CGA®
Compressed Gas Association
The Standard For Safety Since 1913

CGA P-89—2021

PREVENTION OF PLANT INSTRUMENT AND UTILITY GAS SYSTEM CROSS CONTAMINATION

FIRST EDITION

PREFACE

As part of a program of harmonization of industry standards, the Compressed Gas Association (CGA) has published CGA P-89, *Prevention of Plant Instrument and Utility Gas System Cross-Contamination*, 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.

PLEASE NOTE

The information contained in this document was obtained from sources believed to be reliable and is based on technical information and experience currently available from members of the Compressed Gas Association, Inc. and others. However, the Association or its members, jointly or severally, make no guarantee of the results and assume no liability or responsibility in connection with the information or suggestions herein contained. Moreover, it should not be assumed that every acceptable commodity grade, test or safety procedure or method, precaution, equipment or device is contained within, or that abnormal or unusual circumstances may not warrant or suggest further requirements or additional procedure.

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.

This document should not be confused with federal, state, provincial, or municipal specifications or regulations; insurance requirements; or national safety codes. While the Association recommends reference to or use of this document by government agencies and others, this document is purely voluntary and not binding unless adopted by reference in regulations.

A listing of all publications, audiovisual programs, safety and technical bulletins, and safety posters is available via the Internet at our website at www.cganet.com. For more information contact CGA at Phone: 703-788-2700, ext. 799. E-mail: customerservice@cganet.com.

Work Item 17-133
HYCO Committee

NOTE—Appendix A (Informative) is for information only.

FIRST EDITION: 2021

Contents **Page**

Figures

Appendix

1 Introduction

Process gases in HYCO plants are flammable and can be toxic. Prior to maintenance, piping and equipment are purged with nitrogen to prevent exposure to flammable or toxic gases. After maintenance, similar purging is done to prevent the mixing of flammable gas with air that entered the piping or equipment during maintenance. In addition, HYCO plants utilize nitrogen during startup to carry heat through the process until the piping and equipment are hot enough for steam and feed addition. All operating plants utilize control valves to maintain control of the process. These control valves require an instrument gas to operate.

To facilitate purging and startup, utility nitrogen connections are present throughout the process. These interconnections provide the possibility for cross-contamination between the process and utility air or instrument gases (e.g., CO in N2, H2 in N2). Similar cross-contamination potential exists when air that is backed up by nitrogen is used for the instrument gas (e.g., N2 in air, air in N2). If there is a connection between the utility gas and the instrument nitrogen backup, further cross-contamination is possible. In any of these cases, cross-contamination can lead to hazardous conditions. Exclusive use of nitrogen as the instrument gas eliminates one of the cross-contamination concerns but increases the possibility of asphyxiation hazards.

2 Scope

This publication provides recommendations and minimum requirements for the design and safeguards of utility and instrument gas systems and their interconnections, both permanent and temporary. It includes startup systems as well as maintenance and continuous purge connections. It identifies the potential hazards resulting from the connections between purge gases, instrument gases, and the process. These requirements may also be considered for existing facilities.

This publication does not cover process or product cross-contamination issues, but some of the principles covered in this publication could apply.

This publication does not cover breathing air systems.

This publication was developed around and applies to HYCO plants, which are facilities that produce hydrogen and/or carbon monoxide. These plants are typically operated with feed stocks such as natural gas, refinery off gas, naphtha, and other light hydrocarbons. The principles and concepts identified in this publication are applicable to other segments of the gases industry (for example, specialty gas plants and air separation units), although some of the scenarios described might not apply and some design details can require modification. Other technologies could require either more or less stringent minimum requirements depending on the specific application, whether contamination is a safety concern or a quality or reliability concern, and the severity of any consequences.

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.