



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

GB/T 40937-2021

**Plastic piping systems - Determination of long-term strength for
plastic composite pipes and fittings**

Issued on: November 26, 2021

Implemented on: June 1, 2022

**Issued by: State Administration for Market Regulation, China National
Standardization Administration**

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Foreword

This document is in accordance with the provisions of GB/T 1.1-2020 "Guidelines for Standardization Work Part 1. Structure and Drafting Rules of Standardization Documents" Drafting.

This document uses the redrafting method to modify and adopt ISO 17456.2006 "Determination of Long-term Strength of Multilayer Pipes in Plastic Piping Systems".

Compared with ISO 17456.2006, this document has added 6.3, Chapter 7, Appendix C and Appendix D in the structure.

The technical differences between this document and ISO 17456.2006 and the reasons are as follows.

--- A third measurement method (Method III) has been added to the scope to meet the application requirements of domestic thermoplastic composite pipe products;

---Regarding normative reference documents, this document has made adjustments with technical differences to adapt to my country's technical conditions and adjustments.

The situation is collectively reflected in Chapter 2 "Normative Reference Documents", and the specific adjustments are as follows.

* Replace ISO 1167-1 and ISO 1167-2 with non-equivalent adopting international standard GB/T 6111 (see Chapter 5, 6.1.1,

6.2.1 and 6.3.1);

* Replace ISO 9080 with GB/T 18252 equivalent to the international standard (see 6.1.2, 6.1.4, 6.2.2, 6.2.3.3, 6.2.4.2,

6.3.2 and 6.3.3.3);

* Added reference to GB/T 19278-2018 (see Chapter 3);

---The following terms have been added or modified. composite pipe (see 3.1), reinforced thermoplastic composite pipe (see 3.5), approximate structure (see 3.6),

Reinforcement layer standard size ratio (see 3.7), long-term strength (see 3.8), product family (see 3.13), product family representative (see 3.14), product list

Body (see 3.15), maximum pressure rating (see 3.16), to facilitate the understanding and use of this document;

---Added c) the description of the principle of Method III (see Chapter 4) to clarify the differences in the principles of the three methods;

---Added the assembly and its preparation method (see Chapter 5), used for the long-term performance test of the pipeline assembly;

---Added the third method of determination III, the extrapolation method of specific temperature and pressure test (see 6.3) to adapt to the thermoplastic composite pipe

Test needs;

---Added the method of determining the maximum pressure level MPR and the maximum working pressure MOP (see Chapter 7), which is the design of composite pipelines

Provide reference with application;

---Added a normative appendix "Scaling factor based on the pressure resistance of the reinforcement layer structure" (see Appendix C), which is used to calculate the product list

The test pressure of the physical confirmation test.

This document has also made the following editorial changes.

--- Modify the name of the document to "Measurement Method for Long-term Strength of Plastic Composite Pipes and Fittings of Plastic Piping System".

--- Replace the "bar" in the international standard with the legal unit of measurement "MPa" in my country, and modify the formula (A.1) in Appendix A accordingly

coefficient;

---Added an informative appendix "The procedure for determining the maximum pressure level and maximum working pressure" (see Appendix D).

1 Scope

This document specifies three methods for determining the long-term strength of plastic composite pipes and fittings. 1) Method I---Calculation method; 2) Method

II---Multi-temperature withstand voltage test extrapolation method; 3) Method III---Specific temperature withstand voltage test extrapolation method.

This document applies to P-type multilayer pipes, M-type multilayer pipes and reinforced thermoplastic composite pipes (RTP pipes) and other plastic composite pipes.

Used for pipelines composed of a single polymer stress design layer or a polymer outer sheath that does not participate in the stress design.

2 Normative references

The content of the following documents constitutes an indispensable clause of this document through normative references in the text. Among them, dated quotations

Only the version corresponding to the date is applicable to this document; for undated reference documents, the latest version (including all amendments) is applicable to

This document.

GB/T 6111 Determination of internal pressure resistance of thermoplastic piping systems for fluid transportation (GB/T 6111-2018,

ISO 1167-1.2006, ISO 1167-2.2006, ISO 1167-3.2007, ISO 1167-4.2007, NEQ)

GB/T 18252 Plastic piping systems use extrapolation to determine the long-term hydrostatic strength of thermoplastic materials in the form of pipes

(GB/T 18252-2020, ISO 9080.2012, IDT)

GB/T 19278-2018 General terms and definitions for thermoplastic pipes, fittings and valves

3 Terms and definitions

The following terms and definitions defined in GB/T 19278-2018 apply to this document.

3.1

Composite pipe

Pipes made of composite materials, and pipes with a multi-layer structure of different materials, and each structural layer shares the load.

[Source. GB/T 19278-2018, 2.2.5]

3.2

Multilayer pipe

The pipe wall is a pipe made of two or more layers of different materials or structures.

[Source. GB/T 19278-2018, 2.2.4]

3.3

Multilayer Mpipe

It is composed of a polymer material layer participating in the stress design and at least one layer or more of metal, inorganic fiber or organic fiber and other material reinforcement layers.

Combined multi-layer tube.

Note. The thickness of the polymer material layer accounts for more than 60% of the total wall thickness of the pipe (for example, PEX/Al/PEX).

3.4

P-type multilayer pipe multilayerPpipe

The pipe wall is composed of solid-walled layers of multi-layer polymer materials, and at least two layers of materials are involved in the design of multi-layer pipes under compressive stress.

Note. For example, PVC-C/PEX multilayer pipe can be regarded as P-type multilayer pipe.