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CGA G-1.12—2023
MECHANICAL INTEGRITY OF GENERATOR SYSTEMS IN ACETYLENE PLANTS

SECOND EDITION

PREFACE

As part of a program of harmonization of industry standards, the Compressed Gas Association (CGA) has published CGA G-1.12, *Mechanical Integrity of Generator Systems in Acetylene Plants*, 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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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.

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Acetylene Committee

NOTE—Technical changes from the previous edition are underlined.

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1 Introduction

This publication has been developed to give guidance on mechanical integrity (MI) of acetylene generator systems. A mechanical integrity program is intended to ensure that equipment does not fail in a way that causes or enhances a catastrophic release of highly hazardous chemicals.

Elements of a mechanical integrity program ensure that equipment is designed, manufactured, installed, operated, and maintained in a manner that results in safe and reliable performance. MI addresses the effects that equipment suffers in some form of material degradation and damage with an increasing likelihood of failure over the lifetime, sometimes described as aging, and actions taken to identify and mitigate these effects.

The mechanical integrity of an acetylene generator system can be ensured:

- by a documented program of procedures, training, inspections, and tests; and
- through preventive and predictive maintenance based upon good engineering practice, applicable codes, standards, equipment specifications, and manufacturers' recommendations.

2 Purpose and Scope

2.1 Purpose

This publication is intended for designers, manufacturers, and operators within the acetylene industry. Its purpose is to give guidance on development of mechanical integrity programs for acetylene generators. The user of this publication should review the model mechanical integrity plan and create their own specific mechanical integrity plan.

2.2 Scope

This publication gives guidance on the mechanical integrity of acetylene generator systems using calcium carbide added to water, known as wet generation. This guideline is limited to vessels and systems with a maximum operating pressure of 15 psi (1 bar).

This publication includes the following elements of an MI program:

- identification of equipment and systems that are part of an MI program including criteria of selection based on credible failure mechanism and consequence;
- minimum maintenance recommendations for the MI covered equipment and systems;
- minimum inspection and testing recommendations for the MI covered equipment and systems; and
- industry acceptable inspection/testing deficiencies of MI covered equipment and systems.

This publication identifies potential failure scenarios for acetylene generator components. The failure scenario shall be a credible one that does not depend on multiple abnormal conditions taking place at one time. The scenario also does not depend on the failure of a safety protection device such as a pressure relief device.

The publication identifies the consequences of each failure scenario:

- If the component failure leads to an uncontrolled release of a hazardous material, the consequence of the failure is considered a loss of containment. In this publication, the main hazardous material is acetylene. Calcium carbide release is potentially hazardous as, if exposed to water, it will create acetylene carbide lime (also known as calcium hydroxide or lime slurry) is potentially hazardous because the lime water is normally saturated with acetylene and can release acetylene if the temperature rises. Loss of containment can lead to a fire, explosion, environmental impact, or personnel hazard. In this case, the consequence of the component failure is considered a mechanical integrity event. For these consequences, this publication lists the following recommended practices: inspection method, minimum recommended frequency of inspection, and the acceptance criteria for the inspection;