CGA G-4.4—2020

OXYGEN PIPELINE AND PIPING SYSTEMS

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 issued CGA G-4.4, *Oxygen Pipeline and Piping Systems*, jointly produced by members of the International Harmonization Council and originally published by the European Industrial Gases Association (EIGA) as EIGA Doc 13, *Oxygen Pipeline and Piping Systems*.

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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Work Item 16-039
Atmospheric Gases and Equipment Committee

NOTE—Technical changes from the previous edition are underlined.

NOTE—Appendices A and B (Normative) are a requirement.

NOTE—Appendices C, D, E, and F (Informative) are for information only.

SIXTH EDITION: 2020
FIFTH EDITION: 2012
FOURTH EDITION: 2003

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1 Introduction

This publication has been prepared by a group of specialists in oxygen piping and pipeline systems, representing major oxygen producers in various countries of Europe and North America and is based on technical information and experience currently available to the authors.

Oxygen pipeline systems developed over many decades in the various countries of Europe, North America, and in other geographies have shown good and comparable safety records, although company practices show many differences in design and operations. Some national authorities have also introduced legislation that is mandatory for the operators in those countries.

The design and installation requirements and recommendations included in this publication apply only to installations begun after the publication date and not to existing installations. However, the information contained in this publication may benefit existing installations or those in the project phase. Furthermore, to the extent that they exist, national laws supersede the suggested practices listed in this publication. It should not be assumed that every local standard, test, safety procedure, or method is contained in these recommendations or that abnormal or unusual circumstances may not warrant additional requirements or procedures.

2 Scope and purpose

The scope of this publication is for metal oxygen pipelines, distribution piping systems, and gaseous oxygen piping on an air separation plant external to the coldbox. The scope is limited to gaseous oxygen with a temperature range between –22 °F and 400 °F (–30 °C and 200 °C), pressures up to 3000 psi (21 MPa), and a dew point of –22 °F (–30 °C) or less depending on local conditions.[1, 2] Although it is possible to safely use oxygen at higher temperatures and/or pressures, such applications are beyond the scope of this publication. In these cases, additional materials testing and/or a risk assessment, as appropriate to the application, shall be undertaken.

This publication does not apply to the following processes:

- oxygen cylinder filling plants;
- medical oxygen piping installations;
- coldbox internal piping;
- oxygen compressor units;
- liquid oxygen vaporizers;
- bulk oxygen facilities (liquid or high pressure gas) at the customer's site up to the point where gas enters the distribution systems; or
- piping on specialized equipment and machines such as scarfing, jet piercing, etc.

The use of nonmetal piping for oxygen-enriched gases in production plants, transmission systems, or distribution systems is outside the scope of this publication and requires a specific risk assessment and precautions.

The purpose of this publication is to further the understanding of those engaged in the safe design, operation, and maintenance of gaseous oxygen transmission and distribution systems. It is not intended to be a mandatory standard or code.

Some of the practices represent conservative compromises and not all situations are described. The designer is cautioned that this publication is not a complete design handbook and does not do away with the need for

[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* [1].

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