COMMUNITY
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Foreword

Development of the East African Standard has been necessitated by the need for harmonizing requirements governing quality of products and services in the East African Community. It is envisaged that through harmonized standardization, trade barriers which are encountered when goods and services are exchanged within the Community will be removed.

In order to meet the above objectives, the EAC Partner States have enacted an East African Standardization, Quality Assurance, Metrology and Testing Act, 2006 (EAC SQMT Act, 2006) to make provisions for ensuring standardization, quality assurance, metrology and testing of products produced or originating in a third country and traded in the Community in order to facilitate industrial development and trade as well as helping to protect the health and safety of society and the environment in the Community.

East African Standards are formulated in accordance with the procedures established by the East African Standards Committee. The East African Standards Committee is established under the provisions of Article 4 of the EAC SQMT Act, 2006. The Committee is composed of representatives of the National Standards Bodies in Partner States, together with the representatives from the private sectors and consumer organizations. Draft East African Standards are circulated to stakeholders through the National Standards Bodies in the Partner States. The comments received are discussed and incorporated before finalization of standards, in accordance with the procedures of the Community.

Article 15(1) of the EAC SQMT Act, 2006 provides that “Within six months of the declaration of an East African Standard, the Partner States shall adopt, without deviation from the approved text of the standard, the East African Standard as a national standard and withdraw any existing national standard with similar scope and purpose”.

East African Standards are subject to review, to keep pace with technological advances. Users of the East African Standards are therefore expected to ensure that they always have the latest versions of the standards they are implementing.

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Introduction

The Health Ministers of the East, Central and Southern Africa (ECSA) Health Community passed a resolution in 2002 directing the Secretariat to work with the countries to fortify commonly consumed foods in the region after recognizing that the high levels of malnutrition in the region. ECSA-HC is an intergovernmental organization that fosters cooperation in health among countries in the East, Central and Southern African Region. It has 10 active member states namely Kenya, Uganda, Tanzania, Malawi, Zambia, Zimbabwe, Lesotho, Swaziland, Mauritius and Seychelles. The mandate of the organization is to promote relevance and efficiency in health in the region.

Following initial promotion efforts, the countries identified staple foods suitable for fortification as oil, sugar, maize meal/ flour and wheat flour. These foods can be used as vehicles to deliver essential micronutrients to the populations. Based on scientific evidence and working with countries using country data, the Secretariat developed implementation focused guidelines on fortification of these foods to help countries start up programs and scale up the existing programs. These guidelines included fortification levels for addition of micronutrients at the factory, and levels for monitoring at commercial level.

Based on the guidelines and other available information, most of the countries in the East African Region and in the larger Africa have initiated national programs on oil fortification with vitamin A; and wheat and maize meal/ flour fortification with iron, zinc, folic acid, niacin, vitamin B-1, B-2 and B-12 and vitamin A. Sugar fortification with vitamin A has also been considered as a way of supplementing other sources of the vitamin in order to prevent and reduce problems associated with the deficiency of this vitamin. Salt fortification with iodine continues to be implemented in all the countries.

With the increased trade of food commodities including these fortified foods within the region, it has become imperative to develop regional standards that over and above the other standards, stipulate minimum and maximum levels of the added nutrients, provide clauses on how to pack the fortified product and the use of health and nutrition claims. The guidelines developed through ECSA have now been incorporated into food standards to provide for specific fortified products.

It is envisaged that, the adoption of these standards and their utilization within the region will help countries adopt food fortification as a strategy to prevent, alleviate or eliminate micronutrient deficiency in the region. Standards will not only promote the health of the population but will also ensure safety of food products and enhance fair trade.

This standard was developed with support from the East, Central and Southern African Health community (ECSA-HC) Secretariat. This was possible through a grant by the A2Z Project of the United States Agency for International Development (USAID). The financial and technical support was used in the process of formulation of fortification levels, development of the draft standards and mobilization of stakeholders to review the standard in national and regional fora. This support is hereby acknowledged.
Fortified food grade salt — Specification

1 Scope

This draft East African Standard specifies the requirements and methods of sampling and test for fortified food grade salt: coarse salt, crushed salt and table salt intended for human consumption.

2 Normative references

The following normative documents contain provisions which, through reference in this text constitute provisions of this draft Standard:

- EAS 38, Labelling of prepackaged foods — Specification
- EAS 39, Code of practice for hygiene in the food and drink manufacturing industry
- EAS 103, Schedule for permitted food additives
- CAC/GL 1, Codex Alimentarius guidelines for claims
- CAC/GL 2, Codex Alimentarius nutrition labelling for claims
- CAC/GL 23, Guidelines for use of nutrition and health claims
- ISO 2479, Sodium chloride — Determination of matter insoluble in water or in acid and preparation of principal solutions for other determinations
- ISO 2480, Sodium chloride for industrial use — Determination of sulphate content — Barium sulphate gravimetric method
- ISO 2481, Sodium chloride — Determination of halogens, expressed as chlorine — Mercurimetric method
- ISO 2482, Sodium chloride — Determination of calcium and magnesium contents — EDTA complexometric methods
- ISO 2483, Sodium chloride — Determination of moisture content (loss of mass at 110 °C)

3 Terms and definitions

For the purposes of this standard the following definitions shall apply:

3.1 food grade salt
a crystalline product consisting predominantly of sodium chloride, which is obtained either from the sea, underground rock salt deposits or from natural brine. Salt from other origins, and notably the salt which is a by-product of chemical industries, is excluded.

3.2 coarse salt
a predominantly sodium chloride product which is crystalline solid mainly of white, pale pink, or light grey colour

3.3 dried crushed salt
Salt obtained by drying and crushing coarse salt.

3.4 table salt
a predominately white crystalline sodium chloride product suitably coated with free flowing agents such as light magnesium carbonate, calcium carbonate, tricalcium phosphate or calcium silicate, so as to retard moisture absorption, caking and to impart the free flowing property to the salt.

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3.5 fortified food grade salt
salt to which micronutrients have been added in accordance with this standard

3.6 food additive
any substance not normally consumed as food by itself and not normally used as a typical ingredient of the food, irrespective of its nutritive value, the intentional addition of which is for a technological (including organoleptic) purpose in the manufacture, processing, preparation and treatment of the food.

3.7 anti-caking agent
substances that are mixed, in small quantities with salt to coat it and reduce its tendency to cake, and thereby impart to it a free-flowing property, such as magnesium carbonate, calcium carbonate, tricalcium phosphate, calcium silicate or sodium ferrocyanide.

3.8 fortificant
a compound which contains the specified micronutrient intended to be added to a food vehicle

3.9 food fortification
the practice of deliberately adding essential micronutrients in a food to improve the nutritional quality of the food and to provide a public health benefit with minimal risk to health

4 Requirements

4.1 Visible impurities
Fortified food grade salt shall be practically free from grit and other extraneous adulterants when the sample is tested in accordance with Annex A.

4.2 Particle size for table and fine salt
Fortified table salt shall be free flowing. 99 % of the material shall pass through a 1.00 mm (1 000 micron) sieve and not more than 20 % by mass of the material shall pass through a 0.212 mm or a 212-micron sieve.

4.3 Compositional requirements
Fortified food grade salt shall also conform to the requirements in Table 1:
Table 1 — Compositional requirements for fortified food grade salt

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Requirements</th>
<th>Method of Test</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coarse salt</td>
<td>Crushed salt</td>
</tr>
<tr>
<td>Chloride content as (NaCl), % on dry matter basis, min</td>
<td>96.0</td>
<td>96.0</td>
</tr>
<tr>
<td>Moisture content, drying at 105°C, %, m/m, max.</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Matter insoluble in water, %, on dry matter basis, max</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Calcium (as Ca) water soluble, % on dry matter basis, max</td>
<td>0.5</td>
<td>0.5</td>
</tr>
<tr>
<td>Copper, (as Cu), mg/kg, on dry matter basis, Max</td>
<td>2.0</td>
<td>2.0</td>
</tr>
<tr>
<td>Magnesium (Mg) water-soluble, % on dry matter basis, max</td>
<td>0.5</td>
<td>0.5</td>
</tr>
<tr>
<td>Sulphate (as SO₄), % on dry matter basis, max</td>
<td>0.5</td>
<td>0.5</td>
</tr>
<tr>
<td>Total alkalinity (Na₂CO₃), %, by mass, max</td>
<td>0.5</td>
<td>0.5</td>
</tr>
<tr>
<td>Acid insoluble matter % m/m, max</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>pH of solution, 20g in 100ml distilled water, using standard laboratory pH meter.</td>
<td>7.0 - 8.0</td>
<td>7.0 - 8.0</td>
</tr>
</tbody>
</table>

5 Fortification requirements

5.1 Levels of iodine

Food grade salt shall be fortified with potassium iodate to conform to the iodine levels provided in Table 2 when determined in accordance with any of the methods listed in section 9.14 of Codexstan 150, AOAC 935.14 or ECSA methods.

Table 2: Required levels of iodine in food grade salt

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Requirement, mg/100g</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Recommended factory level / border point</td>
</tr>
<tr>
<td></td>
<td>Minimum</td>
</tr>
<tr>
<td>Iodine</td>
<td>4.0±0.5</td>
</tr>
</tbody>
</table>

5.2 Fortificants

The fortificant for addition of iodine in salt shall be potassium iodate. The potassium iodate shall conform to any of the following:

Fortificant for use shall be stable compounds conforming to specifications in any of the following documents:

- British Pharmacopoeia (BP),
- Food Chemical Codex (FCC),
6 Food additives

Food grade salt may contain only food additives conforming to EAS 103.

7 Hygiene

Food grade salt shall be produced, prepared and handled in accordance with the provisions of appropriate sections of EAS 39.

8 Contaminants

8.1 Heavy metals

Food grade salt shall conform to those maximum limits for heavy metals established in CODEXSTAN 193.

8.2 Pesticide residues

Fortified food grade salt shall conform to those maximum residue limits established by the Codex Alimentarius Commission for this commodity.

Note: Where the use of certain pesticides is prohibited by some Partner States, then it shall be notified to all Partner States accordingly.

9 Packaging, transportation and storage

9.1 Fortified food grade salt shall be packaged in food grade, non-absorbent materials which do not have adverse influence upon effects on the composition of the product, its properties and appearance.

NOTE 1: Packaging materials may be required to meet different regulations in the different destination countries.

NOTE 2: The package fill shall conform to the requirements of the legal metrology of the destination country.

NOTE 3: EAS community partner states are signatory to the (ILO) for maximum package weight for 50kg per load where human loading and offloading is involved.

9.2 Bags that have already been used for packaging other articles such as fertilizers, cement, and chemicals shall not be reused for packaging iodised salt.

9.3 The distribution network shall be streamlined so as to reduce the interval between iodisation and consumption of salt.

9.4 Fortified food grade salt shall not be exposed to rain, excessive humidity or direct sunlight at any stage of storage, transportation or sale.

9.5 Bags of iodised salt shall be stored only in covered rooms or “godowns” that have adequate ventilation.
9.7 The consumer shall be similarly advised to store iodised salt in such a manner as to protect it from direct exposure to moisture, heat and sunlight.

10 Labelling

10.1 General

In addition to the requirements in EAS 38, each package shall be legibly and indelibly marked with the following:

10.2 Name of product

10.2.1 The name of the product shall be "Iodated food grade salt" or Iodated edible salt. The name shall have in its close proximity a declaration of either coarse salt or, crushed salt or table salt. Where salt is also used as a carrier for other nutrients, the name of the product shall be indicated on the label for example “Salt fortified with vitamins” or “Salt Fortified with Iron”.

10.2.2 The term "dendritic” shall only be used when ferrocyanide salts have been added to the salt during production.

Note: Dendritic refers to the branched nature of the crystal of the salt due to addition of ferrocyanide salts.

10.2.3 An indication of either the origin, according to the description on Clause 3, or the method of production may be declared on the label, provided such indication does not mislead or deceive the consumer.

10.2.4 The following information shall be shown on the label:

  a) The manufacturer's name, address and trade mark if any.
  b) Net mass of the package
  c) Lot or batch number in code or clear format
  d) Recognized trademark; if any.
  e) Date marking to show shelf life of salt
  f) The level of iodine in mg/100g;
  g) The caution label indicating that the salt must be stored in a cool and dry place.
  h) Country of origin
  i) A complete list of ingredients including food additives in descending order of proportions.

10.3 Nutrition and health claims

Fortified food grade salt may have claims on the importance of the vitamins and minerals in nutrition and health. Such claims when declared shall be consistent with CAC/GL 1 and CAC/GL 23.

11 Methods of sampling

Sampling shall be done in accordance with Annex A.
ANNEX A
METHOD FOR SAMPLING OF EDIBLE SALT

A.1 Scope
This method specifies the sampling procedure to be applied when determining the main component in order to assess the quality of sodium chloride (salt).

The criterion to be used for acceptance or rejection of a lot or consignment on the basis of this sample is also provided.

A.2 Field of application
This method is applicable to the sampling of any type of salt intended for use as food, either prepacked or in bulk.

A.3 Principle
This method represents a variables sampling procedure for mean quality: blended bulk sample analysis.

A blended bulk sample is produced in such a way that it is representative of the lot or consignment. It is composed of a proportion of items drawn from the lot or consignment to be analyzed.

Acceptance criterion is on the basis that the mean value obtained from analyses of those blended bulk samples must comply with the provision in the Standard.

A.4 Definitions
The terms used in this sampling method refer to those in the "Instructions on Codex Sampling Procedures" (CX/MAS 1-1987).

A.5 Equipment
The sampling equipment used shall be adapted to the nature of the tests to be carried out (for example: sampling by borer and sampling equipment made of chemically inert material). The containers used for collecting the samples shall be made of a chemically inert material and should be air-tight.

A.6 Procedure
A.6.1 Pre-packed Salt
Sampling may be carried out by "random sampling" or by "systematic sampling". The choice of the method to be used depends on the nature of the lot (for example: if the packages are marked with successive numbers, systematic sampling may be suitable).

A.6.1.1 Random sampling
Draw the n items from the lot in such a way that each item in the lot has the same chance of being selected.

A.6.1.2 Systematic sampling
If the N units in the lot have been classified and can be numbered from 1 to N, the 1-in-k systematic sampling of n items can be obtained as follows:

a) Determine the k value as k = N/n. (If k is not an integer, then round to the nearest integer).

b) From the first k items in the lot take one at random and then make every k\textsuperscript{th} item thereafter.

A.6.2 Salt in bulk
Here, the lot is fictitiously divided into items (strata); a lot with a total mass of m kg is considered to be composed of m/100 items. In this case, it is necessary to draw up a "stratified sampling" plan appropriate to the lot dimension. The samples are selected from all the strata in proportion to the stratum sizes.

Note: Stratified sampling of a population which can be divided into different subpopulations (called strata) is carried out in such a way that specified proportions of the sample are drawn from the different strata.

A.6.3 Constitution of the sample

A.6.3.1 The size and the number of the items forming the sample depend on the type of salt and the lot magnitude. The minimum size to be taken into account should be in accordance with one of the following specifications according to the circumstances:

- 250 g of salt in bulk or prepacked in more than 1 kg packages;
- one package for prepacked salt in 500 g or 1 kg packages.

Concerning the number of samples to be drawn from the lot, an example of minimum sample number that would be picked up, can be found in the document CX/MAS 1-1987, Appendix V, Table 3, taking into account the magnitude of the lot and appropriate inspection level, in this case generally level 4 (see paragraph 8.4 in the same document).

A.6.3.2 Combine and mix well the different items drawn from the lot. This blended bulk sample constitutes the laboratory sample. More than one laboratory sample may be composed in such a manner.

A.7 Acceptance criterion

A.7.1 Determine the NaCl content (%) of at least two test portions of the laboratory sample.

A.7.2 Calculate the average of the results obtained for the n test portions of the laboratory sample using:

\[ \bar{x} = \frac{\sum x}{n} \quad (n \geq 2) \]

A.7.3 In accordance with the provision for the relevant NaCl content (%), a lot or a consignment shall be considered acceptable if the following condition is verified: \( x \geq \) minimum level specified

A.8 Sampling report

The sampling report should contain the following information:

a) type and origin of the salt;
b) alterations of state of the salt (e.g. presence of foreign matter);
c) date of sampling;
d) lot or consignment number;
e) method of packing;
f) total mass of lot or consignment;
g) number, unit mass of packages and whether the mass is given net or gross;
h) number of items sampled;
i) number, nature and initial position of sampled items;
j) number, composition and mass of the bulk sample(s) and the method used to obtain and conserve it (them);
k) names and signature of people who have carried out the sampling.

A.9 Basic reference

A.10 Remark

"Laboratory sample" is the "blended bulk sample" described in CX/MAS 1-1987, Appendix IV, paragraph 4-B.
Annex B
(normative)

Determination of the chloride content, calculated as sodium chloride

B.1 Apparatus

Normally available laboratory glassware.

B.2 Reagents

B.2.1 Potassium chromate solution.

Dissolve 5 g of potassium chromate (K2CrO4) in 100 mL of water.

B.2.2 Standard 0.1 N silver nitrate solution

B.2.2.1 Preparation

Dissolve 17.0 g of silver nitrate (AgNO3) in 1 000 mL of water. Store the solution in the dark.

B.2.2.2 Standardization

Carry out the standardization in triplicate.

Weigh out accurately 5.8 g of analytical reagent grade sodium chloride (NaCl) (previously dried at 200 °C ± 50 °C for 2 h and cooled to room temperature in a desiccator) into a 1 L volumetric flask and dissolve it in approximately 200 mL of water. Adjust the temperature of this solution to 20 °C and dilute it to 1 000 mL with water at the same temperature. Pipette 25 mL of the sodium chloride solution at 20 °C into a 250 mL conical flask, add 1 mL of potassium chromate solution, and titrate with the 0.1 N silver nitrate solution until a faint reddish-brown colour persists after brisk shaking.

Carry out a blank titration using the same procedure but replacing the 25 mL sodium chloride solution with 25 mL water.

Calculate the mean normality of the silver nitrate solution from the triplicate determinations.

\[ N = \frac{A \times 0.4277}{b - c} \]

where

- \( N \) is the normality of silver nitrate solution;
- \( A \) is the mass of sodium chloride, in grams, in 1 000 mL solution;
- \( b \) is the volume of silver nitrate solution, in millilitres, required to titrate 25 mL of sodium chloride solution;
- \( c \) is the volume of silver nitrate solution, in millilitres, required to titrate the blank.

NOTE A commercially prepared volumetric solution may be used instead.

B.3 Procedure

Carry out the determination in triplicate on each of the test samples.

Pipette 50 mL of the principal solution reserved in accordance with ISO 2479 at 20 °C, into a 250 mL volumetric flask and dilute to 250 mL with water at the same temperature. Mix well and pipette 25 mL of this solution at 20 °C into a 250 mL conical flask. If the solution is acid to litmus, neutralize with sodium bicarbonate solution; if the solution is alkaline, add dilute nitric acid (1:10) drop by drop until the solution is acid to litmus and then neutralize with sodium bicarbonate solution. Add 1 mL of potassium chromate solution and titrate with the standard 0.1 N silver nitrate solution until a faint reddish-brown colour persists after brisk shaking.
B.4 Calculation

Calculate the chloride content as NaCl, on a moisture-free basis (and free-flowing agent-free basis, where relevant), as a percentage, as follows:

\[
C = \frac{a \times N \times 116.9}{B}
\]

where
\( C \) is the chloride content, as NaCl, expressed as a percentage (by mass);
\( a \) is the volume of silver nitrate solution, in millilitres, used in the titration;
\( N \) is the normality of the silver nitrate solution;
\( B \) is the mass of sample, in grams, in 1 000 mL principal solution, corrected for moisture content and, where relevant, the drier content.

B.5 Report

Report the chloride content of each test sample as the mean of its triplicate determinations.
ANNEX C
(NORMATIVE)

Determination of copper content

C.1 Apparatus
Nessler cylinders — 50 ml capacity

C.2 Reagents
C.2.2.1 Citric acid solution — 20 percent aqueous.
C.2.2.2 Ammonium hydroxide - Sp.gr. 0.90.
C.2.2.3 Sodium diethyldithiocarbamate solution
Dissolve 1 g of sodium diethyldithiocarbamate in 1000 ml of water. Keep in amber bottle and protect from strong light.
C.2.2.4 Standard copper solution
Dissolve 0.392 g of copper sulphate pentahydrate (CuSO4.5H2O) in water. Make up the volume with water to 1 000 ml. When required for use, pipette 10 ml of the solution into a 1 000 ml volumetric flask and dilute up to the mark with water. One millilitre of this solution contains 0.001 mg of copper (as Cu).

C.3 Procedure
Dissolve 2 g of the dried material in 10 ml of water in a cylinder; add 5 ml of citric acid solution, 2 ml of ammonium hydroxide and 10 ml of sodium diethyldithiocarbamate solution. Dilute to the mark and mix well. In the other Nessler cylinder carry out a control test using 4 ml of standard copper solution proceeding exactly as with the sample.

The limit prescribed in Table 1 shall be taken as not having been exceed if the intensity of the colour developed with the sample is not greater than that obtained in the control test.
ANNEX D  
(NORMATIVE)

DETERMINATION OF ALKALINITY

D.1 Reagents
D.1.1 Standard Hydrochloric Acid — 0.1 N.
D.1.2 Methyl orange indicator
Dissolve 0.1 g of methyl orange in 100 ml of water.

D.2 Procedure
D.2.1 Procedure for common salt
Pipette out 100 ml of the solution preserved in D.1.2 and titrate against standard hydrochloric acid using methyl orange as indicator.

Transfer about 20 g of the prepared sample, accurately weighed, in a 100 ml measuring flask through a funnel. Wash the funnel in the flask with carbon dioxide-free distilled water and fill it to the mark with that water. Shake the flask well till all the salt goes into solution (undissolved magnesium carbonate will remain in suspension).

Shake it well and filter first 10 ml to 15 ml of the solution through Whatman filter paper No. 1 and discard the filtrate. Then filter the remaining solution and titrate 50 ml of the solution so obtained against standard hydrochloric acid using methyl orange as indicator.

D.3 Calculation
Alkalinity (as Na2CO3), per cent by mass:
For common salt = \( \frac{5.3V}{m} \)
For table salt and food industry salt = \( \frac{1.06V}{m} \)

Where
\( V \) = volume in ml of standard hydrochloric acid used in the titration, and
\( m \) = mass in g of the prepared sample taken for the test
Annex E
(normative)

Determination of acid-insoluble matter

(Carry out this test for free-flowing table salt only)

E.1 Reagents

E.1.1 Dilute hydrochloric acid
E.1.2 Concentrated hydrochloric acid

E.2 Procedure

Transfer for residue obtained in D.1.2 into a beaker. Alternatively, transfer the sintered crucible itself with the residue to 100 ml beaker, and add 15 ml to 20 ml of water and 25 ml of concentrated hydrochloric acid so that the sinter base is immersed in the acid. Heat to boiling for 10 min to 15 min so that practically all the residue and drier have decomposed with the acid. Remove the sintered crucible from the beaker (if it is transferred to the beaker) and wash the crucible with water. Evaporate the extract and wash solution together to dryness and transfer the solid residue with 25 ml of dilute hydrochloric acid (1:1).

Filter on a filter paper (Whatman No. 41 or equivalent), wash the precipitate first with warm dilute hydrochloric acid (1:20) and then with hot water until washings are free from chloride. Dry the residue and ignite in a silica crucible. Heat strongly at red heat for 1 h. Cool and weigh.

NOTE: If silicate drier is not used, acid-insoluble residue will be very low for accurate weighing. In that case, repeat with 50 g of dried material.

E.3 Calculation

Acid insoluble matter, per cent by mass = \[
\frac{100 \times m_1}{m_2}
\]

where

\(m_1\) = mass in g of the residue, and
\(m_2\) = mass in g of the dried sample taken for the test.