

ICS 23.020.30

CCS J74



**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 15385-2022

Replacing GB/T 15385-2011

Method for hydraulic burst test of gas cylinder

气瓶水压爆破试验方法

Issued on: March 9, 2022

Implemented on: October 1, 2022

**Issued by: State Administration for Market Regulation;
Standardization Administration of China**

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1 Scope

GB/T 15385-2022 is the Chinese national standard on method for hydraulic burst test of gas cylinder, in the field of fluid systems and general-purpose components. The /T suffix marks it as a recommended standard: it is not compulsory by itself, but it becomes binding as soon as a contract, a tender or a customer specification calls it up - which in practice is how most foreign buyers meet it. It was issued on 9 March 2022 by the State Administration for Market Regulation; Standardization Administration of China, and has been in force since 1 October 2022. Classification: ICS 23.020.30, CCS J74. This page is published from the official record of the standard held by the Chinese standards administration: the identification, the dates, the classification and the issuing body are taken from there. The clause text, the tables and the numeric limits are in the document itself, which is delivered complete in English translation.

This document specifies the basic requirements for the hydraulic burst test method and test apparatus for gas cylinders. This document is applicable to the hydraulic burst test of gas cylinder with a nominal working pressure not greater than 70 MPa (gauge pressure, the same below).

2 Normative references

The contents of the following documents, through normative references in this text, constitute indispensable provisions of this document. Among them, for dated references, only the edition corresponding to that date applies to this document. For undated references, the latest edition (including all amendments) applies to this document.

GB/T 13005 Terminology of gas cylinders JJG 539 Verification regulation of digital indicating weighing instrument JJG 1036 Verification regulation for electronic balance

3 Terms and definitions

The terms and definitions defined in GB/T 13005 and the following ones apply to this document.

3.1 Testing cylinder Gas cylinders to be tested or being tested.

4 Principle

In the hydraulic burst test of gas cylinder, use water as the pressurization medium. According to the specified pressurization rate, gradually increase the pressure in the testing cylinder, until the testing cylinder bursts. Determine the yield pressure of the testing cylinder (when required), the hydraulic burst pressure, and the amount of water pressed in. Calculate the volume deformation value and volume deformation rate of the testing cylinder (when required). And check the cracking forms such as cracking characteristics and cracking position of the testing cylinder.

5 Test conditions

5.1 The test water shall be clean fresh water. Continuous and stable water supply is required.

5.2 The temperature of the test water and the test environment shall not be lower than 5 °C.

6.1 Basic requirements for test apparatus

6.1.1 The typical layout of test apparatus is shown in Figure 1.

6.1.2 The pressurization of the testing cylinder shall use a plunger pump, a pneumatic pump, or other pressurization devices with stable pressure output. Use water as the pressurization medium.

6.1.3 The rated working pressure of the pressurization device shall meet the requirements for the hydraulic burst pressure of gas cylinder. The pressurization device shall have good sealing performance and stable pressurization rate. Its flow rate shall be adjustable, to meet the requirements of the testing cylinder product standard for pressurization rate.

6.1.4 The connection between the pressure-bearing pipeline and the test device and

measuring instrument shall have a good seal. Metal pipes shall be used for fixedly- installed pressure-bearing pipelines. A flexible connection that acts as a shock absorber can be a high-pressure hose. The pressure-bearing capacity of the pressure-bearing pipeline shall meet the requirements for the hydraulic burst pressure of gas cylinder.

6.2.1 Pressure measuring instrument

6.2.1.1 A pressure gauge and a pressure transmitter (or a digital pressure gauge capable of outputting pressure signals) shall be installed on the test apparatus. The pressure gauge is used to display test pressure in real time. The pressure transmitter (or digital pressure gauge that can output pressure signals) is used to collect pressure data. The installation position of pressure gauge and pressure transmitter (or digital pressure gauge that can output pressure signals) shall be such that the test pressure can be correctly displayed.

6.2.1.2 The range of the pressure gauge shall be 1.5~3 times the minimum burst pressure of the testing cylinder. The accuracy level shall not be lower than level 1.6. The range of the pressure transmitter (or digital pressure gauge capable of outputting pressure signals) shall be 1.5~3 times the minimum burst pressure of the testing cylinder. The accuracy level shall not be lower than level 0.5.

6.2.1.3 Pressure measuring instruments shall be verified or calibrated regularly. The verification or calibration cycle shall be implemented in accordance with relevant regulations.

6.2.2 Water volume measuring instrument

6.2.2.1 The water volume measuring instrument can be electronic balance, measuring tube, flow sensor, or other suitable measuring instruments.

6.2.2.2 The range of electronic balance shall meet the test requirements. The accuracy level and allowable error shall meet the requirements of Class III specified in JJG 1036. If the nominal volume of gas cylinder is greater than 450 L, the verification scale value and the actual scale value shall not be greater than 10 g. If the nominal volume of gas cylinder is not greater than 450 L, the verification scale value shall not be greater than 5 g; the actual scale value shall be 1 g.

6.2.2.3 The range of measuring tube shall meet the test requirements. The relative error of the scale value on this measuring range shall not be greater than $\pm 1\%$.

6.2.2.4 The range of the flow sensor shall meet the requirements of the test. The accuracy level shall not be lower than level 0.5.

6.2.2.5 The range and accuracy level of other water volume measuring instruments shall meet the test requirements.

6.2.2.6 Water volume measuring instruments shall be verified or calibrated regularly. The

verification or calibration cycle shall be implemented in accordance with relevant regulations.

6.2.3 Weighing instrument For weighing instruments used to weigh the mass of testing cylinder, its maximum weighing capacity shall be

3.0 times the commonly used weighing value. The allowable error shall meet the requirements of "medium accuracy level" stipulated in JJG 539.

6.2.4 Temperature measuring instrument The minimum scale value of the temperature measuring instrument, which is used to measure the temperature of the test water and the test environment, shall not exceed 1.0 °C. Temperature measuring instruments shall be verified or calibrated regularly. The verification or calibration cycle shall be implemented in accordance with relevant regulations.

7 Test procedure

7.1 Before the test, it shall measure the actual volume of testing cylinder and the temperature of test water.

7.2 After the testing cylinder is filled with water and left standing, before the test, it shall use a mallet or rubber mallet to lightly tap the cylinder body; to exhaust the air bubbles attached to the inner wall of the cylinder. After using water to fill up, connect it to the test system.

7.3 Before the testing cylinder is pressurized, through repeated low-pressure loading, it shall exhaust all the air in the testing cylinder and the pressure-bearing pipeline. It shall be confirmed that there is no leakage in the test system.

7.4 Gradually pressurize the testing cylinder until it bursts. The pressurization rate is measured in megapascals per second (MPa/s). It shall meet the requirements of the product standard for gas cylinder. If there are no requirements in the product standard for gas cylinder, it shall not exceed

0.5 MPa/s.

7.5 During the test, when the test cannot be carried out due to equipment or system failure, if the test pressure in the testing cylinder does not reach the yield pressure, it is allowed to re-test after the failure is repaired. If the test pressure in the testing cylinder has exceeded the yield pressure, the testing cylinder can no longer be tested. Another sample shall be taken again.

7.6 The determination of the test results shall be carried out in accordance with the provisions of the corresponding gas cylinder product standards.

9.2 When the indicated value of the pressure measuring instrument is not reduced to "zero", it shall not disassemble all pressure-bearing parts and disassemble-assemble the testing cylinder on the pressure-bearing pipeline. It shall not tighten the joints on the