DRAFT EAST AFRICAN STANDARD

Palm Olein— Specification
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<td>10</td>
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Foreword

Development of the East African Standards has been necessitated by the need for harmonizing requirements governing quality of products and services in the East African Community. It is envisaged that through harmonized standardization, trade barriers that are encountered when goods and services are exchanged within the Community will be removed.

In order to achieve this objective, the Community established an East African Standards Committee mandated to develop and issue East African Standards.

The Committee is composed of representatives of the National Standards Bodies in Partner States, together with the representatives from the private sectors and consumer organizations. Draft East African Standards are circulated to stakeholders through the National Standards Bodies in the Partner States. The comments received are discussed and incorporated before finalization of standards, in accordance with the procedures of the Community.

East African Standards are subject to review, to keep pace with technological advances. Users of the East African Standards are therefore expected to ensure that they always have the latest versions of the standards they are implementing.

Draft Standard was prepared by Technical Committee EASC/ TC/015, Oil Seeds and Edible Fats.
Palm Olein — Specification

1 Scope
This Draft East Africa Standard prescribes the requirements and methods of sampling and test for crude and processed palm olein derived from fleshy mesocarp of the fruit of the oil palm (Elaeis guineensis).

2 Normative references
The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EAS 38: Labelling of pre-packaged foods
EAS 39: Hygiene in the food and drink manufacturing industry — Code of practice
EAS 291: Animal and vegetable fats and oils — Sampling
EAS 306: Animal and vegetable fats and oils — Determination of peroxide value
EAS 308: Animal and vegetable fats and oils — Determination of unsaponifiable matter
EAS 309: Animal and vegetable fats and oils — Determination of iodine value
EAS 310: Animal and vegetable fats and oils — Determination of refractive index
EAS 311: Animal and vegetable fats and oils — Determination of moisture and volatile matter
EAS 312: Animal and vegetable fats and oils — Determination of insoluble impurities
EAS 313: Saponification value
EAS 317: Animal and vegetable fats and oils — Determination of Lovibond colour
EAS 319: Animal and vegetable fats and oils — Determination of melting point in open capillary tubes (Slip point)
ISO 5508: Animal and vegetable fats and oils -- Analysis by gas chromatography of methyl esters of fatty acids
ISO 15304: Animal and vegetable fats and oils — Determination of the content of trans fatty acid isomers of vegetable fats & oils — Gas Chromatographic method

3 Terms and definitions
For the purposes of this standard, the following terms and definitions shall apply
3.1

**Crude palm olein**

is the liquid fraction derived from fractionation of crude palm oil made for further processing.

3.2

**Neutralized palm olein**

is the liquid fraction, obtained by fractionation of neutralized palm oil or crude palm oil which has been neutralized with alkali.

3.3

**Neutralized bleached palm olein**

is the liquid fraction obtained by fractionation either from crude palm oil and subsequently neutralized with alkali and bleached with bleaching earth or from neutralized palm oil and subsequently bleached with bleaching earth.

3.4

**Refined palm olein**

is the liquid fraction obtained by fractionation of refined palm oil.

4  

**Quality and Compositional requirements**

4.1  

**General quality and compositional requirements**

4.1.1  
Palm olein shall be clear and free from adulterants, sediments, suspended or foreign matter, separated water and added colouring or flavouring substances.

4.1.2  
The colour of crude or neutralized palm olein shall be bright clear and deep red at the temperature of 40 °C to 45 °C. The colour of neutralized, bleached palm olein shall be bright clear and pale golden yellow at 40 °C to 45 °C. The colour of refined, bleached and deodorized palm olein shall be bright clear and pale golden yellow at 40 °C to 45 °C.

4.1.3  
All palm olein products shall be free from foreign and rancid odour and taste.

4.1.4  
Palm olein shall conform to the general and compositional requirements of Table 1.

<table>
<thead>
<tr>
<th>S. No</th>
<th>Characteristics</th>
<th>Range</th>
<th>Method of Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>i)</td>
<td>Relative density 40 °C/water at 20 °C</td>
<td>0.899 — 0.920</td>
<td>Annex A</td>
</tr>
<tr>
<td>ii)</td>
<td>Refractive Index, (ND 40 °C)</td>
<td>1.458 — 1.460</td>
<td>EAS 310</td>
</tr>
<tr>
<td>iii)</td>
<td>Saponification value, mgKOH/g oil</td>
<td>194 — 202</td>
<td>EAS 313</td>
</tr>
<tr>
<td>iv)</td>
<td>Unsaponifiable matter, g/kg</td>
<td>≤ 13</td>
<td>EAS 308</td>
</tr>
</tbody>
</table>
### 4.2 Specific quality and compositional requirements

Palm olein shall comply with requirements in Table 2

**Table 1 — Specific requirements quality and compositional requirements of palm olein**

<table>
<thead>
<tr>
<th>S. No</th>
<th>Parameter</th>
<th>Crude</th>
<th>Neutralized</th>
<th>Neutralized Bleached</th>
<th>Refined palm olein</th>
<th>Method Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>i)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ii)</td>
<td>Free fatty acid (as palmitic), %,</td>
<td>≥ 2.5</td>
<td>≤ 0.4</td>
<td>≤ 0.4</td>
<td>≤ 0.3</td>
<td>ISO 15304</td>
</tr>
<tr>
<td>iii)</td>
<td>Moisture and volatile Matter at 105 °C, % m/m Max</td>
<td>0.5</td>
<td>0.20</td>
<td>0.20</td>
<td>0.20</td>
<td>EAS 311</td>
</tr>
<tr>
<td>iv)</td>
<td>Peroxide value, mEq/kg, max.</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>10</td>
<td>EAS 306</td>
</tr>
<tr>
<td>v)</td>
<td>Iodine value (wijs), min.</td>
<td>56 — 62</td>
<td>56 — 62</td>
<td>56 — 62</td>
<td>56 — 62</td>
<td>EAS 309</td>
</tr>
<tr>
<td>vi)</td>
<td>Slip point, °C, max.</td>
<td>24.0</td>
<td>24.0</td>
<td>24.0</td>
<td>24.0</td>
<td>EAS 319</td>
</tr>
<tr>
<td>vii)</td>
<td>Colour, 133.35 mm (5¼ in.) Lovibond,</td>
<td>≥ 20R</td>
<td>≥ 20R</td>
<td>&gt; 6 ≤ 20R</td>
<td>≤ 6R</td>
<td>EAS 317</td>
</tr>
<tr>
<td>viii)</td>
<td>Total carotenoids mg/kg/arp/carotene</td>
<td>500 — 1200</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>Annex B</td>
</tr>
</tbody>
</table>

**NOTE** The characteristics of processed palm olein differ is not significant ways from the above figures with the exception of carotenoids, which are removed during refining.
5 Fortification

Palm olein may be fortified in accordance to EAS 767

6 Food additives

6.1 General requirement

Food Additives shall not be used virgin or cold pressed oils. In other forms the additives may be used subject to tables 2, 3, 4 and 5.

6.2 Colours

The colours provided in table 2 below are permitted for use within the stated maximum use level for the purpose of restoring natural colour lost in processing or for the purpose of standardizing colour but not for the purposes of concealing damage or inferiority or making the product appear to be of greater than actual value.

**Table 2 – permitted colours in Palm olein**

<table>
<thead>
<tr>
<th>INS No.</th>
<th>Colour</th>
<th>Maximum Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>100(i)</td>
<td>Curcumin</td>
<td>5 mg/kg</td>
</tr>
<tr>
<td>160a(ii)</td>
<td>Beta-carotenes (Vegetable)</td>
<td>25 mg/kg</td>
</tr>
<tr>
<td>160a(i)</td>
<td>Beta Carotene (Synthetic)</td>
<td></td>
</tr>
<tr>
<td>160a(iii)</td>
<td>Beta Carotene (Blakeslea trispora)</td>
<td>25 mg/kg (singly or in combination)</td>
</tr>
<tr>
<td>160e</td>
<td>Beta-apo-8'-carotenal</td>
<td></td>
</tr>
<tr>
<td>160f</td>
<td>Beta-apo-8' carotenoic acid, methyl or ethyl ester</td>
<td></td>
</tr>
<tr>
<td>160b(i)</td>
<td>Annatto extracts, bixin-based</td>
<td>10 mg/kg (as bixin)</td>
</tr>
</tbody>
</table>

*a INS means International Numbering System as published by Codex

6.3 Antioxidants

**Table 3 - Antioxidants**

<table>
<thead>
<tr>
<th>INS No.</th>
<th>Antioxidant</th>
<th>Maximum Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>304</td>
<td>Ascorbyl Palmitate</td>
<td>500 mg/kg (Singly or in combination)</td>
</tr>
<tr>
<td>305</td>
<td>Ascorbyl Stearate</td>
<td></td>
</tr>
<tr>
<td>307a</td>
<td>Tocopherol, d-alpha-</td>
<td>300 mg/kg (Singly or in combination)</td>
</tr>
<tr>
<td>307b</td>
<td>Tocopherol concentrate, mixed</td>
<td></td>
</tr>
<tr>
<td>307c</td>
<td>Tocopherol, dl-alpha</td>
<td></td>
</tr>
</tbody>
</table>
310 Propyl gallate  100 mg/kg  
319 Tertiary butyl hydroquinone (TBHQ)  120 mg/kg  
320 Butylated hydroxyanisole (BHA)  175 mg/kg  
321 Butylated hydroxytoluene (BHT)  75 mg/kg  
Any combination of gallates, BHA, BHT, and/or TBHQ  200 mg/kg but limits above not to be exceeded  
389 Dilauryl thiodipropionate  200 mg/kg  

6.4 Antioxidant synergists

Table 4 – Antioxidant Synergists

<table>
<thead>
<tr>
<th>INS No.</th>
<th>Antioxidant synergist</th>
<th>Maximum Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>330</td>
<td>Citric acid</td>
<td>GMP</td>
</tr>
<tr>
<td>331(i)</td>
<td>Sodium dihydrogen citrate</td>
<td></td>
</tr>
<tr>
<td>331(iii)</td>
<td>Trisodium citrate</td>
<td></td>
</tr>
<tr>
<td>384</td>
<td>Isopropyl citrates</td>
<td>100 mg/kg</td>
</tr>
<tr>
<td>472c</td>
<td>Citric and fatty acid esters of glycerol</td>
<td>(Singly or in combination)</td>
</tr>
</tbody>
</table>

6.5 Antifoaming agents (deep frying oil)

Table 5 – Antifoaming agent

<table>
<thead>
<tr>
<th>INS No.</th>
<th>Antifoaming agent</th>
<th>Maximum Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>900a</td>
<td>Polydimethylsiloxane</td>
<td>10 mg/kg</td>
</tr>
</tbody>
</table>

7 Hygiene

Palm olein shall be produced, prepared and handled in accordance with the provisions of appropriate sections of EAS 39

8 Contaminants

8.1 Pesticide residues

Palm olein shall comply with those maximum pesticide residue limits established by the Codex Alimentarius Commission for this commodity.

NOTE: Where the use of certain pesticides is prohibited by some Partner States, it should be notified to all Partner States accordingly.

8.2 Other contaminants

Palm olein shall comply with those maximum limits specified in Table 6.
Table 6 — Limits for contaminants in Palm olein

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Contaminant</th>
<th>Maximum level</th>
<th>Test method</th>
</tr>
</thead>
<tbody>
<tr>
<td>i)</td>
<td>Iron, mg/kg</td>
<td>Virgin 5</td>
<td>EAS 315</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Non virgin 1.5</td>
<td></td>
</tr>
<tr>
<td>ii)</td>
<td>Copper, mg/kg</td>
<td>Virgin 0.4</td>
<td>EAS 315</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Non virgin 0.1</td>
<td></td>
</tr>
<tr>
<td>iii)</td>
<td>Lead, mg/kg</td>
<td>0.1</td>
<td>EAS 314</td>
</tr>
<tr>
<td>iv)</td>
<td>Arsenic, mg/kg</td>
<td>0.1</td>
<td>EAS 101</td>
</tr>
<tr>
<td>v)</td>
<td>Nickel, mg/kg</td>
<td>0.1</td>
<td>EAS 315</td>
</tr>
</tbody>
</table>

5 Packaging

Palm olein shall be packed in food grade containers and sealed in manner to ensure the safety and quality specified in this standard are maintained throughout the shelf life of the product.

6 Labelling

In addition to the mandatory labelling provisions found in EAS 38, the following specific provisions apply:

a) the name of the product shall be ‘Palm Olein’ with the description as either ‘neutralised’ or bleached or ‘bleached and neutralised’ or ‘refined’

b) Where corn oil has been subject to any process of esterification or to processing which alters its fatty acid composition or its consistency, the name of the product or any synonym shall not be used unless qualified to indicate the nature of the product.

10.0 Sampling

10.1 Sampling of palm olein products for the purposes of testing shall be done in accordance with the method prescribed in ISO 5555

10.2 Any package/container drawn randomly from a lot/batch shall constitute a representative sample of that lot or batch.
Annex A
(Normative Reference)
Determination of relative density t/20 °C

1.1 Principle

The relative density at t/20°C of an oil or fat is the ratio of the mass in air of a given volume of the oil or fat at t °C to that of the same volume of water at 20 °C, the weighings being made with weights adjusted to balance weight in air.

1.2 Apparatus

Pycnometer.

1.3 Procedure

Calibrate a relative density bottle or pycnometer (of capacity of at least 25 mL) as follows:

Clean and dry the bottle and weigh it in a bath of water at 20 °C until it reaches that temperature. If a bottle is used, insert the stopper in such a way that the capillary, if complete filled with water, and then maintain it at 20 °C until no further alteration in volume occurs. Wipe the stopper. If a pycnometer is used, adjust the volume of liquid to the fixed mark. Remove the bottle or pycnometer from the bath, dry the outside, allow to stand for a short time and weigh.

Empty and dry the bottle or pycnometer. Fill it with the sample of oil or fat previously brought near to the temperature of t °C. Keep the bottle or pycnometer in a bath adjusted to t °C until it has acquired that temperature. If a bottle is used, insert the stopper in such a way that the capillary is completely filled with the oil or the fat and then maintain it at the temperature t °C until no further alteration in volume occurs. Wipe the stopper. If a psychrometer is used, adjust the volume to the fixed mark. Remove the apparatus from the bath, dry the outside, allow to stand for a short time and weigh. Make all weighing air with weights adjusted to balance brass weights in air.

1.4 Calculation and Expression of Results (align the method)

\[
\text{Relative density} \pm /20 ^\circ\text{C in air} = \frac{M_2}{M_1 (1 + \infty (t - 20 ^\circ\text{C}))}
\]

where,

- \( m_2 \) = mass, in grammes, of oil or fat obtained in the test;
- \( m_1 \) = mass, in grammes, of water obtained in calibration test; and
- \( \infty \) = the coefficient of cubic expansion of glass at the given temperature.

\( \infty \) = 0.000 03 for soda glass.

\( \infty \) = 0.000 01 for borosilicale glass.
Annex B
(Normative Reference)
Determination of Carotene Contents

1.1 Definition
The carotene of palm oil is defined and calculated as B-carotene in parts per million (ppm).

1.2 Principle
Spectrophotometric measurement at 446 nm of the absorbance of a homogenized and diluted sample.

1.3 Reagent
Trimethylpentane (ISO-octane) or n-hexane — Optically pure at 446 nm.

1.4 Apparatus
1.4.1 Spectrophotometer — With 1 cm quartz cuvettas suitable for measurement at 446 nm.
1.4.2 Volumetric Flask — 25 mL capacity.
1.4.3 Pipette — 5 mL

1.5 Preparation of Sample
Melt the sample at 60 °C to 70 °C and homogenize thoroughly before taking a test portion. Filter through a fast filter paper if the sample contains impurities or is not clear.

1.6 Procedure
Weigh, to the nearest 0.0001g, 0.3 g of the sample into the 25 mL volumetric flask. Dissolve the test portion with a few millilitres of solvent and dilute to the mark.

Pipette accurately 5 mL of the prepared solution into another 25 mL volumetric flask and make up to volume with the same solvent.

Transfer the diluted solution to the 1 cm cuvette and measure the absorbance at 466 nm against the solvent used. Correct for cuvette error at the same wavelength.

1.7 Expression of Results
The carotene content is expressed as ppm B-carotene and is given by
Where,

\[
\frac{478.75(a_s - a_b)}{w}
\]

\(a_s\) = the absorbance of the sample;
\(a_b\) = the cuvette error;
\(w\) = the weight of sample in grammes.

Express the results to the nearest unit
### Annex C
(Normative)
Free Fatty Acids Composition (Expressed as % of total fatty acids)

<table>
<thead>
<tr>
<th>Carbon Number</th>
<th>Range</th>
<th>Method of Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>C 12:0</td>
<td>0.1 — 0.5</td>
<td>ISO 5508</td>
</tr>
<tr>
<td>C 14:0</td>
<td>0.5 — 1.5</td>
<td></td>
</tr>
<tr>
<td>C 16:0</td>
<td>36 — 43.5</td>
<td></td>
</tr>
<tr>
<td>C 16:1</td>
<td>0.05 — 0.6</td>
<td></td>
</tr>
<tr>
<td>C 18:0</td>
<td>3.5 — 5.0</td>
<td></td>
</tr>
<tr>
<td>C 18:1</td>
<td>39.8 — 46</td>
<td></td>
</tr>
<tr>
<td>C 18:2</td>
<td>10.0 — 13.5</td>
<td></td>
</tr>
<tr>
<td>C 18:3</td>
<td>0.05 — 0.6</td>
<td></td>
</tr>
<tr>
<td>C 20:0</td>
<td>0.05 — 0.6</td>
<td></td>
</tr>
</tbody>
</table>