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Montažni armirani elementi iz avtoklaviranega celičnega betona

Prefabricated reinforced components of autoclaved aerated concrete

Vorgefertigte bewehrte Bauteile aus dampfgehärtetem Porenbeton

Éléments préfabriqués armés en béton cellulaire autoclavé

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ICS:

91.100.30	Beton in betonski izdelki	Concrete and concrete products
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**Prefabricated reinforced components of autoclaved
aerated concrete**

Éléments préfabriqués armés en béton cellulaire
autoclavé

Vorgefertigte bewehrte Bauteile aus dampfgehärtetem
Porenbeton

This European Standard was approved by CEN on 4 June 2016.

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

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

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EN 12602:2016 (E)**European foreword**

This document (EN 12602:2016) has been prepared by Technical Committee CEN/TC 177 “Prefabricated reinforced components of autoclaved aerated concrete or light-weight 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of an identical text or by endorsement, at the latest by March 2017, and conflicting national standards shall be withdrawn at the latest by June 2018.

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

This document supersedes EN 12602:2008+A1:2013.

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 Regulation (s).

For relationship with Regulation (EU) No. 305/2011, 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,
- procedure to be used where alternative procedures are given in this European Standard.
- decisions on the application of informative annexes,
- references to non-contradictory complementary information to assist the user to apply this European Standard:

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5.3.4	A.10.2.2
A.3.2	A.10.3
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A.5.2

A.5.3.3.3 (3)

A.6.3

A.7

According to the CEN-CENELEC Internal Regulations, the national standards organisations 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.

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1 Scope

This European Standard is for prefabricated reinforced components of autoclaved aerated concrete to be used in building construction for:

a) Structural elements:

- loadbearing wall components;
- retaining wall components;
- roof components;
- floor components;
- linear components (beams and piers).

b) Non-structural elements:

- non-loadbearing wall components (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 utilized, the components can be applied – in addition to their loadbearing and encasing function – for purposes of fire resistance, sound insulation and thermal insulation indicated 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 and integrity E of resistance to fire);
- fixtures;
- finishes for external components, such as tiling.

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

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 678, *Determination of the dry density of autoclaved aerated concrete*

EN 679, *Determination of the compressive strength of autoclaved aerated concrete*

EN 680, *Determination of the drying shrinkage of autoclaved aerated concrete*

EN 772-16, *Methods of test for masonry units - Part 16: Determination of dimensions*

EN 772-20, *Methods of test for masonry units - Part 20: Determination of flatness of faces of aggregate concrete, manufactured stone and natural stone masonry units*

EN 989, *Determination of the bond behaviour between reinforcing bars and autoclaved aerated concrete by the "Push-Out" test*

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 dimensions of prefabricated reinforced components made of autoclaved aerated concrete or lightweight aggregate concrete with open structure*

EN 1351, *Determination of flexural strength of autoclaved aerated concrete*

EN 1352, *Determination of static modulus of elasticity under compression of autoclaved aerated concrete or lightweight aggregate concrete with open structure*

EN 1355, *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 15304, *Determination of the freeze-thaw resistance of autoclaved aerated concrete*

EN 1737, *Determination of shear strength of welded joints of reinforcement mats or cages for prefabricated components made of autoclaved aerated concrete or lightweight aggregate concrete with open structure*

EN 1738, *Determination of steel stresses in unloaded reinforced components made of autoclaved aerated concrete*

EN 1739, *Determination of shear strength for in-plane forces of joints between prefabricated components 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 1742, *Determination of shear strength between different layers of multilayer components made of autoclaved aerated concrete or lightweight aggregate concrete with open structure*

EN 1992-1-1:2004, *Eurocode 2: Design of concrete structures - Part 1-1: General rules and rules for buildings*

EN 10080, *Steel for the reinforcement of concrete - Weldable reinforcing steel - General*

EN 10088-5, *Stainless steels - Part 5: Technical delivery conditions for bars, rods, wire, sections and bright products of corrosion resisting steels for construction purposes*

EN 12269-1, *Determination of the bond behaviour between reinforcing steel and autoclaved aerated concrete by the "beam test" - Part 1: Short term test*

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EN 12269-2, *Determination of the bond behaviour between reinforcing steel and autoclaved aerated concrete by the beam test - Part 2: Long term test*

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

EN 13501-2, *Fire classification of construction products and building elements — Part 2: Classification using data from fire resistance tests, excluding ventilation services*

EN 15361:2007, *Determination of the influence of the corrosion protection coating on the anchorage capacity of the transverse anchorage bars in prefabricated reinforced components of autoclaved aerated concrete*

EN ISO 354, *Acoustics - Measurement of sound absorption in a reverberation room (ISO 354)*

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

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

EN ISO 10456, *Building materials and products - Hygrothermal properties - Tabulated design values and procedures for determining declared and design thermal values (ISO 10456)*

EN ISO 10140-1, *Acoustics - Laboratory measurement of sound insulation of building elements - Part 1: Application rules for specific products (ISO 10140-1)*

EN ISO 10140-2, *Acoustics - Laboratory measurement of sound insulation of building elements - Part 2: Measurement of airborne sound insulation (ISO 10140-2)*

EN ISO 10140-3, *Acoustics - Laboratory measurement of sound insulation of building elements - Part 3: Measurement of impact sound insulation (ISO 10140-3)*

EN ISO 10140-4, *Acoustics - Laboratory measurement of sound insulation of building elements - Part 4: Measurement of impact sound insulation (ISO 10140-4)*

EN ISO 10140-5, *Acoustics - Laboratory measurement of sound insulation of building elements - Part 5: Requirements for test facilities and equipment (ISO 10140-5)*

EN ISO 15630-1, *Steel for the reinforcement and prestressing of concrete - Test methods - Part 1: Reinforcing bars, wire rod and wire (ISO 15630-1)*

3 Terms, definitions, symbols and abbreviations

3.1 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1.1

autoclaved aerated concrete

AAC

concrete that is manufactured from binders such as cement and/or lime combined with fine siliceous based material, cell generating material and water whereby the raw materials are mixed together and cast into

moulds where the mix is allowed to rise and set into cakes; after this part of the process, the cake is cut into the required sizes of components and cured with high pressure steam in autoclaves

3.1.2

raw materials

constituents which combined with additives and agents, where appropriate, can be used in the manufacturing process

3.1.3

reinforcement

strengthening material that is commonly composed of steel mats, cages and/or steel bars; other types of reinforcement can be used; depending on the function of the components, the reinforcement can be structural or non-structural

Note 1 to entry: Structural reinforcement is reinforcement which is necessary for the loadbearing function of the component as part of the structure. It consists of steel.

Note 2 to entry: Non-structural reinforcement is reinforcement which is necessary in order to ensure adequate resistance of the component during handling, transportation and construction. Any suitable kind of reinforcement may be used for this purposes

3.1.4

corrosion protective coating

corrosion protective coating is a coating applied on the surface of the reinforcement to protect the reinforcement against corrosion

3.1.5

declared value

value declared by a manufacturer which is derived from values under specified conditions and rules

3.1.6

pier

vertical loadbearing part of the wall between or besides openings

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3.2 Symbols

3.2.1 General symbols

A	area;
b	width of component;
d	effective depth or thickness of component, diameter (e.g. of a bar);
E	modulus of elasticity;
e	eccentricity;
F	force;
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 roof or floor components;
M	bending moment;

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N	axial force;
R	resistance, loadbearing capacity;
t	time;
V	shear force;
ε	strain;
γ	partial safety factor;
σ	normal stress;
τ	shear stress;
ϕ	diameter.

3.2.2 Subscripts

a	anchorage, actual;
b	bond;
c	concrete parameter, compression;
comp	component;
cr	critical;
d	design value;
dry	in the dry state
eff	effective value;
g	declared value;
h	horizontal;
k	characteristic value;
l	longitudinal;
M	material;
m	mean or mass;
pl	plastic;
R	resistance;
S	acting in the section;
s	steel parameter, shear;
t	tension;
test	in testing;
u	ultimate;
um	in the moist state;
w	welded, web;
y	yield value (for steel);
0	effective value.

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3.2.3 Symbols used in this European Standard (including normative annexes, except Annex C)

A_c	— total cross-sectional area of concrete;
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	— area of the compression zone of the cross-section;
	— area of AAC within the tensile zone;
A_{crit}	critical area according to A.6.2.3;
A_{c0}	loaded area according to Figure A.13;
A_{c1}	maximum distribution area according to Figure A.13;
A_k	area defined by longitudinal reinforcement according to Figure A.12;
A_s	cross-sectional area of tensile reinforcement;
A_{smin}	minimum cross-sectional area of the reinforcement;
A_{swmin}	minimum cross-sectional area of shear reinforcement within length s ;
A_{sw}	cross-sectional area of vertical or inclined shear reinforcement;
A_{sl}	— cross-sectional area of the reinforcing bar with the larger diameter of the connection; — cross-sectional area of tension reinforcement;
a	— dimension of support perpendicular to the plane of a wall; — shear span; — larger dimension of a rectangular loaded area (see Figure A.8);
a_b	dimension of rectangular loaded area perpendicular to the span of a slab;
a_0	minimum support length;
a_1	horizontal displacement of the envelope of the design bending moment distribution (see Figure A.16);
b	— width of a component; — smaller dimension of a rectangular loaded area (see Figure A.8);
b'	centre distance of longitudinal reinforcement according to Figure A.12;
b_w	minimum width of the web;
c	— concrete cover; — a value, in Megapascals, representing the difference between the characteristic compressive strength and the permissible minimum individual value of the compressive strength;
d	— effective depth of a component; — design thickness of a component, for a solid wall $d = h$; — diameter of a circular loaded area (see Figure A.9);
$E_{c,eff}$	effective modulus of elasticity of AAC;
E_{cm}	mean value of the modulus of elasticity of AAC;
$E_{cm,eff}$	“effective” modulus of elasticity of AAC;
E_s	modulus of elasticity of reinforcing steel;
$(EI)_k$	stiffness in bending of a section in the “semi-cracked” state;
$(EI)_0$	stiffness of a section in the uncracked state, assuming $E = E_{cm}$;
$(EI)_1$	stiffness of a section in the uncracked state;