AS 4838—2002
ISO 11439:2000

Australian Standard™

Gas cylinders—High pressure cylinders for the on-board storage of natural gas as a fuel for automotive vehicles

Standards Australia

This Australian Standard was prepared by Committee ME-002, Gas Cylinders. It was approved on behalf of the Council of Standards Australia on 29 November 2002 and published on 20 December 2002.

The following are represented on Committee ME-002:

Air Conditioning and Refrigeration Wholesalers Association
Australasian Institute of Engineer Surveyors
Australasian Railway Association
Australian Chamber of Commerce and Industry
The Australian Gas Association
Australian Industry Group
Australian Liquefied Petroleum Gas Association
Boiler and Pressure Vessel Manufacturers Association of Australia
Bureau of Steel Manufacturers of Australia
Certification Bodies (Australia)
Department for Administrative and Information Services, S.A.
Department of Defence (Australia)
Department of Industrial Relations, Qld
Department of Labour New Zealand
Department of Natural Resources and Mines, Qld
Fire Protection Association Australia
Institute of Materials Engineering Australasia
Institution of Engineers Australia
International Accreditation New Zealand
New Zealand Heavy Engineering Research Association
Victorian WorkCover Authority
Welding Technology Institute of Australia
WorkCover New South Wales

Keeping Standards up-to-date

Standards are living documents which reflect progress in science, technology and systems. To maintain their currency, all Standards are periodically reviewed, and new editions are published. Between editions, amendments may be issued. Standards may also be withdrawn. It is important that readers assure themselves they are using a current Standard, which should include any amendments which may have been published since the Standard was purchased.

Detailed information about Standards can be found by visiting the Standards Australia web site at www.standards.com.au and looking up the relevant Standard in the on-line catalogue.

Alternatively, the printed Catalogue provides information current at 1 January each year, and the monthly magazine, *The Australian Standard*, has a full listing of revisions and amendments published each month.

We also welcome suggestions for improvement in our Standards, and especially encourage readers to notify us immediately of any apparent inaccuracies or ambiguities. Contact us via email at mail@standards.com.au, or write to the Chief Executive, Standards Australia International Ltd, GPO Box 5420, Sydney, NSW 2001.

This Standard was issued in draft form for comment as DR 02113.

Australian Standard™

Gas cylinders—High pressure cylinders for the on-board storage of natural gas as a fuel for automotive vehicles

First published as AS 4838—2002.

Published by Standards Australia International Ltd
GPO Box 5420, Sydney, NSW 2001, Australia

ISBN 0 7337 4946 1

PREFACE

This Standard was prepared by the Standards Australia members of the Joint Standards Australia/Standards New Zealand Committee ME-002, Gas Cylinders as a new Standard. After consultation with stakeholders in both countries, Standards Australia and Standards New Zealand decided to develop this Standard as an Australian, rather than an Australian/New Zealand Standard.

This Standard is identical with and has been reproduced from ISO 11439:2000, *Gas cylinders—High pressure cylinders for the on-board storage of natural gas as a fuel for automotive vehicles.*

The objective of this Standard is to provide manufacturers with the material details and requirements for these types of cylinders, together with details of installation and maintenance for the end users.

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

Notes expressed in mandatory terms in footnotes to tables and within tables are deemed to be requirements of this Standard.

As this Standard is reproduced from an International Standard, the following applies:

(a) Its number appears on the cover and title page while the International Standard number appears only on the cover.

(b) In the source text, 'this International Standard' should read 'this Australian Standard.'

(c) A full point substitutes for a comma when referring to a decimal marker.

References to International Standards should be replaced by references to Australian Standards as follows:

Reference International Standard		*Australian Standard*	
ISO		AS	
306	Plastics—Thermoplastic materials—Determination of Vicat softening temperature (VST)	1368	Plastics—Thermoplastic materials—Determination of Vicat softening temperature (VST)
527	Plastics—Determination of tensile properties	1145	Determination of tensile properties of plastics materials
527-2	Part 2: Test conditions for moulding and extrusion plastics	1145.2	Part 2: Test conditions for moulding and extrusion plastics

NOTE: Only international references identical to Australian or Australian/New Zealand Standards have been listed. None of the other normative references in the source document has been adopted as an Australian or Australian/New Zealand Standard.

CONTENTS

INTRODUCTION

Cylinders for the on-board storage of fuel for natural gas vehicle service are required to be light-weight, at the same time maintaining or improving on the level of safety currently existing for other pressure vessels. These requirements are achieved by:

a) specifying service conditions precisely and comprehensively as a firm basis for both cylinder design and use;

b) using an appropriate method to assess cyclic pressure fatigue life and to establish allowable defect sizes in metal cylinders or liners;

c) requiring design qualification tests;

d) requiring non-destructive testing and inspection of all production cylinders;

e) requiring destructive tests on cylinders and cylinder material taken from each batch of cylinders produced;

f) requiring manufacturers to have a comprehensive quality system documented and implemented;

g) requiring periodic re-inspection and, if necessary, retesting in accordance with the manufacturer's instructions;

h) requiring manufacturers to specify as part of their design, the safe service life of their cylinders.

Cylinder designs that meet the requirements of this International Standard:

a) will have a fatigue life which exceeds the specified service life;

b) when pressure cycled to failure, will leak but not rupture;

c) when subject to hydrostatic burst tests, will have factors of "stress at burst pressure" over "stress at working pressure" that exceed the values specified for the type of design and the materials used.

Owners or users of cylinders designed to this International Standard should note that the cylinders are designed to operate safely if used in accordance with specified service conditions for a specified finite service life only. The expiry date is marked on each cylinder and it is the responsibility of owners and users to ensure that cylinders are not used after that date, and that they are inspected in accordance with the manufacturer's instructions.

AUSTRALIAN STANDARD

Gas cylinders — High pressure cylinders for the on-board storage of natural gas as a fuel for automotive vehicles

1 Scope

This International Standard specifies minimum requirements for serially produced light-weight refillable gas cylinders intended only for the on-board storage of high pressure compressed natural gas as a fuel for automotive vehicles to which the cylinders are to be fixed. The service conditions do not cover external loadings which may arise from vehicle collisions, etc.

This International Standard covers cylinders of any steel, aluminium or non-metallic material construction, using any design or method of manufacture suitable for the specified service conditions. This International Standard does not cover cylinders of stainless steel or of welded construction.

Cylinders covered by this International Standard are designated as follows:

CNG-1 Metal

CNG-2 Metal liner reinforced with resin impregnated continuous filament (hoop wrapped)

CNG-3 Metal liner reinforced with resin impregnated continuous filament (fully wrapped)

CNG-4 Resin impregnated continuous filament with a non-metallic liner (all composite)

NOTE Cylinders designed in accordance with ISO 9809-1, ISO 9809-2, ISO 9809-3 and ISO 7866 can be used for this service provided these designs meet additional requirements as specified in this International Standard.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this International Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO 148:1983, *Steel — Charpy impact test (V-notch)*.

ISO 306:1994, *Plastics — Thermoplastic materials — Determination of Vicat softening temperature (VST)*.

ISO 527-2:1993, *Plastics — Determination of tensile properties — Part 2: Test conditions for moulding and extrusion plastics (incorporating Technical Corrigendum 1:1994)*.

ISO 2808:1997, *Paints and varnishes — Determination of film thickness*.