CODEX ALIMENTARIUS
INTERNATIONAL FOOD STANDARDS

Food and Agriculture Organization of the United Nations
World Health Organization

E-mail: codex@fao.org - www.codexalimentarius.org

STANDARD FOR OLIVE OILS AND OLIVE-POMACE OILS

CXS 33-1981

Adopted in 1981. Revised in 1989, 2003, 2015, 2017 and 2024. Amended in 2009, 2013 and 2021.

2024 Revisions

Following decisions taken at the Forty-seventh Session of the Codex Alimentarius Commission in December 2024, revisions were made in Sections 3, 7.2, 8 and in Appendix I.

1. SCOPE

This standard (formerly CAC/RS 33-1970) applies to olive oils and olive-pomace oils described in Section 2 presented in a state for human consumption.

2. DESCRIPTION

Olive oil is the oil obtained solely from the fruit of the olive tree (*Olea europaea* L.), to the exclusion of oils obtained using solvents or re-esterification processes and of any mixture with oils of other kinds.

Virgin olive oil is the oil obtained from the fruit of the olive tree solely by mechanical or other physical means under conditions, particularly thermal conditions, that does not lead to alterations in the oil, and which has not undergone any treatment other than washing, decanting, centrifuging and filtration.

Olive-pomace oil is the oil obtained by treating olive pomace with solvents other than halogenated solvents or by other physical treatments, to the exclusion of oils obtained by re-esterification processes and of any mixture with oils of other kinds.

3. ESSENTIAL COMPOSITION AND QUALITY FACTORS

3.1 Designations and definitions

Extra virgin olive oil: virgin olive oil with a free acidity, expressed as oleic acid, of not more than 0.8 grams per 100 grams and whose other physicochemical and organoleptic characteristics correspond to those laid down for this category.

Olive oil composed of refined olive oil and virgin olive oils: olive oil consisting of a blend of refined olive oil and extra virgin olive oil and/or virgin olive oil. It has a free acidity, expressed as oleic acid, of not more than 1 gram per 100 grams and its other physicochemical characteristics correspond to those laid down for this category.

Olive-pomace oil composed of refined olive-pomace oil and virgin olive oils: olive-pomace oil consisting of a blend of refined olive-pomace oil and extra virgin olive oil and/or virgin olive oil. It has a free acidity, expressed as oleic acid, of not more than 1 gram per 100 grams and its other physicochemical characteristics correspond to those laid down for this category. In no case shall this blend be called olive oil.

Ordinary virgin olive oil: virgin olive oil with a free acidity, expressed as oleic acid, of not more than 3.3 grams per 100 grams and whose other characteristics correspond to those laid down for this category.[i]

Refined olive oil: olive oil obtained from virgin olive oils by refining methods (including methods aiming to the complete or partial removal of chemical compounds responsible for organoleptic descriptors) that do not lead to alterations in the initial glyceridic structure. It has a free acidity, expressed as oleic acid, of not more than 0.3 grams per 100 grams and its other physicochemical characteristics correspond to those laid down for this category.[ii]

Refined olive-pomace oil: olive-pomace oil obtained from crude olive-pomace oil by refining methods that do not lead to alterations in the initial glyceridic structure. It has a free acidity, expressed as oleic acid, of not more than 0.3 grams per 100 grams and its other physicochemical characteristics correspond to those laid down for this category.[iii]

Virgin olive oil: virgin olive oil with a free acidity, expressed as oleic acid, of not more than 2 grams per 100 grams and whose other physicochemical and organoleptic characteristics correspond to those laid down for this category.

Note: Genuine virgin olive oil that does not meet one or more of the virgin olive oil's quality criteria for this standard is referred to as Lampante olive oil. It is considered unfit for human consumption either as it stands or blended with other oils.

---

[i] This product may only be sold direct to the consumer if permitted in the country of retail sale. (Retained until CCFO30 for ordinary olive oil).
[ii] See note i.
[iii] See note i.

3.2 Composition factors

3.2.1 *GLC ranges of fatty acid composition (expressed as percentages of total fatty acids)*

The fatty acid values in this table apply to the oils described in Section 3.1 presented in a state for human consumption. However, to provide clarity in the trade of Lampante olive oil and crude olive-pomace oil, the values of the table, trans isomers excluded, may also be applied.

	Extra virgin olive oil Virgin olive oils	Olive oil composed of refined olive oil and virgin olive oils Refined olive oil	Olive-pomace oil composed of refined olive-pomace oil and virgin olive oils Refined olive-pomace oil
C14:0	⩽ 0.03	⩽ 0.03	⩽ 0.03
C16:0	7.0–20.0	7.0–20.0	7.0–20.0
C16:1	0.3–3.5	0.3–3.5	0.3–3.5
C17:0	⩽ 0.4	⩽ 0.4	⩽ 0.4
C17:1	⩽ 0.6	⩽ 0.6	⩽ 0.6
C18:0	0.5–5.0	0.5–5.0	0.5–5.0
C18:1	53.0–85.0	53.0–85.0	53.0–85.0
C18:2	2.5–21.0	2.5–21.0	2.5–21.0
C18:3	⩽ 1.0 [a]	⩽ 1.0[a]	⩽ 1.0[a]
C20:0	≤ 0.6	≤ 0.6	≤ 0.6
C20:1	⩽ 0.5	⩽ 0.5	⩽ 0.5
C22:0	≤ 0.2	≤ 0.2	≤ 0.3
C24:0	≤ 0.2	≤ 0.2	≤ 0.2
Trans fatty acids			
Σ(t-C18:1)	≤ 0.05	≤ 0.20	≤ 0.40
Σ(t-C18:2) + Σ(t-C18:3)	≤ 0.05	≤ 0.30	≤ 0.35
(a) In cases where an edible virgin olive oil exhibits 1.0 < linolenic acid % ⩽ 1.4, then this oil is authentic provided that apparent β-sitosterol/campesterol ⩾ 24 and all other composition factors lie within the official limits.			

3.2.2 *ΔECN42 (Difference between the actual and theoretical ECN 42 triglyceride content)*

Extra virgin olive oil Virgin olive oils	≤ |0.20|
Refined olive oil Olive oil composed of refined olive oil and virgin olive oils	≤ |0.30|
Refined olive-pomace oil Olive-pomace oil composed of refined olive-pomace oil and virgin olive oils	≤ |0.50|

3.2.3 *4α-Desmethylsterols composition (% total 4α-desmethylsterols)*

Cholesterol	≤ 0.5
Brassicasterol	⩽ 0.1 for olive oils ≤ 0.2 for olive-pomace oils
Campesterol	≤ 4.0[b]
Stigmasterol	< campesterol
Δ7-stigmastenol	≤ 0.5[c]
Apparent β-sitosterol[d]	≥ 93.0
(b) When a virgin or extra virgin olive oil naturally has a campesterol level > 4% and ⩽ 4.8%, it is considered authentic if the stigmasterol level is ⩽ 1.4% and the delta-7-stigmastenol level is ⩽ 0.3%. The other parameters shall meet the limits set out in the standard. (c) For virgin olive oils, if the value is > 0.5 and ⩽ 0.8%, campesterol must be ⩽ 3.3, apparent β-sitosterol/(campesterol+Δ7-stigmastenol) ⩾ 25, stigmasterol ⩽ 1.4 and ΔECN42 ⩽ |0.1|. For refined olive-pomace oils values > 0.5 and ⩽ 0.7% then stigmasterol ⩽ 1.4% and ΔECN42 ⩽ |0.4|. (d) Chromatographic peak composed by Δ5,23-stigmastadienol+clerosterol+β-sitosterol+sitostanol+Δ5-avenasterol+Δ5,24-stigmastadienol peaks.	

3.2.4 *Total 4α-desmethylsterols content (mg/kg)*

Virgin olive oils Refined olive oil Olive oil composed of refined olive oil and virgin olive oils	≥ 1 000
Refined olive-pomace oil	≥ 1 800
Olive-pomace oil composed of refined olive-pomace oil and virgin olive oils	≥ 1 600

3.2.5 *Erythrodiol and uvaol (% total 4α-desmethylsterols + erythrodiol and uvaol)*

Extra virgin olive oil Virgin olive oils Olive oil composed of refined olive oil and virgin olive oils Refined olive oil	≤ 4.5
Olive-pomace oil composed of refined olive oil and virgin olive oils Refined olive-pomace oil	> 4.5

3.2.6 *Waxes content (mg/kg)*

Extra virgin olive oil Virgin olive oils	≤ 150[e]
Refined olive oil Olive oil composed of refined olive oil and virgin olive oils	≤ 350[f]
Refined olive-pomace oil Olive-pomace oil composed of refined olive-pomace oil and virgin olive oils	> 350[f]
(e) Sum of C_{42} esters+C_{44} esters+C_{46} ester (f) Sum of C_{40} esters+C_{42} esters+C_{44} esters+C_{46} ester	

3.2.7 *Stigmastadienes content (mg/kg)*

Extra virgin olive oil Virgin olive oils	≤ 0.05

3.2.8 *Percentage of 2-glyceryl monopalmitate (2P) (% total monoacylglycerol)*

Extra virgin olive oil Virgin olive oil Olive oil composed of refined olive oil and virgin olive oils	If C16:0 ≤ 14.0 %; 2P ≤ 0.9 % If C16:0 > 14.0 %, 2P ≤ 1.0 %
Refined olive oil	If C16:0 ≤ 14.0 %; 2P ≤ 0.9 % If C16:0 > 14.0 %, 2P ≤ 1.1 %
Refined olive-pomace oil	2P ≤ 1.4 %
Olive-pomace oil composed of refined olive-pomace oil and virgin olive oils	2P ≤ 1.2 %

3.2.9 *$\Delta K^{(g, h)}$*

Extra virgin olive oil Virgin olive oil Ordinary virgin olive oil[j]	≤ 0.01

(g) Defined as:

$$\Delta K_{270} = K_{270} - \frac{K_{266} + K_{274}}{2}$$

$$\Delta K_{268} = K_{268} - \frac{K_{264} + K_{272}}{2}$$

(h) 270 nm when using cyclohexane; 268 nm when using iso-octane.
(j) Retained until CCFO30.

3.3 Quality factors

3.3.1 *Organoleptic characteristics of virgin olive oils*

	Median of the most perceived defect	Median of the fruity attribute
Extra virgin olive oil	0.0	> 0.0
Virgin olive oil	≤ 2.5[i]	> 0.0
Ordinary virgin olive oil[j]	2.5 < Me ≤ 6.0[k]	

(i) Does not include the uncertainty of the measure calculated by IOC method.
(j) Retained until CCFO30.
(k) or when the median of the defect is less than or equal to 2.5 and the median of the fruity attribute is equal to 0.

3.3.2 *Free fatty acids (g/100 g, expressed as oleic acid)*

Extra virgin olive oil	≤ 0.8
Virgin olive oils	≤ 2.0
Refined olive oil	≤ 0.3
Olive oil composed of refined olive oil and virgin olive oils	≤ 1.0
Refined olive-pomace oil	≤ 0.3
Olive-pomace oil composed of refined olive-pomace oil and virgin olive oils	≤ 1.0

3.3.3 *Peroxide value (milliequivalents of active oxygen/kg oil)*

Extra virgin olive oil	≤ 20
Virgin olive oils	≤ 20
Refined olive oil	≤ 5
Olive oil composed of refined olive oil and virgin olive oils	≤ 15
Refined olive-pomace oil	≤ 5
Olive-pomace oil composed of refined olive-pomace oil and virgin olive oils	≤ 15

3.3.4 *Absorbency in the ultraviolet region (K270) at 270/or 268 nm[(l)] (expressed as K_{270}/or K_{268})*

Extra virgin olive oil	≤ 0.22
Virgin olive oil	≤ 0.25
Ordinary virgin olive oil[j]	≤ 0.30*
Refined olive oil	≤ 1.25
Olive oil composed of refined olive oil and virgin olive oils	≤ 1.15
Refined olive-pomace oil	≤ 2.00
Olive-pomace oil composed of refined olive-pomace oil and virgin olive oils	≤ 1.70

(l) 270 nm when using cyclohexane; 268 nm when using iso-octane.
(j) Retained until CCFO30.
* After passage of the sample through activated alumina, absorbency at 270 nm shall be equal to or less than 0.11.

3.3.5 *$\Delta K^{(g, h)}$*

Refined olive oil	≤ 0.16
Olive oil composed of refined olive oil and virgin olive oils	≤ 0.15
Refined olive-pomace oil	≤ 0.20
Olive-pomace oil composed of refined olive-pomace oil and virgin olive oils	≤ 0.18

(g) Defined as

$$\Delta K_{270} = K_{270} - \frac{K_{266} + K_{274}}{2}$$

$$\Delta K_{268} = K_{268} - \frac{K_{264} + K_{272}}{2}$$

(h) 270 nm when using cyclohexane; 268 nm when using iso-octane.

3.3.6 *Fatty acid ethyl esters (mg/kg)*

Extra virgin olive oil	≤ 35

4. FOOD ADDITIVES

Antioxidants used in accordance with Table 1 and Table 2 of the *General standard for food additives* (CXS 192-1995)[1] in food category 02.1.2 (Vegetable oils and fats) are acceptable for use in foods conforming to this standard.

No additives are permitted in virgin olive oils covered by this standard.

5. CONTAMINANTS

5.1 The products covered by this standard shall comply with the maximum levels of the *General standard for contaminants and toxins in food and feed* (CXS 193-1995).[2]

5.2 Pesticide residues

The products covered by the provisions of this standard shall comply with those maximum residue limits

established by the Codex Alimentarius Commission for these commodities.

5.3 Halogenated solvents

Maximum content of each halogenated solvent	0.1 mg/kg
Maximum content of the sum of all halogenated solvents	0.2 mg/kg

6. HYGIENE

It is recommended that the products covered by the provisions of this standard be prepared and handled in accordance with the appropriate sections of the *General principles of food hygiene* (CXC 1-1969),[3] and other relevant Codex texts such as codes of hygienic practice and codes of practice.

The products should comply with any microbiological criteria established in accordance with the *Principles and guidelines for the establishment and application of microbiological criteria related to foods* (CXG 21-1997).[4]

7. LABELLING

The products shall be labelled in accordance with the *General standard for the labelling of pre-packaged foods* (CXS 1-1985).[5]

7.1 Name of the food

The name of the product shall be consistent with the descriptions as shown in Section 3 of this standard. In no case shall the designation ‘olive oil’ be used to refer to olive-pomace oils.

7.2 Labelling of non-retail containers

The labelling of non-retail containers should be in accordance with the *General standard for the labelling of non-retail containers of foods* (CXS 346-2021).[6]

8. METHODS OF ANALYSIS AND SAMPLING

For checking the compliance with this standard, the methods of analysis and sampling contained in the *Recommended methods of analysis and sampling* (CXS 234-1999)[7] relevant to the provisions in this standard shall be used.

APPENDIX I

OTHER QUALITY AND COMPOSITION FACTORS

These quality and composition factors are supplementary information to the essential composition and quality factors of the standard. A product, which meets the essential quality and composition factors but does not meet these supplementary factors, may still conform to the standard.

1. QUALITY CHARACTERISTICS

1.1 Organoleptic characteristics

Extra virgin and virgin olive oils: See Section 3.3.1			
Type of oil	Perceptions		
	Odour	Taste	Colour
Refined olive oil	Acceptable		light yellow
Olive oil composed of refined olive oil and virgin olive oils	Good		light yellow to green
Refined olive-pomace oil	Acceptable		light yellow to brownish yellow
Olive-pomace oil composed of refined olive-pomace oil and virgin olive oils	Good		light yellow to green

1.2 Moisture and volatile matter (g/100 g)

Extra virgin olive oil Virgin olive oils	**≤** 0.2
Refined olive oil	**≤** 0.1
Olive oil composed of refined olive oil and virgin olive oils	**≤** 0.1
Refined olive-pomace oil	**≤** 0.1
Olive-pomace oil composed of refined olive-pomace oil and virgin olive oils	**≤** 0.1

1.3 Insoluble impurities in light petroleum (g/100 g)

Extra virgin olive oil Virgin olive oils	**≤** 0.1
Refined olive oil Olive oil composed of refined olive oil and virgin olive oils Refined olive-pomace oil Olive-pomace oil composed of refined olive-pomace oil and virgin olive oils	≤ 0.05

1.4 Absorbance in the ultraviolet region at 232 nm (expressed as K_{232})

Extra virgin olive oil	⩽ 2.50[i]
Virgin olive oils	⩽ 2.60[ii]

[i] The country of retail sale may require compliance with these limits when the oil is made available to the end consumer.
[ii] See note i.

1.5 Trace metals (mg/kg)

All olive oils and olive-pomace oils	
Iron (Fe)	≤ 3.0
Copper (Cu)	≤ 0.1

2. CHEMICAL AND PHYSICAL CHARACTERISTICS

2.1 Relative density (d_r^{20}) (20 ºC/water at 20 ºC)

Extra virgin olive oil Virgin olive oils Refined olive oil Olive oil composed of refined olive oil and virgin olive oils Refined olive-pomace oil Olive-pomace oil composed of refined olive-pomace oil and virgin olive oils	0.910–0.916

2.2 Refractive index (n_D^{20})

Extra virgin olive oil Virgin olive oils Refined olive oil Olive oil composed of refined olive oil and virgin olive oils	1.4677–1.4705
Refined olive-pomace oil Olive-pomace oil composed of refined olive-pomace oil and virgin olive oils	1.4680–1.4707

2.3 Saponification value (mg KOH/g)

Extra virgin olive oil Virgin olive oils Refined olive oil Olive oil composed of refined olive oil and virgin olive oils	184–196
Refined olive-pomace oil Olive-pomace oil composed of refined olive-pomace oil and virgin olive oils	182–193

2.4 Iodine value (Wijs method)

Extra virgin olive oil Virgin olive oils Refined olive oil Olive oil composed of refined olive oil and virgin olive oils	75–94
Refined olive-pomace oil Olive-pomace oil composed of refined olive-pomace oil and virgin olive oils	75–92

2.5 Unsaponifiable matter (g/kg)

Extra virgin olive oil Virgin olive oils Refined olive oil Olive oil composed of refined olive oil and virgin olive oils	≤ 15
Refined olive-pomace oil Olive-pomace oil composed of refined olive-pomace oil and virgin olive oils	≤ 30

3. METHODS OF ANALYSIS AND SAMPLING

For checking the compliance with this standard, the methods of analysis and sampling contained in the *Recommended methods of analysis and sampling* (CXS 234-1999)[7] relevant to the provisions in this standard shall be used.

NOTES

[1] FAO and WHO. 1995. *General standard for food additives*. Codex Alimentarius Standard, No. CXS 192-1995. Codex Alimentarius Commission. Rome.

[2] FAO and WHO. 1995. *General standard for contaminants and toxins in food and feed*. Codex Alimentarius Standard, No. CXS 193-1995. Codex Alimentarius Commission. Rome.

[3] FAO and WHO. 1969. *General principles of food hygiene*. Codex Alimentarius Code of Practice, No. CXC 1-1969. Codex Alimentarius Commission. Rome.

[4] FAO and WHO. 1997. *Principles and guidelines for the establishment and application of microbiological criteria related to foods*. Codex Alimentarius Guideline, No. CXG 21-1997. Codex Alimentarius Commission. Rome.

[5] FAO and WHO. 1985. *General standard for the labelling of pre-packaged foods*. Codex Alimentarius Standard, No. CXS 1-1985. Codex Alimentarius Commission. Rome.

[6] FAO and WHO. 2021. *General standard for the labelling of non-retail containers of foods.* Codex Alimentarius Standard, No. CXS 346-2021. Codex Alimentarius Commission. Rome.

[7] FAO and WHO. 1999. *Recommended methods of analysis and sampling.* Codex Alimentarius Standard, No. CXS 234-1999. Codex Alimentarius Commission. Rome.