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Document Name: CGA C-13: Guidelines for Periodic Visual Inspection and Requalification of Acetylene Cylinders

CFR Section(s): 49 CFR 173.303(e)

Standards Body: Compressed Gas Association

APPROVED

Official Incorporator:
THE EXECUTIVE DIRECTOR
OFFICE OF THE FEDERAL REGISTER
WASHINGTON, D.C.

CGA C-13—2000

GUIDELINES FOR PERIODIC VISUAL INSPECTION AND REQUALIFICATION OF ACETYLENE CYLINDERS

FOURTH EDITION

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Docket 97-20
Acetylene Committee

NOTE—Underlines are used to identify technical changes from the previous edition.

FOURTH EDITION: 2000
THIRD EDITION: 1992
SECOND EDITION: 1985
FIRST EDITION: 1978

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1 Introduction

This publication is one of a series compiled by the Compressed Gas Association, Inc. (CGA) to meet the demand for information on compressed gases, cryogenic liquids, and related products.

2 Scope and purpose

2.1 Scope

This publication has been prepared as a guide for the inspection and requalification of the acetylene cylinder shell and porous mass. It should be of interest to acetylene cylinder manufacturers, acetylene production and distribution personnel, authorized acetylene cylinder reinspection facilities, welding gas distributors, safety personnel, and users of acetylene.

2.2 Purpose

This publication covers both a thorough external prefill visual inspection of acetylene cylinders and the periodic inspections of the cylinder shell and porous mass, which are required for acetylene cylinder requalification.

The guidelines contained in this publication apply to acetylene cylinders manufactured:

- under Department of Transportation (DOT) Specifications 8 and 8AL found in *49 Code of Federal Regulations* (CFR) 178.59 and 178.60 [1];[1]
- under Specifications TC 8WM and 8WAM found in Canadian Standards Association (CSA) standard B339, *Cylinder, Spheres, Tubes and Other Containers for the Transportation of Dangerous Goods* [2]; and
- required for service by the *Transportation of Dangerous Goods Regulations* [3] of Transport Canada (TC) and CSA B340, *Selection of Cylinders, Spheres, Tubes, and Other Containers for the Transportation of Dangerous Goods, Class 2* [4].

Until 1970, U.S. regulations applicable to acetylene cylinders were under the authority of the Interstate Commerce Commission (ICC). Those cylinders identified by an ICC stamping are now regulated according to DOT requirements. In Canada, the CSA Standards came into effect in 1987. Before 1987, other regulatory agencies issued these cylinder specifications (the most recent being Canadian Transport Commission [CTC]). Canadian cylinders marked with CTC, Board of Transport Commissioners (BTC), or Canadian Railway Commission (CRC) stampings must be requalified and inspected in accordance with the requirements of CSA B339 [2].

The guidelines in this publication also apply to an acetylene cylinder with a non-monolithic or monolithic porous mass manufactured under exemptions or special permits issued by the DOT or TC.

3 Compliance schedule

In the United States, regulations covering acetylene cylinder requalification became effective January 15, 1992, and similar requirements were enacted in December 1991 in Canada by TC [1, 3]. Requalification requirements differ slightly for cylinders manufactured before or after 1991, as follows:

3.1 Cylinders manufactured before 1991

Requalification of the shell must be made within 10 years of January 1, 1991 and every 10 years thereafter. A one-time requalification of the porous mass is required within 20 years of January 1, 1991, but no sooner than 5 years from the date of manufacture. All in-service cylinder shells must be requalified by January 1, 2001, and the porous mass must be requalified by January 1, 2011. Cylinders not requalified within this time frame must

[1] References in this publication are shown by bracketed numbers and are listed in order of appearance in Section 6, References.

be withdrawn from service until requalification.[2] It is the cylinder owner's responsibility to ensure the cylinder porous mass and shell are requalified in accordance with this guideline.

3.2 Cylinders manufactured 1991 and after

Requalification of the shell shall be made within 10 years from the date of cylinder manufacture and every 10 years thereafter. A one-time requalification of the porous ass shall be performed within 20 years, but no sooner than 5 years from the date of manufacture (see table 1).

Table 1—Compliance schedule

Date of cylinder manufacture	Shell visual requalification		Porous filler requalification	
	Initial	Subsequent	Initial	Subsequent
Before January 1, 1991	Before January 1, 2001	10 Years	Before January 1, 2011	Not required
On or after January 1, 1991	10 Years[1]	10 Years	20 Years[2]	Not required

[1] Years from date of cylinder manufacture

[2] For cylinders manufactured on or after January 1, 1991, requalification of the porous filler must be performed no sooner than five years, and no later than 20 years from the date of manufacture.

4 Necessary inspection experience

Rejection or acceptance of acetylene cylinders for continued use in accordance with the limits stated in this publication represents practice, which has been satisfactorily used in the compressed gas industry. Experience in the inspection of an acetylene cylinder's shell and porous mass is an important factor in determining the acceptability of that cylinder for continued service. Acetylene cylinder owners or acetylene cylinder charging companies lacking the authorization, and having cylinders requiring requalification, shall return the cylinders to an authorized acetylene cylinder reinspection facility.

5 Definitions

5.1

For the purpose of this publication the following definitions shall apply:

5.1.1 Authorized reinspection facility

A facility registered with the Office of Hazardous Materials Regulation (OHMR) of DOT or the Director General, Transport Dangerous Goods Directorate of TC, as appropriate, for the requalification of acetylene cylinders.

5.1.2 Condemned

No longer fit for service, nonrepairable, and must be scrapped. (See 8.6.2.)

5.1.3 Corrosion

Loss of wall thickness due to rusting or other chemical processes.

5.1.3.1 Crevice corrosion

Line corrosion that occurs in the area of the intersection of the footring or headband and the cylinder. The bottom head of the cylinder may be especially susceptible to excessive and harmful corrosion.

[2] Cylinders whose porous mass or shell, or both, that were requalified prior to January 15, 1993 in accordance with the procedures and limits of CGA C-13 are considered to have met the applicable requirements of CGA C-13. Subsequent requalification schedules shall be based on the date of the initial requalification of the cylinder (see table 1).

5.1.3.2 General corrosion
Corrosion of uniform nature that covers a given surface area.

5.1.3.3 Line corrosion
General corrosion or pitting in a continuous pattern or where pits are connected in a narrow band or line. This condition is more serious than isolated pitting.

5.1.4 Cut, gouge, or dig
A deformation of the cylinder shell normally caused by the cylinder contact with a sharp object that decreases the metal thickness at the point of contact.

5.1.5 Dent
A deformation of the cylinder shell that does not materially decrease the metal thickness, normally caused by contact with a blunt object.

5.1.6 Flashback
A decomposition that propagates through the valve passage into the cylinder, either as a result of improper operation of the torch or from other causes external to the cylinder.

5.1.7 Minimum allowable head thickness
The minimum bottom head thickness and the minimum top head thickness required by the specification under which the cylinder was manufactured. It may also refer to the original bottom head thickness, the top head thickness, or the typical minimum head thickness covered in the note following table 2.

Table 2—Minimum allowable wall thickness required by DOT or TC specifications

DOT & TC Specification No.	Approximate diameter		Typical minimum sidewall thickness	
	inches	(mm)	Inches	(mm)
8/8WM	12	(305)	0.150	(3.810)
8/8WM	10	(254)	0.125	(3.175)
8/8WM	8	(203)	0.110	(2.794)
8/8WM	7	(178)	0.100	(2.540)
8/8WM	6	(152)	0.090	(2.286)
8/8WM	4	(102)	0.070	(1.778)
8AL/8WAM	16	(406)	0.168	(4.268)
8AL/8WAM	12	(305)	0.123	(3.125)
8AL/8WAM	10	(254)	0.110	(2.794)
8AL/8WAM	8	(203)	0.100	(2.540)
8AL/8WAM	7	(178)	0.087	(2.210)
8AL/8WAM	6	(152)	0.087	(2.210)
8AL	4	(102)	0.070	(1.778)

NOTE—Cylinders manufactured with top or bottom heads convex to pressure that have been found to have head thickness less than two times the minimum sidewall thickness shall be condemned or removed from service. For those cylinders with top or bottom heads convex to pressure, the actual head thickness shall be generally considered to be twice the typical minimum sidewall thickness. The original sidewall and head thickness can be determined from the cylinder manufacturer, or by ultrasonic measurement of the cylinder sidewall and head in an area of the cylinder shell where corrosion has not taken place. For cylinders with top or bottom heads concave to pressure, the actual head (bottom or top) thickness shall be considered to be equal to the typical minimum sidewall thickness.

5.1.8 Minimum allowable wall thickness
The minimum sidewall shell thickness required by the specification under which the cylinder was manufactured. It may also refer to the original sidewall thickness or the typical minimum sidewall thickness listed in table 2.

5.1.9 Pitting

Corrosion of an isolated nature that occurs at discrete points.

5.1.10 Remove from service

Segregate from acceptable cylinders. After further evaluation, the cylinder may be repaired or rebuilt in accordance with DOT or TC regulations.

6 Construction of acetylene cylinders

6.1 Porous mass (filler)

Acetylene compressed to increasingly higher pressure becomes less stable and can decompose into its constituent elements, carbon and hydrogen. To reduce the possibility of a decomposition and to suppress its propagation, acetylene cylinders are constructed in a unique way that sets them apart from all other compressed gas cylinders. For example, they are filled with a porous mass composed of small interconnected pores or cells. The total volume of these millions of cells can be as much as 92% of the volume of the cylinder. The purpose of the porous mass is to suppress an acetylene decomposition, should it be initiated, thereby reducing the potential of a violent cylinder failure. Ideally, the heat of decomposition of the acetylene in one cell is absorbed by the walls of the cell and interconnected passages so that the temperature is reduced below that required to propagate the decomposition. If no porous mass were present or if a void of significant size in the porous mass existed within the cylinder, the decomposition could progress at a rate that could cause violent failure of the cylinder.

6.1.1 Non-monolithic porous mass

Since the early 1900s, acetylene cylinders have been constructed with many different porous mass materials. Some of the earliest masses were made with corn pith, balsa wood, animal hair, asbestos fiber, or granular solids similar to dry clay or porous stone. Some porous masses consisted of a mixture of two or more of these ingredients. Some asbestos-filled cylinders used multiple discs of compressed asbestos held together with a water glass (sodium silicate) binder. These are classed as non-monolithic porous masses. Because some of these porous masses may have shrunk or settled in normal service creating excessive clearances or voids, most of these cylinders have been rebuilt or condemned. Cylinders containing non-monolithic porous masses were made as late as the 1950s. From the non-monolithic porous masses listed previously, only balsa wood porous masses are considered safe for continued service.

6.1.2 Monolithic porous mass

The second category of porous masses is called monolithic, meaning a one-piece porous mass. The ingredients are mixed together with water, put into the cylinder shell as a slurry, and then the slurry solidifies into a single mass. These porous masses first appeared about 1925 and used a mixture of asbestos fiber, charcoal, finely divided silica, and Portland cement as a binder. The disadvantages of these early monolithic cylinders were relatively low porosities of 70% to 80% and heavy weight. Porous masses beginning in the late 1940s used calcium silicate as the binder and are sometimes referred to as lime-silica porous masses. Beginning in the early 1980s some lime-silica porous mass cylinders used glass fibers, carbon, or other reinforcement fibers. Porosities for the lime-silica porous mass cylinders vary between 83% and 92%. This type of porous mass has a tendency to shrink slightly upon drying during manufacture, leaving some clearance between the porous mass and shell. Maximum allowable clearances at the time of manufacture are established in DOT 8 and 8AL and CSA Specifications 8WM and 8WAM. For additional information on the chronological history of acetylene cylinder construction, see Appendix A.

6.2 Solvent

The porous mass contains a prescribed amount of solvent, commonly acetone, which has a high solvency for acetylene. When the acetylene is charged into a cylinder, it goes into solution in the solvent (it is absorbed by the solvent). Through the use of the porous mass and solvent, it is possible for a cylinder to contain approximately eight times the volume of acetylene that could safely be compressed into the same cylinder without solvent.

Due to density variations and gas absorption characteristics, different solvents must not be mixed.

6.3 Core-hole with packing

Most acetylene cylinders also have another unique feature and that is a core-hole with packing immediately under the valve (see figure 1). The packing consists of one or more brass, Monel, or stainless steel screens, one of which is in contact with or incorporated into the base of the valve. The core-hole also may contain one or more felt discs, charcoal, asbestos fibers, or other packing material.

Core-holes may be up to 1 inch (25.4 mm) in diameter, and as much as 6 inches (152 mm) deep; other cylinders may have no depression. An early practice was to pack granular charcoal to all but the top 0.25 inch (6.35 mm) with a felt disk and a screen placed between it and the base of the valve.

The core-hole packing may contribute to the capability of a cylinder to cope with a flashback. Whenever a cylinder valve is removed or replaced, the core-hole packing should be renewed. When the core-hole packing is renewed, sufficient packing should be used so that it is compressed by the base of the valve.

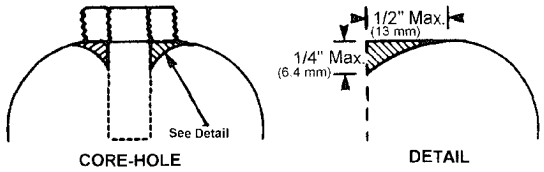


Figure 1—Top clearance of monolithic filler cylinder

6.4 Fusible metal pressure relief device (fuse plug)

Each cylinder has one or more fusible metal pressure relief devices, intended to release the acetylene and prevent excessive internal pressure whenever the temperature of the fusible metal alloy is raised to approximately the boiling point of water, 212 °F (100 °C). The actual melting range is between 208 °F and 224 °F (97.8 °C and 106.7 °C). The fusible metal is usually contained in a channel in an externally threaded plug, although in some cylinders, especially the small sizes, the channel is in the body of the valve. Regardless of placement, the relief device is not designed so it will function because of pressure. The temperature must cause the alloy to melt before it can function to relieve the pressure. See CGA S-1.1 for additional requirements [5].

6.5 Shell

Steel shall be used for acetylene cylinder construction and shall meet DOT 8, 8AL, or TC 8WM, 8WAM specifications.

7 Acetylene cylinder inspection

One of the most important aspects in maintaining acetylene cylinders in an acceptable condition for charging, transportation, and use is an adequate inspection before each cylinder charging. Cylinders shall be inspected for shell defects such as dents, gouges, grinding scars, torch or arc burns, fire damage, corrosion, and damaged footrings and headbands. The cylinder valve and valve outlet shall also be inspected for defects such as a damaged valve stem or broken handwheel, and excessive wear or damage to the valve outlet threads.

7.1 Prefill cylinder inspection

Each acetylene cylinder shall be inspected for the conditions listed below. Some guidelines for inspecting each of these conditions, including acceptance and rejection criteria, are contained in the following Section 8 paragraphs listed opposite each condition:

Condition or defect	Paragraph
unauthorized shell repairs	8.3
corrosion or pitting f sidewall or heads	8.4.2.1.1, 8.4.2.1.2, 8.4.2.1.3,
dents	8.4.3
cuts, digs, or gouges	8.4.4
fire damage	8.4.5, 8.4.5.1, 8.4.5.2, 8.4.5.3
torch or arc burns	8.4.6
bulges	8.4.7
fusible metal pressure relief devices	8.4.8
attachments (footring, headband, marking plate)	8.4.9, 8.4.9.1, 8.4.9.2
footring area corrosion	8.4.10

7.1.1 Cylinder valve

Each cylinder valve shall be inspected to ensure it is free of defects such as a damaged stem, a damaged or missing handwheel, excessive wear on outlet threads, and nicks or damage to the valve outlet regulator mating surface. Reducing bushings are not permitted.

NOTE—Acetylene cylinder valves containing left handed bonnet nuts shall be replaced. Left handed bonnet nuts can be determined by notches or cutouts in the wrench flats of the bonnet nut.

If the cylinder valve is removed, it is recommended that the cylinder core-hole packing is removed and the cylinder porous mass is inspected.

7.1.2 Stamped markings

Each cylinder shall be inspected for the presence of complete, readable, and required stamped markings. Also, each cylinder shall be inspected for the evidence of unauthorized alterations to the tare weight or other stamped markings.

7.1.3

Each cylinder shall be inspected for signs of any other type of damage or mechanical defect that may significantly weaken the shell or porous mass or affect the operability of the cylinder valve, external spud threads, or fusible metal pressure relief devices.

7.1.4

Any cylinder that exhibits any of the conditions listed in 7.1.1 through 7.1.3 shall be removed from service.

7.2 Filling and post filling inspection

Each cylinder shall be inspected for leaks. Leaks can originate in a welded or brazed seam, at a threaded opening, valve, fusible metal pressure relief device, or from digs, gouges, or pits. Cylinders should be carefully examined for leaks both during and after charging. *Acetylene cylinders shall be inspected for leaks after charging.* Any cylinder found to have a leak shall not be shipped but immediately removed from service.

8 Acetylene cylinder requalification

8.1 Authorized inspectors

Acetylene cylinder requalification may be performed only by authorized acetylene cylinder reinspection facilities registered either with DOT's Associate Director for Hazardous Materials Regulations or the Director General of

the Transport Dangerous Goods Directorate of TC. Inspection of an acetylene cylinder's shell and porous mass shall be made only by competent and trained persons. The inspection results shall be recorded on an appropriate form (see 8.7). The completed copies of the forms shall be kept by the cylinder owner, his authorized agent, or the reinspection company until the next requalification period or until the cylinder is again requalified, whichever occurs first.

8.2 Cylinder inspection equipment

8.2.1 Shell inspection equipment

8.2.1.1 Depth gauges and scales

Exterior shell corrosion, dents, bulges, gouges, or digs are measured normally by direct measurement with scales or depth gauges. A rigid straightedge or other suitable device is placed over the defect, and a scale is used to measure the distance to the bottom of the defect. There are also available commercial depth gauges, which are especially suitable for measuring the depth of small cuts or pits. It is important when measuring such defects to use a straightedge that spans the entire affected area.

8.2.1.2 Ultrasonic devices

There are a variety of commercial ultrasonic devices that can be used to measure wall thickness.

8.2.2 Porous mass inspection equipment

Specifications DOT 8, 8AL, and TC 8WM and 8WAM provide for overall shrinkage of the porous mass within the cylinder shell. To measure the longitudinal clearance between the interior surface of the shell under the valve opening and the porous mass, various feeler gauges of known thickness are used. Examination of the porous mass clearance and condition is made through the cylinder valve opening and fusible metal pressure relief device openings. If necessary, a dental mirror and a light source that is acceptable for hazardous locations can be used for a more detailed inspection.

8.3 Inspection for unauthorized cylinder shell repairs

Cylinders with unauthorized repairs (such as shell defects filled with plastic filler, grinding, welding, brazing, or soldering) shall be condemned. Authorized shell repairs are set forth in 49 CFR 173.34 or CSA B339 [1, 2].

8.4 External inspection of acetylene cylinder shells

This section covers external inspection of acetylene cylinder shells, which are exempt from the DOT/TC hydrostatic test requirements because of the internal porous mass. Acetylene cylinder shells are not subjected to internal corrosion and do not require internal shell inspection.

8.4.1 Preparation for shell inspection

After determining that the cylinder has been safely drained to atmospheric pressure or below 15 psig (103 kPa), cylinders shall be adequately cleaned to facilitate the examination of the shell surface. Layered rust is an indication of severe corrosion. In weld and crevice areas, judgment of the severity of corrosion should be made before removal of layered rust unless measurements of the remaining metal thickness can be made. Cylinder handling equipment should be provided to facilitate inspection of the cylinder bottom. Bottom head inspection is essential because experience has shown this area to be the most susceptible to severe corrosion.

8.4.2 External sidewall and head inspection

Cylinder shells shall be examined as follows for corrosion, general distortion, or any other possible defect that might indicate a weakness, which would render the shell unfit for further service. See tables 4 through 7 for minimum and maximum wall thickness at defects.

8.4.2.1 Corrosion and corrosion limits

To establish corrosion limits for all types, designs, and sizes of acetylene cylinders and include them in the guideline is not practical. Failure to meet any of the following general rules is cause for condemning a cylinder.

8.4.2.1.1 Isolated pitting

A cylinder shall be condemned when the remaining sidewall or head thickness in an area having only isolated pitting is less than one-third of the minimum allowable wall or head thickness. Figure 2 illustrates an example of isolated pitting.

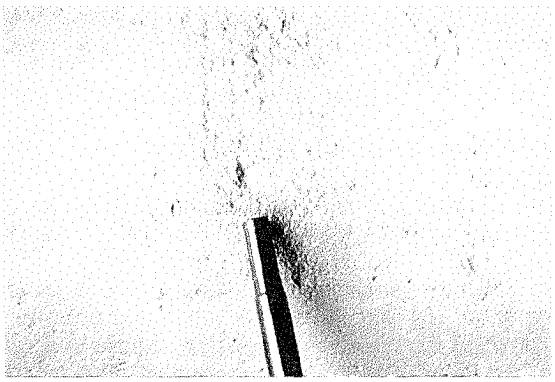


Figure 2—Isolated pitting

8.4.2.1.2 Line or crevice corrosion

Line or crevice corrosion is more serious than isolated pitting. Figures 3 and 4 illustrate examples of line and crevice corrosion. A cylinder shall be condemned when line or crevice corrosion on the cylinder sidewall or head is 3 inches (76 mm) or longer, and the remaining thickness in the corrosion area is less than three-fourths of the minimum allowable wall thickness. A cylinder shall also be condemned when line or crevice corrosion on the cylinder sidewall or head is less than 3 inches (76 mm) long and the remaining sidewall thickness in the corrosion area is less than one-half of the minimum allowable wall thickness.

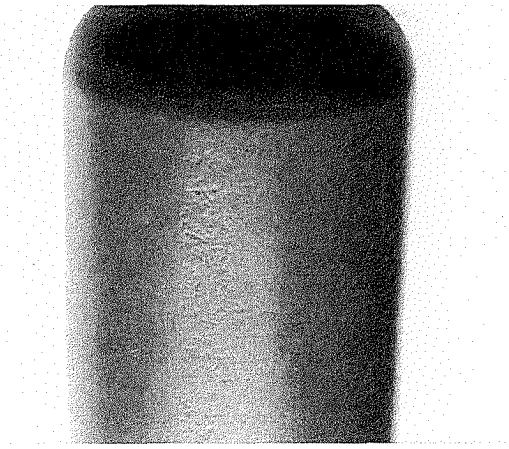


Figure 3—Line corrosion

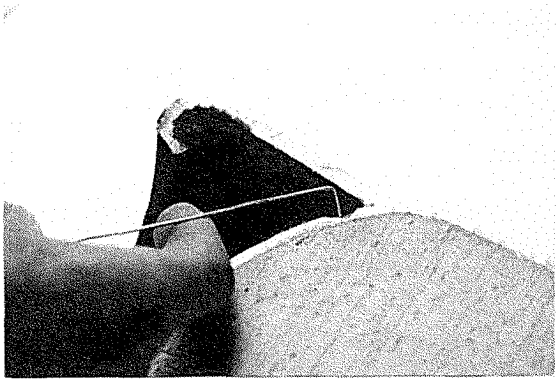


Figure 4—Crevice corrosion near the cylinder footring

8.4.2.1.3 General corrosion of sidewall and heads

It is often difficult to measure or estimate the depth of general corrosion because direct comparison with the original sidewall or head thickness cannot always be made. General corrosion is often accompanied by pitting.

A cylinder shall be condemned when the remaining sidewall thickness in an area of general corrosion having dimensions up to and including 10 in^2 (64 cm^2) (similar in length and width) is less than one-half of the minimum allowable wall thickness or when the remaining sidewall thickness in an area of general corrosion having dimensions greater than 10 in^2 (64.5 cm^2) [similar in length and width] is less than three-quarters of the minimum allowable wall thickness.

A cylinder shall also be condemned when the remaining head (bottom or top) thickness in an area of general corrosion is less than three-quarters of the minimum allowable head thickness. Figures 5 and 6 illustrate general corrosion with isolated pitting on a cylinder sidewall and bottom head.

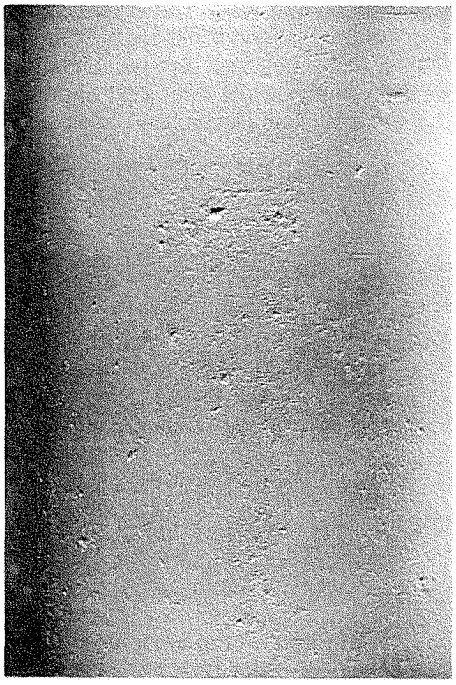


Figure 5—General corrosion with isolated pitting on cylinder sidewall

8.4.2.2 Minimum allowable cylinder wall and head thickness (bottom and top)

To use the criteria in 8.4.2.1, it is necessary to know the original sidewall and head thickness or the minimum allowable sidewall and head thickness of the cylinder as required by the specification under which the cylinder was manufactured. The original sidewall and head thickness can be determined from the cylinder manufacturer, or by ultrasonic measurement of the cylinder sidewall and head in an area of the cylinder shell where corrosion has not taken place, or on another cylinder of same type not subjected to corrosion. Table 2 may be used as a guide in the absence of information on the original sidewall thickness or the minimum allowable wall thickness.

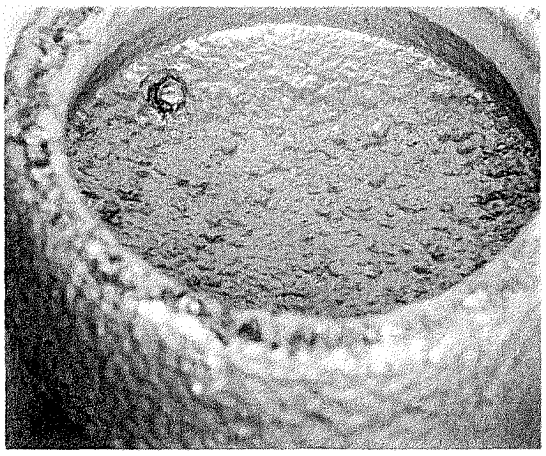


Figure 6—General corrosion with pitting on bottom head

8.4.3 Dents

Dents are of concern where the metal deformation is sharp or creased to significantly increase stress, and such cylinders shall be condemned. Where metal deformation is not sharp, dents of greater magnitude can be tolerated. Figure 7 illustrates a dent.

Where denting occurs, the cylinder shall be condemned if the depth of the dent is greater than one-tenth of the greatest dimension of the dent.

On cylinders exceeding 40 ft^3 (1.13 m^3) capacity, the depth of the dent shall not exceed 0.75 inch (19.1 mm). On 40 ft^3 (1.13 m^3) cylinders and smaller, the maximum allowable dent depth shall be 0.375 inch (9.5 mm).

8.4.4 Cuts, digs, or gouges

Cuts, digs, or gouges reduce the wall thickness of the cylinder and are considered to increase stress. A cylinder shall be condemned if the depth of the cut, dig, or gouge exceeds one-half the minimum allowable wall thickness or the minimum allowable head thickness and is less than 3 inches (76 mm) in length. When the length of the defect is 3 inches (76 mm) or more, the limit shall be reduced to one-fourth of the minimum allowable wall thickness or the minimum allowable head thickness. When measuring cuts, the upset metal should be removed or compensated for so that only the actual depth of metal removed from the cylinder wall is measured.

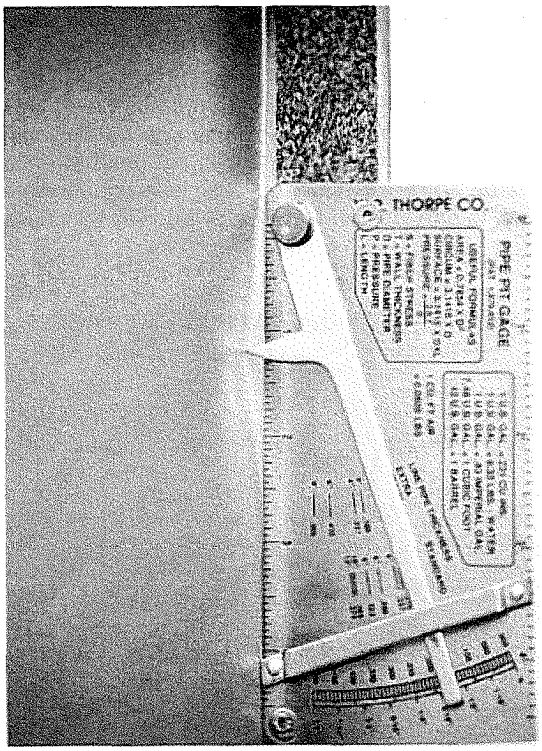


Figure 7—Measuring the length and depth of typical dent

8.4.5 Fire damage

Cylinders shall be examined for evidence of exposure to fire.

8.4.5.1 Inspection for fire damage

Common evidence of exposure to fire is:

- charred, burnt, cracked, or checkered protective coating;
- burnt or scarfed metal;
- distortion of the cylinder shell;
- melted out fusible metal pressure relief device(s); or
- burnt or melted valve.

8.4.5.2 Evaluation of fire damage to cylinder shell

Federal regulations state that a cylinder that has been subjected to the action of fire must not again be placed in service until it has been properly reconditioned in accordance with 49 CFR 173.34 or TC requirements [1, 2]. The general intent of this requirement is to condemn those cylinders that have been subjected to the action of fire that has changed the metallurgical structure or the strength properties of the steel, or caused breakdown of the porous mass. This is normally a determination made by visual examination as covered previously, with particular emphasis on the condition of the protective coating. If there is evidence that the protective coating has been burned completely off any portion of the cylinder surface, or if the cylinder body is burned, warped, or distorted, the cylinder shall be condemned. However, if the protective coating is only smudged, discolored, or blistered, and is found by examination to be intact underneath, the cylinder may be returned to service.

8.4.5.3 Evaluation of fire damage to cylinder porous mass

The *Code of Federal Regulations*, 49 CFR 173.34 states that if the cylinder is undamaged and the porous mass is unchanged and intact, the cylinder may be returned to service without reheat treatment or test [1]. TC regulations require compliance with CSA B340, which in turn requires inspection and maintenance in accordance with this publication [4]. The porous mass shall be closely inspected through the valve opening and all fusible metal pressure relief device openings for evidence of charring, disintegration, or heavy carbon deposits. Core-hole packing, if used, shall be removed for close examination of the porous mass at the valve opening. If the porous mass is firm and not damaged, as evidenced by the absence of charring, crumbling, powdering, or heavy carbon deposits, the cylinder may be returned to service.

8.4.6 Torch and arc burns

Cylinders shall be condemned when torch or arc burns result in either of the following conditions:

- removal of metal by scarfing; or
- removal of metal by cratering or deposit of metal.

8.4.7 Bulges

Cylinders are manufactured with a symmetrical shape. Those cylinders with a definite visible sidewall, top or bottom head bulge shall be condemned. Cylinders manufactured with heads convex to pressure that have bulge, best described as a partial bulge or a reverse bending of the head, shall be condemned upon verification of bulging (see cylinder bottom in figure 8).

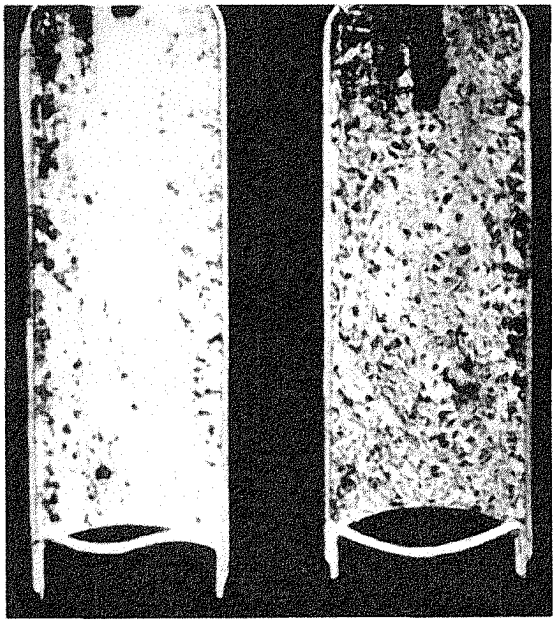


Figure 8—Cylinders manufactured with bottom head convex to pressure that have become bulged (partial bulge or reverse bending of the bottom)

8.4.8 Fusible metal pressure relief devices

Fusible metal pressure relief devices shall be examined for:

- extruded metal;
- corrosion;
- bent condition; and

– peened fusible metal.

Defective fusible metal pressure relief devices shall not be peened, altered or repaired and must be replaced.

8.4.9 Attachments

Attachments such as footrings, headbands, marking plates, and lifting lugs found on cylinders may lose their intended function through service abuse. These attachments and the associated portion of the cylinder shall receive careful inspection.

8.4.9.1

Footrings and headbands shall be examined for distortion, looseness, excessive corrosion, and failure of welds.

Cylinders with footrings or headbands no longer able to perform their respective functions, a) to cause the cylinder to remain stable and upright, or b) to protect the valve and fusible metal pressure relief devices, shall be removed from service.

Repairs to footrings and headbands shall only be performed by an authorized repair facility. Appearance may often warrant cylinder condemnation.

8.4.9.2

In the case of a marking plate not completely sealed, any evidence of corrosion between it and the shell shall require removal of the plate and visual inspection of the cylinder wall. However, removal and reattachment of the plate must be undertaken only by authorized repair facilities, or original cylinder manufacturers, as noted in the 49 CFR 173.34 or TC requirement [1, 2].

8.4.10 Bottom head-to-sidewall weld corrosion on press-fit footring cylinders

A cylinder of the press-fit footring design manufactured from the mid 1930s until the later 1950s may be identified by the one-piece shell and the absence of a weld where the footring is secured to the sidewall (see figure 9). There were several types of bottom head-to-sidewall weld arrangements.

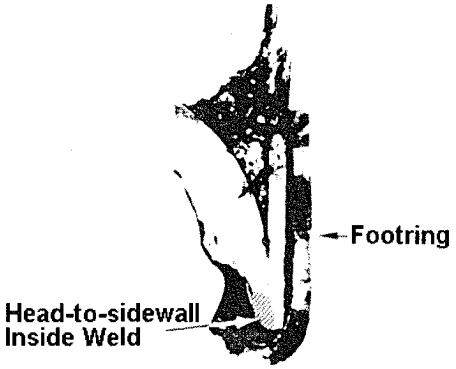


Figure 9—Press-fit footring cylinder head-to-sidewall inside weld. One of several types of bottom head-to-sidewall weld arrangements

In the press-fit footring construction, the bottom head is convex to pressure, and the rolled bottom lip of the footring is very close to the bottom head-to-sidewall weld. This design allows dirt and moisture to accumulate resulting in severe corrosion of the weld filler material, thereby reducing the strength of the weld joint. Severe corrosion of this bottom head weld is sometimes accompanied by severe corrosion between the top of the footring and the sidewall.

All press-fit footring design cylinders, particularly the large 12 inch (305 mm) diameter sizes, shall be carefully inspected in the horizontal or inverted position for the following three conditions:

- Any cylinder with an accumulation of rust in the weld joint area judged to have significantly weakened the strength of the weld shall be removed from service and rebuilt in accordance with DOT or TC regulations, or be condemned;
- Any cylinder with sidewall or head corrosion that results in a sidewall or head thickness of less than that permitted in 8.4.2 shall be condemned; and
- Any cylinder with rust between the inside top of the footring and the sidewall exceeding 0.187 inch (4.750 mm) shall be removed from service and repaired in accordance with DOT/TC regulations or be condemned.

The quantity of rust accumulated and removed is indicative of the severity of corrosion. For the most effective evaluation of rust accumulation, the weld should be examined both before and after carrying out shot blasting or other methods of rust removal.

NOTE—Any cylinder that has had the footring removed shall be removed from service and scrapped or repaired in accordance with DOT/TC regulations.

8.5 Inspection of acetylene cylinder porous mass

This section covers the internal inspection of the porous mass of the monolithic and non-monolithic types. Regulations permit clearance between the porous mass and internal surface of the cylinder shell at the time of manufacture, provided that such clearances do not impair the functions of the porous mass. A feeler or thickness gauge may be used to determine the maximum top clearance between the porous mass and internal surface of the cylinder (see 8.5.3). This inspection procedure requires a certain amount of experience, and only authorized, trained personnel may perform this inspection.

8.5.1 Preparation for inspection

The cylinder shall be safely drained of acetylene to atmospheric pressure and allowed to warm up to ambient temperature to remove any acetylene remaining due to cooling of the cylinder during draining. The cylinder pressure and weight should be checked before removal of the valve to help ensure that the cylinder is not pressurized because of plugged core-hole packing or damaged valve. Absence of pressure on the pressure gauge is not always an indication that a cylinder is empty. Additional tests may be performed such as blowing low pressure nitrogen into the valve opening for several seconds and then listening for the nitrogen to be expelled. Porous mass inspection shall be performed in a well-ventilated area away from sources of ignition and electrical equipment not approved for hazardous locations. The valve and sufficient core-hole packing shall be removed.

8.5.2 Porous mass inspection

The inspector shall use a brass or Monel metal wire probe or a gloved finger to feel the porous mass for disintegration through the valve opening. Insert the probe or gloved finger into the opening against all porous mass surfaces that can be reached. If a wire probe is used, do not jab the probe into the porous mass. If the general condition of the porous mass is firm, its condition is satisfactory. If the porous mass is excessively soft or is powdery, crumbling, or broken down, its condition is unsatisfactory. Visual inspection of the porous mass with a dental mirror and a light source that is acceptable for hazardous locations will assist in determining the extent of the clearances and the condition of the porous mass.

8.5.3 Porous mass clearance measurement

A measurement of top head-to-porous mass clearance must be made. Cylinders with acceptable head-to-porous mass clearance, as shown in table 3, will normally be within the acceptable limits of sidewall clearance. Figure 10 gives some details of a typical clearance gauge, which may be used to assure that top head-to-porous mass clearance does not exceed maximum limits.

Typically, a top clearance maximum limit gauge is constructed with a thickness (t) corresponding to the maximum allowable top head-to-porous mass clearance for the porous mass length being requalified.

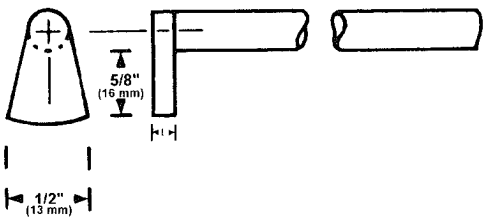


Figure 10—Typical clearance gauge

NOTE—Dimensions shown are suggested for 0.75-inch and 1 inch (19.1-mm and 25.4-mm) cylinder openings.

The top head-to-porous mass clearance is gauged and determined to be acceptable if:

- the maximum top clearance gauge cannot be inserted;
- the maximum top clearance limit gauge can be inserted into the top clearance at any point, and provided that the fit of the gauge in the top clearance is a snug fit, without vertical movement; or
- the maximum top clearance limit gauge can be inserted into the top clearance area with vertical movement and radial movement up to a total of 180 degrees.

When the top clearance gauge fits loosely into the top clearance space with more than a total of 180-degree radial movement, the cylinder shall be removed from service.

The cylinder may be rebuilt in accordance with 49 CFR 173.34 or CSA B339 [1, 2]. An enlarged core-hole may be repacked in accordance with note 2 under table 3. Where the porous mass clearance is not uniform on the top surface, the gauge shall be used around the entire circumference of the spud. If a porous mass does not have acceptable top clearance based on the above criteria and does not exceed the dimensions shown in figure 1, a 7-inch (178-mm) or larger diameter cylinder may either be repacked as described in note 2 under table 3 or be condemned. Cylinders that exceed the dimensions as shown in figure 1 shall be condemned.

8.5.3.1 Monolithic porous mass clearance measurement without center circumferentially welded shell

The top head-to-porous mass clearance shall not exceed 0.5% of the porous mass length, but in no case be more than 0.125 inch (3.175 mm).

8.5.3.2 Monolithic porous mass clearance measurement with center circumferentially welded shell

The top head-to-porous mass clearance shall not exceed 0.5% of the porous mass length, but in no case be more than 0.084 inch (2.134 mm). Where bottom clearance is measured, total clearance must not exceed maximum top clearances allowed in 8.5.3.1.

8.5.3.3 Non-monolithic porous mass clearance measurement

Non-monolithic porous masses, other than balsa wood, shall be condemned. The top head-to-porous mass clearance shall not exceed 0.5% of the porous mass length, but in no case shall be more than 0.125 inch (3.175 mm).

8.5.3.4 Alternate method of checking "B" and "MC" cylinders

On "B" (40 ft^3 [1.13 m^3]) and "MC" (10 ft^3 [0.28 m^3]) cylinders, check the porous mass by holding the cylinder longitudinally (see figure 11) in an inverted position at 45 degrees, and shaking the cylinder to detect any movement of the porous mass. Rotate the cylinder 90 degrees and shake again. The cylinder is acceptable if no movement is felt or heard. Therefore, valve removal and measurement of the head-to-porous mass is not necessary. If movement can be detected in either position, refer to 8.5.2 and 8.5.3.

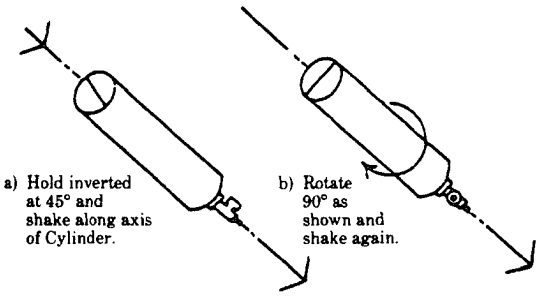


Figure 11—Method of checking "B" and "MC" cylinders

8.6 Inspection markings

8.6.1 Marking of approved cylinders

Each cylinder that passes shell and porous mass requalification must be marked with the date (month and year) plainly and permanently stamped into the metal of the cylinder or on a metal plate, which must be permanently secured onto the cylinder. Between the month and year numbers, the Retesters Identification Number (RIN) mark of the authorized reinspection facility (*) shall be stamped, for example, 4-*-91 for April 1991. When stamping B and MC cylinders, the month of the requalification may be omitted. Acetylene cylinders requalified and marked in accordance with CGA C-13 before October 1, 1994, do not require the RIN marking [1].

Stamping shall be in accordance with the requirements of DOT Specifications 8 and 8AL, CTC Specifications 8, 8AL and 8WC and TC Specifications 8WM and 8WAM. Date of the previous tests shall not be obliterated. In the case of cylinder shell inspection without porous mass inspection, the letter "S" shall be stamped following the initial requalification date stamping. For example, 4-*-91 S identifies that only the shell inspection was made. In the case of the porous mass inspection without shell inspection, the letter "F" shall be stamped following the initial requalification date stamping. For example, 4-*-91 F identifies that only the porous mass inspection was made. In the case of shell and porous mass inspections at the initial requalification date, the letters "S" and "F" shall be stamped following date stamping. For example, 4-*-91 SF identifies that both the shell and porous mass inspections were made. After an initial requalification of the shell and porous mass, the letters "S" and "F" are not required following subsequent requalification dates.

8.6.2 Marking of condemned cylinders

Each cylinder that does not pass shell or porous mass requalification shall be marked according to 49 CFR 173.34 (e)(6)(ii): "When a cylinder is required to be condemned, the retester shall stamp a series of ×'s over the DOT specification number and the marked service pressure or stamp "CONDEMNED" on the shoulder, top head, or neck using a steel stamp. Alternatively, at the direction of the owner, the retester may render the cylinder incapable of holding pressure"[1].

8.7 Sample visual inspection and requalification report.

The results obtained under requirements of this guideline shall be recorded, and a record kept by the owner or owner's authorized agent until either expiration of the requalification period or until the cylinder is again requalified, whichever occurs first. "B" and "MC" cylinders are exempt from requirements for recording the requalification data, since these cylinders are a resale-type cylinder. A Sample Visual Inspection and Requalification Report Form is shown in Appendix B. An equivalent form may be used.

9 References

[1] *Code of Federal Regulations*, Title 49 CFR Parts 100-180 (Transportation), U.S. Department of Transportation, Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.

[2] CAN/CSA B339-96, *Cylinders, Spheres and Tubes for the Transportation of Dangerous Goods*, Canadian Standards Association, 178 Rexdale Boulevard, Rexdale, Ontario, Canada M9W 1R3.

[3] *Transportation of Dangerous Goods Regulations*, CGP Publishing, Ordering Dept., Ottawa, Ontario, Canada K1A 0S9.

[4] CAN/CSA B340-97, *Selection and Use of Cylinders, Spheres, Tubes, and other Containers for the Transportation of Dangerous Goods, Class 2*, Canadian Standards Association, 178 Rexdale Boulevard, Rexdale, Ontario, Canada M9W 1R3.

[5] CGA S-1.1, *Pressure Relief Device Standards--Part 1--Cylinders for Compressed Gases*, Compressed Gas Association, Inc., 4221 Walney Rd., 5th Floor, Chantilly, VA 20151.

10 Additional sources of information

CGA SB-4, *Handling Acetylene Cylinders in Fires*, Compressed Gas Association, Inc., 4221 Walney Rd., 5th Floor, Chantilly, VA 20151.

CGA C-12, *Qualification Procedure for Acetylene Cylinder Design*, Compressed Gas Association, Inc., 4221 Walney Rd., 5th Floor, Chantilly, VA 20151.

CGA AV-9, *Handling Acetylene Cylinders in Fire Situations*, Compressed Gas Association, Inc., 4221 Walney Rd., 5th Floor, Chantilly, VA 20151.

Table 3—Maximum top head-to-porous mass clearance for non-monolithic and monolithic porous mass cylinders

Typical cylinder design		Maximum allowable head-to-porous mass clearance		Maximum allowable head-to-porous mass clearance for shell with enter circumferential weld[1]	
in	mm	in	mm	in	mm
4 × 13	102 × 330	0.060	1.5	0.060	1.5
6 × 20	152 × 508	0.090	2.3	0.060	1.5
7 × 25	178 × 635	0.120	3.0	0.080	2.0
7 × 31	178 × 787	0.125	3.2	0.084	2.1
8 × 25	203 × 635	0.125	3.2	0.084	2.1
10 × 32	254 × 813	0.125	3.2	0.084	2.1
10 × 38	254 × 965	0.125	3.2	0.084	2.1
12 × 27	305 × 686	0.125	3.2	0.084	2.1
12 × 33	305 × 838	0.125	3.2	0.084	2.1
12 × 41	305 × 1041	0.125	3.2	0.084	2.1
16 × 52	406 × 1321	0.125	3.2	0.084	2.1
20 × 38	508 × 965	0.125	3.2	0.084	2.1

[1] Where bottom clearance is measured, total clearance must not exceed maximum top clearance allowed in column to the left.

NOTE–Monolithic porous mass cylinders having enlarged core-holes directly under the valve within the dimensions shown in figure 10 may be replaced with materials such as felt.

Table 4—Minimum wall thickness at defect for acetylene cylinders Specification 8AL

Cylinder diameter in inches (mm)	4 (102)	6 (152)	7 (178)	8 (203)	10 (254)	12 (305)
Cylinder allowable wall thickness in inches (mm)	0.070 (1.778)	0.087 (2.210)	0.087 (2.210)	0.100 (2.540)	0.111 (2.819)	0.125 (3.175)
Minimum wall thickness at defect when sidewall or head (concave) line and crevice corrosion are greater than 3 inches (76 mm)	0.053 (1.346)	0.065 (1.651)	0.065 (1.651)	0.075 (1.905)	0.083 (2.108)	0.094 (2.388)
Minimum wall thickness at defect when sidewall or head (concave) line and crevice corrosion are less than 3 inches (76 mm)	0.035 (0.889)	0.044 (1.118)	0.044 (1.118)	0.050 (1.270)	0.056 (1.422)	0.063 (1.600)
Minimum wall thickness at isolated pitting sidewall and concave head	0.023 (0.584)	0.029 (0.737)	0.029 (0.737)	0.033 (0.838)	0.037 (0.940)	0.042 (1.067)
Minimum wall thickness at defect for sidewall general corrosion in an area covering up to 10 in^2 (64 cm^2)	0.035 (0.889)	0.044 (1.118)	0.044 (1.118)	0.050 (1.270)	0.056 (1.422)	0.063 (1.600)
Minimum wall thickness at defect for sidewall general corrosion in an area exceeding 10 in^2 (64 cm^2)	0.053 (1.346)	0.065 (1.651)	0.065 (1.651)	0.075 (1.905)	0.083 (2.108)	0.094 (2.388)
Minimum wall thickness at defect for head (concave) general corrosion	0.053 (1.346)	0.065 (1.651)	0.065 (1.651)	0.075 (1.905)	0.083 (2.108)	0.094 (2.388)
Minimum wall thickness at defect when gouge is less than 3 inches (76 mm)	0.035 (0.889)	0.044 (1.118)	0.044 (1.118)	0.050 (1.270)	0.056 (1.422)	0.063 (1.600)
Minimum wall thickness at defect when gouge is greater than 3 inches (76 mm)	0.053 (1.346)	0.065 (1.651)	0.065 (1.651)	0.075 (1.905)	0.083 (2.108)	0.094 (2.388)

Table 5—Minimum wall thickness at defect for acetylene cylinders Specification 8

Cylinder diameter in inches (mm)	4 (102)	6 (152)	7 (178)	8 (203)	10 (254)	12 (305)
Cylinder allowable wall thickness in inches (mm)	0.070 (1.778)	0.090 (2.286)	0.100 (2.540)	0.110 (2.794)	0.125 (3.175)	0.150 (3.810)
Minimum wall thickness at defect when sidewall or head (concave) line and crevice corrosion are greater than 3 inches (76 mm)	0.053 (1.346)	0.068 (1.727)	0.075 (1.905)	0.083 (2.108)	0.094 (2.388)	0.113 (2.870)
Minimum wall thickness at defect when head (convex) line and crevice corrosion are greater than 3 inches (76 mm)	0.035 (0.889)	0.045 (1.143)	0.050 (1.270)	0.055 (1.397)	0.063 (1.600)	0.075 (1.905)
Minimum wall thickness at defect when head (convex) line and crevice corrosion are less than 3 inches (76 mm)	0.070 (1.778)	0.090 (2.286)	0.100 (2.540)	0.110 (2.794)	0.125 (3.175)	0.150 (3.810)
Minimum wall thickness at defect when sidewall or head (concave) line and crevice corrosion are less than 3 inches (76 mm)	0.035 (0.889)	0.045 (1.143)	0.050 (1.270)	0.055 (1.397)	0.063 (1.600)	0.075 (1.905)
Minimum wall thickness at isolated pitting sidewall and concave head	0.023 (0.584)	0.030 (0.762)	0.033 (0.838)	0.037 (0.940)	0.042 (1.067)	0.050 (1.270)
Minimum wall thickness at isolated pitting convex head	0.047 (1.194)	0.060 (1.524)	0.067 (1.702)	0.073 (1.854)	0.083 (2.108)	0.100 (2.540)
Minimum wall thickness at defect for sidewall general corrosion in an area covering up to 10 in^2 (64 cm^2)	0.035 (0.889)	0.045 (1.143)	0.050 (1.270)	0.055 (1.397)	0.063 (1.600)	0.075 (1.905)
Minimum wall thickness at defect for sidewall general corrosion in an area exceeding 10 in^2 (64 cm^2)	0.053 (1.346)	0.068 (1.727)	0.075 (1.905)	0.083 (2.108)	0.094 (2.388)	0.113 (2.870)
Minimum wall thickness at defect for head (concave) general corrosion	0.053 (1.346)	0.068 (1.727)	0.075 (1.905)	0.083 (2.108)	0.094 (2.388)	0.113 (2.870)
Minimum wall thickness at defect for head (convex) general corrosion	0.105 (2.667)	0.135 (3.429)	0.150 (3.810)	0.165 (4.191)	0.188 (4.775)	0.225 (5.715)
Minimum wall thickness at defect when gouge is less than 3 inches (76 mm)	0.035 (0.889)	0.045 (1.143)	0.050 (1.270)	0.055 (1.397)	0.063 (1.600)	0.075 (1.905)
Minimum wall thickness at defect when gouge is greater than 3 inches (76 mm)	0.053 (1.346)	0.068 (1.727)	0.075 (1.905)	0.083 (2.108)	0.094 (2.388)	0.113 (2.870)
Minimum wall thickness at defect when head gouge is greater than 3 inches (76 mm)	0.105 (2.667)	0.135 (3.429)	0.150 (3.810)	0.165 (4.191)	0.188 (4.775)	0.225 (5.715)

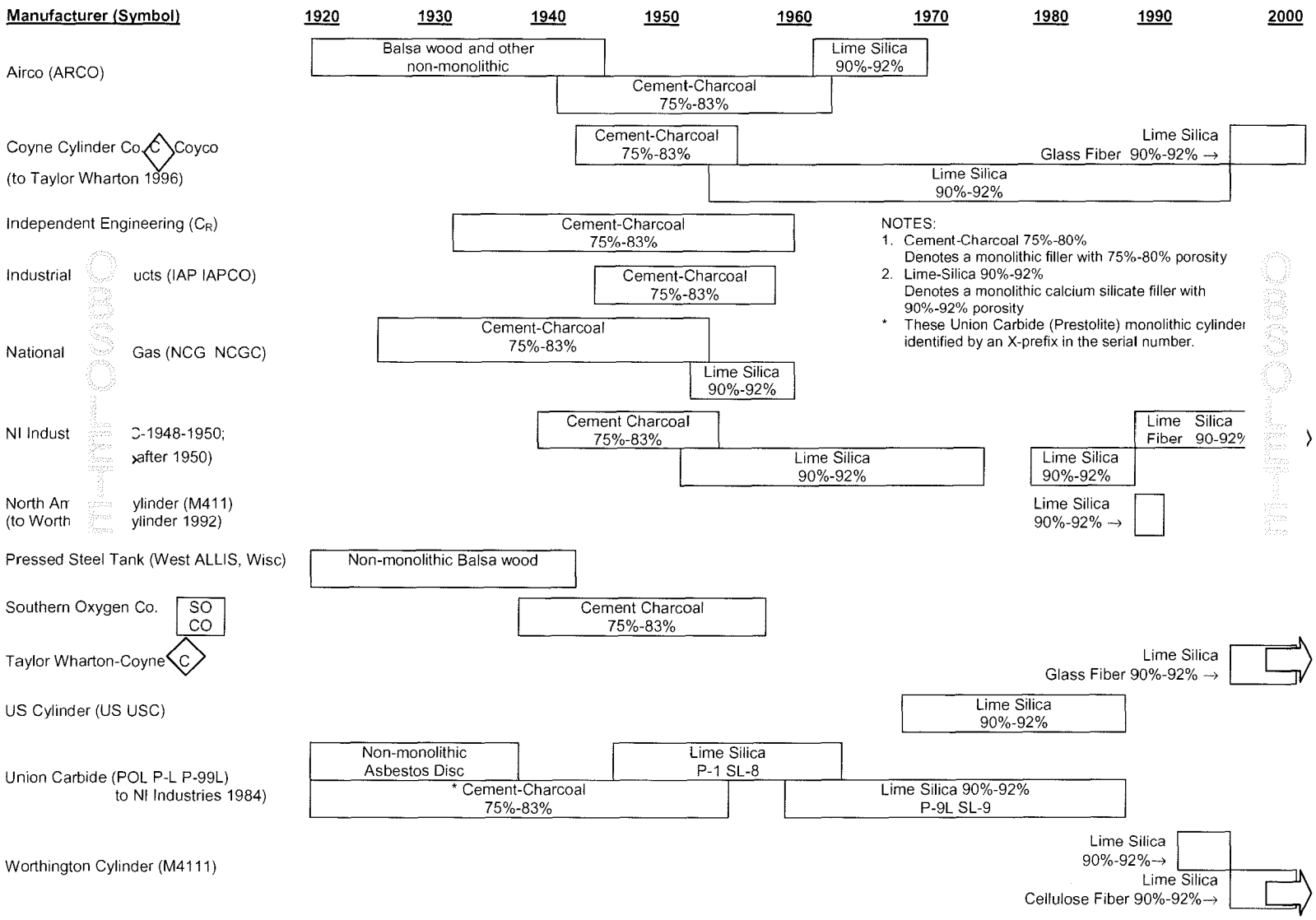
Table 6—Maximum allowable defect depth for acetylene cylinders Specification 8AL

Cylinder diameter in inches (mm)	4 (102)	6 (152)	7 (178)	8 (203)	10 (254)	12 (305)
Cylinder allowable wall thickness in inches (mm)	0.070 (1.778)	0.087 (2.210)	0.087 (2.210)	0.100 (2.540)	0.111 (2.819)	0.125 (3.175)
Maximum depth of defect when sidewall or head (concave) line and crevice corrosion are greater than 3 inches (76 mm)	0.018 (0.457)	0.022 (0.559)	0.022 (0.559)	0.025 (0.635)	0.028 (0.711)	0.031 (0.787)
Maximum depth of defect when sidewall or head (concave) line and crevice corrosion are less than 3 inches (76 mm)	0.035 (0.889)	0.044 (1.118)	0.044 (1.118)	0.050 (1.270)	0.056 (1.422)	0.063 (1.600)
Maximum depth of isolated pitting sidewall and concave head	0.047 (1.194)	0.058 (1.473)	0.058 (1.473)	0.067 (1.702)	0.074 (1.880)	0.083 (2.108)
Maximum depth of defect for sidewall general corrosion in an area covering up to 10 in^2 (64 cm^2)	0.035 (0.889)	0.044 (1.118)	0.044 (1.118)	0.050 (1.270)	0.056 (1.422)	0.063 (1.600)
Maximum depth of defect for sidewall general corrosion in an area exceeding 10 in^2 (64 cm^2)	0.018 (0.457)	0.022 (0.559)	0.022 (0.559)	0.025 (0.635)	0.028 (0.711)	0.031 (0.787)
Maximum depth of defect for head (concave) general corrosion	0.018 (0.457)	0.022 (0.559)	0.022 (0.559)	0.025 (0.635)	0.028 (0.711)	0.031 (0.787)
Maximum depth of defect when gouge is less than 3 inches (76 mm)	0.035 (0.889)	0.044 (1.118)	0.044 (1.118)	0.050 (1.270)	0.056 (1.422)	0.063 (1.600)
Maximum depth of defect when gouge is greater than 3 inches (76 mm)	0.018 (0.457)	0.022 (0.559)	0.022 (0.559)	0.025 (0.635)	0.028 (0.711)	0.031 (0.787)

Table 7—Maximum allowable defect depth for acetylene cylinders Specification 8

Cylinder diameter in inches (mm)	4 (102)	6 (152)	7 (178)	8 (203)	10 (254)	12 (305)
Cylinder allowable wall thickness in inches (mm)	0.070 (1.778)	0.090 (2.286)	0.100 (2.540)	0.110 (2.794)	0.125 (3.175)	0.150 (3.810)
Maximum depth of defect when sidewall or head (concave) line and crevice corrosion are greater than 3 inches	0.018 (0.457)	0.023 (0.584)	0.025 (0.635)	0.028 (0.711)	0.031 (0.787)	0.038 (0.965)
Maximum depth of defect when head (convex) line and crevice corrosion are greater than 3 inches	0.035 (0.889)	0.045 (1.143)	0.050 (1.270)	0.055 (1.397)	0.063 (1.600)	0.075 (1.905)
Maximum depth of defect when head (convex) line and crevice corrosion are less than 3 inches	0.070 (1.778)	0.090 (2.286)	0.100 (2.540)	0.110 (2.794)	0.125 (3.175)	0.150 (3.810)
Maximum depth of defect when sidewall or head (concave) line and crevice corrosion are less than 3 inches	0.035 (0.889)	0.045 (1.143)	0.050 (1.270)	0.055 (1.397)	0.063 (1.600)	0.075 (1.905)
Maximum depth of isolated pitting sidewall and concave head	0.047 (1.194)	0.060 (1.524)	0.067 (1.702)	0.073 (1.854)	0.083 (2.108)	0.100 (2.540)
Maximum depth of isolated pitting convex head	0.093	0.120	0.133	0.147	0.167	0.200
Maximum depth of defect for sidewall general corrosion in an area covering up to 10 in^2	0.035 (0.889)	0.045 (1.143)	0.050 (1.270)	0.055 (1.397)	0.063 (1.600)	0.075 (1.905)
Maximum depth of defect for sidewall general corrosion in an area exceeding 10 in^2	0.018 (0.457)	0.023 (0.584)	0.025 (0.635)	0.028 (0.711)	0.031 (0.787)	0.038 (0.965)
Maximum depth of defect for head (concave) general corrosion	0.018 (0.457)	0.023 (0.584)	0.025 (0.635)	0.028 (0.711)	0.031 (0.787)	0.038 (0.965)
Maximum depth of defect for head (convex) general corrosion	0.035 (0.889)	0.045 (1.143)	0.050 (1.270)	0.055 (1.397)	0.063 (1.600)	0.075 (1.905)
Maximum depth of defect when gouge is less than 3 inches	0.035 (0.889)	0.045 (1.143)	0.050 (1.270)	0.055 (1.397)	0.063 (1.600)	0.075 (1.905)
Maximum depth of defect when gouge is greater than 3 inches	0.018 (0.457)	0.023 (0.584)	0.025 (0.635)	0.028 (0.711)	0.031 (0.787)	0.038 (0.965)
Maximum depth of defect when head gouge is greater than 3 inches	0.035 (0.889)	0.045 (1.143)	0.050 (1.270)	0.055 (1.397)	0.063 (1.600)	0.075 (1.905)

Appendix A—Chart of chronological history of acetylene cylinder construction



Appendix B—Acetylene cylinder periodic visual inspection and requalification report

(Sample form)

Company_____ Date_____
month year

Plant_____ Responsible manager_____ Inspector_____
signature signature

Cylinder identification					Shell inspection										Porous mass inspection				Disposition		
Serial no.	Sym-bo	ICC/ T c.	Mfg.	Date of mfg.	Corro-sion and pitting	Dents	Cuts, digs and gouges	Unauth-orized repairs	Stencil changes	Torch or arc burns	Fire damage	Bulges	Neck dents	Attach-ments	Mono-lithic	Non-mono-lithic	Filler condi-tion	Head clear-ance	Dispos-ition code	Date	Inspec-tors initials
001			ABC	1958	✔	✔	✔	✔	✔	✔	✔	C							C		
002			EFG	1923	✔	✔	C												C		
003			XYZ	1924	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔		✔	✔	✔	✔		

Disposition code:

✔ = OK, return to service
C = Condemn and scrap
R = Remove from service