

New Zealand Standard

Specification for Polyethylene Pipe (Type 5) for Cold Water Services

NZS 7602:1977

Single User PDF Terms & Conditions

You have material which is subject to strict conditions of use. Copyright in this material is owned by the New Zealand Standards Executive. Please read these terms and conditions carefully, as in addition to the usual range of civil remedies available to Standards New Zealand on behalf of the New Zealand Standards Executive for infringement of copyright, under New Zealand law every person who infringes copyright may be liable to a fine of up to \$10,000 for every infringing copy or imprisonment of up to 5 years, or a fine of up to \$150,000 or imprisonment not exceeding 5 years.

You have access to a single-user licence to read this non-revisable Adobe Acrobat PDF file and print out and retain ONE printed copy only.

We retain title and ownership of the copyright in this PDF file and the corresponding permitted printed copy at all times.

Under this license use of both the PDF file and the single permitted printed copy of this PDF file you may make are restricted to you. Under no circumstances are you permitted to save, sell, transfer, or copy this PDF file, the one permitted printed copy of this PDF file, or any part of either of them.

You undertake that you will not modify, adapt, translate, reverse engineer, decompile, disassemble or create derivative works based on any of the downloaded PDF file, nor will you merge it with any other software or document, even for internal use within your organization.

Under no circumstances may this PDF file be placed on a network of any sort without our express permission.

You are solely responsible for the selection of this PDF file and any advice or recommendation given by us about any aspect of this PDF file is intended for guidance only and is followed or acted upon entirely at your own risk.

We are not aware of any inherent risk of viruses in this PDF file at the time that it is accessed. We have exercised due diligence to ensure, so far as practicable, that this file does not contain such viruses.

No warranty of any form is given by us or by any party associated with us with regard to this PDF file, and you accept and acknowledge that we will not be liable in any way to you or any to other person in respect of any loss or damage however caused which may be suffered or incurred or which may arise directly or indirectly through any use of this PDF file.

Regardless of where you were when you received this PDF file you accept and acknowledge that to the fullest extent possible you submit to New Zealand law with regard to this licence and to your use of this PDF file.

Copyright Standards New
Zealand

© 1977 STANDARDS COUNCIL

Declared on 16 December 1977 by the Standards Council to be a standard specification pursuant to the provisions of section 23 of the Standards Act 1965.

First published
Reprinted

December 1977
March 1987

The following SANZ references relate to this standard:

Project No. P 1022
Draft for comment No. DZ 7602
Printing code: 300 1986/2029/23271

AMENDMENTS

<i>No.</i>	<i>Date of issue</i>	<i>Description</i>	<i>Entered by, and date</i>

NEW ZEALAND STANDARD

Specification for POLYETHYLENE PIPE (TYPE 5) FOR COLD WATER SERVICES

Metric units

© COPYRIGHT

The copyright of this document is the property of the Standards Council. No part of it may be reproduced by photocopying or by any other means without the prior written permission of the Director of the Standards Association of New Zealand unless the circumstances are covered by the exemption sections (19 and 21) of the Copyright Act 1962.

Superseding NZS 2034

NOTES

Copyright Standards New
Zealand

CONTENTS	PAGE
Committee representation	4
Related documents	4
Acknowledgement	4
Foreword	5
<i>Section</i>	
1 Scope	6
2 Interpretation	6
3 Classification	6
4 Composition	6
5 Freedom from defects	7
6 Dimensions	7
7 Packing	7
8 Hydrostatic test	7
9 Heat reversion test	8
10 Tensile test (type test)	8
11 Marking	8
<i>Figure</i>	
1 to 6 Satisfactory dispersion of pigment	9
7 to 12 Unsatisfactory dispersion of pigment	9
13 Suitable end connections for hydrostatic test	13
<i>Table</i>	
1 Pipe dimensions	7
2 Distance between supports	16
<i>Appendix</i>	
A Method for the determination of toluene extract of carbon black	10
B Method for the determination of 1, 1-di-(3- <i>tert</i> butyl- 4-hydroxy-6-methylphenyl) butane	10
C Hydrostatic test	12
D Heat reversion test	14
E Tensile test	14
F Notes on the use of polyethylene pipe (type 5) for cold water services	15

COMMITTEE REPRESENTATION

This standard was prepared under the supervision of the Plastics Industry Sectional Committee (76/—) for the Standards Council, established under the Standards Act 1965. The committee consisted of representatives of the following:

Department of Education
 *Department of Health
 Department of Labour
 *Department of Scientific and Industrial Research
 *Ministry of Works and Development
 New Zealand Institution of Engineers
 *New Zealand Society of Master Plumbers
 *Plastics Institute of New Zealand

The Polyethylene Pipe for Cold Water Services Committee (76/7) was responsible for the preparation of the standard, and, in addition to those above marked with an asterisk (*) consisted of representatives of the following organizations:

Municipal Association of New Zealand
 New Zealand Wholesale Plumbers Merchants Guild

ACKNOWLEDGEMENT

In the preparation of this standard assistance has been derived from publications of the British Standards Institution and of the Standards Association of Australia. This assistance is gratefully acknowledged.

RELATED DOCUMENTS

Reference is made in this standard to the following documents:

NEW ZEALAND STANDARD		Clause reference herein
NZS 7601 : 0000	<i>Polyethylene pipe (type 3) for cold water services (in preparation)</i>	Foreword
BRITISH STANDARDS		
BS 572 : 1960	<i>Interchangeable conical ground glass joints</i>	B2
BS 1792 : 1960	<i>One-mark volumetric flasks</i>	B2
BS 2782	<i>Methods of testing plastics</i>	4.1.1 4.1.3 4.2 E1.1
BS 3412 : 1976	<i>Polyethylene materials for moulding and extrusion</i>	4.1.3

RELATED LEGISLATION

The Electrical Wiring Regulations 1976	F2.1
--	------

FOREWORD

This standard is an updating and metric revision of NZS 2034 : 1965, *Polythene pipe (Type 710) for cold water services*, and is intended to meet the requirements for makers and users of polyethylene pipe (Type 5) for cold water services.

The former imperial units have been “soft” metricated in this document. It was considered that other changes or “hard” metrication would not be in the best interests of users, causing increased costs, and creating other difficulties in relation to the manufacture of fittings. The opportunity has been taken to update and revise the composition, packing and marking clauses.

The type designation (5) indicates the recommended maximum working stress for the material, in megapascals, at 20 °C when in pipe form. This stress has been used as the basis for calculating the minimum wall thicknesses. A specification for polyethylene pipe (Type 3) for cold water services is provided in NZS 7601*.

The *Notes on the use of polyethylene pipe (Type 5) for cold water services* in Appendix F of this standard are intended to assist users in assessing the suitability of polyethylene pipe for particular purposes and to ensure its proper use.

Throughout this standard the term “polyethylene” is used. It should be noted that this designation is equivalent to the name “polythene”.

*See list of related documents.

NEW ZEALAND STANDARD

Specification for
POLYETHYLENE PIPE (TYPE 5)
FOR COLD WATER SERVICES

1 SCOPE

1.1 This standard sets out the requirements for black polyethylene pipe of Type 5 for use in cold water services, and in flush, overflow, warning and waste-pipe applications. The type designation refers to the maximum working stress of the material at 20 °C, in megapascals, when in pipe form.

2 INTERPRETATION

2.1 General

2.1.1 Where any other standard named in this standard has been declared or endorsed in terms of the Standards Act 1965, then –

- (a) Reference to the named standard shall be taken to include any current amendments declared or endorsed in terms of the Standards Act 1965; or
- (b) Reference to the named standard shall be read as reference to any standard currently declared or endorsed in terms of the Standards Act 1965 as superseding the named standard, including any current amendments to the superseding standard declared or endorsed in terms of the Standards Act 1965.

3 CLASSIFICATION

3.1 Polyethylene pipe (Type 5) covered by this standard is classified as follows:

Class B – for maximum working pressure
60 m H₂O (0.6 MPa)

Class C – for maximum working pressure
90 m H₂O (0.9 MPa)

Class D – for maximum working pressure
120 m H₂O (1.2 MPa)

NOTE – These classifications apply to working temperatures up to and including 20 °C. Manufacturers' data should be consulted for working temperatures above 20 °C.

*See list of related documents.

4 COMPOSITION

4.1 Extrusion compound

4.1.1 The compound shall be manufactured from a mixture of the following:

- (a) Polyethylene with a density greater than 930 kg/m³ at 20 °C. This includes copolymers of ethylene and higher olefins in which the higher olefin constituent does not exceed 10 percent and the density falls between 946 kg/m³ and 955 kg/m³ at 20 °C.
- (b) Carbon black in such an amount that, when the compound is tested by Method 405A of BS 2782*, the carbon black content shall be 2.5 ± 0.5 percent. The carbon black shall comply with the following requirements:
Density: 1500–2000 kg/m³.
Maximum volatile matter: 9.0 percent by mass.
Average particle size: 0.010–0.025 µm.
Toluene extract: Not more than 0.10 percent by mass when determined by the method set out in Appendix A.
- (c) Antioxidant in such an amount that, when the compound is tested by Methods 405B, 405D or 434D of BS 2782*, or by the method set out in Appendix B, the antioxidant content shall not be more than 0.30 percent nor less than 0.02 percent by mass. The antioxidant used shall be one or more of the following:
 - (1) *N, N'*-2-di-naphthyl-*p*-phenylenediamine, with melting range of 228–235 °C (see Method 405B of BS 2782*).
 - (2) 4-aminophenol *N*-stearate (see Method 405D of BS 2782*).
 - (3) 4,4'-thiodi-(6-*tert* butyl-*m*-cresol) (see Method 434D of BS 2782*).
 - (4) 1,1,3-tri-(5-*tert* butyl-4-hydroxy-2-methylphenyl) butane (see Method 434D of BS 2782*).
 - (5) Octadecyl 3-(3,5-di-*tert* butyl-4-hydroxyphenyl) propionate (see Method 434D of BS 2782*).
 - (6) Pentaerythritol tetra-3-(3,5-di-*tert* butyl-4-hydroxyphenyl) propionate (see Method 434D of BS 2782*).
 - (7) 1,1-di(3-*tert* butyl-4-hydroxy-6-methylphenyl) butane (see Appendix B).

4.1.2 The addition of the manufacturer's own rework material produced during the manufacture and works testing of pipe complying with this standard is permissible. No other rework material shall be used.

4.1.3 The compound, when tested by Method 105C of BS 2782*, shall have a melt flow index not exceeding 0.4.

NOTE — Extrusion compound conforming to Type WA of BS 3412*, satisfies the requirements of this standard in respect of carbon black content and average particle size of the carbon black and content of permitted antioxidants.

4.2 **Pipe material.** The extruded pipe shall contain 2.5 ± 0.5 percent by mass of carbon black when tested by Method 405A of BS 2782*. The carbon black and antioxidant shall be evenly dispersed in the pipe material. The carbon black dispersion shall be satisfactory when tested by the microtome technique described in Method 510A of BS 2782*. Figures 1 to 6 illustrate satisfactory dispersion and figures 7 to 12 illustrate unsatisfactory dispersion.

5 FREEDOM FROM DEFECTS

5.1 The internal and external surfaces of the pipe shall be smooth, clean and reasonably free from grooves and other defects.

6 DIMENSIONS

6.1 The pipes shall conform to the outside diameters and wall thicknesses given in table 1.

6.2 Pipes shall be supplied in random lengths, or in coils of 30 m, 50 m, 75 m, 100 m, 150 m, 200 m, or as agreed between manufacturer and purchaser. Tolerance on coil length shall be $-0 +1$ percent.

7 PACKING

7.1 If the pipe is to be coiled, it shall be done at a temperature of less than 30°C . The internal diameter of the coil shall not be less than 24 times the mean outside diameter of the pipe, with a minimum of 0.6 m.

8 HYDROSTATIC TEST

8.1 Short term test

8.1.1 For the purpose of testing, the pipe shall be divided into batches of continuous production from one machine of the same size of pipe. A sample having a length 10 times the nominal bore of the pipe, but not less than 250 mm nor greater than 750 mm, shall be cut from each batch or once in each 8 h of continuous production, whichever is less. The sample taken from the batch shall be representative of the whole batch.

8.1.2 The sample shall be tested according to the method set out in Appendix C, and shall withstand for a period of not less than 1 h, without showing signs of leakage or weeping, a test pressure as follows:

Class B 1.8 MPa

Class C 2.7 MPa

Class D 3.6 MPa

Table 1

PIPE DIMENSIONS

Nominal bore	Outside diameter		Wall thickness					
			Class B		Class C		Class D	
			Working pressure 0.6 MPa 60 m H_2O		Working pressure 0.9 MPa 90 m H_2O		Working pressure 1.2 MPa 120 m H_2O	
	min.	max.	min.	max.	min.	max.	min.	max.
mm	mm	mm	mm	mm	mm	mm	mm	mm
15	16.9	17.3	—	—	1.5	1.7	1.9	2.1
20	24.9	25.4	1.8	2.0	2.1	2.3	2.8	3.1
25	31.2	31.8	2.2	2.4	2.7	3.0	3.5	3.8
32	37.5	38.0	2.4	2.7	3.2	3.5	4.1	4.5
40	43.8	44.5	2.8	3.1	3.7	4.1	4.8	5.3
50	60.0	60.8	3.5	3.8	5.1	5.6	6.6	7.2

*See list of related documents.

8.1.3 Should a sample fail to meet the requirements of clause 8.1.2, further tests on 3 additional samples from the same batch shall be carried out in a similar manner. If these further 3 samples pass the test, the batch shall be deemed to comply with this standard, but if one or more of the samples also fails, the batch shall be deemed not to comply with this standard.

8.2 Long term test

8.2.1 One test station shall be set up for each production line, and one sample of pipe shall be cut from each of these production lines. The sample shall have a length 10 times the nominal bore of the pipe, but neither less than 250 mm nor greater than 750 mm. The sample shall be tested according to the method set out in Appendix C, and shall withstand for a period of 168 ± 1 h, without sign of failure, a test pressure as follows:

Class B 1.4 MPa

Class C 2.1 MPa

Class D 2.8 MPa

The test procedure shall be repeated immediately and continuously with a fresh sample of pipe at each test station.

9 HEAT REVERSION TEST

9.1 Three representative samples of pipe shall be taken from each extrusion run, at intervals not exceeding 8 h, and shall be tested by the method set out in Appendix D. No sample shall alter in length by more than 3 percent.

9.2 Should any sample fail to meet the requirements of clause 9.1, a further 6 samples shall be selected at random from the batch and tested in a similar manner. If these further 6 samples pass the test, the batch shall be deemed to comply with this standard, but if one or more of the samples also fails, the batch shall be deemed not to comply with this standard.

10 TENSILE TEST (TYPE TEST)

10.1 A tensile test shall be carried out on a sample of pipe in accordance with the method set out in Appendix E at intervals not exceeding 4 weeks, and at every change in composition of the extrusion compound. The pipe shall have a tensile strength of not less than 18.62 MPa and an elongation at break of not less than 150 percent.

NOTE – This test may be omitted subject to a certificate of compliance with the above requirements being provided by the manufacturer of the raw material.

11 MARKING

11.1 All pipes shall be indelibly marked at intervals not greater than 2 m with the following:

- (a) The number of this standard, that is, NZS 7602.
- (b) The name, trademark or other means of identification of the manufacturer.
- (c) The nominal bore as given in table 1, and the class.

11.2 The marking shall be impressed longitudinally in the following colours:

Class B – red

Class C – blue

Class D – green

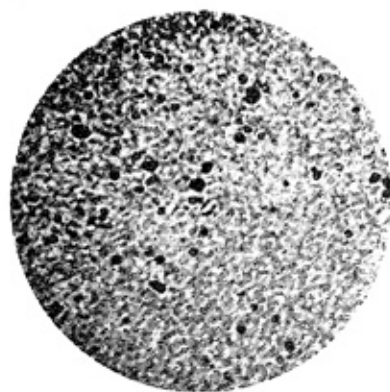
NOTE – Compliance with this standard may be claimed in two ways:

- (1) The expression “NZS 7602” appearing on a product is a *claim* by the manufacturer that it complies with the requirements of this standard. This is the manufacturer's responsibility, and carries the usual obligations under the Sale of Goods Act 1908 and the Consumer Information Act 1969, as well as others under the Standards Act 1965.
- (2) The Standard Certification Mark appearing on a product *certifies* compliance with the standard through a system of supervision, control, and testing which has been established by the manufacturer to the satisfaction of the Standards Council. In addition, periodical inspections are made at the manufacturer's works, and testing to the standard at agreed intervals is carried out by independent testing authorities. The Standard Certification Mark is registered as a certification trademark under the Trade Marks Act 1953, and may be used *only* (a) in terms of a licence issued by the Standards Association of New Zealand and also (b) in conjunction with the licence number and the relevant New Zealand Standard number.

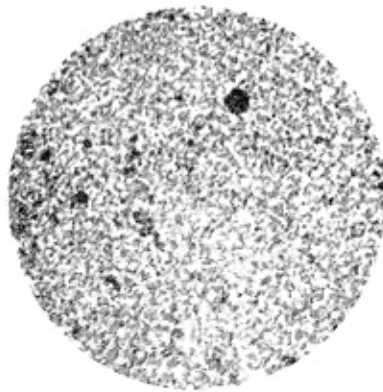
Further particulars of the conditions of licensing may be obtained from the Director, Standards Association of New Zealand, Private Bag, Wellington.



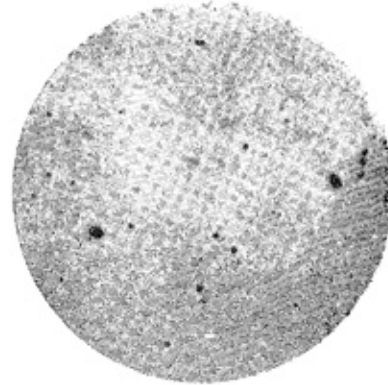
THE STANDARD CERTIFICATION MARK



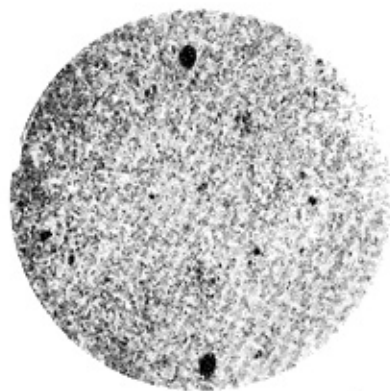
1



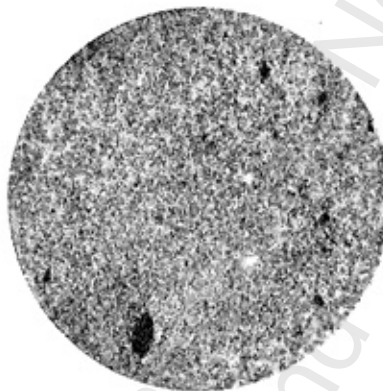
2



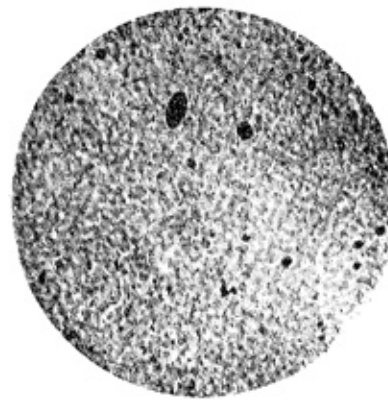
3



4

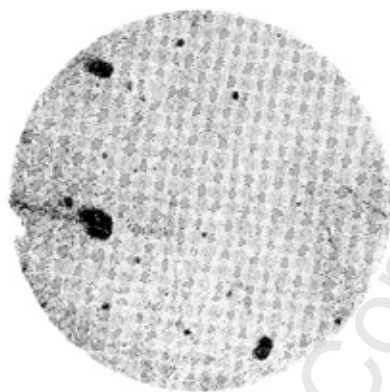


5

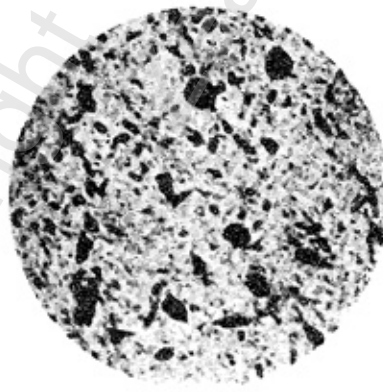


6

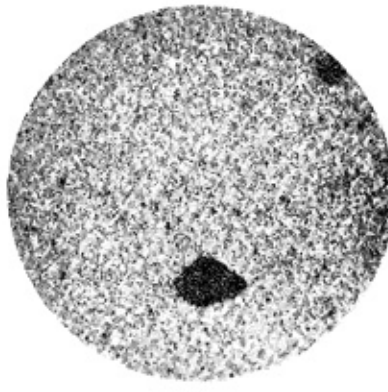
Figures 1 to 6 SATISFACTORY DISPERSION OF PIGMENT



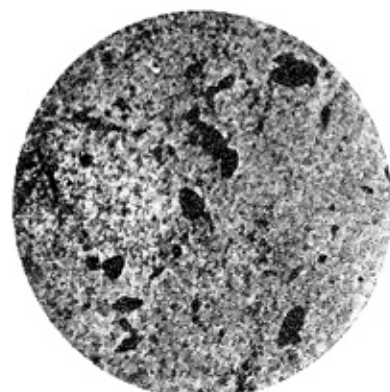
7



8



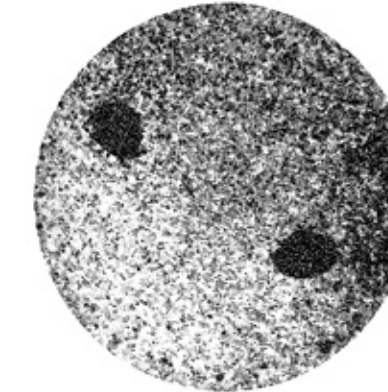
9



10



11



12

Figures 7 to 12 UNSATISFACTORY DISPERSION OF PIGMENT

APPENDIX A**METHOD FOR THE DETERMINATION OF TOLUENE EXTRACT
OF CARBON BLACK****A1 APPARATUS**

- (1) *Extraction thimbles*, double thickness, fat extracted.
- (2) *Soxhlet apparatus*.
- (3) *Shallow weighing dish*, 50 ml capacity, of borosilicate glass.

A2 REAGENT

A2.1 The reagent used shall be sulphur-free toluene of a recognized analytical reagent quality.

A3 PROCEDURE

A3.1 Weigh to 1 mg 5 to 8 g of pelletized carbon black or 2 to 5 g of compressed fluffy black and place in a paper extraction thimble. Measure 50 to 60 ml of toluene into the Soxhlet flask. Insert the thimble into the Soxhlet extractor. Assemble the Soxhlet apparatus and extract for 22 h. Evaporate successive small portions of the extract solution (filtered if necessary) nearly to dryness in the previously cleaned, dried and tared 50 ml shallow glass weighing dish. Rinse the extraction flask with toluene and add the washings to the weighing dish. Evaporate the combined extracts on a hotplate to a volume of approximately 5 to 10 ml, and finally dry to constant mass the dish and contents in an oven at 115 °C. Cool in a desiccator to room temperature and weigh to 1 mg.

A4 CALCULATION

$$A4.1 \quad \text{Toluene extract percent} = \frac{\text{mass of extract}}{\text{mass of sample}} \times 100.$$

APPENDIX B**METHOD FOR THE DETERMINATION OF
1,1-di-(3-*tert* butyl-4-hydroxy-6-methylphenyl) butane****B1 SUMMARY**

B1.1 The quantitative estimation of small amounts of 1,1-di-(3-*tert* butyl-4-hydroxy-6-methylphenyl) butane in polyethylene compounds is made by means of an ultra-violet spectrophotometric method. In this method the antioxidant is extracted from the sample with boiling chloroform; the amount of antioxidant present in this solution is determined by measuring the ultra-violet absorption at a wavelength of 244 nm.

B2 APPARATUS

- (1) *Ultra-violet spectrophotometer*.

- (2) *One-mark volumetric flasks*, 100 ml capacity, made to BS 1792*.
- (3) *A matched pair of fused quartz cells*, with 10 mm path length.
- (4) *Electric hotplate*.
- (5) *Reflux condenser*, with 24/29 (B24) ground glass joint to BS 572*.
- (6) *Extraction flasks*, with 24/29 (B24) ground glass joint to BS 572*.
- (7) *Filter funnel*.
- (8) *Filter paper*, 150 mm diameter†.

B3 REAGENT

B3.1 The reagent used shall be chloroform of a recognized analytical reagent quality.

B4 PROCEDURE

B4.1 Preparation of sample solution

B4.1.1 Range 0.02 to 0.1 percent. Weigh to 1 mg approximately 5.0 g of the sample into a 150 ml extraction flask and add 60 ml of chloroform by means of a pipette. Add a few anti-bumping granules. To the neck of the flask fit a condenser and then boil the contents of the flask gently on a hotplate for 45 min. Wash down the condenser and the neck of the flask with about 15 ml of chloroform, stopper the flask, and leave to cool in a bath of running water for 15 min. Filter the solution through a 150 mm paper, and wash the flask and the polymer on the filter with chloroform until the volume of the filtrate collected in a volumetric flask is 100 ml. Shake well. At the same time carry out a blank on the chloroform used, submitting the solvent to the same heating and filtration as described for the sample.

B4.1.2 Range 0.1 to 0.6 percent. The procedure here is exactly the same as set out in clause B4.1.1 except that only 1.0 g of the sample is used.

B4.2 Spectrophotometry. Measure the ultra-violet absorption of the sample extract over the wavelength range 220 to 310 nm in a 10 mm cell against the chloroform blank in the comparison cell. To avoid evaporation of the solvent use stoppered or covered cells. Calculate the absorbance at a wavelength of 244 nm using the base line method with a base line drawn from the absorbance at 220 nm tangentially.

B4.3 Calibration of graph. Prepare the calibration graphs relating the concentration of 1,1-di-(3-*tert*-butyl-4-hydroxy-6-methylphenyl) butane in chloroform to absorbance at 244 nm by the following method:

To a series of 100 ml volumetric flasks add 0, 1, 2, 3, 4, 5 ml and 6 ml of a standard 1.0 g/l solution of 1,1-di-(3-*tert*-butyl-4-hydroxy-6-methylphenyl) butane in chloroform and dilute each to 100 ml with chloroform. Measure the absorbance of each solution in the range 255 to 320 nm in 10 mm cells against chloroform in the comparison cell. Calculate the absorbance at 286 nm by the base line method as

*See list of related documents.

† Whatman No. 542 papers are suitable.

described in B4.2 and plot a graph of absorbance at 286 nm against milligrammes of 1,1-di-(3-*tert*-butyl-4-hydroxy-6-methylphenyl) butane per 100 ml of chloroform solvent. This graph applies to the range 0 to 6 mg of 1,1-di-(3-*tert*-butyl-4-hydroxy-6-methylphenyl) butane per 100 ml of chloroform solvent.

B5 RESULTS

B5.1 Read off the concentration of 1,1-di-(3-*tert*-butyl-4-hydroxy-6-methylphenyl) butane in the chloroform extract from the appropriate calibration graph. Hence calculate the amount of 1,1-di-(3-*tert*-butyl-4-hydroxy-6-methylphenyl) butane in the original sample and quote the results as a percentage.

B6 ACCURACY

B6.1 This method should give results, at the 0.3 percent level of antioxidant, accurate to ± 10 percent of the mean value.

APPENDIX C

HYDROSTATIC TEST

C1 CONDITIONING OF TEST SAMPLE

C1.1 Condition the test sample in air or water at 20 ± 2 °C for 24 h immediately prior to testing. Conditioning in water may be carried out with the sample connected to the test apparatus.

C2 TEST PROCEDURE

C2.1 If the conditioning has been carried out in air, connect the sample to the test apparatus and fill with water, ensuring that all air is released from the sample. If the conditioning has been carried out in water, connect the sample to the test apparatus if it is not already connected, and ensure that any remaining air is released from the sample.

C2.2 Apply the test pressure at a uniform rate without shock or pulsation. Maintain the test pressure within 2 percent of the value required and the test temperature at 20 ± 2 °C for the time specified in section 8. Suitable end connections for the sample are shown in fig. 13.

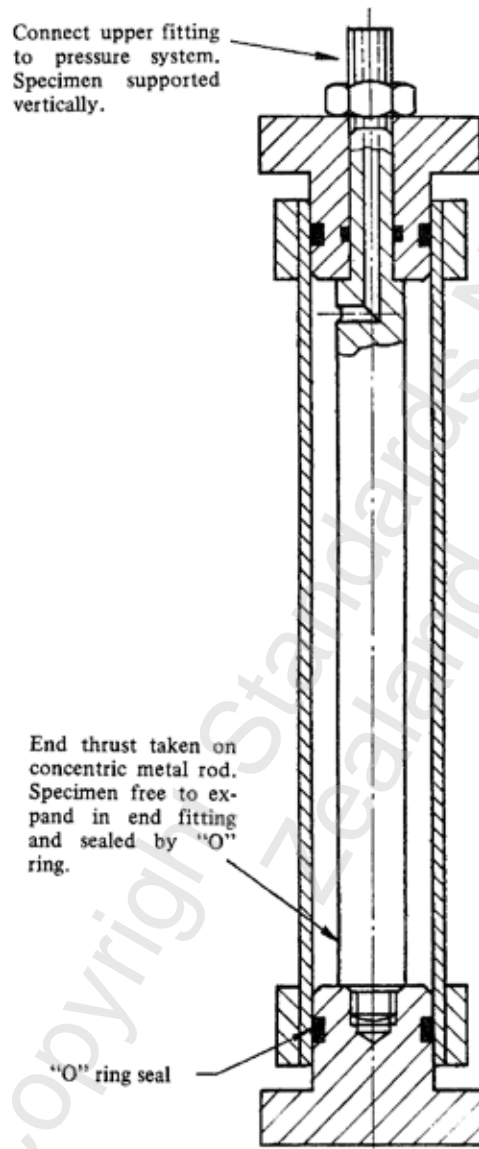


Fig. 13 SUITABLE END CONNECTIONS FOR HYDROSTATIC TEST

APPENDIX D

HEAT REVERSION TEST

D1 PROCEDURE

D1.1 Measure the length at 20 °C of a sample of pipe approximately 150 mm long. Immerse the pipe for 30 ± 2 min in a bath containing ethylene glycol or in an oil free from aromatic hydrocarbons at a temperature of 110 ± 2 °C. Remove the pipe from the bath and allow it to cool. Measure the length of the pipe when it has cooled to 20 °C.

APPENDIX E

TENSILE TEST

E1 PROCEDURE

E1.1 Cut two longitudinal test specimens from points 180° apart on the circumference of the pipe to conform with the profile of the dumb-bell shown in fig. 301.9 of BS2782*. On each test specimen mark two reference lines 25 mm apart, perpendicular to the long axis, placing the lines symmetrically on the waisted part of the specimen. Condition and test the 2 specimens in accordance with Method 301D of BS 2782*, except for setting the rate of traverse at 100 ± 25 mm/min, and for reporting the test results of each specimen separately.

* See list of related documents.

APPENDIX D

HEAT REVERSION TEST

D1 PROCEDURE

D1.1 Measure the length at 20 °C of a sample of pipe approximately 150 mm long. Immerse the pipe for 30 ± 2 min in a bath containing ethylene glycol or in an oil free from aromatic hydrocarbons at a temperature of 110 ± 2 °C. Remove the pipe from the bath and allow it to cool. Measure the length of the pipe when it has cooled to 20 °C.

APPENDIX E

TENSILE TEST

E1 PROCEDURE

E1.1 Cut two longitudinal test specimens from points 180° apart on the circumference of the pipe to conform with the profile of the dumb-bell shown in fig. 301.9 of BS2782*. On each test specimen mark two reference lines 25 mm apart, perpendicular to the long axis, placing the lines symmetrically on the waisted part of the specimen. Condition and test the 2 specimens in accordance with Method 301D of BS 2782*, except for setting the rate of traverse at 100 ± 25 mm/min, and for reporting the test results of each specimen separately.

*See list of related documents.

APPENDIX F

NOTES ON THE USE OF POLYETHYLENE PIPE (TYPE 5) FOR COLD WATER SERVICES

F1 GENERAL

F1.1 The following notes have been prepared for guidance in the reasonable and practical use of polyethylene pipe (Type 5) for cold water service. Users can obtain further information and advice from the manufacturers, and before installing polyethylene pipe for cold water supplies, should approach the controlling local authority regarding local conditions and regulations.

F2 PROPERTIES

F2.1 **Essential characteristics.** Polyethylene is not liable to attack from any potable water or from soils which are corrosive to metals. Because of the slight permeability of polyethylene to gases, including coal gas, particular care should be taken when siting polyethylene pipe. It is flexible, elastic, and heat insulating; this facilitates laying and installation, and minimizes the danger of frost damage. It is an electrical insulator and therefore cannot be used for earthing electrical installations.

NOTE – Metallic water pipes may be part of the earthing arrangements of electrical installations in compliance with the Electrical Wiring Regulations 1976*. Wherever existing metallic pipe systems are repaired or replaced using pipes or joints of electrically insulating material, additional work may be needed to maintain the electrical continuity of the earthing system. The pipe installer must ensure that this aspect is checked by a registered electrician or Electrical Supply Authority Inspector.

F2.2 **Effect of heat.** The mechanical properties of polyethylene are adversely affected by a rise in temperature. Polyethylene pipes should therefore not be used for hot water services, and should not be fixed in contact with hot surfaces, nor where they will be exposed to direct sunlight.

F2.3 **Coefficient of thermal expansion.** The coefficient of thermal expansion is such that an increase in length of 1.5 mm/m for a 10 °C rise in temperature is likely to be experienced.

F2.4 **Effect of ultra-violet.** The black pigment retards the degradation of polyethylene by ultra-violet in sunlight and inhibits organic growth within the pipe. It is advisable that where the pipe is intended for long-term or permanent use it is trenched in, thus giving further protection from ultra-violet degradation.

F3 JOINTING

F3.1 Suitable compression fittings are available to suit the sizes of pipe listed in table 1. Care should be taken in the selection of appropriate fittings.

*See list of related documents.

F4 BENDING

F4.1 Cold bends can be made when the bend radius is greater than 20 times the outside diameter of the pipe. For tighter radius bends, the pipe must be supported internally by using dry sand or a suitably sized bending spring and hot bending carried out. The heat may be applied using a boiling saturated salt solution, or glycerine at a temperature of 120 °C, or by the careful application of a blow-lamp. The pipe should be held in the shape required until cold.

F5 FIXING

F5.1 **General.** The pipe is supplied in coils or in straight lengths, and the latter should be used for surface installations where neat appearance is of particular importance. Where pipe is cut from a coil, fixing should be arranged so that the curvature of the pipe is corrected by contact with the surface to which it is fixed. Such pipe should not be straightened by applying tension. Standard pipe clips and the like may be used for supporting the pipe and these should be tightened firmly but not too tightly so that they do not bite into the pipe. In view of the high coefficient of thermal expansion of polyethylene, provision for expansion and contraction may be necessary in long runs of pipe. The general practice of avoiding proximity between cold water pipes and hot pipes or hot surfaces should be followed. Where stopcocks or heavy fittings are used, care must be taken to anchor securely the end of the pipe to prevent twisting or other distortion of the pipe.

F5.2 **Horizontal runs.** Present knowledge indicates that, failing continuous support, clips and similar devices should be used at approximately the following distances:

Table 2

DISTANCE BETWEEN SUPPORTS

<i>Nominal bore</i>	<i>Distance between supports</i>
mm	mm
15	750
20	750
25	750
32	900
40	900
50	1200

F5.3 **Vertical runs.** The clips or other supports should be fixed at not more than twice the distances for horizontal runs.

NEW ZEALAND STANDARD

Specification for
POLYETHYLENE PIPE (TYPE 5) FOR
COLD WATER SERVICES

AMENDMENT No. 1 (Corrigendum)
September 1978

*EXPLANATORY NOTE - Amendment No. 1 corrects an error in the
reference to the Test Method given in Appendix E.*

To ensure receiving the next amendment to NZS 7602 : 1977
please complete and return the amendment request form.

DECLARATION

Amendment No. 1 was declared on 22 September 1978 by the
Standards Council to be an amendment to NZS 7602 : 1977 pursuant
to the provisions of the Standards Act 1965.

Appendix E, Tensile test:

Delete clause E1.1 and substitute the following:

E1.1 Cut two longitudinal test specimens from points 180°
apart on the circumference of the pipe to conform with
fig.1 of BS 2782: Part 3: Methods 320A to 320F. On
each test specimen mark two reference lines 25 mm apart,
perpendicular to the long axis, placing the lines sym-
metrically on the waisted part of the specimen. Condition
and test the 2 specimens in accordance with Method 320A of
BS 2782, setting the rate of traverse at 100 mm/min and
reporting the test results of each specimen separately.

(C) 1978 STANDARDS COUNCIL
STANDARDS ASSOCIATION OF NEW ZEALAND
WORLD TRADE CENTER, 15-23 STURDEE STREET, WELLINGTON 1