SLOVENSKI STANDARD
SIST EN 1226:1997

01-februar-1997

Cevni sistemi iz polimernih materialov - Cevi iz duromernih materialov, ojačenih s steklenimi vlakni (GRP) - Metoda za preskus in potrditev odpornosti proti začetni obodni deformaciji

Plastics piping systems - Glass-reinforced thermosetting plastics (GRP) pipes - Test method to prove the resistance to initial ring deflection

Kunststoff-Rohrleitungssysteme - Rohre aus glasfaserverstärkten duroplastischen Kunststoffen (GFK) - Verfahren zur Überprüfung der Anfangs-Ringverformbarkeit

Systemes de canalisations en plastique - Tubes en plastique thermodurcissables renforcé de verre (PRV) - Méthode d'essai pour établir la résistance a la déflexion annulaire initiale

Ta slovenski standard je istoveten z: **EN 1226:1996**

ICS:

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

SIST EN 1226:1997 **en**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 1226

June 1996

ICS 23.040.20

Descriptors: pipelines, plastic tubes, reinforced plastics, glass reinforced plastics, thermosetting resins, mechanical tests, measurements, flexing, mechanical strength

English version

Plastics piping systems - Glass-reinforced thermosetting plastics (GRP) pipes - Test method to prove the resistance to initial ring deflection

Systèmes de canalisations en plastique - Tubes en plastique thermodurcissables renforcé de verre (PRV) - Méthode d'essai pour établir la résistance à la déflexion annulaire initiale

Kunststoff-Rohrleitungssysteme - Rohre aus glasfaserverstärkten duroplastischen Kunststoffen (GFK) - Verfahren zur Überprüfung der Anfangs-Ringverformbarkeit

This European Standard was approved by CEN on 1996-01-04. 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.

The European Standards exist 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 Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

CEN

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

Central Secretariat: rue de Stassart,36 B-1050 Brussels

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 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 December 1996, and conflicting national standards shall be withdrawn at the latest by December 1996.

This standard is based on the Draft International Standard ISO/DIS 10466 "Glass reinforced thermosetting plastics (GRP) pipes and fittings - Test method for resistance to initial ring deflection of pipes" prepared by the International Organization for Standardization (ISO). It is a modification of ISO/DIS 10466 for reasons of applicability to other test conditions and alignment with texts of other standards on test methods.

The modifications are:

- test parameters (pressure, time, temperature) are not specified;
- material-dependent or performance 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.

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

1 Scope

This standard specifies a method for testing the ability of glass-reinforced thermosetting plastics (GRP) pipes to withstand specified levels of initial ring deflection without displaying surface damage and/or structural failure.

2 Definitions

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

2.1 vertical deflection (y): The vertical change in diameter of a pipe in a horizontal position in response to a vertical compressive load (see 7.3).

It is expressed in metres.

2.2 relative vertical deflection (y/d_m): The ratio of the vertical deflection, y, (see 2.1) to the mean diameter of the pipe, d_m, (see 2.3).

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

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

$$d_m = d_i + e$$

$$d_m = d_e - e$$

where:

d_i is the average of the measured internal diameters (see 5.3.2), in metres;

d_e is the average of the measured external diameters (see 5.3.2), in metres;

e is the average of the measured wall thicknesses of the pipe (see 5.3.1), in metres.

2.4 structural failure: A failure apparent in any of the following forms (see 7.3):

- interlaminar separation;
- tensile failure of the glass fibre reinforcement;

- buckling of the pipe wall;
- if applicable, separation of the thermoplastic liner from the structural wall.

3 Principle

A piece of pipe supported horizontally is loaded throughout its length to compress it diametrically to two successive specified levels of vertical deflection (see figure 2). The pipe is inspected at the first deflection level for surface damage and/or structural failure and at the second deflection level for structural failure (see 2.4).

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

a) the two deflection limits of the pipe (see 4.1 and 7.3);
b) the length of the test pieces (see clause 5);
c) the number of test pieces (see clause 5);
d) the test temperature (see 7.1);
e) the surface(s) of the test piece to be inspected for surface damage (see 7.3);
f) the characteristics of surface damage and structural failure (see 7.3).

4 Apparatus

4.1 Compressive loading machine, comprising a system capable of applying a controlled rate of compression or a dead weight loading system, without shock, through two parallel load application surfaces conforming to 4.2 so that a horizontally orientated test piece of pipe conforming to clause 5 can be compressed vertically. The machine shall be able to achieve and sustain in accordance with the periods specified in 7.3 the deflections or relative vertical deflections specified in the referring standard.

4.2 Load application surfaces

4.2.1 General arrangement

The surfaces shall be provided by a pair of plates (see 4.2.2), or a pair of beam bars (see 4.2.3), or a combination of one such plate and one such bar, with their major axes perpendicular to and centred on the direction of application of load *F* by the compressive loading machine, as shown in figure 1. The surfaces to be in contact with the test piece shall be flat, smooth, clean and parallel.

Plates and beam bars shall have a length at least equal to the test piece (see clause 5) and have a thickness such that visible deformation does not occur during the test.

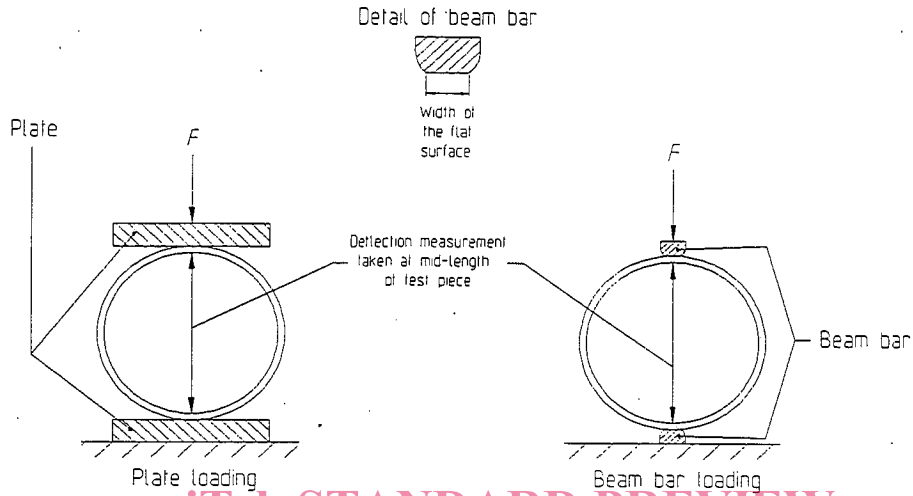

Figure 1: Schematic diagram of the test arrangement

4.2.2 Plates

The plate(s) shall have a width of at least 100 mm.

4.2.3 Beam bars

Each beam bar shall have rounded edges, a flat face (see figure 1) without sharp edges and a width dependent upon the pipe as follows:

a) for pipes with a nominal size not greater than DN 300 the width shall be (20 ± 2) mm;

b) for pipes of nominal sizes greater than DN 300 the width shall be (50 ± 5) mm.

The beam bars shall be so constructed and supported that no other surface of the beam bar structure shall come into contact with the test piece during the test.

4.3 Dimensional measuring devices, capable of determining

- the necessary dimensions (length, diameter, wall thickness) to an accuracy of within ± 0,1 mm;

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

NOTE: The maximum value of the change to be measured depends upon the vertical deflection or the relative vertical deflection specified in the referring standard.

4.4 **Temperature measuring device,** if applicable, capable of verifying conformity to the test temperature (see 7.1).

5 Test pieces

5.1 Preparation

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

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

Two straight lines, to serve as reference lines, shall be drawn on the inside or the outside along the length of the test piece at 180° to each other.

5.2 Number

The number of test pieces shall be as specified in the referring standard.

5.3 Determination of the dimensions

5.3.1 Wall thickness

Measure to within ± 0,2 mm the wall thickness of the test piece at each end of each reference line.

Calculate the average wall thickness, e, in metres, of the four measured values.

5.3.2 Mean diameter

Measure to an accuracy of within ± 0,5 mm either of the following:

a) the internal diameter, d_i, of the test piece between each diametrically opposed pair of reference lines at their mid-length, e.g. by means of a caliper;

b) the external diameter, d_e, of the test piece at the mid-points of the reference lines, e.g. by means of a circumferential wrap steel tape.

Calculate the mean diameter, d_m, of the test piece using the values obtained for wall thickness and either the internal or the external diameter (see 2.3).

6 Conditioning

Unless otherwise specified by the referring standard, store the test pieces for at least 0,5 h at the test temperature (see 7.1) prior to testing.

7 Procedure

7.1 Test temperature

Conduct the following procedure at the temperature specified in the referring standard.

7.2 Choice of load application surfaces and positioning of the test piece

If one of the required relative deflection limits (for surface damage or for structural failure) is in excess of 28 %, use beam bars, otherwise use either plates and/or beam bars (see 4.2).

Place the test piece in contact with the upper and lower plate or beam bar (see 4.2.1) with the pair of diametrically opposed reference lines vertically aligned. Ensure that the contact between the test piece and each bearing plate or beam bar is as uniform as possible and the plates and/or beam bars are not tilted laterally.

7.3 Application of load and measurement of deflection

7.3.1 Either compress or load the test piece at a constant rate so that the first minimum initial vertical deflection or minimum initial relative vertical deflection specified in the referring standard is reached to an accuracy of ± 2,0 % of the specified deflection value in (2 ± 0,5) min and record the corresponding load F_1 (see figure 2).

7.3.2 Maintain this deflection for (2 ± 0,25) min while inspecting the test piece without magnification for surface damage [see items e) and f) of the note to clause 3].