CGA
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2ND EDITION

CGA G-6.12—2024

STANDARD FOR THE SUITABILITY OF CARBON STEEL CONTAINERS FOR STATIONARY CARBON DIOXIDE STORAGE

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Work Item 20-028
Carbon Dioxide Committee

NOTE—Technical changes from the previous edition are underlined.

SECOND EDITION: 2024
FIRST EDITION: 2016

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1 Introduction

The carbon dioxide industry has been using carbon steel pressure vessels for storage of liquid carbon dioxide since the 1940s. These vessels were constructed to standards set by the *ASME Boiler and Pressure Vessel Code*, Section VIII, Division 1 (ASME Code), which is the recognized standard in the United States and Canada for the construction of pressure vessels [1].[1]

The ASME Code was revised in 1989 to further increase the margin of safety for certain grades of steel in low temperature service. Most carbon dioxide vessels manufactured before 1976 were constructed of grades of carbon steel rated with a minimum design metal temperature (MDMT) of –20 °F (–28.9 °C) and would not meet current code requirements for MDMT at stamped maximum allowable working pressure (MAWP) for vessel thickness greater than or equal to 1/2 in. Almost all of these vessels were manufactured with SA-212 or SA-515 carbon steels. It should be noted that SA-212 steel has been discontinued from ASME Code Section II and Section VIII, Division 1 [1].

The performance record of the approximately 10 000 North American steel carbon dioxide containers made of the now restricted grades shows they are safe and reliable when operated within design conditions. There have been only five known incidents in the United States of stationary carbon dioxide container failures. These failures were related to overpressure, improper modification, or existence of fracture critical flaw. Pressure vessel failures can be violent, high energy incidents causing extensive damage.

2 Scope

This publication covers stationary carbon dioxide tanks manufactured with SA-212 or SA-515 carbon steels rated with a MDMT of –20 °F (–28.9 °C), which do not meet current code requirements for MDMT at stamped MAWP.

3 Definitions

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

3.1 Publication terminology

3.1.1 Shall
Indicates that the procedure is mandatory. It is used wherever the criterion for conformance to specific recommendations allows no deviation.

3.1.2 Should
Indicates that a procedure is recommended.

3.1.3 May
Indicates that the procedure is optional.

3.1.4 Will
Is used only to indicate the future, not a degree of requirement.

3.1.5 Can
Indicates a possibility or ability.

3.2 Technical definitions

3.2.1 Authorities having jurisdiction (AHJ)
Local, state, provincial, federal, or other bodies having regulatory authority over the equipment being installed or used.

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