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**SAFE HANDLING OF LIQUID
CARBON DIOXIDE CONTAINERS
THAT HAVE LOST PRESSURE**

FOURTH EDITION



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Carbon Dioxide Committee

NOTE—Technical changes from the previous edition are underlined.

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

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1 Introduction

This publication is one of a series compiled by the Compressed Gas Association, Inc. (CGA) to satisfy the demand for information on the production, handling, storage, transportation, and use of compressed and liquefied gases, cryogenic liquids, and related products.

2 Scope and purpose

2.1 Scope

The scope of this publication is concerned primarily with the safe repressurization of stationary or transportable liquid carbon dioxide containers made of low alloy carbon steels and having a minimum design metal temperature above $-110\text{ }^{\circ}\text{F}$ ($-78.9\text{ }^{\circ}\text{C}$).

2.2 Purpose

The purpose of this publication is to provide information to personnel to ensure that carbon dioxide containers that have lost pressure and may contain dry ice are safely repressurized before being returned to service.

Examples are given of repressurization procedures for containers manufactured under the American Society of Mechanical Engineers *ASME Boiler & Pressure Vessel Code*, Section VIII, Division 1, Pressure Vessels (ASME Code) [1].¹

3 Definitions

For the purpose of this publication, the following definitions apply.

3.1 Autorefrigeration

The lowering of the temperature of carbon dioxide as the pressure reduces to maintain temperature and pressure equilibrium.

3.2 Brittle

The property of a material that causes it to break under load with little or no deformation.

3.3 Coincident temperature

The corresponding temperature for a substance at a given pressure at equilibrium.

3.4 Compressed gas

A substance existing only as a gas at a given temperature and pressure.

3.5 Condensation

The process by which a gas converts to a liquid.

3.6 Container

An insulated pressure vessel manufactured in accordance with the ASME Code for the storage of liquid carbon dioxide [1]. Container is interchangeable with vessel or tank.

3.7 Critical size

The size of a flaw in the container material that causes an uncontrolled increase of the length of a crack while under constant stress.

3.8 Depressurization

A reduction of pressure in a container resulting in a container temperature below the minimum design metal temperature (MDMT) or the solidification of the carbon dioxide.

NOTE—Typical causes are the overdrawing of a pressure-building vaporizer, leaks, or a pressure relief device that did not reseal properly.

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