



NSAI
Standards

Irish Standard
I.S. EN 1520:2011

Prefabricated reinforced components of lightweight aggregate concrete with open structure with structural or non-structural reinforcement

I.S. EN 1520:2011

Incorporating amendments/corrigenda/National Annexes issued since publication:

The National Standards Authority of Ireland (NSAI) produces the following categories of formal documents:

I.S. xxx: Irish Standard – national specification based on the consensus of an expert panel and subject to public consultation.

S.R. xxx: Standard Recommendation - recommendation based on the consensus of an expert panel and subject to public consultation.

SWIFT xxx: A rapidly developed recommendatory document based on the consensus of the participants of an NSAI workshop.

This document replaces:
EN 1520:2002

<i>This document is based on:</i> EN 1520:2011 EN 1520:2002	<i>Published:</i> 3 January, 2012 20 November, 2002
---	---

This document was published under the authority of the NSAI and comes into effect on:
3 January, 2012

ICS number:
91.100.30

NSAI
1 Swift Square,
Northwood, Santry
Dublin 9

T +353 1 807 3800
F +353 1 807 3838
E standards@nsai.ie
W NSAI.ie

Sales:
T +353 1 857 6730
F +353 1 857 6729
W standards.ie

Údarás um Chaighdeáin Náisiúnta na hÉireann

I.S. EN 1520:2011

National Foreword

This Irish Standard is the national version of European Standard EN 1520 *Prefabricated reinforced components of lightweight aggregate concrete with open structure*

I.S. EN 1520:2002 included an Irish National Annex which addressed requirements for intended use for the essential characteristics listed in Tables ZA.1a to ZA.1h inclusive.

At the time of publication of the 2011 version of the standard, NSAI is engaged with industry experts to update the National Annex to take account of changes in the European standard.

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

Compliance with an Irish Standard does not of itself confer immunity from legal obligations.

In line with international standards practice the decimal point is shown as a comma (,) throughout this document
--

This page is intentionally left BLANK.

English Version

**Prefabricated reinforced components of lightweight aggregate
concrete with open structure with structural or non-structural
reinforcement**

Composants préfabriqués en béton de granulats légers à
structure ouverte avec des armatures structurales et non-
structurales

Vorgefertigte Bauteile aus haufwerksporigem Leichtbeton
und mit statisch anrechenbarer oder nicht anrechenbarer
Bewehrung

This European Standard was approved by CEN on 5 February 2011.

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, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.



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

Management Centre: Avenue Marnix 17, B-1000 Brussels

Contents

	Page
Foreword.....	7
1 Scope	10
2 Normative references	10
3 Terms, definitions, symbols and abbreviations	13
3.1 Terms and definitions	13
3.2 Symbols	13
3.2.1 General symbols	13
3.2.2 Subscripts	14
3.2.3 Symbols used in this European Standard	14
3.3 Abbreviations	19
3.4 Units	19
4 Properties and requirements of materials	20
4.1 Constituents	20
4.1.1 General.....	20
4.1.2 Release of dangerous substances.....	20
4.2 Lightweight aggregate concrete parameters	20
4.2.1 Dry density	20
4.2.2 Characteristic strength values	21
4.2.3 Compressive strength.....	21
4.2.4 Flexural strength and uniaxial tensile strength.....	23
4.2.5 Stress-strain diagram	23
4.2.6 Modulus of elasticity	24
4.2.7 Poisson's ratio	24
4.2.8 Coefficient of thermal expansion	24
4.2.9 Drying shrinkage.....	24
4.2.10 Creep	25
4.2.11 Thermal conductivity.....	25
4.2.12 Water vapour permeability.....	27
4.2.13 Water tightness	27
4.3 Reinforcement steel	27
5 Properties and requirements of components.....	28
5.1 General.....	28
5.1.1 Mechanical resistance.....	28
5.1.2 Deflections.....	28
5.1.3 Acoustic properties	28
5.1.4 Reaction to fire and resistance to fire	29
5.1.5 Design thermal resistance and design thermal conductivity	29
5.2 Types of components.....	30
5.2.1 General.....	30
5.2.2 Roof and floor components.....	31
5.2.3 Wall components	31
5.2.4 Beams and piers	31
5.2.5 Other prefabricated components	31
5.3 Detailing, technical requirements, and declared properties	31
5.3.1 Detailing.....	31
5.3.2 Dimensions and tolerances	31
5.3.3 Mass of the components.....	32
5.3.4 Deflections.....	32
5.3.5 Strength of joints	32
5.3.6 Minimum requirements	32
5.3.7 Reinforcement detailing.....	32
5.4 Additional requirements for roof and floor components and beams.....	33
5.4.1 Minimum dimensions	33

5.4.2	Minimum requirements for structural reinforcement	33
5.4.3	Support length	34
5.5	Additional requirements for wall components	35
5.5.1	General.....	35
5.5.2	Walls with non-structural reinforcement.....	35
5.5.3	Walls with structural reinforcement	35
5.6	Durability	36
5.6.1	General.....	36
5.6.2	Minimum cover with regard to bond.....	37
5.6.3	Exposure classes related to environmental conditions	37
5.6.4	Corrosion protection of reinforcement	38
5.6.5	Freeze-thaw resistance	40
6	Evaluation of conformity.....	40
6.1	Introduction	40
6.2	Initial type-testing of the component.....	41
6.2.1	General.....	41
6.2.2	Sharing of results from ITT.....	41
6.3	Factory production control.....	42
6.3.1	General.....	42
6.3.2	Process control.....	42
6.3.3	Finished products.....	42
6.4	Initial inspection of the factory and the factory production control	43
6.4.1	Information to be supplied.....	43
6.4.2	Inspection	43
6.4.3	Reports	43
6.5	Surveillance, assessment and approval of the factory production control	43
6.5.1	Inspection tasks.....	43
6.5.2	Frequency of inspections	43
6.5.3	Reports	44
6.6	Actions to be taken in the event of non-conformity	44
7	Basis for design	50
7.1	Design methods	50
7.2	Limit states	50
7.3	Actions.....	50
8	Marking, labelling and designation.....	51
8.1	Standard designation	51
8.2	Additional information on accompanying documents	52
Annex A (normative) Design of components by calculation.....		53
Annex B (informative) Design of components by testing		81
Annex C (informative) Recommended values for partial safety factor.....		87
Annex ZA (informative) Provisions for the CE marking of prefabricated components of lightweight aggregate concrete with open structure with structural or non-structural reinforcement under the EU Construction Product Directive		88
Bibliography		109

Figures

Figure 1 — Determination of dry thermal conductivity $\lambda_{10\text{dry}}$	26
Figure 2 — Examples of multilayer slab, hollow core slab and solid slab (With respect to transverse reinforcement, see 5.4.2.1).....	34
Figure 3 — Support length a_0	35
Figure 4 — Basic design of hollow core wall components	36
Figure A.1 — Bi-linear stress-strain diagram for LAC in compression for cross-sectional design	55
Figure A.2 — Design stress-strain diagram for reinforcement steel.....	56
Figure A.3 — Possible strain diagrams in the ultimate limit state	56
Figure A.4 — Limits of slenderness ratio S of loadbearing walls and piers	62
Figure A.5 — Design loads for cellar walls	67
Figure A.6 — Additional horizontal force H_{fd} due to inclination of the components and effects of second order theory	72
Figure A.7 — Tensile splitting forces in wall components with oversail s	73
Figure A.8 — Tensile splitting forces at the top of a hollow core wall component.	74
Figure A.9 — Tensile splitting force T due to centric loading	75
Figure A.10 — Anchorage of smooth reinforcing bars	79
Figure A.11 — Anchorage of ribbed reinforcing bars	79
Figure B.1 — Definition of shear span l_s	83
Figure B.2 — Simplified N/M interaction diagram of the cross-section, representing results of three test series	86
Figure ZA 1 — Example of CE marking with Method 1.....	101
Figure ZA 2 — Example of CE marking with Method 2.....	103
Figure ZA.3 — Example of CE marking with Method 3a.....	105
Figure ZA.4 — Example of CE marking with Method 3b.....	107
Figure ZA.5 — Example of simplified label.....	108

Tables

Table 1 — Tolerances on declared mean dry density of LAC.....	20
Table 2 — Density classes of LAC	21
Table 3 — Determination of the characteristic strength f_k and required minimum strength f_{min}	21
Table 4 — Statistical coefficient K_n for determination of characteristic strength.....	22
Table 5 — Reduction factors for compressive strength of cores with indicated diameter and equal length of cubes	22

Table 6 — Conversion factors for conversion of test results of cast test specimens to the strength of reference test specimens (drilled cores of 100 mm diameter and length or 100 mm cubes)	22
Table 7 — Strength classes and strength requirements for LAC	23
Table 8 — Dry thermal conductivity $\lambda_{10\text{dry}}$ of LAC for 50 % and 90 % of production, with a confidence level $\gamma = 90$ % (compiled according to EN 1745)	27
Table 9 — Basic values for moisture content and moisture conversion coefficient of LAC (compiled according to EN ISO 10456)	29
Table 10 — Types of components	30
Table 11 — Maximum permissible deviation from squareness in the plane of components	32
Table 12 — Minimum percentage of reinforcement R	33
Table 13 — Description of permissible exposure classes with respect to risk of reinforcement corrosion	37
Table 14 — Embedding in a zone of normal concrete or LC-concrete with closed structure - Minimum concrete cover in mm	38
Table 15 — Minimum concrete cover in mm for hot dip galvanized reinforcement steel	39
Table 16 — Minimum concrete cover in mm with regard to durability and test method to pass by initial type-test and FPC for bars with a corrosion protective coating	40
Table 17 — Initial type-testing of the LAC components	45
Table 18 — Factory production control, testing of the finished product LAC components for structural uses	46
Table 19 — Factory production control, testing of the finished product, LAC components for non-loadbearing uses	48
Table A.1 — Minimum percentages of shear reinforcement $\rho_{w,\text{min}}$ for reinforcement steel with $f_{yk} = 500$ MPa	60
Table A.2 — Coefficient β for the determination of the buckling length l_0 at different boundary conditions (used in Equation (A. 25), $l_0 = \beta \cdot l_w$)	64
Table A.3 — Required dimensions of beams without verification of loadbearing capacity	71
Table A.3 — Limits of reinforcement in roof and floor components for design by calculation (plain steel, with characteristic yield strength $f_{yk} \leq 220$ MPa)	78
Table C.1 — Partial safety factors γ_M for material properties	87
Table C.2 — Partial safety factors γ_{comp} for components	87
Table ZA.1a — Harmonised clauses for loadbearing wall components	89
Table ZA.1b — Harmonised clauses for retaining wall components	90
Table ZA.1c — Harmonised clauses for roof components	91
Table ZA.1d — Harmonised clauses for floor components	92
Table ZA.1e — Harmonised clauses for linear components	93
Table ZA.1f — Harmonised clauses for non-loadbearing wall components	94
Table ZA.1g — Harmonised clauses for cladding components	95

I.S. EN 1520:2011

EN 1520:2011 (E)

Table ZA.1h — Harmonised clauses for small box culvert components	96
Table ZA.2a — Systems of attestation of conformity	97
Table ZA.2b — Assignment of evaluation of conformity tasks (for structural components) under system 2+	97
Table ZA.2c — Assignment of evaluation of conformity tasks (for non structural or light structural components) under System 4.....	98

Foreword

This document (EN 1520:2011) has been prepared by Technical Committee CEN/TC 177 “Prefabricated reinforced components of autoclaved aerated concrete or lightweight aggregate concrete with open structure”, 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 September 2011, and conflicting national standards shall be withdrawn at the latest by December 2012.

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.

This document supersedes EN 1520:2002.

Among others, the following changes have been made compared to EN 1520:2002:

- terms and definitions have been updated;
- the order of clauses has been changed;
- lightweight aggregate concrete parameters have been adapted;
- normative references for reinforcement steel have been updated;
- properties and requirements of components have been adapted, e.g. acoustic properties, thermal resistance;
- evaluation of conformity has been adapted;
- Annex A and Annex ZA have been adapted;
- the standard has been editorially edited.

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 89/106/EEC.

For relationship with EU Directives, see informative Annex ZA, which is an integral part of this document.

This document uses the methods given in the Guidance Paper L, clause 3.3, of the European Commission.

This European Standard is used together with a national application document. The national application document may only contain information on those parameters which are left open in this European Standard for national choice, known as Nationally Determined Parameters, to be used for the design of the construction products and civil engineering works to be constructed in the country concerned, i.e.:

- values and/or classes where alternatives are given in this European Standard;
- values to be used where a symbol only is given in this European Standard;
- country specific data (geographical, climatic, etc.), e.g. snow map;
- the procedure to be used where alternative procedures are given in this European Standard.

I.S. EN 1520:2011**EN 1520:2011 (E)**

It may contain

- decisions on the application of informative annexes;
- references to non-contradictory complementary information to assist the user to apply this European Standard.

There is a need for consistency between this document for construction products and the technical rules for works. That means all the information accompanying the CE Marking of the construction products should clearly mention which Nationally Determined Parameters have been taken into account.

EN 1520 describes the design principles and requirements for safety, serviceability and durability of prefabricated components of lightweight aggregate concrete with open structure and with structural or non-structural reinforcement. The design of the components is based on the limit state concept used in conjunction with partial safety factors.

EN 1520 is intended to be used together with Eurocodes EN 1990, EN 1991 and EN 1998.

Numerical values for partial safety factors and other reliability parameters are recommended as basic values that provide an acceptable level of reliability. They have been selected assuming that an appropriate level of workmanship and of quality management applies.

This European Standard gives values with notes indicating where national choices may be made. Therefore, the National Standard implementing EN 1520 should be used with a national application document containing all Nationally Determined Parameters to be used for the design of prefabricated components of lightweight aggregate concrete with open structure and with structural or non-structural reinforcement to be constructed in the relevant country.

National choice is allowed in EN 1520 through the following clauses:

4.3	A.5.2
5.1.1.1	A.6
5.3.5	A.6.1
5.3.7	A.6.2
5.4.3	A.6.3.3.3
5.5.1	A.8.1.4
5.6.2	A.8.2.1.2
5.6.4.2	A.8.2.2.2
7.3	A.9
A.3	B.3.2
A.4.1	B.3.3
A.4.2	B.4.3.1
A.4.3	B.4.3.3
A.5.1	Annex C

Regulatory classes are only given for "Reaction to fire" and "Resistance to fire". All other classes used in this European Standard, i.e. density classes and strength classes, are technical classes.

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, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

1 Scope

This European Standard is for prefabricated components of lightweight aggregate concrete (LAC) with open structure and with structural or non-structural reinforcement intended to be used in building construction

a) for structural elements:

- loadbearing wall components (solid, hollow core or multilayer);
- retaining wall components (solid) with or without surcharge loading;
- roof components (solid, hollow core or multilayer);
- floor components (solid, hollow core or multilayer);
- linear components (beams or piers).

b) for non-structural elements:

- non-loadbearing wall components (e.g. for partition walls);
- cladding components (without fixtures) intended to be used for external facades of buildings;
- small box culverts used to form channels for the enclosure of services;
- components for noise barriers.

NOTE 1 In addition to their loadbearing and encasing function, components can also be used to provide fire resistance, sound insulation and thermal insulation.

Components covered by this European Standard are only intended to be subjected to predominantly non-dynamic actions, unless special measures are introduced in the relevant clauses of this European Standard.

The term "reinforced" relates to reinforcement used for both structural and non-structural purposes.

This European Standard does not cover:

- rules for the application of these components in structures;
- joints (except their strength);
- fixtures;
- finishes for external components, such as tiling.

NOTE 2 LAC components can be used in noise barriers if they are designed to fulfil also the requirements of EN 14388.

2 Normative references

The following referenced documents are indispensable for the application 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.

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

EN 990, *Test methods for verification of corrosion protection of reinforcement in autoclaved aerated concrete and lightweight aggregate concrete with open structure*

EN 991, *Determination of the dimension of prefabricated reinforced components made of autoclaved aerated concrete or lightweight aggregate concrete with open structure*

This is a free preview. Purchase the entire publication at the link below:

[Product Page](#)

-
- [Looking for additional Standards? Visit Intertek Inform Infostore](#)
 - [Learn about LexConnect, All Jurisdictions, Standards referenced in Australian legislation](#)
-