

**IODIZED EDIBLE SALT- SPECIFICATION**

**ANNEX 1: FORTIFICATION (IODIZATION), SAMPLING AND TESTING**

## **0. FOREWORD**

0.1 Fortification of food is a public health measure aimed at improving and maintaining the health of individuals in the population through provision of an adequate level of nutrient intake by the addition of nutrients to processed foods or food products

0.2 Salt is considered to be one of the most cost effective, technically feasible and widely used vehicle for iodine fortification because of its inclusion in many foods at the household level, in commercially processed foods and its acceptance by almost all sectors of the population.

0.3 This Afghanistan Standard is drafted and prepared in order to assist in alleviating the problem of iodine deficiency and to ensure that the safety and quality of fortified products are complied with, and the respective sources of iodine are supplied in the right amount and form.

## **1. SCOPE AND FIELD OF APPLICATION**

This standard prescribes requirements, methods of sampling and tests for fortified food grade salt intended for human consumption.

### **2. Terminologies**

**2.1** For the purpose of this Afghanistan standard the following definitions shall apply:

**2.1.1 Salt** – Food grade salt is a crystalline product consisting predominantly of sodium chloride. It is obtained from the sea, from underground rock salt deposits or from natural brine.

**2.1.2 Fortificant** – A micronutrient compound to be added to food vehicle.

**2.1.3 Fortification** - The addition of one or more micronutrients to food for purpose of preventing or correcting a demonstrated deficiency of one or more micronutrients in the population or specific population group.

**2.1.4 Food vehicle** - A food stuff identified to be fortified with the prescribed micronutrient (s) as prescribed in this standard.

**2.1.5 Micronutrient** - A natural or synthesized vitamin, mineral or trace element that is essential for normal growth, development and maintenance of life; and of which a deficit will cause characteristic biochemical or physiological changes.

## **3. REQUIREMENTS**

### 3.1 Description

Iodized salt shall be a food stuff composed of high quality food grade salt to which potassium iodate ( $KIO_3$ ) has been added according to Afghanistan Regulations on Iodizing Salt Official Gazette Serial No 1048 (6.1.1390) 26.3.2011.

### 3.2 Physical and chemical requirements

The quality and purity of salt shall conform to chemical requirements given in this Afghanistan regulation (Official Gazette No 1048 / (6.1.1390) 26.3.2011) based on Codex Standard 150-1985

### 3.3 Permitted additives

Permitted additives including free flowing agents and emulsifiers must be in accordance with Afghanistan Regulations on Iodizing Salt Official Gazette Serial No 1048 (6.1.1390) 26.3.2011

## 4.4 FORTIFICATION

4.4.1 For the purpose of iodization, the quantity of iodine in food grade salt should be as given in Table 1

**Table 1: Limits for iodine content in iodized food grade salt.**

	Micronutrient	Minimum Content	Maximum content	Method of reference test
1	Iodine (added as potassium iodate)  Target 40ppm (mg/kg) iodine or 67ppm potassium iodate	30ppm /kg	50ppm/kg	AS480:2014/ De Maeyer EM, Lowenstein FW, Thilly CH. "The control of endemic goiter." World Health Organization, Geneva, 1979

### 4.4.2 Permitted fortificants

For the purpose of iodization of food grade salt, the source of iodine shall be potassium iodate. Potassium iodate shall conform to the United States Pharmacopoeia, British Pharmacopoeia, Food Chemical Codex, the FAO/WHO General Principles for the use of Food Additives of the Codex Alimentarius, Volume 1 or the European Pharmacopoeia.

Note: the addition of potassium iodide as iodine source is not permitted.

## 5. EXAMPLE METHOD OF IODIZATION

The method of fortification must ensure uniform distribution of the added iodine within food grade salt such that the all samples provide levels for iodine within the minimum and maximum limits set in Table 1.

Batch or continuous fortification processes may be used whereby potassium iodate solution is pumped and sprayed at an appropriate rate into a mixing chamber to obtain a product with uniform distribution of iodine. The effectiveness

of the mixing chamber to uniformly distribute iodine throughout the salt should be determined.

An equivalent protocol would be applied to a batch iodization process whereby a solution of potassium iodate is dosed into a ribbon mixer or equivalent and mixed for a pre-established time to ensure homogeneity of iodine distribution.

### Stages of the process

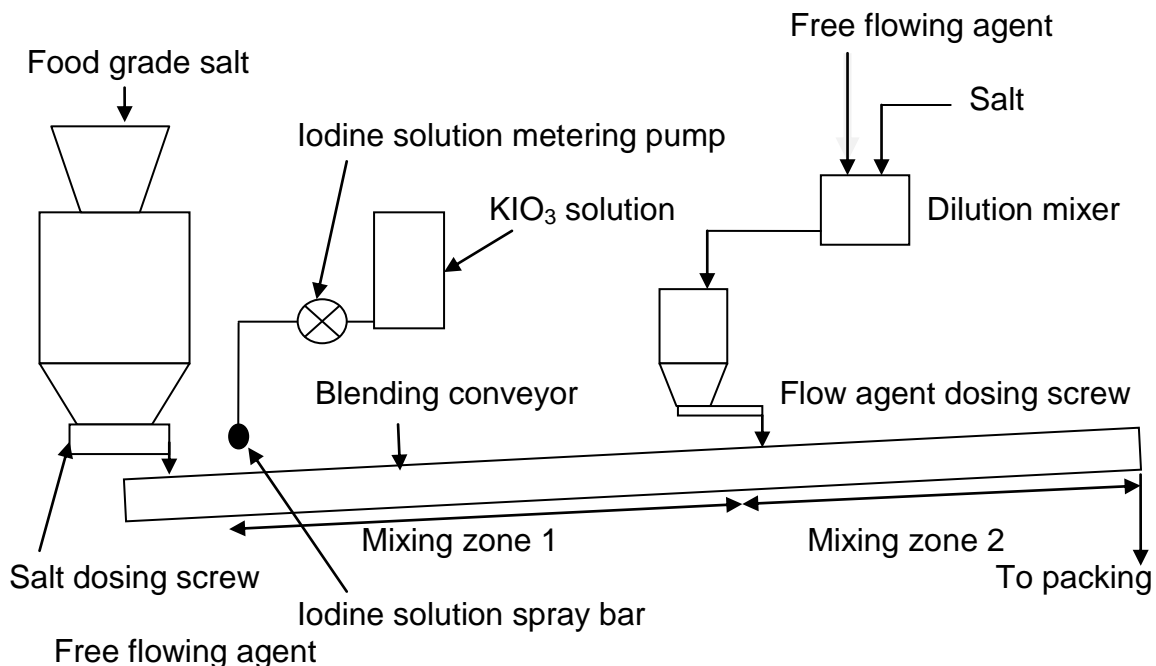
Stage 1: Fill the salt hopper with food grade salt and calibrate the dosing screw to the desired output rate per hour.

Stage 2: Make up a 5.5% solution of potassium iodate in water. Stir well to ensure complete solubility. Set the iodine pump to deliver the required volume of iodate solution per hour in relation to salt output and check that the delivery rate of the pump is correct.

Stage 3: Calibrate dosing of permitted free flowing agent (if required) (See para 3.3). This should be prepared as a 200 ppm premix with refined salt to obtain a 2ppm inclusion level in the product.

Stage 4: The finished product should be tested quantitatively every one or two hours in factory laboratory by titration method or its other quantitative tests to ensure that production of iodized salt is in accordance with standard (30-50ppm) and iodine pump grade should be adjusted to that.

**Fig.1 Example Continuous Iodization Method using Food Grade Salt**



**Box 1: Example process**

Target iodine concentration is 30-50ppm (mean of 40ppm +/-25%)

Mol wt ( $\text{KIO}_3$ ) = 214    Atomic wt iodine =127

67g ( $\text{KIO}_3$ ) contains 40g iodine per 1 ton (40ppm)

If the production requirement is 51 tons in 12 hours, dissolve 3.4kg ( $\text{KIO}_3$ ) in 60 litres water to be added uniformly by pump. (Equivalent to 67g ( $\text{KIO}_3$ ) in 1.18 litres water added to 1 ton of salt with a moisture increase of 0.12%)

Salt output from the doser should be 4.25 tons/hour

Potassium iodate solution output from the pump should be 5 litres/hour

Diluted Free flowing agent output at 200ppm (max) should be 850g/hour

**6. RECORDS OF PERFORMANCE**

It is a requirement within this Standard that all mills retain for inspection records relating to the performance of fortification. These are:

1. Certificate of license to prepare iodized salt
2. Certificate of analysis and inclusion level of potassium iodate from the supplier
3. Date of iodate delivery/batch number and date of usage.
4. Daily record of flow rate of salt through the plant.
5. Daily record of quantity of iodate used
6. Daily record of calibration of iodine pump
7. Daily record of confirmatory tests that salt has been iodized using the rapid iodine assay procedure (Appendix 2)
8. Written Standard Operating Procedures (SOP) related to the calibration of all components of the salt iodization system.

## **7. HYGIENE**

Salt iodized with potassium iodate shall be produced in accordance with Recommended General Principles of Food Hygiene CAC/RCP 1-1969-Rev 4 - 2003 including the adoption of the principles of Hazard Analysis Critical Control Point (HACCP). Appropriate standards of health and safety must be applied due to the nature of potassium iodate in high concentration.

## **8. SAMPLING AND TEST**

**8.1** The method of drawing representative samples shall be in accordance with Codex Sampling Plans For Prepackaged Foods (Vol.13) (or the new Afghanistan protocol under review Ref No....)

**8.2** Testing shall be done in accordance with the respective prescribed methods provided in Table 1 and Appendix 1. The method shall be used as reference and routine methods for the determination of iodine in salt.

**NOTE: "Pure chemicals" shall mean chemicals that do not contain impurities which affect the results of analysis (chemicals of analytical grade).**

**8.3** 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 Afghanistan Standard XYZ

## **9. PACKAGING, MARKING AND LABELING**

**9.1** Packing – iodized salt shall be packed in food grade, non-absorbent material which has no adverse influence upon the composition of the product, its properties and appearance, should be packed in accordance with Afghanistan Regulations on Iodizing Salt Serial No 1048 (6.1.1390) 26.3.2011. If necessary in order to avoid the loss of iodine, iodised salt should be packed in air tight bags of either high density polyethylene (HDPE) or polypropylene (PP) (laminated or non-laminated) or LDPE-lined jute bags (Grade 1803 DW jute bags lined with 150 gauge polyethylene sheet). In many countries bags are made from straw or jute, this may require main changes.

Bulk packing units should not exceed 50 kg (in accordance with International Labour Organization (ILO) Conventions) to avoid the use of hooks for lifting the bags.

Bags that have already been used for packing other articles such as fertilizers, cement, chemicals, etc. Should not be reused for packing iodized salt.

The container shall be sunlight proof and sealed to safeguard the product in terms of the following.

- a) Safety and hygiene, that is, prevent contamination of the product
- b) Nutrition value; that is minimizes loss of nutrients.

- c) Technological qualities of the products; and
- d) Organoleptic qualities of the product and the food to which is to be applied.

## **9.2 Marking and labeling**

Containers of iodized salt shall be legibly and indelibly marked with the following information

- a) Name of the product  
The name of the product shall be iodized food grade salt.
- b) Date marking.  
The date of minimum durability (preceded by the words “Date of manufacture and expiry date”) shall be declared by the day, month and year in uncoded numerical sequence except that the products with a shelf life of more than three months; the month and year shall suffice.
- c) List of ingredients
- d) The statement “store in cool and dry place away from sunlight” shall be included in close proximity to the date marking.
- e) The fortified mineral nutrient (iodine) and the average quantity in parts per million (ppm) or mg per 1000 g of the product.
- f) The name, postal and physical address of the manufacturer of the product.
- g) Country of origin
- h) Net content by mass in SI units
- i) Lot/Batch identification number in code or in clear
- j) Manufacturers registered trade mark; if any.

## **9.3 Certification mark**

- In the case of voluntary implementation, each container of iodized edible salt may also be marked with the recognized mark of competent certification body.
- After the implementation has become compulsory, Each container shall be marked with the logo of supervising body.

## **APPENDICES**

### **Appendix 1;**

#### **OFFICIAL REFERENCE METHOD FOR THE MEASUREMENT OF IODINE (ADDED AS IODATE) IN IODIZED SALT**

Sullivan K, Houston R, Cervinskask J, Gorstein J (1995) Titration methods for salt iodine analysis in Monitoring Universal Salt Iodization 86-101, UNICEF/PAMM/MI/ICCIDD/WHO

#### **Method summary**

1. Reaction 1: Liberation of free Iodine from salt • Addition of H<sub>2</sub>SO<sub>4</sub> liberates free iodine from the iodate in the salt sample. • Excess KI is added to help solubilise the free iodine, which is quite insoluble in pure water under normal conditions.
2. Reaction 2: Titration of free Iodine with thiosulfate. • Free iodine is consumed by sodium thiosulfate in the titration step. The amount of thiosulfate used is proportional to the amount of free iodine liberated from the salt
3. Starch is added as an external (indirect) indicator of this reaction, and reacts with free iodine to produce a blue colour. When added towards the end of the titration (that is, when only a trace amount of free iodine is left) the loss of blue colour, or endpoint, which occurs with further filtration, indicates that all remaining free iodine has been consumed by thiosulfate.
4. Convert burette reading to parts per million of iodine.

Alternative:

Eu salt/AS 002-2005 Determination of total iodine – titrimetric method with sodium thiosulphate. European Salt Producers Association.

### **Appendix 2**

#### **RECOMMENDED ROUTINE METHOD FOR THE MEASUREMENT OF IODINE ADDED AS IODATE IN IODIZED SALT**

Bioanalyt rapid photometric Elan System – to be confirmed



