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Compressed Gas Association

The Standard For Safety Since 1913

CGA P-96—2023

RECIPROCATING CRYOGENIC PUMPS AND PUMP INSTALLATIONS FOR HYDROGEN AND LIQUEFIED NATURAL GAS

FIRST EDITION

PREFACE

As part of a program of harmonization of industry standards, the Compressed Gas Association (CGA) has published CGA P-96, *Reciprocating Cryogenic Pumps and Pump Installations for Hydrogen and Liquefied Natural Gas*, 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), European Industrial Gases Association (EIGA), 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 web site, www.cganet.com.

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1 Introduction

Reciprocating cryogenic pumps are key components in hydrogen and liquefied natural gas (LNG) service. To ensure that pumps operate both safely and reliably in liquefied flammable gas service, it is important that reciprocating pumps are correctly designed, installed, operated, and maintained as required for the duty.

Pumping these fluids is accompanied by some degree of hazard. The hazards include liquid under pressure, cryogenic temperatures, volume and pressure increases due to vaporization, and flammability of the vapor.

This publication contains a summary of industrial practices and is based on the combined knowledge, experiences, and practices of industrial gas and equipment suppliers to manage these hazards.

2 Scope and purpose

This publication covers cryogenic reciprocating pumps and pump installations for hydrogen and LNG service.

The information contained in this publication only applies to new installations designed after the publication of this document and not to existing installations. However, the information contained in this publication may benefit existing installations or those in the project phase.

This publication does not cover:

- Cryogenic reciprocating pumps and installations for liquid oxygen, argon, and nitrogen, which are covered in CGA P-48, *Reciprocating Cryogenic Pumps and Pump Installations for Oxygen, Argon, and Nitrogen* [1];[1]
- Centrifugal liquid oxygen pumps, which are covered in CGA G-4.3, *Stationary, Electric-Motor-Driven, Centrifugal Liquid Oxygen Pumps* [2]; and
- Carbon dioxide pumps, which are covered in CGA G-6.3, *Carbon Dioxide Cylinder Filling and Handling Procedures* and EIGA Doc 83, *Recommendations for Filling of Cylinders and Bundles with Carbon Dioxide* [3, 4].

3 Definitions

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 the 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.

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