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GB 24159-2009

Welded Insulated Cylinders

焊接绝热气瓶

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Jointly issued by the General Administration of Quality Supervision, Inspection and Quarantine (AQSIQ) and Standardization Administration (SAC) of the People's Republic of China

Contents

Foreword

All technical contents of this standard are compulsory.

Scope, material and design requirements in this standard are modified in relation to "Welded Insulated Cylinders" (DOT4L-1999) issued by the United States Department of Transportation.

Calculation for leak and outgassing capacity of safety accessories in this standard is referred to those specified in "Pressure-relief Device Standards - Part 1: Cylinders for Compressed Gases (CGAS-1.1) issued by the United States Compressed Gas Association.

In this standard, requirements of "Welded Steel Gas Cylinders" (GB 5100-1994) and relevant standards are adopted in combination with China's national conditions.

Annex A of this standard is normative while Annexes B, C and D are informative.

This standard was proposed by and is under the jurisdiction of the National Technical Committee 31 on Cylinder of Standardization Administration of China (SAT/TC 31).

Drafting organizations of this standard: Ningbo Mingxin Chemical Machinery Co., Ltd., Sichuan Air Separation (Group) Co., Ltd., Beijing Tianhai Industry Co., Ltd. and Chart Cryogenic Equipment (Changzhou) Co., Ltd.

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Welded Insulated Cylinders

1 Scope

This standard specifies the definitions and symbols, types and basic parameters, materials, design, manufacturing, test methods, inspection rules as well as marking, packaging, transportation and storage requirements of welded gas cylinders (hereinafter referred to as cyclines).

This standard is applicable to vertical cylinders, with the storage medium of liquid oxygen, liquid nitrogen, liquid argon, carbon dioxide and nitrous oxide cryogenic liquid, design temperature no less than -196℃, nominal volume of 10L~450L and service pressure of 0.2MPa~3.5MPa respectively, that are used under normal ambient temperature (-40℃~60℃) and may be filled repeatedly.

2 Normative References

The following normative documents contain provisions which, through reference in this standard, constitute provisions of this standard. For dated references, subsequent amendments to (excluding corrigenda), or revisions of, any of these publications do not apply. However, all parties coming to an agreement according to this standard are encouraged to study whether the latest editions of these documents apply. For undated references, the latest editions of the normative document apply.

GB 150 Steel Pressure Vessels

GB/T 228 Metallic Materials - Tensile Testing at Ambient Temperature (GB/T 228-2002, eqv ISO 6892: 1998)

GB/T 229 Metallic Materials - Charpy Pendulum Impact Test Method (GB/T 229-2007, ISO 148-1: 2006, MOD)

GB/T 1804 General tolerances - Tolerances for Linear and Angular Dimensions without Individual Tolerance Indications (GB/T 1804-2000, eqv ISO 2768-1:1989)

GB/T 2653 Methods of Bend and Compression Tests for Welded Joint (GB/T 2653-2008, ISO 5173: 2000, IDT)

GB/T 3280 Cold Rolled Stainless Steel Plate Sheet and Strip

GB/T 4237 Hot Rolled Stainless Steel Plate Sheet and Strip

GB 7144 Coloured Cylinder Mark for Gases

GB/T 9251 Methods for Hydrostatic Test of Gas Cylinders

GB/T 12137 Method for Leakage Test of Gas Cylinders

GB/T 13005 Terminology of Gas Cylinders

GB 15384 Designation for Gas Cylinders

GB/T 18443.2 Testing Method of Cryo-insulation Pressure Vessels - Vacuum Measurement

GB/T 18443.3 Testing Method of Cryo-insulation Pressure Vessels - Leakage

Measurement

GB/T 18443.4 Testing Method of Cryo-insulation Pressure Vessels - Leak and Outgassing Rate Measurement

GB/T 18443.5 Testing Method of Cryo-insulation Pressure Vessels - Static Evaporation Rate Measurement

JB 4708 Welding Procedure Qualification for Steel Pressure Vessels

JB/T 4730.2 Nondestructive Testing of Pressure Equipments - Part 2: Radiographic Testing"

JB/T 4744 Mechanical Property Tests of Product Welded Test Coupons for Steel Pressure Vessels

JB/T 6896 Surface Cleanliness of Air Separation Plants

3 Terms, Definitions and Symbols

3.1 Terms and definitions

For the purpose of this standard, terms and definitions established in GB/T 13005 and the following ones apply.

3.1.1

Lot

The limited quantity of inner containment vessel of cylinders produced continuously with the same design, material, welding procedure and insulation process, which is referred to as the lot of the inner containment vessel.

The limited quantity of cylinder products with the same design and in continuous production is referred to as product lot.

3.1.2

Inner containment vessel

A kind of inner shell that can store cryogenic liquid and bear service pressure.

3.1.3

Outer shell

A kind of enclosure that forms and protects insulation space of cylinders.

3.1.4

Static evaporation rate

Where the cylinders are filled with cryogenic liquid greater than 1/2 of the effective volume and after they are standing and reach the thermal balance, the ratio of the cryogenic liquid mass loss due to natural evaporation within 24h to that under effective volume of the vessels, which is converted to evaporation rate under standard environment (20℃, 0.1MPa), %/d.

3.1.5

Net weight

Actual weight of cylinders and non-detachable connection (including valves and pipeline systems).

3.1.6

Effective volume

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