**Technical Specifications for the manufacture of:**

# Fortified refined bleached deodorized Palm Olein

# -PALM OLEIN-

Specification reference: **Palm Olein**
Version: **2.0**
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## 1. INTRODUCTION

### 1.1 Product type

**Palm Olein** 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).* **Palm Olein** distributed by WFP is fortified with vitamin A and vitamin D in proportions described in product specifications.

### 1.2 Standards and recommendations

**Palm Olein** shall be manufactured in accordance with: "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".

## 2. RAW MATERIALS

### 2.1 Palm Oil

The palm oil utilized for extraction shall conform to Codex STAN 210-1999.

### 2.2 Vitamins

Fortified vitamins (vitamin A and D) shall conform to Codex Standard CAC/GL 09-1987- General principles for the addition of essential nutrients to foods.

Vitamin premix should be purchased from a WFP approved suppliers: BASF (Stern Vitamin), DSM, Fortitech, Nicholas Piramal, Hexagon Nutrition or their authorized dealers and GAIN premix facility. Addresses of premix suppliers are on http://foodquality.wfp.org
Vitamin premix must be stored in a dry, cool and clean place where the temperature is a maximum of 25°C.

## 3. PROCESSING

Fortified **Palm Olein** 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. In addition, the producer must have a ***legal authorization*** to produce this commodity in the country where the factory is located.

## 4. PRODUCT SPECIFICATIONS

### 4.1. Main requirements

| Specification | Recommended value |
|---|---|
| Organoleptic | Neutral/bland taste; absence of foreign odours and flavours |
| Moisture and volatile matter | 0.2% maximum |
| Insoluble impurities | 0.05% maximum |
| Free fatty acid | 0.1% maximum expressed as palmitic acid |
| Acid value | 0.6 mg maximum of KOH/g oil |
| Color | 5-1/4 inch Lovibond cell<br>Red: 3 maximum<br>Yellow: 30 maximum |
| Soap content | 0.005% maximum |
| Peroxide value | 2 milliequivalents maximum of active oxygen per kg oil |
| Melting point | 24°C maximum |
| Saponification value | 194 - 202 mg KOH per g oil |
| Iodine value | 55 - 60 g per 100g oil |
| Unsaponifiable matter | 1.3% maximum |
| Refractive index (ND 40$^{o}$C) | 1.458 – 1.460 |
| Relative density (40$^{o}$C /water at 20°C) | 0.889 – 0.920 |
| Authorized additives | |
| -*Butylated hydroxyanisol* | - 175 mg/kg maximum |
| -*Butylated Hydroxytoluene* | - 75 mg/kg maximum |
| Vitamin A | 24000– 36000 UI per kg oil |
| Vitamin D | 2400 – 3600 UI per kg oil |

### 4.2 Additional Requirements

**Palm Olein** shall meet the following additional requirements:

***Shelf life*:** it shall retain above qualities for at least one year from date of manufacture when stored dry at ambient temperatures prevalent in the country of destination

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

- Heavy metals
  - Lead (Pb) Max 0.1 ppm
  - Arsenic (As) Max 0.1 ppm
  - Iron (Fe) Max 1.5 ppm
  - Cooper (Cu) Max 0.1 ppm
- Polycyclic Adromatic Hydrocarbures (PAH)
  - PAH heavy Max 5 ppb
  - PAH total Max 25 ppb
  - Benzo(a)pyrene Max 2 ppb
- Free from radioactivity
- Free from Genetically Modified Organisms (GMO) (*if required by the contract*).

## 5. PACKAGING

**Palm Olein** can either be packaged into 3 to 5 liters jerry cans or bottles of 1 to 1.5 liters, to constitute the primary packaging. The secondary packaging is cartons to facilitate transportation and storage.

### 5.1 Primary packaging

***Jerry cans***

The plastic containers must be of High Density Polyethylene (HDPE), with heat-sealed membranes and screw-top lids. They shall be made by blow-molding and be seamless so that they can not leak (except at the closure) unless ruptured. The containers must be suitable for foodstuffs, have stoppers fitted with safety devices and must be hermetically sealed. The containers shall have two flat walls, a built-in handle and a screw top.

Specifications:

- Material: HDPE
- Color: white/translucent
- Net weight per empty jerry can: 200 gm minimum for 5 liters jerry cans.
- Rated capacity: 3.0 or 5.0 liters
- Screw cap with inner plug
- Typical wall thickness: 1.0 mm (middle of side panels)

***PET bottles***

Bottles for **Palm Olein** must be made of Polyethylene Terephtalate (PET). They shall be hermetically closed thanks to a safety device. PET bottles shall be suitable for foodstuff, clean and free from any abnormal odor.

### 5.2 Carton

Bottles and jerry cans are disposed into cartons.

They should be new, strong cardboard cartons containing either 4 to 6 jerry cans of 3 to 5 liters or 12 to 15 bottles of 1 or 1.5 liters.

Cartons should be manufactured from well constructed single wall, luted paper, corrugated board with a specific weight of approximately 750 grams per square meter. This specific weight corresponds to a carton weight of approximately 560 grams for golding.

- Cartons should have burst strength (edge crush test) of approximately 44 pounds per square inch or 3.2 kg/ $cm^2$ or equivalent.
- Carton seams should be glued.
- Substance of cartons 275-120-275 (750 grams per $m^2$).

Dunnage of strong sheets, plywood has to be placed inside each container at every three layer of cartons to provide the required stacking strength.

## 6. MARKING

### 6.1 On jerry cans or bottles.

The following information should be available on bottles and cans

- Name of the product:
- Net content:
- Name and address of the supplier (including country of origin).
- Batch number (or SI).
- Production date.
- Additional marking as per contractual agreement.

### 6.2 On cartons

The following information should be available on each carton:

- Name of the product:
- Number of unit per carton
- Name and address of the supplier (including country of origin).
- Production date.
- Additional marking as per contractual agreement.

## 7. STORING

**Palm Olein** must be stored under dry, ventilated and hygienic conditions.

## 8. ANALYTICAL REQUIREMENTS

*Table 1: List of compulsory tests and reference methods*

| N° | Test | Recommended value | Reference method* |
|---|---|---|---|
| 1 | Organoleptic | Neutral/bland taste; absence of foreign odours and flavours | |
| 2 | Moisture and volatile matter | 0.2% maximum | ISO 662:1998<br>AOCS Ca 2d-25<br>IUPAC 2.601 |
| 3 | Insoluble impurities | 0.05% maximum | ISO 663:2007<br>AOCS Ca 3a-46<br>IUPAC 2.604 |
| 4 | Free fatty acid | 0.1% maximum expressed as palmitic acid | ISO 18395:2005<br>AOCS Ca 5a-40<br>AOAC 940.28 |
| 5 | Acid value | 0.6 mg maximum of KOH/g | ISO 660:2009<br>AOCS Cd 3d-63 |
| 6 | Color | 5-1/4 inch Lovibond cell<br>Red: 3 maximum<br>Yellow: 30 maximum | AOCS Cc 13b-45<br>BS 684-1.14:1998 |
| 7 | Soap content | 0.005% maximum | AOCS Cc 15-60<br>BS 684 Section 2.5 |
| 8 | Peroxide value | 2 milliequivalents maximum of active oxygen per kg of oil | ISO 3960:2007<br>BS 684-2.14:2001<br>AOCS Cd 8-53<br>AOAC 965.33<br>IUPAC 2.501 |
| 9 | Melting point | 24°C maximum | AOAC 920.156<br>ISO 6321:2002 |
| 10 | Saponification | 194 - 202 mg KOH per g oil | ISO 3657:2002<br>AOCS Cd 3-25 |
| 11 | Iodine value | 55 - 60 g per 100g oil | ISO 3961:2009<br>AOAC 993.20<br>IUPAC 2.205 |
| 12 | Unsaponifiable matter | 1.3% maximum | ISO 18609:2000<br>ISO 3596:2000<br>AOCS Ca 6a – 40<br>IUPAC 2.401 |
| 13 | Refractive index (ND 40°C) | 1.458 – 1.460 | ISO 6320:2000<br>AOCS Cc 7-25<br>AOAC 921.08,<br>IUPAC 2.102 |
| 14 | Relative density (40°C /water at 20°C) | 0.889 – 0.920 | AOCS 10c-95<br>IUPAC 2.101 |
| 15 | Vitamin A | 24000– 36000 UI per kg oil | |
| 16 | Vitamin D | 2400 – 3600 UI per kg oil | |

** or equivalent*