AS 2470—1981
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Australian Standard 2470—1981

STEEL CYLINDERS FOR COMPRESSED GASES—WELDED—11 kg TO 150 kg

STANDARDS ASSOCIATION OF AUSTRALIA
Incorporated by Royal Charter

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THE FOLLOWING SCIENTIFIC, INDUSTRIAL AND GOVERNMENTAL ORGANIZATIONS and departments were officially represented on the committee entrusted with the preparation of this standard:

Aluminium Development Council

Australasian Steamship Owners Federation

Australian Chamber of Commerce

Australian Liquefied Petroleum Gas Association

Australian Underwater Federation

Bureau of Steel Manufacturers of Australia

Confederation of Australian Industry

Department of the Capital Territory

Department of Defence

Department of Industrial Affairs and Employment, S.A.

Department of Industrial Relations, N.S.W.

Department of Labour and Industry, Vic.

Department of Labour and Industry, W.A.

Department of Labour and Industry, Tas.

Department of Labour Relations, Qld

Department of Mines, Qld

Department of Mines and Energy, N.T.

Insurance Council of Australia

Railways of Australia Committee

This standard, prepared by Committee ME/2, Gas Cylinders, was approved on behalf of the Council of the Standards Association of Australia on 6 April 1981, and was published on 1 July 1981.

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Amendment No 1
to
AS 2470—1981
STEEL CYLINDERS FOR COMPRESSED GASES—WELDED—11 kg to 150 kg

CORRECTIONS

SUMMARY: This amendment applies to Clauses 4.1.1 and 7.1.1.

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STEEL CYLINDERS FOR COMPRESSED GASES—WELDED—11 kg TO 150 kg

AS 2470—1981

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PREFACE

This standard is one of three prepared by the Association's Committee on Gas Cylinders to provide (in part) metric standards for gas cylinders previously covered by AS B115 and AS B239. The other two are AS 2468, Steel Cylinders for Compressed Gases—Brazed—0.1 kg to 11 kg (part revision of AS B115—1966), and AS 2469, Steel Cylinders for Compressed Gases—Welded—0.1 kg to 11 kg (part revision of AS B115—1966).

Welded cylinders of greater than 150 kg are not yet catered for by these standards, and AS B115 will be retained for this purpose. In any case, AS B115 and AS B239 will be retained for reference purposes for cylinders already manufactured and in use, until such time as that requirement no longer exists.

A significant change is that specific grades of steel are not listed, but instead the design is based on a relationship of permissible stress to yield strength, with a maximum permissible stress being set for calculation purposes. The minimum elongation has been specified as nominally 20 percent, but this may be reduced to a minimum of 16 percent for materials of certain higher tensile strengths.

Another departure from AS B239 and AS B115 is to acknowledge that welding of gas cylinders is now normally a mechanized operation, and so the previous qualification and inspection applicable to manual welding do not apply unless manual welding is employed.

Pressure testing requirements differ from those specified in AS B239 and AS B115 in that, although a proof test is required for every cylinder, a stretch test is required only for 1 per 200, or batch if less than 200.

The proportions of bosses used for threaded attachments have been made less conservative and follow more closely the proportions given in BS 3799, Steel Pipe Fittings, Screwed and Socket-welding for the Petroleum Industry.

This standard makes reference to the following standards:

AS 1210	SAA Unfired Pressure Vessels Code
AS 1391	Methods for Tensile Testing of Metals
AS 1425	The Use of LP Gas in Internal Combustion Engines
AS 1594*	Hot-rolled Unalloyed Low Carbon Steel Sheet and Strip (see DR 80171)
AS 1595*	Cold-rolled Unalloyed Low Carbon Steel Sheet and Strip (see DR 80172)
AS 1596	SAA LP Gas Code
AS 1627	Code of Practice for Preparation and Pretreatment of Metal Surfaces Prior to Protective Coating Part 4—Abrasive Blast Cleaning of Steel Surfaces
AS 1650	Galvanized Coatings
AS 1721	General Purpose Metric Screw Threads
AS 1722	Pipe Threads of Whitworth Form Part 1 -Sealing Pipe Threads
AS 1750	Steel Sections and Bars for Boilers and Unfired Pressure Vessels (Other Than Bolting Material)
AS 2030	SAA Gas Cylinders Code
AS 2105	Inorganic Zinc Silicate Paint
AS 2177	Radiography of Welded Butt Joints in Metal Products Part 1—Methods of Test Part 2—Image Quality Indicators (IQI) and Recommendations for Their Use
AS 2205	Methods of Destructive Testing of Welds in Metal Part 2.1— Tensile Tests—Transverse Butt Tensile Test Part 2.3 · Tensile Tests Transverse Joggle-butt Tensile Test Part 3.1 Bend Tests ··Transverse Guided Bend Test Part 3.3— Bend Tests—Longitudinal Guided Bend Test Part 3.4 · Bend Tests ·Transverse Joggle-butt Wrap-around Bend Test
AS 2337	Gas Cylinder Test Stations
BS 2569	Sprayed Metal Coatings Part 1 ··Protection of Iron and Steel by Aluminium and Zinc Against Atmospheric Corrosion
BS 2937	General Requirements for Seam Welding in Mild Steel
ANSI B57.1	Compressed Gas Cylinder Valve Outlet and Inlet Connections

*In course of revision.

CONTENTS

Page 4. Clause 4.1.1. AMD No 1 FEB 1983

Alter first sentence to read:

The thickness shall be not less than the greater of those calculated from the following formulas, but in any case shall be not less than 1.75 mm:

STANDARDS ASSOCIATION OF AUSTRALIA

Australian Standard
for
STEEL CYLINDERS FOR COMPRESSED GASES—WELDED—11 kg TO 150 kg

1 SCOPE. This standard specifies requirements for welded steel cylinders of water capacity 11 kg and greater but less than 150 kg, which have test pressures from 1750 kPa to 7000 kPa and intended for the storage and transport of compressed gases in accordance with AS 2030.

NOTE: Appendix B lists the suggested minimum information that should be supplied by the purchaser when ordering gas cylinders to this standard.

2 DEFINITIONS. For the purpose of this standard the definitions in AS 2030 and the following definition apply:

Inspector—a person, acceptable to the Inspecting Authority, who ensures and certifies that all the inspections specified herein have been carried out and that the cylinders comply with all the requirements of this standard.

3 STEEL.

3.1 Cylindrical Section and Ends. The steel for the cylindrical section and ends shall be manufactured by an open hearth, basic oxygen, or electric process, and shall be of weldable quality. The chemical composition shall comply with Table 1.

TABLE 1
CHEMICAL COMPOSITION

1	2
Element	Ladle analysis percent max.
Carbon	0.25
Manganese	1.70
Silicon	0.40
Micro-alloying elements	0.15
Sulphur	0.050
Phosphorus	0.050
Iron	Remainder

Steel to AS 1594 and AS 1595 may be suitable, but rimmed steels shall not be used for this application.

NOTE: AS 1594 and AS 1595 include rimmed steels, but such steels are not suitable for welding because of problems associated with welding of the slit edge.

The steel shall achieve the strength values used in the formulas in Clause 4 and determined in accordance with Clause 7.

When determined in accordance with Clause 7.1.2, the elongation shall be not less than 20 percent minus 1 percentage unit for each increment of 50 MPa by which the measured tensile strength exceeds 350 MPa, but shall in any case be not less than 16 percent.

If resistance welded attachments are to be added to the cylinder, the maximum carbon content of the steel shall not be greater than 0.15 percent.

3.2 Attachments.

3.2.1 *Pressure-retaining attachments.* Pressure-retaining attachments shall be of steel complying with Clause 3.1 or AS 1750.

3.2.2 *Non-pressure-retaining attachments.* Non-pressure-retaining attachments shall be of steel complying with Clause 3.1 or the following, as appropriate:

(a) For arc welded attachments, steel shall be weldable and with a maximum carbon content of 0.25 percent.

(b) For resistance welded attachments, steel shall be weldable and with a maximum carbon content of 0.15 percent.

4 DESIGN AND CONSTRUCTION.

4.1 Minimum Thickness of Cylindrical Section.

4.1.1 *Cylinders of 150 mm and greater outside diameter.* ~~The thickness shall be not less than the greater of those calculated from the following formulas~~ SEE AMENDMENTS No 1

$$t = 2.5\sqrt{\frac{D_i}{T}} \quad \text{and} \quad t = \frac{P_h D}{2000fJ + P_h}$$

where

t = minimum finished thickness of the cylinder, in millimetres

D = external diameter, in millimetres

D_i = nominal internal diameter, in millimetres

P_h = test pressure (see Rule 1.9.6 of AS 2030), in kilopascals

f = maximum permissible stress, to be taken as 90 percent of the specified minimum yield strength of the steel, but not exceeding 60 percent of the minimum specified tensile strength of the steel, in megapascals. For calculation purposes, a maximum value for f of 320 MPa shall apply

T = specified minimum tensile strength of the steel, in megapascals.

NOTE: T refers to minimum tensile strength verified by tests in Clause 7, i.e. following heat treatment.

J = joint factor, being the appropriate value given below, and which is substantiated in accordance with Clause 5.2:

= 0.75 where cylinders are constructed with a longitudinal joint and no radiography is carried out

= 0.90 where one cylinder from each 50 (or part thereof) consecutively welded cylinders and one cylinder from the first 5 cylinders welded following a shut-down of welding operations exceeding 4 h are spot radiographed at each intersection of