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Anticorrosive coatings for liquefied natural gas (LNG) tanks

液化天然气（LNG）储罐用防腐涂料

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Anticorrosive coatings for liquefied natural gas (LNG) tanks

1 Scope

This standard specifies the product categories, requirements, test methods, inspection rules, marking, packaging, and storage of anticorrosive coatings for liquefied natural gas (LNG) storage tanks.

This standard applies to protective and decorative coatings for fixed-type liquefied natural gas storage tanks such as shore-based liquefied natural gas receiving terminal storage tanks, urban natural gas peak-shaving station storage tanks, and gas field liquefied gas storage tanks.

2 Normative references

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

GB/T 1724-1979 Methods of test for fineness of grind of paints

GB/T 1725-2007 Paints, varnishes and plastics - Determination of non-volatile-matter content

GB/T 1728-1979 Methods of test for drying time of coatings of paints and putties

GB/T 1732-1993 Determination of impact resistance of film

GB/T 1733-1993 Determination of resistance to water of films

GB/T 1740-2007 Determination of resistance to heat and humidity of paint films

GB/T 1748-1979 Method of test for flexibility of putty coatings

GB/T 1766 Paints and varnishes - Rating schemes of degradation of coats

GB/T 1771-2007 Paints and varnishes - Determination of resistance to neutral salt spray (fog)

GB/T 1865-2009 Paints and varnishes - Artificial weathering and exposure to artificial radiation - Exposure to filtered xenon-arc radiation

GB/T 3186 Paints, varnishes and raw materials for paints and varnishes - Sampling

GB/T 5210-2006 Paints and varnishes - Pull-off test for adhesion

GB/T 6682 Water for analytical laboratory use - Specification and test methods

GB/T 6742-2007 Paints and varnishes - Bend test (cylindrical mandrel)

GB/T 6750-2007 Paints and varnishes - Determination of density - Pycnometer method

GB/T 8170-2008 Rules of rounding off for numerical values & expression and judgement of limiting values

GB/T 8923.1 Preparation of steel substrates before application of paints and related products - Visual assessment of surface cleanliness - Part 1: Rust grades and preparation grades of uncoated steel substrates and of steel substrates after overall removal of previous coatings

GB/T 9271 Paints and varnishes - Standard panels for testing

GB/T 9274-1988 Paints and varnishes - Determination of resistance to liquids

GB/T 9278 Temperatures and humidities for conditioning and testing of paint specimens

GB/T 9750 Marks for package of coating products

GB/T 13288.1 Preparation of steel substrates before application of paints and related products - Surface roughness characteristics of blast-cleaned substrates - Part 1: Specification and definitions for ISO surface profile comparators for the assessment of abrasive blast-cleaned surfaces

GB/T 13452.2 Paints and varnishes - Determination of film thickness

GB/T 13491 General rule for packing of coatings

HG/T 3668-2009 Zinc rich primer

HG/T 3792-2014 Crosslinking fluorocarbon resin coatings

HC/T 4755-2014 Polysiloxane coatings

JG/T 25-1999 Determination for freeze-thaw resistance of film of building coatings

JTJ 275-2000 Corrosion Prevention Technical Specifications for Concrete Structures of Marine Harbour Engineering

intermediate coats and top coats are prepared according to the provisions in Table 8; test panels for performances of coatings are prepared according to the provisions in Table 11. The coating thickness is measured according to the provisions of GB/T 13452.2.

5.4 Operation methods

5.4.1 Operation methods for coating performances

5.4.1.1 State in container

Open the container and stir with a spatula or stirring rod, allowing there to be sediments at the bottom of the container. If it is easy to mix evenly after stirring, it is rated as "Uniform without hard lumps after stirring". The main agent and curing agent of two-component coatings shall be inspected separately.

5.4.1.2 Non-volatile matter content

According to the provisions of GB/T 1725-2007, the main agent and curing agent of the two-component coating are mixed for inspection. The baking temperature is 105 °C±2 °C, the baking time is 2 hours, and the sample is about 2 g.

5.4.1.3 Applicable period

Pre-adjust the temperature of each component of the coating to 23 °C±2 °C, and mix evenly according to the proportion specified by the product (the middle value is taken when the proportion of the diluent is a range); take out 300 mL and put it into a 500 mL well-sealed iron can, place the can under the condition of 23 °C±2 °C; after the agreed time, inspect the state in the container and the coating appearance according to the requirements of 5.4.1.1 and 5.4.1.5. If the test results meet the requirements of 5.4.1.1 and 5.4.1.5, and there is no obstacle to the application of the coating during the panel-making process, it is rated as "Pass".

5.4.1.4 Drying time

Carry out the test according to the regulations of GB/T 1728-1979, in which surface dry test is carried out according to method B, hard dry test of putty is carried out according to method C, and hard dry tests of other coatings (including dried type) are carried out according to method A.

5.4.1.5 Coating appearance

The test panel is observed visually under scattered sunlight. If the coating is uniform and free of defects such as sagging, floating, pinholes, cracking, and peeling, it is rated as "Normal".

5.4.1.6 Bending test

The test is carried out according to the provisions of GB/T 6742-2007.

5.4.1.7 Flexibility

The test is carried out according to the provisions of GB/T 1748-1979.

5.4.1.8 Impact resistance

The test is carried out according to the provisions of GB/T l732-l993.

5.4.1.9 Density

The test is carried out according to the provisions of GB/T 6750-2007. The components of the product (except the diluent) are mixed according to the proportion specified by the manufacturer and then tested.

5.4.1.10 Fineness

The test is carried out according to the provisions of GB/T 1724-1979. The two-component coatings shall be inspected immediately after the main agent and curing agent are mixed.

5.4.1.11 Fluorine content in the base material

The test shall be carried out according to the provisions of Appendix A of HG/T 3792-2014.

5.4.1.12 Silicon-oxygen bond content in the base material

The test shall be carried out according to the provisions of Appendix A of HG/T 4755-2014.

5.4.1.13 Metal zinc content in non-volatile matter

The test shall be carried out according to the provisions of 5.7 in HG/T 3668-2009.

5.4.2 Operation methods for coating system performances

5.4.2.1 General provisions

Unless otherwise specified, the reagents used are all chemically pure and above, the water used is third-grade water in accordance with the provisions of GB/T 6682, and the test solution is adjusted to the test temperature before the test.

5.4.2.2 Coating appearance

5.4.2.7 Chloride ion permeability resistance

The test shall be carried out according to Appendix C.2 of JTJ 275-2000.

5.4.2.8 Humidity and heat cycle resistance

The test shall be carried out according to the regulations of JG/T 25-1999, a total of 10 cycles (a cycle consists of soaking in water at 23 °C±2 °C for 18 hours, freezing at -20 °C±2 °C for 3 hours, and baking at 50 °C±2 °C for 3 hours). After the cycles are complete, observe visually under scattered sunlight. If 2 of the 3 test panels of Class A products do not show any coating defects such as blistering, cracking, peeling, dusting, obvious discoloring, and obvious dulling, it is rated as "no abnormality"; If 2 of the 3 test panels of Class B products do not show any coating defects such as rusting, blistering, cracking, peeling, dusting, obvious discoloring, and obvious dulling, it is rated as "no abnormality". If any of the above coating defects occurs, it shall be described according to GB/T 1766.

5.4.2.9 Moisture and heat resistance

The test shall be carried out according to the provisions of GB/T 1740-2007. If blistering, rusting, peeling, or other coating defect occurs, it shall be described according to GB/T 1766.

5.4.2.10 Salt spray resistance

The test shall be carried out according to the provisions of GB/T 1771-2007 (the test panel is not scribed). If blistering, rusting, peeling, or other coating defect occurs, it shall be described according to GB/T 1766.

5.4.2.11 Resistance to artificial weathering

The test shall be carried out according to the provisions of Cycle A in GB/T 1865-2009. The evaluation of the results shall be carried out according to GB/T 1766.

6 Inspection rules

6.1 Inspection classification

6.1.1 Product inspection is divided into factory inspection and type inspection.

6.1.2 The factory inspection items include the state in the container, non-volatile matter content, drying time, applicable period, density, and coating appearance.

6.1.3 Type inspection items include all technical requirements listed in this standard. Under normal production conditions, heat and humidity resistance and salt spray resistance are tested every 3 years, resistance to artificial weathering is tested every 5

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