Compressed Gas Association
The Standard For Safety Since 1913

CGA P-91—2021
PLANT INTEGRITY MANAGEMENT

FIRST EDITION

PREFACE

As part of a program of harmonization of industry standards, the Compressed Gas Association (CGA) has issued CGA P-91, *Plant Integrity Management*, jointly produced by members of the International Harmonization Council and originally published by the European Industrial Gases Association (EIGA) as EIGA Doc 190, *Plant Integrity Management*.

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 web site, www.cganet.com.

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

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1 Introduction

This publication has been prepared by industrial gas companies to establish a common position and give guidance on plant integrity management. This topic is also referred to as plant ageing and is increasingly included in authority inspections of plants subject to regulations such as *Directive 2012/18/EU on the control of major-accident hazards involving dangerous substances* (Seveso III Directive) and Occupational Safety and Health Administration (OSHA) Process Safety Management (PSM) in Title 29 of the U.S. *Code of Federal Regulations*, etc. [1, 2].[1]

Ageing is not about the age of the equipment. It is about its condition and how that changes over time. Ageing is the effect whereby equipment suffers some form of material deterioration and damage (usually, but not necessarily, associated with time in service) with an increasing likelihood of failure over the lifetime. For more information, see HSE RR823, *Plant Ageing Study – Phase 1 Report* and HSE RR823 Summary Report. *Managing Ageing Plant—A Summary Guide* [3, 4].

The integrity of equipment can be ensured by:

- operation of the equipment within design conditions;
- documented programme of procedures, training, inspections, tests; and
- preventive/predictive maintenance including inspection based upon good engineering practice, applicable codes, standards, specifications, and manufacturers' recommendations.

It is important to recognise that equipment can be subject to ageing, can contribute to the health, safety, and environmental performance of a plant, and/or can compromise the performance if they fail or collapse. Therefore, a broad view is required when assessing the potential impact of ageing at a given installation.

2 Scope and purpose

2.1 Scope

This publication gives general guidance on integrity management of process plants including, but not limited to, air separation plants, HYCO plants, cylinder filling plants and carbon dioxide, acetylene, and nitrous oxide plants. The goal is to keep hazardous fluids and energy contained in order to maintain safe working conditions for personnel and prevent unacceptable environmental releases. The information contained in this publication applies to both new and existing equipment. Integrity management starts when the equipment is first put into service and continues throughout its lifecycle.

This includes:

- piping;
- static and rotating equipment;
- equipment civil structures and foundations;
- electrical, control, and instrumentation equipment;
- pressure vessels; and
- combinations thereof.

The user is cautioned that this publication is not a design handbook and does not exclude the need for competent engineering judgement and interpretation. To the extent that they exist, national laws may supersede the information included in this publication.

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