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Gas cylinders — Cylinders for dissolved acetylene — Inspection at time of filling

Bouteilles à gaz — Bouteilles à acétylène dissous — Contrôle au moment du remplissage

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Foreword

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International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. 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.

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.

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

This second edition cancels and replaces the first edition (ISO 11372:1995), which has been technically revised.

Introduction

This International Standard covers requirements that reflect current practice and experience.

Each transportable gas cylinder for dissolved acetylene is inspected at time of filling in order to establish that

— it has no defects such that the cylinder is unsafe for filling or continued use;

— it can be identified and complies with the relevant requirements with regard to marking, labelling, colour coding and completeness of its accessories;

— its valve functions satisfactorily;

— the appropriate amounts of solvent and acetylene have been determined and charged.

The cylinder filling inspection is to be carried out only by persons who are trained and competent in the subject, for the purpose of ensuring that a cylinder is safe for continued use.

Gas cylinders — Cylinders for dissolved acetylene — Inspection at time of filling

1 Scope

This International Standard

— specifies minimum requirements that reflect current practice and experience for inspection at time of filling of single cylinders of water capacity up to 150 l for the storage and transport of dissolved acetylene gas under pressure;

— is not applicable to palletized cylinders, or to manifolded cylinders or manifolded bundles on trailers;

— does not cover aspects related to the inspection or testing of the porous material.

NOTE In International Standards, weight is equivalent to a force, expressed in newtons. However, in common parlance (as used in terms defined in this International Standard), the word “weight” continues to be used to mean mass, although this practice is deprecated (ISO 31-3).

2 Terms and definitions

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

2.1
complete cylinder
cylinder shell ready to be charged with acetylene gas that is complete with porous material, solvent, saturation gas, valve, any valve protection (permanently attached to the cylinder shell) and other permanently fixed accessories

NOTE Examples of permanently fixed accessories are neck ring, foot ring and fusible plugs.

2.2
cylinder shell
pressure vessel manufactured for storage and transport, and suitable for containing a porous material, a solvent for the acetylene and the acetylene

2.3
filler
person or persons responsible for inspection prior to, during and immediately after filling and who has or have received an appropriate level of training for the work involved and has or have access to all necessary data for the cylinder, valve and all other fittings used

2.4
maximum acetylene content
specified maximum mass of acetylene in the cylinder (in kilograms), including the mass of saturation gas

2.5
maximum charging weight

2.5.1
maximum charging weight
⟨tare A⟩ maximum acetylene content (2.4)

2.5.2
maximum charging weight
⟨tare S⟩ maximum acetylene content (2.4) minus saturation gas (2.8)

2.6
nominal weight of solvent
weight of solvent to be added to the complete cylinder, as established during the prototype testing

2.7
porous material
single or multicomponent material introduced or formed in the cylinder shell in order to completely fill it, whose porosity allows the absorption of the solvent and the acetylene gas

NOTE The porous material may 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.

2.8
saturation gas
weight of acetylene dissolved in solvent in a cylinder at atmospheric pressure and 15 °C

2.9
solvent
liquid absorbed by the porous material and capable of dissolving and releasing acetylene

2.10
tare

2.10.1
tare A
weight of the complete cylinder (2.1) without saturation gas

2.10.2
tare S
weight of the complete cylinder (2.1) including saturation gas

2.10.3
tare F
tare A (2.10.1) minus the weight of solvent

NOTE Tare F is used for solvent-free acetylene cylinders.

2.11
working pressure
maximum settled pressure in bar (gauge) developed at a uniform temperature of 15 °C in a cylinder containing the maximum acetylene content and the specified weight of solvent

3 Filling inspection

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

a) verification of serviceable condition (see 4.1);

b) identification of cylinder's suitability for filling (see 4.2);

c) identification of cylinder owner, if required (see 4.3);

d) verification of integrity and presence of permanent attachments (e.g. neck ring/threaded boss) (see 4.4);

e) verification of valve integrity and suitability (see 4.5);

f) verification of filling conditions (see 4.6);

g) check of the valve protection (see 4.7).

Cylinders not fulfilling items a) to g) shall be clearly identified according to written procedures of the filling company.

4 Description of inspection items

4.1 Verification of serviceable condition

It shall be established that each cylinder is in a serviceable condition before it is taken to the filling manifold. It shall therefore be established that the cylinder is clean and free of foreign material (i.e. such that the cylinder can be assessed for mechanical damage that would prevent it from being filled safely) and does not exhibit any abnormalities that could impair the safety such as arc burns, severe corrosion, heat/fire damage or significant mechanical damage.

Any pressure relief device, if fitted, such as a fusible plug, shall be inspected to ensure it is in a satisfactory condition.

Cylinders that have been found to be unserviceable shall be clearly identified and isolated for further inspection according to written procedures of the filling company.

4.2 Identification of cylinder's suitability for filling

Before filling a cylinder, it shall be established that

a) the cylinder has not passed its due date for periodic inspection and maintenance;

b) the porous material contained within the cylinder is fit for further service and does not have a current history of problems, e.g. by reference to the manufacturer of the material;

c) the complete cylinder is permitted for filling in the country of the filling station (e.g. through verification of the cylinder's markings or by questioning the cylinder owner);

d) the stamp marking, label and colour coding are appropriate to acetylene (see, for example, ISO 13769, ISO 3807-1 and ISO 3807-2).

4.3 Identification of cylinder owner

If required, before filling, the identity of the cylinder's owner shall be established and his authorization to fill the cylinder obtained.

4.4 Verification of integrity and presence of permanent attachments

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. If there is a permanent valve guard, it shall be checked to ensure that it is properly attached. Similarly, the integrity of a foot ring, if fitted, shall be checked for intended duty.

4.5 Verification of valve integrity and suitability

4.5.1 Before filling a cylinder, it shall be established that the installed valve is suitable for acetylene and is in a satisfactory condition. As a minimum, it shall be established that

a) the valve outlet is suitable for the intended use;

b) the valve is easy to operate;

c) the valve is free from contaminants;

d) the handwheel or key-operated spindle is operable (if the valve is suspected to be blocked, isolate the cylinder and treat for example in accordance with Annex A);

e) the safety device (e.g. fusible plug), if present, is undamaged;

f) the outlet thread and body are undamaged;

g) the valve attaches correctly to the filling connector.

4.5.2 During the filling cycle of a cylinder, which includes the solvent replenishment stage, the filler shall determine

a) that the valve is not blocked or obstructed (as an example see Annex A) and that the operation is progressing satisfactorily (e.g. by checking the weight increase);

b) that the valve does not leak when in the open position; if leakage is suspected, perform a check including the bonnet or gland nut. Filling of the cylinder shall be stopped and only recommenced after the leak has been rectified.

4.5.3 After filling a cylinder, the filler shall ensure that the valve and the pressure relief device (e.g. fusible plug), if fitted, do not leak when in the closed position and disconnected from the filling connection. If leakage is suspected, a check shall be made for seat leakage at the valve outlet. A check shall also be made that the interface between the valve and the cylinder is leak tight.

4.5.4 Tests shall be carried out on other accessories and fittings to ensure that they do not leak.

4.6 Verification of filling conditions

4.6.1 General requirements

The basic conditions for each type of acetylene cylinder established during the initial prototype testing shall be available to the filler:

a) maximum acetylene content (2.4);

b) type of solvent (2.9);

c) nominal weight of solvent (2.6) and permitted tolerances;

d) working pressure (2.11).

Correct filling of an acetylene cylinder requires the following consecutive steps:

a) determination of any solvent shortage, taking into account the actual weight, the temperature of the cylinder, the pressure in the cylinder and tare (2.10) stamped on the cylinder;

b) replenishment of solvent, if necessary;

c) weight check;

d) filling of acetylene;

e) weight check after filling [the total mass shall not exceed the sum of the tare plus the maximum charging weight (2.5); if it does, the cylinder shall be drained in a safe manner back to the proper weight];

f) pressure check.

NOTE Since the solvent content has been verified as correct, there is no need to check the pressure of each individual cylinder.

4.6.2 Requirements for weight and pressure checks

Weighing scales that have a working range and a measuring accuracy applicable to the size of cylinder being filled shall be used.

If the pressure is too high at ambient temperature and the weight is correct, it is indicative of the following possible conditions:

a) deficiency of solvent;

b) solvent has become contaminated, e.g. by water;

c) high concentration of inert gases in the acetylene.

Conversely, too low a pressure at ambient temperature is indicative of the following possible conditions:

a) excessive solvent content;

b) acetylene has become contaminated, e.g. by water.

Corrective action shall be taken before the cylinder may leave the filling station.

4.7 Check of the valve protection

If a valve guard or valve cap is fitted prior to dispatch, a check shall be made of the guard fitting connection.

Annex A
(informative)

Procedure to be adopted when de-valving and when it is suspected that a cylinder valve is obstructed

A.1 Check for obstructed valve

The following procedures shall be carried out only by trained personnel. In view of the potential hazards in acetylene cylinders, this operation can lead to injury from stored energy release and fire; hence personnel shall take such precautions as deemed necessary for the work to be performed. When the acetylene, if any, has been released and the pressure within the cylinder reduced to atmospheric pressure, the valve may be removed after an additional check has been made to establish that there is free passage through the valve.

The method adopted shall be a recognized procedure, such as a) followed by either b) or c) below, or one that provides equivalent safeguards.

a) First check to establish that the actual total weight of the cylinder is the same as the tare stamped on the cylinder, adjusted if necessary to represent the condition of the cylinder being weighed (e.g. tare A is likely to require adjustment in most cases). If there is a positive difference, the cylinder may contain either a liquefied gas under pressure or contaminants.

b) Introduce inert gas at a pressure of up to 5 bar and check its discharge.

c) Use the device shown in Figure A.1. Press the rubber bulb by hand and press the device tight against the valve outlet. If the rubber bulb inflates (tight on the outlet) the free passage through the valve is established. If there is a positive weight difference (actual total weight minus tare), the cylinder may contain contaminants (e.g. water or other liquids).

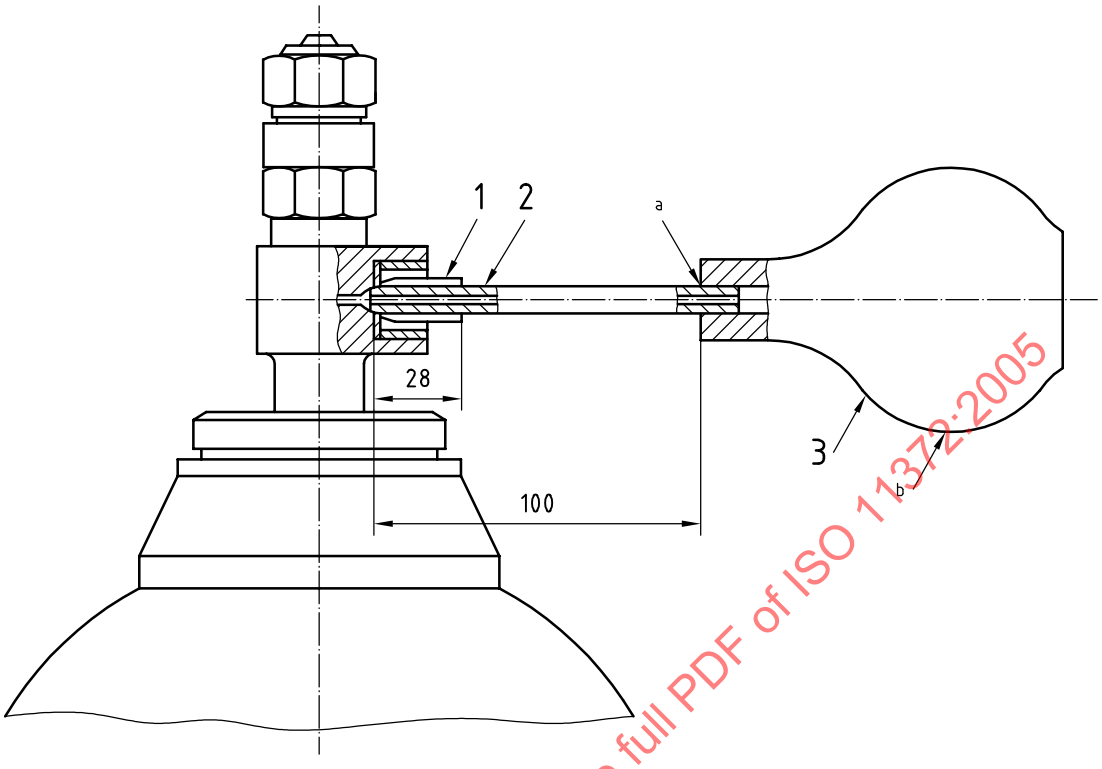
A.2 Valve unobstructed

When it is established that there is no obstruction to gas flow in the cylinder valve and there is no longer residual pressure in the cylinder, the valve may be removed.

A.3 Valve obstructed

When a cylinder is found to have an obstructed gas passage in the valve, the cylinder shall be set aside and handled only by personnel specially trained in this task. The preferred method is to partially unscrew the valve within a glanded cap, secured and joined to the cylinder and vented to a safe discharge.

The principles of a suitable device are illustrated in Figure A.2. This procedure shall be performed in a controlled manner in such a way as to avoid personal injury.



Key

1 rubber tube (8 mm internal diameter × 13 mm outer diameter) ground to olive shape and bonded

2 steel tube (3 mm internal diameter × 8 mm outer diameter)

3 rubber bulb

[a] Bonded.

[b] Hand pressure.

Figure A.1 — Typical device for detecting an obstructed cylinder valve