INTERNATIONAL STANDARD

ISO 10462

Third edition
2013-12-15

Gas cylinders — Acetylene cylinders — Periodic inspection and maintenance

Bouteilles à gaz — Bouteilles d'acétylène — Contrôle et entretien périodiques

Reference number
ISO 10462:2013(E)

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

Published in Switzerland

Contents

Page

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2. www.iso.org/directives

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received. www.iso.org/patents

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

The committee responsible for this document is ISO/TC 58, *Gas cylinders*, Subcommittee SC 4, *Operational requirements for gas cylinders*.

This third edition cancels and replaces the second edition (ISO 10462:2005), which has been technically revised.

The following are the main technical modifications.

a) The second edition (ISO 10462:2005) has been revised taking EN 12863 into account; EN 12863 has been superseded by this third edition.

b) Periodic inspection periods are based on the relevant regulations and do not have to be repeated in this International Standard, thus also avoiding possible inconsistencies in case periodic inspection periods are changed in the regulations. Consequently, the former Annex A has been deleted and relevant information is covered in 4.1.

c) For the removal of the valve, reference to ISO 25760 is included and, consequently, the former Annex B has been deleted.

d) The external visual inspection has been revised; 6.1 and Annex B (which was Annex C in the second edition) have been updated accordingly.

e) The inspection of monolithic porous materials with regard to cracking, crumbling or cavitation is given in greater detail for better clarity. A new Annex C for the determination of the top clearance has been added.

f) For the inspection of the valve, reference to ISO 22434 is included and, consequently, the former Annex F has been deleted.

Introduction

Acetylene cylinders differ from all other cylinders transporting compressed or liquefied gases in that they contain a porous material and, normally, a solvent in which the acetylene is dissolved. Acetylene cylinders that contain a porous material but no solvent are only used for special applications. For periodic inspections, it is intended that due regard be given to the different types of construction of cylinders and porous materials. This International Standard should be read considering these differences.

The primary objective of the porous material is to limit an acetylene decomposition, if it is initiated, and thus prevent a cylinder incident. If some porous material is missing, or if a defect (e.g. a cavity, crack or void of significant size) exists as a result of breakdown or subsidence of the porous material, the decomposition could progress at a rate that can cause violent failure of the cylinder accompanied by an explosion.

The requirements in this International Standard are mainly those specific to acetylene cylinders. The periodic inspection of acetylene cylinders is to be performed only by competent persons and, in those jurisdictions requiring it, persons authorized by the regulatory authority.

This International Standard is intended to be used under a variety of national regulatory regimes, but has been written so that it is suitable for the application of Reference [1]. Attention is drawn to requirements in the specified relevant national regulations of the country (countries) where the cylinders are intended to be used that might override the requirements given in this International Standard. Where there is any conflict between this International Standard and any applicable regulation, the regulation always takes precedence.

In International Standards, “weight” is equivalent to a force, expressed in Newton. However, in common parlance (as used in terms defined in this International Standard), “weight” is used as an equivalent of “mass”, but this practice is deprecated (see ISO 80000-4).

Similarly, the unit “bar”[1)], which is not an SI unit and is deprecated by ISO, is used as an equivalent of Pascal, the SI unit for pressure. This is because of its universal use in the field of technical gases. Pressure values in this International Standard are given as gauge pressure (pressure exceeding atmospheric pressure), unless noted otherwise.

1) 1 bar = 0,1 MPa = 10^5 Pa; 1 MPa = 1 N/mm^2.

Gas cylinders — Acetylene cylinders — Periodic inspection and maintenance

1 Scope

This International Standard specifies requirements for the periodic inspection of acetylene cylinders as required for the transport of dangerous goods and for maintenance in connection with periodic inspection. It applies to acetylene cylinders with and without solvent and with a maximum nominal water capacity of 150 l.

NOTE The limitation of 150 l is derived from the definition of cylinder in Reference [1].

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 13341, *Gas cylinders — Fitting of valves to gas cylinders*

ISO 22434, *Transportable gas cylinders — Inspection and maintenance of cylinder valves*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1
acetylene cylinder
cylinder manufactured and suitable for the transport of acetylene, containing a *porous material* (3.6) and *solvent* (3.9) (where applicable) for acetylene with a valve and other accessories affixed to the cylinder

Note 1 to entry: When there is no risk of ambiguity, the word “cylinder” is used.

3.2
cylinder shell
<acetylene cylinders> empty cylinder manufactured and suitable for receiving and containing a *porous material* (3.6) for use as part of an *acetylene cylinder* (3.1)

3.3
maximum acetylene content
<acetylene cylinders> specified maximum weight of acetylene including *saturation acetylene* (3.8) in an *acetylene cylinder* (3.1)

3.4
maximum acetylene charge
<acetylene cylinders> *maximum acetylene content* (3.3) minus the *saturation acetylene* (3.8)

3.5
periodic inspection body
<acetylene cylinders> body responsible for the periodic inspection of *acetylene cylinders* (3.1)

3.6
porous material
<acetylene cylinders> single or multiple component material introduced to or formed in the *cylinder shell* (3.2) that, due to its porosity, allows the absorption of a solvent/acetylene solution

Note 1 to entry: The porous material can be either

— monolithic, consisting of a solid product obtained by reacting materials or by materials connected together with a binder, or

— non-monolithic, consisting of granular, fibrous or similar materials without the addition of a binder.

3.7
residual gas
<acetylene cylinders> weight of acetylene including the *saturation acetylene* (3.8) contained in an *acetylene cylinder* (3.1) returned for filling

3.8
saturation acetylene
<acetylene cylinders> acetylene dissolved in the *solvent* (3.9) in the *acetylene cylinder* (3.1) at atmospheric pressure (1,013 bar) and at a temperature of 15 °C

3.9
solvent
<acetylene cylinders> liquid that is absorbed by the *porous material* (3.6) and is capable of dissolving and releasing acetylene

Note 1 to entry: The following abbreviated terms are used:

— "A" for acetone;

— "DMF" for dimethylformamide.

3.10
tare
<acetylene cylinders> reference weight of the *acetylene cylinder* (3.1) including the specified solvent content

Note 1 to entry: The tare is further specified in accordance with the following subclauses.

Note 2 to entry: For acetylene cylinders with solvent, the tare is expressed by indicating either tare S or both, tare A and tare S. For solvent-free acetylene cylinders, the tare is expressed by indicating tare F. For the tare used for acetylene cylinders in bundles, see ISO 13088.

3.10.1
tare A
<acetylene cylinders> sum of the weights of the empty *cylinder shell* (3.2), the *porous material* (3.6), the specified solvent content, the valve, the coating and the valve guard, where applicable, and all other parts that are permanently attached to the cylinder when it is presented to be filled

Note 1 to entry: Generally, valve guards are included in the tare and are considered to be permanently attached (and are not removed when the cylinder is filled). This, however, might not always be the case.

3.10.2
tare S
<acetylene cylinders> *tare A* (3.10.1) plus the weight of the *saturation acetylene* (3.8)

3.10.3
tare F
<acetylene cylinders> *tare A* (3.10.1) minus the specified solvent content

3.11
top clearance
<acetylene cylinders> gap between the inside of the cylinder shoulder and the monolithic porous material

3.12
working pressure
<acetylene cylinders> settled pressure at a uniform reference temperature of 15 °C in an *acetylene cylinder (3.1)* containing the specified solvent content and the *maximum acetylene content* (3.3)

4 General

4.1 Intervals between periodic inspections

A cylinder is due for periodic inspection when the periodic inspection interval has elapsed. After that time the cylinder shall not be filled with acetylene. The regular periodic inspection intervals are given in the Reference [1], Section 4.1.4, Packing instruction P200, or are specified by national or international authorities.

However, for acetylene cylinders that are newly filled with porous material, it is recommended to carry out the first periodic inspection earlier. This first periodic inspection interval is recommended as follows:

a) non-monolithic porous material: two years;

b) monolithic porous material: three years.

After the first periodic inspection according to either a) or b), the regular periodic inspection interval as stated in the first paragraph of this subclause applies.

Provided the cylinder has been subjected to normal conditions of use and has not been subjected to abusive or abnormal conditions rendering the cylinder unsafe, there is no general requirement for the user to return an acetylene cylinder before the content has been used, even when the periodic inspection interval has elapsed.

4.2 Requirements for inspection

Before any work is carried out, the relevant information on the acetylene cylinder and its ownership shall be identified (e.g. from its marking and labelling). Cylinders with illegible or incorrect markings shall be set aside for further investigation.

Due to the presence of a porous material in the cylinder, neither a pressure test (hydraulic or pneumatic) nor a visual inspection of the internal surface of the cylinder shell is required by this International Standard.

5 Preparation of the acetylene cylinder

5.1 Depressurization of the acetylene cylinder

SAFETY PRECAUTIONS — Emptying of the cylinder should be carried out slowly; a typical rate would be 1/8 of the maximum acetylene content per hour.

Before the periodic inspection, cylinders shall be emptied of gas and depressurized. Cylinders shall be checked for pressure, both before and after depressurization. Depressurization shall be carried out in a safe manner with due regard to the characteristics of acetylene. Depressurization shall be carried out over a period long enough to ensure removal of all acetylene, except saturation acetylene. Precautions shall be taken because variations in temperature influence the quantity of acetylene that remains dissolved in the solvent.

The absence of a positive pressure reading does not clearly indicate the absence of gas under pressure due to the possibility of a blocked valve (for information, see ISO 25760). In case of any doubt regarding the efficiency of the depressurization, the cylinder shall be weighed.

If a cylinder weighs more than the tare stamped on the cylinder, it is not always a clear indication of the presence of gas under pressure. Some relevant factors that should be considered are a possible excess of solvent or contamination with water, etc.

If a cylinder weighs less than or equal to the stamped tare, it is not always a clear indication of the absence of gas under pressure. Some relevant factors that should be considered are a possible solvent shortage or external corrosion causing a loss of cylinder shell.

5.2 Preparation for external visual inspection

Each cylinder shall be cleaned and have all loose coatings, corrosion products, tar, oil or other foreign matter removed from its external surface by a suitable method, e.g. by brushing, shot blasting (under closely controlled conditions to ensure that there is no leakage of acetylene into the brushing or shot-blasting cabinet), water jet abrasive cleaning, chemical cleaning. Care shall be taken at all times to avoid damaging the cylinder and pressure relief devices (where fitted) or removing excess amounts of cylinder wall.

Shot blasting is a process utilizing iron shot of various sizes. It is not to be confused with or referred to as sand blasting, grit blasting or other more aggressive processes that remove a significant amount of the base metal or metallic coatings. These more aggressive processes should not be used.

The external visual inspection in accordance with 6.1 may be carried out at this stage.

5.3 Removal of the valve

The valve shall be removed safely. For information, see ISO 25760.

The cylinders should not be left open or without valves longer than necessary for the inspection.

5.4 Removal of neck/core hole filters

Acetylene cylinders usually contain neck filters/core hole packings consisting of filter or metallic gauze and felts. Neck filters and packing materials placed between the top of the porous material and the base of the valve stem shall be removed, as appropriate, to enable an adequate inspection of the porous material in accordance with the inspection requirements of the porous material manufacturer. For various types of neck filters/core hole packings, see Annex A.

Some porous material manufacturers equip acetylene cylinders containing a monolithic porous material with wooden plugs, which form an integral part of the porous material. These plugs, which are situated below the neck filter or gauze arrangement, shall be left intact and not removed for the purpose of the visual inspection provided the wooden plug is in the correct position permitting the measurement of the top clearance in accordance with the manufacturer's instructions. If during a previous inspection the wooden plug was tampered with, removed by mistake or is not in the correct position, it shall be replaced with a new one in accordance with the porous material manufacturer's specification.

Special care shall be taken when removing filters or packing material. Some restrictions at the neck can hold residual pressure that, if suddenly released, can blow the filter out with some of the porous material and cause injury.

NOTE The presence of soot on the filters or packing material indicates that a flashback might have occurred.

6 Inspection and maintenance

6.1 External visual inspection

The external surface of each cylinder shall be inspected for

a) illegible, incorrect, unauthorized or incorrectly located stamp markings, or unauthorized additions or modifications,

b) plug or neck inserts, vertical stability, bulges, dents, cracks, cuts, gouges, laminations and excessive removal of material from the cylinder base,

c) fire and heat damage, torch or electric-arc burns,

d) corrosion. Special attention shall be given to areas where water can be trapped. These include the entire base area, the junction between the cylinder shell and the footring and the junction between the cylinder shell and the valve and the neckring (if applicable), and

e) integrity of all permanent attachments.

The external visual inspection shall be carried out in accordance with Annex B. Cylinders no longer suitable for future service shall be rendered unserviceable (see Clause 9).

Damaged valve guards, threaded neckrings and footrings may be repaired or replaced as appropriate. No welding or any heat shall be directly applied to the pressure-containing part of the cylinder. If welding is performed on a non-pressure-containing part of the cylinder, due care shall be taken with regard to the presence of acetylene and solvent.

SAFETY PRECAUTIONS — Acetylene cylinders cannot be completely emptied. They will always contain some residual gas and solvent (except for solvent-free acetylene cylinders). Therefore, special care should be taken when repairing acetylene cylinders using methods that can be a source of ignition (e.g. through heat or sparks).

6.2 Inspection of the porous material

6.2.1 General

After the removal of neck/core hole filters in accordance with 5.4, the porous material shall be inspected for the presence of visible contamination or other defects that could affect the ability to suppress an acetylene decomposition. The inspection shall be performed by the appropriate use of special non-sparking tools such as metal wire probes, rods, feeler or clearance gauges to check the firmness and the presence of voids or other defects in the porous material. Rejection criteria are given in 6.2.2 to 6.2.4. Care shall be taken to ensure that the porous material is not damaged by the inspection tools.

6.2.2 Contamination

The porous material shall be checked visually for contamination such as the presence of soot, water or oil deposits, or if there has been a discoloration of the porous material. The following guidelines shall apply:

a) cylinders in which any soot is visible shall be rejected;

b) cylinders in which water or oil deposits are visible shall be rejected depending on the level of such contamination. For monolithic porous materials, this is often visible through greying of the porous material.

6.2.3 Monolithic porous materials — Cracking, crumbling or cavitation

The visual inspection shall verify that the porous material shows:

a) no top clearance above the maximum allowed top clearance;

The top clearance as determined in accordance with Annex C shall not exceed that in the type approval, if specified.

If a top clearance specification does not exist for a given cylinder, the top clearance shall not exceed

— 2 mm for asbestos-free porous materials, or

— 5 mm for all other monolithic porous materials.

If at a later stage cylinders with other top clearance sizes pass the requirements of the backfire test as described in ISO 3807 and are approved, then these maximum top clearances apply.

b) no excessive cracking;

Only small cracks without visible side walls are acceptable for all porous materials, provided they do not incorporate breakouts and do not allow the material to get dislodged. This can be checked by applying a gentle lateral load with a gloved finger. Porous materials with cracks having visible side walls are not acceptable and shall be rejected (for examples, see Annex D).

c) no excessive crumbling;

Crumbling of the porous material is acceptable if it arises from the collar of the porous material only and if it is so little that the maximum allowed top clearance is not exceeded at any point. Small breakouts in the top of the cylinder neck/shoulder area are acceptable and may be repaired by a procedure validated and endorsed by the porous material manufacturer, e.g. by backfire testing. Cylinders with porous materials that show crumbling in excess of the allowable shall be rejected.

d) no voids or cavities.

The porous material shall be checked to ensure that there are no voids or cavities between the porous material and the cylinder wall by verifying there is no detectable lateral movement (e.g. by applying a gentle lateral load with a gloved finger). A cylinder that demonstrates lateral movement of the porous material shall be rejected.

If the cylinder is equipped with a wooden plug (see 5.4), it shall be checked by applying a gentle load that the plug is firmly fixed in its position and there is no lateral movement of the wooden plug. The wooden plug shall not be removed during the inspection except if there is a lateral movement of the plug. In this case, it shall be replaced with a new one in accordance with the porous material manufacturer's specification.

6.2.4 Non-monolithic porous material — Compaction

Acetylene cylinders containing non-monolithic porous material that shows compaction either shall be rejected or porous material shall be added in accordance with 6.3.

6.3 Addition of non-monolithic porous material

An acetylene cylinder containing non-monolithic porous material that has been rejected due to compaction shall have porous material added only if this does not impair the safety of the cylinder. The porous material used shall be in accordance with the specifications of the porous material manufacturer and the addition of non-monolithic porous material shall be performed by or on behalf of the porous material manufacturer.

The quantity of porous material that may be added at each periodic inspection shall not exceed 50 g. The cumulative total quantity of porous material added to the acetylene cylinder shall be limited so that

the resulting porosity of the porous material is not decreased to an extent that it falls below the lower of the permissible limits. The minimum porosity of the porous material is either obtained from the type approval or is 1,5 % below the nominal porosity (if no lower limit for the porosity is indicated in the type approval).

The quantity of porous material added shall be recorded, the tare of the cylinder shall be corrected as appropriate and the stamp marking shall be corrected accordingly.

A rejected cylinder to which no further porous material may be added shall be rendered unserviceable (see Clause 9) or its porous material shall be replaced in accordance with 6.4.

6.4 Replacement of porous material

If the porous material is no longer acceptable but the external condition of the cylinder shell is satisfactory, either the porous material shall be replaced or the complete cylinder shall be made unserviceable.

The removal of the porous material and the solvent shall be carried out in a safe manner and the cylinder shall be thoroughly cleaned and inspected. Special care shall be taken if the porous material contains asbestos.

Before introducing new porous material into the cylinder, the internal surface of the cylinder shell shall be inspected for corrosion and other visible defects and the cylinder shall be hydraulically tested at the stamped test pressure if more than the regular periodic inspection interval has elapsed since the last pressure test.

It should be verified that replacement of the porous material is authorized and that the relevant requirements are met, e.g. with regard to modification of the stamp marking.

6.5 Inspection of fusible plugs

Fusible plugs, if used, shall be inspected for damage. When damage is found, a new fusible plug shall be fitted and checked for gas tightness.

If fusible plugs are replaced by solid plugs, it should be verified that this is authorized and that the relevant requirements are met. The new plugs should be checked for gas tightness and any possible damage after their installation.

6.6 Inspection of valves

At the time of the periodic inspection the valve shall be either replaced by a new one or it shall be inspected and maintained in accordance with ISO 22434 to ensure that it will perform satisfactorily in service and meet the requirements of gas tightness.

6.7 Inspection of cylinder neck

6.7.1 Cylinder to valve threads

When the valve is removed, the cylinder-to-valve thread shall be visually inspected to identify the type of thread (e.g. 25E as specified in ISO 11363-1) and to ensure that they are

a) clean and of full form,

b) free of damage,

c) free of burrs,

d) free of cracks, and

e) free of other imperfections.

Cracks manifest themselves as lines that run vertically down the thread and across the thread faces. They should not be confused with tap marks (thread machining stop marks). Special attention should be paid to the area at the bottom of the threads.

6.7.2 Other neck surfaces

Other surfaces of the neck also shall be visually inspected to ensure they are free of cracks or other defects in accordance with Annex B.

6.7.3 Internal neck threads

Damaged internal neck threads may be re-tapped or the thread type changed to provide the appropriate number of effective threads if the manufacturer confirms that the design of the neck permits these actions and endorses the procedure. After re-tapping or changing the thread form, the threads shall be checked with the appropriate thread gauge (e.g. according to ISO 11363-2 for 17E and 25E threads).

6.7.4 Neckring and collar

When a neckring/collar is attached, a visual inspection shall be carried out to ensure that it is secure and that there is no thread damage. A neckring shall be changed only using an approved procedure. If it is found that any significant damage to the cylinder has occurred by replacement of the neckring/collar, the cylinder shall be rendered unserviceable (see Clause 9).

6.8 Reassembly

Cylinders meeting the requirements of this International Standard shall be reassembled as specified by the porous material manufacturer. This includes replacing any packing materials in the core hole/neck and fitting new filters in such a way as to ensure contact between the packings/filters and the base of the valve stem when the valve is fitted.

New or inspected valves (see 6.6) shall be fitted to the cylinder using a suitable jointing material and the torque necessary to ensure a gas-tight seal between the valve and the cylinder in accordance with ISO 13341.

7 Cylinder marking and identification

Each cylinder that passes the periodic inspection shall be marked with the date of the periodic inspection (YY/MM *or* YYYY/MM) and the symbol of the periodic inspection body in accordance with the relevant regulation or standard, e.g. ISO 13769. Where an alteration of a stamp marking is necessary (e.g. due to a change of the tare as a consequence of replacement of a footring, neckring, guard, valve or the porous material, or as a consequence of the addition of new porous material), the old markings shall be obliterated (or crossed out) and the new data shall be stamped. A procedure shall be used that cannot damage the porous material.

For monolithic porous materials, stamping on the shoulder of welded cylinders is not permitted unless a data plate is provided for that purpose or unless it is provided for by the specification to which the cylinder is manufactured. In such cases, the stamping may be on a ring under the valve (see e.g. ISO 13769).

When relevant regulations require, the next periodic inspection date shall be shown by an appropriate method. The next periodic inspection date (year) may be stamped, labelled or indicated by a ring fitted over the valve stem prior to the valve being fitted. Annex E provides one example of an existing system for indicating the date of the next periodic inspection.

8 Records

A cylinder periodic inspection record shall be retained for at least 20 years. (Usually, this is done by the owner.) It shall record sufficient information to positively identify the cylinder and the results of the periodic inspection. The following information shall be available:

a) owner's name;

b) manufacturer's or owner's serial number;

c) type and weight of porous material added for every periodic inspection, if any;

d) attachment replacement, if any;

e) cylinder tare change, if appropriate;

f) result of the inspection (pass or fail: in case of failure, the reasons should be recorded);

g) present inspection date: year/month/day;

h) identification symbol of the periodic inspection body;

i) identification of the individual who performed the inspection;

j) details of any cylinder repairs made.

9 Rejection and rendering cylinders unserviceable

The decision to reject a cylinder may be taken at any stage during the periodic inspection. If it is impossible to recover a rejected cylinder, after notifying the owner, the cylinder shall be made unserviceable for holding gas under pressure so it is impossible for any part of the cylinder, especially the shoulder, to be re-issued into service. In case of any disagreement, it shall be ensured that the legal implication of the contemplated action is fully understood.

Prior to taking any of the following actions, it shall be ensured that the cylinder is empty (see 5.1). Appropriate measures shall be taken in case the porous material contains asbestos.

The following methods may be employed for rendering cylinders unserviceable:

a) crushing the cylinder using mechanical means;

b) irregular cutting of the neck;

c) irregular cutting of the cylinder in two or more pieces including the shoulder;

d) destroying the cylinder neck thread.

In some cases, it might be necessary to transport rejected cylinders to a place where they can be disposed of. In that case, the relevant regulations for the transport of dangerous goods apply. Additional regulations, such as for waste might apply. If there are no specific regulations, the rejected cylinder shall be stamp-marked with the words "FOR DISPOSAL". The stamp-marking shall be at least 2 cm high and shall be highlighted with white colour.

10 Disposal of unserviceable cylinders

Procedures used for disposing of non-acetylene cylinders are inappropriate for acetylene cylinders because of the nature of the contents of an acetylene cylinder.

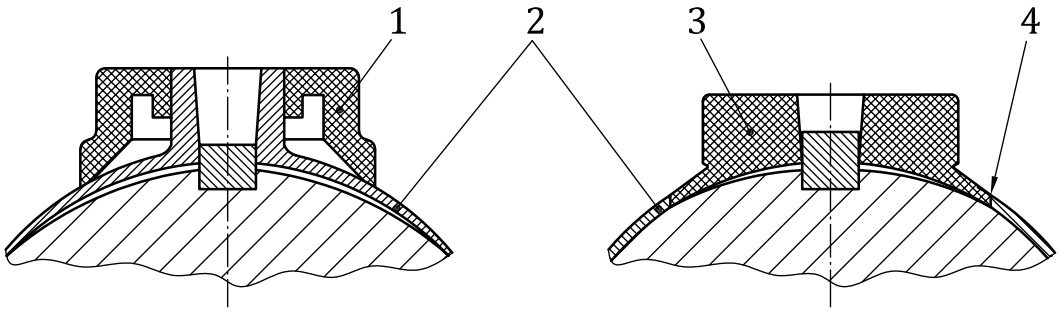
When disposing of acetylene cylinders, very careful consideration shall be given to the fact that the cylinders can contain residual gas, solvent (acetone or DMF) and porous material, which could contain asbestos.

Disposal shall be in accordance with national and local regulations.

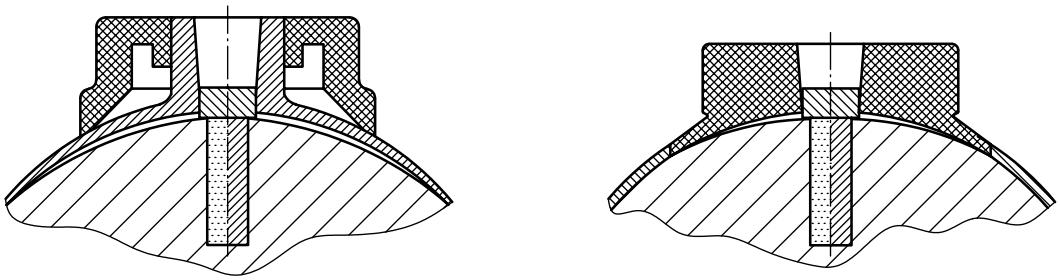
Annex A
(informative)

Tops of acetylene cylinders containing monolithic porous material

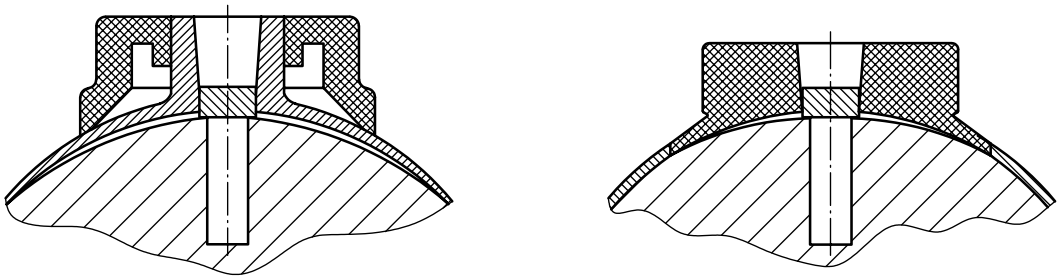
Porous materials can have a core hole of varying depths or no core hole at all. In all cases, the open space is filled with felt, fibrous padding material or a granular material. A metal screen is positioned between this material and the valve. See Figures A.1 and A.2.



a) Monolithic porous material without core hole, valve hole filled with felt, metal screen on top of felt filter



b) Core hole filled with felt, wood or fibrous padding material, metal screen on top of felt filter in valve hole

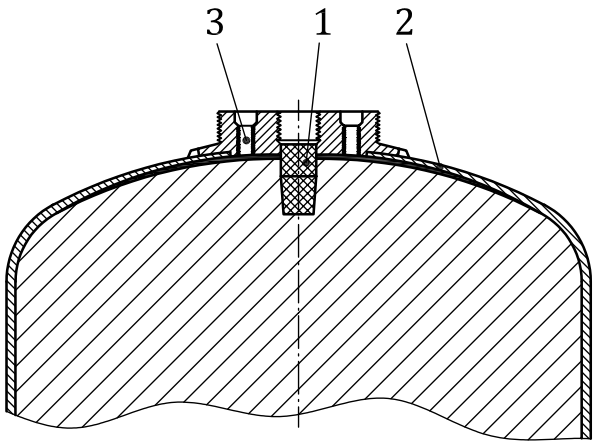


c) Core hole filled with non-monolithic porous material, metal screen on top of felt filter in valve hole

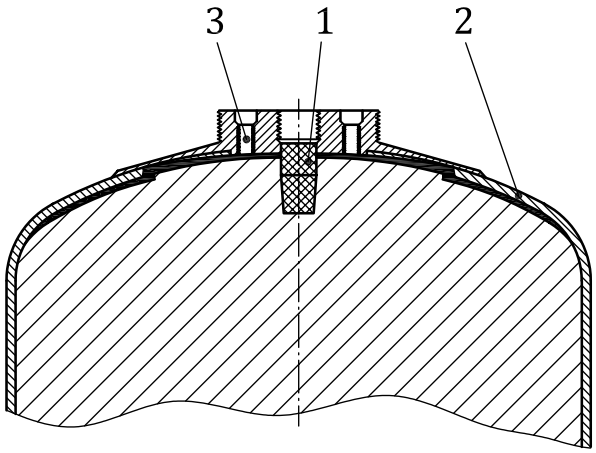
Key

1 neckring
2 top clearance
3 metal boss
4 weld area

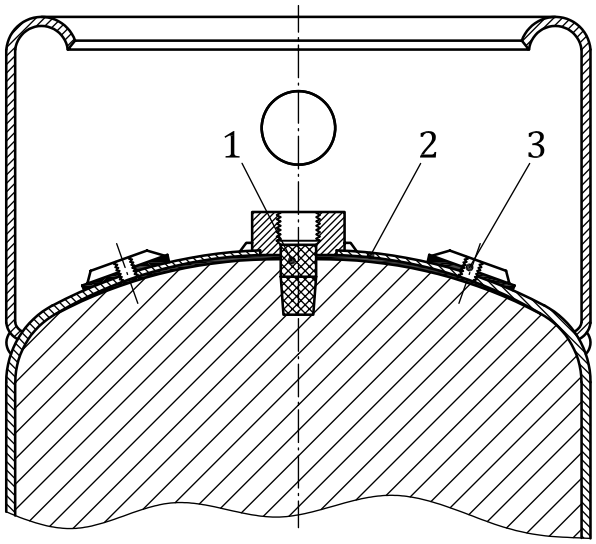
Figure A.1 — Exemplary illustration of the tops of seamless (left) and welded (right) acetylene cylinders containing monolithic porous material: cylinders without fusible plugs



a) Ellipsoidal/toroidal head with marking on shoulder



b) Ellipsoidal/toroidal head with flange marking



c) Ellipsoidal/toroidal head with collar with marking on collar

Key

1 core hole

2 top clearance

3 fusible plug hole

Figure A.2 — Exemplary illustration of acetylene cylinders with ellipsoidal tops containing monolithic porous material: cylinders with fusible plugs

Annex B
(normative)

External visual inspection

B.1 General

Gas cylinder defects can be physical, material or due to corrosion as a result of operating or environmental conditions to which the cylinder has been subjected during its life.

This annex provides general guidelines to the periodic inspection body as to the application of rejection criteria in the course of the external visual inspection. When applying the rejection criteria, the conditions of use of the cylinders and the severity of the defect shall be taken into account.

B.2 Physical and material defects

Permanent attachments (e.g. footrings, shrouds) shall be inspected to ensure that they are suitable for their intended purpose. Physical or material defects of the cylinder shall be inspected in accordance with Table B.1.

Table B.1 — Physical and material defects of the cylinder and applicable rejection criteria

Type of defect	Definition	Rejection criteria	Conclusion
Stamping	Marking by means of a metal punch	Any illegible or incorrect markings For welded cylinders: Stamp marking on the shoulder of welded cylinders unless a data plate is provided for that purpose or unless the cylinder is designed and constructed to accept stamp markings on the shoulder	Render unserviceable[a]
Suspicious marks	Marks introduced other than by the cylinder manufacturing process or by approved repair	Any marks introduced other than by the cylinder manufacturing process or by approved repair	Continued use possible after addi tional inspection
Plug or neck inserts	Additional inserts fitted in the cylinder neck or base	Any additional inserts fitted in the cylinder neck or base unless it can be clearly established that the addition is part of approved design	Render unserviceable
Vertical stability		For steel cylinders: Any deviation from verticality which can present a risk during service (especially if fitted with a footring)	Repair or render unserviceable
Bulge	Visible swelling of the cylinder	Any visible swelling of the cylinder	Render unserviceable
Dent	A depression in the cylinder with a depth >1 % of the external diameter that has neither penetrated nor removed metal	Any dent with a depth >3 % of the external diameter of the cylinder or any dent with a diameter less than 15 times its depth	Render unserviceable
Crack	A split or rift in the metal	Any split or rift in the metal	Render unserviceable

Table B.1 *(continued)*

Type of defect	Definition	Rejection criteria	Conclusion
Cut or gouge	A sharp impression with a depth > 5 % of the cylinder wall thickness where metal has been removed or redistributed	For seamless steel or seamless aluminium-alloy cylinder shells: Any cut or gouge with a depth >15 % of the wall thickness or any cut or gouge with a length >25 % of the external diameter of the cylinder	Render unserviceable
		For welded-steel cylinder shells: Any cut or gouge with a depth >10 % of the wall thickness or any cut or gouge with a length >25 % of the external diameter of the cylinder	Render unserviceable
Fire damage	Excessive general or localized heating of a cylinder	Any partial melting of the cylinder or any distortion of the cylinder or any charring or burning of paint or any fire damage to valve, melting of plastic guard or date ring or fusible plug, if fitted	Render unserviceable
Arc or torch burns	Partial melting of the cylinder, addition of weld metal or removal of metal by scarfing or cratering	Any partial melting of the cylinder, the addition of weld metal or the removal of metal by scarfing or cratering	Render unserviceable
Flashback	Ignition of acetylene in the cylinder	Any ignition of acetylene within the cylinder	Render unserviceable
[a] If it can be clearly established that the cylinder fully complies with the appropriate specifications, altered operational and modified markings may be acceptable and inadequate markings may be corrected, provided there is no possibility of confusion.			

B.3 Corrosion

Corrosion defects shall be inspected in accordance with Table B.2.

Table B.2 — Rejection criteria for corrosion of the cylinder

Type of corrosion	Definition	Rejection criteria	Conclusion
General corrosion	Loss of wall thickness over an area ≥20 % of the total cylinder surface	The original surface of the metal is no longer recognizable or the depth of penetration exceeds 10 % of the original wall thickness or the wall thickness is less than the minimum guaranteed wall thickness	Render unserviceable
Local corrosion[a]	Loss of wall thickness over an area <20 % of the total cylinder surface, except for other local corrosion as described below	The depth of penetration exceeds 20 % of the original wall thickness or the wall thickness is less than the minimum guaranteed wall thickness	Render unserviceable

Table B.2 *(continued)*

Type of corrosion	Definition	Rejection criteria	Conclusion
Chain, pitting or line corrosion	Corrosion forming a narrow longitudinal or circumferential line or strip, or isolated craters or pits that are almost connected	The total length of corrosion in any direction exceeds the diameter of the cylinder and the possible depth exceeds 10 % of the original wall thickness	Render unserviceable
Crevice corrosion	Corrosion associated with and taking place at or immediately around an aperture	The depth of penetration exceeds 20 % of the minimum guaranteed wall thickness (after thorough cleaning)	Render unserviceable
[a] Special attention shall be given to corrosion underneath attachments, such as footring or shroud. In such cases, repair might be possible.			

Annex C
(normative)

Determination of the top clearance

C.1 The top clearance shall be determined through inserting top clearance gauges (for examples, see Figure C.1). As a minimum, a gauge with a thickness corresponding to the maximum allowed top clearance and a gauge with a thickness of 1 mm more than the maximum allowed top clearance shall be used. The clearance gauges shall be inserted gently and they shall be gently moved around the circumference as far as possible.

C.2 The cylinder is acceptable if

a) a gauge with a thickness corresponding to the maximum allowed top clearance cannot be inserted at any point, or

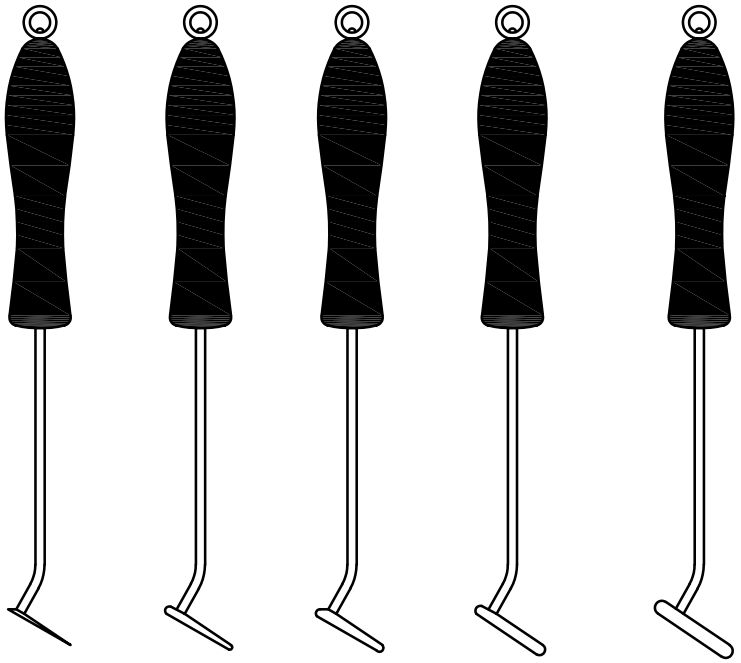
b) a gauge with a thickness corresponding to the maximum allowed top clearance can be inserted into the top clearance and fits tightly without movement, or

c) a gauge with a thickness corresponding to the maximum allowed top clearance can be inserted into the top clearance with vertical movement and can be moved less than or up to 180° around the total circumference of the cylinder top.

C.3 The cylinder shall be rejected if

a) a gauge with a thickness of 1 mm more than the maximum allowed top clearance can be inserted at any point, or

b) a gauge with a thickness corresponding to the maximum allowed top clearance can be inserted and moved more than 180° around the total circumference of the cylinder top.



The angle between the gauge and its handle should correspond to the shape of the cylinder shoulder so that it can be properly moved. The width should be appropriate for the shape of the cylinder shoulder

Figure C.1 — Examples of top clearance gauges for measuring the top clearance

Annex D
(normative)

Cracks in the porous material

Figure D.1 a) illustrates an acetylene cylinder with porous material that shows hairline cracking and crumbling. The cylinder may be acceptable for further service, provided there are no breakouts and the porous material cannot be dislodged.

Figure D.1 b) illustrates an acetylene cylinder with a porous material that shows cracking with visible side walls and crumbling. The cylinder shall be rejected.

a) Hairline crack without visible sidewalls **b) Crack with visible sidewalls**

Figure D.1 — Cracks in the monolithic porous material of an acetylene cylinder

Annex E
(informative)

Rings for indicating the date of the next periodic inspection for gas cylinders

Table E.1 specifies a typical system of colour and shape of rings to identify the date of the next periodic inspection. Other systems (also with different colours) are used as well.

NOTE These rings are different from rings on to which the date of the last periodic inspection is engraved; see, for example Reference [1], Section 6.2.2.7.8.

Table E.1 — Colour and shape of rings to identify the date of the next periodic inspection

Year	Colour	Shape
2000	Aluminium	Circle
2001	Red	Hexagon
2002	Blue	Hexagon
2003	Yellow	Hexagon
2004	Green	Hexagon
2005	Black	Hexagon
2006	Aluminium	Hexagon
2007	Red	Square
2008	Blue	Square
2009	Yellow	Square
2010	Green	Square
2011	Black	Square
2012	Aluminium	Square
2013	Red	Circle
2014	Blue	Circle
2015	Yellow	Circle
2016	Green	Circle
2017	Black	Circle
2018[a]	Aluminium	Circle
2019	Red	Hexagon
2020	Blue	Hexagon
2021	Yellow	Hexagon
2022	Green	Hexagon

Table E.1 *(continued)*

Year	Colour	Shape
2023	Black	Hexagon
2024	Aluminium	Hexagon
[a] The sequence of colour and shape of rings to identify the date of the next periodic inspection is repeated every 18 years. Hence, 2018 is a repeat of 2000.		

Bibliography

[1] *UN Recommendations on the Transport of Dangerous Goods — Model Regulations*, 17th revised edition, United Nations, Geneva

[2] EN 1089-3, *Transportable gas cylinders — Gas cylinder identification (excluding LPG) — Part 3: Colour coding*

[3] ISO 3807, *Gas cylinders — Acetylene cylinders — Basic requirements and type testing*

[4] ISO 7225, *Gas cylinders — Precautionary labels*

[5] ISO 11363-1, *Gas cylinders — 17E and 25E taper threads for connection of valves to gas cylinders — Part 1: Specifications*

[6] ISO 11363-2, *Gas cylinders — 17E and 25E taper threads for connection of valves to gas cylinders — Part 2: Inspection gauges*

[7] ISO 13088, *Gas cylinders — Acetylene cylinder bundles — Filling conditions and filling inspection*

[8] ISO 13769, *Gas cylinders — Stamp marking*

[9] ISO 25760, *Gas cylinders — Operational procedures for the safe removal of valves from gas cylinders*

[10] ISO 80000-4, *Quantities and units — Part 4: Mechanics*

ICS 23.020.30

Price based on 22 pages