SLOVENSKI STANDARD
SIST EN 1120:1997

01-februar-1997

Cevni sistemi iz polimernih materialov - Cevi in fitingi iz duromernih materialov, ojačenih s steklenimi vlakni (GRP) - Določanje kemične odpornosti iz notranjosti deformiranega odseka

Plastics piping systems - Glass-reinforced thermosetting plastics (GRP) pipes and fittings - Determination of the resistance to chemical attack from the inside of a section in a deflected condition

Kunststoff-Rohrleitungssysteme - Rohre und Formstücke aus glasfaserverstärkten duroplastischen Kunststoffen (GFK) - Ermittlung der Widerstandsfähigkeit gegen Chemikalieneinwirkung von der Innenseite eines Abschnittes im verformten Zustand

Systemes de canalisations plastiques - Tubes et raccords en plastique thermodurcissable renforcé de verre (PRV) - Détermination de la résistance a une attaque chimique par l'intérieur d'un tronçon de tube soumis a déflexion

Ta slovenski standard je istoveten z: **EN 1120:1996**

ICS:

23.040.20	Cevi iz polimernih materialov	Plastics pipes
23.040.45	Fitingi iz polimernih materialov	Plastics fittings
83.120	Ojačani polimeri	Reinforced plastics

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English version

Plastics piping systems - Glass-reinforced thermosetting plastics (GRP) pipes and fittings - Determination of the resistance to chemical attack from the inside of a section in a deflected condition

Systèmes de canalisations plastiques - Tubes et raccords en plastique thermodurcissable renforcé de verre (PRV) - Détermination de la résistance à une attaque chimique par l'intérieur d'un tronçon de tube soumis à déflexion

Kunststoff-Rohrleitungssysteme - Rohre und Formstücke aus glasfaserverstärkten duroplastischen Kunststoffen (GFK) - Ermittlung der Widerstandsfähigkeit gegen Chemikalieneinwirkung von der Innenseite eines Abschnittes im verformten Zustand

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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 by Technical Committee CEN/TC 155 "Plastics piping systems and ducting systems", the Secretariat of which is held by NNI.

This standard is based on document N 191 "Glass reinforced thermosetting plastics (GRP) pipes and fittings - Test method for resistance of a pipe in a deflected condition to chemical attack from the inside", prepared by working group 1 of subcommittee 6 of technical committee 138 of the International Organization for Standardization (ISO). It is a modification of ISO/TC 138/SC 6/WG 1 N 191 for reasons of applicability to other test conditions and alignment with texts of other standards on test methods.

Following a request from some experts in the committee this standard contains a concept for structural failure as an alternative failure mode to the traditional weep failure (see note 2 to clause 1). The extension of the failure modes will be considered in a future revision following consideration of results of tests performed using these criteria.

The modifications are:

- concept of a second failure mode (structural failure) is added;
- test parameters are omitted;
- material-dependent requirements are not given;
- editorial changes have been introduced.

The material-dependent test parameters and/or performance requirements are incorporated in the referring standard.

This standard is one of a series of standards on test methods which support System Standards for plastics piping systems and ducting systems.

This standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by September 1996, and conflicting national standards shall be withdrawn at the latest by September 1996.

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

1 Scope

This standard specifies a method for determining the chemical resistance properties of glass-reinforced thermosetting plastics (GRP) pipes and fittings in a deflected condition for nominal sizes DN 100 and larger.

In conjunction with EN 705 this standard provides a method for evaluating the effect of a chemical environment on the interior of a pipe or fitting after a specified period of time.

NOTE 1: It has been found that the effect of chemical environments can be accelerated using strain induced by deflection, hence it is frequently referred to as strain corrosion.

NOTE 2: To study the applicability of the method to testing the pipe or fitting with regard to structural failure (where structural failure becomes apparent by a sudden reduction in the load applied of at least 20 % of the initial load) then where "weep failure" is referred to in this standard substitute "structural failure". A structural failure can be caused by conditions such as:

- interlaminar separation;
- cracks in or through the structural layer of the wall;
- tensile failure of the glass reinforcement;
- if applicable, separation of a thermoplastics liner from the structural wall.

For such studies, data from "structural failure" results will be analyzed separately from "weep failure" results.

2 Normative references

This 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 standard only when incorporated in it by amendment or revision.

For undated references the latest edition of the publication referred to applies.

EN 705	*Plastics piping systems - Glass-reinforced thermosetting plastics (GRP) pipes and fittings - Methods for regression analyses and their use*

3 Definitions

For the purposes of this standard, the following definitions apply:

3.1 mean diameter (d_m): The diameter of the circle corresponding with the middle of the pipe wall cross section.

It is given, in millimetres, by either of the following equations:

$$d_m = d_i + e$$

$$d_m = d_e - e$$

where:

d_i is the internal diameter, in millimetres;

d_e is the external diameter, in millimetres;

e is the wall thickness of the pipe, in millimetres.

3.2 weep failure: Failure which becomes apparent by the passage of the test liquid through the pipe wall.

4 Principle

The interior of a test piece is exposed to a corrosive test liquid at a specified temperature while being maintained in a fixed diametrically deflected condition. The test is repeated at several deflection levels, using a fresh test piece each time and recording the time to weep failure at each deflection. The results are used to calculate an extrapolated deflection value for a specified period of time.

Alternatively the extrapolation can be performed using calculated or measured strains. Strain can be measured by the use of strain gauges.

NOTE 1: Use of strain allows testing using test pieces of variable thickness and stiffness classes. Deflection and strain are interrelatable by calculation.

NOTE 2: It is assumed that the following test parameters are set by the standard making reference to this standard:

a) the composition of the test liquid (see clause 5);

b) the number and length of test pieces (see clause 7);

c) if applicable, the conditioning to be applied (see clause 9);

d) the test temperature (see 10.1 or 11.1);

e) if failures do not occur (see 10.11 or 11.11) the specified deflection levels and related minimum time intervals;

f) the time to which the data have to be extrapolated (see clause 12).

5 Test liquid

The test liquid shall be as specified in the referring standard. The quantity shall be sufficient to achieve the specified depth within the test piece (see 10.7 or 11.7).

6 Apparatus

6.1 Loading frame, comprising two parallel steel sections, with or without bearing plates, and threaded rods which can maintain a constant deflection of the test piece (see figure 1). The surfaces in contact with the test piece shall be hard, flat, smooth and clean. The sections and bearing plates shall be sufficiently stiff such that visible bending or deformation of the sections or plate does not occur during the compression of the test piece. Each section or plate shall have a length at least equal to the length of the test piece plus 30 mm and a width of at least 100 mm.

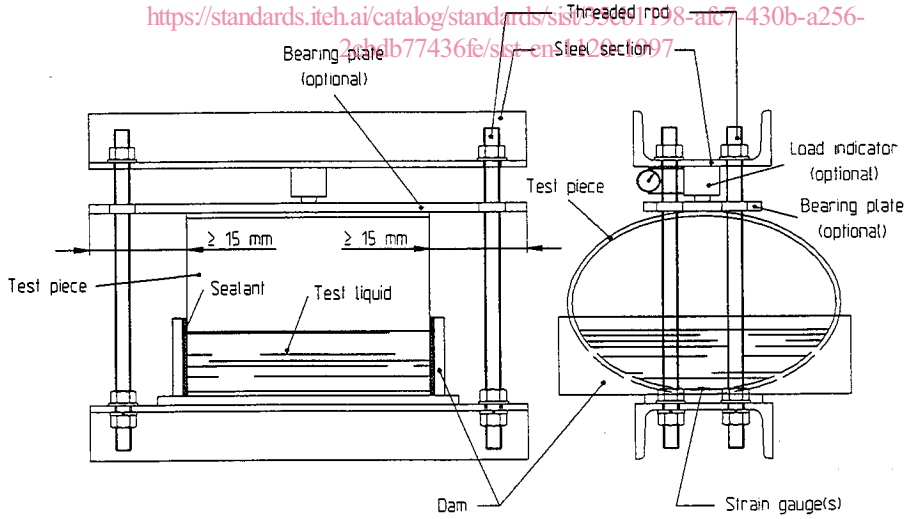

Figure 1: Typical test arrangement

6.2 Dimensional measurement devices, capable of determining:

- the dimensions (length, diameter, wall thickness) to an accuracy of within ± 0,5 %;

- the change in diameter of the test piece in the vertical direction to an accuracy of within ± 1,0 % of the maximum value of the change.

6.3 Load indicator (optional), capable of determining the load to an accuracy of within ± 2 % of the initial load.

NOTE: Such devices include machined sections made from steel together with strain gauges and mobile measuring instruments with suitable output devices.

6.4 Strain gauges of the foil type, single element suitable for strain levels up to 1,5 % strain and a length appropriate for the pipe diameter.

7 Test pieces

7.1 Preparation

The test piece shall comprise a complete ring cut from the pipe or fitting to be tested. The length of the test piece shall be as specified in the referring standard, with permitted deviations of ± 5 %.

The cut ends shall be smooth and perpendicular to the axis of the pipe or fitting.

Two straight lines, diametrically opposed, shall be drawn longitudinally on the inside of the test piece.

7.2 Number

The number of test pieces shall be as specified in the referring standard provided that for regression analysis the number of test pieces is such that a minimum of 18 data points in accordance with 10.2 or 11.2 can be obtained.

8 Determination of the dimensions of the test piece

8.1 Length

Measure the length of the test piece along each line (see clause 7) with sufficient accuracy to determine whether or not each test piece conforms to clause 7. Trim or replace, as applicable, each test piece that does not conform.

8.2 Mean wall thickness

Measure to within ± 1,0 % the wall thickness of the test piece at each end of the test piece at three positions equally distributed around the circumference. Calculate the mean wall thickness, e, as the average of the six measured values.

8.3 Mean diameter

Measure to an accuracy of within ± 1,0 % either the internal diameter, d_i, of the test piece at mid-length, by means of e.g. a calliper, or the external diameter, d_e, of the test piece, by means of e.g. a circumferential wrap steel tape.

Determine the mean diameter, d_m, of the test piece by calculation using the values obtained for mean wall thickness and either the internal or the external diameter (see 3.1).

9 Conditioning

Unless otherwise specified by the referring standard, the test pieces shall not be conditioned.

10 Test procedure using deflection measurement

WARNING: Precautions should be taken to contain any fragmentation or leakage that can occur during the test.

10.1 During the following procedure, maintain the temperature specified in the referring standard.

10.2 Select the range of estimated deflections such that the times to failure of at least 18 test pieces are distributed between 0,1 h and over 10000 h and the distribution of failure times of at least 10 values conforms to the limits given in table 1.

Table 1: Failure time distribution

Failure time h	Minimum number of failures
≥ 10 and ≤ 1000	4
> 1000 and ≤ 6000	3
> 6000	3 *)
*) At least one of these shall exceed 10000 h.	