

Australian/New Zealand Standard™

AS/NZS 1462.6:2008

Methods of test for plastics pipes and fittings

Method 6: Thermoplastics pipes, fittings and assemblies for the transport of fluids under pressure—Resistance to internal pressure

PREFACE

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee PL-045, Plastics Pipe Systems Test and Calculations. This Standard is based on ISO 1167-1, *Thermoplastics pipes, fittings and assemblies for the conveyance of fluids—Determination of the resistance to internal pressure, Part 1: General method*, ISO 1167-2, *Thermoplastics pipes, fittings and assemblies for the conveyance of fluids—Determination of the resistance to internal pressure, Part 2: Preparation of pipe test pieces*, ISO 1167-3, *Thermoplastics pipes, fittings and assemblies for the conveyance of fluids—Determination of the resistance to internal pressure, Part 3: Preparation of components*, and ISO 1167-4, *Thermoplastics pipes, fittings and assemblies for the conveyance of fluids—Determination of the resistance to internal pressure, Part 4: Preparation of assemblies*, and replaces the following Standards:

AS/NZS

- 1462 Methods of test for plastics pipes and fittings
- 1462.6 Part 6: Method for hydrostatic pressure testing of pipes

AS

- 1462.9 Part 9: Method for hydrostatic pressure testing of UPVC pressure fittings
- 1462.17 Part 17: Method for testing pressure pipe joints with elastomeric seals

The methodology for carrying out regression analysis previously detailed in AS 1462.6 is now covered by AS/NZS 1462.29, *Plastics piping and ducting systems—Determination of the long-term hydrostatic strength of thermoplastics materials in pipe form by extrapolation* (ISO 9080:2003, MOD).

Tests for determining the resistance to internal pressure are essential for assessing the properties and durability of thermoplastics piping system components. They provide a basis for determining both short-term and long-term characteristics.

Many standards contain requirements for determining the resistance to pressure of pipes, fittings or assemblies. This document describes the method for pressurizing the different test pieces concerned as well as the testing procedure and the test report.

METHOD

1 SCOPE

This Standard specifies a general test method for determining the resistance to internal hydrostatic pressure, at a given temperature, of thermoplastics pipes, fittings and piping systems intended for the transport of fluids.

2 REFERENCED DOCUMENTS

The following documents are referred to in this Standard:

AS/NZS

1462 Method of test for plastics pipes and fittings

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

3 SYMBOLS AND DEFINITIONS

For the purposes of this Standard, the following symbols and definitions apply:

$e_{\min}$ minimum wall thickness of the test piece, in millimetres

l_o free length of the test piece, in millimetres

σ hoop stress, in megapascals

p pressure to be applied, in megapascals

d_{em} mean outside diameter, in millimetres

d_n nominal outside diameter, in millimetres

A component is a combination of any pipe, fitting or valve, in single or multiple form, that is supplied as an integral unit.

Free length is the length of the test piece between the end-caps.

4 TEST RINCIPLE AND PARAMETERS

4.1 Principle

After conditioning, test pieces are subjected to a specified constant internal hydrostatic pressure for a specified period of time or until the test piece(s) fail(s).

Throughout the test, the test pieces shall be kept at a specified constant temperature in one of the following environments:

- (a) Water ('water-in-water' test).
- (b) Another liquid ('water-in-liquid' test).
- (c) Air ('water-in-air' test).

4.2 Parameters

The following test parameters shall be specified by the Standard making reference to this Standard:

- (a) The type of end-cap to be used.
- (b) The test temperature.
- (c) For evaluation purposes, the SDR, pressure class or size of pipe or fitting to be used.
- (d) The number of test pieces.
- (e) The test pressure (p) or the circumferential (hoop) stress (σ) to be induced by the test pressure.
- (f) The conditioning period.
- (g) The type of test, i.e. water-in-water/air/liquid.
- (h) The duration of the test under pressure and the criteria for a failure.
- (i) The requirements, or patterns of requirements, if any, that determine when additional testing should be carried out.

5 APPARATUS

5.1 End-caps

5.1.1 Pipe tests

By means of an appropriate system, end-caps shall allow sealing and connection to the pressurizing equipment and shall allow purging of the air before testing.

The end-caps shall be one of the following types:

- (a) *Type A* Fittings rigidly connected to the test piece but not to each other, and hence transmit the hydrostatic end-thrust to the test piece (e.g. as shown in Figure 1) or equivalent. They may comprise flanged plates on the ends of a large diameter pipe, optionally fused when flanges, caps, plugs or plates are of a compatible material to the test pieces;
- (b) *Type B* Sockets made of metal and fitted with joints that ensure sealing onto the external surface of the test piece and connected to one another, and hence does not transmit the hydrostatic end-thrust to the test piece. They may consist of one or more metal rods (see Figure 1), allowing sufficient longitudinal movement at the ends of the test pieces to avoid buckling due to thermal expansion.

Any sharp edges, other than toothed grips, that may come into contact with the outside surface of the pipe shall be rounded off.

The constituent material of the end-cap shall not have any known adverse effect on the test piece under test.

If not stated otherwise in the product standard, the 'Type A' test method shall be the reference test method.

NOTE: It is recognized that times to failure may be different depending upon the type of end-caps used.

5.1.2 Component tests

When testing components, the end-caps may be replaced by a watertight connection. Where used, the watertight connection shall be made to the fitting within the socket or on the external surface.

The test specimen shall be supported and held in a suitable jig so that no external axial force is applied to the specimen when the openings and branches are sealed off (see Figure 2). Pressure shall be applied through one of the end-connections or sealing plug seals. Care shall be taken to ensure that the apparatus used for testing fittings with screw threads does not cause notching of the thread.

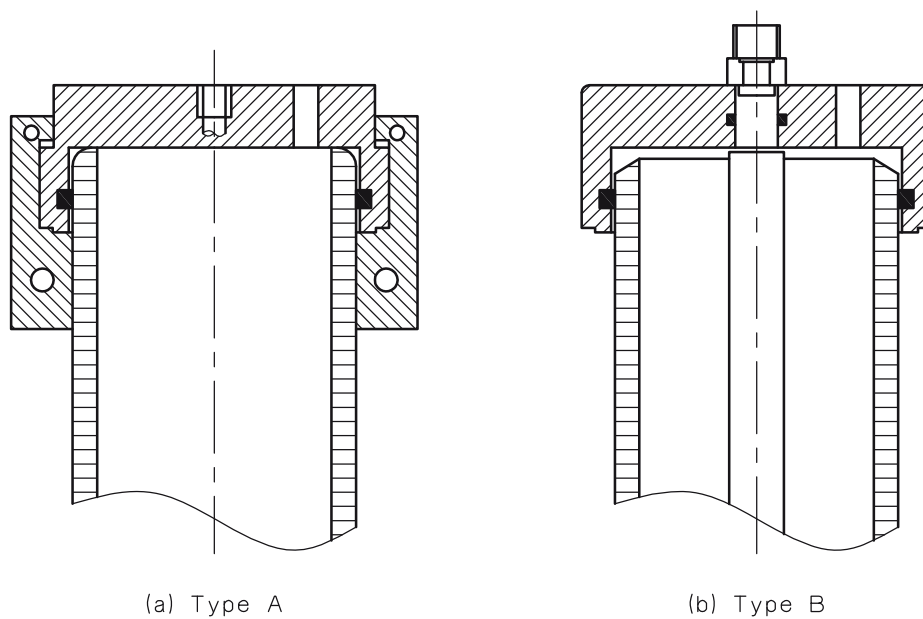


FIGURE 1 EXAMPLES OF END-CAPS FOR INTERNAL PRESSURE TESTING OF PIPES

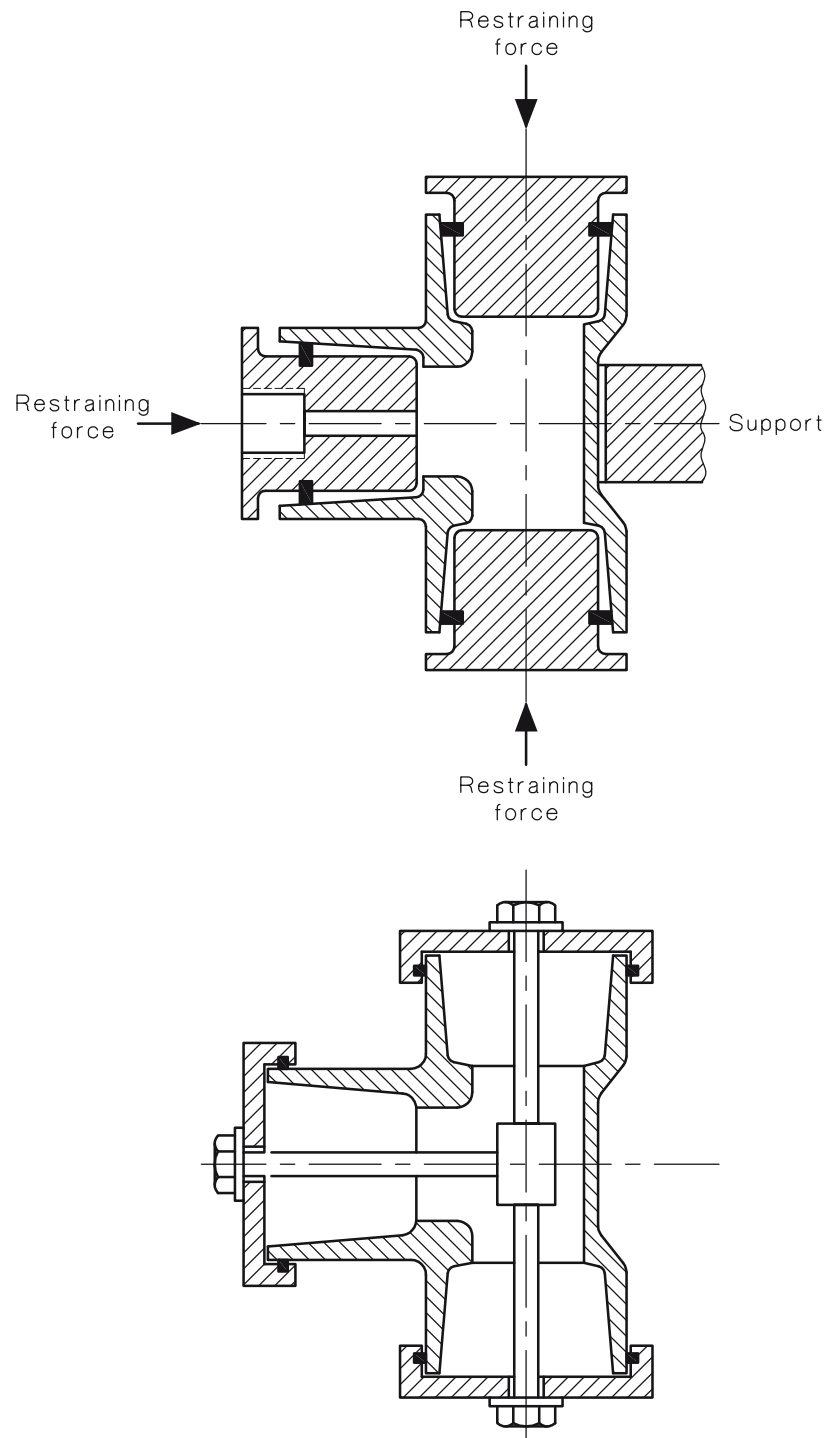


FIGURE 2 EXAMPLES OF END-CAPS FOR INTERNAL PRESSURE TESTING OF COMPONENTS

5.2 Tank, oven or laboratory

A tank, filled with water or other liquid, a controlled temperature laboratory, or an oven kept at a constant temperature, as specified in the referring Standard, to within $\pm 2^{\circ}\text{C}$.

When an environment other than water is used, necessary safety precautions shall be taken, in particular those concerning safety any interaction between the liquid and the material(s) of the test piece. Where an oven is used at elevated temperatures it shall have fan-forced air circulation.

When environments other than water are used, tests that are intended to be comparative shall be carried out in the same environment.

As test results are strongly influenced by temperature, the tolerance on temperature shall be kept as small as possible within the specified limits (e.g., by using forced circulation of the fluid).

NOTES:

- 1 When testing in air, it is recommended that the pipe surface temperature be checked in addition to that of the air.
- 2 Potable water should be used and it is necessary to avoid contamination of the water by any substances likely to affect the results (e.g. detergents, lubricants).

5.3 Support

Support or hangers, that enable test pieces to be placed in the tank or oven in such a way that contact between them or with the side walls of the tank or the oven is avoided as far as possible in order not to influence the test results.

5.4 Pressurizing equipment

Pressurising equipment capable of applying the required pressure gradually and smoothly in accordance with Clause 9 and then of keeping this indicated (or measured) pressure to within $\pm 2\%$ for the duration of the test.

As the results are strongly influenced by pressure, the tolerance on pressure shall be kept as small as possible within the specified limits.

NOTES:

- 1 The pressure should, preferably, be applied individually to each test piece; however, the use of equipment enabling the pressure to be applied simultaneously to several test pieces, is also permitted if there is no danger of interference when failure occurs (e.g. by the use of an isolation valve or a test based on the first failure in a batch).
- 2 To maintain the pressure within the specified tolerance, it is recommended that a system be introduced, which automatically controls the pressure within this specified tolerance (e.g. due to expansion of the test piece).

5.5 Pressure measurement devices

Pressure measurement devices capable of checking conformity to the specified test pressure. In the case of gauges or similar calibrated pressure measurement devices, the range of the gauge shall be such that the required pressure setting shall lie within the calibrated range of the device used (see Clause 7).

The pressure measurement devices shall not contaminate the test fluid.

Variations in the height between specimens and pressure measurement devices may give rise to inaccuracies in pressure measurement. In the case of a dispute, the reference level of the pressure device shall be equal to the top of the test piece.

NOTE: The use of equipment that is sensitive to pressure variations due to leaks or a failure and that is capable of stopping the timer (see Clause 5.8) and, if necessary, closing the pressure circuit to the test piece concerned is recommended.

5.6 Dimension-measuring equipment

Dimensions shall be measured using equipment in accordance with AS/NZS 1462.1.

5.7 Temperature-measuring equipment

Temperature-measuring equipment capable of checking conformity to the specified test temperature within $\pm 0.5^\circ\text{C}$.

5.8 Timer

A timer, capable of recording the duration of the pressure applications up to the moment of failure or leakage to within 1% of the expected testing time.