DR 98245

AS 1425—1989

1995 ed.

Australian Standard®

# SAA Automotive LP Gas Code

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STANDARDS AUSTRALIA

This Australian Standard was prepared by Committee ME/46, Gas Fuel Systems for Vehicle Engines. It was approved on behalf of the Council of Standards Australia on 2 December 1989 and published on 13 March 1989.

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The following interests are represented on Committee ME/46:

Australian Automobile Association

Australian Automobile Chamber of Commerce

Australian Gas Association

Australian Liquefied Petroleum Gas Association

Australian Road Transport Federation

Australian Taxi Industry Association

Boiler and Pressure Vessel Manufacturers Association of Australia

Box Hill College of Technical and Further Education

Confederation of Australian Industry

Country Fire Authority, Vic.

Department of Transport, S.A.

Department of Industrial Relations and Employment, N.S.W.

Department of Labour, S.A.

Department of Labour, Vic.

Department of Mines, Qld

Department of Primary Industries and Energy

Department of the Arts, Sport, the Environment, Tourism and Territories

Department of Transport and Communications

Federal Chamber of Automotive Industries

Institution of Engineers, Australia

Insurance Council of Australia

Licensed Autogas Installers Society, N.S.W.

Metal Trades Industry Association of Australia

Metropolitan Fire Brigades Board, Melbourne

Motor Traders Association of New South Wales

Road Traffic Authority, Vic.

State Energy Commission, W.A.

Victoria Police

Work Health Authority, N.T.

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Memo to:

From:

Date: 28-5-1992

File No:

Standards Association of Australia

Re: AS 1425

As of the 1st JANUARY 1993 the 'Automotive Alternative Fuels Registration Board' will require that:

a) that all businesses that install LPG tanks will need to be registered.

and b) that any servicemen who need to break open the gas line must be accredited.

* There will be training, plates issued to registered businesses and interstate recognition.
* The 'Automotive Alternative Fuels Registration Board' consists of representatives from the RACV, VICROADS, VACC, RAME, ALPGA, and the VBEF.
* Contact: Noel Roberts - RACV (790-2211) for any further enquiries.

ROYALAUTO JUNE 1992.

# LPG's FUTURE

The future of automotive LPG as a viable alternative fuel has been secured with the introduction of a sound industry regulation scheme.

The establishment of an Automotive Alternative Fuels Registration Board (AAFRB) is widely regarded as a long overdue initiative for Victoria.

Under the new regulations, which will be operational from January 1 next year, conversions of motor vehicles to run on LPG will only be carried out by registered businesses employing accredited staff.

The mechanism ensures that the required standards are met and consumers protected.

Provided conversions are professionally completed and maintained, LPG is a very safe fuel.

The new AAFRB comprises representatives from the Victorian Automobile Chamber of Commerce, Vic Roads, the Royal Automobile Club of Victoria, the Australian Liquefied Petroleum Gas Association, the Institute of Automotive Mechanical Engineers and the Vehicle Builders Employees Federation.

The board will accredit individuals and register businesses undertaking conversions or repairs which comply with a code of practice.

It will also set standards, accredit training courses, promote safe work practices and monitor the industry.

For more information, contact the AAFRB secretariat at the VACC on (03) 829 1111.□

AMDT No. 3 DEC. 1993

**Page 16 Clause 4.3.5**

*Delete* Clause 4.3.5 and *substitute* the following:

**4.3.5 Test of fuel control systems** A test shall be made to ensure that the automatic fuel shut-off device(s) and the dual-fuel selector are functioning correctly.

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AMDT No. 3 DEC. 1993

**Page 16 Clause 4.3.7**

*Delete* the existing Clause 4.3.7.

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AMDT No. 3 DEC. 1993

**Page 17 Clause 5.2**

*Delete* Item (g) and Note and *substitute* the following:

(g) *Fuel containment system* Test as described in (i) or (ii) below depending upon the type of system fitted at the container.

(i) *Automatic fuel shut-off device* Deactivate automatic fuel shut-off device at the container and run the engine until the service line is empty and the engine stops.

NOTE: If an automatic fuel shut-off device is fitted at the container there is no requirement to test the excess-flow valve.

(ii) *Excess-flow valve* Shut off the service valve and run the engine until the service line is empty. It may be necessary to attempt to restart the engine after another half minute or so, to ensure that all residual LP Gas has been cleared. Open the service valve and listen for the sound of the excess-flow valve operating. If it is not closed, close the service valve, disconnect the service line at the engine end, and recheck the excess-flow valve.

NOTE: If the service line is to be disconnected, first remove the battery and take steps to ensure that discharging gas does not become a hazard.

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AMDT No. 3 DEC. 1993

**Page 18 Clause 5.2**

*Delete* Item (h) and *substitute* the following:

(h) *Test of fuel control systems* Check that the automatic fuel shut-off device(s) and the dual-fuel selector are present and functioning correctly.

NOTE: Where an automatic fuel shut-off device is not installed at the container, retrofitting is to be encouraged.

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AMDT No. 3 DEC. 1993

**Page 8 Clause 3.3.2**

*Add* the following new Item and paragraphs:

(i) Automatic fuel shut-off device.

The requirement for an automatic fuel shut-off device at the container becomes part of the Standard on 1 January 1994.

Retrofitting of the automatic fuel shut-off device should be encouraged whenever an LP Gas system inspection is undertaken.

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AMDT No. 3 DEC. 1993

**Page 8 Clause 3.3.4**

*Add* the following to Item (a):

An automatic fuel shut-off device may incorporate a fitting between it and the manual service valve. In all cases the automatic fuel shut-off device shall be located in a protected position. Where vehicles are fitted with containers manufactured prior to 1 January 1994 as indicated by the test date marked on the container and the automatic fuel shut-off device cannot be accommodated in the compartment or valve sub-compartment as required in Clause 3.6.1, the automatic fuel shut-off device may be located outside the compartment or sub-compartment provided it is as close as practical to the service valve and under no circumstances more than 1 m from the service valve outlet point, and is located in a sub-compartment.

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AMDT No. 3 DEC. 1993

**Page 9 Clause 3.4.7**

*Add* the following new paragraphs:

Any alteration(s) made to a vehicle's original equipment or the engine's fuel management system shall not adversely affect the original manufacturer's design, safety level and performance when operating on the fuel for which it was designed.

Where a vehicle was originally designed to operate with a closed loop engine management system, a LP Gas closed loop management system shall be installed that results in exhaust emission levels for LP Gas operation that are not inferior to the levels produced by the original vehicle system.

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AMDT No. 3 DEC. 1993

**Page 15 Clause 4.2.3**

*Add* the following new paragraphs:

This test may be carried out with the fittings downstream of the service valve removed.

Where an automatic fuel shut-off device is integral with the excess-flow valve and service valve, fittings downstream of this combined valve may be removed for the excess-flow valve test.

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AMDT No. 3 DEC. 1993

**Page 15 Clause 4.2.4**

*Add* the following new Clause 4.2.4:

**4.2.4 Testing of shut-off device** The automatic fuel shut-off device at the container shall be tested for leakage in the unpowered condition.

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STANDARDS AUSTRALIA

# Amendment No. 3
# to
# AS 1425—1989
# LP gas fuel systems for vehicle engines
# (known as the SAA Automotive LP Gas Code)

**REVISED TEXT**

The 1989 edition of AS 1425 is amended as follows; the amendments should be inserted in the appropriate place.

*SUMMARY*: This Amendment applies to Clauses 2.17, 3.3.2, 3.3.4(a), 3.4.7. 4.2.3, 4.2.4, 4.3.5, 4.3.7, 5.2(g) and 5.2(h).

Published on 13 December 1993.

AMDT No. 3 DEC. 1993

## Page 7 Clause 2.17

*Delete* all text and *substitute* the following:

**2.17 AUTOMATIC FUEL SHUT-OFF DEVICES** Automatic fuel shut-off devices shall automatically act to prevent the flow of liquid to the service line and the vapourizer unless the following conditions are simultaneously satisfied:

(a) The ignition is on.

(b) The engine is turning.

Automatic fuel shut-off devices may be permitted to open for a period of up to 3 s when the ignition is first turned on, so as to allow priming of the fuel system.

Automatic fuel shut-off devices shall have a reflux (backflow opening) pressure of 0.275 MPa maximum. Care shall be taken with the fitting of automatic fuel shut-off devices to ensure correct direction of flow.

The automatic fuel shut-off device at the container shall be of the electrically encapsulated type with electrical terminals located outside of the compartment or sub-compartment.

Wiring circuits electronics and terminals provided for activation of the automatic fuel shut-off device shall be protected so as to minimize the possibility of the control/safety shutdown feature being overridden. This protection shall be achieved by the routing of wiring away from potential voltage sources or by the incorporation of backfeed protection in the circuitry.

NOTE: This requirement does not preclude the use of combination modules comprising dual fuel selector/safety switch/fuel gauge units.

The automatic fuel shut-off device shall not be activated by switching to earth.

ISBN 0 7262 8692 3

STANDARDS AUSTRALIA

# Amendment No 2
# to
# AS 1425—1989
# LP gas fuel systems for vehicle engines (known as the SAA Automotive LP Gas Code)

**REVISED TEXT**

The 1989 edition of AS 1425 is amended as follows; the amendment should be inserted in the appropriate place.

*SUMMARY*: This Amendment applies to Clause 5.2.

Published on 4 March 1991.

AMDT No 2 MAR. 1991

**Page 17 Clause 5.2**

*Delete* the introductory paragraph, and item (b), and *substitute*:

**5.2 ROUTINE SYSTEM CHECK** The following checks shall be carried out at least annually, and at every roadworthiness examination for the renewal of vehicle registration, or as otherwise specified by the Authority.

(b) *Fuel container life* Check the container date stamp. If it will be more than ten years old before the next periodic vehicle inspection, initiate the procedures for reinspection and restamping in accordance with AS 2337.2.

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STANDARDS AUSTRALIA

# Amendment No 1
# to
# AS 1425—1989
# Automotive LP gas code

**REVISED TEXT**

The 1989 edition of AS 1425 is amended as follows; the amendment(s) should be inserted in the appropriate place.

*SUMMARY*: This Amendment applies to Clauses 3.8.4(e) and 5.2.

Published on 6 August 1990.

AMDT No 1 AUG 1990

**Page 12 Clause 3.8.4(e)**

*Delete* the third line and *substitute:*

against ground impact when one or more of the following conditions exist:

AMDT No 1 AUG 1990

**Page 17 Clause 5.2(c)**

*Delete* existing Clause and *substitute:*

(v) Fire damage.

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AS 1425—1989

Australian Standard®

# LP gas fuel systems for vehicle engines

# (known as the SAA Automotive LP Gas Code)

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Second edition 1979.
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Fourth edition 1989.

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1 THE CRESCENT, HOMEBUSH, NSW 2140

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# PREFACE

This edition of this Standard was prepared by the Standards Australia Committee on Gas Fuel Systems for Vehicle Engines, to supersede AS 1425—1982.

The first edition, published in 1973, had been derived in the main from NFPA 58. A revision in 1979 introduced compartments and sub-compartments to control random leakage, required external filling points, and upgraded the strength of mountings, amongst other things. An amendment in October 1980 introduced automatic fill limiters, and a second in 1981 virtually eliminated the hydrostatic relief valve.

The 1982 edition was generally a consolidation, in which editorial presentation was improved and a number of adjustments of detail occurred, the most significant of which was that attempts to make the excess flow valve more sensitive were abandoned in the face of experiences with inadvertent shut-off of fuel to the engine. Amendment 1 of May 1984 corrected and clarified minor detail. Amendment 2 of December 1985, besides further polishing detail, upgraded a number of requirements related to the security of a container and its fittings in a collision.

Amendment 3 of July 1987 permitted safety valves to discharge into a sub-compartment or compartment. This represented a major reversal of the previous policy of insistence on piping such discharges to exit vertically outside the vehicle. The reason for the change of view was that an investigation into a tank failure had indicated that the 'pipe away' system, and particularly the elbow fitting screwed into the safety valve to connect the piping, could interfere with the function of the valve and with gas flow from it, and more importantly the degree of interference was not predictable. While it was known that most countries permitted discharge into the sub-compartment, apparently successfully, there remained reservations about the dangers to bystanders from such discharges. A series of fire tests on actual vehicles dispelled these concerns, and the alternative of internal discharge was allowed.

In this edition, the previous amendments have been consolidated and further alterations have been made, as follows:

(a) Arising from the publication of a new Standard (AS 3509, *LP gas fuel vessels for automotive use*), a few requirements that are covered by it were removed from AS 1425, and a few additional installation requirements relating to container security were added, at the request of the committee responsible for AS 3509.

(b) Routine reinspection from time to time, and in particular the recertification of the fuel vessels at intervals, is a developing subject and some aspects of Section 5 have been upgraded, in particular to emphasize inspection for damage and deterioration.

(c) A fixed liquid level gauge is no longer mandatory. Since the advent of the automatic fill limiter (AFL), its only function has been to check that the AFL is present and functioning. A dispenser meter does this better, and a survey revealed that the ullage gauge now had no useful function.

(d) Some requirements, warning notes, and illustrations have been added to deal with container tank mounting and anchoring.

(e) The minimum area for ventilation ducts has been reduced from 1000 $mm^2$ to 500 $mm^2$ as the result of a review of the consequences of all possible events.

(f) Requirements dealing with the suitability of material used to make vent conduits have been amended following a series of physical tests.

(g) Requirements for heat shielding and for the prevention of dry-out of petrol systems have been elaborated.

# CONTENTS

STANDARDS AUSTRALIA

# Australian Standard
# LP gas fuel systems for vehicle engines

## SECTION 1. SCOPE AND GENERAL

**1.1 SCOPE.** This Standard specifies requirements for liquefied petroleum gas (LPG) fuel systems for engines mounted on motor vehicles, either for the propulsion of the vehicles or for driving some auxiliary function, e.g. a mixer or a pump. It provides requirements for the design and construction of component parts, and for their installation in vehicles, and for testing, commissioning, and periodic inspection. The Standard may be applied to stationary engines and small engine-powered appliances such as floor sweepers, polishers, trolleys, etc, where it is relevant. It does not apply to other LPG usage, e.g. the gas supply system for appliances in caravans.

**1.2 REFERENCED DOCUMENTS.** A list with titles of the Standards referred to in this Standard is given in Appendix B.

**1.3 NEW DESIGNS AND INNOVATIONS.** Any novel materials, designs, method of assembly procedures, etc, which do not comply with specific requirements of this Standard, or are not mentioned in it, but which give equivalent results to those specified, are not necessarily prohibited. Standards Australia Committee ME/46 can act in an advisory capacity concerning equivalent suitability, but the specific approval remains the prerogative of the Authority.

**1.4 INTERPRETATIONS.** Questions concerning the meaning, application or effect of any part of this Standard, may be referred to Standards Australia Committee ME/46, for interpretation. The authority of this committee is limited to matters of interpretation and it will not adjudicate in disputes.

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

**1.5.1 Approved, approval**—approved by or approval of the Statutory Authority.

**1.5.2 Authority**—the Authority having statutory powers to control the design, manufacture and installation of equipment described in this Standard in the State or Territory in which the vehicle is registered.

NOTE: In some areas, vehicle installations and stationary installations are under the control of different authorities.

**1.5.3 Automatic fill limiter**—a provision in the filling system which automatically terminates filling when a predetermined liquid level in the container has been reached.

**1.5.4 Automatic fuel shut-off**—a provision for shutting off the fuel supply piping unless certain essential conditions exist.

**1.5.5 Capacity (of a container)**—the total internal volume of the container, expressed in litres.

NOTE: This was previously known as 'water capacity'.

**1.5.6 Compartment**—a structure which encloses the whole of the container and its fittings, whose purpose is to collect any gas leakage which might occur, so that it can be discharged to open air.*

**1.5.7 Container**—a gas cylinder or pressure vessel which functions as the fuel tank for the engine.

**1.5.8 Double non-return valve**—two non-return valves arranged in series to provide dual security against backflow.

**1.5.9 Excess-flow valve**—a valve normally in the open position which closes automatically when flow in a specified direction exceeds a predetermined limit.

**1.5.10 Fixed liquid level gauge**—a gauge which indicates the maximum permitted liquid level in the fuel container. It is either of two types: one incorporates a tube arranged with its open end located at the liquid level, so that gaseous discharge changes to liquid discharge as the liquid surface reaches the level; the other is a sight-glass of the circular window-type, marked at the level.

**1.5.11 Ignition source**—a source of energy sufficient to ignite a flammable atmosphere and includes naked flames, exposed incandescent material, electric welding arcs, and electrical or mechanical equipment or components not approved for use in hazardous locations.

NOTE: A vehicle will not be regarded as being an ignition source while it is entering or leaving the hazardous zone surrounding a fuel dispenser, for refuelling.

**1.5.12 Internal (component)**—a fitting or component constructed with its significant working parts within the tank perimeter so that any damage to exposed portions will not prevent effective safe functioning of the component, e.g. closure, reseating, pressure relief.

NOTE: The perimeter of the tank is taken to mean not only the surface of the tank shell and ends, but also the outline of any boss, spigot, or nozzle welded to the tank so as to project outwards from it. The outline of welded brackets, mountings, guards, sub-compartments, or the like would not be considered as being the perimeter for the purpose of this Clause.

**1.5.13 Maximum permitted filling level**—the level of the liquid in a container when the liquid contents are 80 percent of the total available internal volume of the container.

**1.5.14 POL coupling**—an LPG union connection as specified for Type 21 in AS 2473 and having a left-hand thread.

**1.5.15 Safety coupling**—a coupling which is normally open when in use, but which closes automatically to both directions when uncoupled.

**1.5.16 Shut-off valve**—a manually operated stop valve.

**1.5.17 Sub-compartment**—a structure attached to the container, which encloses the container fittings, and whose purpose is to collect any gas leakage which might occur, so that it can be discharged to open air.*

**1.5.18 Removable container**—a container which is removed from the vehicle for refuelling, usually in exchange for a full container.

* The primary function of a compartment or sub-compartment is leakage collection and discharge, not physical protection. This is a separate need, which may equally well be provided by some other means.