

საქართველოს სტანდარტი

გადამუშავების წინასწარგანსაზღვრული კომპონენტები ავტოკლავით გაზიანი
ბეტონისათვის

საქართველოს სტანდარტებისა და მეტროლოგიის
ეროვნული სააგენტო
თბილისი

საინფორმაციო მონაცემები

1 შემუშავებულია საქართველოს სტანდარტების და მეტროლოგიის ეროვნული სააგენტოს სტანდარტების დეპარტამენტის მიერ

2 დამტკიცებულია და შემოღებულია სამოქმედოდ საქართველოს სტანდარტების და მეტროლოგიის ეროვნული სააგენტოს 2018 წლის 17 აგვისტოს № 85 განკარგულებით

3 მიღებულია გარეკანის თარგმნის მეთოდით სტანდარტიზაციის ევროპული კომიტეტის სტანდარტი ენ 12602:2016 „ გადამუშავების წინასწარგანსაზღვრული კომპონენტები ავტოკლავით გაზიანი ბეტონისათვის“

4 პირველად

5 რეგისტრირებულია საქართველოს სტანდარტების და მეტროლოგიის ეროვნული სააგენტოს რეესტრში: 2018 წლის 17 აგვისტო №268-1.3-013929

აკრძალულია ამ სტანდარტის გადაცემა მესამე პირებისათვის ან/და მისი სხვა ფორმით გავრცელება

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 12602

September 2016

ICS 91.100.30

Supersedes EN 12602:2008+A1:2013

English Version

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.

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.



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

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

Contents

	Page
European foreword.....	6
1 Scope.....	8
2 Normative references.....	8
3 Terms, definitions, symbols and abbreviations.....	10
3.1 Terms and definitions	10
3.2 Symbols.....	11
3.2.1 General symbols	11
3.2.2 Subscripts.....	12
3.2.3 Symbols used in this European Standard (including normative annexes, except Annex C).....	12
3.3 Abbreviations	19
4 Properties and requirements of materials.....	20
4.1 Constituent materials of autoclaved aerated concrete	20
4.1.1 General.....	20
4.1.2 Release of dangerous substances.....	20
4.2 Autoclaved aerated concrete parameters.....	20
4.2.1 General.....	20
4.2.2 Dry density	21
4.2.3 Characteristic strength values.....	22
4.2.4 Compressive strength.....	22
4.2.5 Tensile strength and flexural strength.....	23
4.2.6 Stress-strain diagram	23
4.2.7 Modulus of elasticity	23
4.2.8 Poisson's ratio	24
4.2.9 Coefficient of thermal expansion.....	24
4.2.10 Drying shrinkage	24
4.2.11 Creep.....	24
4.2.12 Specific heat	25
4.2.13 Thermal conductivity	25
4.2.14 Water vapour permeability.....	27
4.2.15 Water tightness.....	27
4.3 Reinforcement.....	27
4.3.1 Steel.....	27
4.3.2 Structural reinforcement	28
4.3.3 Effective diameter of coated bars.....	29
4.3.4 Non-structural reinforcement.....	30
4.4 Bond	30
4.5 Thermal prestress	31
4.5.1 General.....	31
4.5.2 Declared mean initial prestrain $\varepsilon_{0m,g}$.....	32
5 Properties and requirements of components.....	32
5.1 General.....	32
5.1.1 Mechanical resistance	32
5.1.2 Acoustic properties	32
5.1.3 Reaction to fire and resistance to fire.....	33
5.1.4 Design thermal resistance and design thermal conductivity.....	33
5.2 Technical requirements and declared properties	34

5.2.1	Dimensions and tolerances.....	34
5.2.2	Mass of the components.....	34
5.2.3	Dimensional stability	34
5.2.4	Load-bearing capacity.....	35
5.2.5	Deflections	36
5.2.6	Joint strength.....	36
5.2.7	Minimum requirements.....	36
5.3	Durability	38
5.3.1	General	38
5.3.2	Environmental conditions.....	38
5.3.3	Corrosion protection of reinforcement.....	39
5.3.4	Freeze and thaw resistance.....	40
6	Assessment and verification of constancy of performance – AVCP	40
6.1	Introduction	40
6.2	Type testing	40
6.2.1	General	40
6.2.2	Test samples, testing and compliance criteria.....	41
6.2.3	Test reports	46
6.2.4	Shared other party results	46
6.2.5	Additional provisions for structural elements/components and/or structural kits	46
6.2.6	Additional provisions for semi-structural elements/components and/or semi-structural kits	47
6.3	Factory production control (FPC).....	48
6.3.1	General	48
6.3.2	Requirements.....	48
6.3.3	Product specific requirements	57
6.3.4	Initial inspection of factory and of FPC.....	57
6.3.5	Continuous surveillance of FPC	59
6.3.6	Procedure for modifications.....	60
6.3.7	One-off products, pre-production products (e.g. prototypes) and products produced in very low quantity	60
7	Basis for design	61
7.1	Design methods	61
7.2	Limit states.....	61
7.3	Actions	61
8	Marking, labelling and designation.....	62
8.1	Standard designation	62
8.2	Production detail information.....	63
8.3	Additional information on accompanying documents.....	63
Annex A (normative)	Design by calculation.....	64
A.1	General	64
A.2	Ultimate limit states (ULS) General design assumptions.....	64
A.3	Ultimate limit states (ULS): design for bending and combined bending and axial compression.....	66
A.3.1	Design assumptions	66
A.3.2	Stress-strain diagram for AAC.....	66
A.3.3	Stress-strain diagram for reinforcing steel.....	67
A.3.4	Minimum reinforcement.....	69
A.4	Shear.....	70
A.4.1	Shear design for components predominantly under transverse load	70
A.5	Ultimate limit states induced by structural deformation (buckling)	75
A.5.1	General	75
A.5.2	Method based on Euler formula	75
A.5.3	Modified model column method	77

A.6	Punching.....	82
A.6.1	General.....	82
A.6.2	Scope and definitions.....	82
A.6.3	Design method for punching shear.....	84
A.7	Primary torsion/combined primary torsion and shear.....	85
A.8	Concentrated forces	87
A.9	Serviceability limit states (SLS)	88
A.9.1	General.....	88
A.9.2	Limitation of stresses under serviceability conditions.....	88
A.9.3	Serviceability limit states of cracking.....	89
A.9.4	Serviceability limit states of deformation.....	89
A.10	Detailing of reinforcement.....	92
A.10.1	General.....	92
A.10.2	Bond	93
A.10.3	Anchorage.....	93
A.11	Support length.....	97
	Annex B (normative) Design by testing.....	98
B.1	General.....	98
B.2	Safety evaluation	99
B.2.1	General.....	99
B.2.2	Brittle and ductile failure.....	99
B.3	Ultimate limit state.....	99
B.3.1	General.....	99
B.3.2	Transversely loaded components.....	99
B.3.3	Longitudinally loaded components.....	102
B.3.4	Simultaneously transversely and longitudinally loaded wall components.....	104
B.3.5	Anchorage	105
B.4	Serviceability limit states.....	107
B.4.1	Crack width control.....	107
B.4.2	Deformations	107
	Annex C (normative) Resistance to fire design of AAC components and structures	108
C.1	General.....	108
C.1.1	Scope	108
C.1.2	Distinction between principles and application rules	108
C.1.3	Terms and definitions	108
C.1.4	Symbols.....	111
C.1.5	Units	112
C.2	Basic principles.....	112
C.2.1	Performance requirements.....	112
C.2.2	Design values of material properties.....	112
C.2.3	Assessment methods.....	113
C.3	Material properties	113
C.3.1	General.....	113
C.3.2	AAC	114
C.3.3	Steel.....	115
C.4	Structural fire design methods.....	117
C.4.1	General.....	117
C.4.2	Tabulated data	117
C.4.3	Simplified design methods	122
C.4.4	Anchorage	126
C.5	Protective layers.....	126
	Annex CA (normative) Modulus of elasticity and maximum strain of AAC and reinforcing steel at elevated temperature	127
	Annex CB (informative) Joints between AAC components satisfying resistance to fire E	129

CB.1	Floor and roof components with dry joints.....	129
CB.2	Floor and roof components with mortar joints	129
CB.3	Vertical and horizontal wall components with dry joints	130
CB.4	Vertical and horizontal wall components with mortar joints	130
Annex CC (normative) Temperature profiles of AAC wall, floor and roof components and AAC beams 132		
CC.1	Basis of temperature profiles.....	132
CC.2	Temperature profiles for AAC wall, floor and roof components.....	132
CC.3	Temperature profiles for AAC beams.....	135
CC.4	Calculation assumptions	144
Annex CD (normative) Resistance to fire tabulated data for walls with mechanical impact..... 145		
Annex D (informative) Recommended values for partial safety factors 147		
D.1	General	147
D.2	Ultimate Limit States (ULS).....	147
D.3	Serviceability Limit States (SLS).....	149
Annex E (informative) Recommendations for the consideration of prestress in the design of prefabricated reinforced AAC components..... 150		
E.1	Calculation of prestrain from test results.....	150
E.1.1	General	150
E.1.2	Symbols	151
E.1.3	Cross-section values of AAC components.....	152
E.1.4	Calculation of prestrain ε_0 from steel measurement.....	152
E.2	Cross-sectional analysis of a AAC component in SLS if prestress is taken into account	152
E.3	Splitting forces due to prestress	153
E.4	Methods to prevent end cracks due to prestress	153
Annex F (informative) Statistical methods for quality control 154		
Annex G (normative) Factory production control of stainless reinforcing steel based on at least three samples – Minimum acceptance criteria for individual values and corresponding mean values 156		
Annex H (informative) Methods for declaring the mechanical and fire resistance performances in ENs for structural elements..... 157		
H.1	Declaration methods	157
H.2	Method M1.....	157
H.3	Method M2.....	157
H.4	Method M3a	158
H.5	Method M3b	158
Annex ZA (informative) Relationship of this European Standard with Regulation (EU) No.305/2011..... 160		
ZA.1	Scope and relevant characteristics	160
ZA.2	System of Assessment and Verification of Constancy of Performance (AVCP)	176
ZA.3	Assignment of AVCP tasks	176
Bibliography 179		

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:

4.2.2.4	A.8
5.1.4	A.9.4.1
5.3.4	A.10.2.2
A.3.2	A.10.3
A.3.3	B.3.2.2
A.4.1.2	B.3.3.2
A.4.1.3.1 (7)	B.3.3.3.2
A.4.1.3.2	Annex D
A.4.1.3.3	

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.

საინფორმაციო ნაწილი. სრული გექნილი დოკუმენტი სანახავაზე შეიძლება გვითარდო.