



**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.

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Work Item 17-133  
HYCO Committee

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

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<b>Contents</b>	<b>Page</b>
1 Introduction.....	1
2 Scope .....	1
3 Definitions.....	1
4 General safety .....	2
4.1 Basic design considerations for safety .....	4
4.2 General design guidelines for avoiding cross-contamination .....	5
5 Types of systems .....	7
5.1 Utility air.....	9
5.2 Instrument air.....	9
5.3 Instrument gas.....	9
5.4 Nitrogen.....	12
6 Typical connections.....	12
6.1 Continuous purges .....	13
6.2 Connections for maintenance.....	14
6.3 Process connections for startup .....	17
6.4 Pneumatic force to drive valve actuators and pneumatic motors .....	17
6.5 Back-up connections .....	17
6.6 Automatic sweep of reactive gases .....	17
7 Operational and retrofit considerations .....	18
8 References .....	19
 <b>Figures</b>	
Figure 1—Indirect interconnection of incompatible fluids.....	6
Figure 2—Direct interconnection of compatible fluids .....	6
Figure 3—Single purge stream to multiple process lines with incompatible fluids.....	7
Figure 4—Overview of possible systems and interconnections in a HYCO plant.....	8
Figure 5—Segregation of instrument gas and nitrogen headers using cascading pressures.....	10
Figure 6—Nitrogen backup of instrument air with automatic double block and bleed .....	11
Figure 7—Typical reverse flow protection for continuous compressor purges .....	13
Figure 8—Typical reverse flow protection for flare or vent purge .....	14
Figure 9—Hose connection in isolated safe condition, low pressure source .....	15
Figure 10—Hose connection in isolated safe condition, high pressure source.....	15
Figure 11—Hose connection in use .....	15
Figure 12—Hard-piped purge connection with double block and bleed reverse flow protection .....	16
Figure 13—Hard-piped purge connection with removable spool piece for reverse flow protection .....	16
Figure 14—Nitrogen startup connection using blind for reverse flow protection .....	17
Figure 15—Automatic sweep of reactive feed gases .....	18
 <b>Appendix</b>	
Appendix A—Legend for figures (Informative).....	20

## 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 N<sub>2</sub>, H<sub>2</sub> in N<sub>2</sub>). Similar cross-contamination potential exists when air that is backed up by nitrogen is used for the instrument gas (e.g., N<sub>2</sub> in air, air in N<sub>2</sub>). 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.