![SIST logo]

SLOVENSKI STANDARD
SIST EN 12602:2008/kFprA1:2013

01-februar-2013

Montažni armirani elementi iz avoklaviranega celičnega betona

Prefabricated reinforced components of autoclaved aerated concrete

Vorgefertigte bewehrte Bauteile aus dampfgehärtetem Porenbeton

Eléments préfabriqués armés en béton cellulaire autoclavé

Ta slovenski standard je istoveten z: **EN 12602:2008/FprA1**

<u>**ICS:**</u>

91.100.30	Beton in betonski izdelki	Concrete and concrete products

SIST EN 12602:2008/kFprA1:2013   **en,fr,de**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

**FINAL DRAFT
EN 12602:2008**

FprA1

November 2012

ICS 91.100.30

English Version

Prefabricated reinforced components of autoclaved aerated concrete

Eléments préfabriqués armés en béton cellulaire autoclavé

Vorgefertigte bewehrte Bauteile aus dampfgehärtetem Porenbeton

This draft amendment is submitted to CEN members for unique acceptance procedure. It has been drawn up by the Technical Committee CEN/TC 177.

This draft amendment A1, if approved, will modify the European Standard EN 12602:2008. If this draft becomes an amendment, CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for inclusion of this amendment into the relevant national standard without any alteration.

This draft amendment was established by CEN 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.

Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

Warning : This document is not a European Standard. It is distributed for review and comments. It is subject to change without notice and shall not be referred to as a European Standard.

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

Management Centre: Avenue Marnix 17, B-1000 Brussels

Ref. No. EN 12602:2008/FprA1:2012: E

EN 12602:2008/FprA1:2012 (E)

Contents

Page

EN 12602:2008/FprA1:2012 (E)

Foreword

This document (EN 12602:2008/FprA1:2012) 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 document is currently submitted to the Unique Acceptance Procedure.

4

1 Modifications to Clause 2

Replace the introductory paragraph with the following one:

"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."*.*

Between EN 10080 and EN 12269-1, add the following standard to the list of normative references:

"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*"*.*

Between EN ISO 10456 and ISO 4356, add the following standard to the list of normative references:

"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)*"*.*

2 Modification to 3.2.3

In the description of "k_w", replace "Table 5" *with* "Table 5c"*.*

3 Modification to 4.1.2

Replace the content of the subclause with the following text:

"National regulations on dangerous substances may require verification and declaration on release, and sometimes content, when construction products covered by this standard are placed on those markets.

In the absence of European harmonised test methods, verification and declaration on release/content should be done taking into account national provisions in the place of use.

NOTE   An informative database covering European and national provisions on dangerous substances is available at the Construction web site on EUROPA accessed through *http://ec.europa.eu/enterprise/construction/cpd-ds/*."*.*

4 Modifications to 4.2.4

In the 1st, 2nd and 3rd paragraphs above Table 2, replace three times "Table 2" *with* "Table 2a"*.*

In the line dedicated to the title and number of Table 2, replace "Table 2" *with* "Table 2a"*.*

5 Modifications to 4.2.10

Replace the 2nd sentence "The value may be declared as the mean conventional reference value $\varepsilon_{cs,ref}$ or alternatively as a value taking the total value of drying shrinkage $\varepsilon_{cs,tot}$ multiplied by a reduction factor 0,5." *with* "The shrinkage class as specified in Table 2b shall be declared based on the mean conventional reference value $\varepsilon_{cs,ref}$ or alternatively based on a value taking the total value of drying shrinkage $\varepsilon_{cs,tot}$ multiplied by a reduction factor 0,5."*.*

Add the following new Table 2b after the Note:

"

EN 12602:2008/FprA1:2012 (E)

Table 2b — Drying shrinkage classes for AAC

Drying shrinkage class	0,15	0,20	0,25	0,30	0,35	0,40
ε_{cs} mm per m	≤ 0,15	≤ 0,20	≤ 0,25	≤ 0,30	≤ 0,35	≤ 0,40

".

6 Modifications to 4.3.1

Replace the existing sentence with the following text:

"The reinforcement consists of reinforcement steel made by smooth bars or de-coiled products according to EN 10080 or stainless steel according to EN 10088-5.

Unless specified by a harmonised product standard, it shall be demonstrated that the reinforcement purchased from the steel works to be used in prefabricated reinforced components of autoclaved aerated concrete has been subject to an initial type testing, audit testing of samples taken at the factory, initial inspection of the FPC and continuous surveillance of the FPC.

NOTE 1   Appropriate certificate will demonstrate how the manufacturing of reinforcing steel is subject to third party control covering initial type testing, audit testing of samples taken at the factory, initial inspection of the FPC and continuous surveillance of the FPC.

Unless specified by a harmonised product standard for structural stainless reinforcing steel, it shall have a diameter not greater than 12 mm.

Declared strength and ductility properties of reinforcing steel used in AAC components shall comply with the properties of steel after straightening and after autoclaving.

NOTE 2   Thermal elongation for austenitic stainless steel is higher than for normal steel and ferritic or austenitic ferritic stainless steel.".

7 Modifications to 4.3.2

Add the following text after the 1st paragraph:

"Table 5a together with EN 10088-5 gives the applicable stainless steel grades, their chemical composition and density.

Electrical resistance welding shall be used when connecting stainless steel bars and de-coiled products.

NOTE 1   Corrosion protection layer is often needed also with stainless reinforcing bars and de-coiled products due to autoclaving process.

Table 5a — List of steel grades for stainless reinforcing steel

Steel number	Steel name	Density [kg/dm^3] — according to EN 10088-1	Comment
1.4003	X2CrNi12	7,7	Ferritic stainless steel [a]
1.4016	X6Cr17	7,7	Ferritic stainless steel
1.4162	X2CrMnNiN21-5-1	7,8	Austenitic-ferritic steel
1.4362	X2CrNiN23-4	7,8	Austenitic-ferritic steel
1.4462	X2CrNiMoN22-5-3	7,8	Austenitic-ferritic steel
[a] This steel number needs corrosion protection the efficiency of which is verified in accordance with EN 990, see 5.3.3.			

The performance characteristics of stainless steel are defined in EN 10088-5 and shall be tested in accordance with the test methods of that European Standard with the following exceptions and additional performance characteristics when used for reinforcing of AAC components:

1) Characteristic values for mechanical properties of stainless reinforcing steel

Tensile strength values of stainless reinforcing steel shall be declared as characteristic values defined as the 5% fractile of that property (p=0,95) at a confidence level γ = 90%. When calculating strength values, nominal cross-section area of the product is used. This definition refers to the long term quality level of production.

2) Suitability for bending

When bent stainless reinforcing steel is used its suitability for bending shall be determined by the bend test according to EN ISO 15630-1, with a minimum angle of bend of 180°. After testing the products shall not show rupture or visible cracks. The mandrel diameter specified for the bend test shall not exceed the relevant maximum diameter specified in Table 5b.

NOTE 2   The absence of cracks visible to a person with normal or corrected vision is considered as evidence that the test piece withstood the bend test. A superficial ductile tear can occur at the base of the ribs or indentations and is not considered to be a failure. The tear can be considered superficial when the depth of the tear is not greater than the width of the tear.

Table 5b — Mandrel diameter for the bending test

Nominal diameter d (mm)	Maximum mandrel diameter
≤16	3d
>16	6d

3) Dimensions and tolerances

The permissible deviation from the nominal mass per metre shall not be more than:

± 6,0 % on nominal diameters 12 mm and below.".

In the line dedicated to the title and number of Table 5, replace "Table 5" *with* "Table 5c".

In the paragraphs immediately before and after Table 5c, replace twice "Table 5" *with* "Table 5c".

In the final NOTE, replace "NOTE" *with* "NOTE 3".

EN 12602:2008/FprA1:2012 (E)

8   Modification to 4.3.3

In the 2nd paragraph, replace "When used in designed calculations," *with* "When used in design calculations,"*.*

9   Modifications to 4.4

Replace Table 6 with the following table:

"

Table 6 — Bond classes

Bond class	Explanation
B1	Bond is not taken into account in design
B2-N	Bond is taken into account in design and ACC components are used in normal operational conditions
B2-T	Bond is taken into account in design and ACC components are used in operational conditions up to 50 ºC

".

Add the following text after Table 6:

"For bond classes B2-N and B2-T the minimum characteristic bond strength f_{bk} shall be 0,20 MPa."*.*

Replace the last paragraph with the following text:

"Long-term effects and temperature effects shall be determined according to EN 12269-2 to verify that the declared reduction factor k_2 used in design, see A.10.2, is acceptable. The reduction factor k_2 may be applied for normal operational conditions, i.e. class N, or operational conditions up to 50 °C, i.e. class T. Before long-term testing, initial short-term tests shall be performed in accordance with EN 12269-1.

The reduction factor k_2 may be considered acceptable if the long-term bond strength f_{bl} obtained in the final short-term tests after 200 000 load cycles in accordance with EN 12269-2 fulfils the following requirement:

$$f_{bl,mean} \geq 0,7\, k_2 f_{bm} \tag{9}$$

where

$f_{bl,mean}$ is the mean value of the long-term bond strength according to EN 12669-2 obtained in the final short-term tests after 200 000 load cycles;

k_2 is the reduction factor taking into account the long term influences and temperature effects on the bond between reinforcing bars and AAC;

f_{bm} is the mean value of the short-term bond strength determined in accordance with EN 12269-1.

NOTE   The bond strength values $f_{bl,mean}$ and f_{bm} will be determined on test specimens prepared from the same sample.".

10 Modification to 4.5.1

Replace the paragraph under Table 7 by:

"Due to different deformation properties of AAC and steel, prestress can be generated during autoclaving and the subsequent cooling. In components where prestress might cause end cracks, see Formula (E.17), stirrups or other transverse reinforcements shall be provided to withstand splitting forces."*.*

8

11 Modifications to 5.1.4

Replace:

"The design thermal resistance can be determined in accordance with EN ISO 6946 using the design thermal conductivity λ_d to be determined according to Equation (11)

$$\lambda_d = \lambda_{10dry} \cdot e^{fu \cdot \mu m} \tag{11}$$

where"

with:

"The design thermal resistance can be determined in accordance with EN ISO 6946 using the design thermal conductivity λ_d to be determined according to Formula (11a)

$$\lambda_d = \lambda_{10dry} \cdot e^{fu \cdot \mu m} \tag{11a}$$

where"*.*

After NOTE 2, add the following text:

"Alternatively, moisture conversion coefficients and moisture conversion factors can be derived from tests, carried out at several practical moisture contents.

The design thermal resistance can then be determined according to Formula (11b):

$$\lambda_d = \lambda_{10dry} \cdot F_m \tag{11b}$$

where

λ_{10dry} is the thermal conductivity in the dry state, in watts per metre Kelvin (see NOTE 2 above);

F_m is the moisture conversion factor derived from tests."*.*

12 Modification to 5.2.1

In the 3rd paragraph, replace "Table 7" *with* "Table 8"*.*

13 Modifications to 5.2.3

In Table 9, replace "Mm" *with* "mm"*.*

Replace the definition of u with the following one:

"u is the perimeter of AAC component in contact with atmosphere."*.*

14 Modification to 5.2.4.1

Replace the content of the subclause with the following text:

"All relevant structural properties of a product shall be evaluated for both the ultimate and the serviceability limit states.

The design method used according to Annex A or Annex B shall be declared by the manufacturer.

The design values for the load-bearing capacities shall be determined according to one of the following methods: