CGA C-6.1—2006

STANDARDS FOR VISUAL INSPECTION OF HIGH PRESSURE ALUMINUM COMPRESSED GAS CYLINDERS

FIFTH EDITION

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Work Item 06-015
Cylinder Specifications Committee

NOTE—Technical changes from the previous edition are underlined.

NOTE—Appendices A, B, and C (Informative) are for information only.

FIFTH EDITION: 2006
FOURTH EDITION: 2002
THIRD EDITION: 1995
SECOND EDITION: 1984

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1 Introduction

The U.S. Department of Transportation (DOT) and Transport Canada (TC) require that cylinders used for the transportation of compressed gases be requalified periodically by visual inspection followed by hydrostatic testing if they are to remain in service (CGA C-1, *Methods for Hydrostatic Testing of Compressed Gas Cylinders*) [1].[1] However, a cylinder that was charged or filled before the requalification became due may remain in service until it has been emptied. U.S. regulations in Part 180 Subpart C of Title 49 of the *Code of Federal Regulation* (49 CFR) and equivalent Canadian regulations in Section 24 of CSA B339, *Cylinders, Spheres, and Tubes for the Transportation of Dangerous Goods*, identify the inspection and hydrostatic testing requirements for most cylinders [2, 3]. Cylinders fabricated in accordance with DOT, TC, or the former Canadian Transport Commission (CTC) permits or exemptions/special permits shall be requalified as specified in the exemption/special permit or permit. These documents can be obtained from DOT, TC, or the manufacturer.

The approval of the 3AL specification in 49 CFR 178.46 (July 2, 1982) consolidated the majority of the exemptions and special permits for aluminum cylinders into one manufacturing regulation [2]. The Canadian Specification TC-3ALM also consolidates specification CTC-3AL and permits for aluminum cylinders into their regulations [3, 4].

Both DOT and TC have provisions in their regulations for introduction of new cylinder designs, materials, and fabrication techniques. Aluminum cylinders, before implementation of CTC/DOT specification 3AL and TC specification 3ALM, had been manufactured under special permits and/or exemptions E 6498, E 7042, E 8107, E 8364, E 8422, or CTC SP 890 or SP 922. Permit or exemption numbers are stamped on the shoulder of the cylinder. These cylinders may be continued in use in Canada. In the United States, these cylinders with the exception of CTC SP 922 may be continued in use but shall be remarked in compliance with 49 CFR 173.23 at the time of the first retest following July 2, 1982 [1]. Care should be exercised that other exemption number cylinders should not be remarked.

In the United States, DOT exemptions E 6498, E 7042, E 8107, E 8364, and E 8422 were previously issued that identified the manufacturing, usage, and inspection requirements of these cylinders. These exemptions have been superseded by DOT specification 3AL, and copies of the exemptions are no longer required. Cylinders marked with S.P. preceding the previously noted exemption numbers, designating special permits, also are covered by the DOT specification 3AL. Some cylinders with the previously noted markings might be preceded by CTC indicating compliance with the CTC requirements, for example, CTC/DOT E 6498-1800. Exemption and special permit cylinders shall be remarked at the time of the first hydrostatic testing occurring since July 2, 1982. Requirements for remarking can be found in 49 CFR 173.23(c), which states that after July 2, 1982, a seamless aluminum cylinder manufactured in conformance with and for use under DOT exemption E 6498, E 7042, E 8107, E 8364, or E 8422 may be continued in use if marked before or at the time of the next retest with the specification identification 3AL immediately above the exemption number, or if the DOT mark (i.e., DOT-3AL 1800) is added in proximity to the exemption marking [2]. See Figures 1 and 2 for examples of exemption marked cylinders.

Experience in the inspection of cylinders is an important factor in determining the acceptability of a given cylinder for continued service. Users lacking this experience or having questionable cylinders should consult the manufacturer or other knowledgeable sources.

2 Scope

This publication has been prepared as a guide for the visual inspection of aluminum compressed gas cylinders with service pressures of 1800 psig (12 410 kPa) or greater.[2] It is general in nature and does not cover all circumstances for each individual cylinder type or lading.

Additional publications prepared by the Compressed Gas Association, Inc. (CGA), that might be helpful include:

– CGA C-1, *Methods for Hydrostatic Testing of Compressed Gas Cylinders* [1];

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

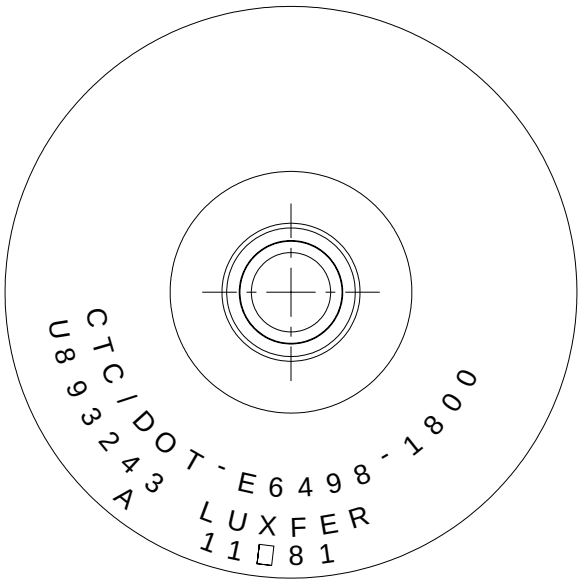
[2] kPa shall indicate gauge pressure unless otherwise noted as (kPa, abs) for absolute pressure or (kPa, differential) for differential pressure. All kPa values are rounded off per CGA P-11, *Metric Practice Guide for the Compressed Gas Industry* [5].

– CGA C-6, *Standards for Visual Inspection of Steel Compressed Gas Cylinders* [6];

– CGA C-6.2, *Guidelines for Visual Inspection and Requalification of Composite High Pressure Cylinders* [7]; and

– CGA C-6.3, *Guidelines for Visual Inspection and Requalification of Low Pressure Aluminum Compressed Gas Cylinders* [8].

Since there has been little or no experience with aluminum cylinders in the pressure range from 900 psig to 1800 psig (6200 kPa to 12 410 kPa), this publication is directed at cylinders with a service pressure of 1800 psig (12 410 kPa) or greater. CGA C-6.3 is available for cylinders with lower service pressure [8].



Note—It is recommended that existing exemption markings remain intact.

Figure 1—Exemption marked cylinder

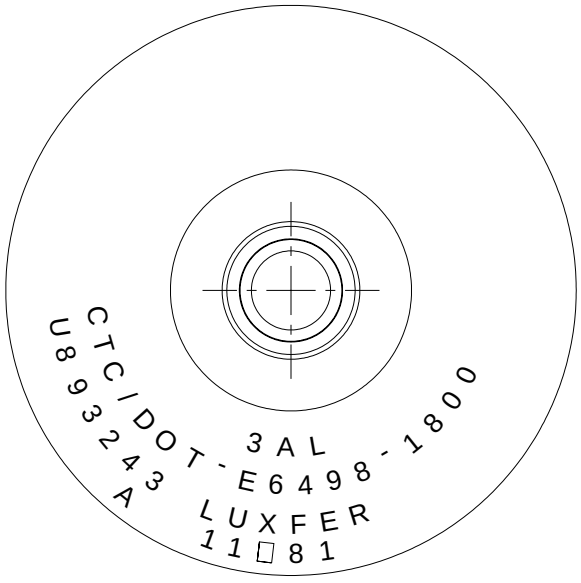


Figure 2—3AL marked exemption cylinder