

ICS 23.040.20

CCS Q33



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

GB/T 15560-1995

**Standard test method for short-time hydraulic failure and
resistance to constant internal pressure of the plastics pipes
for the transport of fluids**

流体输送用塑料管材液压瞬时爆破和耐压试验方法

Issued on: May 2, 1995

Implemented on: December 1, 1995

Issued by: State Bureau of Technical Supervision

Table of Contents

1 Subject contents and application scope
2 Normative references
3 Terminology
4 Test principle
5 Sealing joints
6 Test equipment
6.2 Pressure system
6.3 Pressure gauge
7 Specimens
8 Test conditions and pretreatment
9 Test steps
9.3 Apply test pressure to the specimen
10 Calculation...
Appendix A

1 Subject contents and application scope

GB/T 15560-1995 is the Chinese national standard on standard test method for short-time hydraulic failure and resistance to constant internal pressure of the plastics pipes for the transport of fluids, 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 2 May 1995 by the State Bureau of Technical Supervision, and has been in force since 1 December 1995.

Classification: ICS 23.040.20, CCS Q33. 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 standard specifies test methods for short-time hydraulic failure and resistance to pressure of the plastic pipes for fluid transportation. This standard is applicable to various types of thermoplastic pipes and thermosetting- reinforced plastic pipes for fluid transportation.

2 Normative references

GB 8806 Plastics piping systems - Plastics components - Determination of dimensions

3 Terminology

3.1 Failure: It refers to the continuous loss of pressure through the liquid in the sample. Failure can be one of the following forms or a combination of the following forms. a. Ductile failure: It refers to the rupture of the specimen accompanied by plastic deformation or local spherical expansion. NOTE: The slight expansion of the specimen due to creep caused by long-term stress does not belong to ductile failure. b. Brittle failure: It means that there is no obvious material deformation in the fracture area of the specimen, such as extension and necking; at this time, the test pressure does not show a yielding phenomenon, the specimen ruptures instantly, and the pressure drops rapidly to zero. c. Leakage and seepage: It refers to the liquid in the specimen seeping out through the tiny cracks in the pipe wall under the action of pressure. If the test pressure is reduced at this time, the pipe specimen will usually not experience liquid loss.

4 Test principle

This test method is divided into two test types: the short-time failure test and the resistance to pressure test. The short-time failure test refers to the rapid and continuous application of liquid pressure to the interior of a given section of the plastic pipe specimen, causing the specimen to rupture in a short period of time. The pressure value when the specimen ruptures is read and its hoop stress is calculated. The resistance to pressure test is to subject a given section of plastic pipe specimen to a specified constant internal pressure for a given period of time and observe whether the specimen is damaged. The test pressure value and test time are determined by the product standard of the pipe.

5 Sealing joints

Sealing joints are installed at both ends of the specimen. The joints are reasonably designed to seal the specimen and the pressure device. The joints installed on the specimen cannot cause the specimen to bear axial force or cause damage to the specimen. It is recommended to use the sealing joints in Appendix A (informative).

6 Test equipment

6.1 Constant temperature control system The constant temperature system consists of a constant temperature bath, a fluid circulation or stirring device, a heating and temperature control device, etc. Regardless of whether the heating medium in the constant temperature bath is water, air or other fluids, the temperature is maintained within a deviation of ± 2 °C.

6.2 Pressure system

6.2.1 The pressure-applying device is required to gradually and steadily raise the pressure to the specified value, and then maintain the pressure within a deviation of $\pm 2\%$ throughout the test.

6.2.2 For the short-time failure test, the pressure device is required to have sufficient pressure capacity to complete the specimen rupture within 60~70 seconds. It is recommended to use the gas pressurization system shown in Appendix B (informative).

6.2.3 The pressure system can apply pressure to a single specimen or to multiple specimens simultaneously through a system branch. In the case of a system branch, each pressure branch is required to have a controllable shut-off valve and each specimen branch has its own pressure gauge. When a specimen ruptures, the pressure control system can close the branch to prevent the pressure of specimens on other branches from dropping (it is recommended to use an electric-contact pressure gauge for control or similar pressure control systems).

6.3 Pressure gauge

6.3.1 The accuracy of the test pressure gauge shall not be lower than Grade 1.0.

6.3.2 The range scale of the pressure gauge shall be selected so that the pressure value reading is around 60% of the pressure gauge scale. Each specimen is required to have a pressure gauge, and the pressure gauge shall be equipped with a pressure buffer protection device.

6.4 Timing device The timer is accurate to within $\pm 2\%$.

7 Specimens

7.1 The surface of the specimen shall not have visible cracks, scratches or other defects that affect the test results. Both ends of the specimen shall be flat and perpendicular to the axis of the pipe.

7.2 Specimen length: Unless otherwise specified in the product standard, the effective length L of the specimen between two sealed joints shall comply with the requirements of the following table. Nominal outer diameter $D < 160$ mm $L = 5D$, but not less than 300 mm
Nominal outer diameter $D \geq 160$ mm $L = 3D$, but not less than 760 mm

7.3 Number of specimens Under the same test conditions, the number of specimens shall not be less than 5. Or, the number of specimens shall be determined according to the provisions of the product standard.

8 Test conditions and pretreatment

8.1 The test temperature shall be in accordance with the test conditions specified in the product standards.

8.2 Liquid pressure must be applied inside the specimen, such as water. If other media are used, it must be ensured that the liquid does not corrode the specimen.

8.3 The environment outside the specimen can be a liquid or gas environment. The temperature of the external environment must be the same as the temperature of the liquid inside the specimen.

8.4 The specimen shall be pretreated before pressure is applied. The pretreatment temperature shall be the same as the test temperature. The pretreatment time shall be such that the specimen reaches the test temperature. For the test at 23 °C, when the specimen is immersed in liquid, the pretreatment time shall be not less than 1 h. When the specimen is placed in a gas medium, the pretreatment time shall be not less than 16 h.

9 Test steps

9.1 Install the sealing joints on the specimens. Fill each specimen with liquid at the test temperature, remove the air from the specimen, and then pretreat it according to 8.4.

9.2 Connect the specimen to the pressure device and support the specimen to prevent bending and deflection of the specimen due to the weight of the pipe and joints (the support shall not cause longitudinal and radial constraints on the specimen).

9.3 Apply test pressure to the specimen

9.3.1 During the short-time failure test, apply pressure to the specimen continuously, evenly and quickly, and start timing at the same time until the specimen ruptures. If the specimen ruptures in less than 60 seconds, reduce the pressure application speed and repeat the test until the specimen ruptures in 60~70 seconds. Record the pressure and time when the specimen ruptures and the rupture state of the specimen.

9.3.2 During the resistance to pressure test, continuously and evenly apply the pressure to the specimen to the given value, and then start timing. During the entire test process, keep the pressure constant and meet the requirements of 6.2.1. After the specified time is reached, record the test results and the rupture status of the specimen.

9.4 When the failure occurs within one diameter from the joint, if there is a reason to confirm that the failure is caused by some defect in the sample itself, the specimen is valid; otherwise, take another specimen and retest.

Appendix A

Sealing joints (Informative) A

1 As shown in Figure A1, the joints are rigidly connected to the specimen; the lower joint, whose weight is carried by the specimen, bears the back pressure. This type of joint is suitable for hard pipes with good roundness, such as PVC, PP and other pipes. A