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

GB/T 50538-2020

Replacing GB/T 50538-2010

**Technical standard for anti-corrosion and insulation coatings of
buried steel pipeline**

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1 General

2 terms

1 General

1.0.1 This standard is formulated to standardize the design, construction and inspection of the external anti-corrosion insulation layer of buried steel pipelines.

1.0.2 This standard is applicable to the external anti-corrosion and thermal insulation of buried steel pipelines with the temperature of the conveying medium not higher than 350°C and the ambient temperature not lower than -25°C.

1.0.3 The design, construction and inspection of the external anti-corrosion and thermal insulation layer of buried steel pipelines shall not only comply with this standard, but also comply with the current relevant national standards.

2.0.1 protective layer jacket layer

In order to prevent water or moisture from entering the insulation layer, a protective structure is set outside the insulation layer.

2.0.2 Water proof cap

It is made of radiation cross-linked polyethylene heat shrinkable material or other equivalent materials, and is used for waterproofing the end of the insulation pipe.

2.0.3 "one-step" process one-step process The extrusion of polyethylene outer sheath and the foaming of polyurethane insulation layer are continuously and synchronously produced on one production line.

2.0.4 "pipe-in-pipe" process pipe-in-pipe process The production process of pouring polyurethane insulation raw materials into the closed annular space formed by the outer protective pipe and the steel pipe, and foaming.

2.0.5 "spraying method" process spraying process The manufacturing process of coating the polyurethane insulation material on the outer surface of the steel pipe by spraying to form the insulation layer.

2.0.6 reflecting layer reflecting layer

The material layer with heat reflection function set in the high temperature composite

insulation structure.

2.0.7 Protective layer protective layer

In the high-temperature composite organic-inorganic insulation structure, there is an inorganic cushion layer that can reduce vibration and facilitate the relative movement between the pipeline and the inorganic insulation layer.

Figure 4.0.1-3 Structural diagram of "anticorrosion layer-insulation layer-protection layer-end waterproof layer" insulation pipeline with the temperature of the conveying medium higher than 80°C and not higher than 140°C

Figure 4.0.1-3 Structural diagram of "anticorrosion layer-insulation layer-protection layer-end waterproof layer" insulation pipeline with the temperature of the conveying medium higher than 80°C and not higher than 140°C

1-steel pipe; 2-anti-corrosion layer; 3-end waterproof layer; 4-insulation layer; 5-protective

layer 4.0.2 When the temperature of the conveying medium is higher than 140°C and not higher than 350°C, a high-temperature anti-corrosion and thermal insulation structure shall be selected according to Table 4.0.2, and temporary waterproof measures shall be adopted at the end of the thermal insulation pipe, and the reserved length shall meet the following requirements.

1 When the insulation pipe has no anti-corrosion layer, the reserved length at the end of the insulation pipe should not be less than 100mm;

2 When the insulation pipe has an anti-corrosion layer, the reserved length at the end of the insulation pipe should not be less than 120mm.

Table 4.0.2 Form and structure of high temperature anticorrosion and heat preservation pipe

Table 4.0.2 Form and structure of high temperature anticorrosion and heat preservation pipe

4.0.3 The anti-corrosion and thermal insulation structure of special-shaped parts such as elbows and tees shall be determined according to the following regulations according to the temperature of the conveying medium.

1 When the temperature of the conveying medium is not higher than 80°C, it is advisable to adopt the structure of "anticorrosion layer-insulation layer protection layer-end waterproof cap" or the insulation structure made by spraying method;

2 When the temperature of the conveying medium is higher than 80°C and not higher than 140°C, the structure of "anticorrosion layer-insulation layer-protection layer-end waterproof layer" can be adopted;

3 When the temperature of the conveying medium is higher than 140°C and not higher than

350°C, a high-temperature anti-corrosion and heat-preservation structure shall be adopted according to 4.0.2 of this standard.

4.0.4 The waterproof measures at the end of the prefabricated thermal insulation pipes and elbows, tees and other special-shaped parts shall meet the following requirements.

1 When the temperature of the conveying medium is not higher than 80°C, the end waterproof measures should adopt radiation cross-linked polyethylene heat shrinkable waterproof cap;

2 When the temperature of the conveying medium is higher than 80°C, it is advisable to determine the material performance and structural form of the waterproof layer at the end according to the actual working conditions.

4.0.5 The anti-corrosion and heat-insulation structure of the insulation pipe made on site shall be consistent with the anti-corrosion and heat-preservation structure prefabricated in the factory, and the anti-corrosion and heat preservation structure at the joint shall match the anti-corrosion and heat preservation structure of the main pipeline.

5 materials

5.1 Anti-corrosion layer material 5.1.1 The outer anti-corrosion layer of steel pipelines should have good basic properties such as electrical insulation, mechanical properties, moisture and water resistance, adhesion, chemical resistance, thermal aging resistance, and microbial erosion resistance.

5.1.2 The materials for the anti-corrosion layer under the insulation layer of buried steel insulation pipelines should be selected according to Table 5.1.2.

Table 5.1.2 Commonly used anti-corrosion layer materials under the insulation layer of thermal insulation pipelines

Continued Table 5.1.2

Note. The lower limit of applicable temperature is the lowest ambient temperature for installation and storage of the anti-corrosion coating.

5.2 Insulation layer material 5.2.1 The insulation layer can be made of organic materials such as rigid polyurethane foam, rigid polyisocyanurate, and rigid phenolic foam, as well as inorganic materials such as rock wool and glass wool. The performance of commonly used insulation materials should meet the current national standards In addition to the basic performance requirements of thermal insulation materials in GB 50264 "Code for Design of Industrial Equipment and Pipeline Thermal Insulation Engineering", it should also meet the requirements in Table 5.2.1.

Table 5.2.1 Common insulation layer materials

5.2.2 The properties of "one-step method" rigid polyurethane foam shall meet the

requirements in Table 5.2.2.

Table 5.2.2 "One-step" polyurethane foam properties

Note. 1 The heat resistance test condition is 100 degrees C, 96h.

2 The production of foam plastic test pieces shall comply with the provisions of Appendix D of this standard.

5.2.3 "Pipe-in-pipe method" rigid polyurethane foam properties should meet the requirements of Table 5.2.3.

Table 5.2.3 "Pipe-in-pipe" polyurethane foam properties

Note. 1 The heat resistance test condition is 120 degrees C, 96h.

2 The production of foam plastic test pieces shall comply with the provisions of Appendix D of this standard.

5.2.4 "Spray method" rigid polyurethane foam properties should meet the requirements of Table 5.2.4.

Table 5.2.4 "Spray method" polyurethane foam properties

Note. 1 The heat resistance test conditions are 120°C for normal temperature type polyurethane foam, 96h; 140°C for high temperature type polyurethane foam, 96h.

2 The production of foam plastic test pieces shall comply with the provisions of Appendix D of this standard.

5.2.5 The specifications of steel strips, steel wires and other binding materials shall comply with the relevant provisions of the current national standard "Code for Design of Industrial Equipment and Pipeline Thermal Insulation Engineering" GB 50264.

5.3 Material of protective layer 5.3.1 The material of the protective layer can be polyethylene material, glass fiber reinforced plastic, anti-corrosion steel pipe, etc. The performance of the material of the non-metallic protective layer should meet the requirements in Table 5.3.1.

Table 5.3.1 Non-metallic protective layer materials

5.3.2 The performance of the polyethylene raw material and protective layer of the "one-step" process shall meet the requirements in Table 5.3.2.

Table 5.3.2 Performance of polyethylene special materials and protective layer in "one-step" process

Table 5.3.2 Performance of polyethylene special materials and protective layer in "one-step" process

Note. 1 The chemical medium corrosion resistance and ultraviolet light aging resistance