

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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Work Item 17-002
Hydrogen Technology Committee

NOTE—Technical changes from the previous edition are underlined.

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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 condition 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.