



Plastics Industry Pipe Association
of Australia Limited

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Technical Commentary

AS/NZS 4130 Polyethylene pipes (PE) for pressure applications

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Pipelines Integrity For a Cleaner Environment



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Contents

C FOREWORD.....	4
C1 SCOPE AND APPLICATION	4
C1.2 Application.....	4
C3 DEFINITIONS	4
C3.2 Co-extruded “jacket” pipes.....	4
C3.7 Lower prediction limit of the predicted hydrostatic strength (σ_{LPL}).....	4
C3.8 Maximum allowable operating pressure (MAOP)	4
C3.9 Minimum required strength (MRS).....	4
C4 NOTATION.....	4
C5 OVERALL SERVICE (DESIGN) COEFFICIENT	4
C6 CLASSIFICATION.....	5
C TABLE 1.....	5
C TABLE 2.....	5
C7 COMPOSITION.....	5
C7.3 Striping and jacket compounds.....	5
C8 COLOUR.....	6
C8.1 General.....	6
C8.2 Stripes and jackets	6
C9 GENERAL REQUIREMENTS	7
C9.1 Diameter and wall thickness	7
C9.6 Effect on Water	7
C9 Deleted Clauses.....	7
C10 PERFORMANCE REQUIREMENTS	7
C10.1 Resistance to internal pressure	7
C10.2 Reversion	8
C10.3 Thermal Stability	8
C10.4 Slow crack growth resistance	8
C10 Deleted Clause.....	9
C11 Marking	9
C Appendix A.....	9
C Table A.....	9

PREFACE

This Commentary was prepared by the Polyolefins Technical Committee of the Plastics Industry Pipe Association of Australia Ltd (PIPA). It is intended that it be read in conjunction with AS/NZS 4130:2003, Polyethylene (PE) pipes for pressure applications, but does not form part of that Standard.

This document provides a guide for manufacturers, product certification auditors, pipeline designers, and purchasers using polyethylene pressure pipe. It is issued in conjunction with the latest standard and assumes a working knowledge of the previous edition.

The main purpose is to:

1. Identify the changes introduced to the standard.
2. Explain the significance of the change.
3. Provide a guide for the implementation of the change.

For ease of cross-reference, clause numbers and titles used in the Commentary are the same as those used in the body of the Standard, but are prefixed with the letter C. Not all Clauses in the standard require comment and thus the numbering of this document is not sequential.

AS/NZS 4130 Polyethylene pipes (PE) for pressure applications

C FOREWORD

The compound designation PE 63 has been deleted for Series 1 pipes as the material is no longer commercially available. This change shall be immediate.

C1 SCOPE AND APPLICATION

C1.2 Application

The maximum allowable operating pressure for gas pipes was changed from 1000kPa to 1050kPa to reflect practice within the gas industry and a more accurate conversion from 150psi. This change shall be immediate.

Where aromatic constituents in excess of a certain level are present, the reference to ISO 4437 is now quoted directly rather than AS/NZS4131.

C3 DEFINITIONS

C3.2 Co-extruded “jacket” pipes

This definition was introduced to define a continuous, coloured outer layer that is coextruded as part of the pipe wall to aid identification. In principle the process is no different to applying stripes that have been in the Standard since its inception. A test has been added to Section 7 to ensure the layer is adhered correctly to the inner pipe. Correct adhesion is not only necessary to resist internal pressure but it is necessary to ensure proper jointing with mechanical and electrofusion fittings.

C3.7 Lower prediction limit of the predicted hydrostatic strength (σ_{LPL})

The definition was changed to align with ISO. (Refers to section 3.6 in AS/NZS 4130:2001)

C3.8 Maximum allowable operating pressure (MAOP)

The definition was changed to align with ISO. (Refers to section 3.7 in AS/NZS 4130:2001)

C3.9 Minimum required strength (MRS)

The definition was changed to align with ISO. (Refers to section 3.8 in AS/NZS 4130:2001)

C4 NOTATION

The design factor F has been replaced with the overall service (design) coefficient C . A definition was added for T_{max} . These are for clarification purposes only.

C5 OVERALL SERVICE (DESIGN) COEFFICIENT

The heading and text changed from “Design Factor” in accordance with the adoption of the overall service (design) coefficient but the usage is unchanged.

C6 CLASSIFICATION

C TABLE 1

As previously noted the Compound Classification PE63 has been deleted.

C TABLE 2

The following corrections were made to the Table 2. It now conforms to the dimension specified in ISO4427.

Value	Previous	Current
SDR 17, 40mm OD	Min Wall Thickness 2.2	Min Wall Thickness 2.4
SDR 7.4, 16mm OD	Min Wall Thickness 2.3	Min Wall Thickness 2.2
SDR 7.4, 16mm OD	Max Wall Thickness 2.7	Max Wall Thickness 2.6
SDR 9, 16mm	Not included	Included
SDR 11, 16mm	Not included	Included

Note number 2 referring to “rural applications” was deleted as this is a specification Standard not an application Standard. Use and application guides can be found in other Standards or codes. The corresponding grey highlighting within the table was also removed.

All changes shall be immediate.

C7 COMPOSITION

C7.3 Striping and jacket compounds

C7.3.1 General

Striping and jacket compounds no longer need to comply with AS/NZS 4131 as this was determined to be a requirement that in many cases was impractical. The striping and jacket compounds must however comply with the properties that affect the overall performance of the pipe. ie.

- The base resin must come from a material that complies with AS/NZS 4130. eg. The striping or jacket compound could be made from the natural base resin that was used to produce a black material that complies with AS/NZS 4131.
- The MRS classification of the base resin for the striping and jacket compound must be greater than or equal to the pipe material. eg. PE80 or PE100 for PE80 Pipe or PE100 for PE100 pipe.
- The compound must comply with the thermal stability test detailed in section 7.3.2.
- The compound must comply with the dispersion test detailed in section 7.3.3.

- The compounds must either contain 0.2% of hindered amine light stabilisers (HALS) or meet the requirement for the weathering resistance test specified in section 7.3.4.
- The minimum thickness of the jacket must be 0.2mm.

All changes shall be immediate.

C7.3.2 Thermal stability of striping compounds

The test method has been changed to ISO 11357-6. Please refer to the explanation given in section C10.3.

C7.3.4 Weathering resistance

The test method reference is now AS/NZS 1462.26 but the test is precisely the same as the one previously specified in Appendix F of AS/NZS 4131:2001. Retesting or the evaluation of new test data is not required as a result of this change.

C7.3.5 Cohesive resistance

This is new type test. It is expected that the type test be conducted before claiming jacketed pipe conforms to the standard. Manufacturers previously manufacturing striped pipe are expected to show compliance with this new clause by 30th May 2004.

C8 COLOUR

C8.1 General

The colour lilac has been specified to signify recycled water. This is in line with International designations and industry practice in Australia and New Zealand.

C8.2 Stripes and jackets

C8.2.1 General

The description for stripes has been changed from “solid” to “opaque”. Opaque is a better description of the blending of the colours that occurs between the pipe and stripe materials at a homogenous join. Solid inferred sharp, well-defined edges and that could lead to a poor bond and premature failure.

C8.2.2 Yellow, C8.2.3 Blue, C8.2.4 Lilac

The colour is now defined by RAL numbers rather than by reference to AS2700 or NZ7702. Colours that complied with the previous specification will comply with the new RAL specifications. The changes shall be immediate.

C9 GENERAL REQUIREMENTS

C9.1 Diameter and wall thickness

C9.1.1 Tables 2, 3 and 4

The measurement method is now specified in AS/NZS 1462.1 but the method is essentially the same as the one previously specified in Appendix D of AS/NZS 4130:2001. The only applicable differences are:

- Measurements no longer need to be taken within 24 hours of manufacture.
- The conditioning time varies for various wall thicknesses.
- The wall thickness must be measured at 6 places equally spaced around the pipe circumference.

Retesting or the evaluation of new test data is not required as a result of this change.

C9.1.2 Special Applications

The Appendix outlining the calculations required to determine the wall thickness for special applications has been renumbered from Appendix E to Appendix D. A requirement for pipe outside diameters to be selected from the Standard has been introduced, so that only the wall thickness may be varied. There has been no change to the calculation.

C9.6 Effect on Water

A scaling factor of 1 has been added to clarify what has been the practice since the introduction of AS/NZS4020. Retesting or the evaluation of new test data is not required as a result of this change.

C9 Deleted Clauses

The clauses “Effect on fluid other than water and fuel gas” and “Effect of chemicals” have been deleted. These test were considered ambiguous and outside of the scope of the Standard. The performance in any specialist applications should be confirmed with the supplier.

C10 PERFORMANCE REQUIREMENTS

C10.1 Resistance to internal pressure

The test method reference is now AS/NZS 1462.6 with the conditioning times included in the Standard as Table 6. The reference to AS/NZS 1462.6 has been included in anticipation of imminent publication of the revised test method but unfortunately there have been delays. In the interim it is expected that the tests will be conducted in accordance with the method outlined in AS/NZS 4130:2001 with reference to the values given in Table 6 of the current Standard.

The table of applied stresses for the 80°C Test has been renumbered from 6 to 7. PE63 has been removed as previously explained. The applied stresses for the 165 hour tests have been reduced from 4.6 to 4.5 for PE80 and 5.5 to 5.4 for PE100 to

reflect the change in the pressure curves brought about by the development towards greater crack growth resistance. It only affects the test pressure and does not infer that the long term pressure performance has reduced. The amended applied stresses have been adopted by ISO and are in the process of being disseminated into the relevant ISO Standards. Retesting or the evaluation of new test data is not required as previous tests conducted at higher pressures will pass at the slightly lower pressures.

The table outlining alternative test parameters where ductile failure has occurred has been deleted. There are now only two test times, 165 and 1000 hours.

Retesting or the evaluation of new test data is not required as a result of this change.

C10.2 Reversion

The test method reference is now AS/NZS 1462.4 which is based on the previously referenced test method ISO 2505. AS/NZS 1462.4 departs from ISO 2505 in that it increases the sample length required by a third and reduces the number of tests per sample from three to one. ISO 2505 takes specimen curvature into account when measuring specimens after immersion/exposure, AS/NZS 1462.4 does not. Pipe manufacturers are expected to show compliance with this new clause by 30th May 2004.

C10.3 Thermal Stability

The test method reference is now ISO11357.6. This is an update to the previous test method specified, ie ISO/TR 10837, and it now accounts for advances in Differential Scanning Calorimeter (DSC) instrumentation and practices. The major changes are:

- A DSC must be used. A Differential Thermal Analyser can no longer be used.
- The grades and purity of Oxygen and Nitrogen are now clearly defined and in practice are more pure than previously used.
- The sample mass range is broader.
- The test now consists of a minimum of two samples rather than five.
- It now includes a method for determining the onset of oxidation when the “knee” is not well defined.

However, some ISO member countries have highlighted difficulties with changeover and therefore compliance with either Standard is deemed acceptable until a resolution is issued by the ISO Committee.

C10.4 Slow crack growth resistance

The test method reference is now AS/NZS 1462.24 but the test is precisely the same as the one previously specified in ISO 13479. Retesting or the evaluation of new test data is not required as a result of this change.

P63 and PE100-165 have been removed from Table 8. The previous Standard adopted the cautious approach of adapting PE100 grades for both 165 and 500

hours slow crack resistance tests. It had since been established that a core group of materials conform to the 500 hours test and the committee felt it was prudent to adopt the higher performance. The latest ISO draft incorporates 500 hours.

C10 Deleted Clause

The requirement for the squeeze-off test was deleted on the basis that pipes manufactured to the Standard have always passed the requirement. In addition, squeezing off pipe to prevent flow is only used while emergency repairs are undertaken and it is recommended that the pipe affected by the squeeze-off be replaced or reinforced as soon as practicable. Therefore a test is unnecessary.

C11 Marking

The marking requirements have been defined in terms of “not initiating cracks” and “legibility maintained for the life of the pipe”. A test to confirm that the marking meets these requirements is not available but it is accepted that standard ink jet printing will suffice.

C Appendix A

C Table A

The test method references have been updated in accordance with the previously defined changes. Dispersion has been added to the Batch Release Tests. These changes are effective immediately.