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Replacing GB 13004-1999

Periodic Inspection and Evaluation of Seamless Steel Gas Cylinders

钢质无缝气瓶定期检验与评定

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Foreword

This Standard was drafted as per the rules specified in GB/T 1.1-2009.

This Standard replaced GB 13004-1999 Periodic Inspection and Evaluation of Seamless Steel Gas Cylinders. Compared with GB 13004-1999, this Standard has the major changes as follows:

--- Applicable scope of standard:

- a) The pressure in hydrostatic test less than or equal to 45MPa is changed into nominal working pressure less than or equal to 30MPa;
- b) Nominal volume is changed from the original 0.4L~80L to 0.4L~150L;
- c) Add applicable mixed gas to the gas that can be contained;
- d) Delete the provisions applicable to the seamless gas cylinders for automotive natural gas;
- e) Modify the inapplicable scope into the following ones are not applicable like internal filled gas cylinders, fire extinguishing cylinders, or auxiliary cylinder pressure containers on the transport tools and machinery equipment;
- f) Add "NOTE": the gas cylinders with nominal volume less than 0.4L can perform periodic inspection as per this Standard;

--- Add requirements to the inspection agency: the inspection agency that carries out the gas cylinder inspection shall meet the requirements of GB 12135; and shall be approved by national special equipment safety supervision and management department as per TSG Z7001;

--- Add requirements to perform comprehensive thickness-measurement inspection of the gas cylinders containing corrosive gases one by one;

--- Add requirements of residual wall-thickness after the treatment against the knock injuries, scratches and corrosive defects; confirm the residual wall-thickness shall be less than design wall-thickness of cylinder;

--- Modify the description of volume measurement;

--- Confirm the cylinder valves are not allowed to be repaired; and add the requirements for the assembly torque of the cylinder valves;

--- Add requirements for the gas cylinder periodic inspection report;

--- Modify requirements for treatment mode of rejected gas cylinders;

Periodic Inspection and Evaluation of Seamless Steel Gas Cylinders

1 Scope

This Standard specifies the basic methods and technical requirements of periodic inspection and evaluation of seamless steel gas cylinders (hereinafter refers to as “gas cylinder”).

This Standard is applicable to the periodic inspection and evaluation of seamless steel gas cylinders with nominal working pressure less than or equal to 30MPa, nominal volume of 0.4L~150L, containing compressed gas, high pressure liquefied gas or mixed gas, and that can be recharged.

This Standard is not applicable to the internal filled gas cylinders, fire extinguishing cylinders, or auxiliary cylinder pressure container on the transport tools and machinery equipment.

NOTE: the gas cylinder with nominal volume less than 0.4L can perform periodic inspection as per this Standard.

2 Normative References

The following documents are essential to the application of this document. For the dated documents, only the versions with the dates indicated are applicable to this document; for the undated documents, only the latest version (including all the amendments) are applicable to this document.

GB 7144 Coloured Cylinder Mark for Gases

GB 8335 Special Threads for Gas Cylinders

GB/T 8336 Special Thread Gauges for Gas Cylinders

GB/T 9251 Methods for Hydrostatic Test of Gas Cylinders

GB/T 10878 Special Taps of Taper Threads for Gas Cylinders

GB 12135 Technical Specifications for Periodic Inspection Station of Gas Cylinders

GB/T 12137 Methods for Leakage Test of Gas Cylinders

TSG R0006 Gas Cylinder Safety Specification

TSG Z7001 Accreditation Criteria on Special Equipment Inspection Agencies

3 Inspection Agency, Inspection Cycle, and Inspection Items

3.1 Inspection agency

The inspection agency performing the periodic inspection of gas cylinder shall meet the requirements of GB 12135; and shall be approved by national special equipment safety supervision and management department as per TSG Z7001.

3.2 Inspection cycle

The gas cylinder containing nitrogen, hexafluoroethane, inert gas and non-corrosive high-purity gas with purity greater than or equal to 99.999% shall be inspected once every 5 years; the gas cylinder containing the gas generated corrosive role against the cylinder materials, as well as gas cylinder in constant contact with seawater shall be inspected once every 2 years; while the gas cylinder containing other gases shall be inspected once every 3 years. The inspection cycle of gas cylinder containing mixed gas shall be subject to the gas with shortest inspection cycle.

In the course of use, if the cylinder is found to have serious corrosion, damage or dubious safety and reliability problems, the inspected shall be performed in advance.

The gas cylinder that has been stored in the warehouse or shutdowns for more than one inspection cycle, it shall be re-inspected before starting to use.

3.3 Inspection items

The periodic inspection items of gas cylinders include appearance inspection, sound inspection, cylinder-mouth thread inspection, internal inspection, weight and volume determination, hydrostatic test, cylinder valve inspection, and air tightness test.

4 Inspection Preparation

4.1 Records

4.1.1 Check the gas cylinders' manufacturing marks and inspection marks one by one. The record contents shall include the following information at least like manufacturer name code or manufacturing license number, gas cylinder number,

5.5 Inspection and evaluation of collar, base and others

5.5.1 For the gas cylinders with loose collar that can't be reinforced, or damaged collar that can't be replaced, they shall be rejected.

5.5.2 For the gas cylinders with loose, tilting, rupturing, worn base or the distance between the support surface and lowest point of the cylinder bottom is less than 10mm, they shall be rejected.

5.5.3 Gas cylinders shall be rejected under one of the following conditions:

- a) Measure the difference between the maximum and minimum outer diameters in the same section of the cylinder, if it exceeds 3.0% average outer diameter of such section;
- b) If cylinder's straightness exceeds 0.4% length of cylinder straight line, and the bending depth is greater than 5mm;
- c) If the cylinder's perpendicularity exceeds 1% length of cylinder straight line.

6 Acoustic Inspection

6.1 Inspection requirements

6.1.1 The gas cylinders that are qualified in appearance inspection shall perform the acoustic inspection.

6.1.2 Use 250g-weight copper hammer to gently hit the cylinder wall in the absence of appendage or other objects that hinder the shake of steel cylinders.

6.2 Evaluation of results

If it emits the sound that is crisp, powerful, its lingering sound is light, long, and has a sense of melody, such inspection is qualified. If the gas cylinders emit the sound that is turbid, grave, the lingering sound is heavy, short, and has the shell-broken sound, such gas cylinders shall be rejected.

7 Cylinder-Mouth Thread Inspection

7.1 Inspection and result evaluation

7.1.1 Use direct visual inspection or low-power magnifier visual inspection methods to check whether the cylinder-mouth thread has cracks, deformation, wearing, corrosion, or other mechanical damages one by one.

9.3 Determination and result evaluation

9.3.1 If the actually-measured weight is less than the marking weight on gas cylinder manufacturing steel seal, and when the difference between the former two items is greater than 5% marking weight on the steel seal, then measure the minimum wall-thickness of gas cylinder; the gas cylinder with minimum wall-thickness less than design wall-thickness shall be rejected.

9.3.2 For the gas cylinders with weight inspection qualified, measure the volume according to the method stipulated in Appendix B. The gas cylinder with actually-measured volume greater than 10% above volume on the steel seal shall be rejected.

10 Hydrostatic Test

10.1 Test requirements and result evaluation

10.1.1 According to the provisions of GB/T 9251, perform the hydrostatic test against the gas cylinders one by one; measure the residual deformation rate of volume; test method shall adopt the external determination (excluding the small volume of gas cylinders).

10.1.2 The pressure in hydrostatic test shall be determined as 1.5 times of nominal working pressure; the retention time under test pressure shall be no less than 2min.

10.1.3 For gas cylinders, when performing hydrostatic test, the cylinder body occurs leakage, obvious deformation, or the pressure is declined during the pressure keeping period (not due to test equipment or cylinder-mouth leakage), they shall be rejected.

10.1.4 When the residual deformation rate of gas cylinder volume exceeds 6%, measure the minimum wall-thickness of cylinder body, if the former value is less than design wall-thickness, the gas cylinder shall be rejected. When the residual deformation rate of volume exceeds 10%, the gas cylinder shall be rejected.

10.2 Treatment for invalid test

In the course of hydrostatic test of gas cylinder, when the pressure rises to 90% or above test pressure, if the test can't be continued due to some reasons, then improve the test pressure according to the provisions of GB/T 9251, then gas cylinders that failed the test shall be re-tested.

11 Internal Drying

11.1 Drying methods and requirements

11.1.1 The gas cylinders that are qualified in the hydrostatic test shall perform the

The cylinder immersion holding time shall be no less than 2min; during the pressure maintaining period, there shall be no leakage or pressure decline phenomena.

The gas cylinders containing other gases are allowed to perform air tightness test by using liquid coating method. The pressure maintaining time of gas cylinders with liquid shall be no less than 1min, the bubbles are allowed to escape.

13.1.3 During the test period, if gas-charging device occurs failures or cylinder valve leaks, test shall be stopped immediately; re-test after repairing or re-assembly.

13.2 Result evaluation

Under the test pressure, if cylinder body leaks, the gas cylinders shall be rejected.

14 Other Work

14.1 Inspection marks

The gas cylinders that are periodically inspected qualified shall be marked or imprinted inspection marks, coated inspection color marks according to the provisions of TSG R0006.

14.2 Coating

The gas cylinders that are inspected qualified shall be re-coated. Before coating, clean the surface oil stains, rust and other impurities, and the coating shall be performed under the condition of drying. The paint color, words, word color on the gas cylinder surface shall conform to the provisions of GB 7144.

14.3 Inspection records and rejection treatment

14.3.1 The inspectors shall carefully fill in the periodic inspection and evaluation records; after the inspection, timely issue the periodic inspection report for the gas cylinders that are inspected qualified and rejected according to the provisions of TSG R0006.

14.3.2 The treatment eliminating the use function of rejected gas cylinders shall conform to the provisions of TSG R0006.

14.4 Security management

The inspection agencies are encouraged to take information technology to carry out security management against the gas cylinders.

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