CGA

Compressed Gas Association

The Standard For Safety Since 1913

# CGA H-13—2017

## HYDROGEN PRESSURE SWING ADSORBER (PSA) MECHANICAL INTEGRITY REQUIREMENTS

FIRST EDITION

## PREFACE

As part of a program of harmonization of industry standards, the Compressed Gas Association (CGA) has published CGA H-13, *Hydrogen Pressure Swing Adsorber (PSA) Mechanical Integrity Requirements*, 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 14-063
HYCO Committee

NOTE—Appendix A (Normative) is a requirement.

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

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# 1 Introduction

Industrial gas companies operate and maintain hydrogen production facilities. Pressure swing adsorption (PSA) exists as the primary method of product purification in most large-scale hydrogen production facilities. The maintenance and inspection of PSA equipment is critical to the overall reliability and safe operation of the facility. Mechanical integrity of the vessels, piping, and piping components is crucial to ensure that this equipment is fit for service.

# 2 Scope and purpose

This publication is an industry-wide guideline for in-service mechanical integrity of PSA units and is intended to contribute to the operational safety and reliability of these units. This publication is not intended to address the details of design and installation of PSA vessels and piping.

This publication applies to PSA units with reformer syngas, refinery off-gas, and other hydrogen containing off-gases. This publication is focused on the parts of the PSA that are subjected to pressure cycles, although some consideration is given to the noncyclic portions of the PSA system. This publication is limited to piping and vessels designed and constructed to a recognized code or standard, for example:

- American Society of Mechanical Engineers *Boiler and Pressure Vessel Code* (ASME Code) [1];
- European Committee for Standardization CEN; European Standard EN 13445, *Unified Pressure Vessels* [2];
- Standardization Administration of China GB 150, *Pressure Vessels* [3];
- German Association of Steam Boiler, Pressure Vessel and Piping Manufacturers AD 2000, *Pressure Vessel Code* [4];
- British Standards Institution (BSI) PD 5500, *Specification for unfired, fusion welded pressure vessels* [5]; and
- Standards Australia AS1210, *Pressure Vessels* [6].

This publication applies to piping and vessels from the feed line isolation (i.e., flange or manual valve) to the valve skid, up to and including the surge drum outlet isolation (i.e., flange or manual valve) and the hydrogen product isolation (i.e., flange or manual valve), to downstream equipment. See Figure 1.

# 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.

### 3.1.5 Can
Indicates a possibility or ability.