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Cross helically wound steel wires reinforced-polyethylene composite pipelines for water supply

给水用钢丝网增强聚乙烯复合管道

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Cross helically wound steel wires reinforced-polyethylene composite pipelines for water supply

1 Scope

This Standard specifies the terms and definitions, materials, requirements, test methods, inspection rules and marks, packaging, transportation, storage for cross helically wound steel wires reinforced-polyethylene composite pipes (hereinafter referred to as pipes) and pipe fittings.

This Standard is applicable to cross helically wound steel wires reinforced-polyethylene composite pipelines for water supply whose temperature of the conveying medium does not exceed 40°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 228.1, *Metallic materials - Tensile testing - Part 1: Method of test at room temperature*

GB 912, *Hot-rolled sheets and strips of carbon structural steels and high strength low alloy structural steels*

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

GB/T 1040.1, *Plastics - Determination of tensile properties - Part 1: General principles*

GB/T 1040.2, *Plastics - Determination of tensile properties - Part 2: Test conditions for moulding and extrusion plastics*

GB/T 1633-2000, *Plastics - Thermoplastic materials. Determination of Vicat softening temperature (VST)*

GB/T 1844.1-2008, *Plastics - Symbols and abbreviated terms - Part 1: Basic polymers and their special characteristics*

GB/T 2035-2008, *Terms and definitions for plastics*

GB/T 2790, *Adhesives, 180-degree peel strength test method for a flexible-bonded-to-rigid test specimen assembly*

GB/T 2791, *Adhesives, T peel strength test method for a flexible-to-flexible test specimen assembly*

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

GB/T 2918, *Plastics - Standard atmospheres for conditioning and testing*

GB/T 3682, *Determination of the melt mass-flow rate (MFR) and the melt volume-flow rate (MVR) of thermoplastics*

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

GB/T 8806, *Plastics piping systems - Plastics components - Determination of dimensions*

GB/T 11253, *Cold-rolled sheet and strip of carbon structural steels*

GB/T 13663-2000, *Polyethylene pipes (PE) for water supply*

GB/T 13663.2-2005, *Polyethylene (PE) piping systems for water supply - Part 2: Fittings*

GB/T 14450, *Bead wire*

GB/T 15560, *Standard test method for short-time hydraulic failure and resistance to constant internal pressure of the plastics pipes for the transport of fluids*

GB/T 17219, *Standard for safety evaluation of equipment and protective materials in drinking water system*

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

GB/T 19466.6, *Plastics - Differential scanning calorimetry (DSC) - Part 6: Determination of oxidation induction time (isothermal OIT) and oxidation induction temperature (dynamic OIT)*

CJ/T 124, *Fittings of steel reinforced polyethylene plastic pipes for water supply*

3 Terms and definitions

For the purposes of this document, the terms and definitions defined in GB/T 19278, GB/T 13663-2000, GB/T 13663.2-2005, GB/T 1844.1-2008 and GB/T 2035-2008 as

materials (including plastics, steel, aluminum, copper and other metal materials and non-metal materials) together.

3.5 nominal pressure; PN

Reference values relating to the pressure resistance of piping system components. For ease of use, the priority number of the R10 series is usually taken.

[GB/ T19278-2003, the term 6.12 related to product performance]

4 Materials

4.1 Polyethylene

4.1.1 Basic performance

The properties of polyethylene materials for pipes and pipe fittings shall meet the requirements of special materials for polyethylene pipes of grade PE80 and above in GB/T 13663-2000.

4.1.2 Recycled material

It is allowed to use a small amount of clean regrind of the same designation from our factory to produce the same product. The produced pipes or fittings shall meet the requirements of this Standard.

External salvage, regrind shall not be used.

4.2 Steel wire

4.2.1 Appearance

The surface of the steel wire shall be free from oil, rust, dirt and other dirt. There shall be no damage, no indentation and other defects that are harmful to use.

4.2.2 Diameter and allowable deviation

The nominal diameter, allowable deviation and out-of-roundness of steel wire shall comply with the provisions of GB/T 14450.

4.2.3 Mechanical properties

The tensile strength and elongation at break of the steel wire shall meet the requirements in Table 1. The number of one-way twists shall comply with the provisions of GB/T 14450.

6 Requirements

6.1 Color

Color of pipe: it shall be black with blue color stripes, but the adhesive resin layer shall be white, natural or transparent.

Color of fitting: it shall be black.

6.2 Appearance

6.2.1 The inner and outer surfaces of the pipes shall be clean and smooth. Defects such as bubbles, obvious scratches, dents, impurities, and uneven colors are not allowed.

6.2.2 The pipe ends shall be cut flat and perpendicular to the pipe axis. The ends shall be capped.

6.2.3 The inner and outer surfaces of pipe fittings shall be clean and smooth. Shrinkage cavities (pits), obvious scratches, impurities, uneven color and other surface defects are not allowed.

6.3 Resistance deviation of electrofusion fittings

It shall meet the provisions of 6.3 in GB/T 13663.2-2005.

6.4 Specification and size of pipe

6.4.1 Specifications and sizes of pipes with different pressure levels

The nominal outer diameter, average outer diameter and allowable deviation of the pipe, the minimum wall thickness of the outer layer of polyethylene, the minimum nominal diameter of the steel wire, and the value range of the wall thickness at any point shall meet the requirements of Table 5.

7.4 Specification and size

They shall comply with the provisions of GB/T 8806.

7.5 Hydrostatic strength and burst pressure

7.5. Pipes

The hydrostatic strength test of the pipe shall comply with the provisions of GB/T 6111. The burst pressure test shall comply with the provisions of GB/T 15560.

7.5.2 Polyethylene pipe fittings and mechanically connected pipe fittings

The hydrostatic strength test of polyethylene pipe fittings and mechanically connected pipe fittings shall comply with the provisions of GB/T 13663.2.

7.5.3 Perforated steel plate skeleton and polyethylene composite fittings

The hydrostatic strength and burst pressure test of steel skeleton perforated steel plate skeleton and polyethylene composite fittings shall comply with the provisions of CJ/T 124.

7.6 Physical and mechanical properties

7.6.1 Pipes

7.6.1.1 Melt mass flow rate

The melt mass flow rate of raw materials and finished products shall be measured in accordance with the provisions of GB/T 3682. Finished specimens shall be taken from the connection surface of the pipe and fittings.

7.6.1.2 Oxidation induction time

It shall comply with the provisions of GB/T 19466.6. The specimen shall be taken from the connecting surface of the pipe and the fitting.

7.6.1.3 Compression cracking stability

Three pipe specimens with a length of (100±10) mm are randomly selected for the test. The specimens are placed between the two platens of the testing machine and pressed down. The length of each platen shall be at least equal to the length of the specimen. When under load, the width of the pressure plate shall be at least 25 mm wider than the largest surface of the specimen in contact. Press down at a speed of 100 mm/min to 50% of the nominal outer diameter of the pipe specimen.

7.6.1.4 Peeling strength

Conduct according to GB/T 2791. See Annex B for specimen preparation methods.

NOTE: If the specimen breaks without being peeled off, take the maximum force value when the specimen breaks to calculate its peel strength value.

7.6.1.5 Circumcision hydrostatic strength

7.6.1.5.1 Specimen preparation

Randomly select two pipes with a length of (600±20) mm. Connect with electrofusion fittings while the pipe ends are sealed. Cut an annular groove with a width of (1.5±0.5) mm and a depth to the surface of the steel wire winding layer along the circumference of the outer surface of the pipe at a distance of 150 mm from both ends of the combined specimen.

7.6.1.5.2 Test

The specimen test is carried out at 20°C, 1.5 PN, and for 165 h.

7.6.2 Polyethylene pipe fittings and mechanically connected pipe fittings

They shall comply with the provisions of GB/T 13663.2.

7.6.3 Perforated steel plate skeleton and polyethylene composite fittings

They shall comply with the provisions of CJ/T 124.

7.7 Hygienic performance

It shall comply with the provisions of GB/T 17219.

8 Inspection rules

8.1 Inspection classification

Inspection is divided into exit-factory inspection and type inspection. Products must pass the inspection of the quality inspection department of the manufacturer and be attached with a qualified mark before leaving the factory.

8.2 Batching

8.2.1 Pipes

Pipes of the same specification produced continuously with the same raw material, formula and process are regarded as a batch. The quantity of each batch shall not exceed 100 t. If the production period is less than 100 t in 7 days, the 7-day output is regarded as a batch.

8.2.2 Pipe fittings

b) After formal production, if there are major changes in structure, materials, and processes, which may affect product performance;

c) During normal production, not less than once every two years;

d) When there is a large difference between the exit-factory inspection result and the last type inspection result;

e) Resumption of production after suspension of production for more than half a year.

8.4.3 Type inspection items

The type inspection items of pipes and fittings are all the technical requirements in Chapter 6.

8.4.4 Sampling plan

According to the technical requirements of this Standard, according to the groupings in Table 12 and Table 13, each group selects any specification for testing. For products with qualified appearance and dimensions, perform the performance test in Chapter 6. The specifications for each inspection are rotated within each group.

8.5 Judgment rules and reinspection rules

Inspect according to the test methods specified in this Standard. Make quality judgments on products based on test results and technical requirements. The ones in 6.1, 6.2, 6.4, 6.5 shall be judged according to Table 11. If one of the sanitation indicators is unqualified, it will be judged as an unqualified batch. When one of the other properties fails to meet the requirements, double samples are randomly selected for reinspection of this item. If it is still unqualified, the batch of products will be judged as unqualified.

9 Marks, packaging, transportation and storage

9.1 Marks

9.1.1 Pipes

9.1.1.1 The mark for pipes shall be as shown in Figure 4, including the following contents:

- name of the manufacturer and the product trademark;

- product name or name symbol;

- nominal outer diameter and wall thickness;

- nominal pressure;

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