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

GB/T 43982.11-2025

**Plastics piping systems for renovation of underground water
supply networks - Part 11: Lining with inserted hoses**

地下供水管网非开挖修复用塑料管道系统 第11部分：软管穿插内衬法

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1 Scope

GB/T 43982.11-2025 is Part 11 of the Chinese series on plastics piping systems for the trenchless renovation of underground water supply networks, and covers the lining method in which a flexible hose is inserted through the existing main. It is the cheapest of the renovation techniques and the one best suited to long runs under streets that cannot be dug up, but it depends entirely on the hose surviving decades of hot and cold potable water at pressure inside a host pipe that cannot be inspected again. The standard sets the requirements for the M stage hose and its fittings, the accessories, the system requirements for the I stage, and the construction and acceptance of the completed lining, with normative annexes on the hot water ageing life prediction method for the TPU material and on the test methods for the hoses and fittings. It takes effect on 1 August 2025.

This document specifies the technical requirements for M stage hoses and fittings for plastic piping systems used in water supply network renovation using the lining with inserted hoses, and I stage system requirements, construction and acceptance. This document applies to the hoses for repairing underground water supply networks with an operating temperature not exceeding 45°C (hereinafter referred to as the hoses) and their accessories. Repairs to above-ground pipes in water supply networks can be carried out in

accordance with this document. NOTE

1.The supplier provides the pressure reduction factor. The purchaser is responsible for selecting the appropriate product specified in this document based on its specific application requirements and in conjunction with relevant laws, regulations, standards, or specifications. NOTE

2.When the internal membrane is PE, the applicable operating temperature does not exceed 40°C. When the internal membrane is TPU, the applicable operating temperature does not exceed 45°C.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

GB/T 528-2009, Rubber, vulcanized or thermoplastic -- Determination of tensile stress-strain properties

GB/T 531.1, Rubber, vulcanized or thermoplastic -- Determination of indentation hardness -- Part

3 Terms and definitions

For the purposes of this document, the terms and definitions defined in GB/T 19278, GB/T 43982.1 apply.

3.1 hose a liner pipe that is made of flexible fabric as reinforcement layer, covered with rubber/plastic anti-seepage layer (internal membrane) on the inside and rubber/plastic external membrane on the outside NOTE. When using a hose as a repair lining, the hose and the existing pipe can have both a loose fit (with radial clearance reserved during design) and a tight fit. A loose-fit hose independently withstands internal pressure during operation without transferring radial stress to the existing pipe. A tight-fit hose typically withstands internal pressure together with the existing pipe.

3.2 internal membrane a rubber/plastic material layer covering the inner side of the hose reinforcement layer with sealing and wear-resistant functions

3.3 reinforcement layer the designed pressure-bearing layer in the hose structure NOTE. It is usually a fiber braided structure and also has the function of stabilizing the size of the pipe.

3.4 external membrane a rubber/plastic material layer covering the outside of the reinforcement layer with anti- seepage and wear-resistant functions

3.5 M stage the stage where pipeline components have been factory-fabricated but have

not yet undergone any on-site treatment according to specific pipeline repair methods
[Source: GB/T 43982.1-2024, 3.5.1]

3.6 I stage the stage that the final form of the pipeline components after installation, all on-site work has been completed according to the specific pipeline repair method [Source: GB/T 43982.1-2024, 3.5.2]

4 Symbols and abbreviations

The symbols and abbreviations defined in GB/T 43982.1 and the following apply to this document.

4.1 Symbols de. outside diameter (at any point) dem, max. maximum average outside diameter dem, min. minimum average outside diameter dn. nominal hose outside diameter en. nominal wall thickness et. reinforcement layer thickness e1.internal membrane thickness e2.external membrane thickness T. aging test temperature t. hot water aging life

4.2 Abbreviations CCTV. closed circuit television PE. polyethylene PET. poly (ethylene terephthalate) PN. nominal pressure PPTA. poly (p-phenylene terephthalamide) TPU. thermoplastic polyurethane elastomer

5 Requirements for M stage hose

5.1 Hose structure and materials The hose structure mainly includes the internal membrane reinforcement layer and external membrane, as shown in Figure

2.The common materials of each layer are shown in Table 1. surface of the hose. The marking shall not cause cracks or premature failure of the hose. The legibility shall not be lost during normal storage, transportation, and installation.

5.8.2 The interval between hose marks shall not exceed 1 m.

5.8.3 Hose marks shall at least include the information listed in Table 5.

5.9 Packaging, transportation and storage

5.9.1 Hoses shall be packaged. The manufacturer's name and address shall be clearly indicated on the outer packaging, label or sign.

5.9.2 During transportation, the hose shall not be scratched, dropped, subjected to severe impact, exposed to the sun, rain, or contaminated by oil or other chemicals.

5.9.3 Hoses shall be stored in a well-ventilated warehouse with a flat floor, away from heat sources and chemical contamination. Sun protection measures shall be taken when stacking outdoors.

6 Requirements for M stage pipe fittings

6.1 Classification M stage pipe fittings include pipe end connectors of various structures, which are used to fix the lined hose to the original pipe wall at the end of the repaired original pipe, isolating the hose ends from the conveying medium and providing ports for subsequent connections. Typical connection forms between pipe end joints, hoses and existing pipelines include

6.5 Marks

6.5.1 Pipe fitting markings shall be permanently and legibly marked on the outer surface of the fitting. Marks shall not cause cracks or premature failure of the fitting. Clarity shall not be lost during normal storage, transportation, and installation.

6.5.2 Pipe fitting marks shall at least include the contents listed in Table 6.

7 Accessories

The sanitary properties of accessory materials that come into contact with drinking water shall comply with the relevant provisions of GB/T 17219.

8.1 Material properties

8.1.1 Hygienic properties For drinking water pipes, the installed lining system shall not cause any unacceptable deterioration of water quality. The sanitary properties of materials in contact with drinking water shall comply with the requirements of GB/T 17219.

8.1.2 Filling resin requirements The filling resin of the injection joint shall be submitted with a suitability test certificate.

8.2 Geometric properties

8.2.1 After I stage installation, the hose must be fully inflated at the design pressure. After inflation, the inner wall must be free of cusps, bulges, wrinkles, twists, or damage. It must not bulge out of the original pipe from damaged areas. For lined hoses designed for a tight fit, there must be no gaps or cavitation between the hose and the original pipe inner wall after inflation.

8.2.2 The minimum inside diameter of the installed hose shall not be less than the nominal value provided by the supplier. NOTE

1.The minimum inner diameter has two functions. one is to reserve sufficient cross-section for flow capacity; the other is to reserve sufficient space for daily maintenance equipment or inspection channels. NOTE

2.The maximum inside diameter of the rehabilitated piping system is limited by the inside