



**World Food
Programme**

Technical Specifications for:

FORTIFIED VEGETABLE OIL - PALM OLEIN

Version: 4

Replacing: Version 3, 2020

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*Reason for issue:
Updated fortification requirements
Updated specification template
Updated labelling requirements*

1. Definition

FORTIFIED VEGETABLE OIL - PALM OLEIN (hereafter called the product) is the liquid fraction obtained by fractionation of palm oil which is derived from the fleshy mesocarp of the fruit of the oil palm (*Elaeis guineensis*).

2. Standards

Except when specified otherwise in the contract, the product shall comply with the following standards/guidelines, all applicable laws and regulations, and other requirements specified in this document (whichever is stricter). The latest edition of the referenced below (including any amendments) applies.

- CODEX GENERAL PRINCIPLES OF FOOD HYGIENE (CXC 1-1969)
- CODEX GUIDELINES FOR THE VALIDATION OF FOOD SAFETY CONTROL MEASURES (CXG 69-2008)
- CODEX PRINCIPLES FOR THE ESTABLISHMENT AND APPLICATION OF MICROBIOLOGICAL CRITERIA FOR FOODS (CAC/GL 21-1997)
- CODEX PRINCIPLES AND GUIDELINES FOR THE CONDUCT OF MICROBIOLOGICAL RISK MANAGEMENT (CXG 63-2007)
- RECOMMENDED METHODS OF SAMPLING FOR THE DETERMINATION OF PESTICIDE RESIDUES FOR COMPLIANCE WITH MRLS (CXG 33-1999)
- CODEX GENERAL STANDARD FOR FOOD ADDITIVES (CXS 192-1995)
- CODE OF PRACTICE ON FOOD ALLERGEN MANAGEMENT FOR FOOD BUSINESS OPERATORS (CXC 80-2020)
- CODEX GENERAL PRINCIPLES FOR ADDITION OF ESSENTIAL NUTRIENTS TO FOODS (CXG 9-1987)
- GENERAL STANDARD FOR THE LABELLING OF AND CLAIMS FOR PRE-PACKAGED FOODS FOR SPECIAL DIETARY USES (CXS 146-1985)
- CODE OF PRACTICE FOR THE PREVENTION AND REDUCTION OF DIOXIN, DIOXINS-LIKE PCBS AND NON-DIOXIN-LIKE PCBS IN FOOD AND FEED (CXC 62-2006)
- CODE OF PRACTICE FOR THE REDUCTION OF 3-MONOCHLOROPROPANE-1,2- DIOL ESTERS (3-MCPDES) AND GLYCIDYL ESTERS (GES) IN REFINED OILS AND FOOD PRODUCTS MADE WITH REFINED OILS (CXC 79-2019)
- CODEX STANDARD FOR NAMED VEGETABLE OILS (CXS 210-1999)

3. Raw Materials

Main ingredients

All ingredients shall comply with Codex Alimentarius and applicable food laws and regulation in the originating and recipient countries (which-ever is stricter). Suppliers shall conduct risk assessment on raw materials to ensure quality of raw materials is adequate to meet final product specifications.

Raw material name	Applicable Codex Standards	Key contaminants ¹
Palm Oil	Codex Standard for Named Vegetable Oils (CXS 210-1999) Codex Maximum Residue Limits for pesticide residues	Arsenic; Lead; Glycidyl fatty acid esters; PAH Total (sum of benzo(a)pyrene, benz(a)anthracene, benzo(b)fluoranthene and chrysene; Benzo(a)pyrene; Iron; Copper; 3-MCPD; Pesticides

Vitamins and minerals

The product shall be fortified with a premix containing Vitamin A (retinol palmitate) and Vitamin D (D3 as cholecalciferol). Suppliers are responsible of applying sufficient overage to ensure that the final product meets all requirements stated in this document.

- Suppliers shall implement an effective food safety and quality management system for the premix, including supplier approval and premix quality control.

Additionally, the premix shall:

- Be suitable for vegetarian²
- Be purchased from WFP or GAIN approved suppliers³
- Be delivered to the manufacturer with a Certificate of Analysis (CoA) showing levels of all micronutrients included in the premix. This CoA shall be submitted to WFP along with other documents for payment.
- Micronutrient premixes shall be stored as recommended by premix manufacturer (e.g. under 25 °C).

Additives:

The product shall contain antioxidants, within admissible level stated in Codex, such as:

Antioxidants	Maximum use level (mg/kg)
Butylated Hydroxyanisole (BHA)	175
Butylated Hydroxytoluene (BHT)	75
Tertiary Butyl Hydroquinone (TBHQ) ⁴	120
Any combination of gallates, BHA, BHT, or TBHQ	200 within individual limit.

Note: The manufacturer shall conform use of other additives i.e. synergists and antifoaming agents as per Codex STAN 210-1999.

4. Processing

¹ This list is not exhaustive and shall be complemented by other contaminants listed in Codex and applicable laws and regulations at the origin and recipient countries. Please refer to Product Safety Section of this specification for target values.

² The definition of the terms "Food suitable for vegetarians" can be found here: <https://www.euroveg.eu/wp-content/uploads/2021/02/FoodDrinkEurope-EVU-joint-position-on-vegetarian-vegan-labelling-definitions.pdf>

³ <http://gpf.gainhealth.org>

⁴ TBHQ is recommended.

Food safety and quality management at manufacturing premises

The manufacturer shall be able to demonstrate by principle and practice the adoption, implementation and recording of:

- Good Manufacturing Practice
- Good Hygiene Practices (GHPs)
- Hazard Analysis Critical Control Point program (HACCP)
- Global Food Safety Initiative (GFSI) scheme principles

In this context an appointed WFP staff/ WFP appointed Inspector / Quality Surveyor/Auditor is entitled to visit the factory without prior notice during any period when WFP product is being manufactured to check that production is done as per WFP contract specification. The WFP staff/Inspector/Quality Surveyor/Auditor may request to see:

- **Production facilities** (e.g. storages, production rooms, staff facilities, utility rooms etc.)
- **Procedures** (e.g. cleaning, personnel hygiene, risk assessment and HACCP, environmental monitoring programme, sampling & analysis, product release and control of non-conformance etc.).
- **Records** (e.g. QC records, CCP monitoring, traceability etc.).
- **Practices** (e.g. pest control, hygiene, cleaning)

Contractors shall notify WFP immediately of lots (pre-delivery and post-delivery) that fail to meet contract requirements. Any testing on food safety parameters for foods and/or associated raw materials delivered to WFP shall be pre-agreed with WFP.

Homogeneity of micronutrients

Coefficient of Variation (CV) of maximum 10% using Vitamin A and/or Vitamin D as the indicator element.⁵

5. Product Specifications

General requirements

- The product's organoleptic characteristics shall be characteristics of the designated product
- The product shall meet the testing requirements stated in this document

Parameters	Requirements
Moisture and volatile matter at 105°C	0.2% maximum (m/m)
Insoluble impurities	0.05% maximum (m/m)
Free fatty acid	0.1% maximum expressed as palmitic acid
Soap content	0.005% maximum (m/m)
Melting point	24°C maximum
Iodine value	55 - 60
Unsaponifiable matter	1.3% maximum
Refractive index (ND 40°C)	1.458 - 1.460
Relative density (40°C /water at 20°C)	0.899 - 0.920

Nutritional requirements

The product shall contain the following nutritional values throughout the shelf life.

⁵ The guidelines for calculating CV: <https://foodqualityandsafety.wfp.org/food-fortification-and-coefficient-of-variation-cv-calculation>.

Nutrient content per 100 g finished product	Unit	Minimum	Label ⁶	Maximum
Energy	kcal	897	x	
Energy	kJ	3753	x	
Fat	g	99.7	x	
of which saturates	g	40	x	50
Carbohydrate ⁷	g	0	x	
of which sugars	g	0	x	
Protein	g	0	x	
Sodium	mg	0	x	
Vitamin D	µg	23 ⁸	23	69
Vitamin A	µg RE	2000 ⁹	2000	4000

Product Safety

- The product shall not contain any harmful substances including micro-organisms, heavy metals, pesticides, mycotoxin, foreign matter or anti-nutritional factors, or other contaminants in amounts that may represent a hazard to health, in line 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 following requirements:

Contaminant ¹⁰	Requirements (maximum limits)
Arsenic	0.1 ppm
Lead	0.08 ppm
Iron	1.5 ppm
Copper	0.1 ppm
PAH Total (sum of benzo(a)pyrene, benz(a)anthracene, benzo(b)fluoranthene and chrysene)	10 ppb
Benzo(a)pyrene	2 ppb

- Fit for human consumption guarantee: Suppliers shall 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.

Shelf life

The product shall have minimum 12 months shelf life when stored in ambient, dry and hygienic conditions. Or reduced shelf life as per contract. Suppliers should conduct shelf-life studies following WFP shelf-life study requirements¹¹ to support the shelf-life claim.

6. Packaging ¹²and Marking

⁶ Where X is marked, suppliers to label values based on their products. Suppliers shall follow the labelling specification, including the number & order of nutrients unless destination countries' regulation state otherwise. All nutrients shall be labelled on the primary packaging even if the values are zero (it should be marked as "= 0").

⁷ Carbohydrates = Available Carbohydrates = sugars + starches. The theoretical calculation can be made based on food composition database such as: <https://fdc.nal.usda.gov/>

⁸ The minimum Vitamin D at the end of shelf life shall be 23 µg=920IU; 69 µg=2760 IU

⁹ The minimum Vitamin A at the end of shelf life shall be 2000 µg RE= 6666IU RE; 4000 µg RE = 13,332IU RE.

¹⁰ For Glycidyl fatty acid esters and sum of 3-monochloropropanediol (3-MCPD) and 3-MCPD fatty acid esters, expressed as 3-MCPD, the target shall be as low as achievable, aiming to comply with EC 1881/2006 (latest version).

¹¹ <https://docs.wfp.org/api/documents/WFP-0000118387/download/>

¹² WFP shall be informed and consulted before making any modification to the current primary, secondary and tertiary packaging (e.g. the composition of the packaging material(s), ink or any other parameters) that could impact the integrity of the packaging and food or storage and transport conditions.

Food shall be packed in a suitable container complying with the packaging and marking requirements separately available under “Vegetable oil packaging technical specification” on <http://foodqualityandsafety.wfp.org/specifications>. Additionally, the labelling shall comply with the General Standard for the Labelling of Pre-packaged Foods (CXS 1-1985). Weight and quantity tolerance must meet The International Organization of Legal Metrology International Recommendation OIML R 87¹³.

7. Technical document requirements

Suppliers shall submit the following documents to WFP along with other documents for payment.

- a CoA showing levels of all micronutrients included in the premix
- a CoA of the final product to WFP
- the specification of antioxidants used in the oil

Additionally, suppliers shall provide other technical documents upon request from WFP.

8. Analytical Requirements

Suppliers shall follow its own food safety and quality management plan. WFP can conduct the following routine tests (as presented in the Table below) on products. Additionally, WFP reserves the rights to change this testing plan at any time.

Any products taken for the purpose of weight check and lab testing (including retention samples) shall be replenished by the supplier. The shipment quantity shall not be less than the purchased quantity.

The supplier acknowledges that any inspection of the foods by WFP or its designated inspection agents does not constitute a determination whether the specification for the foods set out in this document or any purchase order (including mandatory technical requirements) have been met. The supplier will be required to comply with its warranty and other contractual obligations whether or not WFP carries out such pre-delivery inspection of the foods.

The pre-delivery inspection and any testing of the foods undertaken by WFP or its designated inspection agents will not substitute for the inspection and testing of the goods upon delivery to WFP.

Table: Analytical Requirements and testing methods

Tests	Requirements	Reference methods (latest versions) ¹⁴
Organoleptic	The color, odor and taste of product shall be characteristics of the designated product. It shall be free from foreign and rancid odor and taste.	Organoleptic evaluation
Acid value	0.6 mg maximum of KOH/g Oil	ISO 660:2009; AOCS Cd 3d-63
Color	5-1/4 inch Lovibond cell Red: 3 maximum Yellow: 30 maximum	AOCS Cc 13b-45; BS 684-1.14:1998; ISO 27608:2010
Peroxide value	2 milliequivalents maximum of active oxygen per kg of oil (at time of purchase) 10 milliequivalents maximum of active oxygen per kg of oil (throughout shelf life)	ISO 3960:2017 BS 684-2.14:2001 AOCS Cd 8b-90 AOAC 965.33; IUPAC 2.501
Saponification	194 - 202 mg KOH per g oil	ISO 3657:2013; AOCS Cd 3-25
Vitamin A	2600 – 4000 ¹⁵ µg RE/100g (8665 -13,332 IU RE/100g) at the time of purchase or as per contract	EN 12823-1:2014
Vitamin D	30 – 69 µg/100g (1200-2760 IU /100g) at the time of purchase or as per contract	EN 12821:2009

¹³ OIML R 87 Quantity of commodity in pre-packages https://www.oiml.org/en/files/pdf_r/r087-e04.pdf, latest edition to be followed

¹⁴ or equivalent validated methods