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

GB/T 18742.1-2017

**Polypropylene (PP) piping systems for hot and cold-water
installations -- Part 1: General**
(English Translation)

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Table of Contents

Foreword...	3
1 Scope...	5
2 Normative References...	5
3 Terms and Definitions...	7
4 Symbols, Codes and Abbreviations...	12
5 Application Condition Levels...	14
6 Material Requirements...	15
7 Hygiene Requirements...	19
Appendix A (Normative) Predicted Strength Reference Curves...	20

1 Scope

This Part of GB/T 18742 specifies the terms and definitions, symbols, codes and abbreviations, service level, material requirements and hygiene requirements for polypropylene piping systems for hot and cold water installations.

This Part, together with GB/T 18742.2 and GB/T18742.3, applies to hot and cold water piping systems in buildings, including drinking water and heating piping systems.

NOTE 1: The purchaser is responsible for selecting this product appropriately based on its specific application requirements and in accordance with relevant regulations, standards or specifications.

NOTE 2: Information concerning connectors to polypropylene pipes and fittings for hot and cold water installations, and connections BETWEEN polypropylene pipes and fittings AND other plastic or non- plastic components, can be found in the relevant parts of ISO 15874 (see reference [6]) and other standard documents.

This Part does not apply to fire extinguishing systems.

2 Normative References

The provisions in following documents become the essential provisions of this Document through reference in this Document. For the dated documents, only the versions with the dates indicated are applicable to this Document; for the undated documents, only the latest version (including all the amendments) is applicable to this Document.

GB/T 1033.1-2008 Plastics - Methods for determining the density of non-cellular plastics
- Part 1.Immersion method liquid pyknometer method and titration method (ISO 1183-

1.2004, IDT)

GB/T 1040.2-2006 Plastics - Determination of tensile properties - Part 2. Test conditions for moulding and extrusion plastics (ISO 527-2.1993, IDT)

GB/T 1043.1-2008 Plastics - Determination of Charpy impact properties - Part 1. Non - instrumented impact test (ISO 179-1.2000, IDT)

Determination of oxidation induction time (isothermal OIT) and oxidation induction temperature (dynamic OIT) (ISO 11357-6.2008, MOD)

GB/T 21300-2007 Plastics pipes and fittings - Determination of opacity (ISO 7686.2005, IDT)

3 Terms and Definitions

For the purposes of this Document, the terms and definitions given in GB/T 19278-2003 and the following apply. For ease of use, some terms and definitions from GB/T 19278-2003 are repeated below.

3.1.1 Nominal size; DN

It represents the nominal value of a component's size.

[GB/T 19278-2003, Definition 3.4]

3.1.2 Nominal outside diameter; dn

The specified value of the outside diameter of a pipe or fitting socket, in mm.

NOTE: The nominal diameter of fittings that mate with the outside diameter of the pipe is also expressed as the nominal outside diameter of the pipe.

[GB/T 19278-2003, Definition 3.5]

3.1.3 Outside diameter (at any point); de

The outside diameter measured through a cross-section at any point on the pipe, in mm.

3.1.4 Mean outside diameter; dem

The value obtained by dividing the outer circumference of any cross-section of a pipe or fitting socket end by 3.142 (π) and rounding-off to the nearest 0.1 mm; the unit is in mm.

[GB/T 19278-2003, Definition 3.8]

3.1.5 Mean inside diameter

The arithmetic mean of two or more mutually perpendicular measurements of the inside diameter; the unit is in mm.

[GB/T 19278-2003, Definition 3.11]

Where.

σ_D - design stress, in MPa;

MRS - minimum required strength, in MPa;

C - Overall service (design) coefficient (3.3.2), a dimensionless value greater than 1 (see 3.3.2).

NOTE: GB/T 19278-2003, 6.11 uses " σ_S ". The design stress code for pipe materials is σ_{DP} ; and for pipe fitting materials it is σ_{DF} .

3.3.4 Polypropylene compound

Granular material conforming to the predicted strength reference curve, produced by extrusion of the base polymer polypropylene (PP) and additives such as antioxidants and colorants.

3.3.5 Pipes with barrier layer

Polypropylene pipes with a very thin barrier layer, for example, used to prevent or reduce the passage of gas and light through the pipe wall, where the design stress requirements are entirely borne by the polypropylene material layer.

NOTE: The maximum thickness of the outer barrier layer (including the adhesive layer) of a typical barrier-layered pipe is 0.4 mm. Pipes with an outer layer thickness exceeding 0.4 mm are called multi-layered pipes (see Bibliography [7] ~ [10]). The outermost layer is often considered to be the first layer of the multi-layered pipe, rather than just a barrier layer.

4 Symbols, Codes and Abbreviations

The symbols, codes and abbreviations defined in GB/T 1844.1-2008 and the following apply to this document.

4.1 Symbols and Codes

C. Overall service (design) coefficient

DN. Nominal size d_e . Outside diameter (at any point) d_{em} . Mean outside diameter d_{em} , max. Maximum mean outside diameter d_{em} , min. Minimum mean outside diameter

sigmaLPL. Lower confidence limit of the predicted hydrostatic strength

sigmaP. Hydrostatic stress of plastic pipe material

4.2 Abbreviation

PP. Polypropylene

PP-H. Polypropylene homopolymer

PP-B. Polypropylene block copolymer

PP-R. Polypropylene random copolymer

PP-RCT. Polypropylene random copolymer with modified crystallinity

5 Application Condition Levels

Polypropylene piping systems shall comply with the provisions of GB/T 18991-2003, and four application levels shall be selected according to the application conditions, as shown in Table

1.

Each level corresponds to a specific application range and a 50-year service life. In specific applications, different design pressures such as 0.4 MPa, 0.6 MPa, 0.8 MPa, and 1.0 MPa shall also be considered.

The piping systems listed in Table 1 for each service condition level shall simultaneously meet the requirement of a 50-year service life for conveying cold water at 20 °C and 1 MPa.

All heating systems shall use only water or treated water as the transmission fluid.

NOTE: The suitability of water treatment types and special applications (such as oxygen permeation) should be advised by the manufacturer of the plastic pipes and fittings.

6.1 Polypropylene compounds

6.1.1

Polypropylene compounds for pipes and fittings shall use the following four base resins suitable for pipes.

- a) Polypropylene homopolymer (PP-H). A propylene homopolymer.
- b) Polypropylene block copolymer (PP-B). A two- or multi-phase propylene copolymer formed from PP-H and/or PP-R with a rubber phase. The rubber phase is composed of a copolymer of propylene and another olefin monomer (or multiple olefin monomers). The olefin monomer has no functional groups other than olefins.
- c) Polypropylene random copolymer (PP-R). A random copolymer formed by