



SLOVENSKI STANDARD

SIST EN 1008:2003

01-januar-2003

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Mixing water for concrete - Specification for sampling, testing and assessing the suitability of water, including water recovered from processes in the concrete industry, as mixing water for concrete

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Zugabewasser von Beton - Festlegungen für die Probenahme, Prüfung und Beurteilung der Eignung von Wasser, einschließlich bei der Betonherstellung anfallendem Wasser, als Zugabewasser für Beton

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Eau de gâchage pour bétons - Spécifications d'échantillonnage, d'essais et d'évaluation de l'aptitude à l'emploi, y compris les eaux des processus de l'industrie du béton, telle que l'eau de gâchage pour béton

Ta slovenski standard je istoveten z: EN 1008:2002

ICS:

91.100.30 Beton in betonski izdelki Concrete and concrete products

SIST EN 1008:2003

en

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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 1008

June 2002

ICS 91.100.30

English version

**Mixing water for concrete - Specification for sampling, testing
and assessing the suitability of water, including water recovered
from processes in the concrete industry, as mixing water for
concrete**

Eau de gâchage pour bétons - Spécifications
d'échantillonnage, d'essais et d'évaluation de l'aptitude à
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anfallendem Wasser, als Zugabewasser für Beton

This European Standard was approved by CEN on 4 March 2002.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Management Centre has the same status as the official versions.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

Management Centre: rue de Stassart, 36 B-1050 Brussels

Contents

	page
Foreword.....	3
Introduction	4
1 Scope	4
2 Normative references	4
3 Classification of types of water	5
3.1 Potable water	5
3.2 Water recovered from processes in the concrete industry	5
3.3 Water from underground sources	5
3.4 Natural surface water and industrial waste water	5
3.5 Sea water or brackish water	5
3.6 Sewage water	5
4 Requirements	5
4.1 General.....	5
4.2 Preliminary assessment.....	5
4.3 Chemical properties	6
4.4 Setting time and strength.....	7
5 Sampling	7
6 Testing	8
6.1 Test methods.....	8
6.2 Frequency for testing	9
6.3 Conformity evaluation	9
7 Report.....	9
Annex A (normative) Requirements for the use of water recovered from processes in the concrete industry	10
A.1 Scope	10
A.2 Terms and definitions.....	10
A.2.1 Water recovered from processes in the concrete industry	10
A.2.2 Combined water	10
A.2.3 Surplus concrete and mortar	10
A.2.4 Recovered aggregates	11
A.3 Limitations on the use of water recovered from processes in the concrete industry.....	11
A.4 Requirements	11
A.4.1 General.....	11
A.4.2 Storage.....	11
A.4.3 Distribution of solid material in the water	11
A.4.4 The mass of solid material present in the recovered water	11
A.5 Inspection	12
A.5.1 Density	12
A.5.2 Suitability	13
Annex B (informative) Testing scheme for mixing water for concrete	14
Annex C (informative) Recommended test methods	17
Bibliography	18

Foreword

This document EN 1008:2002 has been prepared by Technical Committee CEN/TC 104 "Concrete and related products", the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by December 2002, and conflicting national standards shall be withdrawn at the latest by December 2002.

This standard has been prepared by CEN/TC 104-WG 5 „Mixing water for concrete“.

Annex A is normative. The annexes B and C are informative.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

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EN 1008:2002 (E)**Introduction**

The quality of the mixing water for production of concrete can influence the setting time, the strength development of concrete and the protection of the reinforcement against corrosion.

When assessing the suitability of water of unknown quality for the production of concrete, both the composition of the water and the application of the concrete to be produced should be considered.

1 Scope

This European Standard specifies the requirements for water that is suitable for making concrete that conforms to EN 206-1 and describes methods for assessing its suitability.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text, and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

EN 196-1, *Methods of testing cement — Part 1: Determination of strength.*

[SIST EN 1008:2003](https://standards.iteh.ai/SIST/EN-1008-2003)

EN 196-2, *Methods of testing cement — Part 2: Chemical analysis of cement.*

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EN 196-3, *Methods of testing cement — Part 3: Determination of setting time and soundness.*

EN 196-21, *Methods of testing cement — Part 21: Determination of the chloride, carbon dioxide and alkali content of cement.*

EN 206-1:2000, *Concrete — Part 1: Specification, performance, production and conformity.*

EN 12390-2, *Testing hardened concrete — Part 2: Making and curing specimens for strength tests.*

EN 12390-3, *Testing hardened concrete — Part 3: Compressive strength of test specimens.*

EN ISO 9963-2, *Water quality — Determination of alkalinity — Part 2: Determination of carbonate alkalinity (ISO 9963-2:1994).*

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

ISO 7890-1, *Water quality — Determination of nitrate — Part 1: 2,6-Dimethylphenol spectrometric method.*

3 Classification of types of water

In general the suitability of water for the production of concrete depends upon its origin. The following types may be distinguished:

3.1 Potable water

This water is considered as suitable for use in concrete. Such water needs no testing.

3.2 Water recovered from processes in the concrete industry

(This water, defined in A.2.1, will normally be suitable for use in concrete, but shall conform to the requirements of annex A.

3.3 Water from underground sources

This water may be suitable for use in concrete, but shall be tested.

3.4 Natural surface water and industrial waste water

This water may be suitable for use in concrete, but shall be tested.

3.5 Sea water or brackish water

This water may be used for concrete without reinforcement or other embedded metal, but is in general not suitable for the production of reinforced or prestressed concrete.

For concrete with steel reinforcement or embedded metal, the permitted total chloride content in the concrete is the determining factor.

3.6 Sewage water

This water is not suitable for use in concrete.

4 Requirements

4.1 General

Water for use in concrete shall conform to the requirements of 4.2, 4.3.1, 4.3.2 and 4.3.3. The water shall also conform to either the chemical requirements in 4.3.4, or the requirements for setting time and compressive strength in 4.4.

Water supplied as potable water is deemed to conform to the requirements in this standard.

When waters are to be combined (see A.2.2), the requirements apply to the combined water.

NOTE Water conforming to the European Directive 98/83/EC is potable water and therefore considered as suitable for use in concrete.

4.2 Preliminary assessment

The water shall be examined in accordance with the test procedures stated in Table 1. Water not conforming to one or more of the requirements in Table 1 may be used only, if it can be shown to be suitable for use in concrete, in accordance with 4.4.

EN 1008:2002 (E)

Table 1 — Requirements and test procedures for preliminary inspection of mixing water

		Requirement	Test procedure
1	Oils and fats	Not more than visible traces.	6.1.1
2	Detergents	Any foam should disappear within 2 minutes.	6.1.1
3	Colour	Water not from sources classified in 3.2: The colour shall be assessed qualitatively as pale yellow or paler.	6.1.1
4	Suspended matter	Water from sources classified in 3.2	A.4
		Water from other sources: Maximum 4 ml. sediment.	6.1.1
5	Odour	Water from sources classified in 3.2. No smell, except the odour allowed for potable water and a slight smell of cement and where blastfurnace slag is present in the water, a slight smell of hydrogen sulphide.	6.1.1
		Water from other sources. No smell, except the odour allowed for potable water. No smell of hydrogen sulphide after addition of hydrochloric acid.	
6	Acids	pH \geq 4	6.1.1
7	Humic matter	The colour shall be assessed qualitatively as yellowish brown or paler, after addition of NaOH.	6.1.2

4.3 Chemical properties

SIST EN 1008:2003

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4.3.1 Chlorides

The chloride content of the water, tested in accordance with 6.1.3, and expressed as Cl⁻, shall not exceed the levels given in Table 2, unless it can be shown that the chloride content of the concrete will not exceed the maximum value for the specified class selected from 5.2.7 of EN 206-1:2000.

Table 2 — Maximum chloride content of mixing water

End use	Max. chloride content mg/l	Test procedure
Prestressed concrete or grout	500	6.1.3
Concrete with reinforcement or embedded metal	1 000	
Concrete without reinforcement or embedded metal	4 500	

4.3.2 Sulphates

The sulphate content of the water, tested in accordance with 6.1.3 and expressed as SO₄²⁻ shall not exceed 2 000 mg/l.

4.3.3 Alkali

If alkali-reactive aggregates are expected to be used in the concrete, the water shall be tested for its alkali content in accordance with 6.1.3. The equivalent sodium oxide content of the water shall not normally exceed 1 500 mg/l. If this limit is exceeded, the water may be used only if it can be shown that actions have been taken to prevent deleterious alkali-silica reactions.

NOTE See CEN Report CR 1901 „Regional specifications and recommendations for the avoidance of damaging alkali silica reactions in concrete.“

4.3.4 Harmful contamination

In the first instance qualitative tests for sugars, phosphates, nitrates, lead and zinc may be carried out. If the qualitative tests show a positive result, either the quantity of the substance concerned shall be determined or tests for setting time and compressive strength shall be performed.

If chemical analysis is chosen, the water shall conform to the limits given in Table 3.

Table 3 — Requirements for harmful substances

Substance	Maximum content (mg/l)	Test procedure
Sugars	100	6.1.3
Phosphates; expressed as P ₂ O ₅	100	
Nitrates; expressed as NO ₃ ⁻	500	
Lead; expressed as Pb ²⁺	100	
Zinc; expressed as Zn ²⁺	100	

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4.4 Setting time and strength

When tested in accordance with 6.1.4 the initial setting time obtained on specimens made with the water shall be not less than 1 hour and not differ by more than 25 % from the initial setting time obtained on specimens made with distilled or de-ionised water. The final setting time shall not exceed 12 hours and not differ by more than 25 % from the final setting time obtained on specimens made with distilled or de-ionised water.

The mean compressive strength at 7 days of the concrete or mortar specimens, prepared with the water, shall be at least 90 % of the mean compressive strength of corresponding specimens prepared with distilled or de-ionised water.

5 Sampling

A sample of water of not less than 5 litres shall be taken. The sample shall be correctly identified and representative of the water to be used, due regard being given to the possible effects of seasonal fluctuations.

The sample shall be stored in a clean and sealed container. The container shall be rinsed out with water from the source prior to filling to capacity with the water sample.

The water shall be tested within 2 weeks of sampling.

EN 1008:2002 (E)

6 Testing

6.1 Test methods

6.1.1 Preliminary assessment

A small sub sample shall be assessed as soon as possible after sampling for oil and fats, detergents, colour, suspended matter, odour and humic matter.

Bring any material that may have settled back into suspension by shaking the sample. Pour 80 ml of the sample into a 100 ml measuring cylinder. Seal with a suitable stopper and shake the cylinder vigorously for 30 seconds. Smell the sample for any odours other than those of clean water. If in doubt about the odour, test the water for its odour level in accordance with national regulations for potable water. The odour level of the water shall be lower than the maximum level accepted for potable water. Observe the surface for foam. Stand the cylinder in a place free from vibration and allow standing for 30 min. After 2 minutes check for the continuing presence of foam and signs of any oils or fats. At the end of 30 minutes note the apparent volume of the settled solids and the colour of the water. Measure the pH using indicator paper or a pH meter. Then add 0,5 ml hydrochloric acid, mix then and smell or test for the presence of hydrogen sulphide.

6.1.2 Humic matter

Put 5 ml of the sample into a test tube. Bring it to a temperature between 15 °C and 25 °C by allowing it to stand indoors. Add 5 ml of 3 % sodium hydroxide solution shake and leave for 1 hour. Observe the colour.

6.1.3 Chemical tests

The following test methods describe the reference procedures for the mentioned chemical tests. If other methods are used it is necessary to show that they give results equivalent to those given by the reference methods. In case of a dispute, only the reference procedures shall be used.

Chlorides	Relevant extracts of EN 196-21
Sulphates	Relevant extracts of EN 196-2
Alkali	Relevant extracts of EN 196-21
Sugars	According to standards valid in the place of use.
Phosphates	According to standards valid in the place of use.
Nitrates	ISO 7890-1
Lead	According to standards valid in the place of use.
Zinc	According to standards valid in the place of use.

6.1.4 Setting time and strength

The following test methods shall be applied:

Setting time of paste	EN 196-3
Strength of mortar prisms	EN 196-1
Making concrete specimens	EN 12390-2
Testing concrete specimens	EN 12390-3

For strength testing, three mortar or concrete specimens shall be made using the water under investigation and tested. The test results shall be compared with the results of tests on similar specimens made using distilled or de-ionised water.

6.2 Frequency for testing

The following frequencies for testing water apply:

Potable water

no testing;

Water recovered from processes in the concrete industry (as defined in A.2.1)

test in accordance with annex A;

Water from underground sources, natural surface water and industrial waste water

test before first use and thereafter monthly until such time that a clear insight in the fluctuation of the water composition has been established. Thereafter a lower frequency may be adopted;

Sea water and brackish water

test before first use, thereafter once per year and whenever necessary.

6.3 Conformity evaluation

The requirements given in this standard are expressed as absolute values. For conformity the mixing water shall conform to the requirements given in clause 4.

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7 Report

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The test report shall contain the following information:

- a) a description of the type and source of the water;
- b) the place of sampling;
- c) the time and date of sampling;
- d) the name of laboratory and of the person responsible for the test;
- e) the date of testing;
- f) the test results and the comparison with the requirements of this standard.