INTERNATIONAL STANDARD

ISO 3528

Third edition
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Essential oil of mandarin, Italian type (*Citrus reticulata* Blanco)

Huile essentielle de mandarine, type Italie (Citrus reticulata Blanco)

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 3528 was prepared by Technical Committee ISO/TC 54, *Essential oils*.

This third edition cancels and replaces the second edition (ISO 3528:1997), which has been technically revised. It also incorporates the Technical Corrigendum ISO 3528:1997/Cor.1:1998.

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Essential oil of mandarin, Italian type (*Citrus reticulata* Blanco)

1 Scope

This International Standard specifies certain characteristics of the oil of mandarin, Italian type (*Citrus reticulata* Blanco) in order to facilitate assessment of its quality.

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.

ISO/TR 210, *Essential oils — General rules for packaging, conditioning and storage*

ISO/TR 211, *Essential oils — General rules for labelling and marking of containers*

ISO 212, *Essential oils — Sampling*

ISO 279, *Essential oils — Determination of relative density at 20 °C — Reference method*

ISO 280, *Essential oils — Determination of refractive index*

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ISO 592, *Essential oils — Determination of optical rotation*

ISO 875, *Essential oils — Evaluation of miscibility in ethanol*

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ISO 1242, *Essential oils — Determination of acid value*

ISO 11024 (all parts), *Essential oils — General guidance on chromatographic profiles*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply

3.1
oil of mandarin, Italian type
essential oil obtained by expression, without the aid of heat and with or without previous separation of the pulp and the peel, from the fresh fruit of *Citrus reticulata* Blanco of the *Rutaceae* family

NOTE For information on CAS number, see ISO/TR 21092[2].

4 Requirements

4.1 Appearance

Clear mobile liquid.

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4.2 Colour

The colour depends on the season of harvest.

Green	Yellow	Red
Light green to dark green, with a blue fluorescence	Light yellow to dark orange, with a blue fluorescence	Reddish to dark red, with a blue fluorescence

4.3 Odour

The odour from the fresh pericarp of the fruit is characteristic.

4.4 Relative density at 20 °C, d_{20}^{20}

	Green	Yellow	Red
Minimum	0,847	0,846	0,844
Maximum	0,855	0,854	0,853

4.5 Refractive index at 20 °C

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	Green	Yellow	Red
Minimum	1,473 2	1,472 6	1,472 2
Maximum	1,475 8	1,475 3	1,474 6

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4.6 Optical rotation at 20 °C

	Green	Yellow	Red
Minimum	+69°	+69°	+70°
Maximum	+75°	+76°	+79°

4.7 Residue on evaporation

	Green	Yellow	Red
Minimum	1,90 % mass fraction	1,80 % mass fraction	1,40 % mass fraction
Maximum	3,90 % mass fraction	3,90 % mass fraction	3,30 % mass fraction

4.8 Miscibility with 90 % (volume fraction) ethanol at 20 °C

It shall not be necessary to use more than 10 volumes of 90 % (volume fraction) ethanol at 20 °C to obtain an opalescent solution with 1 volume of essential oil.

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4.9 Acid value

	Green	Yellow	Red
Maximum	2,0	2,0	2,0

4.10 Chromatographic profile

Carry out the analysis of the essential oil by gas chromatography. Identify in the chromatogram obtained, the representative and characteristic components shown in Table 1. The proportions of these components, indicated by the integrator, shall be as shown in Table 1. This constitutes the chromatographic profile of the essential oil.

Table 1 — Chromatographic profile

Component	Green		Yellow		Red	
	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum
	%	%	%	%	%	%
α-Pinene	1,6	2,7	1,6	2,7	1,8	3
β-Pinene	1	2	1	2	1,2	2
Myrcene	1,4	2	1,4	2	1,5	2
n-Octanal	0,08	0,14	0,05	0,14	0,03	0,08
p-Cymene	n.d.[a]	0,4	n.d.[a]	0,5	n.d.[a]	0,8
γ-Terpinene	17	22	16	22	16	22
Limonene	65	74	65	75	65	75
Linalool	0,05	0,2	0,05	0,2	0,03	0,2
n-Decanal	0,04	0,14	0,04	0,14	0,04	0,12
Methyl *N*-methylanthranilate	0,4	0,7	0,3	0,6	0,3	0,6
α-Sinensal	0,2	0,5	0,2	0,5	0,1	0,5

NOTE The chromatographic profile is normative, contrary to typical chromatograms given for information in Annex A.

[a] Not detectable.

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4.11 Flashpoint

Information on the flashpoint is given in Annex B.

5 Sampling

Sampling shall be performed in accordance with ISO 212.

Minimum volume of test sample: 50 ml

NOTE This volume allows each of the tests specified in this International Standard to be carried out at least once.

6 Test methods

6.1 Relative density at 20 °C, d_{20}^{20}

Determine the relative density in accordance with ISO 279.

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6.2 Refractive index at 20 °C

Determine the refractive index in accordance with ISO 280.

6.3 Optical rotation at 20 °C

Determine the optical rotation in accordance with ISO 592.

6.4 Residue on evaporation

Determine the residue on evaporation in accordance with ISO 1242.

Test portion: 5 g

Evaporation time: 6 h

6.5 Miscibility with 90 % (volume fraction) ethanol at 20 °C

Determine the miscibility in accordance with ISO 875.

6.6 Acid value

Determine the acid value in accordance with ISO 1242.

6.7 Chromatographic profile

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Determine the chromatographic profile in accordance with ISO 11024.

7 Packaging, labelling, marking and storage

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These items shall be in accordance with ISO/TR 210 and ISO/TR 211.

NOTE This essential oil is particularly susceptible to oxidization.

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Annex A
(informative)

Typical chromatograms of the analysis by gas chromatography of the essential oil of mandarin, Italian type (*Citrus reticulata* Blanco)

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