CODEX ALIMENTARIUS
INTERNATIONAL FOOD STANDARDS

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World Health Organization

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STANDARD FOR OLIVE OILS AND OLIVE POMACE OILS

CXS 33-1981

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

Formerly CAC/RS 33-1970.

1. SCOPE

This Standard 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*s are the oils obtained from the fruit of the olive tree solely by mechanical or other physical means under conditions, particularly thermal conditions, that do not lead to alterations in the oil, and which have 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

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 characteristics correspond to those laid down for this category.

Virgin olive oil: virgin olive oil with a free acidity, expressed as oleic acid, of not more than 2.0 grams per 100 grams and whose other characteristics correspond to those laid down for this category.

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[1].

Refined olive oil: olive oil obtained from virgin olive oils by refining methods which 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 characteristics correspond to those laid down for this category[1].

Olive oil: oil consisting of a blend of refined olive oil and virgin olive oils suitable for human consumption. It has a free acidity, expressed as oleic acid, of not more than 1 gram per 100 grams and its other characteristics correspond to those laid down for this category[2].

Refined *olive-pomace oil*: oil obtained from crude olive-pomace oil by refining methods which 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 characteristics correspond to those laid down for this category[1].

Olive*-pomace *oil: oil consisting of a blend of refined olive-pomace oil and virgin olive oils. It has a free acidity, expressed as oleic acid, of not more than 1 gram per 100 grams and its other characteristics correspond to those laid down for this category[2].

3.1 Organoleptic characteristics (odour and taste) of virgin olive oils

	Median of the defect	Median of the fruity attribute
Extra virgin olive oil	Me = 0	Me > 0
Virgin olive oil	0 < Me ≤ 2.5	Me > 0
Ordinary virgin olive oil	2.5 < Me ≤ 6.0 *	

* 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.

[1] This product may only be sold direct to the consumer if permitted in the country of retail sale.
[2] The country of retail sale may require a more specific designation.

Fatty acid composition as determined by gas chromatography (% total fatty acids)

	Virgin olive oils	Olive oil Refined olive oil	Olive-pomace oil Refined olive-pomace oil
Fatty acid			
C14:0	0.0 - 0.05	0.0 - 0.05	0.0 - 0.05
C16:0	7.5 – 20.0	7.5 - 20.0	7.5 - 20.0
C16:1	0.3 - 3.5	0.3 - 3.5	0.3 - 3.5
C17:0	0.0 - 0.3	0.0 - 0.3	0.0 - 0.3
C17:1	0.0 - 0.3	0.0 - 0.3	0.0 - 0.3
C18:0	0.5 - 5.0	0.5 - 5.0	0.5 - 5.0
C18:1	55.0 - 83.0	55.0 - 83.0	55.0 - 83.0
C18:2	3.5 – 21.0	3.5 - 21.0	3.5 - 21.0
C18:3[3]			
C20:0	0.0 - 0.6	0.0 - 0.6	0.0 - 0.6
C20:1	0.0 - 0.4	0.0 - 0.4	0.0 - 0.4
C22:0	0.0 - 0.2	0.0 - 0.2	0.0 - 0.3
C24:0	0.0 - 0.2	0.0 - 0.2	0.0 - 0.2
Trans fatty acids			
C18:1 T	0.0 - 0.05	0.0 - 0.20	0.0 - 0.40
C18:2 T + C18:3 T	0.0 - 0.05	0.0 - 0.30	0.0 - 0.35

Sterol and triterpene dialcohol composition

Desmethylsterol composition (% total sterols)

Cholesterol	≤ 0.5
Brassicasterol	≤ 0.2 for olive-pomace oils ≤ 0.1 for other grades
Campesterol	≤ 4.0*
Stigmasterol	< campesterol
Delta-7-stigmastenol	≤ 0.5
Beta-sitosterol + delta-5-avenasterol + delta-5-23-stigmastadienol + clerosterol + sitostanol + delta-5-24-stigmastadienol	≥ 93.0

* When an authentic oil naturally has a campesterol level >4.0% and ≤ 4.5%, it is considered virgin or extra virgin olive oil if the stigmasterol level is ≤ 1.4%, the delta-7-stigmastenol level is ≤ 0.3% and stigmastadienes is ≤0.05 mg/kg. The other parameters shall meet the limits set out in the standard.

Minimum value for total sterols

Virgin olive oils	)	
Refined olive oil	)	1,000 mg/kg
Olive oil	)	
Refined olive-pomace oil		1,800 mg/kg
Olive-pomace oil		1,600 mg/kg

[3] Pending the results of IOOC survey and further consideration by the Committee on Fats and Oils, national limits may remain in place.

Maximum erythrodiol and uvaol content (% total sterols)

Virgin olive oils	)	
Refined olive oil	)	≤ 4.5
Olive oil	)	

Wax content

	Level
Virgin olive oils	≤ 250 mg/kg
Refined olive oil	≤ 350 mg/kg
Olive oil	≤ 350 mg/kg
Refined olive-pomace oil	> 350 mg/kg
Olive-pomace oil	> 350 mg/kg

Maximum difference between the actual and theoretical ECN 42 triglyceride content

Virgin olive oils	0.2
Refined olive oil	0.3
Olive oil	0.3
Olive-pomace oils	0.5

Maximum stigmastadiene content

Virgin olive oils	0.15 mg/kg

Peroxide value	
Virgin olive oils	≤20 milliequivalents of active oxygen/kg oil
Refined olive oil	≤5 milliequivalents of active oxygen/kg oil
Olive oil	≤15 milliequivalents of active oxygen/kg oil
Refined olive-pomace oil	≤ 5 milliequivalents of active oxygen/kg oil
Olive-pomace oil	≤ 15 milliequivalents of active oxygen/kg oil

Absorbency in ultra-violet K270

	Absorbency in ultra-violet at 270 nm	*Delta K*
Extra virgin olive oil	≤ 0.22	≤ 0.01
Virgin olive oil	≤ 0.25	≤ 0.01
Ordinary virgin olive oil	≤ 0.30 (*)	≤ 0.01
Refined olive oil	≤ 1.10	≤ 0.16
Olive oil	≤ 0.90	≤ 0.15
Refined olive-pomace oil	≤ 2.00	≤ 0.20
Olive-pomace oil	≤ 1.70	≤ 0.18

* After passage of the sample through activated alumina, absorbency at 270 nm shall be equal to or less than 0.11.

4. FOOD ADDITIVES

Antioxidants used in accordance with Tables 1 and 2 of the *General Standard for Food Additives* (CXS 192-1995) 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).

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), 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).

7. LABELLING

The products shall be labelled in accordance with the *General Standard for the Labelling of Prepackaged Foods* (CXS–1985).

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

Information on the above labelling requirements shall be given either on the container or in accompanying documents, except that the name of the food, lot identification and the name and address of the manufacturer or packer shall appear on the container.

However, lot identification and the name and address of the manufacturer or packer may be replaced by an identification mark, provided that such a mark is clearly identifiable with the accompanying documents.

8. METHODS OF ANALYSIS AND SAMPLING

Determination of the organoleptic characteristics

According to COI/T.20/Doc. no. 15.

Determination of free acidity

According to ISO 660 1996, amended 2003 or AOCS Cd 3d-63(03).

Determination of the fatty acid composition

According to COI/T.20/Doc. no. 24 and ISO 5508:1990 and AOCS Ch 2-91(02) or AOCS Ce 1f-96 (02). For Sample preparation ISO 5509:2000 or AOCS Cc 2-66(97)

Determination of *trans* fatty acids content

According to COI/T.20/Doc no. 17 or ISO 15304:2002 or AOCS Ce 1f-96 (02).

Determination of wax content

According to COI/T.20/Doc. no. 18 or AOCS Ch 8-02 (02).

Calculation of the difference between the actual and theoretical ECN 42 triglyceride content

According to COI/T.20/Doc. no. 20 or AOCS Ce 5b-89 (97).

Determination of sterol composition and content

According to COI/T.20/Doc. no. 10 or ISO 12228:1999 or AOCS Ch 6-91 (97).

Determination of erythrodiol content

According to COI/T.20/doc. No 30-2011.

Determination of stigmastadienes

According to COl/T.20/Doc. no. 11 or ISO 15788-1:1999 or AOCS Cd 26-96 (03) or ISO 15788-2:2003.

Determination of the peroxide value

According to ISO 3960:2001 or AOCS Cd 8b-90 (03).

Determination of the absorbency in ultra-violet

According to COI/T.20/Doc. no. 19 or ISO 3656:2002 or AOCS Ch 5-91 (01).

Determination of alpha-tocopherol

According to ISO 9936:1997.

Detection of traces of halogenated solvents

According to COI/T.20/Doc. no. 8.

Sampling

According to ISO 661:1989 and ISO 5555:2001.

APPENDIX

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

	Maximum level
Moisture and volatile matter:	
Virgin olive oils	0.2 %
Refined olive oil	0.1 %
Olive oil	0.1 %
Refined olive-pomace oil	0.1 %
Olive-pomace oil	0.1 %
Insoluble impurities:	
Virgin olive oils	0.1 %
Refined olive oil	0.05 %
Olive oil	0.05 %
Refined olive-pomace oil	0.05 %
Olive-pomace oil	0.05 %
Trace metals:	
Iron (Fe)	3 mg/kg
Copper (Cu)	0.1 mg/kg

Organoleptic characteristics:

Virgin olive oils:

See Section 3 of Standard.

Others:

	Odour	Taste	Colour
Refined olive oil	acceptable	acceptable	light yellow
Olive oil	good	good	light, yellow to green
Refined olive-pomace oil	acceptable	acceptable	light, yellow to brownish yellow
Olive-pomace oil	acceptable	acceptable	light, yellow to green

Appearance at 20°C for 24 hours:

Refined olive oil, olive oil, refined olive-pomace oil, olive-pomace oil:	Limpid

2. COMPOSITION CHARACTERISTICS

Saturated fatty acids at the 2-position in the triglyceride (sum of palmitic & stearic acids):

	Maximum level
Virgin olive oils	1.5 %
Refined olive oil	1.8 %
Olive oil	1.8 %
Refined olive-pomace oil	2.2 %
Olive-pomace oil	2.2 %

3. CHEMICAL AND PHYSICAL CHARACTERISTICS

Relative density (20°C/water at 20°C): 0.910-0.916

Refractive index (n_D^{20}):

Virgin olive oils, Refined olive oil, Olive oil	1.4677-1.4705
Olive-pomace oils	1.4680-1.4707

Saponification value (mg KOH/g oil):

Virgin olive oils, Refined olive oil, Olive oil	184-196
Olive-pomace oils	182-193

Iodine value (Wijs):

Virgin olive oils, Refined olive oil, Olive oil	75-94
Olive-pomace oils	75-92

Unsaponifiable matter:

	Maximum level
Virgin olive oils, Refined olive oil, Olive oil	15 g/kg
Olive-pomace oils	30 g/kg

Absorbency in ultra-violet K232

	Absorbency in ultra-violet at 232 nm
Extra virgin olive oil	≤ 2.50[4]
Virgin olive oil	≤ 2.604

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

4. METHODS OF ANALYSIS AND SAMPLING

Determination of moisture and volatile matter

According to ISO 662:1998.

Determination of the insoluble impurities in light petroleum

According to ISO 663:2000.

Determination of trace metals (iron, copper)

According to ISO 8294:1994 or AOAC 990.05.

Determination of saponification value

According to ISO 3657:2002 or AOCS Cd 3-25 (03).

Determination of unsaponifiable matter

According to ISO 3596:2000 or ISO 18609:2000 or AOCS Ca 6b-53 (01).

Determination of the fatty acids in the 2-position of the triglycerides

According to ISO 6800:1997 or AOCS Ch 3-91 (97).

Determination of relative density

According to IUPAC 2.101, with the appropriate conversion factor.

Determination of refractive index

According to ISO 6320:2000 or AOCS Cc 7-25 (02).

Determination of iodine value

According to ISO 3961:1996 or AOAC 993.20 or AOCS Cd 1d-92 (97) or NMKL 39(2003)

Determination of the organoleptic characteristics

According to COl/T.20/Doc. no. 15.

Determination of the absorbency in ultra-violet

According to COI/T.20/Doc. no. 19 or ISO 3656:2002 or AOCS Ch 5-91 (01).

Sampling

According to ISO 661:1989 and ISO 5555:2001.