

SEPTEMBER 2, 2016

1

UL 1337

**Outline of Investigation for LP-Gas, Natural Gas, and Manufactured Gas
Devices for Engine Fuel Systems**

Issue Number: 3

September 2, 2016

Summary of Topics

This is the third issue of the Outline of Investigation for LP-Gas Automotive Accessories, UL 1337 includes requirements for fuel control valves and a reference to requirements in the Standard for Rotating Electrical Machines - General Requirements, UL 1001-1.

COPYRIGHT © 2016 UL LLC

**UL COPYRIGHTED MATERIAL –
NOT AUTHORIZED FOR FURTHER REPRODUCTION OR
DISTRIBUTION WITHOUT PERMISSION FROM UL**



Documents
Document Sharing Hub

No Text on This Page

**UL COPYRIGHTED MATERIAL –
NOT AUTHORIZED FOR FURTHER REPRODUCTION OR
DISTRIBUTION WITHOUT PERMISSION FROM UL**



Documents

Document Sharing Hub

CONTENTS

INTRODUCTION

1 Scope	4
2 General	5
2.1 Components	5
2.2 Units of measurement	5
2.3 Undated references	5
3 Glossary	5
4 Pressure and Temperature Ratings	7

CONSTRUCTION

5 General	7
6 Materials	8
7 Bodies	9
8 Springs	10
9 Electrically Operated Automatic Shutoff Valves and Devices Containing Solenoids or Other Electrical Components	10
10 LP-Gas Liquid Level Gauges	11
11 LP-Gas Automatic Liquid Level Control Valves	11
12 Vacuum Actuated Fuel Locks and Automatic Shutoff Valves	11
13 Regulators, Vaporizers, and Vaporizer-Regulators	12
14 Relief Devices	12
15 Air-Fuel Mixers/Carburetors	12
16 Fittings and Connectors	12
17 Filters	13
18 Motors	13

PERFORMANCE

19 General	13
20 Deformation Test	14
21 Leakage Test	15
22 Endurance Test	16
23 Start-To-Discharge Test for Relief Valves	17
24 Hydrostatic Strength Test	18
25 Operation Test for Excess Flow Valves	18
26 Vibration Test	19
27 Solenoid Primer Cycling Test	20
28 Freeze Test	20
29 Accelerated Aging Test	20
30 Fuel Gas Compatibility Test	21
31 Low Temperature Test	21
32 Moist Ammonia Air Stress Cracking Test	22
33 Ignition Test	22

MARKINGS

34 General	23
------------------	----

**UL COPYRIGHTED MATERIAL –
NOT AUTHORIZED FOR FURTHER REPRODUCTION OR
DISTRIBUTION WITHOUT PERMISSION FROM UL**



Documents

Document Sharing Hub

INTRODUCTION

1 Scope

1.1 These requirements cover the following types of devices for engine fuel system applications intended for use with liquefied petroleum gas (LP-Gas), natural gas, and/or manufactured gas.

- a) Automatic shutoff valves – electrically operated or vacuum actuated (mechanical);
- b) Combination Manual/Automatic Shutoff Valves – electrically operated or vacuum actuated (mechanical);
- c) Carburetors or Air-Fuel Mixers;
- d) Regulators;
- e) Vaporizers and Vaporizer/Regulators;
- f) Filters and strainers;
- g) Fuel locks and fuel-lock filters;
- h) Fittings and connectors;
- i) Quick connect couplings and quick closing couplings;
- j) Liquid level gauges;
- k) Liquid level control valves (also known as overfilling prevention devices);
- l) Relief devices; and
- m) Fuel control valves.

1.2 Devices covered by these requirements are for use in engine fuel systems and engine fuel systems in facilities covered in the Liquefied Petroleum Gas Code, NFPA 58, Vehicular Fuel Systems Code, NFPA 52, and/or Standard for the Installation and Use of Stationary Combustion Engines and Gas Turbines, NFPA 37.

1.3 Devices covered by this standard are intended to be installed and used on board the vehicle (automobile, fork-lift, etc.) or engine generators that they are intended for use with. This outline does not cover these devices for general use.

1.4 Except for such observations as are required to ascertain performance characteristics, the assigning of flow capacity ratings are not within the scope of these requirements.

1.5 These requirements do not cover products for use in hazardous (Classified) locations.

2 General

2.1 Components

2.1.1 Except as indicated in 2.1.2, a component of a product covered by this outline shall comply with the requirements for that component.

2.1.2 A component is not required to comply with a specific requirement that:

- a) Involves a feature or characteristic not required in the application of the component in the product covered by this outline, or
- b) Is superseded by a requirement in this outline.

2.1.3 A component shall be used in accordance with its rating established for the intended conditions of use.

2.1.4 Specific components are incomplete in construction features or restricted in performance capabilities. Such components are intended for use only under limited conditions, such as certain temperatures not exceeding specified limits, and shall be used only under those specific conditions.

2.2 Units of measurement

2.2.1 Values stated without parentheses are the requirement. Values in parentheses are explanatory or approximate information.

2.3 Undated references

2.3.1 Any undated reference to a code or standard appearing in the requirements of this outline shall be interpreted as referring to the latest edition of that code or standard.

3 Glossary

3.1 For the purposes of this outline, the following definitions apply.

3.2 AUTOMATIC SHUTOFF VALVE – A type of shutoff valve that uses energy (electrical or mechanical) based upon some input, to open and close the valve member.

3.3 COMBINATION MANUAL/AUTOMATIC SHUTOFF VALVE – A shutoff valve for fuel gas service that can be operated by both manual and automatic means.

3.4 FUEL LOCK – An industry term used to indicate an automatic shutoff valve that is placed in the fuel line ahead of the vaporizer-regulator.

3.5 FUEL LOCK FILTER – A device that combines a fuel lock (automatic shutoff valve) with a fuel gas filter.

3.6 LIQUEFIED PETROLEUM GAS (LP-GAS OR LPG) – Any material having a vapor pressure not exceeding that allowed for commercial propane that is composed predominantly of the following hydrocarbons, either by themselves (excluding propylene) as mixtures: propane, propylene, butane (normal butane or isobutane) and butylenes.

3.7 LOCKUP PRESSURE – The outlet pressure of a positive outlet pressure type vaporizer-regulator or regulator under no flow conditions.

3.8 MANUFACTURED GAS – Synthetically produced mixture of methane and other gases, such as carbon monoxide, produced by chemically treating coal.

3.9 NATURAL GAS – A naturally occurring hydrocarbon gas mixture consisting primarily of methane, along with other hydrocarbons, carbon dioxide, nitrogen, and hydrogen sulfide.

3.10 QUICK CLOSING COUPLING – A device that consists of two parts (male and female), which provides for a means of connecting and disconnecting a fuel gas cylinder assembly from the fuel line without the use of tools. The two parts are threaded together. The coupling incorporates 1-1/4 inch ACME threads and each part contains a check valve that closes when the two parts are separated.

3.11 QUICK CONNECT COUPLING – A device that consists of two parts (male and female), which provides for a means of connecting and disconnecting a fuel gas cylinder assembly from the fuel line without the use of tools. The two parts are pushed together and are not threaded. Each part contains a check valve that closes when the two parts are separated.

3.12 REGULATOR, NEGATIVE OUTLET PRESSURE TYPE – A secondary stage fuel gas regulator that takes in vapor at a specified pressure and then reduces the pressure to a pressure less than atmospheric pressure (vacuum) at its outlet or final stage. This term may also apply to vaporizer-regulator.

3.13 REGULATOR, POSITIVE OUTLET PRESSURE TYPE – A regulator (primary or secondary type) that takes in fuel gas vapor at a specified pressure and then reduces the pressure to a lower pressure, but greater than atmospheric pressure at its outlet or final stage. This term may also apply to vaporizer-regulator.

3.14 REGULATOR, PRIMARY STAGE TYPE – A type of regulator for fuel gas, that has an inlet pressure rating equal to or greater than cylinder pressure or main gas supply pressure and reduces this pressure to some lower pressure.

3.15 REGULATOR, SECONDARY STAGE TYPE – A type of regulator for fuel gas that has an inlet pressure rating less than cylinder or main gas supply pressure. It is intended for connection into the fuel gas train at some point after a primary stage regulator. It serves as the final regulator in the fuel train.

3.16 STATIC SEAL – A seal that is not subject to mechanical movement or other applied forces other than compressive forces that are applied during installation and maintained during normal use conditions.

3.17 VAPORIZER-REGULATOR – A combination vaporizer and primary stage regulator that takes in liquid fuel at its inlet and adds heat to change the liquid to a vapor and then reduces the vapor pressure to a specified amount at its outlet or final stage.

4 Pressure and Temperature Ratings

4.1 The pressure rating of a device intended for use in LP-Gas service subjected to container pressure shall not be less than 250 pounds per square inch (psi) (1.7 MPa) and shall not exceed 1/5 of its rupture pressure.

4.2 The pressure rating of a device intended for use in natural gas, manufactured gas, or LP-Gas service not subjected to container pressure shall be in accordance with the manufacturer's rating and shall not exceed 1/5 of its rupture pressure.

4.3 The temperature rating for devices other than those installed in an engine compartment shall comply with the following ranges:

- a) For outdoor use devices, minus 40°C (minus 40°F) to 55°C (130°F), or
- b) For indoor use devices, 0°C (32°F) to 55°C (130°F).

4.4 For devices within an engine compartment, the temperature range shall be set by the manufacturer, but shall not be smaller than the range in (a) above. See Accelerated Aging Test, Section 29.

CONSTRUCTION

5 General

5.1 An engine fuel device shall include all of the components required for its normal function and installation, and shall be furnished as a single unit or assembly.

5.2 When an engine fuel device is of a design that requires the use of special pipe flanges, gaskets, bolts, or other special fittings or parts for making a proper installation, such parts shall be furnished by the manufacturer with each device.

5.3 A seat disc shall be attached to its poppet or holder, or otherwise assembled so as to prevent it from becoming dislocated under service conditions. The means to secure the disc shall not rely on cement or adhesive.

5.4 Vaporizers and vaporizer-regulators shall not be provided with a fusible plug.

6 Materials

6.1 Fluid-confining parts of a device or operating parts shall have the strength and durability to provide reliable service of the parts and of the assembly.

6.2 To determine compliance with 6.1, a material (except a valve disc or soft seat, a seal ring, a diaphragm, or a gasket) shall have a melting point (solidus temperature) of no less than 950°F (510°C) and a tensile strength of no less than 10,000 psi (68.9 MPa) at 400°F (204°C).

Exception No. 1: Bodies and bonnets of vaporizer-regulators, and regulators are allowed to be made of Zinc alloys AG 40A, AG 40B, AC 41A, or AC 43A as specified in the Standard Specification for Zinc and Zinc-Aluminum (ZA) Alloy Foundry and Die Castings, ASTM B86.

Exception No. 2: Fluid confining parts of vaporizer-regulators are not required to comply with 6.2 if the fluid passage is restricted by a No. 54 drill orifice [0.055 inch (1 mm)] or the flow of gas will be stopped if a fault occurs in the fluid confining portion.

6.3 A nonmetallic part in contact with fuel gas which will cause unsafe operation or leakage of the fuel gas shall be resistant to the action of such fuel gas.

6.4 With reference to the requirement in 6.3, elastomeric materials shall be subjected to:

- a) The Accelerated Aging Test, Section 29;
- b) The Fuel Gas Compatibility Test, Section 30; and
- c) The Low Temperature Test, Section 31.

Polymeric materials shall be subjected to the Accelerated Aging Test, Section 29, and the Fuel Gas Compatibility Test, Section 30.

Exception No. 1: Acetal polymers, chlorotrifluorethylene polymers, tetrafluorethylene, fluorinated ethylene propylene polymers and polyamides of composition polyhexamethylene adipamide or polycaprolactam polymers (nylon 6, 6/6 or 6/16) shall only be subjected to the Accelerated Aging Test, Section 29.

Exception No. 2: Nonmetallic parts that serve as static seals in negative pressure chambers of regulators are not required to be subjected to the Fuel Gas Compatibility Test or Low Temperature Test.

6.5 Noductile cast iron (regular gray iron) shall not be used for bodies or closures for engine fuel devices. This does not prohibit the use of nodular iron.

6.6 A brazing material used for joining pressure-confining parts of an engine fuel device shall have a melting point (solidus temperature) of no less than 1000°F (538°C).

6.7 Metals used in combination shall be galvanically compatible. Aluminum shall not be used in combination with copper or copper alloy.