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NATIONAL STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA

GB/T 23257-2017

Replacing GB/T 23257-2009

Polyethylene coating for buried steel pipelines

埋地钢质管道聚乙烯防腐层

Issued on: May 12, 2017 **Implemented on: December 1, 2017**

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Standardization Administration of the PRC

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1 Scope

China's national standard for the polyethylene anticorrosion coating applied to buried steel pipelines. It specifies the classification, the materials, the requirements, the test methods, the inspection rules and the marking, packaging, transport and storage of the coating, together with the requirements for its application. A buried steel pipeline is protected by two systems working together: a coating that isolates the steel from the soil, and cathodic protection that handles what the coating misses. The coating does almost all of the work, and the three-layer polyethylene system this standard covers is the dominant choice

worldwide for a reason. The first layer is fusion-bonded epoxy applied to the blast-cleaned hot steel, which gives the adhesion to the metal and the resistance to under-film corrosion; the second is a copolymer adhesive; the third is extruded polyethylene several millimetres thick, which gives the mechanical protection and the water barrier. Each layer does a job the others cannot, and the failure of the system is nearly always a failure of the bond between them or of the surface preparation beneath the first. That is why the standard's requirements sit where they do. The surface preparation and its cleanliness and profile come before everything. The coating thickness, the peel strength at ambient and at elevated temperature, the cathodic disbondment - the measure of how far the coating lifts from the steel at a holiday under cathodic protection, which is the single best predictor of long-term performance - the impact and indentation resistance, the holiday detection over the whole surface, and the thermal ageing. The field joint, which is coated on site rather than in a plant, is the weakest point of any pipeline and is covered accordingly. Issued on 12 May 2017 and in force since 1 December 2017, it replaces GB/T 23257-2009.

This standard specifies the minimum technical requirements for steel pipe extrusion polyethylene anti-corrosion layer and radiation cross-linked polyethylene heat shrinkable tape (set). This standard is applicable to the design, production and inspection of extruded polyethylene pipe anti-corrosion layer, and the design, construction and on-site filling test. Other laying forms of extruded polyethylene anti-corrosion coatings can be referred to. Extrusion polyethylene anti-corrosion layer can be divided into normal temperature type (N) with maximum design temperature not exceeding 60 °C and maximum design temperature not exceeding 80 °C High temperature type (H) two types.

2 Normative references

The following documents are indispensable for the application of this document. For dated references, only dated versions apply to this article. Pieces. For undated references, the latest edition (including all amendments) applies to this document. Determination of tensile properties of plastics - Part 2. Test conditions for moulding and extruded plastics

GB/T 1408.1 Test methods for electrical strength of insulating materials - Part 1

GB/T 1410 solid insulating material volume resistivity and surface resistivity test method

GB/T 1633 Determination of Vicat softening temperature (VST) of thermoplastics

GB/T 1725 Determination of non-volatile content of paints, varnishes and plastics

GB/T 1842 plastic polyethylene environmental stress cracking test method

GB/T 3682 Thermoplastic melt mass flow rate and melt volume flow rate determination

GB/T 4472 Determination of density and relative density of chemical products Determination of embrittlement temperature of

GB/T 5470 plastic impact method

GB 6514 Painting operation safety regulations Painting process safety and ventilation purification

GB/T 6554 - Resin-based composites for electrical insulation - Part 2. Test method

GB/T 7124 Determination of tensile shear strength of adhesives (rigid materials to rigid materials)

GB 7692 Painting operation safety regulations Pre-painting process safety and ventilation purification

GB/T 8923.1.Determination of surface cleanliness of steels - Part 1 . Uncoated steel Corrosion grade and treatment grade of the surface of the steel after surface and overall removal of the original coating

2.0 GB/T 13021 Moisture content <=

0.1 Appendix G Oxidation induction period (220 ° C) Min >=

30 Appendix F Heat aging a (100 ° C, 4800h) <=35 GB/T 3682 a Heat aging indicator is the rate of change of melt flow rate before and after the test. Table

6 Compressed sheet performance indicators of polyethylene special materials Project performance index test method Tensile yield strength a MPa >=15 GB/T 1040.2 Tensile strength a MPa >=22 GB/T 1040.2 Fracture nominal strain a >=600 GB/T 1040.2 Vicat softening point (A50, 9.8N) >=110 GB/T 1633 Embrittlement temperature <=-65 GB/T 5470 Electrical strength MV/m >=25 GB/T 1408.1 Volume resistivity Omega·m >=1x1013 GB/T 1410 Environmental stress cracking resistance (F50) >=1000 GB/T 1842 Table 6 (continued) Project performance index test method Indentation hardness Mm (23 ° C) (60 ° C or 80 ° C) b <=0.2 <=0.3

3 Terms and definitions

The following terms and definitions apply to this document.

3.1 Extruded polyethylene coating with extrudedpolyethylenecoating In the extruder, by heating and pressurizing, the polyethylene is continuously flowed through the extrusion die to form a coating on the pipe. The coating layer comprises a longitudinal extrusion coating and a lateral wrapping coating.

3.2 Maximum design temperature maximumdesigntemperature The maximum temperature that the coating may reach during pipeline transportation, handling, construction, and operation.

3.3 Maximum operating temperature maximumoperationtemperature The highest

temperature reached by a pipe or pipeline system during operation.

Note. The maximum operating temperature does not exceed the maximum design temperature.

3.4 Low temperature coated epoxy powder coating lowtemperatureappliedepoxypowdercoating It is used as the bottom layer of the three-layer polyethylene anti-corrosion layer specified in this standard, and can be applied to epoxy powder coatings below.200 °C.

3.5 Fracture nominal strain nonlineartensilestrainatbreak Tensile nominal strain corresponding to tensile fracture stress.

3.6 Cohesive failure cohesivefailure The adhesive layer itself ruptures and adhesive bonds exist on both surfaces of the adherend.

3.7 Interface destruction interfacialfailure A visually visible damage occurs at the interface between the adhesive layer and the adherend. 4 anti-corrosion layer structure

4.1 Extruded polyethylene anti-corrosion layer is divided into two layers and two layers. The bottom layer of the two-layer structure is an adhesive layer, and the outer layer is a polyethylene layer; The bottom layer of the three-layer structure is usually an epoxy powder coating, the middle layer is an adhesive layer, and the outer layer is a polyethylene layer. Pipes above DN500 are not suitable A two-layer polyethylene anti-corrosion layer is used.

4.2 The minimum thickness of the coating shall comply with the requirements of Table 1. The thickness of the anti-corrosion layer at the weld site shall not be less than 80% of the value specified in Table 1. should According to the pipeline construction environment and operating conditions, select the grade of the anti-corrosion layer. Table

1 Thickness of anti-corrosion layer Steel pipe nominal diameter DN Epoxy coating a Mm Adhesive layer Mm Minimum thickness of coating Mm Ordinary (G) Enhanced (S) DN<=100 100 \u003cDN<=250 250 \u003cDN\u003c500 500<=DN< 800 800<=DN<=1200 DN >1200 >=120 >=150 >=170 1.8 2.5 2.0 2.7 2.2 2.9 2.5 3.2 3.0 3.7 3.3

4.2 a Not applicable to two-layer polyethylene anti-corrosion coating.

5.1 Steel pipe

5.1.1 Steel pipes shall comply with the current relevant steel pipe standards or technical requirements for ordering, and have a factory certificate.

5.1.2 The visual inspection of steel pipes shall be carried out one by one. Appearance quality should comply with the current relevant standards or technical requirements for ordering, unqualified Steel pipes should not be coated with an anti-corrosion layer.