INTERNATIONAL STANDARD

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Cylinders for liquefied gases (excluding acetylene and LPG) — Inspection at time of filling

Bouteilles à gaz liquéfiés (à l'exception de l'acétylène et du GPL) — Contrôle au moment du remplissage

Reference number
ISO 11113:1995(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 11113 was prepared by Technical Committee ISO/TC 58, *Gas cylinders*, Subcommittee SC 4, *Operational requirements for gas cylinders*.

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

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Introduction

Transportable gas cylinders 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 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.

Cylinders for liquefied gases (excluding acetylene and LPG) — Inspection at time of filling

1 Scope

This International Standard specifies the minimum requirements to verify the integrity of transportable gas cylinders for continued use. 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 transportation of liquefied gases (excluding acetylene and LPG).

NOTE 1 Many of these general requirements also apply to cylinders of water capacity smaller than 0,5 l.

This International Standard does not apply to manifolded bundles or manifolded trailer cylinders; nor does it deal with inspecting or testing for internal contamination.

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 448:1981, *Gas cylinders for industrial use — Marking for identification of content.*

3 Definitions

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

3.1 filling ratio: Ratio of the mass of gas in a cylinder to water capacity of the cylinder.

It is normally expressed in kilograms per litre.

3.2 filling weight: Maximum mass of liquefied gas allowed to be filled into a given cylinder.

3.3 pressure relief device: Device fitted to the cylinder or cylinder valve and designed to relieve gas pressure in the event of abnormal conditions resulting in the development of pressure in excess of a specified value inside the cylinder.

3.4 cylinder mass: Mass of the cylinder including all permanent attachments, e.g. head ring, neck ring or foot ring, but excluding valve and valve cap or valve guard.

3.5 tare weight: Mass of the cylinder including permanent attachments and other fittings not removed during the filling operation, such as valve, dip tube and any permanently or semipermanently fixed valve protection device.

NOTE 2 The values of the mass and or/tare weight are usually stamped onto a cylinder at the time of manufacture.

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.

4.1 Prior to filling

— identification of cylinder (see 5.1);

— establishment of cylinder owner, if required (see 5.2);

— establishment of serviceable condition (see 5.3);

— verification of cylinder tare weight (see 5.4);

— establishment that legal authority authorizes cylinder for the intended gas.

4.2 During filling

— inspection for leaks;

— verification of valve operation.

4.3 After filling

— verification of filling weight;

— verification of leaktightness;

— verification of content identification.

5 Procedure of inspection prior to filling

The detailed requirements for the inspection items listed in 4.1 to 4.3 are as follows.

5.1 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 cylinder (including accessories) is suitable for the intended gas content and filling weight;

— the content indicated on the cylinder corresponds with the colour code of the cylinder shoulder paint and with any attached labels (any disagreement between content indicators and colour code shall be rectified prior to filling).

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

5.2 Identification of owner and authorization to fill

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

5.3 Establishment of serviceable condition

Each cylinder, valve, pressure relief device if present, neck ring and valve guard, if present, shall undergo external visual inspection to establish that it is in serviceable condition.

5.3.1 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, bulging, severe corrosion, heat/fire damage or significant mechanical damage.

In the case of seamless steel cylinders, a hammer test or other suitable test may be performed.

NOTE 3 The hammer test may not detect all types of corrosion, e.g. localized corrosion.

CAUTION — It is particularly important that the bottom of each welded cylinder be inspected for corrosion or rusting.

Competent judgement is required to determine if serious corrosion or just minor rusting is present.

Cylinders exhibiting evidence of serious corrosion shall not be filled until properly examined, cleaned and painted.

Any cylinder that exhibits a serious defect shall not be filled. It shall be removed from service and set aside for further evaluation.

5.3.2 Prior to each fill, it shall be established that the installed valve is suitable for the intended gas and is in satisfactory condition, i.e.:

— has the proper valve outlet (see, for example, ISO 5145);

— is free from contaminants;

— is easy to operate and not obstructed (see annex C);

— exhibits undamaged outlet threads and body, by visual inspection;

— its pressure relief device, if required, is undamaged and appropriate;

— its handwheel, or key-operated spindle, is essentially undamaged and properly fixed;

— attaches correctly to the filling connector.

5.3.3 Prior to each fill, the neck ring/threaded boss shall be inspected to establish that it is fit for the intended purpose and that the neck ring, if one exists, is not loose. The thread must be sufficiently intact so that cap engagement will be secure. If there is a permanent valve guard or a welded-on head ring, it shall

be inspected to ensure that it is properly attached, its welds not broken and is not abnormally deformed.

5.4 Verification of cylinder tare weight

The validity of the cylinder tare weight shall normally be verified at the start of the filling process when the cylinder is placed on the filling scale or weighing device. The tare stamped on the cylinder or on a plate shall be verified by the actual scale reading, within ± 1,0 %. When a system is in place which takes into consideration the quality and quantity of residual product, establishment of the tare weight is not necessary.

The cylinder shall not be filled until the correct tare weight is determined and stamped onto the cylinder. See annex B for tare weight determination. Marking of tare weight shall be carried out only by competent facilities.

The amount of liquefied gas charged into a cylinder shall be determined by weight or, if charged at a pressure lower than the liquefaction point, by pressure shown on a chart for the specific gas. The weight of gas to be charged into a cylinder shall be determined from the water capacity and the filling ratio for the specific gas or by the indicated filling weight.

6 Procedure of inspection during filling

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

— that the valve is not blocked/obstructed and the fill operation is progressing satisfactorily;

— that the valve does not leak in the open position; for example at the bonnet or gland nut.

7 Procedure of inspection after filling

7.1 Verification of filling weight

Immediately after disconnecting from the filling line, the mass shall be checked by use of a suitable weighing device capable of determining the gas content of that cylinder within the tolerances given in 5.4.

The mass of the full cylinder shall not exceed the total mass (tare weight plus filling weight) allowed for that cylinder.

7.2 Verification of leaktightness

After filling the cylinder, the filler shall check by a suitable test that the valve, or pressure relief device, if present, does not leak when the valve is closed and disconnected from the fill connection. The filler shall also verify that the interface between the valve and the cylinder does not leak.

NOTE 4 Leaktightness of welded joints in the cylinder is verified during manufacture and at the time of periodic inspection.

Cylinders with leaks shall be removed from service.

7.3 Verification of content identification

After the cylinder is filled, it shall be established that the contained gas is identified on the cylinder in accordance with ISO 448.

Such identification may be by permanent stampings into the cylinder, stenciling or labels (see for example ISO 7225). When colour coding is used, it shall be established that the cylinder is painted with the correct colour (see for example ISO 32).

Annex A
(informative)

Data which may appear on cylinder shell

A.1 Identification data

— empty mass;

— sign of identification for type approval;

— manufacturer's mark/serial number;

— date of manufacture;

— inspection mark of authorized testing organization;

— owner's name/serial number;

— test pressure;

— size/capacity;

— identification of shell specification (ISO 4705, ISO 4706).

A.2 Filling data

— identification of gas or group of gases;

— working pressure;

— filling weight/water capacity;

— tare weight.

A.3 Inspection data

— date of initial test;

— date of retest(s);

— date of next retest (rarely stamped because it can be determined from date of last retest).

A.4 Other data

— yield stress/ultimate tensile strength;

— identification letter of heat treatment;

— material identification/compatibility mark;

— elastic expansion/reject elastic expansion;

— guaranteed minimum wall thickness;

— thread identification;

— presence of a dip tube.

Annex B
(informative)

Sample procedure to establish correct tare weight

To determine the correct tare weight proceed as follows:

B.1 If the cylinder is valved, perform all necessary purges and evacuations in order to devalve and inspect the cylinder safely.

B.2 Remove the valve (see annex C).

B.3 Visually inspect the cylinder internally and externally for corrosion, excess paint on the exterior, contamination or buildup of deposits on the interior. Clean if necessary, e.g. shot blast, etc. Requalify if necessary, e.g. corrosion evidence requires retesting, etc.

B.4 Weigh cylinder on a calibrated scale or weighing device.

a) Exercise care to make certain that only a clean, empty cylinder with one coat of paint and a valve is weighed and that the weighing device has a suitable accuracy (± 1,0 %). Ensure the cylinder is emptied of all product prior to each weighing.

b) Place on the scale (1) a valve of the appropriate type, (2) the valve guard (if any) to be permanently fixed and (3) the cylinder to be weighed.

c) From these readings, establish the correct tare weight for the cylinder including the valve.

d) Compare the scale reading with tare weight marking on the cylinder, if any. Line out those tare weight markings, if any, which have become obsolete. See B.5.

B.5 Stamp one diagonal line through the obsolete tare weight, if present, so that it is still legible for future reference. This applies to the "original" tare weight. If more than one obsolete tare weight exists, efface the lowest value, taking care not to affect the integrity of the gas cylinder. Retain only the original tare weight (with diagonal line) and the new tare weight.

B.6 Stamp the tare weight, in kilograms to three significant figures, onto the cylinder.

NOTE 5 In some countries this procedure is only allowed under supervision of the relevant authority.

Annex C
(informative)

Procedure to be adopted when it is suspected that a cylinder valve is obstructed

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

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

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

b) Use the device shown in figure C.1 to pump inert gas into the cylinder, by hand.

c) For cylinders of liquefied gases, check to establish that the total mass of the cylinder is the same as the tare stamped on the cylinder. If there is a positive difference, the cylinder may contain either liquefied gas under pressure or contaminants.

C.2 When it is established that there is no obstruction to gas flow in the cylinder valve, and the cylinder is at atmospheric pressure, the valve may be removed.

C.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 as follows:

a) Saw or drill the valve body until interception is made with gas passage between the valve body stem and the valve spindle seat.

b) Loosen or pierce the safety device in a controlled manner.

These methods are applicable to cylinders of non-toxic, non-flammable and non-CFC gases. Appropriate safety precautions shall be taken to ensure that no hazard results from the uncontrolled discharge of any residual gas.

Where the contents are toxic, flammable or CFC, the preferred method is to unscrew partially 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 C.2.

These procedures shall be carried out only by trained personnel.

When the gas, if any, has been released and the pressure within the cylinder has been reduced to atmospheric pressure, and when there is no frost or water on the outside of the cylinder, the valve may be removed.

Dimensions in millimetres

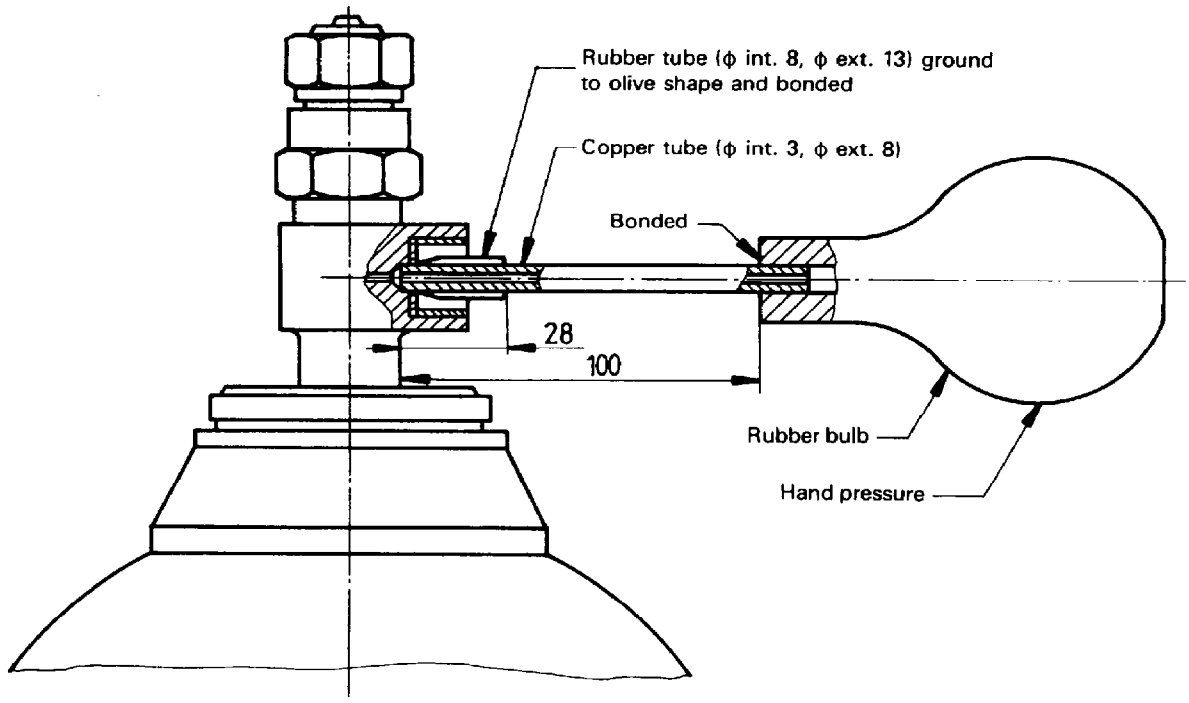

Figure C.1 — Device used to hand-pump inert gas into a cylinder

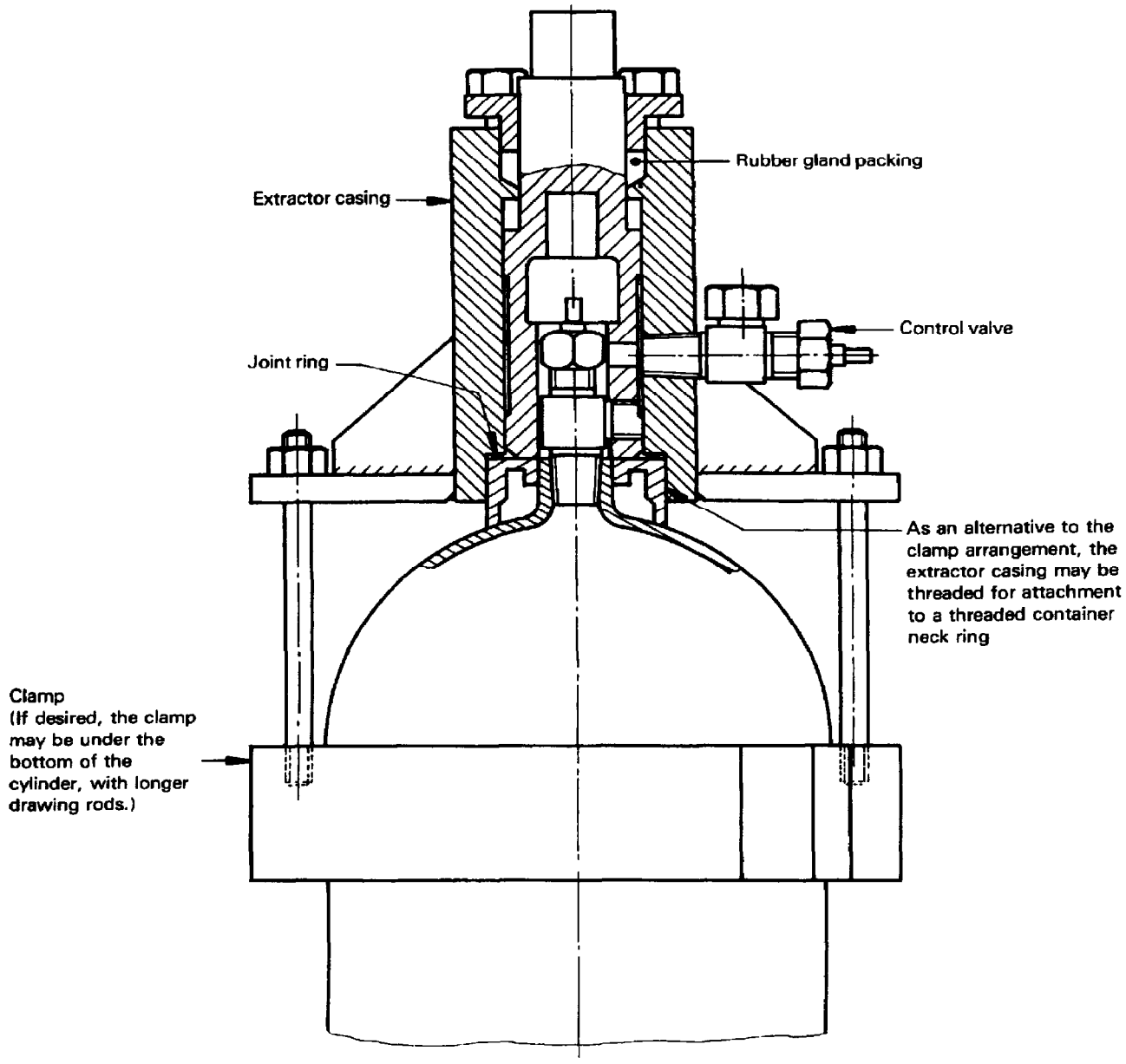

Figure C.2 — Typical device used for the removal of a damaged/obstructed gas cylinder valve

Annex D
(informative)

Bibliography

[1] ISO 32:1977, *Gas cylinders for medical use — Marking for identification of content.*

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[5] ISO 6406:1992, *Periodic inspection and testing of seamless steel gas cylinders.*

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