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CGA P-31—2021

LIQUID OXYGEN, NITROGEN, AND ARGON CRYOGENIC TANKER LOADING SYSTEMS

FOURTH EDITION

PREFACE

As part of a program of harmonization of industry standards, the Compressed Gas Association (CGA) has published CGA P-31, *Liquid Oxygen, Nitrogen, and Argon Cryogenic Tanker Loading Systems*, 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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Atmospheric Gases and Equipment Committee

NOTE—Technical changes from the previous edition are underlined.

FOURTH EDITION: 2021
THIRD EDITION: 2012
SECOND EDITION: 2005
FIRST EDITION: 2000

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1 Introduction

This publication gives information relating to the loading of cryogenic liquid oxygen, liquid nitrogen, and liquid argon.

2 Scope and purpose

2.1 Scope

This publication describes requirements for new installations designed and constructed after date of publication used for the loading of oxygen, nitrogen, or argon as cryogenic liquids. This publication may be used for existing cryogenic liquid oxygen, liquid nitrogen, and liquid argon loading systems. However, application of this publication may benefit existing installations or those in the project phase. Furthermore, to the extent that they exist, national laws may supersede the practices included in this publication. All local regulations, tests, safety procedures, or methods are not included in this publication and abnormal or unusual circumstances can warrant additional requirements.

This publication covers cryogenic liquid oxygen, liquid nitrogen, and liquid argon tanker loading systems for loading by gravity, pressure, or pump filling. It covers the design of the tanker loading systems and the period of time and activities between when a tanker enters the filling area and when it departs from the filling area.

This publication focuses on the factors affecting the transfer of oxygen, nitrogen, and argon as cryogenic liquids between a source and appropriately designed tankers used for the transportation of these products. The source can be either a storage tank or directly from the plant.

For the appropriate design of tankers, refer to CGA 341, *Specification for Insulated Cargo Tank for Nonflammable Cryogenic Liquids*; *ASME Boiler & Pressure Vessel Code*, Section XII "Rules for the Construction & Continued Service of Transport Tanks"; ISO 20421-1, *Cryogenic vessels— Large transportable vacuum-insulated vessels— Part 1: Design, fabrication, inspection and testing*; Title 49 of the U.S. *Code of Federal Regulations* (49 CFR) Part 178.338; CSA B620, *Highway tanks and TC portable tanks for the transportation of dangerous goods*; and CSA B622, *Selection and use of highway tanks, TC portable tanks, and ton containers for the transportation of dangerous goods, Class 2* [1, 2, 3, 4, 5, 6].[1]

This publication does not cover cryogenic rail cars nor does it cover tankers unloading at a customer station or other user location.

2.2 Purpose

The purpose of this publication is to provide information regarding safety in the design, installation, operation, and maintenance of cryogenic liquid oxygen, liquid nitrogen, and liquid argon tanker loading systems. The intent of this publication is to ensure that a uniform level of safety is provided throughout the industrial gas industry for the protection of the public and industry employees. The information presented does not replace but is intended to complement national, state, provincial/territorial, local, and insurance company safety requirements.

Through implementation of procedures, instrumentation, equipment inspection, testing, and system design criteria, this publication presents recommendations to reduce the potential for large releases of stored materials from storage systems or tankers. It emphasizes prevention of releases rather than mitigation of consequences following a release.

This publication is intended to facilitate proper decisions in the design, implementation, and modification of materials and equipment for the efficient handling of cryogenic liquid oxygen, liquid nitrogen, and liquid argon in filling cryogenic tankers.

This publication is written for designers, owners, and operators of cryogenic liquid tanker loading systems.

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