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POLYETHYLENE (POLYTHENE) PIPE FOR PRESSURE APPLICATIONS

STANDARDS ASSOCIATION OF AUSTRALIA
Incorporated by Royal Charter

THE FOLLOWING SCIENTIFIC, INDUSTRIAL AND GOVERNMENTAL ORGANIZATIONS and departments were officially represented on the committee entrusted with the preparation of this standard:

Confederation of Australian Industry

Department of Construction

Department of Public Works, New South Wales

Engineering and Water Supply Department of South Australia

Hunter District Water Board

Local Government Department of Queensland

Melbourne and Metropolitan Board of Works

Metropolitan Water Sewerage and Drainage Board, Sydney

Plastics Institute of Australia Inc.

State Rivers and Water Supply Commission, Victoria

This standard, prepared by Committee PL/6, Polyethylene Pipe, was approved by the Plastics Standards Board on behalf of the Council of the Standards Association of Australia on 11 December 1978 and was published on 1 March 1979.

To keep abreast of progress in industry, Australian standards are regularly reviewed. Suggestions for improvements to published standards, addressed to the head office of the Association, are welcomed.

AUSTRALIAN STANDARD

POLYETHYLENE (POLYTHENE) PIPE FOR PRESSURE APPLICATIONS

AS 1159–1979

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PREFACE

This revision of AS 1159—1973 was prepared by the Association's Committee on Polyethylene Pipe under the authority of the Plastics Standards Board. The revision concerns the adoption of the nominal outside diameter series and associated designations in ISO 161.* Previously, pipe sizes in AS 1159 had been referred to in terms of nominal size.

The tolerances on outside diameter, ovality and wall thickness specified in Tables 2.1, 2.2 and 2.3 have been reviewed and the opportunity has been taken to amend these tolerances in the light of experience in the use of the standard. The range of sizes has been extended to include pipes of 1000 up to 1600 mm nominal outside diameter.

The pipes are classified by pressure rating, viz Classes 3, 4.5, 6, 9, 12 and 15. These class numbers are derived by multiplying, by exactly ten times, the working pressure of the pipe in megapascals (MPa). This classification differs from that in ISO 161 but is similar to the accepted pressure series in AS 1477, Unplasticized PVC (UPVC) Pipes and Fittings for Pressure Applications. This concept was preferred by the commmittee, as it enables interconnection of metric and existing pipes with similar pressure ratings.

The pipe specified herein may be used for all pressure applications except gas reticulation for which AS 1667, Polyethylene Pipes and Fittings for Gas Reticulation: Part 1—Pipes, is applicable.

For underground applications it will be necessary to refer to AS CA68, Rules for Plastics Pipelaying Design, which covers the deformation properties of polyethylene pipes in relation to the applied loads and bedding.

Fittings for use with the pipe are specified in AS 1460, Mechanical Jointing Fittings for Use with Polyethylene Pressure Pipes, and suitable fusion jointing techniques are described in AS 2033, Code of Practice for Installation of Polyethylene Pipe Systems.

This standard may require reference to the following standards:

AS 1349	Bourdon Tube Pressure and Vacuum Gauges
AS 1460	Mechanical Jointing Fittings for use with Polyethylene Pressure Pipes
AS 1463	Polyethylene Pipe Extrusion Compounds (Metric Units)
AS 2033	Code of Practice for Installation of Polyethylene Pipe Systems
AS CA68	Rules for Plastics Pipelaying Design
	International Standards for Drinking Water (World Health Organization Publication)

*ISO 161 Thermoplastics Pipes for the Transport of Fluids—Nominal Outside Diameters and Nominal Pressures—Part 1: Metric Series.

CONTENTS

STANDARDS ASSOCIATION OF AUSTRALIA

Australian Standard Specification for POLYETHYLENE (POLYTHENE) PIPE FOR PRESSURE APPLICATIONS

FOREWORD

In the determination of the stress rating of the material specified herein, the 50-year creep rupture stress has been used with a suitable factor of safety.

The basis of classification for the dimensioning of the pipes and the allocation of working pressures is as follows:

Polyethylene pipe compounds are classified into a series of types, the type number, expressed in tenths of a megapascal, giving an indication of the maximum hoop stress that can be sustained with a factor of safety by the pipe for at least 50 years at 20°C. This stress has been used in calculating the wall thickness, using the following formula:

$$T_{min} = \frac{P\,D_{m\,max.}}{2S + P}$$

where

T_{min} = minimum wall thickness, in millimetres

P = maximum allowable working pressure at 20°C, in megapascals

$D_{m\,max}$ = maximum mean outside diameter, in millimetres

S = maximum hoop stress, in megapascals

The derivation of the classes of pipe is based on the maximum recommended working pressures at 20°C expressed in tenths of a megapascal (0.1 MPa ≈ 1 atm).

In the interests of serviceability, and irrespective of the calculated minimum wall thickness, no wall thickness less than 1.6 mm is used in this specification.

Values of the Standard Dimension Ratio (SDR) have been included, for information, in the tables of dimensions. This ratio is determined by the following formula:

$$SDR = \frac{D_{m\,max.}}{T_{min.}}$$

It should be noted that this ratio is not used for the calculation of the minimum wall thickness T_{min}.

The types covered by the specification are:

Type 30—maximum hoop stress of 3 MPa

Type 40—maximum hoop stress of 4 MPa

Type 50—maximum hoop stress of 5 MPa

For the extrusion compounds, this specification refers to AS 1463, which covers the composition of the compounds and also gives a method of allocating a type number to the compound.

Both short-term and long-term stress rupture tests have been included as it was considered by the committee responsible for the preparation of this standard that two-point testing on the stress *vs* time curve gives greater confidence to the user.

This procedure for carrying out the specified stress rupture test permits tests to be carried out at either 20°C or 25°C, and appropriate test apparatus has been included for both conditions.