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Extenders — Specifications and methods of test —

Part 21: Silica sand (unground natural quartz)

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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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 256, *Pigments, dyestuffs and extenders*.

This second edition cancels and replaces the first edition (ISO 3262-21:2000), which has been technically revised.

The main changes are as follows:

— the first part of the title has been changed to "Extenders";

— the normative references have been updated and the text has been editorially revised.

A list of all parts in the ISO 3262 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Extenders — Specifications and methods of test —

Part 21:
Silica sand (unground natural quartz)

1 Scope

This document specifies requirements and corresponding methods of test for silica sand (unground natural quartz).

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 787-2, *General methods of test for pigments and extenders — Part 2: Determination of matter volatile at 105 °C*

ISO 787-3, *General methods of test for pigments and extenders — Part 3: Determination of matter soluble in water — Hot extraction method*

ISO 787-7, *General methods of test for pigments and extenders — Part 7: Determination of residue on sieve — Water method — Manual procedure*

ISO 787-9, *General methods of test for pigments and extenders — Part 9: Determination of pH value of an aqueous suspension*

ISO 787-14, *General methods of test for pigments and extenders — Part 14: Determination of resistivity of aqueous extract*

ISO 3262-1, *Extenders — Specifications and methods of test — Part 1: Introduction and general test methods*

ISO 3696, *Water for analytical laboratory use — Specification and test methods*

ISO 15528, *Paints, varnishes and raw materials for paints and varnishes — Sampling*

ISO 18451-1, *Pigments, dyestuffs and extenders — Terminology — Part 1: General terms*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 18451-1 and the following apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1
Silica sand
material consisting of unground natural quartz

4 Requirements and test methods

For silica sand complying with this document, the essential requirements are specified in Table 1 and the conditional requirements are listed in Table 2. The test method in Tables 1 and 2 shall be in accordance with the standards listed.

Table 1 — Essential requirements

Characteristic	Unit	Requirement		Test method
		Grade A	Grade B	
Quartz content, min.	% mass fraction	99	80	X-ray diffraction
Silicia content, min.		97	80	X-ray fluorescence or Clause 6
Matter volatile at 105 °C, max.	% mass fraction	0,5		ISO 787-2
Loss on ignition, max.	% mass fraction	0,4	2,5	ISO 3262-1
pH value of aqueous suspension.	–	6,5 to 8,5	7 to 9	ISO 787-9
Matter soluble in water, max.	% mass fraction	0,2	0,6	ISO 787-3

Table 2 — Conditional requirements

Characteristic	Unit	Requirement	Test method
Residue on sieve	% mass fraction	To be agreed between the interested parties	ISO 787-7
Colour	–		ISO 3262-1
Lightness	%		To be agreed between the interested parties
Resistivity of aqueous extract	Ω · m		ISO 787-14

5 Sampling

Take a representative sample of the product to be tested, in accordance with ISO 15528.

6 Determination of silica content

6.1 Principle

A test portion is ignited, weighed and treated with sulphuric acid and hydrofluoric acid. The silicon tetrafluoride thus formed is evaporated off and the silica content is calculated from the resulting loss in mass.

As the silica content is very high, a previous separation from the impurities is not required.

6.2 Reagents

Use only reagents of recognized analytical grade and only water of a least grade 3 purity as specified in ISO 3696.

6.2.1 **Sulfuric acid,** CAS[1)] No. 7664-93-9, diluted 1 + 1.

Add 1 part by volume of concentrated sulfuric acid (6.2.1) approximately 96 % mass fraction, $\rho \approx 1{,}84$ g/ml, slowly to 1 part by volume of water.

1) Chemistry Abstracts Service Registry Number.

6.2.2 Hydrofluoric acid, CAS No. 7664-39-3, concentrated, approximately 40 % mass fraction, $\rho \approx 1{,}13$ g/ml.

6.3 Apparatus

Use ordinary laboratory apparatus and glassware, together with the following:

6.3.1 Platinum dish.

6.3.2 Muffle furnace, capable of being maintained at (1 000 ± 20) °C.

6.3.3 Hotplate.

6.3.4 Desiccator, containing phosphorus pentoxide as desiccant.

6.3.5 Balance, with an accuracy of 0,0001 g.

6.4 Procedure

6.4.1 Number of determinations

Carry out the determination in duplicate.

6.4.2 Test portion

Weigh, to the nearest 1 mg, approximately 2 g (m_0) of the sample (see Clause 5), previously dried at 105 °C in accordance with ISO 787-2, into the tared platinum dish (6.3.1).

6.4.3 Determination

Ignite the test portion to content mass in the muffle furnace (6.3.2) at (1 000 ± 20) °C (this should take approximately 2 h) and allow to cool in the desiccator (6.3.4). Weigh the test portion again (m_1).

Add approximately 1 ml of sulphuric acid (6.2.1). Heat the platinum dish gently until fuming ceases and then continue heating at 900 °C for 15 min in the muffle furnace. Remove from the furnace, allow to cool in the desiccator and weigh (m_2).

Add to the residue in the platinum dish 15 ml of hydrofluoric acid (6.2.2) and 1 ml of sulphuric acid (6.2.1) and evaporate to a syrup, taking care to avoid loss by spitting. Allow to cool and wash the sides down with small quantities of water. Then add a further 10 ml of hydrofluoric acid and evaporate to dryness.

Heat the residue on a hot-plate (6.3.3) until white fumes are no longer evolved, then ignite for 15 min in the muffle furnace at 900 °C. Remove from the furnace, allow to cool in the desiccator and weigh (m_3).

6.5 Expression of results

Calculate the silica content $w(SiO_2)$, expressed as a percentage by mass, using the Formula (1):

$$w(SiO_2) = \frac{(m_2 - m_3)}{m_1} \times 100 \qquad (1)$$

where

m_1 is the mass, in grams, of the ignited residue;