



## Technical Specifications for Micronutrient powder – school children

Specification reference: **MIXMNP010**

Version: **16.0**

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### 1. SCOPE

This specification applies to micronutrient powder (MNP) in 8 g sachets. One sachet contains 20 servings for school children and must be added once a day (or less frequently, depending on program implementation guidance) to the meal prepared at school, using one sachet per 20 children.

### 2. REFERENCE and STANDARD

MNP shall be formulated and manufactured in accordance with latest version of recognized international standards and best practices and/or guidelines, such as:

- Vitamin and mineral requirements in human nutrition, 2nd ed. Geneva: WHO, 2004<sup>1</sup>
- HF-TAG programmatic guidance brief on use of micronutrients powders (MNP) for home fortification
- HF-TAG Quality Manual on Micronutrient Powders — A Guiding Document<sup>2</sup>
- Codex Guidelines For Vitamin And Mineral Food Supplements CAC/GL 55
- Code of Practice for Food Premix Operations' (Pan American health Organisation (FCH/NU/66))

### 3. PRODUCT SPECIFICATION

**Sachets net weight:** average sachets weight must be between 7.6 g and 8.4 g with a maximum coefficient of variation of 5%

**Carrier** must be Corn maltodextrin with a DE 11-14 and max 5% loss on drying

**Anticaking agent** must be Tri-calcium phosphate or Silicon dioxide with adequate particle size.

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<sup>1</sup> RNIs for children 7-9 years were taken as a reference

<sup>2</sup> Home Fortification Technical Advisory Group (HF-TAG). See <http://www.hftag.org>

## Formulation and mixing

- All ingredients in the finished product should be appropriately formulated, and demonstrated to have overcome or significantly minimized any potential problems of bioavailability, stability and acceptability. Indeed, it is well known that interactions between micronutrients can negatively affect stability during storage, and interactions between micronutrients and food can positively or negatively affect bioavailability of one or more micronutrients.
- For all nutrients of the formulation, mixing and particle size must ensure that from one sachet to another, the maximum coefficient of variation is 20%.

## Physical/organoleptic characteristics

- Taste must be bland and addition of the MNP must not significantly change the taste, colour or texture of the food.
- Powder must be homogeneous, stable and dry.
- Powder must be easy to mix uniformly with any semi-solid or solid food the child is eating.

**Nutritional value:** MNP must retain characteristics shown in table 1 during whole shelf life.

*Table 1: nutritional value:*

Nutrients	Label declaration per portion of 0.4 g		Label declaration per 8 g		Nutrient source
	µg RE	500	mg RE	10	
Vitamin A	µg RE	500	mg RE	10	Vitamin A palmitate 250,000 IU/g (beadlet) or Vitamin A acetate 325,000 IU/g (beadlet)
Vitamin D3	µg	5	µg	100	Dry vitamin D3 100,000 IU/g (CWS or beadlet)
Vitamin E	mg TE	7	mg TE	140	Dry vitamin E acetate 500 IU/g (CWS)
Vitamin K1	µg	60	mg	1.2	Dry vitamin K1 (5% CWS)
Vitamin B1	mg	0.9	mg	18	Thiamine mononitrate
Vitamin B2	mg	0.9	mg	18	Riboflavin fine powder or Riboflavin 5 Phosphate
Vitamin B6	mg	1	mg	20	Pyridoxine hydrochloride
Vitamin B12	µg	1.8	µg	36	Cyanocobalamin (1% or 0.1%)
Niacin	mg	12	mg	240	Niacinamide
Folic acid	µg	180 <sup>3</sup>	mg	3.6	Folic acid*
Vitamin C	mg	30	mg	600	Ascorbic acid fine powder
Iron	mg	12.5	mg	250	NaFeEDTA (2.5 mg) + Ferric pyrophosphate micronized (difference) or Coated ferrous fumarate
Zinc	mg	5.6	mg	112	Zinc sulphate or Zinc gluconate
Copper	mg	0.6	mg	12	Copper gluconate or Copper sulphate
Iodine	µg	120	mg	2.4	Potassium iodide*

\* Dilution must be used prior to blending in order to guarantee homogeneity

<sup>3</sup> Equivalent to 300 µg Dietary Folate Equivalent (DFE)

#### 4. PACKAGING AND MARKING

**Packaging material:** The package must be leak proof, light enough for easy handling and transportation, and strong enough to withstand a reasonable amount of physical stress during shipment, storage and use, worldwide, at elevated temperatures and humidity. In addition:

- Foil used to produce sachets shall have the following composition PET 12/ Al 8 / PE 45 or equivalent and adequate barrier properties to protect product from moisture, light and Oxygen.
- Inside box shall be made of paperboard.
- Outside box shall be made of corrugated fiberboard.

#### Labeling

Finished products must be labelled in accordance with local design developed by WFP, if any, and with generic label requirement in an appropriate language (table 2 and annex 1). Production of premix and sachets shall only start when all labels/design of sachet, inside and outside box have been approved by WFP.

*Table 2: Generic label requirement:*

	sachet	inside box	outside box
Product name	"Micronutrient powder – school children" or local appropriate name as per contractual agreement		
Net weight	8g	20x8g	50*20*8g (8 kg)
Ingredient list	NA	XXX	
Nutrients content	NA	As per table 1 and contractual requirement (i.e. nutrient + content per portion or per sachet)	
Preparation instruction	"20 servings"	"One sachet per 20 children, once per day"	NA
Preparation instruction	"Mix with food before consumption", together with a generic pictogram that shows how the powder is sprinkled onto a pot of food (see Annex 1)		NA
Storage instruction	NA	"Best stored below 30 C, in dry and hygienic conditions", "Store away from children"	
Manufacturer name	XXX		
Manufacturer address	NA	XXX	
Manufacturer batch/lot number and production date	XXX		
Best Before Date	Best Before day/month/year or Best Before end month/year		
Other	NA	"not for sale"	
Donor and WFP logo	As per contractual agreement		

#### 5. SHELF LIFE

**Minimum durability:** Unless stated otherwise in the contractual agreement, MNP sachets must have minimum 24 months shelf life when stored up to 30°C and 65% Relative Humidity.

## 6. ANALYTICAL REQUIREMENTS

Analytical requirements shown in table 3 are defined, at the point of procurement, on a composite sample made from 20 sachets. As per contractual agreement, WFP will appoint an inspection company to perform these analysis and compare results with the minimum and maximum values stated in table 3.

*Table 3: analytical requirement at the point of purchase*

No	Test	Minimum per g	Maximum <sup>4</sup> per g	Reference method*
1	Vitamin A RE µg	1250	2000	HPLC
2	Vitamin D3 µg	12	20	HPLC
3	Vitamin E TE mg	17	21	HPLC
4	Vitamin K1 µg	150	240	HPLC
5	Vitamin B1 mg	2.2	3.4	HPLC/Microbiology
6	Vitamin B2 mg	2.2	3.4	HPLC/ Microbiology
7	Vitamin B6 mg	2.5	3.8	HPLC
8	Vitamin B12 µg	4.5	6.8	HPLC/Microbiology
9	Niacin mg	30	36	HPLC
10	Folic acid µg	450	680	HPLC
11	Vitamin C mg	70	110	HPLC/Titration
12	Iron mg	31	38	ICP-MS
13	Zinc mg	14	17	ICP-MS
14	Copper mg	1.5	1.8	ICP-MS
15	Iodine µg	300	400	ICP-MS/HPLC

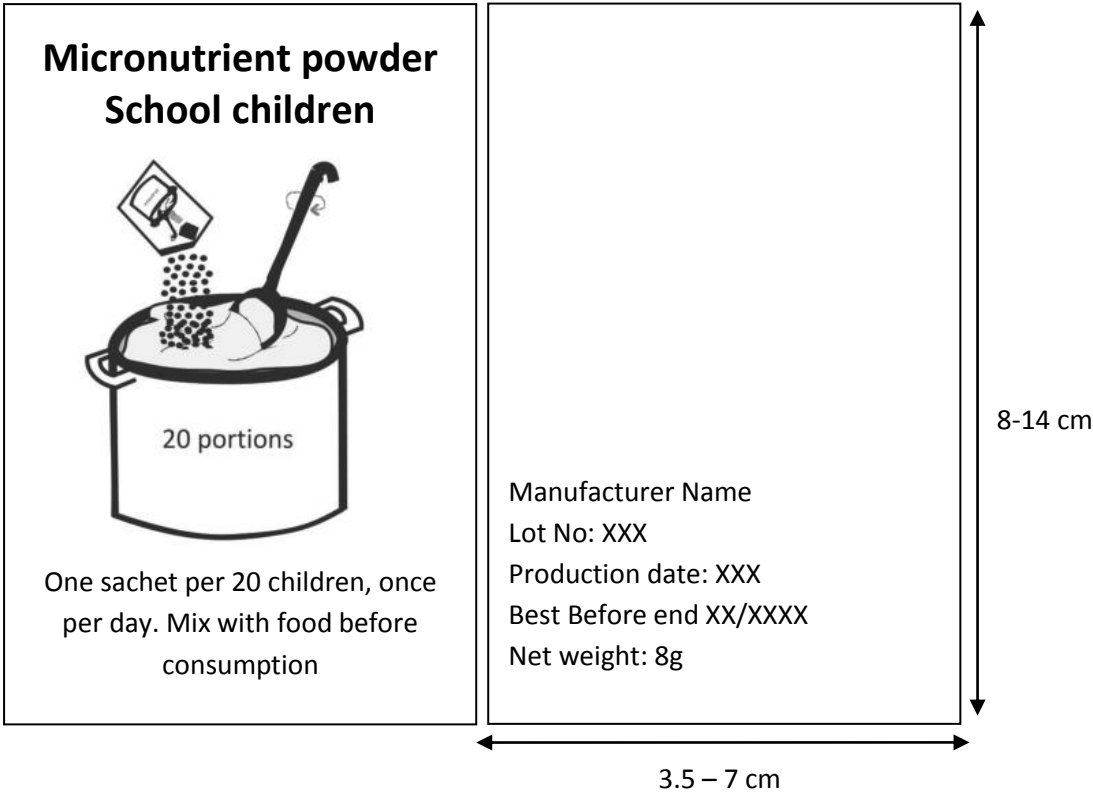
\*or equivalent

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<sup>4</sup> MNP must be formulated to guarantee minimum and maximum values all along shelf life. These maximum levels are below the Tolerable Upper Limit (UL) that may be still reached if other fortified foods are used, and MNP is consumed daily (this is unlikely when it is only added to meals that are provided during school days). In that case, as explained in the HF-TAG Programmatic Guidance Brief (See <http://www.hftag.org/resource/hf-tag-program-brief-dec-2011-pdf>), it is important to keep in mind that: UL includes a safety margin and is conservative; the adverse effects that have been considered for setting the UL are associated with chronic intake, rather than with acute toxicity which occurs at much higher intake levels; where nutrient-nutrient interactions determined the UL (such as a higher zinc intake affecting copper status, or higher folic acid intake affecting vitamin B12 status), a concurrent increase of the intake of both micronutrients involved would allow a higher intake; the UL applies to normal, healthy individuals with adequate stores and no deficits to be corrected; recommended nutrient intakes for treatment of severe and moderate acute malnutrition exceed the UL for 3 nutrients that are also included in MNP (zinc, vitamin A, folic acid), which is considered safe and necessary for treatment.

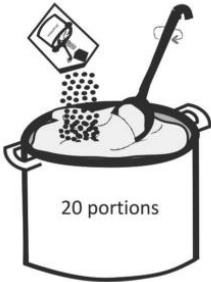
ANNEX 1: sachet and box design, including pictogram<sup>5</sup>

Sachet generic design:



<sup>5</sup> Packaging dimensions are provided to harmonize packaging from the different supply sources. If existing production/packaging facility does not allow to follow recommended dimensions, supplier shall inform WFP through their offers during the procurement process.

Box generic design:

 <p>One sachet per 20 children, once per day. Mix with food before consumption</p> <p>Best stored below 30 C, in dry and hygienic conditions.</p> <p>Store away from children</p> <p><b>NOT FOR SALE</b></p>	<p>Nutrient content per portion of 0.4g</p> <table border="1" data-bbox="852 309 1302 819"><tr><td>Vitamin A µg RE</td><td>500</td></tr><tr><td>Vitamin D3 µg</td><td>5</td></tr><tr><td>Vitamin E mg TE</td><td>7</td></tr><tr><td>Vitamin K1 µg</td><td>60</td></tr><tr><td>Vitamin B1 mg</td><td>0.9</td></tr><tr><td>Vitamin B2 mg</td><td>0.9</td></tr><tr><td>Vitamin B6 mg</td><td>1</td></tr><tr><td>Vitamin B12 µg</td><td>1.8</td></tr><tr><td>Niacin mg</td><td>12</td></tr><tr><td>Folic acid µg</td><td>180*</td></tr><tr><td>Vitamin C mg</td><td>30</td></tr><tr><td>Iron mg</td><td>12.5</td></tr><tr><td>Zinc mg</td><td>5.6</td></tr><tr><td>Copper mg</td><td>0.6</td></tr><tr><td>Iodine µg</td><td>120</td></tr></table> <p>* Equivalent to 300 µg Dietary Folate Equivalent (DFE)</p>	Vitamin A µg RE	500	Vitamin D3 µg	5	Vitamin E mg TE	7	Vitamin K1 µg	60	Vitamin B1 mg	0.9	Vitamin B2 mg	0.9	Vitamin B6 mg	1	Vitamin B12 µg	1.8	Niacin mg	12	Folic acid µg	180*	Vitamin C mg	30	Iron mg	12.5	Zinc mg	5.6	Copper mg	0.6	Iodine µg	120
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<p><b>Micronutrient powder</b></p> <p><b>School children</b></p> <p>Net weight: 20 x 8 g</p> <p>LOGO if required</p>	<p>Ingredient list : XXXXX</p> <p>Manufacturer name and adress</p> <p>Lot No: XXX</p> <p>Production date: XXX</p> <p>Best Before end XX/XXXX</p>
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