



SLOVENSKI STANDARD SIST EN 480-1:1998

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Admixture for concrete, mortar and grout - Test methods - Part 1: Reference concrete and reference mortar for testing

Zusatzmittel für Beton, Mörtel und Einpreßmörtel - Prüfverfahren - Teil 1: Referenzbeton und Referenzmörtel für Prüfungen

Adjuvants pour béton, mortier et coulis - Méthodes d'essais - Partie 1: Béton et mortier de référence pour essais

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ICS:

91.100.10	Cement. Mavec. Apno. Malta	Cement. Gypsum. Lime. Mortar
91.100.30	Beton in betonski izdelki	Concrete and concrete products

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EUROPEAN STANDARD

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NORME EUROPÉENNE

EUROPÄISCHE NORM

October 1997

ICS 91.100.10; 91.100.30

Descriptors: construction materials, concrete, mortars : material, grouting, concrete admixtures, reference materials, manufacturing, composition : property, tests, effectiveness, compatibility

English version

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

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Zusatzmittel für Beton, Mörtel und Einpreßmörtel -
Prüfverfahren - Teil 1: Referenzbeton und Referenzmörtel
für Prüfungen

This European Standard was approved by CEN on 25 December 1996.

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 Central Secretariat 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 Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.



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

Central Secretariat: rue de Stassart, 36 B-1050 Brussels

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Foreword

This European Standard has been prepared by Technical Committee CEN/TC 104 "Concrete (performance, production, placing and compliance criteria)", the secretariat of which is held by DIN.

It has been prepared by Subcommittee 3 (SC 3) of TC 104 "Admixtures for concrete, mortar and grout".

When preparing this standard in SC 3, a number of members held the view, particularly supported by France and Italy, that testing admixtures with three additional types of cement would not provide satisfactory information on the behaviour of admixtures at the site. The reason is the complex interaction between admixtures and cements which depends on the chemical and mineralogical composition of cements which may differ significantly even within one cement type and class.

Consequently, users are advised to check the performance of the admixture by initial tests in combination with the other constituent materials of the concrete to be used on site.

This standard is applicable together with the other standards of the EN 480 series.

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 April 1998, and conflicting national standards shall be withdrawn at the latest by April 1998.

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, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

1 Scope

This standard specifies the constituent materials, the composition and the mixing method to produce reference concrete and reference mortar for testing the efficacy and the compatibility of admixtures in accordance with prEN 934-2.

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.



- EN 196-1
Methods of testing cement - Part 1: Determination of strength
- EN 196-2
Methods of testing cement - Part 2: Chemical analysis of cement
- EN 196-6
Methods of testing cement - Part 6: Determination of fineness
- ENV 197-1:1992
Cement - Composition, specifications and conformity criteria - Part 1: Common cements
- EN 413-2
Masonry cement - Part 2: Test methods
- EN 480-4
Admixtures for concrete, mortar and grout - Part 4: Determination of bleeding of concrete
- EN 934-2 : 1997
Admixtures for concrete, mortar and grout - Part 2: Concrete admixtures; Definitions and requirements
- prEN 1008
Mixing water for concrete - Specifications and tests
- prEN 12358
Testing concrete - Determination of consistency - Flow table test
- prEN 12382
Testing concrete - Determination of consistency - Slump test

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3 Constituent materials

3.1 Cement

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The reference concretes and mortar shall be made with a CEM I cement of strength class 42,5 conforming to ENV 197-1.

The cement used shall have a $C_3 A$ content of 7 % to 11 % by mass calculated from chemical analysis according to EN 196-2 and a specific surface of 3200 cm²/g to 4000 cm²/g determined according to EN 196-6.

For the measurement of the effect on setting at the maximum recommended dosage as required by prEN 934-2, clause 4, table 1, three additional cements optionally chosen from types CEM II, CEM III and CEM IV as specified in ENV 197-1 shall be used. The cements chosen shall be from different types and/or from different sources. No further requirements are laid down for the properties of the above cements.

3.2 Aggregate

3.2.1 Aggregate for reference concrete

A natural normal weight aggregate conforming to the national standards or provisions for aggregates for concrete valid in the place of use of the reference concrete with low water absorption (less than 2 % by mass) shall be used. The size fractions of the aggregate used in the production of reference concretes shall lie within the limits given in Table 1.

Table 1: Aggregate for reference concrete

Aperture size (mm)	Percentage by mass passing the test sieve ¹⁾²⁾
31,5	100
16,0	80 to 95
8,0	55 to 70
4,0	40 to 50
2,0	30 to 40
1,0	20 to 30
0,5	10 to 20
0,25	4 to 8
0,125	2 to 4
0,075	< 2

1) The range is selected to accommodate both crushed and uncrushed aggregate.

2) The variation in the quantity passing each sieve of the chosen grading for both mixes (control and test mix) shall not exceed $\pm 2,0$ % by mass.

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3.2.2 Aggregate for reference mortar

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Standard sand according to EN 196-1 shall be used as the aggregate for the reference mortar.

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3.3 Mixing water

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Water according to prEN 1008 shall be used as mixing water ¹⁾²⁾).

¹⁾ Distilled or de-ionized water may be used in special cases.

²⁾ It is not allowed to use wash water from concrete production.

4 Reference concrete

Unless otherwise specified, tests on reference concrete are performed as comparative tests. That is, the performance of admixtures is determined by comparing the reference concrete containing an admixture (test mix) with the reference concrete made without an admixture (control mix) but otherwise with the same aggregate/cement ratio and constituent materials from the same delivery.

The requirements of reference concretes shall be as given in Table 2. The fresh concrete shall be fully compacted. The air content in the control mix shall not exceed 2 % by volume.

Table 2: Requirements for reference concrete¹⁾

Reference concrete	Type of admixture to be tested	Cement content ⁴⁾ kg/m ³	Consistence at required test temperature	
			Slump ²⁾ (mm)	Flow ²⁾ (mm)
I	Water reducing/ Plasticizing	350 ± 5	70 ± 10	400 ± 20
	High range water reducing/Super- plasticizing			
	Set accelerating			
	Hardening accele- rating			
	Set retarding			
	Water resisting			
II	Water retaining ³⁾	300 ± 5	120 ± 20	450 ± 20
III	Air entraining	350 ± 5	50 ± 10	350 ± 10
IV	High range water reducing/ Super- plasticizing	350 ± 5	30 ± 10	350 ± 20

1) When testing at equal w/c ratio the requirements for consistence shall only apply to the control mix.

2) These tests are alternatives and have to be chosen before starting the test. Slump shall be determined in accordance with prEN 12382 and flow in accordance with prEN 12358 respectively.

3) Water content has to be recorded in accordance with prEN 480-4.

4) Control mix only: The resulting cement content of the test mix may change as a result of volume change to concrete caused by water reducing or air entraining effects of the admixture under test.

5 Reference mortar

Unless otherwise specified, tests on reference mortar are performed as comparative tests. That is, comparing the performance of the reference mortar containing an admixture (test mix) with the performance of the reference mortar without an admixture (control mix).

Standard mortar conforming to EN 196-1 shall be used as the reference mortar.

6 Production of reference concrete

6.1 Mix proportion

The cement content shall be in accordance with Table 2.

Aggregate shall be used in an oven dry condition to remove doubts on moisture content variation. If the aggregate is not oven dry, its moisture content shall be determined and the specific gravity shall be corrected accordingly. In case of dispute, oven dry aggregate shall be used.

The test mix shall have the same aggregate: cement ratio as the control mix but the water content shall be adjusted to give a consistence within the limits given in Table 2 for the control mix. The water content of the mix shall be calculated from the moisture content of the aggregate, the mixing water and the water content of the admixture. In the case of the plasticised or superplasticised flowing concrete mix and when testing water resisting admixtures at equal w/c ratio no water reduction shall be made.

6.2 Mixing procedure

Prior to mixing, each of the constituents shall be conditioned to a temperature of $(20 \pm 2) ^\circ\text{C}$ or when required by the test method, to $(5 \pm 1) ^\circ\text{C}$. Immediately after mixing is completed, the temperature of the fresh concrete shall be $(20 \pm 2) ^\circ\text{C}$ or when required by the test method, $(5 \pm 1) ^\circ\text{C}$.

The following mixing technique shall be adopted to ensure repeatability of results, and eliminate initial absorption effects on consistence:

Use a forced action pan mixer to its minimum of 50 % capacity (maximum 90 % of capacity).

Wipe the inside with a damp cloth if dry.

Add all of the aggregate to the pan mixer with half the mixing water. Mix for two minutes, then stand for two minutes. Cover the pan mixer during the standing period to minimize evaporation effects.

Re-start the mixer for thirty seconds after or whilst adding the cement. Add the remaining water (plus admixture in the test mix) over the next thirty seconds. Mix for two minutes.

In the case of powder admixture, the admixture shall be added to the dry constituents of the concrete unless otherwise specified by the manufacturer.

Determine the consistence within five minutes from completion of mixing.

If the consistence is outside the limit in Table 2, (except test mixes at equal w/c ratio) discard the mix and repeat at a revised water content.

Measure air content and make specimens within 30 minutes from completion of mixing.

7 Production of reference mortar

7.1 Mix proportions

The proportion of cement and sand shall be in accordance with EN 196-1.

The amount of water added to the control mix shall be in accordance with EN 196-1. For test mixes the water added shall be sufficient to give equal consistence to that of the control mix, except when testing water resisting admixtures at equal w/c ratio.

7.2 Mixing procedure

The requirements of conditioning and temperature after mixing shall be as specified in clause 6.2.

Mix the dry sand and cement for 30 seconds at low speed in a mixer in accordance with EN 196-1.