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NATIONAL STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA

GB/T 43117-2023

Glass-reinforced thermosetting plastics (GRP) pipes - Determination of the ring creep properties under wet or dry conditions

玻璃纤维增强热固性塑料（GRP）管 湿态或干态条件下环蠕变性能的测定

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Foreword

This document was issued on 7 September 2023 by the State Administration for Market Regulation; Standardization Administration of the PRC and takes effect on 1 April 2024.

It is a GB/T standard: recommended rather than compulsory, but it is the text a Chinese reviewer applies when assessing a submission.

1 Scope

GB/T 43117-2023 gives the determination of ring creep properties for GRP pipes, wet and dry. A buried GRP pipe is a flexible pipe: it carries the earth load by deflecting and mobilising the support of the soil around it, and the design assumes it will still be doing so in fifty years. But the resin creeps under sustained load, and it creeps faster wet than dry, so the long-term ring stiffness is a fraction of the value measured on a new pipe in a laboratory. That fraction is what this test establishes. The standard sets the principle, the test device, the specimens and their number, the measurement of the specimen dimensions, the conditioning, the test procedure, the calculation of the creep factor and the long-term creep stiffness, and the test report. It took effect on 1 April 2024.

This document describes the test method for the ring creep properties under wet (completely

immersed in water) or dry conditions of glass-reinforced thermosetting plastics (GRP) pipes.

Creep properties include creep factor and long-term creep stiffness.

This document is applicable to the determination of long-term creep properties under simulated

conditions of use through testing and evaluation, and control of raw material consistency under

dry conditions, or through testing under wet conditions.

2 Normative References

The contents of the following documents constitute indispensable clauses of this document

through the normative references in the text. In terms of references with a specified date, only

versions with a specified date are applicable to this document. In terms of references without a

specified date, the latest version (including all the modifications) is applicable to this document.

ISO 3216 Plastics Piping Systems - Plastics Components - Determination of Dimensions

NOTE: GB/T 8806-2008 Plastics Piping Systems - Plastics Components - Determination of

Dimensions (ISO 3126:2005, IDT)

ISO 7685 Glass-reinforced Thermosetting Plastics (GRP) Pipes - Determination of Initial Ring

Stiffness

ISO 10928 Plastics Piping Systems - Glass-reinforced Thermosetting Plastics (GRP) Pipes and

Fittings - Methods for Regression Analysis and Their Use

3 Terms and Definitions

The following terms and definitions are applicable to this document.

3.1 vertical compressive force

A vertical force exerted on a horizontally placed pipe, which leads to deformation of the pipe.

Where,

e---the pipe wall thickness, expressed in (m);

y1---the vertical deflection at position 1, expressed in (m);

dm---the mean diameter (3.3), expressed in (m).

4 Principle

Through a loading plate or a supporting beam, exert a vertical compressive force on the entire

length of a horizontally placed pipe ring specimen of a certain length, so that the pipe ring

reaches the specified strain level [see Formula (8) for strain calculation].

Maintain the vertical compressive force of the pipe ring constant and regularly measure the

vertical deflection. Through the extrapolation method, estimate the long-term specific ring

creep stiffness. When determining the specific ring creep under wet conditions, the pipe ring

shall be immersed in water of a certain temperature. In accordance with the long-term specific

ring creep stiffness and the specific ring stiffness of the same specimen at 0.1 h, determine the

creep factor. The measurement result is the average value of two specimens.

The following test parameter values are specified by relevant standards:

a) Data extrapolation time (see 3.6 and 11.1);

b) Test temperature (see 5.3 and 10.1);

c) Specimen length (see Chapter 6);

d) If applicable, the parameters of state conditioning: temperature, humidity and

duration (see Chapter 9);

e) Limitation of the duration of the specimen under load (see 10.6);

f) The strain level used for testing;

g) Test conditions: dry conditions or wet conditions.

5 Test Device

5.1 Compression Loading Machine

The loading machine shall have a force application system, which can apply load to two parallel

action surfaces in accordance with the stipulations of 5.2, so that a pipe specimen horizontally

immersed in water is subject to vertical compression without vibration, and can maintain a

constant vertical compressive force within the test time in accordance with the stipulations of

10.6.

The force measurement accuracy of the loading machine is ? 1%.

The loading machine shall ensure that the vertical compressive force is not affected by friction

and buoyancy during the creep test under wet conditions.

5.2 Action Surface of Force

5.2.1 Overall design

Loading plates or supporting beams can be chosen to load the specimen, but it needs to be

indicated in the test report. During the determination of initial specific ring stiffness and long-

term specific ring stiffness, the same loading mode shall be adopted (use loading plates and

supporting beams, or a combination of loading plates and supporting beams above and below).

The action surface shall be a pair of loading plates that comply with the requirements of 5.2.2

or a pair of supporting beams that comply with the requirements of 5.2.3, or consist of a loading

plate and a supporting beam. The action surface shall be perpendicular to the vertical

compressive force F, which is at the center of the action surface, as shown in Figure 1. The two

surfaces in contact with the specimen shall be flat, smooth and parallel to each other.

5.2.2 Loading plate

The width of the loading plate is at least 100 mm, and the length is at least equal to the length