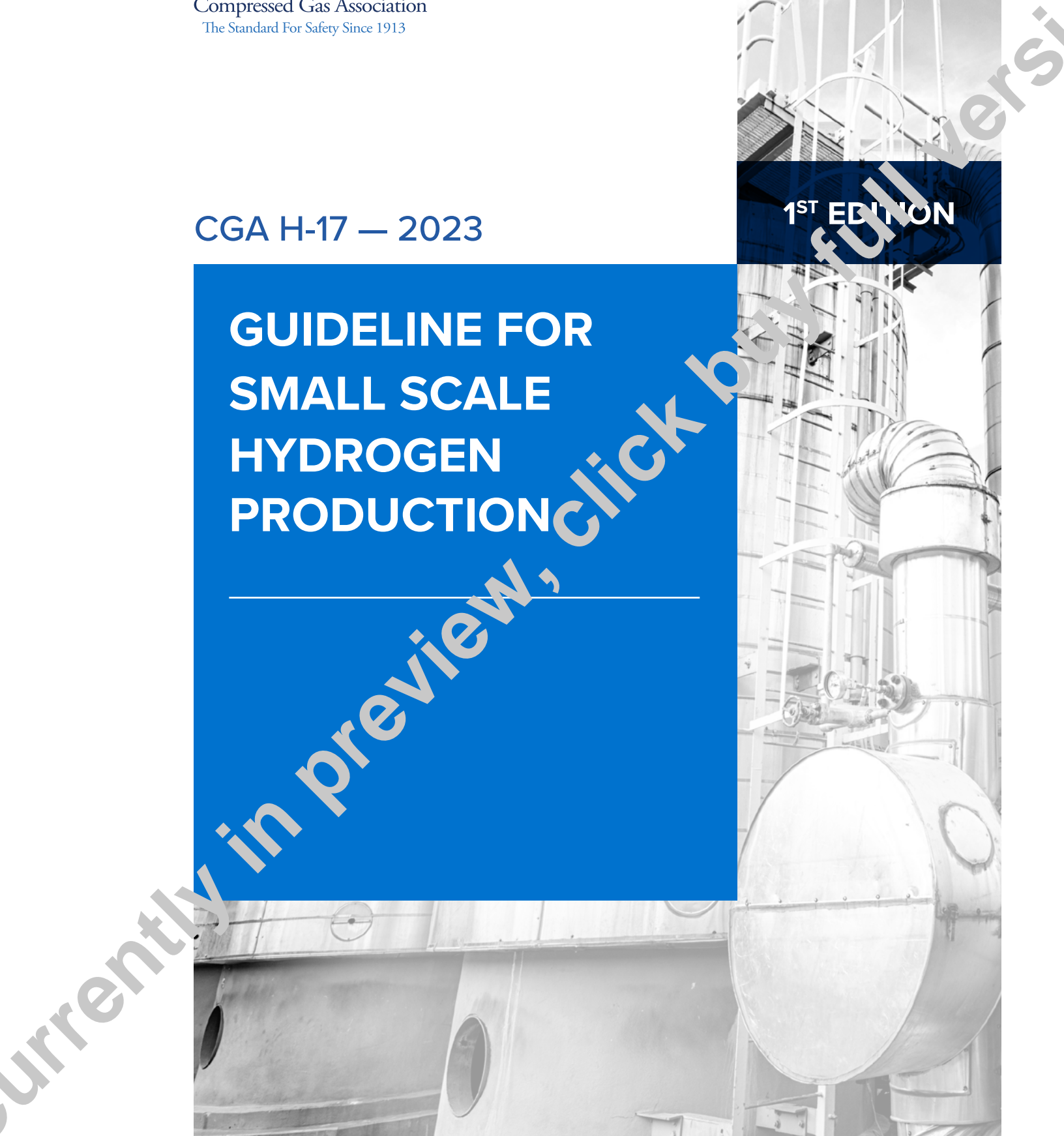




CGA H-17 — 2023

1ST EDITION

**GUIDELINE FOR
SMALL SCALE
HYDROGEN
PRODUCTION**



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PREFACE

As part of a program of harmonization of industry standards, the Compressed Gas Association (CGA) has published CGA H-17, *Guideline for Small Scale Hydrogen Production*, 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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1 Introduction

Large scale hydrogen production has been commercially practiced for decades, and the demand for such production has grown over that period. In response to that demand, industrial gas companies operate and maintain large-scale hydrogen production facilities worldwide and have done so with an exemplary safety record for many years. Most large-scale hydrogen production facilities are based on steam methane reforming (SMR), which is a thermal-based hydrogen production method. Historically, smaller plants have also been based on steam reforming and used in industrial applications. The small facilities typically are sited inside or adjacent to the hydrogen customer's facility.

With the push to include hydrogen as a vehicle fuel, smaller hydrogen production facilities could become more common in order to bring the source of hydrogen closer in proximity to fueling stations and to match the size of the facility with the fuel demand. While some of these production facilities are likely to be based on SMR, other technologies can also be utilized. These plants and the loading facilities associated with them can be more visible and accessible to the public, and end users might have little or no experience in the chemical process industry. In addition, these facilities are more likely than large hydrogen plants to be operated unmanned or partially manned. As a result, there are safety aspects associated with siting and operating small scale hydrogen plants that are not currently addressed in existing publications for HYCO (hydrogen, CO, and/or mixtures thereof) plants and that will be addressed in this publication. Where existing guidelines exist, they will be referenced.

2 Scope and Purpose

2.1 Scope

This publication applies to small hydrogen production units (thermal and electrolytic) that are sited at chemical or refinery plants, as well as those units that are sited at vehicle fueling stations or transfer facilities. For the purposes of this publication, small plants are defined as those with a production capacity between 1666 scfh to 373 000 scfh (45 Nm³/hr to 10 000 Nm³/hr; 40 MSCFD to 9000 MSCFD; or 1070 Nm³D to 241 000 Nm³D).

The thermal hydrogen production methods covered in this guideline are methanol cracking and SMR although some of the guidelines provided can apply to other thermal-based hydrogen production technologies.

2.2 Purpose

This publication will provide a single comprehensive set of safety and operating guidelines to address the multiple hazards associated with the operation of small scale hydrogen production plants. These hazards are particularly acute if the production unit is located next to a liquid fueling station.

This publication will provide information for the end user, whether an experienced industrial user or a first-time industrial or commercial user. This document will reference other related documents and adapt the guidelines of large-scale HYCO facilities to these small scale operations. The following will be addressed:

- best practices for operation of small scale units;
- simplified process descriptions;
- guidance on siting of small scale units, including when next to other flammable material sources. Issues of area classification and vapor cloud explosion (VCE) will be discussed;
- guidelines for how small scale production facilities will interface with a co-located bulk storage facility with compression and high-pressure storage as well as liquid back-up storage and the associated vaporization equipment; and

high level concerns associated with startup, shutdown, and maintenance.