

Australian Standard[®]

**Electric resistance welded steel pipe for
pressure purposes**



This Australian Standard® was prepared by Committee ME-001, Pressure Equipment. It was approved on behalf of the Council of Standards Australia on 26 September 2005. This Standard was published on 20 October 2005.

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Standards Australia wishes to acknowledge the participation of the expert individuals that contributed to the development of this Standard through their representation on the Committee and through public comment period.

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Australian Standard[®]

Electric resistance welded steel pipe for pressure purposes

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PREFACE

This Standard was prepared by the Australian members of the Joint Standards Australia/Standards New Zealand Committee ME-001, Pressure Equipment.

This Standard incorporates Amendment No. 1 (February 2007). The changes required by the Amendment are indicated in the text by a marginal bar and amendment number against the clause, note, table, figure or part thereof affected.

After consultation with stakeholders in both countries, Standards Australia and Standards New Zealand decided to develop this Standard as an Australian Standard rather than an Australian/New Zealand Standard.

This Standard is a result of consensus among members of Committee ME-001. Consensus means general agreement by all interested parties. Consensus includes an attempt to remove all objections and implies much more than the concept of a simple majority, but not necessarily unanimity. It is consistent with this meaning that a member may be included in the Committee list and yet not be in full agreement with all clauses of this Standard.

This Standard was prepared for the Australian pressure pipe industry using, as a basis, the International Standard ISO 9330-1:1990, *Welded steel tubes for pressure purposes—Technical delivery conditions, Part 1: Unalloyed steel tubes with specified room temperature properties*, wherever possible. The direction conforms to Standards Australia's policy of incorporating ISO Standards within Australian Standards where possible, and to Australian manufacturing policy direction.

The objective of this Standard is to provide manufacturers, suppliers and users with the minimum requirements for the manufacture, inspection and testing of three grades of electric resistance welded (ERW) carbon and carbon manganese steel pipe.

Statements expressed in mandatory terms in notes to tables are deemed to be requirements of this Standard.

The terms 'normative' and 'informative' have been used in this Standard to define the application of the appendix to which they apply. A 'normative' appendix is an integral part of a Standard, whereas an 'informative' appendix is only for information and guidance.

CONTENTS

	<i>Page</i>
1 SCOPE	4
2 APPLICATION	4
3 REFERENCED DOCUMENTS.....	4
4 DEFINITIONS.....	4
5 DESIGNATION.....	5
6 STEELMAKING PROCESS	5
7 MANUFACTURE OF THE PIPE	5
8 FINAL SUPPLY CONDITIONS	6
9 CHEMICAL COMPOSITION	7
10 MECHANICAL PROPERTIES	7
11 VISUAL INSPECTION AND APPEARANCE	9
12 TOLERANCES.....	10
13 NON-DESTRUCTIVE TESTING.....	10
14 SELECTION AND PREPARATION OF SAMPLES AND TEST PIECES.....	10
15 TEST METHODS.....	11
16 ROUNDING OF NUMBERS.....	12
17 PROTECTIVE COATING.....	13
18 MARKING	13

APPENDICES

A	LIST OF REFERENCE DOCUMENTS	14
B	APPLICATION OF PIPE TO THIS STANDARD WITHIN AS 4041 AND AS 4458	16
C	PURCHASING GUIDELINES.....	19
D	MEANS FOR DEMONSTRATING COMPLIANCE WITH THIS STANDARD	20
E	FREQUENCY OF MECHANICAL TESTING	22
F	METHOD FOR VERIFYING GRADE L0 COMPLIANCE OF THIN WALL PIPE	25
G	BASIS FOR ASSESSMENT OF COMPLIANCE OF MECHANICAL PROPERTIES BY STATISTICAL SAMPLING	26

A1

STANDARDS AUSTRALIA

Australian Standard**Electric resistance welded steel pipe for pressure purposes****1 SCOPE**

This Standard specifies requirements for three grades of electric resistance welded (ERW) carbon and carbon manganese steel pipe suitable for some pressure purposes. The three grades are designated as 200L0, 240L0 and 290L0, with an outside diameter up to and including 165.1 mm.

It is intended that material made to this Standard be used in ordinary fluid service where a pipe of higher grade than AS 1074 is desirable. It is suitable for pressure service to Classes 2A, 2P and 3 of AS 4041, and to some other standards.

Where intended for pressure piping or equipment service, requirements and restrictions in the applicable design and application standards apply. AS 4041, AS 1210, and other similar standards impose minimum thickness or other criteria which may preclude the use of some pipes manufactured to the specifications of this Standard. Particular note should be taken of requirements for minimum wall thickness under threads specified in AS 4041, and industry requirements for LP Gas and Anhydrous Ammonia service. Appendix B contains the material properties and design parameters to be applied with this Standard and AS 4041.

NOTES:

- 1 For guidelines on information to be supplied at the time of enquiry or order, see Appendix C.
- 2 Alternative means for verifying compliance with this Standard are given in Appendix D.
- 3 The standard allows for optional hydrostatic testing, at the purchaser's request, where required for certain pressure equipment applications.

2 APPLICATION

This Standard is intended as a manufacturing specification for use by manufacturers and users of pressure piping.

3 REFERENCED DOCUMENTS

A list of documents referred to in this Standard is given in Appendix A.

4 DEFINITIONS

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

4.1 Batch

A group of pipes of the same size, thickness and grade, not exceeding 50 tonnes in mass, produced during a production run.

4.2 Cast analysis

Chemical analysis determined from a sample taken during casting.

4.3 Fine grained

A steel of AS 1733 austenitic grain size 7 or finer with the proviso that, should the total aluminium plus titanium content of the steel be 0.015% or greater, the steel is deemed 'fine grained'.

4.4 Longitudinal direction

Direction parallel to the longitudinal weld.

4.5 May

Indicates the existence of an option.

4.6 Outside diameter and thickness

The nominal outside diameter and nominal thickness unless otherwise qualified in the text.

4.7 Pipe, high frequency electric resistance welded

Pipe having a longitudinal seam joint wherein coalescence is produced by the heat obtained from resistance of the steel to the flow of high frequency electric current in a circuit of which the pipe is a part, and by the application of pressure.

NOTE: It is intended that induction welded pipe is included in this definition.

4.8 Product analysis

Chemical analysis determined from a test taken from the finished pipe.

4.9 Shall

Indicates that a statement is mandatory.

4.10 Should

Indicates a recommendation.

4.11 Transverse direction

Direction at right angles to the longitudinal weld.

5 DESIGNATION

All grades shall be designated as follows:

- (a) The number of this Standard, i.e. AS 4728.
- (b) A 3-digit number, YYY, representing the minimum yield strength of the steel (R_e) as specified in Table 3.
- (c) 'L0' signifying the guaranteed impact property at a test temperature 0°C.

NOTE: The combination of (b) and (c), YYYYL0 represents the steel grade.

Example: AS 4728-YYYYL0.

6 STEELMAKING PROCESS

6.1 Steelmaking process

The steel shall be produced by an electric process or one of the basic oxygen processes.

6.2 Deoxidation

The steel shall be made to a fully killed fine grain practice. The steel shall be produced by the continuous casting practice and shall be either aluminium or silicon-aluminium killed.

7 MANUFACTURE OF THE PIPE

The pipe shall be manufactured by the high frequency electric resistance weld method.

8 FINAL SUPPLY CONDITIONS

8.1 General

The electric resistance welded pipe shall be supplied in the as-rolled, as-welded condition, without weld zone heat treatment.

8.2 Standard pipe supply

The dimensions of standard electric resistance welded pipe that can be supplied shall be as set out in Table 1, subject to tolerances specified in Clause 12.

TABLE 1
DIMENSIONS OF STANDARD PIPE

Nominal bore size DN	Class	Nominal thickness mm	Nominal outside diameter, mm
20	Extra light	2.0	26.9
	Light	2.3	
	Medium	2.6	
	Heavy	3.2	
25	Extra light	2.0	33.7
	Light	2.6	
	Medium	3.2	
	Heavy	4.0	
32	Extra light	2.0	42.4
	Light	2.6	
	Medium	3.2	
	Heavy	4.0	
40	Extra light	2.3	48.3
	Light	2.9	
	Medium	3.2	
	Heavy	4.0	
50	Extra light	2.3	60.3
	Light	2.9	
	Medium	3.6	
	Heavy	4.5	
65	Extra light	2.3	76.1
	Light	3.2	
	Medium	3.6	
	Heavy	4.5	
80	Extra light	2.6	88.9
	Light	3.2	
	Medium	4.0	
	Heavy	5.0	

(continued)

TABLE 1 (continued)

Nominal bore size DN	Class	Nominal thickness mm	Nominal outside diameter, mm
90	Extra light	2.6	101.6
	Light	3.2	
	Medium	4.0	
	Heavy	5.0	
100	Sch 10	3.05	114.3
	Extra light	3.2	
	Light	3.6	
	Medium	4.5	
	Heavy	5.4	
125	Light	3.5	139.7
	Medium	5.0	
	Heavy	5.4	
150	Sch 10	3.4	165.1
	Extra light	3.0	
	Light	3.5	
	Medium	5.0	
	Heavy	5.4	

NOTE: The above are standard dimensions. Where other dimensions are required, the supplier should be contacted.

9 CHEMICAL COMPOSITION

9.1 General

The method of sampling for chemical analysis shall be in accordance with AS/NZS 1050 (series). Chemical composition shall be determined in accordance with AS/NZS 1050 (series).

9.2 Heat or product chemical analysis

A chemical analysis of the steel from each heat shall be made to determine the proportions of the specified elements.

The reported heat or product analysis of the steel from which a pipe is manufactured shall conform to the limits specified in Table 2 for the appropriate grade.

10 MECHANICAL PROPERTIES

10.1 General

Test pieces shall be in same condition as the sections that they represent.

10.2 Tensile test

Tensile properties, at room temperature*, shall comply with Table 3, and shall be obtained from test pieces selected, prepared and tested in accordance with Clauses 14 and 15.

* In cases of dispute, room temperature is to be taken as $20 \pm 5^\circ\text{C}$.

TABLE 2
CHEMICAL COMPOSITION

Grade (see Note 2)	Chemical composition (heat or product analysis) % max.								
	C	Si	Mn	P	S	Al (see Note 3)	Ti	Micro- alloying elements	CE (see Note 4)
200L0	0.12	0.05	0.50	0.040	0.030	0.10	0.04	0.03 (see Note 5)	0.25
240L0	0.20	0.45	1.60	0.040	0.030	0.10	—	0.15 (see Note 6)	0.39
290L0	0.20	0.45	1.80	0.040	0.030	0.10	—	0.15 (see Note 6)	0.39

NOTES:

- The use of sulfide modification steelmaking techniques are permitted.
- The following elements may be present to the limits stated, subject to a total content of 0.3 percent:
 - Copper: 0.15%
 - Nickel: 0.15%
 - Chromium: 0.15%.
- Limits specified for total aluminium.
- Carbon equivalent (CE)% = $C + (Mn/6) + ((Cr+Mo+V)/5) + ((Cu+Ni)/15)$.
- Applies to niobium and vanadium only. However, niobium greater than 0.010 percent is not permitted.
- Applies to niobium, vanadium and titanium only. However, vanadium greater than 0.10 percent is not permitted.

TABLE 3
TENSILE TEST REQUIREMENTS

Grade	Minimum yield strength	Minimum tensile strength	Minimum elongation as a proportion of gauge length of $5.65(S_0)^{0.5}$
	MPa	MPa	%
200L0	200	320	18
240L0	240	380	15
290L0	290	415	15

NOTES:

- The values of elongation given in Table 3 shall not be applied to pipe whose nominal diameter is DN 25 (33.7 mm outside diameter) or smaller. However, the value of the elongation shall be recorded.
- S_0 = original cross-sectional area of the test piece within the gauge length, in mm².

10.3 Impact test

When tested in accordance with Clause 15, the absorbed energy value resulting from each individual test, and the average of three tests, shall conform to the specified values given in Table 4 for the appropriate grade and size of test piece.