CGA C-12—2020

QUALIFICATION PROCEDURE FOR ACETYLENE CYLINDER DESIGN

SEVENTH EDITION

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The Standard For Safety Since 1913

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Work Item 18-046
Cylinder Specifications Committee

NOTE—Technical changes from the previous edition are underlined.

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

SEVENTH EDITION: 2020
SIXTH EDITION: 2014
FIFTH EDITION: 2007
FOURTH EDITION: 2002

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WARNING: *When performing testing in accordance with this publication, the user shall be fully knowledgeable of the specifics of cylinder design, cylinder failure modes, and operator safety precautions. Conducting tests as described in this publication without the full understanding of cylinder design, cylinder failure modes, and operator safety precautions can result in property damage, personal injury, and/or death.*

1 Introduction

The manufacturer of acetylene cylinders is to use qualification tests in this publication as required in the *Hazardous Materials Regulations* and specifications for acetylene cylinders as prescribed by the U.S. Department of Transportation (DOT) in Title 49 of the U.S. *Code of Federal Regulations* (49 CFR), Parts 100-180 [1].[1] In Canada, specifications for acetylene cylinders are prescribed in CSA B339, *Cylinders, spheres, and tubes for the transportation of dangerous goods* [2]. This standard is mandated by the *Transportation of Dangerous Goods* (TDG) *Regulations* of Transport Canada (TC) [3].

Regulations in 49 CFR 173.303 and CSA B339 specify that an acetylene cylinder consists of a metal shell filled with a porous mass material, and this material shall be charged with a suitable solvent [1, 2]. Cylinders containing the porous mass material and solvent and representative samples of cylinders charged with acetylene shall be tested with satisfactory results in accordance with this publication.

Regulations in 49 CFR 173.301 and CSA B339 also specify that acetylene cylinders are equipped with pressure relief devices (PRDs) capable of preventing a rupture of the normally charged cylinder when subjected to a fire test [1, 2].

The tests outlined in 6.1, 6.2, and 6.3 are tests required to prove that the porous mass material, hereafter called filler, when installed in a completed cylinder with solvent and acetylene will

- stabilize acetylene by preventing progressive decomposition within the filler when subjected to an internal flash or severe impact; and
- not disintegrate or sag when wet with solvent and subjected to normal service (simulated transportation vibrations).

These tests fulfill the requirements of regulations found in 49 CFR 173.303 and CSA B339 [1, 2].

The fire testing outlined in 6.4 fulfills requirements in 49 CFR 173.301 and CSA B339 [1, 2].

2 Scope

This publication defines test equipment and procedures that are applicable for testing DOT and TC specification acetylene cylinders having a service pressure of 250 psi (1723 kPa).[2]

These four tests in 6.1 through 6.4 are required to be conducted when there is a new cylinder design or a design change in the filler or a change in process. These tests shall be conducted before starting quantity production and introduction of a specific cylinder model into service. Cylinders shall pass all tests.

NOTE—DOT regulations do not define what constitutes a design change; whereas, TC regulations define the criteria for a cylinder design change in CSA B339 [1, 2].

Cylinders to be tested shall be selected from a pilot production run of cylinders to permit the use of planned production equipment and procedures. Cylinders to be tested shall be of those produced in an actual production operation.

Test cylinders are to be complete and of a quality for service including shell, filler, solvent, valve, core hole packing, PRDs, and painting. Cylinders used in any of these tests shall be scrapped.

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

[2] kPa shall indicate gauge pressure unless otherwise noted as (kPa, abs) for absolute pressure or (kPa, differential) for differential pressure. All kPa values are rounded off per CGA P-11, *Guideline for Metric Practice in the Compressed Gas Industry* [4].