SLOVENSKI STANDARD
SIST EN 1277:2004

01-maj-2004

Nadomeģ a:
SIST EN 1277:1997

Cevni sistemi iz polimernih materialov - Plastomerni cevovodi, polog eni v zemljo, ki delujejo po teģnostnem principu - Metode za preskus tesnjenja spojev z elastomernimi tesnilnimi obroļ i

Plastics piping systems - Thermoplastics piping systems for buried non-pressure applications - Test methods for leaktightness of elastomeric sealing ring type joints

Kunststoff-Rohrleitungssysteme - Erdverlegte Rohrleitungssysteme aus Thermoplasten für drucklose Anwendungen - Prüfverfahren für die Dichtheit von elastomeren Dichtringverbindungen

Systemes de canalisations en plastiques - Systèmes de canalisations thermoplastiques pour applications enterrées sans pression - Méthodes d'essai d'étanchéité des assemblages a bague d'étanchéité en élastomere

Ta slovenski standard je istoveten z: **EN 1277:2003**

ICS:

23.040.80	Tesnila za cevne zveze	Seals for pipe and hose assemblies

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 1277

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English version

Plastics piping systems - Thermoplastics piping systems for buried non-pressure applications - Test methods for leaktightness of elastomeric sealing ring type joints

Systèmes de canalisations en plastiques - Systèmes de canalisations thermoplastiques pour applications enterrées sans pression - Méthodes d'essai d'étanchéité des assemblages à bague d'étanchéité en élastomère

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This European Standard was approved by CEN on 3 March 2003.

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 Management Centre or to any CEN member.

This European Standard exists 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 Management Centre has the same status as the official versions.

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

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

Management Centre: rue de Stassart, 36 B-1050 Brussels

Ref. No. EN 1277:2003 E

Foreword

This European Standard (EN 1277:2003) has been prepared by Technical Committee CEN /TC 155, "Plastics piping systems and ducting systems", the secretariat of which is held by NEN.

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 June 2004,, and conflicting national standards shall be withdrawn at the latest by June 2004.

Annex A is normative.

This document supersedes EN 1277:1996.

The modifications are:

— The deflection of the socket is now permitted to be greater than specified if by deflecting the spigot to the specified amount the socket, without applying load to it, is deflected to more than specified. The reason is that experience with testing large diameter pipes in accordance with the 1996 version has shown that for some pipe designs a deflection of 10 % of the spigot resulted in a deflection larger than 5% of the socket without applying any load to it. This is the major reason for the revision.

— A support for the profiles under the deflection device, see Figure 2, are specified in cases where there is a risk that the profiles are deflected too much when deflecting the spigot or socket.

— Figure 4 has been added to clarify the description of the deflection devices.

— The procedure for determining and applying the deflection has been described in more details, see 6.2.

— A number of editorial changes including a more logic order of the description of the test equipment and test procedure have been introduced.

The material-dependent parameters and/or performance requirements are incorporated in the System Standard(s) concerned.

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 European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and the United Kingdom.

1 Scope

This European standard specifies three basic test pressures for determining the leaktightness of elastomeric sealing ring type joints for buried thermoplastics non-pressure piping systems.

Unless otherwise specified in the referring standard, the methods pressures used are the following:

— p_1: internal negative air pressure (partial vacuum);

— p_2: a low internal hydrostatic pressure;

— p_3: a higher internal hydrostatic pressure.

It also describes four test conditions under which the test can be executed, as follows:

A: without any additional diametric or angular deflection;

B: with diametric deflection;

C: with angular deflection;

D: with simultaneous angular and diametric deflection.

These conditions can be applied individually or in combination. The applicable selection of the method(s) and the condition(s) should be specified in the referring standard.

2 Principle

A test piece assembled from pipes and/or fittings is subjected to a specific initial internal negative air pressure, p_1 followed by a low specific initial internal hydrostatic pressure, p_2 and a higher internal hydrostatic pressure, p_3.

During testing the joint may be subjected to diametric and/or angular deflection(s). The referring product standard shall specify which of the test pressures and deflection conditions have to be carried out.

Each pressure is maintained for a specific period during which the joint is monitored for leakage (see clause 6).

NOTE 1 It is assumed that the following test parameters are set by the standard making reference to this standard:

a) the test pressure(s), p_1 [see item d) of 6.1], p_2 [see item f) of 6.1] and p_3 [see item g) of 6.1], as applicable, and the percentage of loss of partial vacuum [see item d) of 6.1];

b) the required diametric and/or angular deflections and their combination with each other and/or the test pressure(s)

NOTE 2 As a consequence of the revision of EN 1277:1996 a modification of test parameters given in referring European Standards on thermoplastics underground drainage and sewerage pipes published before this European Standard may be required (see annex A).

3 Apparatus

3.1 General

The apparatus shall consist of a jig or any other arrangement capable of:

a) applying the specified diametric and/or angular deflection;

b) applying the specified test pressure(s), positive or negative;

c) maintaining the test assembly in the required position throughout the test;

d) resisting the forces resulting from the mass of the water in the test assembly and from the applied hydrostatic test pressure(s) during the test period.

The apparatus shall not otherwise support the joint against the internal test pressure.

A typical arrangement, allowing angular and diametric deflection, is shown in Figure 1.

3.2 Apparatus

The apparatus shall include the following items which all shall be capable of resisting the forces and pressures generated during the test.

3.2.1 End sealing devices, having a size and using a sealing method appropriate to seal the non-jointed ends of the test assembly. The devices shall be restrained in a manner that does not exert longitudinal forces on the joint at positive pressures;

3.2.2 Hydrostatic pressure source, connected to one of the sealing devices, or to the test piece, and capable of applying and maintaining the specified pressure [see items f) and g) of 6.1];

3.2.3 Negative air pressure source, connected to one of the sealing devices, or to the test piece, and capable of applying and maintaining the specified internal negative air pressure for the specified time. See item d) of 6.1;

3.2.4 Arrangement, capable of venting air from the assembly;

3.2.5 Pressure measuring devices, capable of checking conformity to the specified test pressure (see item d), f) and g) of 6.1).

When testing with diametric deflection is required the following items shall also be included:

3.2.6 Mechanical or hydraulic device, capable of applying the necessary diametric deflection to the spigot [see item b) of 6.1] and acting on a beam which is free to move in the vertical plane square to the axis of the pipe. For pipes with a diameter equal to or greater than 400 mm, each beam can be elliptically shaped to suit the expected shape of the pipe when deflected as required, see Figure 4. The length of the beam or the curved part of the beam shall be greater than the contact area with the deflected spigot.

The width, b_1, see Figure 1, shall depend upon the external diameter, d_e, of the pipe as follows:

- b_1 = 100 mm for $d_e \leq 710$ mm;
- b_1 = 150 mm for 710 mm < $d_e \leq 1000$ mm;
- b_1 = 200 mm for $d_e > 1000$ mm.

3.2.7 Mechanical or hydraulic device, capable of applying the necessary diametric deflection to the socket [see item b) of 6.1] and acting on a beam which is free to move in the vertical plane square to the axis of the socket.

The length of the beam or the curved part of the beam shall be greater than the contact area with the deflected socket.

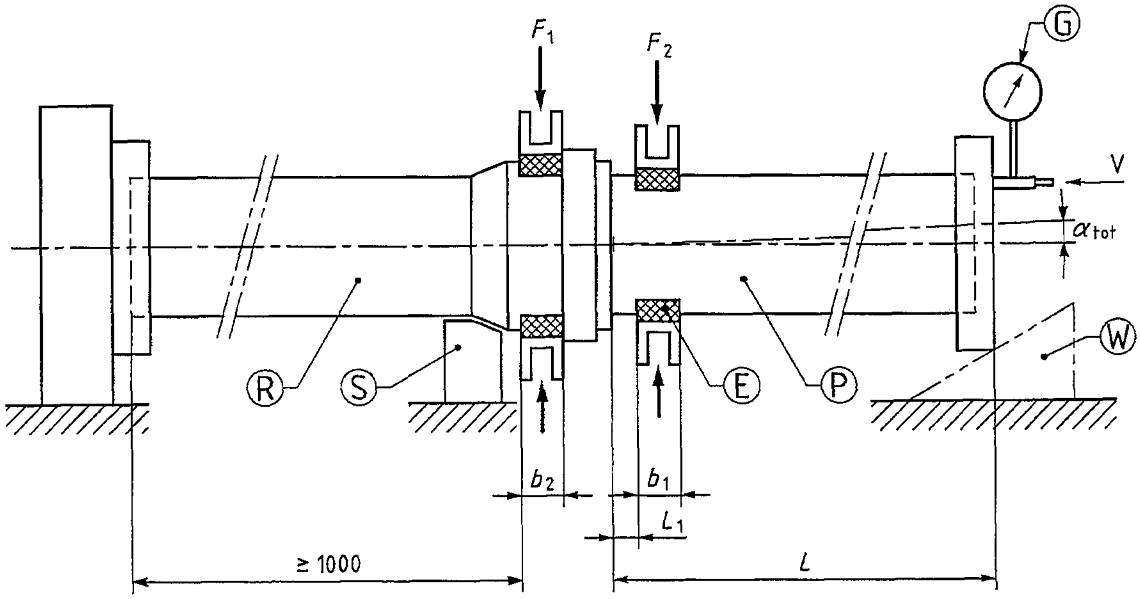
For pipes with a diameter equal to or greater than 400 mm, each beam may be elliptically shaped to suit the expected shape of the socket when deflected as required, see Figure 4;

The width, b_2, shall depend upon the external diameter, d_e, of the pipe as follows:

- b_2 = 30 mm for $d_e \leq 110$ mm;
- b_2 = 40 mm for 110 mm < $d_e \leq 315$ mm;
- b_2 = 60 mm for $d_e > 315$ mm.

When there is a risk that the stiffening elements (profiles) of a structured wall pipe or socket will deflect more than 0,1 times the profile height, the clamps shall be modified so they will come into contact with the pipe wall between the profiles when the profile is deflected to between 0,9 times and 0,95 times the profile height, (see Figure 2).

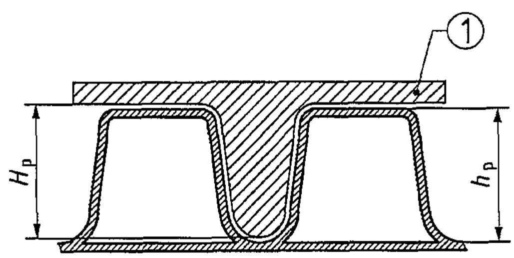
Such modifications shall be made from wood or less flexible materials.



Key

G Vacuum or pressure gauge
E Elliptical beam when applicable
W Adjustable support
P Pipe or fitting with spigot end
R Pipe or fitting with socket
S Socket support
V Connection to pressure source
α_{tot} Angular deflection applied
b_1, b_2 Width of clamp (see 3.2.6 and 3.2.7)
L Length of spigot-ended pipe or fitting, where $L \geq d_e$ or $L \geq 1000$, whichever is the greater, in millimetres
L_1 Distance between socket mouth and clamp

Figure 1 — Typical arrangement for applying diametric distortion and angular deflection



Key

1 Modified loading plate
h_p Construction height
H_p Profile height of the loading plate; $0,9h_p \leq H_p \leq 0,95h_p$

Figure 2 — Example of modified loading plate

4 Test pieces

The test piece shall comprise an assembly of (a) pipe section(s) and/or fitting(s) including at least one elastomeric sealing ring joint.

The joint to be tested shall be assembled in accordance with the manufacturer's instructions where available.

The length of the test pieces in pipe form shall be as specified in Figure 1.

The same test assembly shall be used for the entire specified test regime.

NOTE To reduce the volume of water needed a sealed pipe or mandrel can be located within the test piece provided it is 100 % tight to the test pressures applied, and it is not of a shape that may provide support against possible deformation during the test.

When a fitting or any other ancillary component is to be tested, the appropriate end of the test piece shown in Figure 1 is to be replaced by that component.

The component is fixed to the test rig and plugged in its open end(s) as appropriate for its design.

5 Test temperature

When testing with internal hydrostatic pressure using water the test temperature shall be (19 ± 9) °C.

When testing with internal partial vacuum the test temperature shall be in the range of (23 ± 5) °C and the temperature variation shall not exceed 2 °C during the testing.

6 Procedure

6.1 General

Carry out the following procedures at the specified temperatures.

a) Mount the test piece with sealed ends in the apparatus;

b) When applicable, apply the specified movement of the loading beams for diametric deflection of the spigot and/or socket end(s) as described in 6.2

c) When applicable, apply the specified angular deflection to the joint. Unless otherwise specified in the referring standard the applied angular deflection, α, shall be as follows:

$\alpha = 2°$ for $d_n \leq 315$ mm;

$\alpha = 1{,}5°$ for 315 mm < $d_n \leq 630$ mm;

$\alpha = 1°$ for $d_n > 630$ mm.

Tolerance on all deflections: $\alpha^{+0,2}_{0}$.

If a socket is designed to take up an angular deflection, ß, the total angular deflection shall be the sum of the design angle ß, as declared by the manufacturer, and α.

Maintain these settings throughout the testing.

d) When applicable, apply the specified negative air pressure (partial vacuum) p_1 gradually over a period of not less than 5 min. Unless otherwise specified in the referring standard, p_1 shall be –0,3 bar ± 5 % [1].

Maintain the negative air pressure for a period of not less than 5 min in order to let the test assembly stabilise.

Close the connection between the test piece and the negative air pressure source. Measure and record the internal negative pressure.

After 15 min measure and record the internal negative pressure again.

1) 1 bar = 100 kPa.

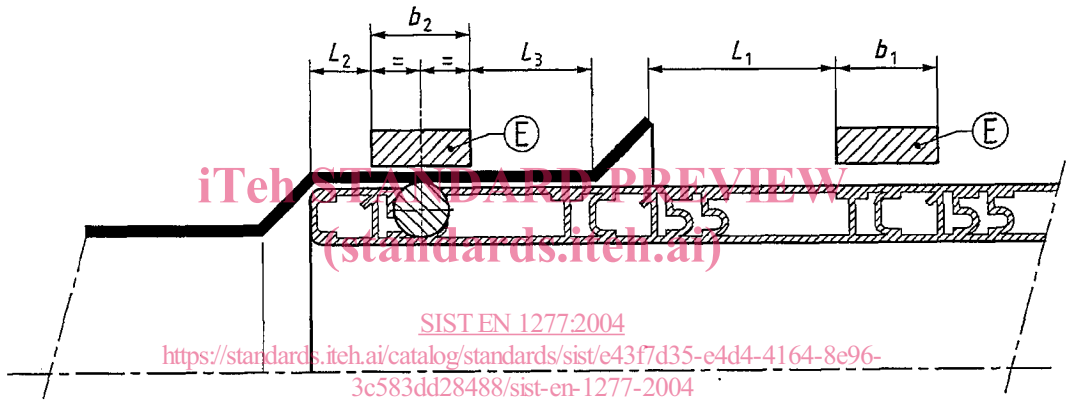
Calculate the loss of partial vacuum and record whether or not it exceeds the specified percentage of p_1. Unless otherwise specified in the referring standard the percentage shall be 10 %.

e) When applicable, fill the test assembly with water while bleeding off the air. To ensure temperature equalisation, leave it for not less than 5 min for pipes of nominal diameter, d_n, less than 400 mm and not less than 15 min for larger sizes.

f) When applicable raise the hydrostatic pressure gradually over a period of not less than 5 min to the specified test pressure, p_2, and maintain that pressure for at least 15 min, monitor the test piece for, and record any leakage. Unless otherwise specified in the referring standard, p_2 shall be 0,05 bar ± 10 %.

g) When applicable, raise the hydrostatic pressure gradually over a period of not less than 5 min to the specified test pressure, p_3, and maintain that pressure for at least 15 min, monitor the test piece for, and record any leakage. Unless otherwise specified in the referring standard, p_3 shall be between 0,5 bar and (0,5 bar + 10 %).

h) If applicable start from b) with an other set of required test parameters after an appropriate rest period which in case of dispute shall be at least 24 h.



Key
E Beam

Figure 3 — Positioning of beam for a sealing ring in an example of a spigot

6.2 Procedure for applying diametric deflection to spigot and socket

Using the mechanical or hydraulic device (see 3.2.6 and 3.2.7), apply the necessary compressive forces, F_1 and F_2 (see Figure 1) to the spigot end of the pipe and the socket of the pipe or fitting in such a way that the distance between the beams, l_{sp} and l_{so}, are as calculated below.

a) Calculate the distance between the beams when the socket and/or spigot is deflected using the following equations,

$$l_{sp} = d_{em} \times (1 - X/100)$$
$$l_{so} = d_{em,so} - (d_{em} \times Y/100)$$

where

l_{sp} is the distance between the plates for deflecting the spigot;
l_{so} is the distance between the plates for deflecting the socket;
d_{em} is the mean outside diameter of the spigot end;
$d_{em,so}$ is the mean outside diameter of the socket;
X is the absolute value of the specified nominal spigot deflection;
Y is the absolute value of the specified nominal socket deflection.