SLOVENSKI STANDARD
oSIST prEN 17468-1:2020

01-oktober-2020

Vlaknatocementni proizvodi - Ugotavljanje vlečne odpornosti in strižne trdnosti ter izračun upogibne trdnosti - 1. del: Ravne plošče

Fibre cement products - Determination of pull through and shear resistance and bending strength calculations - Part 1: Flat sheets

Faserzementprodukte - Bestimmung des Durchzugs- und Querkraftwiderstandes und der Biegefestigkeit - Teil 1: Tafeln

Produits en fibres-ciment - Détermination des calculs de résistance à la traversée de la tête, au cisaillement et à la flexion - Partie 1 : Plaques planes

Ta slovenski standard je istoveten z: **prEN 17468-1**

ICS:

91.060.20	Strehe	Roofs
91.100.40	Cementni izdelki, ojačani z vlakni	Products in fibre-reinforced cement

oSIST prEN 17468-1:2020 **en,fr,de**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

DRAFT
prEN 17468-1

August 2020

ICS 91.100.40

English Version

Fibre cement products - Determination of pull through and shear resistance and bending strength calculations - Part 1: Flat sheets

Produits en fibres-ciment - Détermination des calculs de résistance à la traversée de la tête, au cisaillement et à la flexion - Partie 1 : Plaques planes

Faserzementprodukte - Bestimmung des Durchzugs- und Querkraftwiderstandes und der Biegefestigkeit - Teil 1: Tafeln

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 128.

If this draft becomes a European Standard, 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.

This draft European Standard 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, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, 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

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

Contents

Page

European foreword ... 3
Introduction ... 4
1 Scope ... 5
2 Normative references ... 5
3 Terms and definitions ... 5
4 Symbols and abbreviations ... 6
5 Product requirements ... 7
5.1 Composition ... 7
5.2 Appearance and finish ... 7
6 Sampling procedure ... 7
6.1 Sampling method ... 7
6.2 Type testing ... 7
6.3 Preparation of test specimens ... 7
7 Test method for the determination of pull through resistance ... 8
7.1 Principle ... 8
7.2 Test equipment ... 8
7.3 Fasteners ... 9
7.4 Test procedure ... 9
7.5 Expression of results and test report ... 10
8 Test method for the determination of shear resistance ... 11
8.1 Principle ... 11
8.2 Test equipment ... 11
8.3 Fasteners ... 12
8.4 Test procedure ... 12
8.5 Expression of results and test report ... 13
9 Mechanical characteristics ... 14
9.1 Bending strength (MOR) ... 14
9.2 Longitudinal direction ... 16
9.3 Pull through resistance / Shear resistance ... 17
Bibliography ... 18

European foreword

This document (prEN 17468-1:2020) has been prepared by Technical Committee CEN/TC 128 “Roof covering products for discontinuous laying and products for wall cladding", the secretariat of which is held by NBN.

This document is currently submitted to the CEN Enquiry.

Introduction

Different fibre-cement flat sheets on the market are assessed for pull through resistance.

Fibre-cement flat sheets have been evaluated, for pull through resistance, by a number of test methods designed to simulate conditions of use.

The results from the different existing methods are not directly comparable.

This document establishes an agreed method for evaluation of the pull through resistance and shear resistance of fibre-cement flat sheet products, based on the experiences obtained over the last number of years in different countries.

This is a product standard with no classifications, but this test procedure may be used by national regulators to set classifications for roof and wall assemblies.

The performance of an assembly constructed with these products depends not only on the properties of product as required by this document, but also on the design, construction and performance of the assembly as a whole in relation to the environment and conditions of use.

1 Scope

This document specifies a test method for pull through and shear resistance of fibre-cement flat sheets for roofing and cladding.

The results are also applicable for:

— Coated or uncoated sheets manufactured at the same production facility as the tested sheets.

— The test method can be applied to textured or non-textured fibre-cement flat sheets. The results of non-textured sheets are only applicable for textured sheets if the nominal minimum thickness of the textured sheet is at least the nominal thickness of the non-textured sheet.

— The same type of fixing head or washer assembly where applicable if the diameter of the fixing head or washer is 0 mm to 2 mm larger than in the test.

— The Shore A hardness of the sealing washer, where applicable, is ± 5 that of the washer used in the test.

— The diameter of the drilled hole through the fibre cement sheet is 0 mm to 2 mm smaller than in the test, providing there is the required clearance hole around the shank of the fastener.

It applies only to products as delivered.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 494:2012+A1:2015, *Fibre-cement profiled sheets and fittings - Product specification and test methods*

EN 12467:2012+A2:2018, *Fibre-cement flat sheets - Product specification and test methods*

EN 1990, *Eurocode - Basis of structural design*

EN ISO 7500-1, *Metallic materials - Calibration and verification of static uniaxial testing machines - Part 1: Tension/compression testing machines - Calibration and verification of the force-measuring system (ISO 7500-1)*

3 Terms and definitions

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at https://www.iso.org/obp
- IEC Electropedia: available at http://www.electropedia.org/

3.1
flat sheet
as defined in EN 12467

3.2
type test
test carried out to demonstrate conformity with the requirements of this document or for approval of a new product and/or when a fundamental change is made in formulation and/or method of manufacture, the effects of which cannot be predicted on the basis of previous experience

Note 1 to entry: The test is performed on the delivered product, but is not required for each batch.

3.3
as delivered
same condition as the producer intends to supply the product after completing all aspects of the process including maturing and, when appropriate, painting

3.4
span
distance between the parallel support axes

4 Symbols and abbreviations

For the purposes of this document, the following symbols and abbreviations apply.

b	width of test piece, in millimetres
e	thickness of the sheet, in millimetres
F	breaking load, in newtons
F_{el}	elastic bending load, in newtons
F_{ax}	breaking load pull through, in newtons
F_v	breaking load shear, in newtons
f_{k05}	characteristic bending strength 5 % quantile with 75 % confidence level
f_m	average bending strength
$f_{el\ m}$	average elastic bending strength
k	statistic factor according to EN 1990
l_s	span between supports, in millimetres
N	newtons
$R_{k,ax}$	characteristic pull through resistance
$R_{k,v}$	characteristic shear resistance
$R_{d,ax}$	design value pull through resistance
$R_{d,x}$	design value shear resistance
κ_{wet}	“kappa” factor for reducing the bending strength climatic (20 °C, 65 % r. H.) to wet condition

α	multiplication of ageing factors, Product Ri
γ_m	material safety factor
s	standard deviation
γ	confidence level (%)
R_i	mean quotient of the modulus of rupture of exposed and unexposed specimen, where "$_i$" shall stand for 1 testing freeze-thaw, 2 soak-dry and 3 warm-water according to EN 494
$R_{L,i}$	mean quotient of the modulus of rupture of exposed and unexposed specimen at 95 % confidence level as defined in EN 494, where "$_i$" shall stand for testing: 1 freeze-thaw, 2 soak-dry and 3 warm-water according to EN 494

5 Product requirements

5.1 Composition

Fibre cement flat sheets shall have a composition according to EN 12467.

5.2 Appearance and finish

The appearance and finish shall be as defined in EN 12467.

6 Sampling procedure

6.1 Sampling method

Take an adequate number of full size sheets (minimum 10) drawn at random from a consignment of sheets or, in the case of continuous production, from a production batch. All test specimens used on the test assembly shall be from the same consignment or production batch. The size of the batch is chosen by the manufacturer up to a maximum of one week's production.

6.2 Type testing

The pull through resistance and shear resistance tests are type tests.

6.3 Preparation of test specimens

— Cut 10 samples from 10 different flat sheets to (400+/- 5)mm x (400+/- 5) mm for the pull through tests.

— Cut 10 samples from 10 different flat sheets to (250 +/- 5) mm x (250 +/- 5) mm for the shear tests.

— The specimens shall be stored under normal climatic conditions of 20 °C and a relative air humidity of 65 % r. H. (20/65) until equilibrium of mass. The equilibrium of mass under climate at 20 °C and 65 % r. H. is reached if the mass has a lower difference than 0.1 % in weighting with an interval of 24 h.

— The sheets shall be pre-drilled using a drill bit of nominal diameter as specified by the manufacturer. The sheets can be pre-drilled before or after conditioning.

7 Test method for the determination of pull through resistance

7.1 Principle

The pull through resistance is determined by the maximum load F_{ax} (in N) required to pull the fastener through the test sheet.

7.2 Test equipment

7.2.1 Tensile testing machine:

The test rig shall be essentially composed of a vertical-uniaxial class-1 tensile testing machine as per EN ISO 7500-1 with force capacity appropriate to delivering the loading required (for example: 10 kN), featuring the following main components:

— A clamping device to fix the sample to the machine.

— A connector to enable the force to be applied.

— A representative rail (geometry and strength of the material) has to be used.

— Metal ring of 60 mm to 270 mm diameter depending on the results of the pretesting with rings in the given range.

— Pre-tests with different diameters of the supporting ring shall be carried out. The main tests shall be done with the largest diameter, at which the failure mode is pull through.

— Possibilities for different mounting arrangements, (see Figure 1):

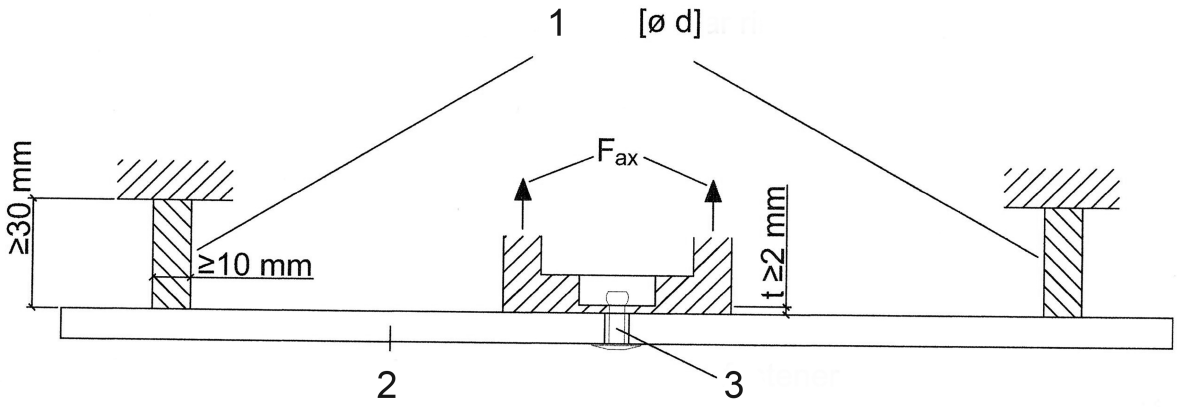
a. Fastener mounted in the middle of the specimen (centre fixing);

b. Fastener mounted in the middle of one edge of the specimen with a minimum distance according the installation at the construction site (edge fixing);

c. Fastener mounted in the corner of the specimen with a minimum edge distance according the installation at the construction site (corner fixing).

The pull through resistance at the edge may be calculated by reducing the pull through resistance (middle of the specimen) with the factor 0,5, the value at the corner by reducing the pull through resistance (middle of the specimen) with the factor 0,35.

The test device simulates a fibre-cement flat sheet fixing to a rail.



Key

1 support
2 test sheet
3 fastener

Figure 1 — a,b,c — Test arrangement for pull through resistancefor center fixing, edge fixing and corner fixing

The test sheets shall be in accordance with 6.1 and the specimens prepared in accordance with 6.3, of this document.

7.3 Fasteners

The fastener shall incorporate all sealing and fastening elements that form part of the fastening system. The fastener supplier should provide the make, type, material, geometric and mechanical characteristics of the fastener (e.g. A2, C-Steel, Alu-grade, Shore hardness A, etc.), and these should be included in the test report.

7.4 Test procedure

— Complete the test fixture in accordance with 7.2.

— Place this fixture on the testing machine, making sure that the load is applied perpendicular to the plain of the sheet with a tolerance of ± 3º.

— Apply the loading displacement controlled, such that the fastener assembly failure (assembly dislodgement) arises under static loading and not under dynamic jolting; the failure shall occur between 60 s and 90 s.

— Continue until failure of the assembly.

— Note down the maximum load reading F_{ax} (in N) recorded by the machine.