



CGA S-1.3 — 2024

10TH EDITION

**PRESSURE RELIEF
DEVICE STANDARDS -
PART 3 -
STATIONARY
STORAGE
CONTAINERS FOR
COMPRESSED GASES**



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 website, 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 18-044
Bulk Distribution Equipment and Standards Committee

NOTE—Technical changes from the previous edition are underlined.

NOTE—Appendices A and B (Informative) are for information only.

TENTH EDITION: 2024
NINTH EDITION: 2020
EIGHTH EDITION: 2008
SEVENTH EDITION: 2005

© 2024 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 and purpose	1
2.1 Scope	1
2.2 Purpose	1
3 Definitions.....	1
4 Types of pressure relief devices.....	4
5 Application requirements for pressure relief devices.....	4
5.1 General.....	4
5.2 Piping of pressure relief systems.....	10
5.3 Commodity-based requirements	11
5.4 Jacket relief device	12
6 Design and construction requirements for pressure relief devices.....	12
6.1 General.....	12
6.2 Flow rate requirement for conditions other than fire	26
6.3 Flow rate requirement under fire conditions	30
6.4 Pressure relief valves	36
6.5 Nonreclosing devices	36
6.6 Nonreclosing device in combination with a pressure relief valve	37
6.7 Breaking/buckling pin devices in combination with a pressure relief valve	37
7 Tests of pressure relief devices.....	37
7.1 Pressure tests of pressure relief valves.....	37
7.2 Flow capacity tests of pressure relief valves	37
7.3 Test of pressure relief devices other than pressure relief valves	37
7.4 Rejected material.....	38
8 Identification	38
9 Maintenance requirements for pressure relief devices.....	38
10 References	39
11 Additional references.....	40
Tables	
Table 1—Minimum required working pressures.....	8
Table 2—Constant C for gas or vapor related to ratio of specific heats ($k = C_p/C_v$) at 60 °F and 14.696 psia (15 °C and 101.325 kPa, abs).....	34
Table 3—Saturation temperature, compressibility factor, and average specific heat for common gases at selected flow rating pressures	35
Table 4—Thermal conductivity for refrigerated (cryogenic) fluids at the mean temperature between saturation and 1660 degrees Rankine at 14.7 psia (922 Kelvin at 101.325 kPa, abs)	36
Figure	
Figure 1—Nomenclature	14
Appendices	
Appendix A—Calculation of G_i and G_u (Informative).....	41
Appendix B—Pressure relief system capacity examples in U.S. customary units (Informative).....	45

1 Introduction

This part of the Pressure Relief Device Standards presents the minimum requirements recommended by the Compressed Gas Association, Inc. (CGA) for pressure relief devices (PRDs) being used on compressed gas storage containers constructed in accordance with the *ASME Boiler & Pressure Vessel Code* (ASME Code) or the equivalent [1].¹ While these standards are written specifically to cover compressed gases as defined in 3.2.3, the procedures are applicable to storage containers with a maximum allowable working pressure (MAWP) exceeding 15 psi (103 kPa).²

2 Scope and purpose

2.1 Scope

It is recommended that containers use PRDs that meet the applicable requirements of the edition of the ASME Code or other applicable regulations, codes, standards, or specifications in effect at the time of manufacture. The container PRDs shall also meet the requirements of this standard, except containers for liquefied petroleum gas and anhydrous ammonia shall use PRDs meeting the applicable requirements of the following two standards:

- NFPA 58, *Liquefied Petroleum Gas Code* [3]; and
- CGA G-2.1, *Requirements for the Storage and Handling of Anhydrous Ammonia (an American National Standard)* [4].

A number of states and cities have pressure vessel laws and regulations that include requirements for PRDs. Manufacturers and users are cautioned that in some instances the relief devices recommended in this standard might not be acceptable unless special permission is obtained from the authority having jurisdiction (AHJ).

2.2 Purpose

The purpose of this standard is to complement the requirements of various regulations, codes, standards, or specifications applicable to storage containers for compressed gases. In case of conflict, the requirements of the regulations, codes, standards, or specifications of the AHJ over such containers shall apply. It is recommended that containers fabricated after December 31, 1995, use PRDs that meet the requirements of this edition of CGA S-1.3.

3 Definitions

For the purpose of this standard, 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.

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

² psi, bar, and kPa shall indicate gauge pressure unless otherwise noted as (psia; bar, abs; and kPa, abs) for absolute pressure or (psid; bar, dif; and kPa, dif) for differential pressure. All kPa values are rounded off per CGA P-11, *Guideline for Metric Practice in the Compressed Gas Industry* [2].