

Australian/New Zealand Standard™

**Modified PVC (PVC-M) pipes for
pressure applications**



AS/NZS 4765:2007

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 29 June 2007 and on behalf of the Council of Standards New Zealand on 27 July 2007.
This Standard was published on 20 September 2007.

The following are represented on Committee PL-021:

Australian Chamber of Commerce and Industry
Certification Interests (Australia)
CSIRO Manufacturing and Infrastructure Technology
Energy Networks Association
Engineers Australia
New Zealand Local Government
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 Standards may also be withdrawn.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.standards.com.au or Standards New Zealand web site at www.standards.co.nz and looking up the relevant Standard in the on-line catalogue.

Alternatively, both organizations publish an annual printed Catalogue with full details of all current Standards. 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 either Standards Australia or Standards New Zealand at the address shown on the back cover.

Australian/New Zealand Standard™

**Modified PVC (PVC-M) pipes for
pressure applications**

Originated as AS/NZS 4765(Int):2000.
This edition 2007.

COPYRIGHT

© Standards Australia/Standards New Zealand

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.

Jointly published by Standards Australia, GPO Box 476, Sydney, NSW 2001 and Standards New Zealand, Private Bag 2439, Wellington 6020

ISBN 0 7337 8383 X

PREFACE

This Australian/New Zealand Standard was prepared by Committee PL-021, PVC, ABS and Polyamide Pipe Systems, to supersede AS/NZS 4765 (Int):2000.

The objective of this Standard is to outline minimum requirements for the manufacture and performance of PVC-M pipes for pressure applications for use by manufacturers, specifiers and purchasers of these products.

The objective of this revision is to update and replace the Interim Standard with a full Australian/New Zealand Standard.

This Standard is intended to apply to PVC-M pipes that exhibit an enhanced level of toughness and ductility as a consequence of the addition of impact modifiers and provides a consistent means of assessment of quality and performance, together with a common design criterion. A comprehensive series of tests are given with the intention of ensuring PVC-M pipe has a combination of high strength and ductility over a wide range of service conditions.

In the preparation of this Standard, consideration has been given to international best practice.

The test criteria specified apply to pipes at the time of manufacture. Pipes or fittings that have been in service might not meet the same performance requirements.

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.....	5
SECTION 1 SCOPE AND GENERAL	
1.1 SCOPE	6
1.2 MEANS FOR DEMONSTRATING COMPLIANCE	6
1.3 REFERENCED DOCUMENTS	6
1.4 DEFINITIONS	7
1.5 NOTATION	8
1.6 CLASSIFICATION	9
SECTION 2 GENERAL REQUIREMENTS	
2.1 SCOPE	10
2.2 COMPOSITION	10
2.3 DIMENSIONS.....	10
2.4 COLOUR.....	10
2.5 EFFECT ON WATER	11
2.6 FREEDOM FROM DEFECTS	11
2.7 SOLVENT CEMENTS.....	11
2.8 ELASTOMERIC JOINTING SEALS	11
2.9 WITNESS MARK	11
SECTION 3 PERFORMANCE REQUIREMENTS	
3.1 SCOPE OF SECTION	12
3.2 TESTS ON PIPES	12
3.3 TESTS ON ELASTOMERIC SEAL JOINTS.....	13
SECTION 4 PIPES	
4.1 SCOPE OF SECTION	16
4.2 DIAMETER AND WALL THICKNESS.....	16
4.3 LENGTH.....	16
4.4 PIPE SPIGOT ENDS.....	17
4.5 SOCKETS FORMED ON PIPES	17
4.6 MARKING	17
4.7 PACKAGING, STORAGE AND TRANSPORTATION	18
SECTION 5 ELASTOMERIC SEAL JOINTS	
5.1 SCOPE OF SECTION	22
5.2 JOINT DESIGN	22
5.3 DEPTH OF ENGAGEMENT	22
5.4 SOCKET DEPTH.....	22
SECTION 6 POST-FORMED BENDS AND COUPLINGS	
6.1 SCOPE OF SECTION AND GENERAL.....	23
6.2 SOCKETS	23
6.3 BEND RADIUS.....	23
6.4 SPIGOT LENGTHS	23
6.5 BEND ANGLE.....	23
6.6 MARKING	23

APPENDICES

A	MEANS FOR DEMONSTRATING COMPLIANCE WITH THIS STANDARD	24
B	METHOD FOR DETERMINATION OF C-RING TOUGHNESS	29
C	METHOD FOR THE DETERMINATION OF HIGH VELOCITY IMPACT FRACTURE MODE.....	32
D	METHOD FOR THE DETERMINATION OF LONG-TERM TOUGHNESS	35
E	METHOD FOR DETERMINING THE RESISTANCE OF NOTCHED PIPE TO INTERNAL PRESSURE.....	38
F	WALL THICKNESS DESIGN FOR PIPES FOR SPECIAL APPLICATIONS	40

FOREWORD

This Australian/New Zealand Standard defines the requirements for modified PVC (PVC-M) pipes. The Standard covers two ranges of pipe sizes, Series 1 and Series 2. Series 1 pipes are a metric pipe size and Series 2 pipes have dimensions that are compatible with cast iron pressure pipes and fittings.

The out-of-roundness tolerance on the outside diameters is applicable to pressure classes PN 12 and above. No such tolerance is placed on Classes PN 9 and below because the thinner walled pipes may be easily re-rounded when inserted into sockets.

The wall thickness of pipes designed in accordance with this Standard have been calculated using the Barlow equation with a hydrostatic design stress of 17.5 MPa. In the interest of serviceability and irrespective of the calculated minimum wall thickness, this Standard does not provide for a wall thickness of less than 2.5 mm. Also in the interests of serviceability, the maximum SDR has been restricted to 47 irrespective of the wall thickness calculated by the hydrostatic design stress of 17.5 MPa.

Calculation of the minimum wall thickness is as follows:

$$T_{\min.} = PD_{m \min.}/(2S+P)$$

where

$T_{\min.}$ = minimum wall thickness, in millimetres

P = maximum allowable operating pressure, in megapascals

$D_{m \min.}$ = minimum outside diameter of the pipe, in millimetres

S = hydrostatic design stress of the material, in megapascals, at 20°C.

Conformance with the MRS requirement is determined from the 20°C stress regression curve developed from testing of multiple specimens and analysing the results according to AS/NZS 1462.29, *Methods for plastics pipes and fittings, Method 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)*.

The analysis adopts the 50 years extrapolation point on the regression curve as the reference for design purposes. This is consistent with long standing international practice. It should not be taken that either—

- (a) the pipes weaken with time; or
- (b) the predicted life is 50 years.

Actual system life is dependent on manufacture, transport, handling, installation, operation, protection from third party damage and other external factors.

For water supply applications, the actual life can be expected to be in excess of 100 years before major rehabilitation is required.

STANDARDS AUSTRALIA/STANDARDS NEW ZEALAND

Australian/New Zealand Standard
Modified PVC (PVC-M) pipes for pressure applications

SECTION 1 SCOPE AND GENERAL

1.1 SCOPE

This Standard specifies requirements for pipes, integral joints and post-formed bends of PVC-M for the conveyance of water and wastewater under pressure. The pipes are intended for installation below ground, and above ground where they are not exposed to direct sunlight.

NOTES:

- 1 Relevant installation requirements for pipe systems, including PVC-M pressure pipes manufactured to this Standard and the associated fittings are covered by AS/NZS 2032, AS/NZS 2566.2 and the AS/NZS 3500 series, as applicable.
- 2 If it is intended to use pipes complying with this Standard for the conveyance of fluids other than water, the manufacturer should be consulted.
- 3 Two series of pipes are specified (see the Foreword in this Standard).

1.2 MEANS FOR DEMONSTRATING COMPLIANCE

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

1.3 REFERENCED DOCUMENTS

The following documents are referred to in this Standard.

AS

- | | |
|--------|--|
| 1199 | Sampling procedures for inspection by attributes |
| 1199.1 | Part 1: Sampling schemes indexed by acceptance quality limit (AQL) for lot-by-lot inspection |

AS/NZS

- | | |
|---------|---|
| 1462 | Methods of test for plastics pipes and fittings |
| 1462.1 | Method 1: Method for determining the dimensions of pipes and fittings |
| 1462.4 | Method 4: Method of determining reversion of UPVC pipes |
| 1462.5 | Method 5: Vicat softening temperature |
| 1462.6 | Method 6: Method for hydrostatic pressure testing of pipes |
| 1462.15 | Method 15: Method for determination of vinyl chloride monomer content |
| 1462.16 | Method 16: Method for high temperature testing of pipe |
| 1462.29 | Method 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) |
| 1646 | Elastomeric seals for waterworks purposes |
| 1646.1 | Part 1: General requirements |
| 1646.2 | Part 2: Material requirements for pipe joint seals used in water and wastewater applications—Specifies by prescription formulation |
| 1646.3 | Part 3: Material requirements for pipe joint seals used in water and wastewater applications with the exception of natural and polyisoprene compounds |