



**CGA P-1—2022**  
**STANDARD FOR SAFE**  
**HANDLING OF COMPRESSED**  
**GASES IN CONTAINERS**

**THIRTEENTH EDITION**

**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](http://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](http://www.cganet.com). For more information contact CGA at Phone: 703-788-2700, ext. 799. E-mail: [customerservice@cganet.com](mailto:customerservice@cganet.com).

Work Item 20-004  
Safety and Health Committee

---

NOTE—Technical changes from the previous edition are underlined.

NOTE—Appendix A (Normative) is a requirement.

THIRTEENTH EDITION: 2022  
TWELFTH EDITION: 2015  
ELEVENTH EDITION: 2008  
TENTH EDITION: 2006

© 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.

<b>Contents</b>	<b>Page</b>
1 Introduction.....	1
2 Scope .....	1
3 Definitions.....	1
4 Regulations and standards applicable to compressed gases in containers.....	5
4.1 Transportation regulating authorities.....	5
4.2 Container regulations .....	6
4.3 Container filling regulations .....	6
4.4 Regulating authorities of workplace safety and health .....	6
5 General safe handling rules for compressed gas containers .....	7
5.1 Personnel .....	7
5.2 Content identification .....	7
5.3 User responsibilities .....	7
5.4 General precautions .....	8
5.5 Valve protection caps and valve outlet caps and plugs.....	8
5.6 Safe handling of containers .....	9
5.7 Transfilling .....	9
5.8 Storing containers.....	10
5.9 Connecting a container and withdrawing its content .....	11
5.10 Transportation of medical oxygen in public and commercial vehicles.....	13
5.11 Transportation in passenger vehicles.....	13
5.12 Transporting gas cylinders and cryogenic liquid containers in elevators .....	13
5.13 Emergency response .....	13
6 Safe handling and storage rules for compressed gas by hazard class .....	14
6.1 Hazard class.....	14
6.2 Flammable gases .....	15
6.3 Asphyxiant gases (including inert).....	17
6.4 Oxidizing gases .....	17
6.5 Corrosive and toxic gases .....	18
6.6 Cryogenic liquids .....	19
6.7 Liquefied gases .....	21
7 Precautions for tank cars, cargo, and portable tanks .....	21
8 Security issues .....	21
8.1 Facility security .....	22
8.2 Distribution security .....	22
9 References .....	23
10 Additional references.....	26
 <b>Appendix</b>	
Appendix A—Cylinder nesting (Normative).....	28
 <b>Appendix Figures</b>	
Figure A-1—Properly nested cylinders .....	28
Figure A-2—Improperly nested cylinders.....	28

## 1 Introduction

Users of gases supplied in containers as compressed or liquefied gases or as cryogenic or refrigerated liquids shall become familiar with the properties and inherent hazards of the products they use. Valuable information about each specific gas is contained in its product labeling and safety data sheet (SDS). Read this information and inform others of the importance of understanding and applying the precautions recommended within the available safety literature.

The user is cautioned that hazard classification systems exist for labeling, storage, transportation, security, and other purposes, particularly from regulatory agencies, which can result in a different classification of the hazard. In addition, there can be additional hazards not addressed in this standard; therefore, the user should consult the gas supplier's SDS for specific information. See Title 29 of the U.S. *Code of Federal Regulations* (29 CFR); CGA C-7, *Guide to Classification and Labeling of Compressed Gases*; and CGA P-19, *CGA Recommended Hazard Ratings for Compressed Gases* [1, 2, 3].<sup>1</sup> The user should perform due diligence to research any necessary codes or regulations that can affect the use of these products.

Safe handling practices for refrigerated liquefied gases and cryogenic liquids are based on understanding the specific properties of each gas. Procedures should be developed based on those specific properties and knowledge of the material compatibility of each gas. The compressed gas industry has developed safe handling, delivery, and equipment design methods that are specific to each refrigerated liquefied gas or cryogenic liquid discussed in this publication by obtaining a thorough understanding of the risks and hazards associated with each gas. This individualized approach minimizes the risks of handling and use of these gases.

## 2 Scope

This standard is primarily for the users of compressed gases in containers and is based upon accepted good practices. This standard also contains precautions that are applicable to gas suppliers and distributors. It should not be assumed that all applicable safety and security precautions or regulations are contained here.

The term "container" as used in this publication shall refer to portable compressed gas cylinders and liquid containers made in accordance with the U.S. Department of Transportation (DOT), Transport Canada (TC), or the American Society of Mechanical Engineers (ASME) specifications [4, 5, 6].

Additional information on the movement and handling of liquid containers with wheel bases can be found in CGA P-84, *Guideline for Safe Handling of Liquid Containers on Wheel Bases* [7].

Additional information and requirements contained in CGA P-2, *Guideline for Characteristics and Safe Handling of Medical Gases*, and other related publications it references should be reviewed when handling medical gases [8].

For the purpose of this publication, the use of the term compressed gas(es) includes cryogenic liquids, refrigerated liquids, and liquefied gases, unless otherwise noted.

## 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.

---

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