
Admixtures for concrete

Adjuvants pour béton

iTeh STANDARD PREVIEW
(standards.iteh.ai)

ISO 19596:2017

<https://standards.iteh.ai/catalog/standards/sist/116e6c32-92f3-458e-9f64-e66205f06e69/iso-19596-2017>



iTeh STANDARD PREVIEW
(standards.iteh.ai)

ISO 19596:2017

<https://standards.iteh.ai/catalog/standards/sist/116e6c32-92f3-458e-9f64-e66205f06e69/iso-19596-2017>



COPYRIGHT PROTECTED DOCUMENT

© ISO 2017, Published in Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
Ch. de Blandonnet 8 • CP 401
CH-1214 Vernier, Geneva, Switzerland
Tel. +41 22 749 01 11
Fax +41 22 749 09 47
copyright@iso.org
www.iso.org

Contents

	Page
Foreword	iv
1 Scope	1
2 Normative references	1
3 Terms and definitions	2
4 Requirements	4
4.1 General requirements	4
4.2 Requirements for specific types of admixtures	5
4.3 Release of harmful substances	11
4.4 Corrosion behaviour	11
4.4.1 Testing and labelling	11
4.4.2 Test requirement	12
5 Sampling	12
6 Conformity control and evaluation of conformity	12
7 Marking and labelling	12
7.1 General	12
7.2 Designation of admixtures	12
7.3 Additional information	12
Annex A (normative) Approved and declared lists for corrosion behaviour	13
Annex B (normative) Reference concretes	16
Annex C (normative) Methods of mixing and testing time-related changes of concrete containing slump and air retention/high range water reducing/air entraining admixtures according to Table 16	19
Annex D (informative) Guidance on conformity control and evaluation of conformity	21

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).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

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

For an explanation on 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 the following URL: www.iso.org/iso/foreword.html. (standards.iteh.ai)

This document was prepared by Technical Committee ISO/TC 71, *Concrete, reinforced concrete and pre-stressed concrete*, Subcommittee SC 3, *Concrete production and execution of concrete structures*.

ISO 19596:2017
<https://standards.iteh.ai/catalog/standards/sist/116e6c32-92f3-458e-9f64-e66205f06e69/iso-19596-2017>

Admixtures for concrete

1 Scope

This document specifies definitions and requirements for admixtures for use in concrete in accordance with ISO 22965.

This document does not specify provisions governing the practical application of admixtures in the production of concrete, i.e. requirements concerning composition, mixing, placing, curing, etc. of concrete containing admixtures.

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 680, *Cement — Test methods — Chemical analysis*

ISO 758, *Liquid chemical products for industrial use — Determination of density at 20 °C*

ISO 1158, *Plastics — Vinyl chloride homopolymers and copolymers — Determination of chlorine content*

ISO 1920-2, *Testing of concrete — Part 2: Properties of fresh concrete*

ISO 1920-4, *Testing of concrete — Part 4: Strength of hardened concrete*

ISO 4316, *Surface active agents — Determination of pH of aqueous solutions — Potentiometric method*

ISO 12439, *Mixing water for concrete*

ISO 22965-1, *Concrete — Part 1: Methods of specifying and guidance for the specifier*

ISO 22965-2, *Concrete — Part 2: Specification of constituent materials, production of concrete and compliance of concrete*

BS 8443, *Specification for establishing the suitability of special purpose concrete admixtures*

EN 480-1, *Admixtures for concrete, mortar and grout — Test methods — Part 1: Reference concrete and reference mortar for testing*

EN 480-2, *Admixtures for concrete, mortar and grout — Test methods — Part 2: Determination of setting time*

EN 480-4, *Admixtures for concrete, mortar and grout — Test methods — Part 4: Determination of bleeding of concrete*

EN 480-5, *Admixtures for concrete, mortar and grout — Test methods — Part 5: Determination of capillary absorption*

EN 480-6, *Admixtures for concrete, mortar and grout — Test methods — Part 6: Infrared analysis*

EN 480-8, *Admixtures for concrete, mortar and grout — Test methods — Part 8: Determination of the conventional dry material content*

EN 480-10, *Admixtures for concrete, mortar and grout — Test methods — Part 10: Determination of water soluble chloride content*

EN 480-11, *Admixtures for concrete, mortar and grout — Test methods — Part 11: Determination of air void characteristics in hardened concrete*

EN 480-12, *Admixtures for concrete, mortar and grout — Test methods — Part 12: Determination of the alkali content of admixtures*

EN 480-14, *Admixtures for concrete, mortar and grout — Test methods — Part 14: Determination of the effect on corrosion susceptibility of reinforcing steel by potentiostatic electro-chemical test*

3 Terms and definitions

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

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

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

3.1 General definitions

3.1.1

performance

ability of an admixture to be effective in its intended use without detrimental effects

3.1.2

compliance dosage

dosage of an admixture, expressed in % by mass of cement or binder, stated by the manufacturer which will meet the requirements of this document

Note 1 to entry: The compliance dosage is within the recommended range of dosage.

3.1.3

recommended range of dosage

dosages between limits expressed in % by mass of cement or binder which the manufacturer recommends for the product based on experience on site

Note 1 to entry: The use of the recommended dosage does not imply that compliance with this document will be met over the whole range. Trial tests should be carried out with the materials to be used on site to find the dosage necessary to achieve the required result.

3.1.4

maximum recommended dosage

upper limit of the recommended range of dosage

3.1.5

reference concrete and mortar

concrete and mortar as specified in [Annex B](#) for testing admixtures for conformity with this document

3.1.6

multifunction admixture

admixture which affects several properties of fresh and/or hardened concrete by performing more than one of the main functions defined in [3.2.2](#) to [3.2.9](#)

3.1.7

primary function

single function of a multifunction admixture designated by the manufacturer

3.1.8

secondary function

function of a multifunction admixture which is additional to the primary function

3.1.9**binder**

cement or combinations of cement and additions of type II

3.2 Specific definitions**3.2.1****admixtures for concrete**

material added during the mixing process of concrete in a quantity not more than 5 % by mass of the cement content of the concrete, to modify the properties of the mix in the fresh and/or hardened state

3.2.2**water reducing/plasticizing admixture**

admixture which without affecting the consistence, permits a reduction in the water content of a given concrete mix, or which, without affecting the water content increases the workability/consistency or produces both effects simultaneously

3.2.3**high range water reducing/super plasticizing admixture**

admixture which, without affecting the consistence, permits a high reduction in the water content of a given concrete mix, or which, without affecting the water content increases the workability/consistency considerably, or produces both effects simultaneously

3.2.4**water retaining admixture**

admixture which reduces the loss of water by a reduction of bleeding

3.2.5**air entraining admixture**

admixture which allows a controlled quantity of small, uniformly distributed air bubbles to be incorporated during mixing which remain after hardening

3.2.6**set accelerating admixture**

admixture which decreases the time to commencement of transition of the mix from the plastic to the rigid state

3.2.7**hardening accelerating admixture**

admixture which increases the rate of development of early strength in the concrete, with or without affecting the setting time

3.2.8**set retarding admixture**

admixture which extends the time to commencement of transition of the mix from the plastic to the rigid state

3.2.9**water resisting admixture****waterproof admixture**

admixture which reduces the capillary absorption of hardened concrete

3.2.10**set retarding/water reducing/plasticizing admixture**

admixture which produces the combined effects of a water reducing/plasticizing admixture (primary function) and a set retarding admixture (secondary function)

3.2.11

set retarding/high range water reducing/superplasticizing admixture

admixture which produces the combined effects of a high range water reducing/superplasticizing admixture (primary function) and a set retarding admixture (secondary function)

3.2.12

set accelerating/water reducing/plasticizing admixture

admixture which produces the combined effects of a water reducing/plasticizing admixture (primary function) and a set accelerating admixture (secondary function)

3.2.13

slump and air retentions/high range water reducing/air entraining admixture

admixture that enable reduction in the water content, while providing slump and air retentivity, without affecting the consistence

3.2.14

viscosity modifying admixture

admixture incorporated in concrete to limit segregation by improving cohesion

3.2.15

antiwashout admixture

admixture that significantly reduces the washout of cement during underwater placing and hardening of concrete

3.2.16

antifreezing admixture

admixture which allows concrete to set and develop compressive strength at temperatures below freezing

iTeh STANDARD PREVIEW
(standards.iteh.ai)

4 Requirements

ISO 19596:2017

<https://standards.iteh.ai/catalog/standards/sist/116e6c32-92f3-458e-9f64-e66205f06e69/iso-19596-2017>

4.1 General requirements

The requirements in this document assume that admixtures are uniformly dispersed in concrete; special attention shall be given to the dispersion of powder admixtures with retarding effects.

All admixtures defined in [3.2.2](#) to [3.2.16](#) shall conform the general requirements in [Table 1](#), [Clause 5](#) and [Clause 6](#).

Table 1 — General requirements

	Property	Test method	Requirements
1	Homogeneity ^a	Visual	Homogeneous when used. Segregation shall not exceed the limit declared by the manufacturer.
2	Colour ^a	Visual	Uniform and similar to the description declared by the manufacturer. Distinctive (distinguished from water).
3	Effective component ^a	EN 480-6 ^b or equivalent	Infrared spectra to show no significant change with respect to the effective component when compared to the reference spectrum provided by the manufacturer.
4	Absolute density ^a (for liquid admixtures only)	ISO 758 ^c	$D \pm 0,03$ if $D > 1,10$ kg/l, $D \pm 0,02$ if $D \leq 1,10$ kg/l, or within the manufacturer's declared range, where D is manufacturer's declared value of density.
5	Conventional dry material content ^a	EN 480-8 ^d or equivalent	$0,95T \leq X \leq 1,05T$ if $T \geq 20$ %, $0,90T \leq X \leq 1,10T$ if $T < 20$ %, T is manufacturer's declared value % by mass; X is test result % by mass.
6	pH value ^a (for liquid admixtures only)	ISO 4316	Manufacturer's declared value ± 1 or within manufacturer's declared range.
7	Total chlorine ^{a, f}	ISO 1158 ^g	Either $\leq 0,10$ % by mass ^e or not above the manufacturer's declared value.
8	Water soluble chloride ^a	EN 480-10 or equivalent	Either $\leq 0,10$ % by mass ^e or not above the manufacturer's declared value.
9	Alkali content (Na ₂ O equivalent) ^a	EN 480-12 or equivalent	Not above the manufacturer's declared maximum value in % by mass.
10	Corrosion behaviour	EN 480-14 or equivalent	See 4.4.2.
11	Silicon dioxide SiO ₂ content ^{a, h, i}	ISO 680	Not above the manufacturer's declared maximum value in % by mass.

^a The manufacturer's declared values and characteristics shall be provided in writing to the user upon request.

^b If the method in EN 480-6 is not suitable, the manufacturer shall specify a documented alternative test method.

^c ISO 758 is the reference method. Another method may be used provided that it can show essentially the same results as the method in ISO 758.

^d If the method in EN 480-8 is not suitable, the manufacturer shall specify a documented alternative test method.

^e Where the chloride content is $\leq 0,10$ % by mass the admixture may be described as "chloride free".

^f If there is no significant difference between the total chlorine and the water soluble chloride content, only the water soluble chloride content should be determined in subsequent tests on the admixture involved.

^g The procedure in ISO 1158 shall be modified as follows:

- Increase the sample size in method B to 0,1 g of dry admixture;
- Use silver nitrate and ammonium thiocyanate solutions at 0,01 N.

^h The silicon dioxide content is only required when silica (see A.1) is a constituent intended to exceed 5 % by mass of the admixture.

ⁱ This requirement does not apply to natural sand.

4.2 Requirements for specific types of admixtures

The admixtures defined in 3.2.2 to 3.2.16 shall comply with the requirements listed in Table 2.

Table 2 — Performance requirements for specific types of admixture

Definition	Name of admixture	Performance requirements
3.2.2	Water reducing/plasticizing admixtures	Table 3
3.2.3	High range water reducing/super plasticizing admixtures	Tables 4 and 5
3.2.4	Water retaining admixtures	Table 6
3.2.5	Air entraining admixture	Table 7
3.2.6	Set accelerating admixtures	Table 8
3.2.7	Hardening accelerating admixtures	Table 9
3.2.8	Set retarding admixtures	Table 10
3.2.9	Water resisting admixtures	Table 11
3.2.10	Set retarding/water reducing/plasticizing admixtures	Table 12
3.2.11	Set retarding/high range water reducing/super plasticizing admixtures	Tables 13 and 14
3.2.12	Set accelerating/water reducing/plasticizing admixtures	Table 15
3.2.13	Slump and air retention/high range water reducing/air entraining admixtures	Table 16
3.2.14	Viscosity modifying admixture	Table 17
3.2.15	Antiwashout admixture	Table 18
3.2.16	Antifreezing admixture	Table 19

Where the manufacturer's declared values are required, these shall be provided in writing on request.

Reference concretes shall comply with [Annex B](#). When testing at equal consistence or equal w/c ratio the requirements and tolerance limits apply.

ISO 19596:2017
Table 3 — Specific requirements for water reducing/plasticizing admixtures (at equal consistence)

No.	Property	Reference concrete	Test method	Requirements
1	Water reduction	Annex B reference concrete I	ISO 1920-2 slump or flow	In test mix $\geq 5\%$ compared with control mix
2	Compressive strength	Annex B reference concrete I	ISO 1920-4	At 7 and 28 days: Test mix $\geq 110\%$ of control mix
3	Air content in fresh concrete	Annex B reference concrete I	ISO 1920-2	Test mix $\leq 2\%$ by volume above control mix unless stated otherwise by the manufacturer
4	Setting time	Annex B mortar	EN 480-2 or equivalent	Initial: test mix \leq control mix + 90 min Final: test mix \leq control mix + 360 min

Table 4 — Specific requirements for high range water reducing/super plasticizing admixtures (at equal consistence)

No.	Property	Reference concrete	Test method	Requirements
1	Water reduction	Annex B reference concrete I	ISO 1920-2 slump or flow	In test mix ≥ 12 % compared with control mix
2	Compressive strength	Annex B reference concrete I	ISO 1920-4	At 1 day: Test mix ≥ 140 % of control mix At 28 days: Test mix ≥ 115 % of control mix
3	Air content in fresh concrete	Annex B reference concrete I	ISO 1920-2	Test mix ≤ 2 % by volume above control mix unless otherwise stated by the manufacturer

Table 5 — Specific requirements for high range water reducing/super plasticizing admixtures (at equal w/c ratio)^a

No.	Property	Reference concrete	Test method	Requirements
1	Increase in consistence	Annex B reference concrete II	ISO 1920-2 slump or flow	Increase in slump ≥ 120 mm from initial (30 ± 10) mm Increase in flow ≥ 160 mm from initial (350 ± 20) mm
2	Retention of consistence	Annex B reference concrete II	ISO 1920-2 slump or flow	30 min after the addition the consistence of the test mix shall not fall below the value of the initial consistence of the control mix
3	Compressive strength	Annex B reference concrete II	ISO 1920-4	At 28 days: test mix ≥ 90 % of control mix
4	Air content in fresh concrete	Annex B reference concrete II	ISO 1920-2	Test mix ≤ 2 % by volume above control mix unless otherwise stated by the manufacturer

^a The compliance dosage for admixtures used to meet the requirements of [Table 5](#) does not have to be the same as that used to meet the requirements of [Table 4](#).

Table 6 — Specific requirements for water retaining admixtures (at equal consistence)

No.	Property	Reference concrete	Test method	Requirements
1	Bleeding	Annex B reference concrete III	EN 480-4 or equivalent	Test mix ≤ 50 % of control mix
2	Compressive strength	Annex B reference concrete III	ISO 1920-4	At 28 days: Test mix ≥ 80 % of control mix
3	Air content in fresh concrete	Annex B reference concrete III	ISO 1920-2	Test mix ≤ 2 % by volume above control mix unless stated otherwise by the manufacturer