



SLOVENSKI STANDARD

SIST EN 1520:2003

01-julij-2003

Armirani montažni elementi iz betona iz lahkega agregata z odprto strukturo

Prefabricated reinforced components of lightweight aggregate concrete with open structure

Vorgefertigte bewehrte Bauteile aus haufwerksporigem Leichtbeton

Produits préfabriqués armés en béton de granulats légers à structure ouverte

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ICS:

91.100.30	Beton in betonski izdelki	Concrete and concrete products
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Prefabricated reinforced components of lightweight aggregate concrete with open structure

Produits préfabriqués armés en béton de granulats légers à structure ouverte

Vorgefertigte bewehrte Bauteile aus haufwerksporigem Leichtbeton

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

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Foreword

This document EN 1520:2002 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of an identical text or by endorsement, at the latest by May 2003, and conflicting national standards shall be withdrawn at the latest by August 2004.

This European Standard has been prepared under mandate M100 given to CEN by the European Commission and the European Free Trade Association and supports essential requirements of Directives 89/106/EEC.

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

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.

Annexes A and B are normative.

Annex C is informative.

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

1 Scope

This European Standard is for prefabricated reinforced components of lightweight aggregate concrete with open structure intended to be used in building constructions

- 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.

Depending on the type and intended use of elements for which the components are utilised, the components can be applied - in addition to their loadbearing and encasing function - for purposes of fire resistance, sound insulation and thermal insulation in the relevant clauses of this European Standard.

Components covered by this 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.

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 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.*
- EN 992, *Determination of the dry density of lightweight aggregate concrete with open structure.*
- EN 1352, *Determination of static modulus of elasticity under compression of autoclaved aerated concrete or lightweight aggregate concrete with open structure.*
- EN 1354, *Determination of compressive strength of lightweight aggregate concrete with open structure.*
- EN 1355:1996, *Determination of creep strains under compression of autoclaved aerated concrete or lightweight aggregate concrete with open structure.*
- EN 1356, *Performance test for prefabricated reinforced components of autoclaved aerated concrete or lightweight aggregate concrete with open structure under transverse load.*
- EN 1364-1, *Fire resistance tests for non-loadbearing elements – Part 1: Walls.*
- EN 1365-1, *Fire resistance tests for loadbearing elements – Part 1: Walls.*
- EN 1365-2, *Fire resistance tests for loadbearing elements – Part 2: Floors and roofs.*
- EN 1365-3, *Fire resistance tests for loadbearing elements – Part 3: Beams.*
- EN 1365-4, *Fire resistance tests for loadbearing elements – Part 4: Columns.*
- EN 1521, *Determination of flexural strength of lightweight aggregate concrete with open structure.*
- EN 1739, *Determination of shear strength for in-plane forces of joints between prefabricated components made of autoclaved aerated concrete or lightweight aggregate concrete with open structure.*
- EN 1740, *Performance test for prefabricated reinforced components made of autoclaved aerated concrete or lightweight aggregate concrete with open structure under predominantly longitudinal load (vertical components).*
- EN 1741, *Determination of shear strength for out-of-plane forces of joints between prefabricated components made of autoclaved aerated concrete or lightweight aggregate concrete with open structure.*
- EN 1745, *Masonry and masonry products – Methods for determining design thermal values.*
- EN 1793-1, *Road traffic noise reducing devices – Test method for determining the acoustic performance – Part 1: Intrinsic Characteristics of sound absorption.*
- EN 1793-2, *Road traffic noise reducing devices – Test method for determining the acoustic performance – Part 2: Intrinsic characteristics of airborne sound insulation.*
- EN 10002-1, *Metallic materials – Tensile testing – Part 1: Method of test at ambient temperature.*
- EN 10025, *Hot rolled products of non-alloy structural steels – Technical delivery conditions.*
- prEN 10080-1, *Steel for the reinforcement of concrete – Weldable reinforcing steel – Part 1: General requirements.*
- EN 12354-1, *Building acoustics – Estimation of acoustic performance of buildings from the performance of elements – Part 1: Airborne sound insulation between rooms.*
- EN 12354-2, *Building acoustics – Estimation of acoustic performance of buildings from the performance of elements – Part 2: Impact sound insulation between rooms.*
- EN 12524, *Building materials and products - Hygrothermal properties - Tabulated design values.*

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EN 12664, *Thermal performance of building materials and products – Determination of thermal resistance by means of guarded hot plate and heat flow meter methods – Dry and moist products of medium and low thermal resistance.*

EN 12667 *Thermal performance of building materials and products - Determination of thermal resistance by means of guarded hot plate and heat flow meter methods - Products of high and medium thermal resistance.*

EN 12939, *Thermal performance of building materials and products – Determination of thermal resistance by means of guarded hot plate and heat flow meter methods – Thick products of high and medium thermal resistance.*

EN 13055-1, *Lightweight aggregates – Part 1: Lightweight aggregates for concrete, mortar and grout.*

EN 13501-1, *Fire classification of construction products and building elements – Part 1: Classification using test data from reaction to fire tests.*

prEN 13501-2, *Fire classification of construction products and building elements – Part 2: Classification using data from fire resistance tests (excluding products for use in ventilation systems).*

EN 20354, *Acoustics – Measurement of sound absorption in a reverberation room (ISO 354:1985).*

EN ISO 140-3, *Acoustics - Measurement of sound insulation in buildings and of building elements - Part 3: Laboratory measurements of airborne sound insulation of building elements (ISO 140-3:1995).*

EN ISO 140-6, *Acoustics – Measurement of sound insulation in buildings and of building elements – Part 6: Laboratory measurements of impact sound insulation of floors (ISO 140-6:1998).*

EN ISO 717-1, *Acoustics – Rating of sound insulation in buildings and of building elements – Part 1: Airborne sound insulation (ISO 717-1:1996).*

EN ISO 717-2, *Acoustics – Rating of sound insulation in buildings and of building elements – Part 2: Impact sound insulation (ISO 717-2:1996).*

EN ISO 6946, *Building components and building elements – Thermal resistance and thermal transmittance – Calculation method (ISO 6946:1996).*

EN ISO 10456, *Building materials and products - Procedures for determining declared and design thermal values (ISO 10456:1999).*

EN ISO 12572, *Hygrothermal performance of building materials and products – Determination of water vapour transmission properties (ISO 12572:2001).*

ISO 1000, *SI units and recommendations for the use of their multiples and of certain other units.*

ISO 1000 AMD 1, *SI units and recommendations for the use of their multiples and of certain other units - Part Amendment 1.*

3 Definitions, symbols and abbreviations

3.1 Terms and definitions

For the purposes of this European Standard the following terms and definitions apply.

3.1.1

lightweight aggregate (LWA)

aggregate consisting of grains with a porous structure and with a particle density of not more than 2 000 kg/m³ or a loose bulk density of not more than 1 200 kg/m³

3.1.2**lightweight aggregate concrete (LAC)**

concrete with an open structure having an oven-dry density of not more than 2 000 kg/m³ and made with aggregates consisting entirely or mainly of lightweight aggregates (LWA)

3.1.3**open structure**

internal structure of a concrete composed in such a manner that a part of its volume (typically more than 3 %) consists of voids between the aggregate grains (These voids are due to a reduced content of aggregate fines and/or cementitious material.)

3.1.4**loadbearing component**

component, which is essential to the overall stability of the structure

3.1.5**non loadbearing component**

component, which is not essential to the overall stability of the structure. The component carries its own dead weight. Components exposed to wind loads are considered to be loadbearing

3.2 Symbols**3.2.1 General symbols**

A area;

b width of component;

d effective depth or thickness of component;

e eccentricity;

E modulus of elasticity;

f strength;

h depth or thickness of component;

i radius of inertia;

I moment of inertia;

k coefficient, factor;

l length, height of wall component, span length of a roof or floor component;

M bending moment;

N axial compression force;

t time;

V shear force;

γ partial safety factor, confidence level;

ϵ strain;

σ normal stress;

τ shear stress.

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3.2.2 Subscripts

- a anchorage;
- c concrete parameter, compression;
- comp component;
- cr critical;
- d design value;
- dry dry state;
- eff effective value;
- fl flexural;
- g declared value;
- h horizontal;
- hum in the moist state;
- k characteristic value;
- M material;
- m mean, mandrel;
- pl plastic;
- R resistance;
- s steel parameter, shear; drying shrinkage;
- t tension;
- u ultimate (in the ultimate limit state ULS);
- w welded, web (shear reinforcement), weak axis;
- y yield value (for steel);
- 0 effective value.

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3.2.3 Symbols used in this European Standard

- a* dimension of a support perpendicular to the plane of the wall, width of a cavity in hollow core components;
- A_c* area of the lightweight aggregate concrete section; compression zone of the cross-section;
- A_{s1}* area of tension reinforcement;
- A_{sw}* area of shear reinforcement;
- b* width of component;
- b₀* minimum residual cross-sectional width of a slab;

b_w	minimum width of the section over the effective depth, minimum width of the section in the compression zone;
d	design thickness of a pier or wall (for a solid wall $d = h$), effective thickness of a cross-section;
E_{cm}	mean modulus of elasticity of concrete;
E_s	modulus of elasticity of steel;
e_a	additional eccentricity of the longitudinal action due to geometrical imperfections;
e_{cr}	eccentricity e_0 of the vertical action including the geometrical imperfections, for the calculation of N_{cr} it shall be assumed greater than or equal to 1/500 of the wall height;
e_g	declared eccentricity at the top of a vertical component, i.e. the eccentricity used in the operational testing;
e_N	eccentricity of the longitudinal action in the plane of the component;
e_0	first order eccentricity of the longitudinal action determined on the basis of both the vertical and the horizontal actions;
e_t	resulting first order eccentricity perpendicular to the plane of the component, taken as the sum of e_0 and e_a ;
f_{cd}	design value of the compressive strength of LAC;
f_{ck}	characteristic value of the compressive strength of LAC;
$f_{ck,g}$	declared characteristic compressive strength;
$f_{c,n}$	required minimum compressive strength of a test set with $n \geq 6$ test specimens;
$f_{c,3}$	required minimum compressive strength of each test set of three consecutive test specimens;
f_k	characteristic value of strength parameters;
f_{min}	required minimum strength;
$f_{m,n}$	mean value of n strength results;
$f_{t,flk}$	characteristic flexural strength of LAC;
f_u	moisture conversion coefficient;
f_{yd}	design value of the yield strength of the steel;
f_{yk}	characteristic value of the yield strength of the steel;
f_{ywd}	design value of the yield strength of the shear reinforcement;
f_{ywk}	characteristic value of the yield strength of the shear reinforcement;
h	thickness of roof or floor component or beam;
h_1	thickness of the top layer of a hollow core or multilayer slab;
h_2	thickness of the bottom layer of a hollow core or multilayer slab;
h_i	overall depth of the cross-section;
h_w	overall thickness of a component in the direction of the weak axis;