BRITISH STANDARD

BS EN
934-2:2001
Incorporating Amendments Nos. 1 and 2 and Corrigendum No. 1

Admixtures for concrete, mortar and grout —

Part 2: Concrete admixtures — Definitions, requirements, conformity, marking and labelling

The European Standard EN 934-2:2001, with the incorporation of amendments A1:2004 and A2:2005, has the status of a British Standard

ICS 91.100.99

BSI
British Standards

National foreword

This British Standard is the official English language version of EN 934-2:2001, including amendments A1:2004 and A2:2005. It supersedes BS EN 934-2:1998 which is withdrawn.

The start and finish of text introduced or altered by CEN amendment is indicated in the text by tags ⟦A1⟩ ⟨A1⟧. Tags indicating changes to CEN text carry the number of the CEN amendment. For example, text altered by CEN amendment A1 is indicated by ⟦A1⟩ ⟨A1⟧.

EN 934-2:2001 is a candidate "harmonized" European Standard and fully takes into account the requirements of the European Commission mandate M128. Products related to concrete, mortar and grout, given under the EU Construction Products Directive (89/106/EEC), and intended to lead to CE marking. The date of applicability of EN 934-2:2001 as a "harmonized" European Standard, i.e. the date after which this standard may be used for CE marking purposes, is subject to an announcement in the *Official Journal of the European Communities*.

EN 934-2:2001 is the subject of transitional arrangements agreed under the European Commission mandate. The Member States have agreed a nominal transition period for the co-existence of EN 934-2:2001 and their corresponding national standard(s). It is intended that this period will comprise a nominal nine month period during which any required changes to national regulations are to be made, followed by a further nominal twelve month period for the implementation of CE marking. At the end of this co-existence period, the national standard(s) will be withdrawn. In the UK, the corresponding national standards are:

— BS 5075-1:1982, *Concrete admixtures — Part 1: Specification for accelerating and retarding water-reducing admixtures;*

— BS 5075-3:1985, *Concrete admixtures — Part 3: Specification for superplasticizing admixtures.*

As these corresponding national standards have already been amended following partial replacement by EN 934-2:1997 and EN 934-6:2000, it has been decided by the responsible BSI subcommittee (B/517/3) that, in the UK, the full 21 month transition period is unnecessary. Instead, only the nominal nine month transition period, set aside to allow required changes to national regulations to be made, is necessary. Based on this nominal nine month transition period BS 5075-1:1982 and BS 5075-3:1985 would be withdrawn in May 2002.

NOTE This date is approximate. Users of this standard should contact BSI Customer Services for confirmation of withdrawal.

This British Standard, having been prepared under the direction of the Sector Policy and Strategy Committee for Building and Civil Engineering, was published under the authority of the Standards Policy and Strategy Committee on 19 September 2001

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Amendments issued since publication

Amd. No.	Date	Comments
15448	18 November 2004	See national foreword
16400	31 May 2006	See national foreword
16490 Corrigendum No. 1	30 June 2006	Correction to formatting errors at printing stage

The UK participation in its preparation was entrusted by Technical Committee B/517, Concrete, to Subcommittee B/517/3, Admixtures, which has the responsibility to:

— aid enquirers to understand the text;

— present to the responsible international/European committee any enquiries on the interpretation, or proposals for change, and keep UK interests informed;

— monitor related international and European developments and promulgate them in the UK.

A list of organizations represented on this subcommittee can be obtained on request to its secretary.

Additional information

Attention is drawn to the fact that the requirements for admixtures covered by EN 934-2:1997 are unchanged in EN 934-2:2001. However, EN 934-2:2001 also includes requirements for dual function admixtures not covered by EN 934-2:1997.

Attention is also drawn to the requirements for corrosion behaviour in Table 1 (item number 10) and Table ZA.1. It states that until there is an accepted European Standard, the national regulations in place of use apply. As the UK has no national regulations in respect of this characteristic, then no testing is required for products sold in the UK and it is acceptable to record "no performance determined" (NPD), with regard to this characteristic, in the information accompanying the CE marking. However, if the product is to be placed on the market in EU or EFTA member states where there are national regulations for this characteristic, then testing is required in accordance with those regulations.

Cross-references

The British Standards which implement international or European publications referred to in this document may be found in the *BSI Catalogue* under the section entitled "International Standards Correspondence Index", or by using the "Search" facility of the *BSI Electronic Catalogue* or of British Standards Online.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, the EN title page, pages 2 to 23 and a back cover.

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 934-2

July 2001

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October 2004

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December 2005

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Supersedes EN 934-2:1997

English version

Admixtures for concrete, mortar and grout - Part 2: Concrete admixtures - Definitions, requirements, conformity, marking and labelling

(including amendments A1:2004 and A2:2005)

Adjuvants pour béton, mortier et coulis - Partie 2: Adjuvants pour béton - Définitions, exigences, conformité, marquage et étiquetage
(inclut les amendements A1:2004 et A2:2005)

Zusatzmittel für Beton, Mörtel und Einpressmörtel - Teil 2: Betonzusatzmittel - Definitionen, Anforderungen, Konformität, Kennzeichnung und Beschriftung
(enthält Änderungen A1:2004 und A2:2005)

This European Standard was approved by CEN on 2 May 2001. Amendment A1 was approved by CEN on 29 July 2004 and Amendment A2 was approved on 20 July 2005.

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

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

Ref. No. EN 934-2:2001 + A1:2004 + A2:2005 E

Contents

Foreword

This European Standard has been prepared by Technical Committee CEN/TC 104 "Concrete", 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 January 2002, and conflicting national standards shall be withdrawn at the latest by April 2003.

This European Standard supersedes EN 934-2:1997.

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

For relationship with EU Directive(s) see informative annex ZA which is an integral part of this standard.

This standard is a part of the series EN 934 "Admixtures for concrete, mortar and grout" which additionally comprises the following parts

- Part 3 Admixtures for masonry mortar - Definitions, requirements, conformity, marking and labelling
- Part 4 Admixtures for grout for prestressing tendons - Definitions, requirements, conformity, marking and labelling
- Part 5 Admixtures for sprayed concrete - Definitions, requirements, conformity, marking and labelling
- Part 6 Sampling, conformity control and evaluation of conformity

This European Standard is used with the standards of the EN 480 series which comprises test methods for admixtures.

The annexes A and ZA 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, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

Foreword to amendment A1

This document (EN 934-2:2001/A1:2004) has been prepared by Technical Committee CEN/TC 104 “Concrete and related products”, the secretariat of which is held by DIN.

This Amendment to the European Standard EN 934-2:2001 shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by April 2005, and conflicting national standards shall be withdrawn at the latest by April 2005.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

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

Foreword to amendment A2

This European Standard (EN 934-2:2001/A2:2005) has been prepared by Technical Committee CEN/TC 104 “Concrete and related products”, the secretariat of which is held by DIN.

This Amendment to the European Standard EN 934-2:2001 shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by June 2006, and conflicting national standards shall be withdrawn at the latest by June 2006.

This European Standard covers matters for which the need for amendments or corrections to EN 934-2:2001-07 has been identified by CEN/TC 104 “Concrete and related products”.

The numbering and headlines in the following correspond to those in EN 934-2 for which the amendments and corrections apply.

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

1 Scope

This European Standard specifies definitions and requirements for admixtures for use in concrete.

It covers admixtures for plain, reinforced and prestressed concrete which are used in site mixed, ready mixed concrete and precast concrete.

The performance requirements in this standard apply to admixtures used in concrete of normal consistence. They may not be applicable to admixtures intended for other types of concrete such as semi-dry and earth moist mixes.

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 are not part of this standard.

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 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 the 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 934-6:2001, *Admixtures for concrete, mortar and grout - Part 6: Sampling, conformity control and evaluation of conformity.*

prEN 1015-13:1993, *Methods of test for mortar for masonry - Part 13: Determination of the dimensional stability of hardened mortars.*

EN 12350-2, *Testing fresh concrete - Part 2: Slump test.*

EN 12350-5, *Testing fresh concrete - Part 5: Flow table test.*

EN 12350-7, *Testing fresh concrete - Part 7: Air content - Pressure method*.

[A1] EN 12390-3:1999 [A1], *Testing hardend concrete – Part 3: Compressive strength of test specimens*.

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

[A2] *Text deleted* [A2]

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

3 Terms and definitions

For the purposes of this standard, the following terms and definitions apply:

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
the dosage of an admixture, expressed in % by mass of cement, stated by the manufacturer which will meet the requirements of this standard. 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 which the manufacturer recommends for the product based on experience on site

NOTE The use of the recommended dosage does not imply that compliance with this standard 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 EN 480-1 for testing admixtures for conformity with this standard

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
a single function of a multifunction admixture designated by the manufacturer

3.1.8
secondary function
a function of a multifunction admixture which is additional to the primary function

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 slump/flow or produces both effects simultaneously

3.2.3
high range water reducing/superplasticizing 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 slump/flow 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 quantitiy 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
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)

4 Requirements

4.1 General requirements

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

All the admixtures defined in this standard shall conform to the general requirements in Table 1.

NOTE For requirements which lead to the CE-marking, see Table ZA.1 of annex ZA

4.2 Requirements for specific types of admixtures

The admixtures defined in 3.2.1 to 3.2.12 shall conform to the corresponding performance requirements as follows:

Water reducing/plasticizing admixtures	Table 2
High range water reducing/superplasticizing admixtures	Tables 3.1 and 3.2
Water retaining admixtures	Table 4
Air entraining admixtures	Table 5
Set accelerating admixtures	Table 6
Hardening accelerating admixtures	Table 7
Set retarding admixtures	Table 8
Water resisting admixtures	Table 9
Set retarding/water reducing/plasticizing admixtures	Table 10
Set retarding/high range water reducing/ superplasticizing admixtures	Table 11.1 and Table 11.2
Set accelerating/water reducing/plasticizing admixtures	Table 12

Where manufacturer's stated values are required, this shall be provided in writing on request.

[A2] *Note deleted* [A2]

Table 1 – General Requirements

No	Property	Test method	Requirements
1	Homogeneity[a]	Visual	Homogeneous when used. Segregation shall not exceed the limit stated by the manufacturer
2	Colour[a]	Visual	Uniform and similar to the description provided by the manufacturer
3	Effective component[a]	EN 480-6[b]	IR spectra to show no significant change with respect to the effective component when compared to reference spectrum provided by the manufacturer
4	Relative density[a] (for liquids only)	A2 ISO 758[i] A2	D ± 0,03 if D > 1,10 D ± 0,02 if D ≤ 1,10 where D is manufacturer's stated value
5	Conventional dry material content[a]	EN 480-8[c]	0,95 T ≤ X < 1,05 T for T ≥ 20 % 0,90 T ≤ X < 1,10 T for T< 20 % T is manufacturer's stated value % by mass; X is test result % by mass
6	pH value[a]	ISO 4316	Manufacturer's stated value ±1 or within manufacturer's stated range
A2 7	Total chlorine[a d]	ISO 1158[e]	Either ≤ 0,10 % by mass or not above the manufacturer's stated value
8	Water soluble chloride (Cl^-)[a]	EN 480-10	Either ≤ 0,10 % by mass[h] or not above the manufacturer's stated value
9	Alkali content (Na_2O equivalent)[a]	EN 480-12	Not above the manufacturer's stated maximum
10	Corrosion behaviour	[f g]	No corrosion promoting effects on steel embedded in concrete[g] A2

[a] Manufacturer's stated value shall be provided in writing, to the user.

[b] If the method in EN 480-6 is not suitable the manufacturer shall recommend an alternative test method.

[c] If the method in EN 480-8 is not suitable the manufacturer shall recommend an alternative test method.

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

[e] The procedure in ISO 1158 shall be modified as follows:
- Increase of the sample size to 0,1 g of dry admixture;
- Use silver nitrate and ammonium thiocyanate solutions 0,01 N.

[f] For testing, cement CEM I with C_3A content less than 5 % by mass shall be used.

[g] Until there is an accepted European Standard the national regulations in the place of use shall apply when required.

[h] Where the chloride content is ≤ 0,10 % by mass the admixture may be described as "chloride free".

A2 [i] ISO 758 is the reference method. Another method may be used provided the method can be shown to give essentially the same results as the method in ISO 758. A2

Table 2 – Specific requirements for water reducing/plasticizing admixtures (at equal consistence)

No	Property	Reference concrete	Test method	Requirements
1	Water reduction	EN 480-1 reference concrete I	slump EN 12350-2 or flow EN 12350-5	In test mix ≥ 5 % compared with control mix
2	Compressive strength	EN 480-1 reference concrete I	[A1] EN 12390-3:2001 [A1]	At 7 and 28 days: Test mix ≥ 110 % of control mix
3	Air content in fresh concrete	EN 480-1 reference concrete I	EN 12350-7	Test mix ≤ 2 % by volume above control mix unless stated otherwise by the manufacturer

Table 3.1 – Specific requirements for high range water reducing/super plasticizing admixtures (at equal consistence)

No	Property	Reference concrete	Test method	Requirements
1	Water reduction	EN 480-1 reference concrete I	slump EN 12350-2 or flow EN 12350-5	In test mix ≥ 12 % compared with control mix
2	Compressive strength	EN 480-1 reference concrete I	[A1] EN 12390-3:2001 [A1]	At 1 day: Test mix ≥ 140 % of control mix At 28 days: Test mix ≥ 115 % of control mix
3	Air content in fresh concrete	EN 480-1 reference concrete I	EN 12350-7	Test mix ≤ 2 % by volume above control mix unless otherwise stated by the manufacturer

Table 3.2 – Specific requirements for high range water reducing/super plasticizing admixtures (at equal w/c ratio)

No	Property	Reference concrete	Test method	Requirements
1	Increase in consistence	EN 480-1 reference concrete IV	slump EN 12350-2 or flow EN 12350-5	Increase in slump ≥ 120 mm from initial (30 ± 10) mm Increase in flow ≥ 160 mm from initial (350 ± 20) mm
2	Retention of consistence	EN 480-1 reference concrete IV	slump EN 12350-2 or flow EN 12350-5	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	EN 480-1 reference concrete IV	[A1] EN 12390-3:2001 [A1]	At 28 days : test mix ≥ 90 % of control mix
4	Air content in fresh concrete	EN 480-1 reference concrete IV	EN 12350-7	Test mix ≤ 2 % by volume above control mix unless otherwise stated by the manufacturer

[A2] NOTE The superplasticiser compliance dosage used to meet the requirements of Table 3.2 does not have to be the same as that used to meet the requirements of Table 3.1. [A2]

Table 4 – Specific requirements for water retaining admixtures (at equal consistence)

No	Property	Reference concrete	Test method	Requirements
1	Bleeding	EN 480-1 reference concrete II	EN 480-4	Test mix ≤ 50 % of control mix
2	Compressive strength	EN 480-1 reference concrete II	[A1] EN 12390-3:2001 [A1]	At 28 days : test mix ≥ 80 % of control mix
3	Air content in fresh concrete	EN 480-1 reference concrete II	EN 12350-7	Test mix ≤ 2 % by volume above control mix unless stated otherwise by the manufacturer

Table 5 – Specific requirements for air entraining admixtures (at equal consistence)

No	Property	Reference concrete	Test method	Requirements[a]
1	Air content in fresh concrete (entrained air)	EN 480-1 reference concrete III	EN 12350-7	Test mix ≥ 2,5 % by volume above control mix Total air content 4 % to 6 % by volume[b]
2	Air void characteristics in hardened concrete	EN 480-1 reference concrete III	EN 480-11[c]	Spacing factor in test mix ≤ 0,200 mm
3	Compressive strength	EN 480-1 reference concrete III	[A1] EN 12390-3:2001 [A1]	At 28 days : test mix ≥ 75 % of control mix

[a] All the requirements apply to the same test mix.
[b] The compliance dosage cannot be stated, the dosage has to be adjusted to obtain the required air content.
[c] EN 480-11 is the reference method. Other methods of determining the spacing factor (e. g. modified point count method) may be used provided that they can be shown to give essentially the same results as the method in EN 480-11.

Table 6 – Specific requirements for set accelerating admixtures (at equal consistence)

No	Property	Reference mortar/ concrete	Test method	Requirements
1	Initial setting time	EN 480-1 mortar	EN 480-2	At 20° C: test mix ≥ 30 min At 5° C : test mix ≤ 60 % of control mix
2	Compressive strength	EN 480-1 reference concrete I	[A1] EN 12390-3:2001 [A1]	At 28 days : test mix ≥ 80 % control mix At 90 days : test mix ≥ test mix at 28 days
3	Air content in fresh concrete	EN 480-1 reference concrete I	EN 12350-7	Test mix ≤ 2 % by volume above control mix unless stated otherwise by the manufacturer

Table 7 – Specific requirements for hardening accelerating admixtures (at equal consistence)

No	Property	Reference concrete	Test method	Requirements
1	Compressive strength	EN 480-1 reference concrete I	[A1] EN 12390-3:2001 [A1]	At 20° C and 24 h : test mix ≥ 120 % of control mix At 20° C and 28 days : test mix ≥ 90 % of control mix At 5° C and 48 h : test mix ≥ 130 % of control mix
2	Air content in fresh concrete	EN 480-1 reference concrete I	EN 12350-7	Test mix ≤ 2 % by volume above control mix unless otherwise stated by the manufacturer

Table 8 – Specific requirements for set retarding admixtures (at equal consistence)

No	Property	Reference mortar/ concrete	Test method	Requirements
1	Setting time	EN 480-1 mortar	EN 480-2	Initial : test mix ≥ control mix + 90 min Final : test mix ≤ control mix + 360 min
2	Compressive strength	EN 480-1 reference concrete I	[A1] EN 12390-3:2001 [A1]	At 7 days : test mix ≥ 80 % of control mix At 28 days : test mix ≥ 90 % of control mix
3	Air content in fresh concrete	EN 480-1 reference concrete I	EN 12350-7	Test mix ≤ 2 % by volume above control mix unless otherwise stated by the manufacturer

Table 9 – Specific requirements for water resisting admixtures (at equal consistence or equal w/c ratio [a])

No	Property	Reference mortar/ concrete	Test method	Requirements
1	Capillary absorption	EN 480-1 mortar	EN 480-5	Tested for 7 days after 7 days curing : test mix ≤ 50 % by mass of control mix Tested for 28 days after 90 days curing : test mix ≤ 60 % by mass of control mix
2	Compressive strength	EN 480-1 reference concrete I	[A1] EN 12390-3:2001 [A1]	At 28 days : test mix ≥ 85 % of control mix
3	Air content in fresh concrete	EN 480-1 reference concrete I	EN 12350-7	Test mix ≤ 2 % by volume above control mix unless otherwise stated by the manufacturer.
[a] All tests shall be performed either at equal consistence or equal w/c ratio				

Table 10 – Specific requirements for set retarding/water reducing/plasticizing admixtures (at equal consistence)

No	Property	Reference concrete/mortar	Test method	Requirements
1	Compressive strength	EN 480-1 reference concrete I	A1 EN 12390-3:2001 A1	At 28 days: test mix ≥ 100 % of control mix
2	Setting time	EN 480-1 mortar	EN 480-2	Initial: test mix ≥ control mix + 90 min Final: test mix ≤ control mix + 360 min
3	Water reduction	EN 480-1 reference concrete I	Slump EN 12350-2 or flow EN 12350-5	In test mix ≥ 5 % compared with control mix
4	Air content in fresh concrete	EN 480-1 reference concrete I	EN 12350-7	Test mix ≤ 2 % (by volume) above control mix unless stated otherwise by the manufacturer

Table 11.1 – Specific requirements for set retarding/high range water reducing/ super-plasticizing admixtures (at equal consistence)

No	Property	Reference concrete/mortar	Test method	Requirements
1	Compressive strength	EN 480-1 reference concrete I	A1 EN 12390-3:2001 A1	At 7 days test mix ≥ 100 % of control mix At 28 days test mix ≥ 115 % of control mix
2	Setting time	EN 480-1 mortar	EN 480-2	Initial: test mix ≥ control mix + 90 min Final: test mix ≤ control mix + 360 min
3	Water reduction	EN 480-1 reference concrete I	Slump EN 12350-2 or flow EN 12350-5	In test mix ≥ 12 % compared with control mix
4	Air content in fresh concrete	EN 480-1 reference concrete I	EN 12350-7	Test mix ≤ 2 % (by volume) above control mix unless stated otherwise by the manufacturer

Table 11.2 – Specific requirements for set retarding/high range water reducing/ super-plasticizing admixtures (at equal w/c ratio)

No	Property	Reference concrete/mortar	Test method	Requirements
1	Retention of consistence	EN 480-1 reference concrete IV	Slump EN 12350-2 or Flow EN 12350-5	60 min after the addition the consistence of the test mix shall not fall below the value of the consistence of the control mix
2	Compressive strength	EN 480-1 reference concrete IV	A1 EN 12390-3:2001 A1	At 28 days: test mix ≥ 90 % of control mix
3	Air content in fresh concrete	EN 480-1 reference concrete I	EN 12350-7	Test mix ≤ 2 % (by volume) above control mix unless stated otherwise by the manufacturer

Table 12 – Specific requirements for set accelerating/water reducing/plasticizing admixtures (at equal consistence)

No	Property	Reference concrete/mortar	Test method	Requirements
1	Compressive strength	EN 480-1 reference concrete 1	[A1] EN 12390-3:2001 [A1]	At 28 days, test mix ≥ 100 % of control mix
2	Initial setting time	EN 480-1 mortar	EN 480-2	At 20 °C test mix ≥ 30 min At 5 °C test mix ≤ 60 % of control mix
3	Water reduction	EN 480-1 reference concrete 1	Slump EN 12350-2 or flow EN 12350-5	In test mix ≥ 5 % compared with control mix
4	Air content in fresh concrete	EN 480-1 reference concrete 1	EN 12350-7	Test mix ≤ 2 % (by volume) above control mix unless stated otherwise by the manufacturer

4.3 Release of dangerous substances

For content and release from hardened concrete of substances dangerous to health, hygiene and environment, see Annex A (informative).

5 Sampling

Requirements for sampling are given in EN 934-6:2001.

6 Conformity control

Requirements for conformity control are given in EN 934-6:2001. The frequency of testing in connection with factory production control is given in Table 13.

7 Evaluation of conformity

Requirements for evaluation of conformity are given in EN 934-6:2001.

Table 13 – Minimum frequency of test for the factory production control of concrete admixtures according to EN 934-2:2001

Tests	Water reducing/ Plasticizing admixtures	High range water reducing/ Superplasticizing admixtures [A2] 3) [A2]	Water retaining admixtures	Air entraining admixtures	Set accelerating admixtures [A2] 4) [A2]	Hardening accelerating admixtures	Set retarding admixtures	Water resisting admixtures [A2] 4) [A2]	Set retarding/ Water reducing/ Plasticizing admixtures	Set retarding/ Highrange water reducing/Superplasticizing admixtures	Set accelerating/ Water reducing/ Plasticizing admixtures
Homogeneity, colour	B	B	B	B	B	B	B	B	B	B	B
Relative density (for liquids only) [A2] 2) [A2]	B	B	B	B	B	B	B	B	B	B	B
Conventional dry material content [A2] 2) [A2]	B	B	B	B	B	B	B	B	B	B	B
pH value (for liquids only)	B	B	B	B	B	B	B	B	B	B	B
Chloride content (Cl^-) 1)	4	4	4	4	4	4	4	4	4	4	4
Alkali content	2	2	2	2	2	2	2	2	2	2	2
Water reduction	A	A							A	A	A
Increase in consistence		A								A	
Retention of consistence		A								A	
Setting time					A		A		A	A	A
Air content in fresh concrete	1	1	1	A	1	1	1	1	1	1	1
Bleeding			A								
Air content in hardened concrete (air void spacing)				1							
Compressive strength	1	1	1	1	1	A	1	1	1	1	1
Capillary absorption								A			

Numbers in this table denote minimum frequency of test per year, spread according to production; if the production is less frequent every batch has to be tested

[A2] A: means test for every 1000 t with a maximum of 3 times a year; [A2]

B: means test for each batch

1) Total chlorine content also has to be tested at this frequency if it is significantly different from the chloride content.

[A2] 2) For factory production control of density and dry material content, different test methods from those specified in Table 1 may be used, provided a correlation between the method used and the specified method has been established.

3) For factory production control, high range water reducing/superplasticising admixtures may be tested for water reduction or for increase in consistence.

4) For factory production control, water resisting and set accelerating admixtures, the 90 day test may be omitted. [A2]

Note: Effective component (infra red analysis) and effect on setting time at maximum recommended dosage need not be included in the programme of factory production control. They have to be included in initial type testing.

8 Marking and labelling

8.1 General

When admixtures for concrete are supplied in containers they shall be clearly marked with the relevant information. When the material is supplied into a bulk container at the point of delivery, the same information shall be provided in writing at the time of delivery.

NOTE For CE-marking and labelling see ZA.3.

8.2 Designation of admixtures

Admixtures for concrete shall be designated by:

a) Name of type of admixture in the language of one member country,

b) Number of standard: EN 934-2,

c) Code, to identify the type of the admixture, consisting of the number of this standard and the number of the table which gives the additional performance requirements for the particular type of admixture. Where the performance requirements are included in two tables both table numbers shall be included.

EXAMPLE High range water reducing/super plasticizing admixture for concrete; EN 934-2: T3.1/3.2

8.3 Additional Information

a) batch number and production plant;

b) a summary of storage requirements including any special requirements on storage life which shall be clearly marked, e. g.: This admixture shall not be taken to comply with EN 934-2 after "date";

c) instructions for homogenisation before use, when necessary;

d) instructions for use and any necessary safety precautions, e. g. if caustic, toxic or corrosive;

e) the manufacturer's recommended range of dosage.

Annex A
(informative)

Release of dangerous substances

In the absence of specific requirements for substances dangerous to health, hygiene and envinoment in this standard, the requirements of ZA.1 (paragraph "Warning") and ZA.3 apply.

Annex ZA
(informative)

Provisions for the CE marking of admixtures for concrete under the EU Construction Products Directive

ZA.1 Clauses of this European Standard addressing the provisions of the EU Construction Products Directive

This European Standard and this annex ZA have been prepared under a mandate[1)] given to CEN by the European Commission and the European Free Trade Association.

The clauses of this European Standard shown in Table ZA.1 meet the requirements of this mandate given under the EU Construction Products Directive (89/106/EEC).

Compliance with this annex ZA confers a presumption of fitness of the admixtures for concrete covered herein for the intended uses under consideration in Table ZA.1.

WARNING Other requirements and other EU Directives, not affecting the fitness for intended uses, can be applicable to the admixtures for concrete falling within the scope of this annex.

NOTE 1 There may be other requirements, relating to dangerous substances applicable to the products falling within its scope of this standard (e. g. transposed European legislation and national laws, regulations and administrative provisions). In order to meet the provisions of the EU Construction Products Directive, these requirements need also to be complied with, when and where they apply.

NOTE 2 An informative database of European and national provision on dangerous substances is available at the construction web site on EUROPA (CREATE, accessed through http://europa.eu.int).

This annex establishes both the conditions for the CE-marking of the construction products intended for the uses indicated in Table ZA.1 and the relevant clauses applicable.

The scope of this annex is defined by Table ZA.1.

[1)] M128 "Products related to concrete, mortar and grout"

Table ZA.1 – Scope and relevant clauses of this standard

Product: Admixtures for concrete as covered under the scope of this standard **Intended use(s):** To be used in concrete for: water reducing/plasticising; high range water reducing/super plasticising; water retaining/repelling; air entraining; set accelerating; hardening accelerating; set retarding; water resisting; set retarding/water reducing/plasticising; set retarding/high range water reducing/super plasticising; set accelerating/water reducing/plasticising;			
Essential characteristics	**Requirement clauses in this standard**	**Mandated level(s) or class(es):**	**Notes**
Chloride ion content	[A2] 4.1 and Table 1 (8) [A2]	None	Applies to all admixtures within the scope of this standard. Requirements are for upper limit or declared maximum value.
Alkali content	[A2] 4.1 and Table 1 (9) [A2]	None	Applies to all admixtures within the scope of this standard. Requirements are for declared maximum value.
Corrosion behaviour	[A2] 4.1 and Table 1 (10) [A2]	None	Applies to all admixtures.
Compressive strength	4.2 and Tables 2(2), 3.1(2), 3.2(3), 4(2), 5(3), 6(2), 7(1), 8(3), 9(2), 10(1), 11.1(1), 11.2(2) and 12(1)	None	Applies to all admixtures within the scope of this standard. Requirements are for lower limits in test mix (with admixture).
Air content	4.2 and Tables 2(3), 3.1(3), 3.2(4), 4(3), 6(3), 7(2), 8(3), 9(3), 10(4), 11.1(4), 11.2(3) and 12(4)	None	Applies to all admixtures within the scope of this standard except air entraining admixtures. Requirements are for upper limits in test mix (with admixture).
Air content (entrained air)	4.2 and Table 5(1)	None	Applies to air entraining admixtures only. Requirements are for an upper and lower limit in test mix (with admixture).
Air void characteristic	4.2 and Table 5 (2)	None	Applies to air entraining admixtures only. Requirements are for an upper limit in test mix (with admixture).
Water reduction	4.2 and Tables 2(1), 3.1(1), 10(3) 11.1(3) and 12(3)	None	Applies to water reducing/plasticizing, high range water reducing/super-plasticizing, set retarding/water reducing/plasticizing, set redarding/ water reducing/super-plasticizing and set accelerating/water reducing/ plasticizing admixtures only. Requirements are for a lower limit in test mix (with admixture).
Bleeding	4.2 and Table 4(1)	None	Applies to water retaining admixtures only. Requirment is for an upper limit in test mix (with admixture).

Essential characteristics	Requirement clauses in this standard	Mandated level(s)or class(es):	Notes
Setting time	4.2 and Tables 6(1), 8(1), 10(2), 11.1(2) and 12(2)	None	Applies to set accelerating, set retarding admixtures, set retarding/water reducing/plasticizing admixtures, set redarding/ water reducing/super-plasticizing and set accelerating/water reducing/ plasticizing admixtures only. Requirement are for upper and lower limit in test mix (with admixture).
Hardening time/strength development	4.2 and Tables 6(2), 7(1), 8(2), 10(1) and 11.1(1)	None	Applies to set accelerating, hardening accelerating, set retarding admixtures, set retarding/water reducing/plasticizing and set redarding/ water reducing/super-plasticizing admixtures only. Requirements are for lower limit in test mix (with admixture).
Capillary absorption	4.2 and Table 9 (1)	None	Applies to water resisting admixtures only. Requirement is for an upper limit in test mix (with admixture).
Consistency	4.2 and Table 3.2 (1)(2) and 11.2 (1)	None	Applies to high range water reducing/-super-plasticizing and set retarding/ high range water reducing/super-plasticizing admixtures only. Requirement are for lower limit in test mix (with admixture).
Dangerous substances	Annex ZA	None	Applies to all admixtures for concrete. Requirements are dependant on regulations in the place of use.
Durability	---	---	Durability relates to the concrete incorporating admixtures.
Corrosion behaviour	[A2] Table 1 (10) [A2]	None	Applies to all admixtures to be used in reinforced or prestressed concrete. Requirements are dependant on regulations in the place of use.

The requirement on a certain characteristic is not applicable in those Member States (MSs) where there are no regulatory requirements on that characteristic for the intended use of the product. In this case, manufacturers placing their products on the market of these MSs are not obliged to determine nor declare the performance of their products with regard to this characteristic and the option "No performance determined" (NPD) in the information accompanying the CE marking (see ZA.3) may be used. The NPD option may not be used, however, where the characteristic is subject to a threshold level.

ZA.2 Procedure for attestation of conformity of admixtures for concrete

ZA.2.1 System of attestation of conformity

The system of attestation of conformity for the admixtures for concrete indicated in Table ZA.2, in accordance with the decision of the Commission of nnn/yy of yyy/-mm-dd as given in Annex III of the mandate M128 "Products related to concrete, mortar and grout", is shown in Table ZA.2 for the indicated intended use:

Table ZA.2 – System of attestation of conformity

Product(s)	Intended use	Level(s) or class(es)	Attestation of conformity system(s)
Admixtures	For concrete	--	2+
System 2+: See Directive 89/106/EEC (CPD) Annex III.2 (ii), first possibility, including certification of the factory production control by an approved body on the basis of initial inspection of factory and of factory production control as well as of continuous surveillance, assessment and approval of factory production control.			

The attestation of conformity of the construction products in Table ZA.1 shall be based on the evaluation of conformity procedures in Table ZA.3 resulting from application of the clauses of this or other European Standard indicated therein.

Table ZA.3 – Assignation of evaluation of conformity tasks

Tasks			Content of the task	Clauses to apply
Tasks for the manufacturer	Factory production control (F.P.C)		Parameters related to all relevant characteristics of Table ZA.1	EN 934-2:2001, clause 6 (relevant tests of table 13) EN 934-6:2001, 5.4
	Initial type testing		All relevant characteristics of Table ZA.1	EN 934-6:2001, 5.3
	Testing of samples taken at the factory		All relevant characteristics of Table ZA.1	EN 934-6:2001, 5.4.4.4
Tasks for the notified body	Certification of F.P.C on the basis of	Initial inspection of factory and of F.P.C	Parameters related to all relevant characteristics of Table ZA.1	EN 934-6:2001, clause 5
		Continuous surveillance, assessment and approval of F.P.C.	Parameters related to all relevant characteristics of Table ZA.1	EN 934-2:2001, clause 6 (relevant tests of Table 13) EN 934-6:2001, 5.4

ZA.2.2 EC certificate and declaration of conformity

When compliance with the conditions of this annex is achieved, and once the notified body has drawn up the certificate mentioned below, the manufacturer or his agent established in the EEA shall prepare and retain a declaration of conformity, which entitles the manufacturer to affix the CE-marking. This declaration shall include:

- name and address of the manufacturer, or his authorised representative established in the EEA and place of production,
- description of the product (Trade name, type, identification, use,...), and a copy of the information accompanying the CE-marking
- provisions to which the product conforms (e. g. annex ZA of this EN),
- particular conditions applicable to the use of the product (e. g. provisions for the use of the product under certain conditions, etc.),
- the number of the accompanying factory production control certificate,
- conditions and period of validity of the certificate,
- name of, and position held by, the person empowered to sign the declaration on behalf of the manufacturer or his authorised representative.

The declaration shall be accompanied by a factory production control certificate, drawn up by the notified body, which shall contain, in addition to the information above, the following:

– name and address of the notfied body,
– the number of the factory production control certificate,
– conditions and period of validity of the certificate, where applicable,
– name of, and position held by, the person empowered to sign the certificate.

The above mentioned declaration and certifcate shall be presented, on demand, in the official language or languages of the Member State in which the product is to be used.

ZA.3 CE marking and labelling

The manufacturer or his authorised representative established within the EU or EFTA is responsible for the affixing of the CE marking. When admixtures for concrete are supplied in containers the affixing shall be done on the container. When the material is supplied in bulk the affixing shall be done on the accompanying documents. The following information shall accompany the CE-marking symbol:

– Identification number of the notified body,
– Name or identifying mark and registered address of the producer,
– The last two digits in which the marking is affixed,
– Number of the factory production control certificate,
– Reference to this European Standard,
– Description of the product: generic name, material, dimensions, ... and intended use,
– Information on the relevant essential characteristics listed in Table ZA.1:
  – presented as standard designation in accordance with clause 8.2,
  – given as declared values and, where relevant, level or class to declare for each essential characteristic as indicated in "Notes" in Table ZA.1, for those essential characteristics not covered by the standard designation,
  – making use of the "No performance determined" (NPD) option when relevant.

The "No performance determinded" (NPD) option may not be used where the characteristic is subject to a threshold level. Otherwise, the NPD option may be used when and where the characteristic, for a given intended used is not subject to regulatory requirements.

In addition to any specific information relating to dangerous substances from hardened concrete shown above, the product should also be accompanied, when and where required and in the appropriate form, by documentation listing any other legislation on dangerous substances for which compliance is claimed, together with any information required by that legislation.

NOTE European legislation without national derogations need not be mentioned.

Format of the CE marking and accompanying information:

Figure ZA.1 gives one example for the CE marking and labelling of admixtures for concrete.

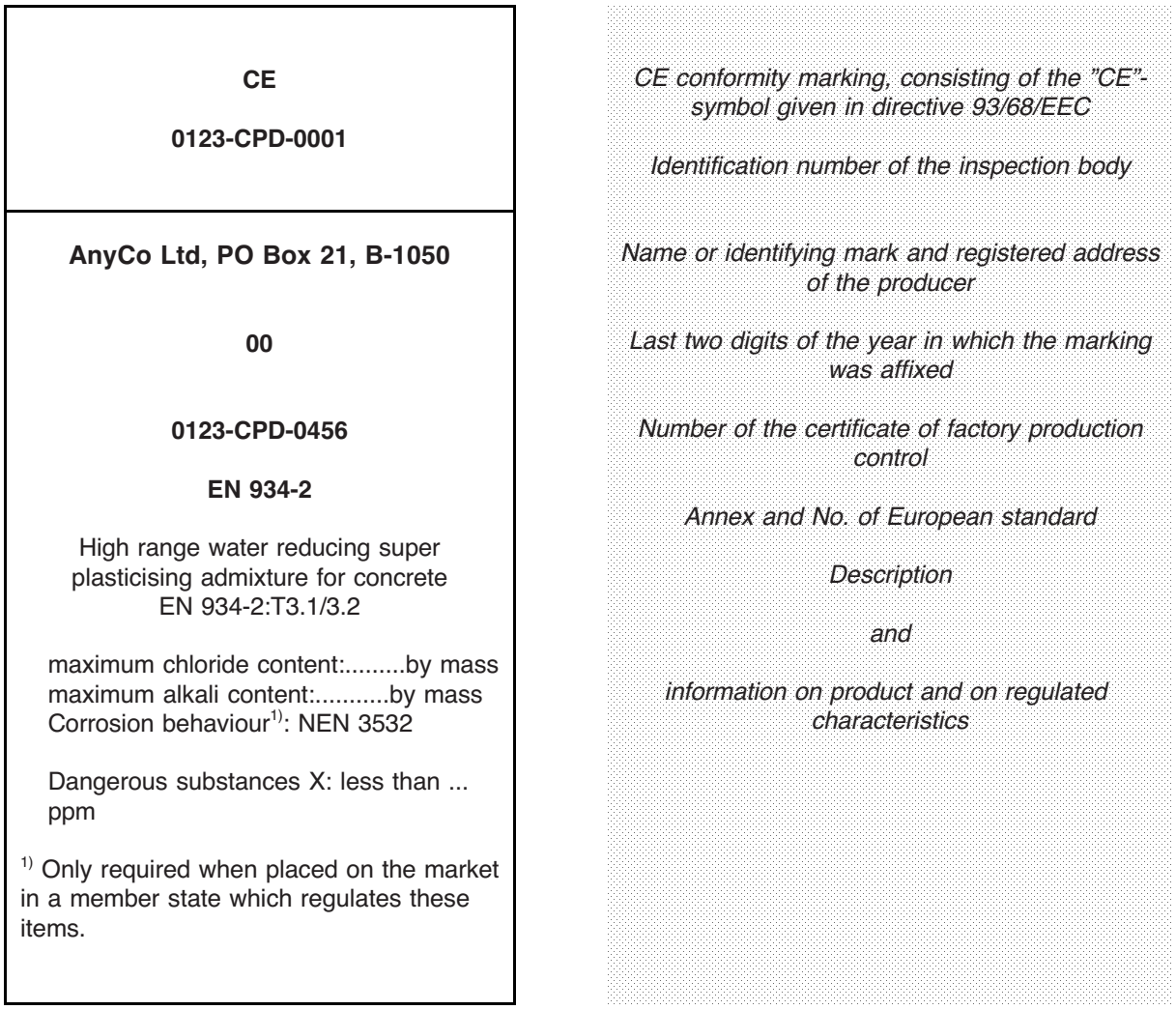

Figure ZA.1 - Example of CE-marking information

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