
**Gas cylinders — Inspection of
the cylinder installation, and
requalification of high pressure
cylinders for the on-board storage of
natural gas as a fuel for automotive
vehicles**

Sample *Bouteilles à gaz — Inspection de l'installation des bouteilles, et
requalification des bouteilles haute pression pour le stockage du gaz
naturel, utilisé comme carburant, à bord des véhicules automobiles*

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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.

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 19078 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 19078:2006), with the following main technical revisions:

- a) The scope clarifies the rework of some types of rejected cylinders;
- b) The periodicity of inspection has been removed from this International Standard. The user is referred to the requirements of ISO 11439 for this information;
- c) Damage levels and criteria are more clearly defined and better align with ISO 11439;
- d) [Clause 7.11](#) was renamed to better clarify its intent;
- e) [Table 2](#) includes acceptance and rejection conditions for gas tight housing;
- f) Reference to ISO 25760 for valve removal has been added; and
- g) Annex A, Inspector qualifications (informative), and Annex F, Composite matrix (informative), were removed.

Introduction

This International Standard sets out requirements regarding the periodic visual examination and inspection of natural gas fuel cylinders installed in vehicles and the condition of their installation. These cylinders are designed to store natural gas at high pressures.

Where there is any conflict between this International Standard and any applicable regulation, the regulation always takes precedence.

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Gas cylinders — Inspection of the cylinder installation, and requalification of high pressure cylinders for the on-board storage of natural gas as a fuel for automotive vehicles

1 Scope

This International Standard specifies the requirements for the inspection, installation and requalification of high pressure cylinders, designed and manufactured in accordance with the requirements of ISO 11439, for the on-board storage of natural gas as a fuel for automotive vehicles.

It provides criteria, in the absence of guidance from the cylinder or vehicle manufacturer, for the acceptance (including any allowed rework) or rejection (including any allowed rework or destruction) of a cylinder and its installation.

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 11439, *Gas cylinders — High pressure cylinders for the on-board storage of natural gas as a fuel for automotive vehicles*

ISO 15500-13, *Road vehicles — Compressed natural gas (CNG) fuel system components — Part 13: Pressure relief device (PRD)*

ISO 15500-15, *Road vehicles — Compressed natural gas (CNG) fuel system components — Part 15: Gas-tight housing and ventilation hose*

ISO 15501-1, *Road vehicles — Compressed natural gas (CNG) fuel systems — Part 1: Safety requirements*

ISO 15501-2, *Road vehicles — Compressed natural gas (CNG) fuel systems — Part 2: Test methods*

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 following terms and definitions apply.

3.1

abrasion

damage to an area of the cylinder or its installation equipment caused by scraping, wearing, vibration or rubbing away of the material by friction

Note 1 to entry: Abrasion can be the result of many cycles of something rubbing lightly on the surface of the cylinder or its installation equipment, or due to a few cycles, perhaps only one, of heavy rubbing.

3.2

impact

blow to the surface of the cylinder that can significantly damage and/or indent the surface (e.g. cutting, gouging)

Note 1 to entry: Impact can also induce such damage as delaminations, which are not readily apparent through visual examination.

3.3

component

parts that are used directly in conjunction with the installation of the fuel container to include the cylinder, valve, pressure relief device (PRD), vent and mounting

3.4

condemned

cylinder or piece of its installation equipment no longer fit for service and for which repair is not allowed

3.5

crazing

hairline cracking of the resin, giving it an opaque, frosty appearance

3.6

cut

damage caused by a sharp object coming into contact with the cylinder's surface

3.7

delamination

form of composite damage, in which a separation develops between layers of the composite

3.8

destroyed

cylinder or piece of its installation equipment in a state that makes it physically unusable for its purpose

3.9

dome

curved end portion of the cylinder

3.10

external coating

surface treatment applied to the cylinder for environmental protection and/or improved appearance

3.11

gas tight housing

enclosure fitted at any potential leakage points (e.g. cylinder/valve connection or PRD) to collect and vent any leaked gas to outside the vehicle

3.12

helical

winding in the longitudinal and circumferential direction on both the cylindrical and dome regions of the cylinder

Note 1 to entry: The strands of reinforcing fibres are oriented at an angle to the longitudinal axis of the cylinder.

3.13

hoop direction

hoop pattern

winding along the cylindrical portion of the cylinder

Note 1 to entry: The strands of reinforcing fibres are oriented at an angle of nearly 90 degrees to the longitudinal axis of the cylinder.

3.14

inspection body

organization that performs the visual inspection of compressed natural gas (CNG) cylinders used in natural gas vehicles (NGVs)

3.15

inspector

individual who is authorized by an inspection body to perform the visual inspection

3.16**inspection mark**

stamp, label or tag placed by an inspector on the cylinder indicating acceptance of the cylinder

3.17**Level 1 damage/condition**

minor damage that can occur during normal use

Note 1 to entry: Such damage normally has no adverse effects on the safety of the cylinder and its continued use. Scratched paint or nicks that have no appreciable depth in metal, or similar damage in the composite cylinder paint or resin where there are no visible frayed fibres, are considered to be of this level of damage.

Note 2 to entry: See Table 1.

3.18**Level 2 damage/condition**

damage that is more severe than Level 1, but where after repair the cylinder is authorized to return to service, or based upon the recommendations of the manufacturer may be classified as Level 1 or Level 3

Note 1 to entry: See [7.4.3](#) and Table 1.

3.19**Level 3 damage/condition**

damage that requires a cylinder be condemned

Note 1 to entry: A Level 3 condition is such that the cylinder must be rendered unfit for continued service and cannot be repaired.

Note 2 to entry: See Table 1.

3.20**liner**

internal container of the cylinder, which sometimes carries pressure, that prevents leakage of gas through the composite cylinder structure

3.21**manufacturer**

cylinder maker, unless otherwise stated

3.22**marking**

information permanently applied to an item (e.g. stamping and permanent labelling)

3.23**mounting brackets and/or straps**

devices used to secure cylinders in a vehicle

3.24**overpressurization**

pressurization of the cylinder, which at 15 °C results in a settled pressure that is higher than the working pressure marked on the cylinder, or pressurization of a cylinder to a pressure that is above 26 MPa independent of temperature conditions (for a 20 MPa working pressure cylinder)

3.25**pressure relief device****PRD**

device that releases the contained gas in specific emergency conditions in accordance with ISO 15500-13

3.26**reinforcing fibres**

continuous fibrous strands in the composite, such as carbon, aramid, glass or combinations thereof, which withstand loads caused by pressurization