
**Gas cylinders — Periodic inspection
and testing of welded steel pressure
drums — Capacities up to 1 000 l**

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[ISO 23088:2020](https://standards.iteh.ai/catalog/standards/sist/f48f7153-8450-4860-a2b9-03961e2edbbd/iso-23088-2020)

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Published in Switzerland

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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 (see 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 (see 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 of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see www.iso.org/iso/foreword.html.

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

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

This document provides information and procedures for the periodic inspection and testing of pressure drums and the condition of the test equipment. It addresses requirements that reflect current practice and experience. The principal aim of a periodic inspection and testing procedure is that at the satisfactory completion of the inspection the pressure drums can be reintroduced into service for a further period of time.

This document has been written so that it is suitable to be referenced in the UN *Model Regulations*^[2].

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Gas cylinders — Periodic inspection and testing of welded steel pressure drums — Capacities up to 1 000 l

CAUTION — Some of the tests specified in this document involve the use of processes that could lead to a hazardous situation.

1 Scope

This document specifies the requirements for periodic inspection and testing of welded steel transportable pressure drums of water capacity from 150 l up to 1 000 l and up to 300 bar test pressure intended for compressed and liquefied gases.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 10286, *Gas cylinders — Terminology*

ISO 11114-1, *Gas cylinders — Compatibility of cylinder and valve materials with gas contents — Part 1: Metallic materials*

ISO 11114-2, *Gas cylinders — Compatibility of cylinder and valve materials with gas contents — Part 2: Non-metallic materials*

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

ISO 13769, *Gas cylinders — Stamp marking*

ISO 21172-1, *Gas cylinders — Welded steel pressure drums up to 3 000 litres capacity for the transport of gases — Design and construction — Part 1: Capacities up to 1 000 litres*

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

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

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 10286 apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

3.1

pressure drum

welded transportable pressure receptacle of a water capacity exceeding 150 l and of not more than 1 000 l

EXAMPLE Cylindrical receptacles equipped with rolling hoops, spheres on skids.

[SOURCE: UN *Model Regulations*, as amended]

3.2

rejected pressure drum

pressure drum (3.1) not fit for service without further evaluation

3.3

minimum design wall thickness

thickness of the *pressure drum* (3.1) wall calculated from the design standard, taking into account the material properties and dimensions at time of manufacture

[SOURCE: ISO 18119:2018, 3.4, modified — "cylinder" replaced by "pressure drum".]

4 Intervals between periodic inspections and tests

A pressure drum shall be due for periodic inspection and testing on its first receipt by a filler following the expiry of the established interval or, in the absence of regulations, in accordance with the UN *Model Regulations* (see [Annex A](#)). The expiry date is based on the last test date shown on the pressure drum.

Provided the pressure drum has not been subjected to abusive and abnormal conditions such as being involved in an accident, heat exposure or other severe conditions that would render the pressure drum unsafe, there is no requirement for the user to return a pressure drum before the contents have been used even though the periodic inspection and test interval has lapsed. However, pressure drums, particularly those containing corrosive gases, should be retested within a period not exceeding twice the periodic inspection and test interval of the applicable regulations.

5 List of procedures for periodic inspection and test

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Each pressure drum shall be submitted to a periodic inspection and test. The following procedures form the requirements for such inspection and testing, and are explained more fully in later clauses:

- a) identification of *pressure drum* (see [Clause 6](#));
- b) preparation for inspection and testing (see [Clause 7](#));
- c) depressurization (see [7.2](#));
- d) devalving and flange removal (see [7.3](#));
- e) external visual inspection (see [Clause 8](#));
- f) internal visual inspection (see [Clause 9](#));
- g) supplementary tests (see [Clause 10](#));
- h) inspection of openings and fittings (see [Clause 11](#));
- i) pressure test (see [Clause 12](#));
- j) repair of pressure drums (see [Clause 13](#));
- k) inspection of valves (see [Clause 14](#));
- l) final operations (see [Clause 15](#));
- m) rejection and rendering unserviceable (see [Clause 16](#)).

These procedures should be performed in the sequence listed in order to improve the safety of the operation and to detect potential harmful damage.

When a pressure drum passes the above listed procedures, but the condition of the pressure drum remains in doubt, additional, supplementary tests shall be performed to confirm its suitability for continued service or the pressure drum shall be rejected (see [Clause 16](#)).

Pressure drums that fail an inspection or test shall be rejected (see [Clause 16](#)).

Depending on the reason for rejection, some pressure drums may be returned to service after further evaluation. The requirements for returning a rejected pressure drum to service are provided in [Clause 16](#) and [Annex B](#).

The eyesight acuity of operators is critical and should be checked by an optician on a yearly basis.

6 Identification of pressure drum

The labelling and permanent marks on the pressure drum shall be checked and the information recorded before carrying out any further work. Pressure drums with incorrect or illegible marks shall be set aside for further evaluation.

Pressure drums with contents that are unknown shall also be set aside for further evaluation.

7 Preparation for inspection and testing

7.1 General

Pressure drums shall be made safe before carrying out any further inspections. This can include purging or other operations depending upon the gas service involved. Pressure drums that cannot be safely emptied of product shall be set aside for further evaluation.

Particular attention shall be paid to pressure drums that have contained flammable, oxidizing or toxic gases to eliminate risks during the internal visual inspection. Additionally, as some liquefied products cannot be removed from the pressure drum by only venting, an additional check such as weighing the pressure drum and comparing this value to its tare may be required.

7.2 Depressurization

Before removing the valve, a check shall be performed to ensure that the pressure drum does not contain any gas under pressure.

A check shall be performed to establish that the valve is not obstructed or inoperable in accordance with ISO 25760.

7.3 Devalving and flange removal

WARNING — The uncontrolled opening of the valve and/or the removal of the valve and flange from a pressure drum can lead to injury, death and/or property damage.

The valve may be removed only after the pressure drum has been depressurized and it has been established that there is no obstruction to gas flow in the pressure drum's valve. Devalving shall be performed in accordance with ISO 25760.

The flange(s) shall only be removed after the pressure drum has been devalved in accordance with ISO 25760.

8 External visual inspection

8.1 Preparation

Each pressure drum shall be cleaned and have all labels, loose coatings, corrosion products, tar, oil or other foreign matter removed from its external surface, e.g. by brushing, shot blasting (under controlled conditions), water jet abrasive cleaning, chemical cleaning or other methods. Care shall be taken to ensure that the integrity of the pressure drum is not compromised by the cleaning process.

8.2 Procedure

The external surface of each pressure drum shall undergo a thorough visual inspection for:

- dents, cuts, gouges, bulges, cracks, laminations or excessive wear;
- heat damage, torch or electric arc burns (as identified in [Table B.1](#));
- corrosion (as defined in [Table B.2](#)) — attention shall be given to areas where water can be trapped;
- defects to welds, welded attachments and the areas adjacent to them;
- other defects such as illegible or unauthorized stamp marks, unauthorized additions or modifications;
- integrity of all permanent attachments, e.g. shrouds, lifting points, lifting pockets; and
- damage to rolling bands.

If the results of the external visual inspection are in doubt, see [Clause 10](#).

For rejection criteria, see [Annex B](#). Pressure drums no longer suitable for continued service shall be rendered unserviceable as defined in [Clause 16](#).

9 Internal visual inspection

Once the requirements of [Clause 7](#) have been met, each pressure drum shall be inspected internally to identify defects such as those listed in [8.2](#). Flange(s), if present, shall be removed in accordance with [7.3](#) to facilitate the internal inspection of the pressure drum.

Precautions shall be taken to ensure that the method of illumination used for the internal visual inspection presents no hazard to the person carrying out the inspection. Any internal lining or coating that can prevent a thorough examination shall be removed.

Any pressure drum showing the presence of foreign matter or signs of corrosion shall be cleaned under closely controlled conditions by a method such as shot blasting, water jet abrasive cleaning, flailing, steam jet, hot water jet, chemical cleaning or other approved method. Care shall be taken to avoid damage to the pressure drum. The pressure drum shall be re-inspected after the cleaning process.

10 Supplementary tests

Where there is doubt concerning the type and severity of a defect found on visual inspection (see [Clauses 8](#) and [9](#)), or when the cleaning processes might have reduced the wall thickness, additional tests or methods of examination may be performed. These additional tests or methods of examination include ultrasonic examination (UT), checking the weight of the pressure drum or other non-destructive testing such as x-ray or dye-penetrant to investigate the presence of surface imperfections.

Only when doubt is eliminated may the drum be further processed (see [Annex B](#)).

11 Inspection of openings and fittings

11.1 Internal threads

The internal threaded openings shall be visually examined to ensure they are:

- clean and of full form;
- free of damage;
- free of burrs;

- free of cracks; and
- free of other imperfections.

Where there is any doubt as to the condition of the threaded openings and the threads of the fittings of pressure drums, the threads shall be checked using a thread gauge.

Threaded openings and the threads of the fittings of pressure drums used in toxic, flammable or corrosive service shall be examined using an appropriate thread gauge or gauges.

For examples on the use of thread gauges, see ISO 11363-2. In all cases, the threads shall be checked by a person trained in gauging threads.

11.2 Damaged internal threads

When necessary, threads may be re-tapped to clean and rectify the appropriate number of effective threads. After re-tapping, the threads shall be checked using the applicable thread gauge (e.g. ISO 11363-2).

11.3 Flanged openings and retaining assemblies

If the pressure drum is fitted with flanged openings, they shall be inspected to ensure that they are:

- clean faced;
- free of damage to the mating surfaces; and
- free of cuts or gouges.

For retaining assemblies, including bolts/studs, ensure that:

- the profile conforms to the required specification;
- is free from all surface defects; and
- the materials are compatible with the intended gas service, even those that are not in the gas stream (see ISO 11114-1).

11.4 Damaged flanged openings and/or retaining assemblies

If the design permits, damaged flange faces on both the pressure drum and the flange may be re-machined to enable a pressure seal to be made on re-assembly.

When retaining assemblies have been replaced, ensure that they are compatible with the intended gas service (see ISO 11114-1 or ISO 11114-2, as applicable).