



Technical Specifications for FORTIFIED RICE

The key adjustments are:

- Testing requirements of aflatoxins

Version: 4

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1. Introduction

This specification applies to **Fortified Rice** that WFP purchases internationally and distributes to beneficiaries.

2. Definition

Rice: *Oryza sativa* in any form.

Paddy: Rice kernels that are still in the inedible husk (lemma) also called "rough rice".

Brown rice: Rice kernels with husk removed by milling (caryopsis).

White rice: Polished rice kernels with the husk, bran and germ removed by milling (endosperm).

Kernel part: 10% the length of a rice kernel.

Chalky kernel: Rice kernel that wholly or partially has a chalky, non-transparent appearance.

Immature kernel: Whole or broken rice kernel that is unripe or undeveloped.

Yellow kernel: Whole or broken white rice kernel that has turned wholly or partially yellow. This includes parboiled rice kernels that have turned partially or wholly light brown.

Red kernel: Whole or broken white rice kernel with a red-coloured pericarp (bran) covering 2.5 parts (25.0%) or more of the surface.

Broken kernel: Piece of a rice kernel with length less than 7.5 parts (75.0%) of whole rice kernel.

Damaged kernel: Kernel that is obviously damaged to the naked eyes due to moisture, heat, fungi, insects or other.

Foreign material: Matter other than rice, including husk and bran detached from rice kernels.

Reasonably well milled: Bran has been largely removed from the rice kernel.

Vitamin and mineral premix kernels: Rice product that is fortified and has the appearance of a rice kernel. Also known as "fortified kernel" and "micronutrient kernel". Acceptable technologies for the production process of this product include extrusion or coating, provided that evidence that supports that the product meets the nutritional and safety requirements as specified in the technical specifications for **Vitamin and Mineral Premix Kernels** is made available. Fortification using dusting technology is not acceptable, as the resulting fortified rice does not withstand pre-washing or decanting of excess water, steps in the cooking process in many of the target countries where the fortified rice will be used.

3. Standards and references

Except when specified otherwise in the contract, the product shall comply with latest versions of recognized international standards and best practices and/or guidelines such as:

- WHO GUIDELINE 2018: FORTIFICATION OF RICE WITH VITAMINS AND MINERALS AS A PUBLIC HEALTH STRATEGY

- GOOD MANUFACTURING PRACTICES (GMPS) OF FOOD PRODUCTS
- CODEX STANDARD FOR RICE (CXS 198-1995)
- CODEX RECOMMENDED INTERNATIONAL CODE OF PRACTICE: GENERAL PRINCIPLES OF FOOD HYGIENE (CAC/RCP 1-1969)“ REV 3 1997 AMENDED (1999) INCLUDING ANNEX “HAZARD ANALYSIS AND CRITICAL CONTROL POINT (HACCP) SYSTEM AND GUIDELINES FOR ITS APPLICATION”
- FOOD SAFETY MANAGEMENT SYSTEM; ISO 22000
- CODEX GENERAL STANDARD FOR CONTAMINANTS AND TOXINS IN FOOD AND FEED (CXS 193- 1995)
- WFP TECHNICAL SPECIFICATIONS FOR VITAMIN AND MINERAL PREMIX KERNELS

Additionally, the supplier shall comply with relevant local regulations/standards of the food originating and recipient countries.

4. Raw Materials

4.1 Main ingredients

Product shall be manufactured from ingredients that are fresh, of good quality, free from foreign materials and substances hazardous to health, that comply with Codex Alimentarius and relevant food laws and standards of the originating and recipient countries. The quality of raw materials should be adequate so that the final product will meet all requirements specified in this document.

Milled rice

- Must conform to Codex Standard 198-1995 and the pertinent WFP specification for Milled Rice.

Vitamin and mineral premix kernels

- Must conform to WFP specification for Vitamin and Mineral Premix Kernels.

Raw materials must be stored under dry, ventilated and hygienic conditions. For agricultural products, only safe insecticides (*i.e.* phosphine) may be used for fumigation control. Where needed, fumigation must be performed by certified operators.

The Vitamin and mineral premix kernel supplier should receive a Certificate of Analysis of the micronutrient premix, from the micronutrient premix supplier at the time of procurement. They should also regularly collect samples at the time of production to analyse for required amounts and uniformity of micronutrient content in the kernels.

A Certificate of Analysis for the finished Vitamin and mineral premix kernels from an accredited lab should be given to the buyers at time of sale to fortified rice supplier.

4.2 Method of processing

Fortified Rice is prepared by blending rice kernels with vitamin and mineral premix kernels. The vitamin and mineral premix kernels should be homogeneously blended into the rice at a ratio that ensures the nutritional requirements are met as outlined below. The recommended mixing ratio is 1:100 (e.g. 1kg of vitamin and mineral premix kernels mixed with 99kg milled rice) or equivalent.

4.3 Food safety and risk assessment at manufacturing premises

The **Fortified Rice** Supplier must implement a HACCP plan specific to the type of product and specific to the environment of production and the process (including Critical Control Points – CCP's, critical limits, and corrective actions). Other principles such as Strict zoning plan, Environmental Monitoring plan and other ISO 22000 related principles shall be implemented where possible.

4.4 Homogeneity of micronutrients

Coefficient of Variation (CV) of maximum 15% is required. The guidelines for CV calculation is shown at <http://foodqualityandsafety.wfp.org>.

5. Product Specifications

5.1 General requirements

The commodity shall meet following quality characteristic requirements:

- Shall be safe and suitable for human consumption.
- Shall be free from abnormal flavours, odours, and living insects.
- Shall be free from filth (impurities of animal origin, including dead insects) in amounts which may represent a hazard to human health.
- Shall be stored under dry, ventilated and hygienic conditions. Only authorized insecticides (e.g. phosphine) may be used for fumigation control. Where needed, fumigation shall be performed by certified operators and as specified in the GAFTA Standard for Fumigation.
- Shall comply with other requirements specified in this document.
- Shall be composed of rice mixed homogeneously with vitamin and mineral premix kernels to mimic the physical characteristics of the rice.

5.2 Nutritional Value

Freshly produced **Fortified Rice** shall comply with the nutritional requirements in Table 1.

Table 1: Micronutrient content of finished Fortified Rice

Nutrient	Minimum mg/kg finished Fortified Rice	Maximum per mg/kg finished Fortified Rice	Per 100g for Labelling
Vitamin A	1.95 mg	3.12 mg	150 mcg
Vitamin B1	6.50 mg	9.75 mg	0.5 mg
Vitamin B3	91.0 mg	109.2 mg	7.0 mg
Vitamin B6	7.80 mg	11.7 mg	0.60 mg
Folic acid	1.69 mg	2.54 mg	0.13 mg
Vitamin B12	0.013 mg	0.020 mg	1 mcg
Iron	40.0 mg	48.0 mg	4.0 mg
Zinc	60.0 mg	72.0 mg	6.0 mg

5.3 Contaminants

The product shall be free from contaminants in amounts which may represent a hazard to health. The product shall comply with those maximum contaminant limits established by the Codex Alimentarius for this commodity. This includes compliance with Codex General Standard for Contaminants and Toxins in Food and Feed (CXS 193-1995) and Codex Maximum Residue Limits for pesticide residues. Additionally, the product shall meet the requirements stated in Table 2.

5.4 Hygiene

It is recommended that the products covered by the provisions of this standard be prepared and handled in accordance with the appropriate sections of the Recommended International Code of Practice – General Principles of Food Hygiene (CXC 1-1969), and other Codes of Practice recommended by the Codex Alimentarius Commission which are relevant to these products. To the extent possible in good manufacturing practice, the products shall be free from objectionable matter. When tested by appropriate methods of sampling and examination, the product:

- shall be free from micro-organisms in amounts which may represent a hazard to health;
- shall be free from parasites which may represent a hazard to health; and
- shall not contain any substance originating from micro-organisms in amounts which may represent a hazard to health.

5.5 Shelf life

Expected shelf life (best before date) is 24 months from the date of packaging. The product can withhold the entire shelf life without issues related to food safety or sensory. Retention of micronutrient levels is yet to be confirmed. This recommendation is on an interim basis until more scientific evidence is generated and with the objective to continuing the facilitation of the operations when introducing this product.

5.6 Fit for human consumption guarantee

Suppliers shall have to check the quality of their products and guarantee that the product is 'fit for human consumption', in line with International Federation of Inspection Agencies requirements.

6. Packaging and Marking

Food shall be packed in a suitable container complying with the packaging and marking requirements separately available under "4.5 to 90 kg PP woven bag specification with or without PE inner liner" on <http://foodqualityandsafety.wfp.org/specifications>.

Weight and quantity tolerance must meet The International Organization of Legal Metrology International Recommendation OIML R 87².

Two percent marked bags (included in the price) requirement: as per contract.

7. Storing

The product shall be stored under dry, ventilated and hygienic conditions and away from direct sunlight.

8. Analytical Requirements

8.1 Sampling Plan

Fortified Rice will be sampled for analysis by a qualified third party utilizing the following rice sampling standards:

- GAFTA Sampling Rules 124 (latest version)

8.2 List of analyses

As per contractual agreement, WFP can appoint an inspection company to check that the food matches requirements of this specification. Analytical tests in table 2 are usually utilized, and additional tests might be performed. Suppliers shall follow its own food safety and quality management plan. WFP reserves the rights to change the testing plan at any time.

The quality requirements (1-15) outlined below correspond to the generic specification, which might change as per contractual obligation.

Supplier shall also submit a Certificate of Analysis from the manufacturer of the vitamin and mineral premix kernels used in the production of the **Fortified Rice** certifying that the micronutrient fortification levels are met.

Table 2: Compulsory tests and recommended reference methods for white Fortified Rice

No	Tests	Requirements	Reference methods (latest versions) ¹
1	Moisture	Max. 14 % (m/m)	ISO 7301
2	Yellow kernels	Max. 1.5 % (m/m)	ISO 7301
3	Red kernels	Max. 7.0 % (m/m)	ISO 7301
4	Chalky kernels	Max. 8.0 % (m/m)	ISO 7301
5	Immature kernels	Max. 1.5 % (m/m)	ISO 7301
6	Paddy kernels	Max. 30 kernels/kg	ISO 7301
7	Damaged kernels	Max. 2.0 % (m/m)	ISO 7301
8	Foreign material	Max. 0.50 % (m/m)	ISO 7301
9	Milling degree	Min. Reasonably well milled	ISO 7301
10	Broken kernels (%)	Max. 25% (m/m) or as per contract	ISO 7301
11	Organoleptic quality	Natural odour, colour appearance	ISO 7301
12	Average kernel length	As per contractual agreement	ISO 7301
13	GMO (<i>if required in the contract</i>)	Negative (<0.9 % of GMO material)	PCR
14	Radiation (<i>if required</i>)	As per contractual agreement	EN 1788
15	Live insect	Nil	ISO 7301
16	Arsenic (inorganic)	Max.0.2 ppm	AOAC 986.15
17	Ochratoxin A	Max. 5 ppb	AOAC 2000.3
18	Vitamin and mineral premix kernels	0.85-1.15% (m/m)	UV-A Lamp
19	Aflatoxins Total ²	Max. 20 ppb	ISO 16050

¹ or equivalent validated methods

² WFP or any appointed agent/inspection company will take samples of the Commodity from the Seller and will carry out, through a laboratory of its choice, an analysis of the level of Total Aflatoxins contained in the Commodity. The maximum acceptable limit is 20 ppb. Any analysis result above this limit will be binding on the Seller and, as the case may be, will entitle WFP to reject the Commodity before or at the time of delivery, which must then be entirely replaced by the Seller at its own risks and costs. All additional expenses and/or consequences resulting from non-compliance of the Commodity with the aforementioned maximum authorized Total Aflatoxins level will be borne by the Seller.