

Australian/New Zealand Standard™

**Polyethylene and polypropylene pipes
and fittings for drainage and sewerage
applications**



AS/NZS 5065:2005

This Joint Australian/New Zealand Standard was prepared by Joint Technical Committee PL-006, Polyolefin Pipe Systems. It was approved on behalf of the Council of Standards Australia on 5 August 2005 and on behalf of the Council of Standards New Zealand on 12 August 2005.

This Standard was published on 18 October 2005.

The following are represented on Committee PL-006:

AUSTAP
Certification Interests (Australia)
CSIRO Manufacturing & Infrastructure Technology
Energy Networks Association
Engineers Australia
Master Plumbers, Gasfitters and Drainlayers New Zealand
New Zealand Water and Waste Association
Plastics Industry Pipe Association of Australia
Plastics New Zealand
Water Services Association of Australia

Keeping Standards up-to-date

Standards are living documents which reflect progress in science, technology and systems. To maintain their currency, all Standards are periodically reviewed, and new editions are published. Between editions, amendments may be issued. Standards may also be withdrawn. It is important that readers assure themselves they are using a current Standard, which should include any amendments which may have been published since the Standard was purchased.

Detailed information about joint Australian/New Zealand Standards can be found by visiting the Standards Web Shop at www.saiglobal.com or Standards New Zealand web site at www.standards.govt.nz and looking up the relevant Standard in the on-line catalogue.

For more frequent listings or notification of revisions, amendments and withdrawals, Standards Australia and Standards New Zealand offer a number of update options. For information about these services, users should contact their respective national Standards organization.

We also welcome suggestions for improvement in our Standards, and especially encourage readers to notify us immediately of any apparent inaccuracies or ambiguities. Please address your comments to the Chief Executive of Standards Australia or the New Zealand Standards Executive at the address shown on the back cover.

This Standard was issued in draft form for comment as DR 05012.

Australian/New Zealand Standard™

Polyethylene and polypropylene pipes and fittings for drainage and sewerage applications

First published as AS/NZS 5065:2005.
Reissued incorporating Amendment No. 1 (February 2010).
Reissued incorporating Amendment No. 2 (November 2018).

COPYRIGHT

© Standards Australia Limited

© The Crown in right of New Zealand, administered by the New Zealand Standards Executive

All rights are reserved. No part of this work may be reproduced or copied in any form or by any means, electronic or mechanical, including photocopying, without the written permission of the publisher, unless otherwise permitted under the Copyright Act 1968 (Australia) or the Copyright Act 1994 (New Zealand).

Jointly published by SAI Global Limited under licence from Standards Australia Limited, GPO Box 476, Sydney, NSW 2001 and by Standards New Zealand, PO Box 1473, Wellington 6140.

ISBN 0 7337 6948 9

PREFACE

This Australian/New Zealand Standard was prepared by Committee PL-006, Polyolefin Pipe Systems.

This Standard incorporates Amendment No. 1 (February 2010) and No. 2 (November 2018). 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 manufacturers, specifiers and purchasers with minimum requirements for the manufacture and performance of polyethylene (PE) and polypropylene (PP) pipes and fittings for gravity sewerage and drainage applications.

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.

Statements expressed in mandatory terms in notes to tables and figures are deemed to be requirements of this Standard. Notes to text are for information and guidance only.

CONTENTS

	<i>Page</i>
FOREWORD.....	4
 SECTION 1 SCOPE AND GENERAL	
1.1 SCOPE.....	5
1.2 MEANS FOR DEMONSTRATING COMPLIANCE	5
1.3 REFERENCED DOCUMENTS.....	5
1.4 DEFINITIONS.....	5
1.5 PACKAGING, STORAGE AND TRANSPORTATION	6
 SECTION 2 MATERIALS	
2.1 MATERIALS.....	7
2.2 WEATHERING RESISTANCE FOR HANDLING AND STORAGE	8
2.3 ELASTOMERIC SEALS.....	8
 SECTION 3 PERFORMANCE REQUIREMENTS	
3.1 TESTS ON PIPES AND FITTINGS—THERMAL STABILITY	9
3.2 TESTS ON PIPES.....	9
3.3 TESTS ON FITTINGS	10
3.4 TESTS ON ELASTOMERIC SEAL JOINTS	10
 SECTION 4 PIPES	
4.1 DIMENSIONS.....	11
4.2 PIPE EFFECTIVE LENGTH.....	22
4.3 SPIGOT ENDS	22
4.4 STRIPES.....	22
4.5 SOCKETS FORMED ON PIPE ENDS.....	22
4.6 FREEDOM FROM DEFECTS	22
4.7 MARKING	23
4.8 WITNESS MARK	23
 SECTION 5 FITTINGS	
5.1 GENERAL.....	24
5.2 DIMENSIONS OF FITTINGS.....	24
5.3 FREEDOM FROM DEFECTS	29
5.4 MARKING	29
 APPENDICES	
A MEANS FOR DEMONSTRATING CONFORMITY WITH THIS STANDARD.....	30
B REFERENCED DOCUMENTS.....	34

FOREWORD

A1 In this Standard, pipes and fittings are classified in terms of stiffness, based on minimum ring-bending stiffness values measured in short-term tests. Four common stiffness classes are given: SN 2, SN 4, SN 8 and SN 16, which are based on the requirements of ISO 8772:2006, *Plastics piping systems for non-pressure underground drainage and sewerage—Polyethylene (PE)*, and ISO 8773:2006, *Plastics piping systems for non-pressure underground drainage and sewerage—Polypropylene (PP)*. Stiffness class of SN 1.25 can only be used for pipes of nominal outside diameter (DN) greater than 600 mm.

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.

By convention, plastics pipe systems are often designed on the basis of 50 year extrapolated test data. This is established international practice but is not intended to imply the service life of drainage pipe 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.

The test criteria specified in this Standard apply to pipes and fittings at the time of manufacture. Storage prior to installation, the passage of time since manufacture and use in service may alter pipe and fitting properties such that the pipes or fittings may no longer meet the performance requirements of this Standard.

STANDARDS AUSTRALIA/STANDARDS NEW ZEALAND

Australian/New Zealand Standard**Polyethylene and polypropylene pipes and fittings for drainage and sewerage applications**

SECTION 1 SCOPE AND GENERAL

1.1 SCOPE

This Standard specifies requirements for polyethylene (PE) and polypropylene (PP) pipes and fittings for sewerage and drainage applications, above and below ground, inside and outside of buildings, and intended to be used where the pipeline is operating under gravity flow and the operating pressure is low. It includes requirements for both plain and structured wall pipes and fittings.

A1 | Pipes manufactured to this Standard are intended to be installed in accordance with AS/NZS 2033, AS/NZS 2566.2, AS/NZS 3500.2, AS/NZS 3500.3, WSA 02 and other utility/authority requirements.

1.2 MEANS FOR DEMONSTRATING COMPLIANCE

Compliance with this Standard shall be demonstrated in accordance with Appendix A.

1.3 REFERENCED DOCUMENTS

The documents referred to in this Standard are listed in Appendix B.

1.4 DEFINITIONS

For the purpose of this Standard, the definitions given in AS/NZS 3500.0 and those below apply. Where there is conflict between the definitions of AS/NZS 3500.0 and this Standard, the definitions in this Standard apply.

1.4.1 Co-extruded 'jacket' pipes

A pipe comprised of two layers, where the melts are bonded simultaneously in a die head as part of the extrusion process.

1.4.2 Effective seal

A1 | That part of the interface between the elastomeric seal and the spigot and socket where the contact pressure is greater than 0.4 MPa for vulcanized seals and 0.47 MPa for thermoplastic seals.

1.4.3 Effective sealing length**1.4.3.1 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.

1.4.3.2 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.

1.4.4 Fabricated fitting

A fitting built up by joining together a number of components, which 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.

1.4.5 Inside wall thickness

The thickness of the wall section in direct contact with the medium being transported.

1.4.6 Maximum differential displacement

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

1.4.7 Minimum jointing compression conditions

The jointing condition brought about by a combination of spigot, socket and ring dimensional tolerances and ring hardness, such that, with the spigot concentric with the socket, a minimum compressive force is generated between the elastomeric seal and the pipe surface.

1.4.8 Out-of-roundness (ovality)

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

1.4.9 Plain wall construction

A pipe or fitting of a homogeneous material with plain inside and outside surface including co-extruded jacket and striped pipes.

1.4.10 Structured wall

A term used to collectively describe sandwich, ribbed and hollow profile pipes and fittings covered in this document.

1.4.11 Ribbed or hollow profile construction

A pipe or fitting with a plain inside surface with a solid or hollow outside helical or annular ribbed or corrugated external surface.

1.4.12 Sandwich construction

A pipe or fitting with smooth inside and outside surfaces in which the inner and outer wall layers are of solid PE or PP, connected by a foam or solid intermediate layer of PE or PP, and the same resin type (PE or PP) is used for all layers.

1.5 PACKAGING, STORAGE AND TRANSPORTATION

Whilst under the manufacturer's control, pipes and fittings manufactured in accordance with this Standard shall be packaged, stored and transported in accordance with AS/NZS 2033, AS/NZS 2566.2, AS/NZS 3500.2, AS/NZS 3500.3, WSA 02 and other utility/authority requirements, as appropriate, in a manner that will maintain their physical and dimensional integrity.

A1

SECTION 2 MATERIALS

2.1 MATERIALS

2.1.1 Composition requirements for PE and PP

Pipes and fittings shall be manufactured from materials containing antioxidants, UV stabilizers and pigments necessary for their manufacture into pipes and fittings.

2.1.2 Stripe and jacket materials

Striping and jacket compounds shall be fully pre-compounded and shall comply with the requirements of Clauses 2.1.3 to 2.1.9.

2.1.3 Black PE and PP compounds

When determined in accordance with ISO 6964, black PE and PP compounds shall contain $2.25 \pm 0.25\%$ by mass of carbon black.

When determined in accordance with ASTM D3849 or equivalent, the average particle size of carbon black shall be in the range of 10 nm to 25 nm.

When determined in accordance with Appendix B of AS/NZS 4131, the toluene extract of carbon black shall be not greater than 0.1%.

2.1.4 Volatile content

When compounds are tested in accordance with Annex A of ISO 4437, the volatile content shall be not greater than 350 mg/kg at the time of manufacture.

2.1.5 Melt mass-flow rate (MFR)

When determined in accordance with ISO 1133, MFR values of materials taken from pipes and fittings shall be as follows:

- (a) PE pipes and injection moulded fittings— $0.2 \text{ g/10 min} \leq \text{MFR} \leq 1.1 \text{ g/10 min}$ (temperature 190°C ; loading mass 5.0 kg, condition T).
- (b) PE rotational moulded fittings— $1.6 \text{ g/10 min} \leq \text{MFR} \leq 3 \text{ g/10 min}$ (temperature 190°C ; loading mass 5.0 kg, condition T).
- (c) PP— $\text{MFR} \leq 1.5 \text{ g/10 min}$ (temperature 230°C ; loading mass 2.16 kg, condition M).

2.1.6 Thermal stability of PE compounds

PE compounds shall contain antioxidants, such that when determined, using oxygen, in accordance with ISO 11357-6, the oxidation induction time at a test temperature of 200°C shall be in accordance with Table 2.1 or a demonstrated equivalent time at higher temperature.

Other test methods may be used provided that they can be demonstrated to give an accuracy of the same or higher degree than that given in ISO 11357-6.

TABLE 2.1
OXIDATION INDUCTION TIME
AT A TEST TEMPERATURE OF 200°C

	Minimum oxidation induction time (minutes)
Injection moulded pipes and fittings	40
Rotation moulded fittings	10

2.1.7 Environmental stress cracking resistance (ESCR) of PE compounds

PE compounds materials or material taken from the pipe or fitting, when tested in accordance with AS/NZS 1462.25, at a stress of 15% of actual yield stress, as derived in accordance with Clause 2.1.8, shall not fail in less than 24 h. Compounds that comply with AS/NZS 4131 may be deemed to comply with this Clause.

2.1.8 Tensile properties of PE compounds

When PE compound is tested in accordance with AS 1145.2 at a strain rate of 5 mm/min, the minimum values of tensile properties shall be established.

2.1.9 Internal pressure resistance of PP compounds

PP copolymer (PP-B) and PP homopolymer (PP-H) materials shall comply with ISO 8773.

2.1.10 Decohesive resistance of jackets and stripes

Jacketed and striped pipe shall be tested in accordance with ISO 13954. Decohesion between jacket or stripe and parent pipe shall not occur over more than 30% of the socket fusion zone as defined in Table 5.4.

2.2 WEATHERING RESISTANCE FOR HANDLING AND STORAGE

The weathering resistance test shall apply to all non-black compounds with less than 0.2% by mass of HALS, including those used for jackets and stripes. Compounds complying with AS/NZS 4131 shall be deemed to comply with this Clause.

The weathering resistance, including resistance to ultraviolet light radiation, of PE or PP compounds determined in accordance with AS/NZS 4131, Appendix C, on samples exposed to at least 3.5 GJ/m² total global radiation shall be such that—

- (a) the thermal stability has been established as above; and
- (b) for PE, the mean elongation at break is $\geq 350\%$, and for PP, the mean elongation at break shall not change by more than 50% of the value of the unexposed material.

NOTE: The intent of the weathering test is to provide assurance of resistance to weathering encountered during storage and transport of pipe. The test does not provide similar assurance for installations exposed to the elements long term. Reference should be made to AS 1745.2 for typical incident energy at various sites around Australia.

2.3 ELASTOMERIC SEALS

A1 | The elastomeric seals shall comply with AS 1646.

SECTION 3 PERFORMANCE REQUIREMENTS

3.1 TESTS ON PIPES AND FITTINGS—THERMAL STABILITY

PE pipes and fittings shall contain antioxidants, such that when determined, using oxygen, in accordance with ISO 11357-6, the oxidation induction time at a test temperature of 200°C shall be in accordance with Table 3.0 or a demonstrated equivalent time at a higher temperature.

Other test methods may be used provided that it can be demonstrated that they give the same or a higher degree of accuracy to that given in ISO 11357-6.

TABLE 3.0
OXIDATION INDUCATION TIME
AT A TEST TEMPERATURE OF 200°C

	Minimum oxidation induction time (minutes)
Injection moulded pipes and fittings	20
Rotation moulded fittings	10

3.2 TESTS ON PIPES

3.2.1 Reversion (applicable to plain wall pipes only)

The longitudinal reversion of pipes shall not exceed 3% for PE, and 2% for PP, as determined in accordance with AS/NZS 1462.4, under the following conditions:

- (a) Test temperature: $T = 110^{\circ}\text{C}$ for PE.
- (b) Test temperature: $T = 135^{\circ}\text{C}$ for PP random copolymers.
- (c) Test temperature: $T = 150^{\circ}\text{C}$ for PP homopolymers and block copolymers.

3.2.2 Stiffness

When tested in accordance with AS/NZS 1462.22, the pipe stiffness shall be not less than that given in Table 3.1 for the relevant pipe class.

NOTE: For plain wall pipes the pipe stiffness can be approximated to standard dimension ratio (SDR) as follows:

Class	Stiffness N/m.m	PE SDR	PP SDR	Class	Stiffness N/m.m	PE SDR	PP SDR
SN1.25	1 250	—	—	SN8	8 000	21	23
SN2	2 000	33	41	SN10	10 000	—	21
SN4	4 000	26	33	SN16	16 000	17	—

TABLE 3.1
MINIMUM PIPE STIFFNESS VALUES

Class	Stiffness N/m.m
SN1.25	1 250
SN2S	2 000
N4	4 000
SN8	8 000
SN10	10 000
SN16	16 000

3.2.3 Ring flexibility

- A1 | When tested in accordance with AS/NZS 1462.23, using a force raised continuously to achieve a 30% deflection, a test specimen of pipe shall not exhibit any cracking in any part of the wall structure, wall delamination, rupture or permanent buckling.

3.3 TESTS ON FITTINGS

3.3.1 Hydrostatic pressure test

- A1 | When an assembled fitting with inspection or test openings or fabricated fittings is tested in accordance with the hydrostatic pressure test of AS/NZS 1462.8, at an internal pressure of 85 +5, -0 kPa for 60 +5, -0 min., the assembled fitting shall not leak.

3.3.2 Liquid infiltration test

When an assembled fitting with inspection or test openings, tightened to a torque of 15 +1, -0 N.m where applicable, tested in accordance with AS/NZS 1462.8, is subjected to an internal vacuum or external hydrostatic pressure, resulting in a pressure differential of 80 +5, -0 kPa, for 60 +5, -0 min, it shall not leak.

3.3.3 Cohesive resistance test for electrofusion sockets

When tested in accordance with ISO 13954 and ISO 13955 at 23°C, the fracture shall be ductile with yield within the rupture zone, except that for socket assemblies, initial rupture may be in the brittle mode over a maximum length of $L_2/3$.

- A1 | **3.3.4 Stiffness (for structured wall fittings only)**

When tested in accordance with ISO 13967, the stiffness value shall be not less than 8 000 N/m/m.

3.4 TESTS ON ELASTOMERIC SEAL JOINTS

3.4.1 Hydrostatic pressure test

- A1 | When tested in accordance with AS/NZS 1462.8, with a diametral distortion of 7.5%, the assembled joint shall withstand an internal pressure of 80 +5, -0 kPa for 60 +5, -0 min. without leakage.

3.4.2 Liquid infiltration test

When tested in accordance with AS/NZS 1462.8, with a diametral distortion of 7.5%, the assembled joint shall not leak, when subjected to an internal vacuum corresponding to a gauge pressure of -80 kPa to -85 kPa for 60 +5, -0 min.

3.4.3 Contact width and pressure

- A1 | When determined in accordance with AS/NZS 1462.13, elastomeric seals manufactured to:
- (a) AS 1646 and AS 681.1 shall have a contact pressure exceeding 0.4 MPa over a continuous width of 4 mm.
 - (b) AS 1646 and AS 681.2 shall have a contact pressure exceeding 0.47 MPa over a continuous contact width of 4 mm.