



Technical Specifications for FORTIFIED REFINED SUNFLOWER OIL

Commodity Code: **OILVEG060**

Version: **4, adopted 2020**

Replacing: **3.0, adopted 2011**

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This version replaces the version 2.0 adopted in 2011

The adjustments are:

-Use of antioxidants recommended as per Codex STAN

-Specification covers multiple fortification options

-Separation of packaging specifications from the product

1. INTRODUCTION

1.1 Product type

Sunflower Oil is derived from the dried seeds of the *Helianthus annuus* L. plant. Refined **Sunflower Oil** distributed by WFP is fortified with vitamin A and vitamin D in proportions described in product specifications.

2. REFERENCE STANDARDS

Sunflower Oil shall comply with the following guidelines and/or standards of the Codex Alimentarius.

- 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".
- Codex General principles for addition of essential nutrients to foods: CAC/GL 09-1987
- CODEX STAN 193-1995, Codex general standard for contaminants and toxins in food and feed
- Codex Standard for Named Vegetable Oils, CODEX STAN 210-1999
- CODEX STAN 192-1995, Codex general standard for food additives.
- EAS 769: Fortified edible oils and fats — Specification
- Senegal Standard: NS 03-080, July 2013, Amd. in Jan 2015, Edible soybean oil enriched with vitamin A
- Mauritanian Standard: APNM01-009, Nov. 2010, Edible soybean oil enriched with vitamin A

Note: Latest versions should be applied for all relevant standards where applicable.

3. RAW MATERIALS

3.1 Sunflower Oil

The sunflower seed utilized for oil production shall have good quality. The **Sunflower Oil** utilized for extraction shall conform to Codex Standard for Named Vegetable Oils, CODEX STAN 210-1999.

3.2 Vitamins

Sunflower Oil shall be fortified with vitamins as described in Table 1. Additionally, the premix shall:

- Be purchased from GAIN Premix Facility or any of the GAIN approved suppliers, as per the list available at the following link: <http://gpf.gainhealth.org/suppliers/current-suppliers>
- Be delivered to the processor of **Sunflower Oil** with a complete Certificate of Analysis. This document shall be presented to WFP with other documents for payment.
- Vitamin premix shall be stored as per manufacturer recommendations.

3.3 Homogeneity of Vitamins

Theoretical calculations indicate that a mixing system with a Coefficient of Variation of 10% using vitamin A and/or vitamin D as the indicator element, will enable product to meet the above variation target on 95%, provided that all conditions of mixing are rigorously applied. The guidelines for this calculation is shown at <http://foodqualityandsafety.wfp.org/coefficient-of-variation-calculator>.

3.4 Food safety and risk assessment at manufacturing premises

Sunflower Oil production must respect the national and international code practice for processing of this commodity. For compliance with Codex standards, the processor must be able to demonstrate by principle and practice the adoption, implementation and recording of:

- Good Manufacturing Practice
- Hazard Analysis Critical Control Point program

In this context an appointed WFP Inspector / Quality Surveyor is entitled to visit the factory without prior notice during any period when WFP product is being manufactured to check that the GMP and HACCP systems are in place. The Inspector / Quality Surveyor may request to see:

- Records (i.e. names of people in charge of the process and quality control, temperatures of the process, mixing times / quantity, cleaning schedules, etc).
- Procedures (e.g. cleaning, personnel hygiene, HACCP, sampling and analysis).
- Instructions (e.g. process instructions, cleaning instructions).
- The quality manual for the process or factory.
- The producer must be registered under national food law as a processor of foods for human consumption.

4. PRODUCT SPECIFICATIONS

4.1 General requirements

Sunflower Oil shall be free from objectionable matter; not contain any substances originating from micro-organisms or any other poisonous or deleterious substances such as heavy metals or pesticide residues, in amounts which may represent a hazard to health.

4.1.1 Contaminants

The commodity shall be free from heavy metals in amounts which may represent a hazard to health. The commodity shall comply with those maximum residue limits established by the Codex Alimentarius Commission in CODEX STAN 193-1995, General Standard for Contaminants and Toxins in Food and Feed (latest version).

Heavy metals

- Lead (Pb) Max 0.08 ppm (mg/kg)
- Arsenic (As) Max 0.1 ppm (mg/kg)
- Iron (Fe) Max 1.5 ppm (mg/kg)
- Copper (Cu) Max 0.1 ppm (mg/kg)

Polycyclic Aromatic Hydrocarbons (PAH)

- PAH total* Max 10 ppb (µg/kg)
- Benzo(a)pyrene Max 2 ppb (µg/kg)

*Sum of Benzo(a)pyrene, benz(a)anthracene, benzo(b)fluoranthene and chrysene

Pesticide residues

The product shall comply with those maximum residue limits established by the Codex Alimentarius Commission for this commodity.

4.1.2 Hygiene

It is recommended that the commodity 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 (CAC/RCP 1-1969), and other Codes of Practice recommended by the Codex Alimentarius Commission which are relevant to these products.

The product should comply with any microbiological criteria established in accordance with the Principles for the Establishment and application of microbiological Criteria for Foods (CAC/GL 21-1997)

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 products:

- 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.

4.1.3 Additional requirements

Sunflower Oil shall meet the following additional requirements:

- Free from radioactivity
- Free from Genetically Modified Organisms (GMO)
- Others as per receipt country regulations

4.2 Specific requirements

The color, odor and taste of **Sunflower Oil** shall be characteristics of the designated product. It shall be free from foreign and rancid odor and taste. The product must also comply with other requirements specified in table 1.

4.2.1 Use of Antioxidants

Sunflower Oil shall contain antioxidants, and comply with Codex Standard for Named Vegetable Oils, CODEX STAN 210-1999. Find below information on admissible level of BHA, BHT and TBHQ use in **Sunflower Oil**.

- | | |
|---|---|
| • Butylated hydroxyanisole (BHA) | 175 mg/kg maximum |
| • Butylated Hydroxytoluene (BHT) | 75 mg/kg maximum |
| • Tertiary Butyl Hydroquinone (TBHQ) ¹ | 120 mg/kg maximum |
| • Any combination of gallates, BHA, BHT, or TBHQ) | Not exceed 200 mg/kg within individual limit. |

Note: The manufacturers of **Sunflower Oil** shall conform i.e. antioxidants, synergists and antifoaming agents as per Codex STAN 210-1999.

¹ A) Introduction to Fats and Oils Technology, Second Edition, Editors, Richard D. O'Brien (2000) AOCS Press
"TBHQ has been found to be the most effective synthetic antioxidant for vegetable oils";

B) Bailey's Industrial Oil and Fat Products (2005), Fereidoon Shahidi, John Wiley & Sons, Ltd
"TBHQ is more effective in vegetable oils than BHA and BHT. It is stable to heat and is regarded as the most effective antioxidant in preventing the oxidation of frying oils and an alternative or supplement to oil hydrogenation for increasing oxidative stability (10, 11).

4.2.2 Shelf Life

Sunflower Oil shall retain shelf life for at least **one year** from date of manufacture when stored under dry conditions at ambient temperatures prevalent in the country of destination. The supplier shall be required to perform a shelf-life study compliant with International standards to validate the declared shelf-life using WFP compliant packaging.

4.2.3 Fit for human consumption guarantee

The manufacturer must check the quality of the commodity and guarantee that the product is 'fit for human consumption'.

5. PRODUCT NET WEIGHT

Sunflower Oil should be packed as per contractual requirements in food grade containers. The actual contents shall not be less, on average, than the nominal quantity. Underweight packaging will be rejected and must be replaced at the seller's expense. Weight and quantity must meet The International Organization of Legal Metrology International Recommendation OIML R 87².

6. STORING

Sunflower Oil must be stored under dry, ventilated and hygienic conditions.

7. PACKAGING AND MARKING

Sunflower Oil 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 Prepackaged Foods (CODEX STAN 1-1985, latest version).

² OIML R 78 Quantity of product in prepackages https://www.oiml.org/en/files/pdf_r/r087-e04.pdf, latest edition to be followed

8. ANALYTICAL REQUIREMENTS

As per contractual agreement, WFP will appoint an inspection company that will check that the food matches requirements specified in Table 1. Additional tests may be defined in case further quality assessment is required. The following analytical plans are currently utilized by WFP and shared only for suppliers' information. Suppliers should follow its own food safety and quality management plan. Additionally, WFP reserves the rights to change these plans at any time.

Table 1: List of compulsory tests and reference methods

N°	Test	Recommended value	Reference method or equivalent validated methods
1	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
2	Moisture and volatile matter at 105°C	0.2% maximum (m/m)	ISO 662:2016; AOCS Ca 2d-25; IUPAC 2.601
3	Insoluble impurities	0.05% maximum (m/m)	ISO 663:2017; AOCS Ca 3a-46; IUPAC 2.604
4	Free fatty acid	0.15% maximum expressed as oleic acid	ISO 18395:2005; AOCS Ca 5a-40; AOAC 940.28
5	Acid value	0.6 mg maximum of KOH/g oil	ISO 660:2009; AOCS Cd 3d-63
6	Color	5-1/4 inch Lovibond cell Red: 1.5 maximum Yellow: 15 maximum	AOCS Cc 13b-45; BS 684-1.14:1998; ISO 27608:2010
7	Soap content	0.005% maximum	AOCS Cc 17-95 BS 684 Section 2.5
8	Peroxide value	2 milliequivalents maximum of active oxygen per kg of oil (<i>at time of purchase</i>) 10 milliequivalents maximum of active oxygen per kg of oil (<i>throughout shelf life</i>)	ISO 3960:2017 BS 684-2.14:2001 AOCS Cd 8b-90 AOAC 965.33; IUPAC 2.501
9	Saponification	188-194 mg KOH/g oil	ISO 3657:2013; AOCS Cd 3-25
10	Iodine value	118-141 g/100g oil	ISO 3961:2018; AOAC 993.20 AOCS Cd 1d-92; IUPAC 2.205
11	Unsaponifiable matter	1.5% maximum	ISO 18609:2000; ISO 3596:2000 AOCS Ca 6a-40; IUPAC 2.401
12	Refractive index (ND 40°C)	1.461 – 1.468	ISO 6320:2017; AOCS Cc 7-25; AOAC 921.08; IUPAC 2.102
13	Relative density (40°C /water at 20°C)	0.918 – 0.923	AOCS 10c-95 IUPAC 2.101
14	Vitamin A	24000– 36000 IU per kg oil	EN 12823-1:2014
15	Vitamin D	2400 – 3600 IU per kg oil	EN 12821:2009

Vitamin A Country Specific Requirement	Senegal	53300-80000 IU per kg oil (16-24 mg/kg)	EN 12823-1:2014
	Mauritania	Min. 67000 IU per kg oil (20 mg/kg)	

Note: The supplier should follow fortification levels as per contractual requirement and standards at the recipient country. If not otherwise specified in the contract/tender, the generic fortification levels for Vitamin A and D to be followed.