CGA G-5.4–2019

STANDARD FOR HYDROGEN PIPING SYSTEMS AT USER LOCATIONS

SIXTH EDITION

CGA
Compressed Gas Association
The Standard For Safety Since 1913

PREFACE

As part of a program of harmonization of industry standards, the Compressed Gas Association (CGA) has published CGA G-5.4, *Standard for Hydrogen Piping Systems at User Locations*, jointly produced by members of the International Harmonization Council.

This publication is intended as an international harmonized standard for the worldwide use and application of all members of the Asia Industrial Gases Association (AIGA), Compressed Gas Association (CGA), and Japan Industrial and Medical Gases Association (JIMGA). Each association's technical content is identical, except for regional regulatory requirements and minor changes in formatting and spelling.

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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.

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Work Item 17-002
Hydrogen Technology Committee

NOTE—Technical changes from the previous edition are underlined.

SIXTH EDITION: 2019
FIFTH EDITION: 2012 (corrected 1/25/2018)
FOURTH EDITION: 2010
THIRD EDITION: 2005

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1 Introduction

This standard is one of a series prepared by the Compressed Gas Association, Inc. (CGA) to provide information on the transportation, handling, and storage of hydrogen.

2 Scope

This standard describes the specifications and general principles recommended for piping systems for gaseous (Type I) or liquid (Type II) hydrogen. The standard applies to hydrogen piping in a supply system (to the source valve) and to customer piping from the source valve to the point of use. For the purposes of this standard, high pressure is defined as gaseous hydrogen at service pressures equal to or greater than 3000 psi (20 680 kPa). [1]

The information in this standard is general in nature and is intended for designers, fabricators, installers, users, and maintainers of hydrogen piping systems as well as for safety personnel, fire departments, building inspectors, and emergency personnel. Basic information on the properties, storage, and handling of hydrogen can be found in CGA G-5, *Hydrogen*; CGA G-5.3, *Commodity Specification for Hydrogen*; NFPA 2, *Hydrogen Technologies Code*; NFPA 55, *Compressed Gases and Cryogenic Fluids Code*; and the CGA *Handbook of Compressed Gases* [1, 2, 3, 4, 5]. [2]

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.

4 Piping system criteria

4.1 Design criteria

Hydrogen piping systems should be designed in accordance with the American Society of Mechanical Engineers (ASME) B31.12, *Hydrogen Piping and Pipelines*, other applicable codes and regulations, and the special requirements for hydrogen service [7]. Single wall piping is used for gaseous hydrogen service and for liquid hydrogen service when thermal insulation is not required. Vacuum-insulated piping is recommended for liquid hydrogen service.

[1] kPa shall indicate gauge pressure unless otherwise noted as (kPa, abs) for absolute pressure or (kPa, differential) for differential pressure. All kPa values are rounded off per CGA P-11, *Guideline for Metric Practice in the Compressed Gas Industry* [6].

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