

Australian/New Zealand Standard™

PVC-U pipes and fittings for stormwater and surface water applications



AS/NZS 1254:2010

This Joint Australian/New Zealand Standard was prepared by Joint Technical Committee PL-021, PVC, ABS and Polyamide Pipe Systems. It was approved on behalf of the Council of Standards Australia on 12 March 2010 and on behalf of the Council of Standards New Zealand on 8 February 2010.
This Standard was published on 6 April 2010.

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This Standard was issued in draft form for comment as DR AS/NZS 1254.

Australian/New Zealand Standard™

PVC-U pipes and fittings for stormwater and surface water applications

Originated in Australia as AS 1254—1973.
Originated in New Zealand as NZS 7649:1974.
Previous edition AS/NZS 1254:2002.
Second edition 2010.
Reissued incorporating Amendment No. 1 (April 2011).
Reissued incorporating Amendment No. 2 (December 2013).

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Jointly published by SAI Global Limited under licence from Standards Australia Limited, GPO Box 476, Sydney, NSW 2001 and by Standards New Zealand, Private Bag 2439, Wellington 6140.

ISBN 978 0 7337 9455 1

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/NZS 1254:2002, *PVC pipes and fittings for stormwater and surface water applications*.

This Standard incorporates Amendment No. 1 (April 2011) and Amendment No. 2 (December 2013). 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 outline minimum requirements for the manufacture and performance of PVC-U pipes and fittings for stormwater applications for use by manufacturers, specifiers and purchasers of such products.

For pipe of nominal diameter DN 75 there is one classification based on minimum wall thickness. This is class SN2. For pipe of nominal diameter DN 90 and DN 100 there are three classifications based on minimum pipe stiffness. These are pipe stiffness classes SN2, SN4 and SN8. For pipes greater than DN 100 there are 4 stiffness classes, SN1.5, SN2, SN4 and SN8.

Sufficient dimensional information is provided to ensure compatible joints, minimum bore and resistance to abrasion.

Stiffness class SN8 has been included for applications where heavy loads, for example deeper burial, traffic loads or poor installation practice for which higher pipe stiffness may be required to minimize deflection of the installed pipes.

Stiffness class SN1.5 in sizes greater than DN 100 has been included to accommodate pipes currently manufactured and shown to perform satisfactorily.

Pipe stiffness is a measure of resistance of a pipe to ring deflection and is determined by testing or calculation, in newtons per metre diametral deflection per metre length.

Users wishing to compare the stiffness of pipes made to the previously superseded classification scheme (AS 1254—1981 and NZS 7649—1988), with current requirements may use the equation of Clause 1.3.11.

The E_b value for sandwich construction pipe may be less than that for plain wall pipe of the same wall thickness. To achieve the same pipe stiffness, a sandwich construction pipe might require a greater wall thickness than for an equivalent plain wall pipe.

Caution is advised, however, because it is necessary to assume a value of the initial three-minute ring bending modulus E_b of PVC in the equation. The committee has assumed a value of 3200 MPa for PVC (as recommended in AS/NZS 2566.1) for the three-minute ring bending modulus (E_b). This value is not a 'material constant'; it depends on the resin used, and the influence of the additives and fillers used in the manufacture of PVC stormwater pipes. While calculations are useful for estimating pipe stiffness and wall thickness, these values should only be used as guidelines.

The test criteria of this Standard apply to pipes and fittings at the time of manufacture and should not be used to assess the results from tests on pipes or fittings that have been in service.

It should be noted that, by convention, plastics pipe systems are often designed on the basis of 50 years extrapolated test data. This is established international practice but is not intended to imply the service life of drainage pipes is limited to 50 years. For correctly manufactured and installed systems, the actual life cannot be predicted, but can logically be expected to be well in excess of 100 years before major rehabilitation is required.

Changes to this edition include the exclusion of additives containing compounds based on lead, cadmium or mercury and changing the reporting requirements for ring flexibility to reflect the changes in the test method.

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Appendix B sets out the provisions for best environmental practice PVC for stormwater and surface water applications. These provisions are in accordance with the credit criteria established by the Green Building Council of Australia in their Green Star rating program.

For best environmental practice PVC satisfying the provisions of Appendix B, an attestation of compliance for upstream materials such as chlorine and vinyl chloride, is necessary. Such attestations can take the form of a declaration of conformity prepared and maintained in accordance with ISO/IEC 17050, *Conformity assessment—Supplier's declaration of conformity*, Part 1: *General requirements*, and Part 2: *Supporting documentation*. Part 1 addresses the contents of the declaration of conformity and the procedures necessary to ensure ongoing compliance. Part 2 addresses the documentation required to support a declaration of conformity including the contents, traceability, availability and retention period.

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

The term 'informative' has been used in this Standard to define the application of the appendix to which it applies. An 'informative' appendix is only for information and guidance.

CONTENTS

Page

SECTION 1 SCOPE AND GENERAL

1.1	SCOPE.....	6
1.2	REFERENCED DOCUMENTS.....	6
1.3	DEFINITIONS.....	7
1.4	NOTATION.....	9
1.5	CLASSIFICATION	9

SECTION 2 GENERAL REQUIREMENTS

2.1	GENERAL.....	10
2.2	COMPOSITION	10
2.3	COLOUR.....	10
2.4	FREEDOM FROM DEFECTS	10
2.5	REQUIREMENTS FOR ELASTOMERIC SEALS	10
2.6	SOLVENT CEMENTS.....	11
2.7	PACKAGING, STORAGE AND TRANSPORTATION	11
2.8	ADDITIONAL REQUIREMENTS FOR BEST ENVIRONMENTAL PRACTICE PVC PIPES AND FITTINGS	11

SECTION 3 PERFORMANCE REQUIREMENTS

3.1	GENERAL.....	12
3.2	TESTS ON PIPES.....	12
3.3	TESTS ON MOULDED AND FABRICATED FITTINGS	13
3.4	TESTS ON ELASTOMERIC SEAL JOINTS.....	13

SECTION 4 PIPES

4.1	GENERAL.....	14
4.2	DIAMETER AND WALL THICKNESS.....	14
4.3	LENGTH	14
4.4	PIPE SPIGOT ENDS	14
4.5	SOCKETS FORMED ON PIPE ENDS.....	14
4.6	MARKING	18
4.7	WITNESS MARK	19

SECTION 5 MOULDED FITTINGS

5.1	GENERAL.....	20
5.2	DIMENSIONS OF MOULDED FITTINGS	20
5.3	WALL THICKNESS	22
5.4	MINIMUM FREE BORE	22
5.5	TEST OPENINGS	23
5.6	MARKING	24

SECTION 6 FABRICATED FITTINGS

6.1	GENERAL.....	25
6.2	MATERIALS.....	25
6.3	COMPLIANCE	25
6.4	MINIMUM FREE BORE	25
6.5	MARKING	25

Page

SECTION 7 ELASTOMERIC SEAL JOINTS

7.1	GENERAL.....	26
7.2	MATERIALS.....	26
7.3	DESIGN	26
7.4	EFFECTIVE SEALING LENGTH	26

APPENDICES

A2	A	MEANS FOR DEMONSTRATING COMPLIANCE WITH THIS STANDARD	28
	B	ADDITIONAL REQUIREMENTS FOR BEST ENVIRONMENTAL PRACTICE PVC PIPES AND FITTINGS.....	36

STANDARDS AUSTRALIA/STANDARDS NEW ZEALAND

Australian/New Zealand Standard**PVC-U pipes and fittings for stormwater and surface water applications**

SECTION 1 SCOPE AND GENERAL

1.1 SCOPE

This Standard specifies requirements for PVC-U pipes and fittings for conveyance of stormwater or surface water. The Standard includes requirements for both plain and structured wall pipes and fittings.

Alternative methods for determining compliance with this Standard are given in Appendix A.

NOTE: Pipe manufactured to this Standard should only be used and installed in accordance with AS/NZS 2032, AS/NZS 2566.1, AS/NZS 2566.2 and AS/NZS 3500.3.

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Appendix B sets out additional requirements for pipes and fittings classed as best environmental practice PVC for stormwater and surface water applications.

1.2 REFERENCED DOCUMENTS

The following documents are referred to in this Standard:

AS

- 681 Elastomeric seals—Material requirements for pipe joint seals used in water and drainage applications
- 681.1 Part 1: Vulcanized rubber
- 681.2 Part 2: Thermoplastic elastomers
- 1199 Sampling procedures and tables for inspection by attributes
- 1199.1 Part 1: Sampling schemes indexed by acceptance quality limit (AQL) for lot-by-lot inspection
- 1646 Elastomeric seals for waterworks purposes
- HB 18.28 Conformity assessment—Guidance on a third party certification system for products

AS/NZS

- 1260 PVC-U pipes and fittings for drain, waste and vent application
- 1462 Methods of test for plastics pipes and fittings
- 1462.1 Method 1: Method for determining the dimensions of pipes and fittings
- 1462.3 Method 3: Method for determining the impact characteristics of pipes
- 1462.8 Method 8: Method for testing the leaktightness of assemblies
- 1462.11 Method 11: Method for high temperature stress-relief testing of fittings
- 1462.15 Method 15: Method for determination of vinyl chloride monomer content
- 1462.21 Method 21: Method for determination of bond strength
- 1462.22 Method 22: Method for determination of pipe stiffness
- 1462.23 Method 23: Method for determination of ring flexibility
- 1477 PVC pipes and fittings for pressure applications
- 2032 Installation of PVC pipe systems

AS/NZS

- 2566 Buried flexible pipelines
- 2566.1 Part 1: Structural design
- 2566.2 Part 2: Installation
- 3500 Plumbing and drainage
- 3500.0 Part 0: Glossary of terms
- 3500.3 Part 3: Stormwater drainage
- 3879 Solvent cements and priming fluids for PVC (PVC-U and PVC-M) and ABS pipes and fittings
- 4765 Modified PVC (PVC-M) pipes for pressure applications

ISO

- 3951 Sampling procedures for inspection by variables
- 3951-1 Part 1: Specification for single sampling plans indexed by acceptance quality limit (AQL) for lot-by-lot inspection for a single quality characteristic and a single AQL
- 3951-2 Part 2: General specification for single sampling plans indexed by acceptance quality limit (AQL) for lot-by-lot inspection of independent quality characteristics
- 3951-3 Part 3: Double sampling schemes indexed by acceptance quality limit (AQL) for lot-by-lot inspection
- 3951-5 Part 5: Sequential sampling plans indexed by acceptance quality limit (AQL) for inspection by variables (known standard deviation)
- 13967 Thermoplastics fittings—Determination of ring stiffness

ISO/IEC

- 17050 Conformity assessment—Supplier's declaration of conformity
- 17050-1 Part 1: General requirements
- 17050-2 Part 2: Supporting documentation

SNZ

- HB 18.28 Guide 28 General rules for a model third-party certification system for products

1.3 DEFINITIONS

For the purpose of this Standard, the definitions given in AS/NZS 3500.0 and those below apply:

1.3.1 Effective sealing length

- (a) *Socket mounted seals* The distance between the cross-sectional centre of the elastomeric sealing ring installed in the socket and the root of the socket.
- (b) *Spigot mounted seals* The distance from the position of effective seal of the elastomeric sealing ring to the mouth of a socket or the point at which the mouth of a socket flares.

1.3.2 Fabricated fitting

A fitting or assembly built up by joining together, by either solvent cement, elastomeric seal or fusion, a number of components that may be—

- (a) moulded, extruded or manufactured by other means;
- (b) formed by reshaping of pipe or fittings, or both; or
- (c) a combination of the above.

NOTE: Moulded fittings joined by means of moulded sockets complying with this Standard are not considered to be fabricated fittings.

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1.3.3 Inside wall thickness

The thickness of the wall section in direct contact with the medium being transported (see Figure 4.1).

1.3.4 Maximum differential displacement

A relative transverse displacement between the spigot and socket surfaces at one point.

1.3.5 Moulded fitting

A fitting manufactured entirely by injection moulding.

1.3.6 Out-of-roundness (sometimes referred to as 'ovality')

The difference between the measured maximum outside diameter and the measured minimum outside diameter in the same cross-section of the pipe.

1.3.7 Pipe stiffness

Pipe stiffness is the measure of the force required to compress a short piece of pipe between two rigid parallel plates at a controlled rate.

NOTE: Typical units for pipe stiffness are newtons per metre per metre length (N/m/m).

1.3.8 Plain wall construction

A pipe or fitting of homogeneous material with plain inside and outside surfaces.

1.3.9 Recycled PVC-U (Recyclate)

PVC-U that can be reclaimed from salvaged materials, cleaned and graded into specific types, dependent on designation and made or reprocessed into new products.

NOTE: Rework generated from the manufacturer's own production is not deemed to be recycled PVC-U.

1.3.10 Ribbed or hollow profile construction

A pipe or fitting with a plain inside surface and with an outside helical or annular ribbed or corrugated surface.

1.3.11 Ring bending stiffness

Ring bending stiffness for flexible pipes is calculated from the following equation:

$$S_{DI} = \frac{E_b I}{D^3} \times 10^6$$

where

S_{DI} = initial (3 min) ring-bending stiffness of the pipe, in newtons per metre per metre length

E_b = initial (3 min) ring-bending modulus, in megapascals

D = diameter at neutral axis of the pipe wall, in metres

For plain walls—

$$I = \frac{t^3}{12}$$

where

t = minimum wall thickness of plain wall pipe, in metres

1.3.12 Sandwich construction

A pipe or fitting with smooth inside and outside surfaces in which the inner and outer wall layers are of solid PVC and are connected by a foamed or solid intermediate layer of PVC-U.

1.3.13 Sharp edge

A clearly defined edge, corner or point, which has the potential to cause personal injury to the handler (e.g. on a pipe end, fitting or component).

1.3.14 Structured wall

A term used to collectively describe sandwich, ribbed and hollow profile pipes and fittings covered by this Standard

1.3.15 Stormwater or surface water

The natural water from ground surface, paved areas and roofs.

1.3.16 Best environmental practice PVC pipes and fittings

Pipes or fittings produced by a manufacturer meeting both of the requirements of the credit criteria prescribed in Appendix C and the normative parts of this Standard.

1.3.17 'Text deleted'

1.4 NOTATION

The following symbols are used in this Standard:

C	=	coefficient of thermal expansion of PVC, taken as 7.0×10^{-5} per °C
DN	=	nominal size, in millimetres
D_m	=	mean outside diameter, in millimetres
D_l	=	socket mouth mean diameter, in millimetres
D_r	=	socket root mean diameter, in millimetres
EL	=	effective length (of pipe), in millimetres
L	=	socket length, in millimetres
S	=	effective sealing length, see Section 7
T	=	wall thickness, in millimetres
SN	=	pipe stiffness in newtons per metre, per metre length of pipe

1.5 CLASSIFICATION

PVC-U stormwater or surface water pipe of nominal diameters DN 75 is defined in terms of its dimensions. DN 75 pipe is classified as SN2. Pipes of nominal diameter DN 90 and DN 100 are classified as SN2, SN4 or SN8. Pipes greater than DN 100 are classified as SN1.5, SN2, SN4 or SN8. These pipes may be of plain wall, profile wall or sandwich construction.

Injection-moulded plain wall fittings are designated Class SN4. These fittings are suitable for use in systems using Class SN2, SN4 and SN8 plain walled or sandwich construction pipe.

Injection-moulded, structured wall fittings are classified as Class SN4.

SECTION 2 GENERAL REQUIREMENTS

2.1 GENERAL

This Section specifies the minimum general requirements applicable to PVC-U pipes and fittings for the conveyance of stormwater or surface water.

2.2 COMPOSITION

The material from which the pipe or fitting is produced shall consist of polyvinyl chloride (PVC) and suitable additives such as lubricants, pigments and stabilizers. The PVC content of the pipe or fitting shall be not less than 75% by mass.

A1 | Additives shall include a minimum of 1.5 parts of rutile titanium dioxide (TiO₂) pigment per 100 parts by mass of PVC content. The titanium dioxide pigment shall contain at least 90% by mass of TiO₂. Establishment of the TiO₂ content shall be by process control methods. This requirement does not apply to fittings with parallel sockets.

Additives containing compounds based on lead (Pb), Cadmium (Cd) or Mercury (Hg) shall not be used except that recycled PVC-U material containing these elements may be used in the core of sandwich construction pipe. Recyclate and rework containing recyclate shall only be used in the core of sandwich construction pipes.

When determined in accordance with AS/NZS 1462.15, the vinyl chloride monomer level shall not exceed 1 mg/kg. If the pipe is manufactured from resin with a residual vinyl chloride monomer content of less than 1 mg/kg, this requirement shall be deemed to have been met. This requirement is not applicable to recyclate.

2.3 COLOUR

The colour of PVC stormwater pipes and fittings made to this Standard shall be selected to suit the local or export market requirements.

NOTE: The colour chosen should enable stormwater pipe, made to this Standard, to be clearly distinguishable from DWV pipe manufactured to AS/NZS 1260.

2.4 FREEDOM FROM DEFECTS

NOTE: The defects described in Clauses 2.4.1 and 2.4.2 cannot be completely quantified. Where the presence, size or frequency of any of these defects is considered to be of concern, arrangements should be made between the purchaser/approving authority/certifying body (as appropriate), and the manufacturer. This may be achieved by the provision of acceptable type samples.

2.4.1 General

Defects shall not affect the performance or function of the pipe or fittings in service.

Pipes and fittings shall be free from blisters or heat marks. When grooves, wrinkles, rippling, dents or projections are present, the pipe shall comply with the dimensional requirements of this Standard.

2.4.2 Spigot ends

Spigot ends of pipes and fittings shall be free from chips and rough edges and shall have sharp edges removed. Jointing surfaces shall be smooth.

2.5 REQUIREMENTS FOR ELASTOMERIC SEALS

The elastomeric seals shall comply with AS 1646 and AS 681.1 or AS 681.2.

2.6 SOLVENT CEMENTS

Pipes and fittings manufactured to this Standard, suitable for solvent cement jointing, are intended for use with solvent cements and priming fluids complying with AS/NZS 3879.

Fittings with parallel sockets manufactured to this Standard, which are suitable for solvent cement jointing, are intended for use with priming fluids and gap-filling solvent cement complying with AS/NZS 3879.

2.7 PACKAGING, STORAGE AND TRANSPORTATION

Pipes and fittings manufactured to this Standard shall be packaged, stored and transported in accordance with AS/NZS 2032 in a manner that will maintain the physical and dimensional integrity of pipes and fittings.

For fittings greater than DN 150 with parallel sockets, manufacturers' storage instructions shall stipulate the limitations for storage in direct sunlight.

A1 | 2.8 ADDITIONAL REQUIREMENTS FOR BEST ENVIRONMENTAL PRACTICE PVC PIPES AND FITTINGS

A2 | For pipes and fittings that are to be classified as 'best environmental practice PVC' the additional requirements set out in Appendix B shall apply.

SECTION 3 PERFORMANCE REQUIREMENTS

3.1 GENERAL

This Section specifies the minimum performance requirements applicable to PVC-U pipes and fittings for conveyance of stormwater or surface water.

3.2 TESTS ON PIPES

3.2.1 Pipe impact characteristics at 20°C

Where determined in accordance with the 20°C impact test of AS/NZS 1462.3 using the appropriate striker mass and a 50 ± 0.5 mm striker radius when testing structured wall pipes, the number of impacts specified in Table 3.1, and a drop height of $2 + 0.1, -0$ m, the impact characteristics shall be such that the pipe shall have a true impact rate (TIR) below 10% at a confidence level of 90%.

TABLE 3.1
20°C IMPACT TEST PARAMETERS

Nominal size DN	Total mass kg	Number of impacts per specimen
75	2.00	3
90	2.25	4
100	2.75	6
150	3.50	8
175	3.75	10
225	5.75	14
≥300	7.50	20

NOTE: The tolerance on mass is $+0.05, -0$ kg.

3.2.2 Bond strength (for hollow profile wall pipes only)

When tested, in accordance with AS/NZS 1462.21, for a pipe hollow profile wall that includes a bond between an inner wall and outer wall, the separation of the two walls without tearing shall not exceed 75% of the maximum contact width on any section.

3.2.3 Pipe stiffness (for all pipes DN90 and greater)

When tested in accordance with AS/NZS 1462.22, the minimum pipe stiffness values shall not be less than that given in Table 3.2 for the relevant pipe class.

TABLE 3.2
MINIMUM PIPE STIFFNESS VALUES

Class	Stiffness N/m/m
SN1.5	1500
SN2	2000
SN4	4000
SN8	8000