



CGA P-97—2022

(Formerly S-8)

GUIDELINE FOR THE SAFE HANDLING OF LIQUEFIED PETROLEUM GAS CYLINDERS

FIRST EDITION

This document licensed for the sole use of the purchaser. It may not be shared with any other person or used after the expiration date without the express written permission of the CGA. Any unauthorized use, reproduction, distribution, or modification of this printed page will result in a \$5,000 liquidated damages fee plus loss of access to CGA publications for one year for your company.

Full document details: CGA P-97-2022



Documents

Document Sharing Hub

PLEASE NOTE:

The information contained in this document was obtained from sources believed to be reliable and is based on technical information and experience currently available from members of the Compressed Gas Association, Inc. and others. However, the Association or its members, jointly or severally, make no guarantee of the results and assume no liability or responsibility in connection with the information or suggestions herein contained. Moreover, it should not be assumed that every acceptable commodity grade, test or safety procedure or method, precaution, equipment or device is contained within, or that abnormal or unusual circumstances may not warrant or suggest further requirements or additional procedure.

This document is subject to periodic review, and users are cautioned to obtain the latest edition. The Association invites comments and suggestions for consideration. In connection with such review, any such comments or suggestions will be fully reviewed by the Association after giving the party, upon request, a reasonable opportunity to be heard. Proposed changes may be submitted via the Internet at our web site, www.cganet.com.

This document should not be confused with federal, state, provincial, or municipal specifications or regulations; insurance requirements; or national safety codes. While the Association recommends reference to or use of this document by government agencies and others, this document is purely voluntary and not binding unless adopted by reference in regulations.

A listing of all publications, audiovisual programs, safety and technical bulletins, and safety posters is available via the Internet at our website at www.cganet.com. For more information contact CGA at Phone: 703-788-2700, ext. 799. E-mail: customerservice@cganet.com.

Work Item 21-043
Liquefied Petroleum Gas Committee

NOTE—Technical changes from S-8—2018 edition are underlined.

FIRST EDITION: 2022

© 2022 The Compressed Gas Association, Inc. All rights reserved.

All materials contained in this work are protected by United States and international copyright laws. No part of this work may be reproduced or transmitted in any form or by any means, electronic or mechanical including photocopying, recording, or any information storage and retrieval system without permission in writing from The Compressed Gas Association, Inc. All requests for permission to reproduce material from this work should be directed to The Compressed Gas Association, Inc., 8484 Westpark Drive, Suite 220, McLean, VA 22102. You may not alter or remove any trademark, copyright or other notice from this work.



Contents	Page
1 Introduction.....	1
2 Scope	1
3 Definitions.....	1
4 Liquefied petroleum gas product names	2
5 Training	2
6 Proper filling procedures	3
7 Cylinder valves and ancillary equipment	4
7.1 Cylinder valve types	4
7.2 Fixed maximum liquid level gauges.....	5
7.3 Overfilling prevention device	7
7.4 CG-7 pressure relief valves	8
7.5 Other valves and equipment.....	9
8 Cylinder storage, handling, and maintenance recommendations	9
8.1 Storage and handling	9
8.2 Maintenance	9
9 References	10
Table	
Table 1—Typical LPG product names and characteristics	2
Table 2—Typical DOT/TC cylinders.....	4
Table 3—Inspection intervals for testing LPG cylinders.....	10
Figures	
Figure 1—Cylinder valve with CG-7 pressure relief valve and integral fixed maximum liquid level gauge at 80% liquid level	5
Figure 2—Stand-alone CG-7 pressure relief valve	6
Figure 3—Stand-alone, fixed maximum liquid level gauge	6
Figure 4—Cylinder valve with integral CG-7 relief valve, OPD and fixed maximum liquid level gauge	7
Figure 5—Top view of OPD cylinder valve handwheel	8

1 Introduction

Millions of liquefied petroleum gas (LPG) cylinders are used worldwide to provide fuel for a wide range of consumer and industrial applications. In the United States and Canada, most LPG cylinders are equipped with a CG-7 pressure relief valve (PRV) designed to discharge and reclose (reseal) after the excessive pressure in the cylinder is reduced to an acceptable level.

In recent years, incidents have occurred that have been attributed to the improper application and maintenance of the LPG cylinder and CG-7 PRV package.

The safe, proper function and use of an LPG cylinder with a CG-7 PRV is dependent upon several variables. These variables include but are not limited to items such as:

- adequate and proper training of all employees who handle cylinder gas products;
- proper filling procedures;
- proper handling, selection, maintenance, and replacement of the CG-7 PRV;
- proper storage and handling; and
- type and location of other devices on the cylinder or valve body.

2 Scope

The purpose of this publication is to provide:

- Reference material and guidelines to personnel who fill, store, distribute, inspect, maintain, or requalify LPG cylinders and to ensure compliance with applicable safety and regulatory requirements; and
- Information on proper selection, handling, and maintenance of cylinder valves and the CG-7 PRV. This information is limited to U.S. Department of Transportation (DOT) and Transport Canada (TC) refillable cylinder designs.

For the purposes of this publication, LPG includes but is not limited to butane, commercial propane, propylene, and mixtures of these products. For more examples, see Table 1.

3 Definitions

For the purpose of this publication, the following definitions apply.

3.1 Publication terminology

3.1.1 Shall

Indicates that the procedure is mandatory. It is used wherever the criterion for conformance to specific recommendations allows no deviation.

3.1.2 Should

Indicates that a procedure is recommended.

3.1.3 May

Indicates that the procedure is optional.

3.1.4 Will

Is used only to indicate the future, not a degree of requirement.

3.1.5 Can

Indicates a possibility or ability.

3.2 Technical definitions

3.2.1 Certified Employee Training Program (CETP)

Workforce training and certification program available through the Propane Education and Research Council (PERC) [1].¹

3.2.2 Overfilling prevention device (OPD)

Safety device that is designed to provide an automatic means to prevent the filling of a container in excess of the maximum permitted filling limit [2].

4 Liquefied petroleum gas product names

LPG that is filled and stored in DOT or TC specification cylinders is marketed under several different product names and can contain chemical additives that cause variations in the specific gravity filling density limits and normal vapor pressures. The most common names for these gases are shown in Table 1 along with some typical properties, the appropriate cylinder service pressure, and the CG-7 PRV start-to-discharge (STD) pressure range for the cylinder.

Table 1—Typical LPG product names and characteristics

Product names	Typical specific gravity of liquid ¹⁾ at 60 °F (15.6 °C) [2]	Maximum allowable filling limit ²⁾ at 60 °F (15.6 °C)	Minimum cylinder service pressure ³⁾	Minimum CG-7 STD setting ⁴⁾ [3]	Maximum CG-7 STD setting ⁴⁾ [3]	Typical marking on PRV ⁴⁾
		(%)	(psi)	(psi)	(psi)	(psi)
1-Butene	0.577 to 0.584	51	240	360	480	375
Cis-2-butene	0.627 to 0.634	57	240	360	480	375
Trans-2-butene	0.627 to 0.634	57	240	360	480	375
Isobutene	0.593 to 0.600	53	240	360	480	375
Isobutane	0.561 to 0.568	49	240	360	480	375
n-Butane	0.5844	42	240	360	480	375
Propane	0.504 to 0.510	42	240	360	480	375
Propylene	0.520 to 0.570	44	260	435	520	435 TB27
¹⁾ If the specific gravity is different than what is listed, refer to 49 CFR, Part 173.304a (d) [4]. ²⁾ Percent of marked water capacity in pounds. ³⁾ Minimum cylinder service pressure is calculated on 80% of the product vapor pressure at 130 °F (54.4 °C) or 240 psi (1655 kPa), whichever is greater. ⁴⁾ <u>When higher cylinder service pressures are used, the minimum and maximum required CG-7 STD settings will change from what is shown in this table.</u>						

5 Training

All employees who fill, handle, or distribute LPG shall be trained in accordance with National Fire Protection Association (NFPA) 58, *Liquefied Petroleum Gas Code* and/or Canadian Standards Association (CSA) B149, *Natural gas and propane code* [2, 5]. Depending on the location, additional state or local training requirements can also apply. Federal regulations for commercially transported cylinders require the proper training and documentation of employee training (see Title 49 of the U.S. *Code of Federal Regulations* [49 CFR]) [4].

For cylinder filling and requalification, employee training on the following subjects shall be provided and documented:

- prefill inspection (such as those described in NFPA 58 and CGA C-6, *Standard for Visual Inspection of Steel Compressed Gas Cylinders*) [2, 6];
- identification of cylinder markings such as DOT-4BA240;

¹ References are shown by bracketed numbers and are listed in order of appearance in the reference section.