

Australian/New Zealand Standard™

Installation of PVC pipe systems



AS/NZS 2032:2006

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Energy Networks Association of Australia
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PREFACE

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee PL-021, PVC, ABS and Polyamide Pipe Systems, to supersede AS 2032—1977, *Code of practice for installation of UPVC pipe system* and NZS 7643:1979, *Code of practice for the installation of unplasticized UPVC pipe systems*.

This Standard incorporates Amendment No. 1 (October 2008). The changes required by the Amendment are indicated in the text by a marginal bar and amendment number against the clause, note, table, figure or part thereof affected.

The objective of this Standard is to provide uniform procedures for the installation of PVC pipe systems for both above- and below-ground applications.

The objective of this revision is to update the Australian Standard and publish as a joint Australian/New Zealand Standard.

This Standard primarily addresses the installation, testing and commissioning of PVC pipes and fittings for water plumbing, sanitary plumbing and drainage, stormwater drainage, and industrial and irrigation applications and is not intended to replace industry-specific installation codes or regulations.

For plumbing applications, reference should also be made to AS/NZS 3500, *Plumbing and drainage* (all parts). For above-ground applications using structured wall pipes, reference should also be made to the manufacturer.

For installations conveying gaseous fluids, reference should be made to AS 5601, *Gas installations*, and AS 3723, *Installation and maintenance of plastics pipe systems for gas*, as appropriate.

For water supply and sewerage network infrastructure involving the design and installation of PVC pipelines, reference should be made to Water Services Association of Australia (WSAA) Codes.

For design and installation of buried flexible pipelines, reference should be made to AS/NZS 2566.1, *Buried flexible pipelines Part 1: Design* and AS/NZS 2566.2, *Buried Flexible Pipelines Part 2: Installation*.

Thermal rerating of PVC pipes at temperatures above 20°C is considered a design issue and is not addressed in this Standard. Expert advice may be sought regarding derating at elevated temperatures.

A bibliography is provided for further references, which may be used to provide more detailed explanations or information regarding the installation of PVC pipelines.

For electrical installations, reference should be made to AS/NZS 3000, *Electrical installations*.

Australian and New Zealand Standards generally do not—

- (a) restate the duties of employers, employees, designers and installers; or
- (b) determine the applicability of regulatory limitations; or
- (c) determine appropriate health and safety practices.

Statements expressed in mandatory terms in notes to figures and tables are deemed to be requirements of this Standard.

Notes to text are for information and guidance only.

The terms 'normative' and 'informative' have been used in this Standard to define the application of the appendix to which they apply. A 'normative' appendix is an integral part of a Standard, whereas an 'informative' appendix is only for information and guidance.

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STANDARDS AUSTRALIA/STANDARDS NEW ZEALAND

Australian/New Zealand Standard Installation of PVC pipe systems

SECTION 1 SCOPE AND GENERAL

1.1 SCOPE

This Standard sets out methods for handling, storage, installation, testing and commissioning of polyvinyl chloride (PVC) pipelines, above- or below-ground, for pressure and non-pressure applications conveying liquids.

PVC materials covered are—

- (a) PVC-U (unplasticized polyvinyl chloride);
- (b) PVC-M (modified polyvinyl chloride);
- (c) PVC-O (oriented polyvinyl chloride); and
- (d) PVC-C (chlorinated polyvinyl chloride).

This Standard applies to PVC pipelines that carry liquids under either pressure or gravity flow situations and the components of which comply with, but are not limited to, the following:

- (a) AS/NZS 1254—Stormwater.
- (b) AS/NZS 1260—Drain, waste and vent.
- (c) AS 1273—Rainwater downpipes.
- (d) AS/NZS 1477—PVC-U pressure applications.
- (e) AS 4441(Int)—PVC-O pressure applications;
- (f) AS/NZS 4765—PVC-M pressure applications.
- (g) ASTM F441—PVC-C Schedules 40 and 80.

1.2 NORMATIVE REFERENCES

The following referenced documents are indispensable for the application of this document.

NOTE: Informative references are listed in Appendix A.

AS

1273	Unplasticized PVC (UPVC) downpipe and fittings for rainwater
1646	Elastomeric seals for waterworks purposes (all parts)
4441(Int)	Oriented PVC (PVC-O) pipes for pressure applications

AS/NZS

1254	PVC pipes and fittings for stormwater or surface water application
1260	PVC-U pipes and fittings for drain, waste and vent applications
1477	PVC pipes and fittings for pressure applications
2566	Buried flexible pipelines
2566.2	Part 2: Installation

AS

2648	Underground marking tape
2648.1	Part 1: Non-detectable tape
3500	Plumbing and drainage
3500.0	Part 0: Glossary of terms
3500.1	Part 1: Water services
3500.2	Part 2: Sanitary plumbing and drainage
3879	Solvent cements and priming fluids for use with unplasticized PVC (uPVC) pipes and fittings
4020	Testing of products for use in contact with drinking water
4327	Metal-banded flexible couplings for low-pressure applications
4765	Modified PVC (PVC-M) pipes for pressure applications
ISO/TR	
10358	Plastics pipes and fittings—Combined chemical resistance classification table
ASTM	
D2855	Standard Practice for Making Solvent-Cemented Joints with Poly(Vinyl Chloride) (PVC) Pipe and Fittings
F441/F441M-02	Standard Specification for Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe, Schedules 40 and 80
F493-04	Standard Specification for Solvent Cements for Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe and Fittings
WSAA	
P3-318	Marking tape, detachable
TN4	Information and Guidance Note TN4
05	Sewer inspection reporting code of Australia
107	Mechanical tapping bands

1.3 DEFINITIONS

For the purpose of this Standard the definitions in AS/NZS 3500.0 and the ones below apply.

1.3.1 Embankment and trench zones

Embankment and trench zones are shown in AS/NZS 3500 and AS/NZS 2566.2.

1.3.2 Environmental stress cracking

Environmental stress cracking (ESC) is the premature initiation of cracking and embrittlement due to the combined action of stress and strain and contact with particular fluids.

1.3.3 Fixed point

A point at which axial movement of the pipe or fitting is restrained.

NOTE: For example—

- (a) at the fixed (clipped) part of an expansion joint fitting;
- (b) at junctions and bends except where alternative provision for expansion is made (see Clause 6.4.3(c)); or
- (c) at connections to fixtures [except where movement is accommodated at a trap, (see Clause 6.4.3(d))] and drains [except where movement is possible at the drain connection (see Clause 6.4.3(b))].

1.3.4 Permeation

The passage or diffusion of a gas, vapour, liquid or solid through a barrier without it being physically or chemically affected.

1.3.5 Shall

Indicates a mandatory requirement.

1.3.6 Should

Indicates text that is not a mandatory requirement but given for information or guidance.

SECTION 2 PRODUCTS AND MATERIALS

2.1 SCOPE OF SECTION

This Section specifies requirements for products and materials used for the installation of PVC pipe systems.

2.2 PIPE AND FITTINGS

2.2.1 PVC pipes and fittings

PVC pipes and fittings installed in accordance with this Standard shall comply with the relevant Standard given in Clause 1.1.

In Australia, for plumbing and drainage applications, PVC pipes and fittings shall be authorized in accordance with plumbing industry regulations. In New Zealand, for plumbing and drainage applications, PVC pipelines shall meet the requirements of AS/NZS 3500.

Pipes and fittings manufactured in accordance with AS 1273 shall not be installed for stormwater stack heights exceeding 15 m and shall not be encased in concrete for multi-storey work.

2.2.2 Chemical resistance

Where the application is for the conveyance of chemicals, information on the suitability of PVC pipe for that application may be found in ISO TR 10358 or obtained from manufacturers.

For installations in contaminated ground the suitability of PVC for that service shall be determined. Such contamination may take the form of actual attack on the material, affecting the system's structural integrity, or it may permeate the pipe or fitting, not adversely affecting structural strength but potentially tainting pipe contents. Such permeation might not be an issue for pipes that do not convey drinking water.

In drainage applications, the tables of chemical resistance may need to be varied to take account of the concentration of the chemicals and the duration of contact (e.g., a laboratory drainage system).

For pipes joined with elastomeric seals or solvent cement joints, consideration shall be given to the chemical resistance of the seals or the solvent cement.

NOTE: Further guidance on chemical resistance is available from the relevant sources listed in Appendix A. Alternatively, refer to the pipe manufacturer.

It may be necessary to assess the effects of external chemical contamination.

2.2.3 Permeation

For PVC, as with other materials, including those used for jointing, permeation depends upon the concentration of the contaminant and its nature.

Permeation is an extremely slow process and significant levels will occur only under conditions of prolonged contact at high levels of concentration.

In general, PVC is highly resistant to permeation by petroleum products, alcohols (ethanol), aliphatic hydrocarbons and organic acids.

In instances involving significant levels of contamination, expert advice should be sought.

2.2.4 Buckling under external load and vacuum

PVC pipes and fittings installed below the water table are subjected to an external load and may buckle, especially in a deep installation. The pipe class selected in the installation shall be high enough to ensure stability against buckling failure when subjected to the maximum external hydrostatic pressure possible for the deepest pipe in the installation.

When grouting is undertaken, the grouting pressures should be determined to ensure that empty pipes do not deflect or buckle beyond acceptable criteria as a result of grout pressure. Where the contribution of grouting pressure to buckling forces on an empty pipe is uncertain, grouting should be carried out with the pipe internally pressurized.

2.2.5 Fittings

Fittings used in conjunction with PVC pipe shall meet the performance requirements of the relevant Australian, New Zealand, International or industry Standard and be capable of withstanding the proposed service conditions for the design life of the installation.

In Australia, for plumbing and drainage applications, fittings made of materials other than PVC shall be authorized in accordance with plumbing industry regulations.

2.2.6 Solvent cements and priming fluids

Solvent cements and priming fluids for PVC-U and PVC-M pipelines shall comply with AS/NZS 3879 except where a gap-filling solvent cement is required. For PVC-C pipelines, solvent cement and priming fluids shall comply with ASTM F493.

2.2.7 Elastomeric seals

Elastomeric seals shall comply with the applicable Parts of the AS 1646 series of Standards and shall be in accordance with the recommendations of the manufacturer of the socketed pipe or fitting. For drinking water applications, elastomeric seals shall comply with AS/NZS 4020.

2.2.8 Lubricants for elastomeric seals and expansion joints

Lubricants used in conjunction with elastomeric seals shall be those specified by the manufacturer of the socketed pipe or fitting. For drinking water applications, lubricants shall also comply with AS/NZS 4020.

2.3 HANGER AND CLIPS

Hangers and clips shall be corrosion-resistant for the intended environment.

Sliding joints, pipe hangers and clips shall be constructed so that, when fully tightened, longitudinal movement of the pipe is possible without damage to the pipe or fitting.

Anchor clips for fixed points shall be constructed so that, when fully tightened, the fitting or pipe is securely and evenly clamped to prevent movement. Care shall be taken to ensure that pipes and fittings are not distorted by over-tightening.

2.4 PIPE EMBEDMENT AND TRENCH-FILL MATERIALS

Embedment and trench-fill materials shall comply with the AS/NZS 3500 series or AS/NZS 2566.2 or specific industry standards, as required.

2.5 TOOLS AND EQUIPMENT

Specialized tools and equipment used in the installation, repair, testing and commissioning of PVC pipes and fittings shall be as recommended by the pipe and fittings manufacturers.

SECTION 3 GENERAL REQUIREMENTS

3.1 SCOPE OF SECTION

This Section specifies general requirements for the installation of PVC pipe systems, and their handling, transport, storage and inspection.

3.2 TRANSPORT, HANDLING AND STORAGE

3.2.1 General

PVC pipes and fittings shall be transported, handled and stored with care by the installer at all times to avoid physical damage (e.g., gouging, scoring, scratching, localized deformation, ovalization or impact damage) that could adversely affect performance.

3.2.2 Transportation

When being transported, pipe shall be supported in a secure manner to prevent damage, excessive distortion of the pipe cross-section or bowing or twisting of the pipe.

3.2.3 Storage

The storage area provided for pipe shall—

- (a) be a flat surface free of any sharp stone or projection, which may cause damage or localized deformation to the pipe; and
- (b) be suitable for the use of the proposed loading and unloading of equipment without the risk of accidental damage to the pipe.

If the total period of exposed storage outdoors is likely to exceed 12 months, pipes and fittings shall be covered and stored in a manner that allows ventilation and prevents heat entrapment. Pipes and fittings may be stored in this manner indefinitely.

Stacking of pipes during storage shall be in accordance with the manufacturer's recommendations.

Similar provisions apply to fittings, except those fittings marked with specific storage instructions.

NOTE: Storage outdoors may be extended by covering pipes and fittings with an appropriate material such as hessian or white PE sheet. Black plastic sheeting may cause unacceptable heat build-up and should not be used.

Joint lubricants shall be stored in sealed containers until ready for use.

Solvent cements and priming fluids shall be kept in sealed containers and stored away from direct heat sources. Solvent cements shall be used before the 'use by' date.

3.3 PRE-INSTALLATION INSPECTION

3.3.1 Correct supply

Before installation, pipes and fittings shall be inspected to ensure that they are of the type, size and classification specified for the installation. Any items that are not according to the specifications shall be replaced.

3.3.2 Cleanliness

Pipes and fittings shall also be inspected to ensure they are free of obstructions and foreign materials, which might interfere with the performance of the pipeline, and be cleaned if necessary.

3.3.3 Fitness for use

The outside surfaces of pipes and fittings shall be visually checked for damage immediately prior to installation, with pipe and fitting spigot ends also being checked for excessive ovality. Spigot ends of cut pipe lengths shall also be checked for excessive ovality. Limits of allowable ovality (including out of roundness) and damage for DN 100 pipes and larger are specified in Table 3.1. Ovality tolerance on the spigots applies to pressure pipes with an SDR <32 and/or PN >9 and non-pressure pipes with an SN >6. No such tolerance is placed on thinner walled pipe spigots, as these may easily be rerounded when inserted into the socket. If non-pressure pipe is ovalized for the full length, the tolerances in Table 3.1 shall apply irrespective of classification. Localized areas that have taken a permanent set exceeding the limits in Table 3.1 shall be removed from the section of pipe. Pipes may be cut to remove damaged sections and the remaining sections used.

TABLE 3.1
ALLOWABLE LIMITS OF OVALITY AND SURFACE DAMAGE

Pipe and fitting type	Allowable ovality (Note 1)	Allowable damage to external surfaces	
		Pipe and fitting not including the sealing surface	Sealing surface (Note 2)
Pressure: PVC-U, PVC-M, PVC-O	3.0%	10% of wall thickness to a maximum of 1 mm	Maximum of 0.5 mm
Non-pressure:			
Plain walled	4.5%	10% of wall thickness	Nil (Note 3)
Plain walled (SN 16)	3.0%	10% of wall thickness	Nil
Sandwich construction	4.5%	10% of wall thickness to a maximum of the inner or outer solid wall thickness	Nil
Ribbed and profile wall	5.0%	10% of wall thickness and/or a maximum of 2 consecutive broken ribs	Nil to socket

NOTES:

- 1 Ovality expressed as a percentage of OD. Measurements apply to unstacked or uncrated pipe.
- 2 Specific limits applicable only to elastomeric sealed joints.
- 3 In this context 'Nil' equates to no observable damage when viewed without magnification. This means gouges and scores are not acceptable but fine scratches can be tolerated.

3.4 PROTECTION AGAINST DAMAGE

3.4.1 General

All pipes and fittings installed in locations or operating under conditions where they may be subject to mechanical damage shall be suitably protected, including during the construction stage.

3.4.2 Protection from heat

Pipelines shall not be placed adjacent to heat sources, such as boilers, hot water or steam lines, where the temperature of the pipeline may exceed the design temperature of the pipe system.

3.4.3 Protection during installation at low temperatures

PVC pipe has decreased resistance to impact at low temperatures, e.g., $\leq 5^{\circ}\text{C}$. Increased care shall be taken if installations are carried out under these conditions.