

Australian/New Zealand Standard™

Methods of test for plastics pipes and fittings

Method 13: Method for the determination of elastomeric seal joint contact width and pressure

1 SCOPE

This Standard sets out a procedure for determining the contact width and contact pressure profile of an elastomeric seal joint. It allows for both spigot-mounted and socket-mounted elastomeric seal joints.

2 PRINCIPLE

A socket with an elastomeric seal is placed over a spigot with a small hole, or a spigot with an elastomeric seal is placed over a socket with a small hole. In each case, the hole is just covered by the elastomeric seal. Pressure is applied at a uniform rate through the hole until leaking occurs. The leak pressure and relative location of the seal is noted. The pressure is then released and the spigot or socket moved by a small increment and the procedure repeated until the contact pressure profile is completed.

3 RELEVANCE OF TEST

A minimum interface pressure and contact width between the elastomeric seal and the spigot of the pipe or fitting is necessary to minimize the risk of tree root intrusion and liquid infiltration or exfiltration.

4 APPARATUS

The following apparatus is required:

- (a) *Hydraulic system*—capable of producing a pressure in excess of the expected interface pressure and capable of maintaining an accuracy of $\pm 2\%$ over the range 0.3–0.8 MPa.
- (b) *Test rig*—with, as a minimum, the following features:
 - (i) Sufficient travel to allow testing of the full contact width of the elastomeric seal.
 - (ii) Construction that shall maintain the elastomeric joint square to the axis of the spigot during testing.
 - (iii) Construction that shall not apply radial pressure to the spigot or socket during testing.
 - (iv) A dial gauge or equivalent means, to determine the relative longitudinal position to ± 0.1 mm.
- (c) *For spigot-mounted seals*—a socket of the maximum inside diameter as shown in the manufacturer's product drawing $-0, +0.02$ mm, with a 0.75 ± 0.3 mm diameter hole connected to the source of hydraulic pressure.
- (d) *For socket-mounted seals*—a spigot of minimum outside diameter, as shown in the appropriate product Standard, $+0.0, -0.02$ mm, with a 0.75 ± 0.3 mm diameter hole, connected to the source of the hydraulic pressure.

Allowance shall be made, either in the socket or spigot as described above, or in the test specimen, for the strain of the joint as derived in Appendix A.

NOTE: A test rig as shown in Figure 1 is suitable for supporting the cylinder and moving the sample.

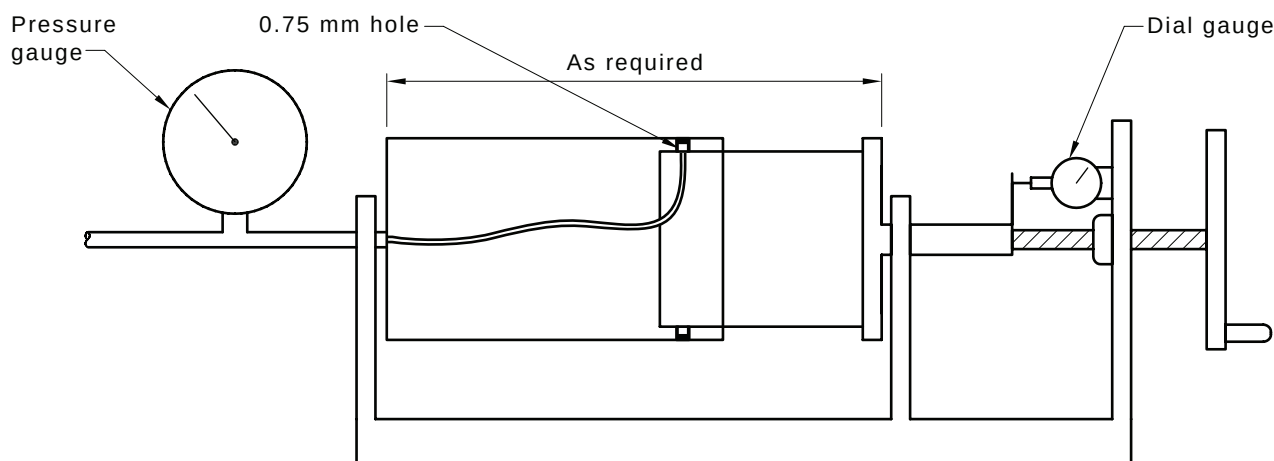


FIGURE 1 TYPICAL TEST APPARATUS

5 PREPARATION OF TEST PIECES

The elastomeric ring joint design under test shall be prepared as follows:

- (a) Manufacture or select a pipe socket or profiled spigot as appropriate.
- (b) Ensure that the elastomeric ring groove profile and diameter are at the extreme dimensions in order to produce the least interface pressure, including allowance for the strain of the joint, as calculated in Appendix A.

A hole may be drilled in the bottom of the spigot or socket to observe leakage.

6 CONDITIONING OF TEST SPECIMENS

The test specimen shall be conditioned in air at $20 \pm 2^\circ\text{C}$ for a period of not less than that indicated in Table 1 immediately prior to testing.

TABLE 1
CONDITIONING OF TEST SPECIMENS

Minimum wall thickness mm (See Note 1)	Conditioning time in moving air (See Note 2)	Conditioning time in still air (See Note 3)
≤5	5 min	15 min
>5 ≤10	15 min	35 min
>10 ≤20	30 min	90 min
≥20	2.5 h	5 h

NOTES:

- 1 Minimum wall thickness for the nominal size under test can be determined by reference to the dimensions table(s) in the relevant pipe or fitting Standard.
- 2 These conditioning times apply when the test specimens are subjected to a circulating air current produced by means of a fan or other device.
- 3 This is considered to be a normal laboratory atmosphere.

7 PROCEDURE

The procedure shall be as follows:

- (a) Lubricate the assembly along its length with a suitable lubricant that does not cause blockage of the hole or seizing of the elastomeric seal on the sealing surface during the test.
- (b) Assemble the socket-seal assembly so that the seal is just short of the 0.75 mm hole and allow to condition for 10–12 min at ambient temperature.
- (c) Apply a pressure of approximately 0.05 MPa and move the assembly towards the hole until it stops leaking. Set the displacement dial gauge to zero.
- (d) Increase the pressure until leaking occurs. The pressure to leak and displacement is recorded and the pressure is released from the system.

NOTE: A slow rate of pressure increase near the value of expected leakage gives more accurate results.

- (e) Move the socket seal assembly forward, in increments of not more than 1 mm and repeat Step (d) until no further pressure can be generated.

NOTE: Smaller increments can be useful for assessment where the interface pressure is changing substantially, i.e. at each end of the seal.

Certain seal profiles, i.e. those with multiple contact regions, may generate an apparent interface pressure. In such cases the seal shall be pierced in an appropriate position to allow the applied hydraulic pressure to vent to the atmosphere (see Figure 2).

- (f) Plot the pressure-displacement profile.

8 REPORT

The following shall be reported:

- (a) The complete identification of all the components of the joint.
- (b) The maximum, continuous length of contact, between the seal and cylinder, that exceeded the minimum pressure specified in the product Standard.
- (c) Reference to this test method, i.e. AS/NZS 1462.13.