ILNAS-EN 206:2013+A1:2016 - Preview only Copy via ILNAS e-Shop

ILNAS

Institut luxembourgeois de la normalisation
de l'accréditation, de la sécurité et qualité
des produits et services

ILNAS-EN 206:2013+A1:2016

Concrete - Specification, performance, production and conformity

Beton - Festlegung, Eigenschaften, Herstellung und Konformität

Béton - Spécification, performances, production et conformité

11/2016

National Foreword

This European Standard EN 206:2013+A1:2016 was adopted as Luxembourgish Standard ILNAS-EN 206:2013+A1:2016.

Every interested party, which is member of an organization based in Luxembourg, can participate for FREE in the development of Luxembourgish (ILNAS), European (CEN, CENELEC) and International (ISO, IEC) standards:

- Participate in the design of standards
- Foresee future developments
- Participate in technical committee meetings

https://portail-qualite.public.lu/fr/normes-normalisation/participer-normalisation.html

ILNAS-EN 206:2013+A1:2016 - Preview only Copy via ILNAS e-Shop

THIS PUBLICATION IS COPYRIGHT PROTECTED
Nothing from this publication may be reproduced or utilized in any form or by any mean - electronic, mechanical, photocopying or any other data carries without prior permission!

ILNAS-EN 206:2013+A1:2016

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 206:2013+A1

November 2016

ICS 91.100.30

Supersedes EN 206:2013

English Version

Concrete - Specification, performance, production and conformity

Béton - Spécification, performances, production et conformité

Beton - Festlegung, Eigenschaften, Herstellung und Konformität

This European Standard was approved by CEN on 28 September 2013 and includes Amendment 1 approved by CEN on 27 July 2016.

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 CEN-CENELEC 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 CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.

ILNAS-EN 206:2013+A1:2016 - Preview only Copy via ILNAS e-Shop

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

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

© 2016 CEN All rights of exploitation in any form and by any means reserved worldwide for CEN national Members.

Ref. No. EN 206:2013+A1:2016 E

ILNAS-EN 206:2013+A1:2016 - Preview only Copy via ILNAS e-Shop

Contents

Page

European foreword ... 6

Introduction ... 8

1 Scope ... 9

2 Normative references ... 10

3 Terms, definitions, symbols and abbreviations ... 12
3.1 Terms and definitions ... 12
3.1.1 General ... 12
3.1.2 Constituents ... 15
3.1.3 Fresh concrete ... 17
3.1.4 Hardened concrete ... 19
3.1.5 Conformity and production control ... 20
3.2 Symbols and abbreviations ... 21

4 Classification ... 23
4.1 Exposure classes related to environmental actions ... 23
4.2 Classes for properties of fresh concrete ... 26
4.2.1 Consistence classes ... 26
4.2.2 Classes for additional properties of SCC ... 28
4.3 Classes for properties of hardened concrete ... 29
4.3.1 Compressive strength classes ... 29
4.3.2 Density classes for lightweight concrete ... 31

5 Requirements for concrete and methods of verification ... 32
5.1 Basic requirements for constituents ... 32
5.1.1 General ... 32
5.1.2 Cement ... 32
5.1.3 Aggregates ... 32
5.1.4 Mixing water ... 33
5.1.5 Admixtures ... 33
5.1.6 Additions (including mineral fillers and pigments) ... 33
5.1.7 Fibres ... 33
5.2 Basic requirements for composition of concrete ... 33
5.2.1 General ... 33
5.2.2 Selection of cement ... 34
5.2.3 Selection of aggregates ... 34
5.2.4 Use of mixing water ... 35
5.2.5 Use of additions ... 35
5.2.6 Use of admixtures ... 37
5.2.7 Use of fibres ... 38
5.2.8 Chloride content ... 38
5.2.9 Concrete temperature ... 39
5.3 Requirements related to exposure classes ... 39
5.3.1 General ... 39
5.3.2 Limiting values for concrete composition ... 39
5.3.3 Performance-related methods ... 40
5.4 Requirements for fresh concrete ... 40
5.4.1 Consistence, viscosity, passing ability and resistance to segregation ... 40

5.4.2 Cement content and water/cement ratio 41
5.4.3 Air content 41
5.4.4 Fibre content 41
5.5 Requirements for hardened concrete 42
5.5.1 Strength 42
5.5.2 Density 42
5.5.3 Resistance to water penetration 43
5.5.4 Reaction to fire 43

6 Specification of concrete 43
6.1 General 43
6.2 Specification for designed concrete 44
6.2.1 General 44
6.2.2 Basic requirements 44
6.2.3 Additional requirements 45
6.3 Specification for prescribed concrete 45
6.3.1 General 45
6.3.2 Basic requirements 45
6.3.3 Additional requirements 46
6.4 Specification of standardized prescribed concrete 46

7 Delivery of fresh concrete 46
7.1 Information from the user of the concrete to the producer 46
7.2 Information from the producer of the concrete to the user 47
7.3 Delivery ticket for ready-mixed concrete 48
7.4 Delivery information for site-mixed concrete 49
7.5 Mix adjustments after the main mixing process and prior to discharge 49

8 Conformity control and conformity criteria 49
8.1 General 49
8.2 Conformity control for designed concrete 50
8.2.1 Conformity control for compressive strength 50
8.2.2 Conformity control for tensile splitting strength 55
8.2.3 Conformity control for properties other than strength 55
8.3 Conformity control of prescribed concrete including standardized prescribed concrete 60
8.4 Actions in the case of non-conformity of the product 60

9 Production control 61
9.1 General 61
9.2 Production control systems 61
9.3 Recorded data and other documents 62
9.4 Testing 64
9.5 Concrete composition and initial testing 64
9.6 Personnel, equipment and installation 64
9.6.1 Personnel 64
9.6.2 Equipment and installation 64
9.7 Batching of constituents 65
9.8 Mixing of concrete 66
9.9 Production control procedures 66

10 Evaluation of conformity 70
10.1 General 70
10.2 Assessment, surveillance and certification of production control 71

11 Designation for designed concrete 71

ILNAS-EN 206:2013+A1:2016 - Preview only Copy via ILNAS e-Shop

Annex A (normative) **Initial test** ... 72
A.1 General ... 72
A.2 Party responsible for initial tests ... 72
A.3 Frequency of initial tests ... 72
A.4 Test conditions ... 72
A.5 Criteria for adoption of initial tests ... 73

Annex B (normative) **Identity testing** ... 74
B.1 General ... 74
B.2 Sampling and testing plan ... 74
B.3 Identity criteria for compressive strength ... 74
B.3.1 Concrete under production control certification ... 74
B.3.2 Concrete not under production control certification ... 75
B.4 Identity criteria for consistence and air content ... 75
B.5 Identity criteria for fibre content and homogeneity of fresh concrete ... 75

Annex C (normative) **Provisions for assessment, surveillance and certification of production control** ... 76
C.1 General ... 76
C.2 Tasks for the inspection body ... 76
C.2.1 Initial assessment of the production control ... 76
C.2.2 Continuous surveillance of the production control ... 77
C.3 Tasks for the certification body ... 78
C.3.1 Certification of production control ... 78
C.3.2 Measures in case of non-conformity ... 78

Annex D (normative) **Additional requirements for specification and conformity of concrete for special geotechnical works** ... 80
D.1 General ... 80
D.2 Constituents ... 80
D.2.1 Cement ... 80
D.2.2 Aggregates ... 81
D.3 Concrete ... 81
D.3.1 General requirements for specification and acceptance of the mix design ... 81
D.3.2 Minimum fines content and minimum cement content ... 82
D.3.3 Water/cement ratio ... 82
D.3.4 Fresh concrete ... 83

Annex E (informative) **Recommendation for the use of aggregates** ... 84
E.1 General ... 84
E.2 Natural normal-weight and heavy-weight aggregates and air-cooled blast furnace slag ... 84
E.3 Recommendation for the use of coarse recycled aggregates ... 85
E.4 Recommendation for the use of lightweight aggregates ... 86

Annex F (informative) **Recommendation for limiting values of concrete composition** ... 88

Annex G (informative) **Guidelines for self-compacting concrete requirements in the fresh state** ... 90
G.1 General ... 90
G.2 Recommendations on classification of self-compacting concrete ... 91
G.2.1 Consistence ... 91
G.2.2 Viscosity ... 91
G.2.3 Passing ability ... 91
G.2.4 Segregation resistance ... 91

Annex H (informative) **Rules of application for 8.2.1.3, Method C** ... 92

ILNAS-EN 206:2013+A1:2016 - Preview only Copy via ILNAS e-Shop

H.1 Introduction 92
H.2 Control based on the cusum system 92
H.3 Control based on Shewhart charts with modified limits by variables 93

Annex J (informative) **Deviation to accommodate a notified Spanish Regulation** 94

Annex K (informative) **Concrete families** 95
K.1 General 95
K.2 Selection of the concrete family 95
K.3 Flow chart for the assessment of membership and conformity of a concrete family 96

Annex L (informative) **Further information regarding specific paragraphs** 97

Annex M (informative) **Guidance on provisions valid in the place of use** 99

Bibliography 101

ILNAS-EN 206:2013+A1:2016 - Preview only Copy via ILNAS e-Shop

ILNAS-EN 206:2013+A1:2016 - Preview only Copy via ILNAS e-Shop

European foreword

This document (EN 206:2013+A1:2016) 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 May 2017 and conflicting national standards shall be withdrawn at the latest by May 2017.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

Based on a CEN/BT Decision (T 42/2013) EN 12620:2013 was withdrawn. Therefore, this document has been aligned with the specifications given in EN 12620:2002+A1:2008. As soon as CEN/TC 154 publishes a new version of EN 12620, CEN/TC 104 intends to amend EN 206.

This document includes Amendment 1 approved by CEN on 27 July 2016.

This document supersedes [A1⟩ EN 206:2013 ⟨A1].

The start and finish of text introduced or altered by amendment is indicated in the text by tags [A1⟩ ⟨A1].

[A1⟩ In particular, the following main items had been subject to revision when preparing EN 206:2013: ⟨A1]

a) adding application rules for fibre concrete and concrete with recycled aggregates;

b) revising *k*-value concept for fly ash and silica fume and adding new rules for ground granulated blast furnace slag;

c) introduction of principles for the performance concepts for the use of additions, e.g. equivalent concrete performance concept and equivalent performance of combinations concept;

d) revising and adding new concepts for the conformity assessment;

e) including EN 206-9 "Additional rules for self-compacting concrete (SCC)";

f) including additional requirements for concrete for special geotechnical works (Annex D).

NOTE Annex D was jointly prepared by CEN/TC 104 and CEN/TC 288.

Figure 1 illustrates the relationships between EN 206 and standards for design and execution, standards for constituents and test standards.

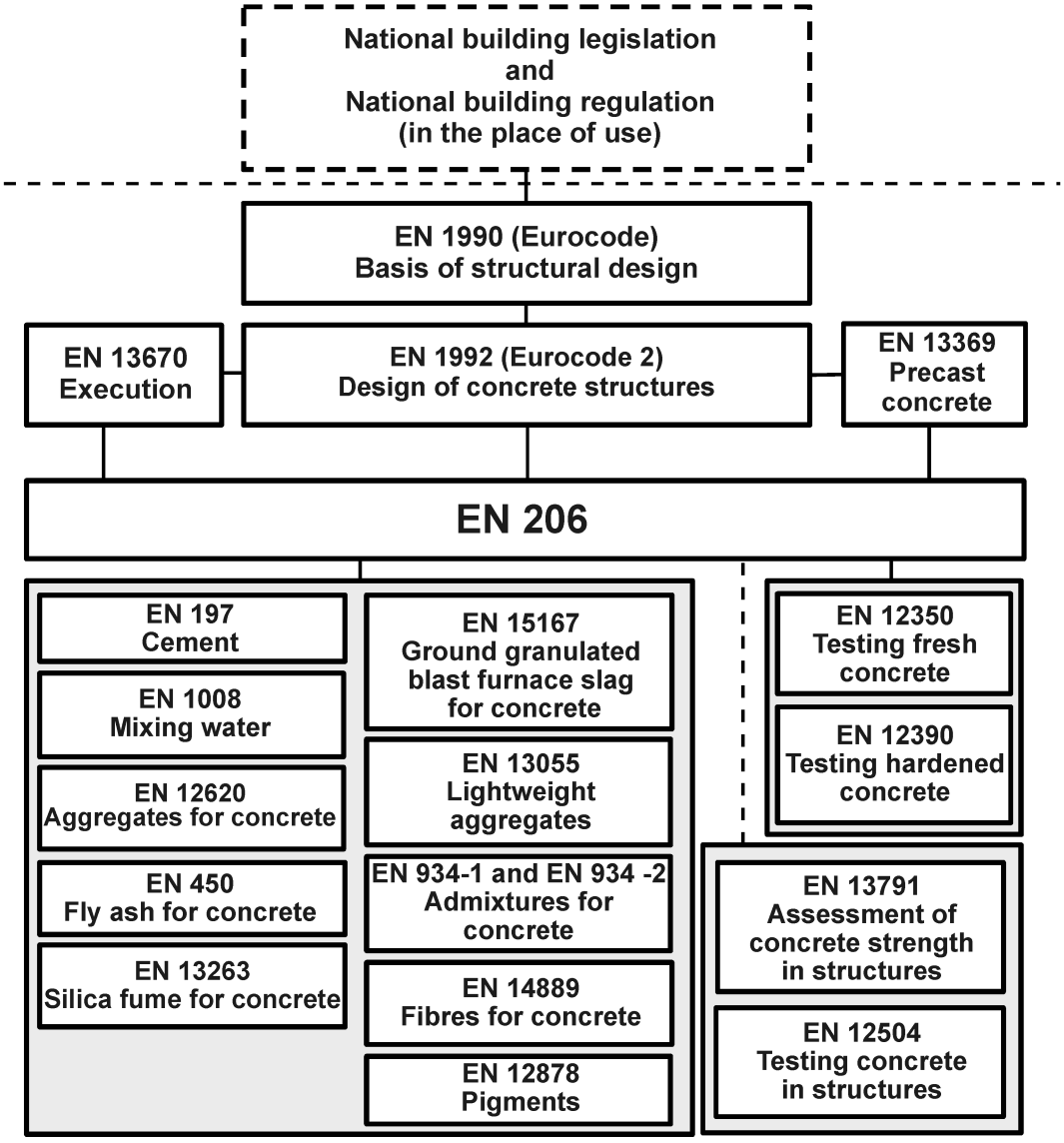

Figure 1 — Relationships between EN 206 and standards for design and execution, standards for constituents and test standards

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

ILNAS-EN 206:2013+A1:2016 - Preview only Copy via ILNAS e-Shop