

Australian Standard<sup>®</sup>

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**PLASTICS PIPES AND FITTINGS  
FOR IRRIGATION AND RURAL  
APPLICATIONS**

**Part 1—POLYETHYLENE  
MICRO-IRRIGATION PIPE**

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Department of Agriculture, N.S.W.  
Department of Agriculture, S.A.  
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Engineering and Water Supply Department, S.A.  
Queensland Water Resources Commission  
State Rivers and Water Supply Commission, Vic.  
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## PREFACE

This standard was prepared by the Association's Committee on Polyethylene Irrigation Systems, under the authority of the Plastics Standards Board. It is based on a draft authorized by an ad hoc committee representative of irrigation interests in the Riverland of South Australia.

One class of pipe is specified and sizes are based on internal diameter. Wall thicknesses are derived from performance requirements believed to cover the widely accepted operating parameters of micro-irrigation and acceptable to all climates throughout Australia. Other requirements include composition, freedom from defects, short and long term hydrostatic pressure tests and environmental stress cracking resistance.

During the preparation of this standard, cognizance was taken of ISO/TC 138/WG 2 N 500, Polyethylene (PE) Pipes for Irrigation Laterals—Specification, ISO/TC 138/WG 5 N 765, Method for Testing Susceptibility of Polyethylene (PE) Pipes to Environmental Stress Cracking Induced by Insert-type Fittings, and AS 1159, Polyethylene (Polythene) Pipe for Pressure Applications.

This standard is one of three parts. AS 2698, Part 2\* covers polyethylene rural pipe and AS 2698, Part 3\* covers fittings for irrigation and rural applications.

It should be noted that polyethylene micro-irrigation pipe is not intended to be used for the conveyance of potable water, unless the manufacturer states otherwise, and in such cases the composition would comply with AS 2070, Plastics Materials for Food Contact Use, Part 1—Polyethylene.

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\* In course of preparation.

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## STANDARDS ASSOCIATION OF AUSTRALIA

## Australian Standard

for

PLASTICS PIPES AND FITTINGS FOR  
IRRIGATION AND RURAL APPLICATIONS

## PART 1—POLYETHYLENE MICRO-IRRIGATION PIPE

## FOREWORD

Polyethylene compounds for pipe extrusion are classified into a series of types in accordance with AS 1463. The type number, when divided by 10, gives the hydrostatic design stress in megapascals (MPa) of the material in pipe form over a period of at least 50 years at 20°C. This type classification has been retained in this standard.

The wall thicknesses used in this standard have been selected to reflect current manufacture and in each case the maximum working pressure at 20°C is in excess of 0.3 MPa. The actual working pressure at 20°C was calculated from the following formula:

$$P = \frac{2 S T_{\min}}{D_{i \max} + T_{\min}}$$

where

$P$  = working pressure at 20°C, in megapascals

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

$D_{i \max}$  = maximum mean inside diameter, in millimetres

$S$  = hydrostatic design stress at 20°C of 3 MPa for Type 30 and 5 MPa for Type 50.

Maximum working pressures at temperatures other than 20°C are given in Tables 1 and 2.

## SPECIFICATION

**1 SCOPE.** This standard specifies requirements for black polyethylene pipe for use in micro-irrigation applications below and above ground.

NOTE: Advisory information on alternative methods for determining compliance of a 'lot' with this standard is given in Appendix A.

**2 REFERENCED DOCUMENTS.** The following standards are referred to in this standard:

AS 1199	Sampling Procedures and Tables for Inspection by Attributes
AS 1349	Bourdon Tube Pressure and Vacuum Gauges
AS 1399	Guide to AS 1199, Sampling Procedures and Tables for Inspection by Attributes
AS 1463	Polyethylene Pipe Extrusion Compounds
AS 1821-23	Suppliers Quality Control Systems, Levels 1, 2 and 3
AS 1984	Vernier Callipers
AS 2000	Guide to AS 1821-23, Suppliers Quality Control Systems
AS 2101	Internal Micrometers (including Stick Micrometers)
AS 2102	External Micrometers
AS 2490	Sampling Procedures and Charts for Inspection by Variables for Percent Defective.

**3 DEFINITIONS.** For the purpose of this standard, the following definitions apply:

**3.1 Hoop stress**—the stress in a pipe or fitting under pressure acting tangentially to the perimeter of a transverse section.

**3.2 Long-term hydrostatic stress**—the continuously applied hoop stress which is estimated will cause failure at a specified time and temperature.

**3.3 Hydrostatic design stress**—the hoop stress due to internal hydrostatic pressure that can be applied continuously at a specified temperature. It is obtained by the application of a safety factor to the extrapolated 50 year long-term hydrostatic stress value.

**3.4 Working pressure**—the maximum pressure that can be sustained by the type and class of pipe or fitting for its estimated useful life under the anticipated working conditions.

**3.5 Test pressure**—the pressure applied internally to pipes and fittings when being tested for strength and watertightness.

**3.6 Pipe material temperature**—the average temperature estimated as applying through the full wall thickness.

**4 NOTATION.** The following notation applies in this standard:

$D_e$  = the nominal inside diameter, in millimetres

$D_i$  = the mean inside diameter, in millimetres

$T$  = the wall thickness, in millimetres.

## 5 TYPE AND CLASSIFICATION.

**5.1 Types.** Polyethylene pipe for micro-irrigation applications shall be classified as Type 30 or 50 in accordance with the type classification given in AS 1463.

**5.2 Classification.** For polyethylene pipe for micro-irrigation applications, the following class shall apply:

Class IRRIG—with a maximum recommended continuous working pressure of 0.3 MPa (nominally 30 m head) at a pipe material temperature of 20°C.

**6 EFFECT OF TEMPERATURE ON WORKING PRESSURE.** The maximum continuous working pressures of polyethylene micro-irrigation pipe at pipe material temperatures above 20°C should not exceed the values given in Table 1 or Table 2, as appropriate.

## 7 GENERAL REQUIREMENTS.

**7.1 Composition.** Polyethylene micro-irrigation pipe shall be manufactured from black polyethylene extrusion compound complying with AS 1463. Compounds of the above composition may be modified to improve stress cracking resistance provided that the modified polyethylene compound then complies with the requirements of AS 1463, Clause 4, Types.

The addition of rework material is permitted, provided that rework material is generated from the manufacturer's own extrusion. Between 10 percent and 100 percent of rework material may be used, provided that it is first pass material, and in any production not more than 10 percent which is second pass material is used. No other rework material may be used.

**7.2 Diameter and wall thickness.** Pipe, measured in accordance with Appendix B, shall conform to the dimensions given in Table 3.

**7.3 Length.** Standard lengths shall be as specified in Table 4.

NOTE: Other pipe lengths may be agreed upon between purchaser and supplier.

**7.4 Coil size.** Polyethylene micro-irrigation pipe shall be supplied in coils, in accordance with the dimensions specified in Table 4.

### 7.5 Freedom from defects.

NOTE: The defects described in Clause 7.5 cannot be completely quantified. Where the presence, size or frequency of any of these are 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.

Where defects are present and the product is submitted for acceptance, the manufacturer should be able to demonstrate fitness for purpose.

The internal and external surfaces of the pipe shall be smooth, clean and free from grooves and other defects likely to affect the performance and service of the pipe.

## 8 TEST REQUIREMENTS.

NOTE: Test requirements in this standard are applicable at the time of manufacture.

### 8.1 Hydrostatic pressure tests.

**8.1.1 Short-term hydrostatic pressure test.** When tested in accordance with Appendix C, Paragraph C3, pipe shall withstand without bursting or cracking, an internal hydrostatic pressure equivalent to a hoop stress of:

- Type 30—8.1 MPa for 1 h at a temperature of 20 +5, -0°C.
- Type 50—15.0 MPa for 1 h at a temperature of 20 +5, -0°C.