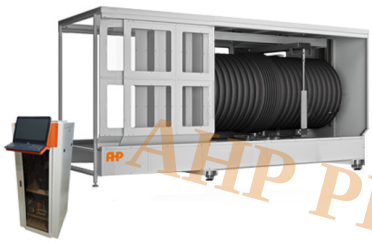
EN 1277 â€“ Thermoplastics Piping Systems for Buried Non-Pressure Applications â€“ Test Methods for Leaktightness of Elastomeric Sealing Ring Type Joints â€“ Testing Equipment

Description



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Combination Test of Corrugated Joints

3 Apparatus

3.1 General
Theapparatus 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.

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.

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The width, b1, see Figure 1, shall depend upon the external diameter, d,, of the pipe as follows:

â€” b1 = 100 mm for d, < 710 mm;

â€” b1 = 150 mm for 710 mm â€• d, < 1000 mm;

â€” tâ€™j = 200 mm for d, â€• 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 ehiptically shaped to suit the expected shape of the socket when deflected as required, see Figure 4;

The width, b2, shall depend upon the external diameter, d,, of the pipe as follows:

â€” b2 = 30 mm for d, < 110 mm;

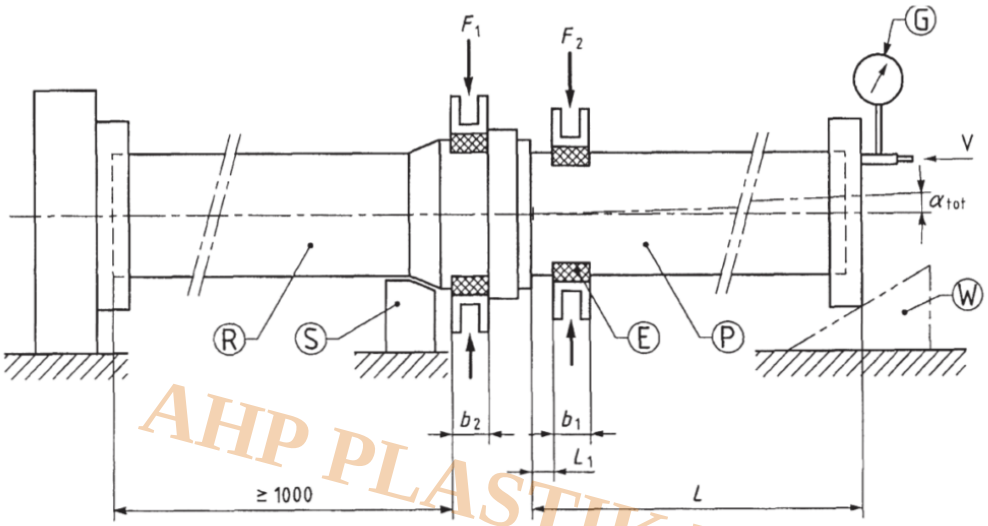
â€” b2 = 40 mm for 110 mm â€• d, < 315 mm;

â€” b2 = 60 mm for d, â€• 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).

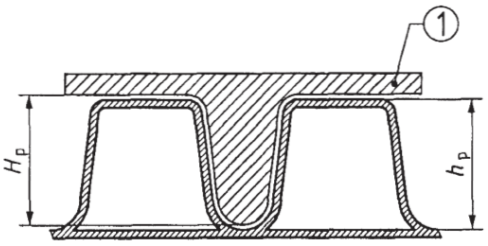
Such modifications shall be made from wood or less flexible materials.



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.

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The joint to be tested shall be assembled in accordance with the manufacturerâ€™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 njay 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.

6 Procedure

6.1 General
Carry out the following procedures at the specified temperatures.

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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, a, 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: $\alpha^{+0,2}_{0}$.

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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.

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 %.

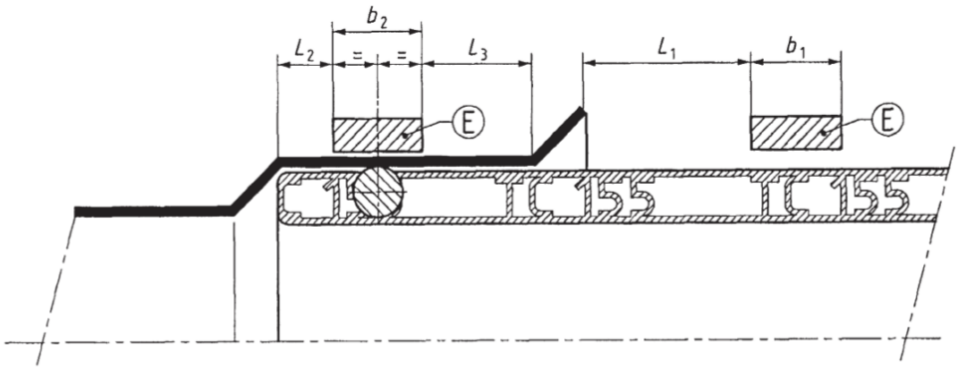
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e) When applicable, fill the test assembly with water while bleeding off the air. To ensure temperature equalisation, leave it for not less than 5 min for pipes of nominal diameter, d_n, less than 400 mm and not less than 15 min for larger sizes.

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

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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.

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Unless otherwise specified in the referring standard X shall be 10 % and Y shall be 5 %. (See also Figure 4).

Example: d_{em} = 1000 mm; $d_{em,so}$ = 1100 mm; X = 10 %; Y = 5 % results in

$l_{sp} = 1000 \times (1 - 10/100) = 900$ mm;

$l_{so} = 1100 - (1100 \times 5/100) = 1045$ mm.

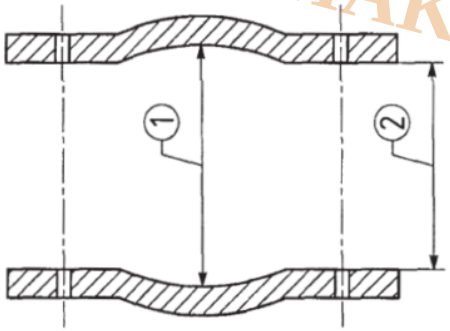
b) Position the spigot deflection clamps so the distance to the mouth of the socket, L_1, when the force is applied, is between $0{,}14d_e$ and $0{,}15d_e$ or (100 ± 5) mm, whichever is the greater. In case of structured wall pipes where the profiles are positioned further away from the socket mouth, the clamps shall be modified in order to apply the force to the spigot at the specified distance.

c) For joints with the sealing ring positioned in the socket, the socket diameter deflection beams shall be positioned next to the sealing ring groove as shown in Figure 1. For joints with the sealing ring(s) positioned on the spigot end of the pipe, the socket diameter deflection beams shall be positioned so that the axis of the beam is aligned with the centre line of the sealing ring profile(s). If the sealing ring(s) are positioned so the distance from the edge of the beams to the end of the socket, L_2 as shown in Figure 3 will bee less than 25 mm, the edge of the beams shall be located so that L_3 is at least 25 mm and, if possible L_2 is also at least 25 mm.

d) Apply the forces needed to move the spigot and socket diametric deflection devices to the calculated levels. If by deflection of the spigot, the socket is deflected to more than calculated this shall not be deemed as a failure and the test shall be carried out under these conditions.

e) Continue with item c) of 6.1.

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Key
1 l_{sp} or l_{so}, as calculated in accordance with item a) of 6.2
2 Reference distance, e.g. for checking conformity to l_{sp} or l_{so}

Figure 4 — Example of diametric deflection device



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Leak Tightness Tester for PVC Pipes up to 250mm-BS EN 1277

- According to BS EN 1277 //
- Structure for applying diametric deflection //
- Capable of applying angular deflection up to 2.5 degrees //
- Structure is suitable for testing PVC pipes up to 250mm //
- Pressure unit including both positive and negative pressure //
- Negative pressure range is 0ï½ž(-0.06)MPa //
- Positive pressure range is 0.005 â€“ 0.1MPa //
- Water fill system to the sample piece //
- Positive and negative pressure accuracies according to EN 1277 //
- Digital radial deformation indicator //
- Radial deformation indicator resolution 0.01mm //
- Test stand including computer and software //
- Software is Windows-based //
- Online support for the software //
- Automatic cycle for the test //
- PLC based control //
- Manual deflection application to the defined positions on the length of the pipe //
- Easy change of place of force application //
- Seal end caps will be quoted separately as the customer need //
- Report in MS-WORD

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Category

1. Equipment for Standards
2. Standards