SLOVENSKI STANDARD
SIST EN 512:1996

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Vlaknatocementni izdelki - Tlačne cevi in spoji

Fibre-cement products - Pressure pipes and joints

Faserzement-Produkte - Druckrohre und Verbindungen

Produits en fibre-ciment - Tuyaux pression et joints

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English version

Fibre-cement products - Pressure pipes and joints

Produits en fibre-ciment - Tuyaux pression et joints

Faserzement-Produkte - Druckrohre und Verbindungen

This European Standard was approved by CEN on 1994-08-09. 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 Central Secretariat or to any CEN member.

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CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

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Foreword

This European Standard has been prepared under a Mandate given to CEN by the Commission of the European Communities and the European Free Trade Association, and supports essential requirements of EC Directive(s).

This European Standard was prepared by Working Group 6 under the direction of CEN Technical Committee CEN/TC 164 "Water Supply", the secretariat of which is held by AFNOR.

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of an identical text or by endorsement, at the latest by February 1995, and conflicting national standards shall be withdrawn at the latest by February 1995.

This European Standard was prepared by Working Group 6 under the direction of CEN Technical Committee TC 164 "Water Supply".

This standard will be brought in line with pr EN 805 "Water supply - Requirements for external systems and components" prepared by CEN/164/WG 1, when issued.

In this standard a distinction has been made between product appraisal (type tests) and routine quality control requirements (acceptance tests).

Attention is drawn to the need for observance of EC and/or EFTA and national legal requirements restricting the use of certain materials and to the related marking and labelling requirements.

Fibre-cement pressure pipes and joints which are in permanent or in temporary contact with water intended for human consumption shall not adversely affect the quality of the drinking water and do not contravene the EC Directives and EFTA Regulations on the quality of drinking water.

The performance of a network constructed with these products depends not only on the properties of the product as required by this standard, but also on the design, construction and performance of the network as a whole in relation to the environment and conditions of use (standards covering these matters are in preparation).

According to the CEN/CENELEC Internal Regulations, the following countries are bound to implement this European Standard: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom.

1 Scope

This standard specifies the characteristics of fibre-cement pipes and joints for use under pressure for conveying potable and non potable water and sewage.

It is concerned with composition, classification, geometrical, mechanical and physical characteristics, acceptance tests and type tests.

NOTE : Other media may be conveyed provided it is compatible with the fibre-cement pipes and joints. A full discussion should take place between the customer and the manufacturer to determine if the pipes and joints need additional protection.

2 Normative references

This European standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

ENV 197-1	:	1992	Cement - Composition, specifications and conformity critera - Part 1 : Common cements
pr EN 805			Water supply - Requirements for external systems and components
pr EN 1295			Structural design of buried pipelines under various conditions of loading
EN 29001	:	1990	Quality systems - Model for quality assurance in design, development, production, installation and servicing
EN 29002	:	1990	Quality systems - Model for quality assurance in production and installation
ISO 390	:	1993	Products in fibre reinforced cement - Sampling and inspection
ISO 2785	:	1986	Directives for selection of asbestos-cement pipes subject to external loads with or without internal pressure
ISO 2859-1	:	1989	Sampling procedures for inspection by attributes - Part 1 : Sampling plans indexed by acceptable quality level *(AQL)* for lot-by-lot inspection
ISO 3951	:	1989	Sampling procedures and charts for inspection by variables for percent nonconforming
ISO 7337	:	1984	Asbestos reinforced cement products - Guidelines for on-site work practices

3 Definitions

For the purposes of this standard the following definitions apply :

3.1 nominal diameter (DN)

A numerical designation of size of a component, which is a convenient round number approximately equal to the manufacturing dimension in mm of the internal diameter.

3.2 nominal pressure (PN)

A numerical designation of pressure used for reference purposes related to the mechanical characteristics of a component.

3.3 test pressure in factory (PT)

Value of the hydrostatic pressure to which the components are tested in the factory according to 4.6.4.

3.4 bursting pressure (PB)

Value of the hydrostatic pressure at which a component fails when tested in the factory according to 4.6.5.

3.5 acceptance test

Test to establish whether a batch of products conforms to a specification. The tests are performed on samples drawn either from continuous production or from a consignment.

NOTE : Test methods, specification and limit values are given in this standard. Sampling levels and acceptance criteria are defined in ISO 390.

3.6 type test

Test carried out for the 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.

The test is performed on the as delivered product; it is required to demonstrate conformity of the generic product to a specification but is not required for each production batch.

3.7 cceptable quality level *(AQL)*

The quality level which, in a sampling plan corresponds to a specified and relatively high probability of acceptance.

It is the maximum percent defective (or maximum number of defects per 100 nits) that for purposes of sampling inspection can be considered satisfactory as a process average.

NOTE : A sampling scheme with an *AQL* of 4 % eans that batches containing up to 4 % efective items have a high probability of acceptance.

4 Pipes

4.1 Composition

Fibre-cement pipes shall consist essentially of cement or a calcium silicate formed by a chemical reaction of a siliceous and a calcareous material reinforced by fibres. The cement shall comply with relevant national standards of CEN Members and/or ENV 197-1.

NOTE : Other components which are compatible with the composite and have no negative influence on the performance in use of the product, may be added.

Two types of fibre reinforced cement pipes are included in this standard :

- type AT (Asbestos Technology) for products the formulation of which contains chrysotile asbestos ;
- type NT (Non-asbestos Technology) for products reinforced by other fibres and not containing asbestos.

For pipes of type AT, all the requirements of this standard shall be fulfilled. For pipes of type NT, all the requirements of this standard shall be fulfilled and, in addition, evidence of long term performance of the product shall be given by a technical agreement.

4.2 Classification

4.2.1 Pipes of nominal diameter up to DN 1 000

Pipes of nominal diameter up to DN 1 000 are classified according to the nominal pressure (PN) given in table 1 :

Table 1 : Pressure classification

PN	(2,5)	4	6	(7,5)	(9)	10	(12)	(12,5)	(15)	16	(17,5)	(20)

NOTE : The preferred nominal pressures are without brackets. Pipes of higher nominal pressure can be delivered by agreement between manufacturer and purchaser.

The relationship between the bursting pressure (PB) expressed in hundred of kilopascals (bars) and the nominal pressure (PN) and the relationship between the test pressure in the factory (PT) expressed in hundred of kilopascals (bars) and the nominal pressure (PN) shall be not less than the values indicated in table 2 :

Table 2 : Pressure relationship

DN	PB/PN	PT/PN
from 50 to 100	4,0	2,0
from 125 to 200	3,5	2,0
from 250 to 500	3,0	2,0
from 600 to 1 000	2,5	1,67

The purchaser's engineer shall decide upon the nominal pressure of pipe to be used in relation to the hydraulic working pressure and other conditions of laying and of operation he has determined. Pipes subjected to external loads shall be calculated according to the relevant national standard transposing the corresponding EN standard if existing, failing this to ISO 2785.

4.2.2 Pipes of nominal diameters exceeding DN 1 000

Pipes of nominal diameters exceeding DN 1 000 are not classified in the same way as defined in 4.2.1. They are designed to suit specific requirements of any particular pipeline.

The purchaser's engineer shall provide the manufacturer with all required data for the design of a suitable pipe. The design shall take into account the external loads according to the relevant national standard transposing the corresponding EN standard if existing, failing this to ISO 2785 and shall be subject to the approval of the purchaser's engineer.

The relationship between the bursting pressure (PB) expressed in hundred of kilopascals (bar) and the nominal pressure (PN) shall not be less than 2,5 and the relationship between the test pressure (PT) in the factory expressed in hundred of kilopascals (bar) and the nominal pressure (PN) shall not be less than 1,67.

4.3 General appearance and finish

The pipes shall be straight, uniform and regular. The shape of the finished ends shall be fixed by the manufacturer to suit the type of joint used.

NOTE : The ends may be machined on their outer surfaces (see figure 1).

The end faces shall be free from breakout and machining burrs. The parts of the pipe were the rubber jointing rings are located shall be free from irregularities which could affect the watertightness of the joint.

NOTE : If necessary, the pipes may be impregnated and/or coated internally and/or externally to meet special working conditions as agreed between manufacturer and customer. The coating and finish should comply with the relevant national standards (transposing the EN standard), if existing.

4.4 Smoothness of internal surface

The internal surface of the pipe shall be regular and smooth. Slight scratches, indentations or small protrusions that do not affect the intended use or efficiency shall be acceptable.

4.5 Characteristics

4.5.1 Geometrical characteristics

4.5.1.1 Nominal diameter (DN)

The list of nominal diameters is stated in table 3 ; the diameters without brackets are preferred.

Table 3 : Nominal diameters (DN)

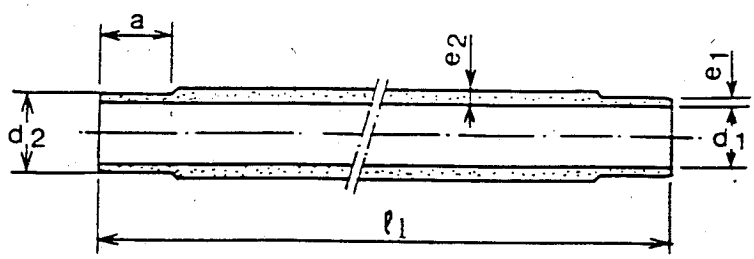
(50)	**900**
(60)	**1 000**
(80)	(1 100)
100	**1 200**
125	(1 300)
150	**1 400**
(175)	**1 500**
200	**1 600**
250	(1 700)
300	(1 800)
(350)	(1 900)
400	(2 000)
450	(2 100)
500	(2 200)
600	(2 300)
700	(2 400)
800	(2 500)

4.5.1.2 Internal diameter

When measured in accordance with 4.6.3.1 the internal diameter d_1 (see figure 1), expressed in millimetres, of the pipe shall be equal to the nominal size, tolerances excluded.

4.5.1.3 Nominal thickness of wall

The nominal thicknesses of the barrel and of the machined end (see figure 1) shall be stated in the manufacturer's literature.



a Length of machined end
d_1 Internal diameter
d_2 Outer diameter of machined end
e_1 Thickness at the machined end
e_2 Thickness of the barrel
l_1 Length

Figure 1 : Nominal dimensions

4.5.1.4 Nominal external diameter

The nominal external diameter of the barrel and of the machined end (see figure 1) shall be stated in the manufacturer's literature.

4.5.1.5 Length

The length of the pipe refers to the length measured between the extremities (see figure 1). It shall be stated by the manufacturer in his literature.

The nominal length shall be :

- for pipes of DN up to 300 : between 2 m and 5 m ;

- for pipes of DN exceeding 300 : between 2,5 m and 6 m.

The nominal length shall be a multiple of 0,5 m.

In special cases shorter lengths may be specified.

At least 90 % of the pipes supplied shall be of the nominal length agreed upon (subject to the tolerance given in 4.5.1.7.4). The remainder may be shorter by not more than 1 m. However the total length of the pipes supplied shall not be less than the length ordered.

4.5.1.6 Nominal length of machined ends

The nominal length of the machined ends (see figure 1) shall not exceed the length of the joint plus 10 mm. Longer machined ends may be supplied provided that evidence is given that these pipes comply with the other requirements of this standard.

4.5.1.7 Tolerances

4.5.1.7.1 Internal diameter

The tolerance on each measured internal diameter shall be :

- (2,5 + 0,01 DN) in millimetres + free.

4.5.1.7.2 Thickness

On the machined end of the pipe and on the barrel each measurement shall be within the tolerances as given in table 4 :

Table 4 : Tolerances on thickness in millimetres

Thickness *e* mm	Tolerances mm	
	-	+
$\leq e < 10$	1,5	free
$10 \leq e < 20$	2,0	free
$20 \leq e < 30$	2,5	free
$30 \leq e < 60$	3,0	free
$60 \leq e < 90$	3,5	free
> 90	4,0	free