CGA

Compressed Gas Association

The Standard For Safety Since 1913

ANSI/CGA G-13—2016

STORAGE AND HANDLING OF SILANE AND SILANE MIXTURES

THIRD EDITION

Approved American National Standard ANSI

PREFACE:

As part of a program of harmonization of industry standards, the Compressed Gas Association (CGA) has published CGA G-13, *Storage and Handling of Silane And Silane Mixtures*, 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 06-056
Specialty Gases Committee

NOTE— Due to the extensive changes in this standard, technical changes from the previous changes are not identified.

NOTE—Appendices A and B (Informative) are for information only.

NOTE—Appendices C and D (Normative) are requirements.

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1 Introduction

The use of the pyrophoric gas silane as a source of silicon has grown with its consumption by semiconductor manufacturers, video display manufacturers, producers of solar cells, and allied technologies. Systems once imagined to be rare are now commonplace and are in use worldwide. Hazards of this material are noteworthy due to the ability of this material to self-ignite with visible flame upon release or in other cases to be released with either no ignition or delayed ignition. This material has been the subject of technical study by users and suppliers [1].[1] Studies conducted by the Compressed Gas Association (CGA) of the release of both large and small scale quantities of silane have produced new technical data [2, 3, 4]. The data have been used to establish minimum separation distances for delivery system installations as well as for the storage of this material. Distance limitations are used to lessen risk to property and personnel in the event of an inadvertent release. The distances determined recognize the probability for immediate ignition as well as the probability of latent ignition with its potential explosive effects. Although the uncontrolled release of compressed gas is a cause for concern, it is the application of engineering and administrative controls to prevent the release of material that allows the users to handle this material at a reduced level of risk. Suppliers and users have contributed to the development of these controls presented in this standard as a means to provide reasonable safeguards for handling this unique material that is characterized by its chemical and physical nature.

It is intended that this standard applies to storage and use of silane containers with the exception of small containers with 0.5 scf (14 L) or less of silane content.

2 Scope and purpose

2.1 Scope

This standard governs the installation of systems and sources that are used to store, transfer, or contain silane or silane mixtures. This standard includes guidance for siting, design of equipment, piping and controls, and the fabrication and installation of silane gas storage and closed-use systems. Additional guidance on operational steps associated with the use of silane and silane mixtures as well as fire protection, gas monitoring, ventilation, and related safeguards are provided.

2.1.1 Application

The requirements of this standard apply to pure silane and silane mixtures with a silane content greater than 1.37% [5]. A concentration of 1.37% has been chosen as it represents the lower flammable limit (LFL) for this material in air under conditions of normal temperature and pressure. Silane containers include tube trailers, International Organization for Standardization (ISO) modules, cylinder packs with manifolded cylinders, and individual cylinders. Silane mixes containing other hazardous components (e.g., toxics) may have additional requirements beyond this standard. These other requirements shall also be taken into consideration and may exceed requirements in this standard.

2.1.2 Limitations

This standard is not intended to provide requirements beyond the first point of control within a user's facility where connections are made to piping systems associated with internal transmission and/or use of this material.

The following subjects are outside the scope of this standard:

- Equipment downstream of a gas cabinet with the exception of valve manifold boxes (VMBs) when used;
- Off-site transportation of compressed gases regulated by the U.S. Department of Transportation (DOT), European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR), or other regulatory authorities; and
- Requirements within the jurisdiction of local, state, provincial/territorial, and national regulatory authorities with laws or regulations that preempt the provisions of this standard. When such is the case, it is recommended that the authority having jurisdiction (AHJ) be guided by this standard in determining requirements.

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