

Australian/New Zealand Standard™

Methods of test for plastics pipes and fittings

Method 23: Method for determination of ring flexibility

1 SCOPE

This Standard sets out a procedure for determining the ring flexibility of plastics pipes with structured walls.

2 PRINCIPLE

Three short lengths of pipe are compressed between two rigid parallel plates, across the diameter at a constant rate of deflection. The condition of the pipes at 30% deflection is noted.

3 REFERENCED DOCUMENTS

The following documents are referenced in this Standard:

AS

2193 Calibration and classification of force-measuring systems

AS/NZS

1462 Methods of test for plastics pipes and fittings

1462.1 Part 1: Method for determining the dimensions of pipes and fittings

4 APPARATUS

The following apparatus is required:

- (a) *Testing machine*—a calibrated Class B compression-testing machine of constant cross-head speed (see AS 2193).
- (b) *Two parallel steel bearing plates*—of thickness not less than 6.0 mm. The plates shall be flat and clean. The stiffness of the plates shall be sufficient to prevent them from bending or deforming during the test. The length of the plates shall be at least equal to the length of the test piece. The width of the plates shall be at least 50 mm more than the contact surface with the test plate.
- (c) *Measuring equipment*—capable of measuring—
 - (i) applied force, to an accuracy within 2%; and
 - (ii) deflection, of the inside diameter in the direction of loading to an accuracy of 0.1 mm or 1% of the deflection, whichever is the greater.

5 TEST SPECIMENS

5.1 Number of test specimens

Three specimens shall be tested.

NOTE: When performing this test, it is normal to find slightly different results when consecutive test pieces are tested. It is also normal to find slightly different results when the rings are rotated with respect to the bearing plates.

5.2 Preparation of test specimens

The test specimens shall be prepared as follows:

- Cut a length of approximately 1000 mm from a pipe.
- Mark the outside of the cut length with three longitudinal lines, each 120° apart, over the full length of the selected pipe section. Identify the marked lines as 'a', 'b' and 'c', respectively.

NOTE: If in a previous test a low value of stiffness was determined in some position, locate line 'a' through the point of application of the load producing the low stiffness reading.

- Cut three test specimens to the length specified in Paragraph 5.3.

5.3 Length of test specimens

The length of each test specimen should be 300 ± 10 mm. However, if the pipe design is such that a length of 300 mm would not be representative because of lack of symmetry, the length of the test specimen may be longer than 310 mm.

Test specimens from pipes with perpendicularly ribbed, corrugated or profiled constructions shall be cut in such a way that their length equals a whole number of ribs, corrugations or profiles (see Figure 1). The cuts shall be in the centre between the ribs, corrugations or profiles.

The ends of the specimens shall be cut $90 \pm 2^\circ$ to the pipe axis. Determine the length of each specimen by taking the arithmetic average of three to six measurements equally spaced around the perimeter of the pipe, in accordance with Table 1.

Determine the diameter of the test specimen in accordance with AS/NZS 1462.1.

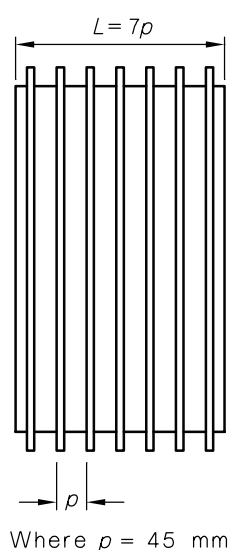


FIGURE 1 EXAMPLE OF TEST PIECE CUT FROM A PERPENDICULAR RIBBED PIPE

TABLE 1
NUMBER OF LENGTH MEASUREMENTS

Pipe designation	Number of length measurements
< DN 200	3
> DN 200 ≤ DN 500	4
> DN 500	6

5.4 Age of test pieces

Testing shall be performed on test specimens whose age is at least 24 h. For reference testing, the age of the test pieces shall be 21 ± 2 days.

5.5 Conditioning of test specimens

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

TABLE 2
CONDITIONING OF TEST SPECIMENS

Minimum total wall thickness, mm	Conditioning time in water or moving air (see Note 1)	Conditioning time in still air (see Note 2)
≤ 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 These conditioning times apply when the test specimens are immersed in water or in a circulating air current produced by means of a fan or other device.
- 2 This is considered to be a normal laboratory atmosphere.

6 TEST TEMPERATURE

Pipes shall be tested at $20 \pm 2^\circ\text{C}$.

7 PROCEDURE

The procedure shall be as follows:

- (a) Locate the test specimen with its longitudinal axis parallel to the bearing plates and centre it laterally in the testing machine.
- (b) Bring the upper plate into contact with line 'a' on the first test specimen. Use only sufficient force to hold the test specimen in position.
- (c) Deflect the test specimen at the speed given in Table 3 to a minimum deflection of 30% of the internal diameter.
- (d) Repeat the procedure described in Steps (a) to (d) bringing the upper plate in contact with line 'b' on the test piece during the second test, and with line 'c' on the test piece during the third test.