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

GB/T 19472.1-2019

Replacing GB/T 19472.1-2004

**Polyethylene structured-wall piping systems for underground
use - Part 1: Polyethylene double-wall corrugated pipes**

埋地用聚乙烯（PE）结构壁管道系统 第1部分：聚乙烯双壁波纹管材

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1 Scope

China's national standard for buried polyethylene double-wall corrugated pipe - the pipe with a smooth bore and a corrugated outer wall that has largely replaced concrete in drainage and sewerage. It is Part 1 of GB/T 19472 and specifies the terms and definitions, symbols and abbreviations, the materials, the product classification and marking, the pipe structure and connection methods, the requirements, the test methods, the inspection rules and the marking, transport and storage. It applies to buried drainage and sewer pipe and to cable ducting for long-term use below 45 C, and, after evaluation of the material's chemical and temperature resistance, to buried industrial drainage and effluent pipe. A buried drain is not a pressure pipe: what it must resist is the soil above it and the traffic on the surface, and it does so as a flexible pipe, deflecting slightly and transferring load into the surrounding fill rather than carrying it in bending like a rigid concrete pipe. The property that governs that behaviour is ring stiffness, and it is the number the pipe is specified and classified by. The double-wall corrugated construction exists to deliver ring stiffness cheaply: the corrugated outer wall provides the section modulus while the smooth inner wall provides the hydraulic bore, and the result is far lighter than an equivalent solid-wall pipe. The standard therefore sets the ring stiffness classes and their verification, the ring flexibility - the ability to deflect substantially without cracking or delaminating, since a pipe that is stiff but brittle fails on installation - the impact resistance at low temperature, the creep ratio which predicts

long-term deflection, and the oxidation induction time which measures the antioxidant stabilisation the polymer needs to survive decades underground. A normative annex covers the sealing test for the elastomeric ring joint. Issued on 30 August 2019 and in force since 1 March 2020, it replaces GB/T 19472.1-2004.

This Part of GB/T 19472 specifies the terms and definitions, symbols and abbreviations, materials, product classification and marking, pipe structure and connection methods, requirements, test methods, inspection rules and signs, transportation, storage of polyethylene double wall corrugated pipes for underground usage. This Part is applicable to pipes for buried drainage, sewage and communication sheath pipes, whose long-term use temperature is below 45 °C. After evaluating the chemical resistance and temperature resistance of the material, it can also be used for buried industrial drainage and sewage pipes.

2 Normative references

The following documents are essential to the application of 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 standard.

GB/T 1033.1-2008 Plastics - Methods for determining the density of non-cellular plastics - Part 1: Immersion method, liquid pycnometer method and titration method

GB/T 2828.1-2012 Sampling procedures for inspection by attributes - Part 1: Sampling schemes indexed by acceptance quality limit (AQL) for lot-by-lot inspection

GB/T 2918-2018 Plastics - Standard atmospheres for conditioning and testing of specimen

GB/T 3682.1-2018 Plastics - Determination of the melt mass-flow rate (MFR) and melt volume-flow rate (MVR) of thermoplastics - Part 1: Standard method

GB/T 6111-2018 Thermoplastics piping systems for the conveyance of fluids - Determination of the resistance to internal pressure

GB/T 8806-2008 Plastics piping systems - Determination of the size of plastic

GB/T 9647-2015 Thermoplastics pipes - Determination of ring stiffness

GB/T 14152-2001 Thermoplastics pipes - Determination of resistance to external blows. Round the clock method

GB/T 18042-2000 Thermoplastics pipes - Determination of creep ratio

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

GB/T 19466.6-2009 Plastics - Differential scanning calorimetry (DSC) - Part 6:

Determination of oxidation induction time (isothermal OIT) and oxidation induction temperature (dynamic OIT)

GB/T 21873-2008 Rubber seals - Joint rings for water supply, drainage and sewerage pipelines - Specification for materials

ISO 13968:2008 Plastics piping and ducting systems - Thermoplastics pipes - Determination of ring flexibility

3 Terms and definitions, symbols and abbreviations

3.1 Terms and definitions The terms and definitions as defined in GB/T 19278-2018, as well as the following terms and definitions, apply to this document.

3.1.1 Nominal size DN The nominal value of the dimension specification, which is usually the rounded value for convenience. [GB/T 19278-2018, definition 2.3.4]

3.1.2 Nominal size DN/OD DN/OD Nominal dimension, which is relative to outside diameter. [GB/T 19278-2018, definition 2.3.5] Nominal value of ring stiffness, which is usually a convenient round integer, representing the minimum specified value of ring stiffness. [GB/T 19278-2018, Definition 2.4.3]

3.2 Symbols The following symbols apply to this document. A: Joint length. Dim,min: The minimum mean inside diameter of the socket. DN: Nominal size. DN/ID: Nominal size, which is expressed in inside diameter. DN/OD: Nominal size, which is expressed in outside diameter. de: Outside diameter. dem: Mean outside diameter. di: Inside diameter. dim: Mean inside diameter. e: Wall thickness of the inside layer (waterway wall thickness). e1: Wall thickness of the inside layer under a hollow section. e2: Wall thickness of a socket. e3: Wall thickness of the outside layer under a hollow section. L: Effective length of pipe. SN: Nominal ring stiffness.

3.3 Abbreviations The following abbreviations apply to this document. MFR: Melt mass-flow rate PE: Polyethylene TIR: True impact rate mean of the two inside diameters, as the mean inside diameter of the pipe.

8.3.4 Wall thickness According to the provisions of GB/T 8806-2008, cut the pipe into four equal parts, along the circumference; measure the wall thickness of the inside layer (waterway wall thickness), the wall thickness of the inside layer under a hollow section, the wall thickness of the outside layer under a hollow section; read the minimum value.

8.3.5 Mean inside diameter of socket As shown in Figure 2, according to the provisions of GB/T 8806-2008, measure the two inside diameters of the socket, that are perpendicular to each other; take the arithmetic mean of the two inside diameters, as the measurement result.

8.3.6 Joint length As shown in Figure 2, use a measuring tool, which has a minimum scale

of not less than

0.02 mm, to measure the joint length.

8.3.7 Wall thickness of socket Measure the wall thickness of the socket, according to the provisions of GB/T 8806- 2008; read the minimum value.

8.4 Ring stiffness Carry out the test, according to the provisions of GB/T 9647-2015; the cutting point shall be in the middle of the trough, when sampling.

8.5 Impact properties

8.5.1 Specimen When the nominal size of the pipe is less than or equal to 500 mm, sampling shall be carried out according to the provisions of GB/T 14152-2001. When the nominal size is greater than 500 mm, it can be cut into pieces for testing. The size of the test block is as follows: the length is (200 ± 10) mm; the inner chord length is (300 ± 10) mm; the outer surface arc of the test block shall be upward; the two ends shall be placed horizontally on the bottom plate; the impact point shall be guaranteed to be the top end of corrugation.

8.5.2 Test procedure The test is carried out, according to the provisions of GB/T 14152-2001. The test temperature is (0 ± 1) °C; the V-shaped pallet is used. The mass of the drop weight and the impact height are as shown in Table 8. When it is usually installed and laid at -10 °C, in the planned use area, the mass of drop weight and impact height are as shown in Observe whether the pipe specimen is broken; whether the inner and outer walls are disengaged; whether the inner wall is reversely bent.

8.7 Oven test

8.7.1 Specimen Take 3 segments of pipes of (300 ± 20) mm long. For pipes, which have a nominal size ≤ 400 mm, cut into two specimens of the same size, along the axial direction. For pipes, which have a nominal size > 400 mm, cut into four specimens of the same size, along the axial direction.

8.7.2 Test procedure Set the oven temperature to (110 ± 2) °C. After the temperature is reached, place the specimen in the oven, so that it does not contact each other AND the four walls of the oven. When the wall thickness of the inside layer (waterway wall thickness) e is ≤ 8 mm, place it at (110 ± 2) °C for 30 min; when the wall thickness of the inside layer (waterway wall thickness) e is > 8 mm, place it at the same temperature for 60 min. Do not deform or damage it, when taking it out. Cool it to room temperature; observe it. If the specimen is delaminated, cracked or blistered, the specimen is unqualified.

8.8 Density The test is carried out, according to the provisions of Method A in GB/T 1033.1-2008. The inner and outer walls are measured, respectively. Take the maximum value.