

DIN EN 12602:2016-12 (E)

Prefabricated reinforced components of autoclaved aerated concrete

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 $0m,g$	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

DIN EN 12602:2016-12 EN 12602:2016 (E) 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
DIN EN 12602:2016-12 EN 12602:2016 (E) 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 σ 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