Australian Standard®

ACRYLONITRILE BUTADIENE STYRENE (ABS) PIPES AND FITTINGS FOR PRESSURE APPLICATIONS

Part 1—PIPES

This Australian Standard was prepared by Committee PL/1, ABS Pipe Systems. It was approved on behalf of the Council of the Standards Association of Australia on 25 October 1987 and published on 4 January 1988.

The following interests are represented on Committee PL/1:

Australian Mining Industry Council

Australian Shippers Council

Council of Australian Food Technology Associations Incorporated

Department of Local Government Queensland

Electricity Commission of New South Wales

Electricity Supply Association of Australia

Engineering and Water Supply Department South Australia

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PREFACE

This Standard was prepared by the Association's Committee PL/1, ABS Pipe Systems, acting under the authority of the Plastics Standards Board, following a request from the Plastics Institute of Australia.

The Standard specifies requirements for pipes up to 200 mm nominal size manufactured from acrylonitrile butadiene styrene (ABS) polymer for pressure and non-pressure applications for conveyance of potable water and other liquids and gases. Pipes manufactured in accordance with this Standard are not intended for the transport of gaseous fuels.

A test is currently being developed to measure the effect of long term pressure cycling on plastics piping systems, and may be included in a future edition of this Standard.

CONTENTS

FOREWORD

The hydrostatic design stresses of the pipes specified in this Standard have been determined by the application of a safety factor 2.13 to the extrapolated 50-year long-term hydrostatic stress value at 20°C.

The ovality tolerance on outside diameter has been calculated as ± 0.5 per cent of the average of the maximum and minimum mean outside diameters, applicable to Classes 9, 12 and 15. No ovality tolerance is placed on sizes in Class 4.5 and Class 6 because the thinner walled pipes may easily be rounded when inserted into sockets.

The wall thicknesses for pressure pipes specified in this document have been calculated from formulas which take into account the maximum allowable hoop stress of the material and the working pressure and diameter of the pipes.

The formulas used are as follows:

(a) $T_{min} = \dfrac{P.D_{m\ max}}{2S + P}$ with minimum of 1.6 mm.

(b) $T_{max} = 1.10\ T_{min} + 0.2$ mm.

where

T_{min} = minimum wall thickness, in millimetres

T_{max} = maximum wall thickness, in millimetres

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

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

S = maximum allowable hoop stress, in megapascals.

For the materials covered by this specification, the value of maximum allowable design hoop stress has been taken at 7.50 MPa.

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 Standard.

The wall thickness for Class T pipe is increased so that when threaded in accordance with AS 1722.1, the pipe can be rated as Class 12.

STANDARDS ASSOCIATION OF AUSTRALIA

Australian Standard

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PART 1—PIPES

1 SCOPE. This Standard specifies requirements for pipes up to 200 mm nominal size manufactured from acrylonitrile butadiene styrene (ABS) polymer for pressure applications for conveyance of potable water and other liquids and gases. Pipes manufactured in accordance with this Standard are not intended for the transport of gaseous fuels.

NOTE: Advisory information on alternative methods of 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 1293	Retractable Steel Pocket Rules.
AS 1294	Coated and Etched Steel Measuring Tapes.
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 1722.1	Pipe Threads of Whitworth Form. Part 1—Sealing Pipe Threads.
AS 1821-1823	Suppliers Quality Systems.
AS 1984	Vernier Callipers (Metric Series).
AS 2000	Guide to AS 1821–1823, Suppliers Quality Systems.
AS 2070	Plastics Materials for Food Contact Use. AS 2070.4 Acrylonitrile Plastics Materials. AS 2070.6 Colourants.
AS 2102	External Micrometers (Metric Series).
AS 2490	Sampling Procedures and Charts for Inspection by Variables for Percent Defective.
AS 1524.1	Code of Practice for Outdoor Weathering of Plastics in the Australian Environment Part 1—Commercial Products.
BS 5391	Specification for Acrylonitrile-Butadiene-Styrene (ABS) Pressure Pipe Part 1—Pipe for Industrial Uses.
ISO 2580/1	Plastics—Acrylonitrile-Butadiene-Styrene (ABS) Moulding and Extrusion Materials—Part 1—Designation.

3 DEFINITIONS. For the purpose of this Standard, the definitions below apply.

3.1 Hoop stress—the stress in a pipe or fitting under pressure acting tangentially to the perimeter of the 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 class of pipe or fitting for its estimated useful life under the expected working conditions.

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

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

3.7 Type test—a test intended to prove the suitability and performance of a new composition, a new compounding or processing technique, or a new design or size of pipe, joint or fitting. Type tests are normally carried out when a change is made in compound composition or method of manufacture.

3.8 Quality control test—a test carried out during or after manufacture to prove the quality of a production run of pipe or fittings.

4 NOTATION. The following notation applies in this Standard:

DN = nominal size, in millimetres.

D_m = mean outside diameter, in millimetres.

D_i = mean inside diameter, in millimetres.

D_o = ovality outside diameter, in millimetres.

T = wall thickness, in millimetres.

NOTE: Nominal size, DN, for ABS pipe is based on the bore diameter.

5 CLASSIFICATION. ABS pressure pipe shall be classified according to maximum static working pressure at a pipe material temperature of 20°C, as follows:

(a) Class 4.5—maximum static working pressure of 0.45 MPa.

(b) Class 6—maximum static working pressure of 0.6 MPa.