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Cylinders for dissolved acetylene — Inspection at time of filling

Bouteilles à acétylène dissous — Contrôle au moment du remplissage



Reference number
ISO 11372:1995(E)

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.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 11372 was prepared by Technical Committee ISO/TC 58, *Gas cylinders*, Subcommittee SC 4, *Operational requirements for gas cylinders*.

Annexes A, B and C of this International Standard are for information only.

Introduction

Transportable gas cylinders for dissolved acetylene require inspection at the time of filling to establish that:

- the cylinder has no serious defects;
- the cylinder can be identified and complies with the relevant requirements with regard to marking, colour coding and completeness of accessories;
- the cylinder valve functions satisfactorily;
- the appropriate amounts of the acetylene, solvent and settled pressure have been determined.

A cylinder filling inspection should be carried out only by persons who are competent in the subject and can assure that the cylinder is safe for continued use.

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Cylinders for dissolved acetylene — Inspection at time of filling

1 Scope

This International Standard specifies the minimum requirements for filling inspections of transportable cylinders for acetylene gas. These requirements reflect current practice and experience.

This International Standard applies to cylinders of water capacity from 0,5 l to 150 l for the storage and transport of dissolved acetylene gas under pressure.

This International Standard does not deal with manifolded bundles or manifolded trailer cylinders, nor does it deal with inspecting or testing of the porous mass.

2 Normative reference

The following standard contains provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the edition indicated was valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent edition of the standard indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 3807:1977, *Dissolved acetylene cylinders — Basic requirements*.

3 Definitions

For the purposes of this International Standard, the following definitions apply.

3.1 cylinder shell: Pressure vessel manufactured for the storage and transport of dissolved acetylene gas, and suitable for containing a porous mass solvent for the acetylene.

3.2 complete cylinder: Cylinder shell ready to be charged with acetylene, including porous mass, solvent, valve and other accessories permanently fixed to the cylinder.

NOTE 1 Examples of permanent accessories include neck ring, foot ring, fixed valve guard (not removed during filling) and fusible plugs.

3.3 porous mass: Single or multicomponent material introduced or formed in the cylinder shell in order to completely fill it, whose porosity allows for the absorption of the solvent and the acetylene gas.

3.3.1 monolithic (coherent) porous mass: Porous mass composed of a solid product obtained by reacting materials together or by connecting materials with a binder.

3.3.2 nonmonolithic (not coherent) porous mass: Porous mass composed of granular, fibrous or similar materials without addition of a binder.

3.4 porosity: Ratio, expressed as a percentage, of the total volume (water capacity) of the cylinder shell minus the volume of the solid material of the porous mass, to the total volume (water capacity) of the cylinder shell, measured in accordance with ISO 3807.

3.5 solvent: Liquid absorbed by the porous mass and capable of dissolving and releasing acetylene.

3.6 saturation gas: Mass of acetylene dissolved in the solvent in a cylinder at atmospheric pressure at 15 °C.

3.7 nominal mass of solvent: Mass of solvent, authorized at approval of the porous mass, to be added to the cylinder and capable of absorbing the maximum acetylene charge.

3.8 maximum acetylene charge: Maximum authorized mass of acetylene which can be contained in a cylinder (including saturation acetylene).

3.9 settled pressure: Pressure developed at a uniform temperature of 15 °C by the dissolved acetylene charge in a cylinder containing the nominal mass of solvent.

This pressure is the sum of the partial pressures of gaseous acetylene, solvent vapor and gaseous impurities.

3.10 maximum settled pressure: Pressure developed at a uniform temperature of 15 °C in a cylinder containing the maximum acetylene charge (3.8) and the nominal mass of solvent (3.7).

3.11 tare

(1) Mass of the complete cylinder (3.2) without saturation gas (Tare A).

(2) Mass of the complete cylinder (3.2) including saturation gas (Tare S).

3.12 maximum charging weight

(1) Maximum acetylene charge (3.8) if tare A applies.

(2) Maximum acetylene charge minus saturation gas if tare S applies.

4 Filling inspection

Each cylinder shall be submitted to inspection prior to, during and immediately after filling. The following items shall be covered by a filling inspection:

- identification of cylinder;
- establishment of cylinder owner, if required;
- establishment of serviceable condition;
- establishment of valve integrity and suitability;
- establishment of integrity of permanent attachments (e.g. neck ring/threaded boss);
- verification of leaktightness;
- establishment of filling conditions.

5 Inspection procedure

5.1 Inspection prior to filling

5.1.1 Identification of cylinder

Before filling a cylinder, it shall be verified that:

- the cylinder is authorized to be filled in the country of the filling station;
- the cylinder does not have an expired retest date;
- the stamp marking, label and colour coding, if any, are appropriate to acetylene and are complete, clear and correct (any conflict between content indicators and colour coding shall be rectified prior to filling).

A list of information which may appear on the cylinder is given in annex A.

5.1.2 Identification of owner and authorization to fill

If required by national or local authority or company policy, before filling, the owner of the cylinder shall be established and authorization to fill the cylinder obtained.

5.1.3 Establishment of serviceable condition

It shall be established that each cylinder is in serviceable condition.

Before a cylinder is filled, it shall be established that the cylinder is clean and reasonably free of foreign material, and does not exhibit any serious defects such as arc burns, bulges, severe corrosion (especially on the bottom), heat/fire damage or significant mechanical damage.

Any pressure relief device, including fusible plugs, shall be inspected to ensure there is no apparent damage to the device.

5.1.4 Establishment of valve and attachment integrity and suitability

Before filling a cylinder, it shall be established that the installed valve is suitable for acetylene and is in satisfactory condition, i.e.:

- has the proper valve outlet (see, for example, ISO 5145);
- is free of contaminants;

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3.3.1 monolithic (coherent) porous mass: Porous mass composed of a solid product obtained by reacting materials together or by connecting materials with a binder.

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3.7 nominal mass of solvent: Mass of solvent, authorized at approval of the porous mass, to be added to the cylinder and capable of absorbing the maximum acetylene charge.

3.8 maximum acetylene charge: Maximum authorized mass of acetylene which can be contained in a cylinder (including saturation acetylene).

3.9 settled pressure: Pressure developed at a uniform temperature of 15 °C by the dissolved acetylene charge in a cylinder containing the nominal mass of solvent.

This pressure is the sum of the partial pressures of gaseous acetylene, solvent vapor and gaseous impurities.

3.10 maximum settled pressure: Pressure developed at a uniform temperature of 15 °C in a cylinder containing the maximum acetylene charge (3.8) and the nominal mass of solvent (3.7).

3.11 tare

(1) Mass of the complete cylinder (3.2) without saturation gas (Tare A).

(2) Mass of the complete cylinder (3.2) including saturation gas (Tare S).

3.12 maximum charging weight

(1) Maximum acetylene charge (3.8) if tare A applies.

(2) Maximum acetylene charge minus saturation gas if tare S applies.

4 Filling inspection

Each cylinder shall be submitted to inspection prior to, during and immediately after filling. The following items shall be covered by a filling inspection:

- identification of cylinder;
- establishment of cylinder owner, if required;
- establishment of serviceable condition;
- establishment of valve integrity and suitability;
- establishment of integrity of permanent attachments (e.g. neck ring/threaded boss);
- verification of leaktightness;
- establishment of filling conditions.

5 Inspection procedure

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Before filling a cylinder, it shall be verified that:

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- the cylinder does not have an expired retest date;
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It shall be established that each cylinder is in serviceable condition.

Before a cylinder is filled, it shall be established that the cylinder is clean and reasonably free of foreign material, and does not exhibit any serious defects such as arc burns, bulges, severe corrosion (especially on the bottom), heat/fire damage or significant mechanical damage.

Any pressure relief device, including fusible plugs, shall be inspected to ensure there is no apparent damage to the device.

5.1.4 Establishment of valve and attachment integrity and suitability

Before filling a cylinder, it shall be established that the installed valve is suitable for acetylene and is in satisfactory condition, i.e.:

- has the proper valve outlet (see, for example, ISO 5145);
- is free of contaminants;

- is easy to operate and not obstructed;
- exhibits undamaged outlet threads and body, by visual inspection;
- its pressure relief device, if required, e.g. a fusible plug, is undamaged;
- its handwheel, or key-operated spindle, is essentially undamaged and properly fixed;
- attaches correctly to the filling connector.

Before filling a cylinder, it shall be established that the neck ring/threaded boss is fit for the intended purpose and that the neck ring, if one exists, is not loose. Any permanent valve guard shall be checked to ensure that it is properly attached. Similarly, the integrity of the foot ring, if fitted, shall be checked for intended duty.

5.2 Inspection during filling

During the filling cycle of a cylinder, the filler shall determine:

- that the valve is not blocked/obstructed and that the fill operation is progressing satisfactorily;
- that the valve does not leak in the open position, for example at the bonnet or gland nut.

If leakage is suspected, the valve and connection to the cylinder shall be tested for leaks, by soapy water or other suitable means. The acetylene content of any cylinder found to be leaking shall be emptied in a safe manner, and the cylinder shall not be refilled until all leaks have been repaired.

5.3 Inspection after filling

5.3.1 After filling a cylinder, the filler shall ensure that the valve does not leak when in the closed position, for example seat leakage at the valve outlet. The interface between the valve and the cylinder, and the fusible plug/safety device, if present, shall be leaktight.

The valve and connection to the cylinder shall be tested for leaks, by soapy water or other suitable means, to assure that no leaks are present. The acetylene content of any cylinder found to be leaking shall be emptied in a safe manner, and the cylinder shall not be refilled until all leaks have been repaired.

5.3.2 After filling, the cylinder shall be weighed to determine that the proper charge of acetylene has been filled and the cylinder marking shall be verified.

5.3.3 The cylinder cap shall be installed and inspected that it fits properly.

6 Establishment of filling conditions

6.1 General requirements

The basis conditions for each type of acetylene cylinder shall be established during the initial type approval and shall define the following:

- maximum acetylene charge (3.8);
- type of solvent;
- nominal mass of solvent and permitted tolerances;
- maximum settled pressure (3.10).

These conditions shall be known to the filler.

6.2 Filling procedure (in the order given)

- verification of mass for determination of solvent shortage, taking into account the actual mass, the temperature of the cylinder, the pressure in the cylinder and tare (3.11) stamped on the cylinder;
- replenishment of solvent, if necessary;
- verification of mass after filling [the total mass shall not exceed the sum of the tare plus the maximum charging weight of acetylene (see 3.12)]. If this mass is exceeded, the cylinder shall be drained back to the required mass;
- settled pressure check (random basis).

7 Precautionary remarks

7.1 It is important to use a suitable weighing device which has a working range and a measuring accuracy applicable to the size of cylinder being filled.

The device shall be capable of determining the mass of acetylene and solvent to an accuracy of $\pm 1\%$ of the maximum charging mass.

7.2 If the settled pressure (3.9) is too high, and the mass is correct, it may be indicative of:

- insufficient solvent;
- partial replacement of solvent by contaminants, e.g. water;

— high concentration of inert gases in the acetylene.

Conversely, too low a settled pressure may be indicative of:

— excessive solvent content;

— replacement of acetylene content by contaminants, e.g. water.

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Annex A

(informative)

Information which may appear on cylinder shell

A.1 In accordance with ISO 3807, each cylinder containing dissolved acetylene gas shall bear the following markings:

NOTE 2 Actual markings on the cylinder vary from country to country.

- "ISO 3807";
- gas identification;
- manufacturer's identification mark;
- cylinder serial number;
- identification of porous mass;
- identification mark of owner;
- tare with suffix A or S (see 3.1);
- maximum acetylene charge (see 3.8);
- identification of solvent, if not acetone;
- maximum settled pressure.

A.2 Other markings that may appear on the cylinder are:

- date of manufacture;
- date of retests (inspections);
- date of next retest (inspection);
- certification mark of authorized inspector;
- water capacity of cylinder shell;
- test pressure of cylinder shell;
- mass of cylinder shell;
- yield stress/ultimate strength of cylinder shell material;
- identification of cylinder shell material;
- identification of heat treatment of cylinder shell;
- identification of type approval;
- identification of shell specification (see ISO 4705, ISO 4706);
- minimum guaranteed wall thickness of the cylinder shell.

Annex B

(informative)

Procedure which may be adopted when a cylinder valve is suspected to be obstructed

B.1 If there is any doubt when the valve of a gas cylinder is opened that gas is not being released and the cylinder may still contain residual gas under pressure, check or checks shall be made to establish that the free passage through the valve is not obstructed.

Check to establish that the total mass of the cylinder does not exceed the tare stamped on the cylinder. If there is a positive difference, the cylinder may contain either acetylene or contaminants. This positive difference confirms the possibility that the valve is blocked.

The method adopted shall be recognized procedure such as one of the following or one that provides equivalent safeguards.

- a) Introduce an inert gas at a pressure of up to 2 bar and check its discharge.

- b) Use a device to pump inert gas into the cylinder (see figure B.1).

B.2 When it is established that there is no obstruction to gas flow in the cylinder valve, the valve may be removed.

CAUTION — Some amounts of acetylene may be discharged due to change of temperature. Do not leave cylinder without valve.

B.3 When a cylinder is found to have an obstructed gas passage in the valve or a damaged/inoperable valve, the cylinder shall be set aside for special attention. Such cylinders shall be treated only by trained personnel according to proven procedures.

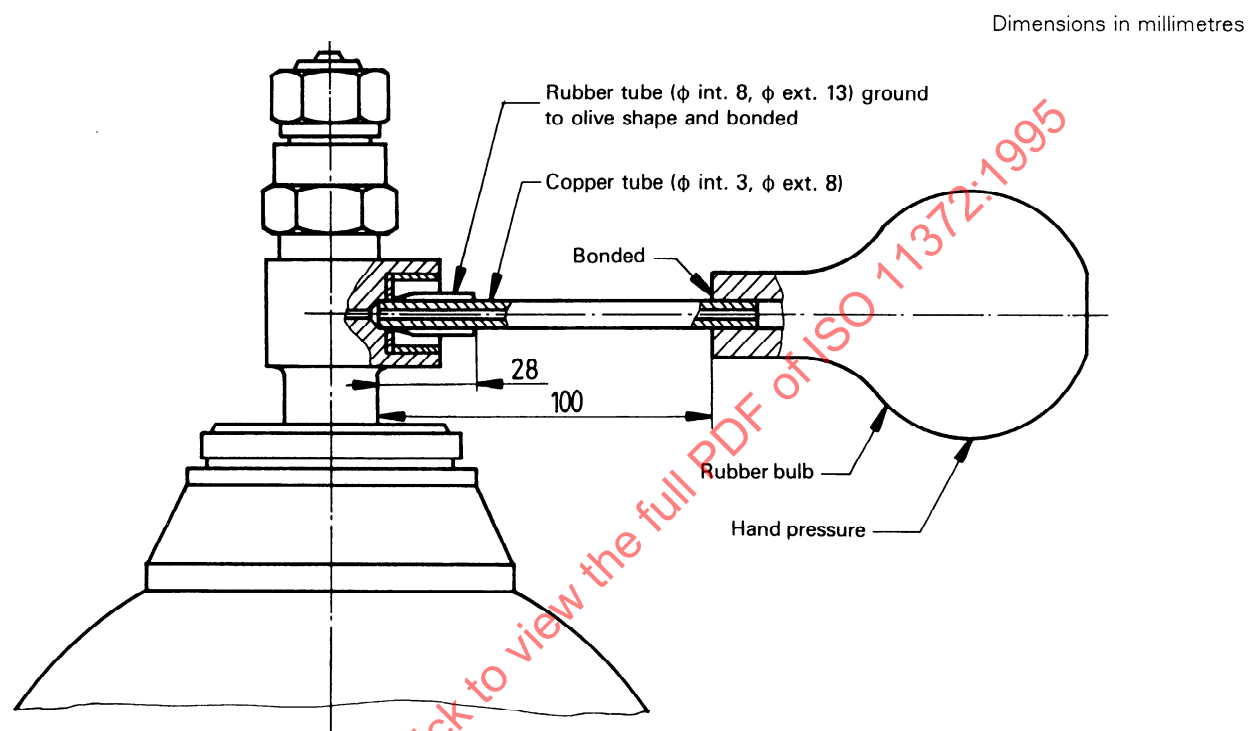


Figure B.1 — Device used to hand-pump inert gas into a cylinder

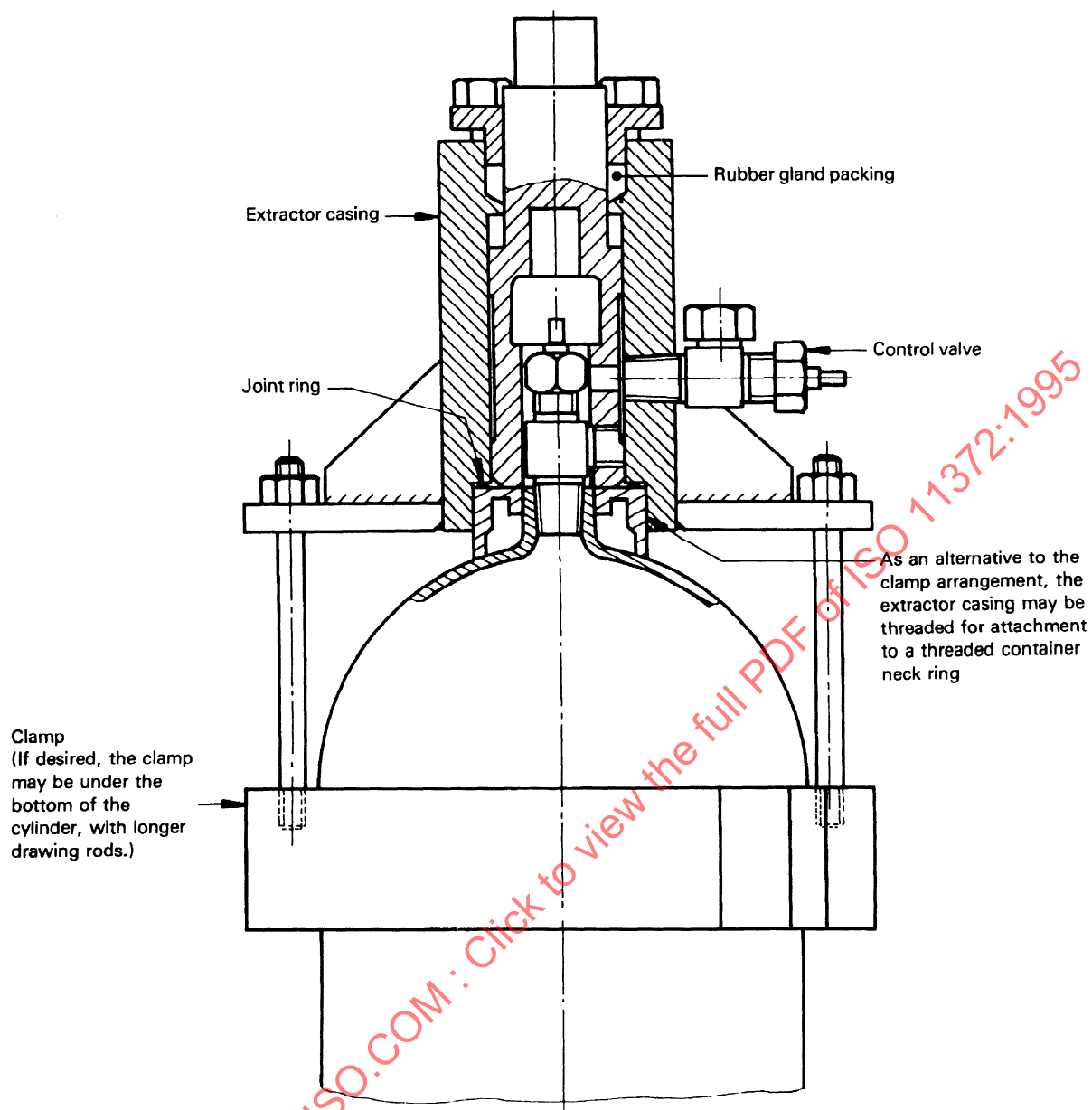


Figure B.2 — Typical device used for the removal of a damaged/obstructed gas cylinder valve