

جمعية الشرق الاوسط
للغازات الصناعية

MEGA

RECERTIFICATION GUIDELINES FOR HIGH PRESSURE CYLINDERS

TD 30/18/E

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1. Introduction

In the Middle East companies source gases and gas cylinders from a variety of international sources. The majority of the cylinders used in this region were manufactured to European or USA standards. There are also a number of cylinders made to various national standards, notable Chinese standards, and others.

The vast majority of gas cylinders requires requalification at prescribed intervals .MEGA recognizes that different standards of manufacture may call for different methods or different time intervals for such requalifications. This document covers the basic principles that should be applied and followed.

Compliance with the below standard will mitigate the risks and liabilities associated with lack of, or improper requalification of compressed gas cylinders.

2. Scope and Purpose

This document outlines the requalification requirements for high pressure cylinders made of steel, aluminum or composite materials. The requirements of the principal standards are covered, there may also be some cylinders in use made to specifications other than the ones specifically mentioned. Low-pressure cylinders, cylinders designed to carry Dissolved Acetylene; low-pressure liquefied gases or Refrigerated Liquids are not covered in this standard. They may be covered in other MEGA standards.

3. Definitions and Abbreviations

Bar	A metric unit of pressure
BS	British Standard
CGA	Compressed Gas Association
DOT	Department of Transportation (of the United States of America)
EIGA	European Industrial Gases Association
EN	European Norm (standard)
GB	Chinese Standard
ISO	International Standards Organization
Psi	Pounds per Square Inch, a non-metric unit of pressure

High Pressure Cylinder when used in this standard, it means a compressed gas cylinder with a design working pressure of more than 900 psi (62 bar)

4. General Principles

There are some significant differences between cylinder specifications, including retest intervals, derivation of test pressure, pass/fail criteria and stamping requirements. Considering that there is no regulation for testing in most of the Middle East countries, MEGA therefore advises that:

- cylinders made to European/ International Standards should be tested in accordance with European / International rules
- cylinders made to DOT specifications should be tested in accordance with DOT rule
- for any other cylinders, if there is no clear correlation with one of these standards, EN/ISO/DOT), it's recommended to use DOT as it's the most stringent standard of them (5Y testing interval).

For Chinese cylinders: MEGA advised to be keep testing it each 5 Years (as it is currently) considering that there is no bad experience in dealing with it where no incidents reported regarding fail in testing process or incident of rapture since more than a decade in service, however, MEGA will remain monitoring its performance through any quality claim or safety incident reported for more investigation and involvement if needed.

4.1 Requalification requirements may be found in the following documents

4.1.1 International Standards

ISO 6406 Gas Cylinders- Seamless steel gas cylinders-Periodic inspection and testing
ISO 10461 Gas cylinders -- Seamless aluminium-alloy gas cylinders -- Periodic inspection and testing

4.1.2 DOT Cylinders

Code of Federal Regulations, Chapter 49, section 180.209. Commonly referred to as 49CFR 180.209 – Requirements for requalification of specification cylinders.

Users are cautioned to be sure to have the latest revision of these and other applicable documents.

5. Retest Procedures and Intervals

It is beyond the scope of this pamphlet to provide detailed, step-by-step requirements and procedures. Users should consult the original source documents, outlined in section 4.1. They are also cautioned to be sure to refer to the most recent version, as these regulations are reviewed and amended from time to time.

5.1 General Procedures

The following are the required steps, usually carried out in this order:

- External visual inspection (this may require cleaning/brushing/shot blasting)
- Inspection of valves and fittings
- Internal inspection, including cylinder neck and neck threads
- A cylinder tare weight check is required in some cases
- Hydrostatic pressure test. This may include measurement of volumetric expansion.
- Removal of water and complete drying
- Repeat of internal inspection
- Stamping /marking of the cylinder
- Completion of the test data reports
- Re-valving, using the same or a replacement valve
- Painting of the cylinder, as required

5.1.1. Some noteworthy provisions in some of the procedures

5.1.1.1. Visual Inspection

The ISO standards provide guidelines for visual inspections. DOT refers to specific CGA pamphlets for steel, aluminum and composite cylinder visual inspections.

5.1.1.2. Hydrostatic Pressure Test

The ISO standards describes the apparatus and methods that may be used. DOT refers to a CGA pamphlet describing the procedure to be used. DOT also requires registration of equipment and personnel with them. They will issue a permit to approved retesters of DOT cylinders. It is also important to note that the test pressure to be used is substantially different between ISO and DOT standards.

5.1.1.3 Stamping / Marking of the Cylinders

Both DOT and ISO standards require stamping of the test date (month-year) after a successful requalification. The ISO standards require retesters to stamp a symbol of the inspection body or test station. The DOT assigns a unique mark to every retester that must be stamped on all prequalified cylinders. DOT may also require additional markings to be stamped after the test date.

5.1.1.4 Reports

Reporting requirements for ISO and DOT are similar, and both give suggestions as to layout of the report form.

The principal differences are

- ISO standards requires reports using bar as a unit of pressure, while DOT uses psi.

- DOT requires additional measurements and stampings for some cylinders, in order for a ten-year retest interval to be valid, and to be able to fill some cylinders to a pressure ten percent higher than the stamped service pressure.

5.2 Requalification Intervals

There are some differences in the Requalification Intervals between the standards. Once again, it is beyond the scope of this pamphlet to list all possibilities, and any retester must always refer back to the original and current copy of the actual regulations. General overviews of the requirements of the standards for seamless steel cylinders are as follows:

ISO 6406 and 10461

Description	Interval (years)
Compressed Gases (Air, Ar, He, H2, N2 etc)	10
Liquefied Gases (CO2, N2O) etc	10
Toxic Gases, CO	5
Corrosive Gases	3
Gas Mixtures	5 or 10 depending on classification

DOT		
Cylinder Specification	Interval (years)	Cylinder Type
DOT 3E	retest not required	lecture bottle, sample cylinder
DOT 3A,3AA	5 or 10*	steel cylinder
DOT 3AAX, 3T	5 or 10 *	tube
DOT 3AL	5	aluminum cylinder
DOT 3HT	3	cylinders limited to aircraft use
DOT 39	n/a	may not be refilled ('disposable')

- * if stamped with a "star" and in specific gas services only
- Cylinders stamped DOT “ SP xxxx ” or “E-xxxx” have been made to an exemption or special permit, and a copy of the exemption or special permit must be consulted to ascertain the requalification requirements.

5.3 Non-Standard Cylinders

Special purpose cylinders such as composite cylinders, cylinders used as Self Contained Breathing Apparatus (SCBA) or Self Contained Underwater Breathing Apparatus (SCUBA) tanks may require different requalification intervals and be subject to additional requirements, including a finite lifetime beyond which they cannot be used. Consult manufacturer recommendations and specification, Special Permit or Exemption requirements.

5.4 Non-Hydrostatic Pressure Test Requalification Methods

Some jurisdictions allow requalification of high pressure cylinders by Ultrasonic Testing, and of high pressure tubes by Acoustic Emission Resting. These methods are beyond the scope of this publication.

6. Cylinders which become due for requalification while in use or in storage

All standards require that cylinders may not be refilled if they are due for requalification. There is no requirement that states that they may not be used and all major world gas associations take the position that it is safe to continue using a cylinder beyond its retest date. See MEGA publication TN 04/14/E *Cylinders that become out-of-test while at customer sites*.

7. Reference Materials

In addition to the publications mentioned in this publication, below is a list of reference materials that may be helpful

CGA C-1	<i>Methods for hydrostatic testing of compressed gas cylinders</i>
CGA C-5	<i>Cylinder service life-seamless steel high pressure cylinders</i>
CGA C-6	<i>Standards for visual inspection of steel compressed gas cylinders</i>
CGA C-6.1	<i>Standards for visual inspection of high pressure aluminum compressed gas cylinders</i>
CGA C-6.2	<i>Guidelines for visual inspections and Requalification of fiber-reinforced high pressure cylinders</i>
CGA C-8	<i>Standard for requalification of DOT-3HT, CTC-3HT and TC-3HTM seamless steel cylinders</i>
CGA C-18	<i>Methods for acoustic emission requalification of seamless steel compressed gas tubes</i>
EIGA 79/13	<i>Cylinder Retest Stations</i>