

Australian Standard[®]

**Fusion-bonded low-density
polyethylene coating for pipes
and fittings**

This Australian Standard was prepared by Committee WS/9, Rolled and Welded Steel Pipes. It was approved on behalf of the Council of Standards Australia on 10 March 1992 and published on 20 July 1992.

The following interests are represented on Committee WS/9:

Brisbane City Council
Building Management Authority, W.A.
Confederation of Australian Industry
Engineering and Water Supply Department, S.A.
Hobart City Council
Hunter Water Board
Melbourne Water
Metal Trades Industry Association
Public Works Department, N.S.W.
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polyethylene coating for pipes
and fittings**

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PREFACE

This Standard was prepared by a subcommittee of Standards Australia Committee for Rolled and Welded Steel Pipes at the request of manufacturers and users of fusion-bonded low-density polyethylene external protective coating for pipes and fittings. It is one of a series of Standards that exist as alternatives to the original coal-tar primer/enamel coating system Standards.

The fusion-bonded low-density polyethylene coating referred to in this Standard is to be applied only to external surfaces of pipes and fittings.

Attention is drawn to the fact that this Standard does not purport to satisfy all requirements in Australian Standard pipelines codes. Contracting parties may therefore need to consider further requirements to satisfy contracts invoking Australian Standard pipeline codes.

This edition incorporates Amendment No. 1 as issued in 1984. It also includes a change to the requirement for tensile stress at yield of the coating. This modification was agreed by the Committee to provide a requirement that is more compatible with the known properties of fusion-bonded low-density polyethylene coatings. Other changes to the 1982 edition are of an editorial nature.

As part of the editorial revision, the frequency of testing requirements that were previously a mandatory part of the Standard, have been incorporated into an informative (non-mandatory) appendix. Here they constitute one of a number of choices available to the user who requires information on means of determining compliance of a 'lot' with this Standard.

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STANDARDS AUSTRALIA

Australian Standard

Fusion-bonded low-density polyethylene coating for pipes and fittings

1 SCOPE This Standard specifies requirements for fusion-bonded low-density polyethylene coating of pipes and fittings for protection against corrosion. The coating is intended for use on pipes and fittings that are installed in locations not subject to weather exposure, although a safe period of 18 months of weather exposure is allowed for to cover the storage period prior to installation.

NOTES:

- 1 Advisory information on methods of determining compliance of a 'lot' with this Standard is given in Appendix A.
- 2 Guidelines to purchasers on requirements that are to be specified by the purchaser and those that are to be or may be agreed upon at the time of enquiry or order are given in Appendix B.
- 3 The attention of purchasers is drawn to the necessity to ascertain the expected weathering period of the coating before installation, and in the likelihood of 18 months being exceeded, to make provision for shielding of the coating from direct sunlight.

Polyethylene materials complying with this Standard are intended for application to pipes and fittings where the pipeline operating temperatures are not normally more than +60°C nor less than -40°C.

2 REFERENCED DOCUMENTS The following documents are referred to in this Standard:

AS

1145	Determination of tensile properties of plastics materials
1193	Plastics—Methods for determining the density and relative density of non-cellular plastics
1199	Sampling procedures and tables for inspection by attributes
1327	Standard environments for conditioning and testing plastics materials
1399	Guide to AS 1199—Sampling procedures and tables for inspection by attributes
1463	Polyethylene pipe extrusion compounds
1579	Arc welded steel pipes for water and gas
1580	Paints and related materials—Methods of test
1580.108.1	Method 108.1: Determination of dry film thickness on iron and steel substrates (permanent magnet instruments)
1627	Metal finishing—Preparation and pretreatment of surfaces
1627.2	Part 2: Power tool cleaning
1627.4	Part 4: Abrasive blast cleaning
3862	External fusion-bonded epoxy coating for steel pipes
3900	Quality systems—Guide to selection and use
SAA HB18	Guidelines for third-party certification and accreditation
HB18.44	Guide 44—General rules for ISO or IEC international third-party certification schemes for products

ASTM

D 1693	Test method for environmental stress-cracking of ethylene plastics
G 8	Test method for cathodic disbonding of pipeline coatings

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

3.1 Coating—fusion-bonded low-density polyethylene compound applied externally to pipes and fittings.

3.2 Flaw—any part of the coating not complying with the electrical insulation requirements of this Standard.

3.3 Fusion-bond—the bond produced between the polyethylene and the surface of the pipe or fitting when the polyethylene is applied to the heated pipe or fitting.

3.4 Weather exposure—continuously exposed without protection from direct sunlight and weathering elements.

3.5 Surface preparation—treatment of the pipe or fitting surface to receive polyethylene coating.

4 MATERIAL REQUIREMENTS

4.1 General Material used for the coating system shall comply with the requirements of Clause 4.2, and shall not contain solvents or other additives known to adversely affect polyethylene.

4.2 Polyethylene fusion-bonding compound

4.2.1 Composition The polyethylene compound shall consist of the following components:

- (a) Homopolymers of ethylene or copolymers of ethylene with other olefinic materials.
- (b) One or more antioxidants.

(c) Carbon black of type and concentration complying with AS 1463.

The combination of the above components shall be such as to ensure a fusion-bonded low-density polyethylene coating complying with Clause 6.

4.2.2 Dispersion of ingredients The components listed in Clause 4.2.1(b) and (c) shall be evenly dispersed in the polymer. When the resultant fusion-bonded compound is tested in accordance with AS 1463, it shall display a satisfactory level of carbon black dispersion. The dispersion of antioxidants shall be deemed satisfactory provided that the above condition is complied with.

5 SURFACE PREPARATION AND APPLICATION OF COATING

5.1 Preparation of pipe surface Preparation shall be in accordance with AS 1627.4, Class 21/2. For repair purposes, power wire brushing in accordance with AS 1627.2, minimum of Class 2, may be employed. The pipe shall be heated in such a way so as not to produce any deleterious contaminants on the surface to be coated.

5.2 Application of polyethylene compound Immediately prior to the application of the polyethylene compound, the surface to be coated shall be free of deleterious contaminants and surface defects.

The polyethylene compound shall be applied in such a way as to obtain a smooth outer surface resulting in a coating complying with Clause 6.

If, after being heated, a pipe or fitting is allowed to cool below the coating temperature without being coated, the surface shall be re-prepared by abrasive blast cleaning before being reheated for coating.

5.3 Cleaning of pipe ends The length of pipe that is to be left free of coating shall be thoroughly cleaned by mechanical means.

5.4 End treatment of coating The junction at the ends of the pipe coating and the pipe surface shall be finished as follows:

- (a) Tapered to a feathered edge over a distance not less than 5 times the coating thickness.
- (b) Sealed with lacquer.

6 TEST REQUIREMENTS

6.1 General The fusion-bonded low-density polyethylene protective coating shall be capable of complying with the test requirements specified in Clauses 6.2 to 6.10 inclusive.

NOTE: Apart from the electric flaw detection test, this Clause does not provide for the checking of each pipe coated. Attention is drawn to Appendix A which gives alternative methods of determining compliance with this Standard.

6.2 Thickness When tested using a magnetic thickness gauge complying with AS 1580.108.1, or other suitable measuring equipment, the minimum coating thickness of the fusion-bonded polyethylene shall be as specified in Table 1.

TABLE 1
COATING THICKNESS

Nominal size of pipe DN	Minimum coating thickness mm	
	Normal	Heavy (see Note 2)
≤100	1.8	2.5
>100 ≤250	2.0	2.5
>250 ≤499	2.2	3.0
≥500 ≤749	2.5	3.5
≥750	3.0	3.5

NOTES:

- 1 Refer to AS 1579 for nominal sizes and corresponding outside diameters of uncoated steel pipes for water, sewerage and gas.
- 2 Where additional protection is required (e.g. because of rocky backfill or expansive clays), consideration may be given to specifying the heavy thickness.
- 3 When the specified minimum coating thickness exceeds 45 percent of the pipe wall thickness, the purchaser should consult the applicator.

6.3 Electric flaw detection The total coated surface of every pipe shall be inspected by means of an electric flaw detector in accordance with Appendix D. Flaws shall be repaired in accordance with Clause 7.

6.4 Bond strength When tested in accordance with Appendix E, the coating shall exhibit a resultant minimum bond strength not less than 2.5 N per millimetre width of strip.

If the strip tears prior to disbondment or during disbondment, then the bond strength shall be deemed satisfactory, provided that the tearing strength is greater than 2.5 N per millimetre width of strip.

6.5 Density When determined in accordance with AS 1193 Method A at 23°C on a specimen obtained and prepared in accordance with Appendix C, the density of the coating shall be within the range of 915 kg/m³ to 940 kg/m³.

6.6 Environmental stress-cracking resistance When tested in accordance with Appendix F, the F₅₀ value shall be not less than 3 h.