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Stainless steel corrugated tubes for the connection of gas appliances

燃气用具连接用不锈钢波纹软管

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Stainless steel corrugated tubes for the connection of gas appliances

1 Scope

This document specifies the classification, specifications and models, requirements, test methods, inspection rules, as well as marking, packaging, transportation and storage of stainless steel corrugated tubes for the connection of gas appliances specified in GB/T 13611.

This document applies to stainless steel corrugated tubes for the connection of gas burning appliances or gas equipment, of which the nominal dimension is not greater than DN32 and the maximum working pressure is 0.01 MPa.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the version corresponding to that date is applicable to this document; for undated references, the latest version (including all amendments) is applicable to this document.

GB/T 191, Packaging - Pictorial marking for handling of goods

GB/T 196, General purpose metric screw threads - Basic dimensions

GB/T 1220, Stainless steel bars

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 3280, Cold rolled stainless steel plate, sheet and strip

GB/T 4226, Cold finished stainless steel bar

GB/T 4240, Stainless steel wires

GB/T 4423, Copper and copper alloy cold-drawn rod and bar

GB/T 5231, Designation and chemical composition of wrought copper and copper alloys

GB/T 7306.1, Pipe threads with 55 degree thread angle where pressure-tight joints are made on the threads - Part 1: Parallel internal and taper external threads

GB/T 7306.2, Pipe threads with 55 degree thread angle where pressure-tight joints are made on the threads - Part 2: Taper internal and external threads

GB/T 7307, Pipe threads with 55 degree thread angle where pressure-tight joints are not made on the threads

GB/T 8815, Plasticized polyvinyl chloride (PVC) compounds for wire and cable

GB/T 9576, Rubber and plastics hoses and hose assemblies - Guidelines for selection, storage, use and maintenance

GB/T 9577, Rubber and plastics hoses and hose assemblies - Rules for marking, package and transportation

GB/T 10125, Corrosion tests in artificial atmospheres - Salt spray tests

GB/T 13657, Bisphenol-A epoxy resin

GB/T 14525, General specification for corrugated metal hose assemblies

GB/T 15065, Black polyethylene compounds for wire and cable

GB/T 16411, Universal test methods of gas burning appliances for domestic use

GB/T 20878, Stainless and heat-resisting steels - Designation and chemical composition

GB/T 23658, Elastomeric seals - Material requirement for seals used in pipes and fittings carrying gaseous fuels and hydrocarbon fluid

YS/T 649, Extruded rod and bar of copper and copper alloys

3 Terms and definitions

Terms and definitions determined by GB/T 14525 and the following ones are applicable to this document.

3.1

Stainless steel corrugated tubes for the connection of gas appliances

The stainless steel corrugated tubes with a fixed length and a protecting coat, both ends of which are provided with threaded joints for the connection of gas burning appliances or gas equipment and pipelines.

4 Classification, specifications and models

4.1 Classification

4.1.1 Hose assemblies are classified – in terms of connection characteristics – as follows:

a) Ordinary hose assembly: hoses only connected to stationary gas burning appliances or gas equipment, coded RLB;

b) Super flexible hose assembly: hoses that can be connected to mobile or stationary gas burning appliances or gas equipment, coded CRLB.

4.1.2 Hose assemblies are classified – in terms of use – as follows:

a) Hose for the connection of gas cooker: coded Z;

b) Hose for the connection of gas meter: coded B;

c) Hose for the connection of gas water heater: coded R;

d) Hose for the connection of other gas appliances: coded Q.

4.1.3 Hose assemblies are classified – in terms of corrugated shape – as follows:

a) helically corrugated tube: helically corrugation, coded L;

b) annularly corrugated tube: annularly corrugation, coded H.

4.2 Specifications

4.2.1 Hose assemblies are divided into DN10, DN15, DN20, DN25 and DN32 in terms of nominal dimension.

4.2.2 The length of hose for the connection of gas cooker should be 500 mm, 800 mm, 1 000 mm, 1 500 mm and 2 000 mm; the length of hose for the connection of gas meter and gas water heater should be 200 mm, 300 mm, 500 mm and 800 mm.

4.3 Models

The model compilation rules are as follows:

5.2.1 The surface of the hose assembly shall be bright and clean; there shall be no obvious scratches and imprints; there shall be no obvious stains in the nozzle.

5.2.2 The wall thickness of the protecting coat shall be uniform; the corrugated part of the tube shall be completely covered; there shall be a clear yellow mark; there shall be no obvious impurities, scars, discolorations and cracks; the surface marking shall be clear.

5.2.3 There shall be no cracks, sandish holes and other defects affecting performance on the inner and outer surfaces of the joint.

5.2.4 The appearance of the sealing gasket shall be regular, without cracks, defects or flash; the color shall be uniform.

5.3 Structure and size

5.3.1 Requirements for the nominal wall thickness of tubular blank:

a) The nominal wall thickness of ordinary tubular blanks shall not be less than 0.20 mm;

b) The nominal wall thickness of super flexible tubular blanks shall not be less than 0.12 mm.

5.3.2 Requirements for the wall thickness of joint:

a) The wall thickness of copper joint shall not be less than 1.5 mm;

b) The wall thickness of stainless steel joint shall not be less than 1.0 mm.

5.3.3 Requirements for the screw threads of joint:

a) The connection of gas cooker, gas water heater or gas meter shall be sealed with a sealing gasket; the thread of the hose joint connected to the gas cooker or the gas water heater shall comply with the provisions of GB/T 7307; the thread of the hose joint connected to the gas meter shall comply with the provisions of GB/T 196;

b) When connected to gas pipelines or pipeline accessories, the thread used for sealing shall comply with the provisions of GB/T 7306.1 or GB/T 7306.2; the gasket used for sealing shall comply with the provisions of GB/T 7307.

5.3.4 The hose length deviation shall meet the requirements in Table 2.

Description of indexing numbers:

1 – inlet pressure regulator;

2 – thermometer;

3 – flow meter;

4 – inlet pressure gauge;

5 – outlet pressure gauge;

6 – differential pressure gauge;

7 – hose assembly;

8 – control valve;

a – 4 holes with a diameter of 1.5 mm;

A – pressure tapping point of the pressure pipe.

Note: D = d ~ 1.1d, where d is the connection size of the hose.

Figure 2 – Schematic diagram of flow test

6.5.4 Tensile resistance test

Connect the connecting joints at both ends of the hose sample whose length is not less than 300 mm to the tensile test device. Gradually stretch to the tensile load specified in Table 8 under the air with a pressure of 20 kPa; maintain the tensile load for 5 minutes, and carry out the air tightness test according to the provisions of 6.5.2; check whether the test results conform to the provisions of No. 4 in Table 4.

6.5.5 Heat resistance test

Place the hose sample in a constant temperature box at 120 °C ± 2 °C for 30 minutes; then, take it out; after cooling to room temperature, carry out the air tightness test according to the provisions of 6.5.2; check whether the test results meet the provisions of No. 5 in Table 4.

6.5.6 Torsion test

6.5.13 Stress corrosion resistance test

Peel off the protecting coat of the hose sample and close both ends; bend the hose sample 180° according to the bending mandrel specified in Table 11; then, soak it in the solutions prepared in mass fractions: 20% sodium chloride, 1% sodium nitrite and 79% distilled water respectively; heat the solution to boiling; reflux for 14 hours, then, take out the sample; then, bend the sample 180° in the reverse direction according to the bending mandrel specified in Table 11; carry out the air tightness test according to the regulations in 6.5.2; check whether the test results meet the requirements of No. 13 in Table 4.

6.6 Hose joint performance test

6.6.1 Impact resistance test

As shown in Figure 8, fasten the joints at both ends of the hose sample according to their structure; apply the impact energy specified in Table 13; impact the center of the joint. After the impact test, carry out the air tightness test according to the regulations in 6.5.2, and check whether the test results meet the requirements of No. 14 in Table 4.

The impact energy is the calculated value of Formula (2).

$$E = MLg(1 - \cos\alpha) \qquad \cdots\cdots(2)$$

Where:

E – impact energy, in Joules (J), 1 J = 0.102 kgf·m;

M – mass of heavy hammer, in kilograms (kg);

L – the distance from the center of the rotary axis of the heavy hammer to the center of gravity, in meters (m);

g – gravitational acceleration, in meters per second squared (m/s^2);

α – upward angle of the heavy hammer, in degrees (°).

6.6.3 Corrosion resistance test

The corrosion resistance tests of different joints are as follows.

a) Stainless steel, electroplated and other surface-treated joints

Stainless steel, electroplated and other surface-treated joints shall be subjected to a salt spray test. Carry out the 96h test according to the salt spray test equipment, neutral salt spray reagent and test method determined in GB/T 10125, and check whether the test results meet the requirements of No. 16 in Table 4.

b) Copper joint

Hang the copper joint in a sealed container (volume of 18 L) containing 250 mL of ammonia water (28% by mass fraction) and 250 mL of distilled water. The copper joint shall not be in contact with the solution. After 2 hours of ammonia fumigation test at room temperature, check whether the test results meet the requirements of No. 16 in Table 4.

6.7 Hose protecting coat performance test

6.7.1 Flame retardance test

As shown in Figure 9, use a Bunsen burner with an inner diameter of 10 mm to make the flame length reach 40 mm; place the hose sample with the protecting coat horizontally on the outer flame about 10 mm away from the upper end of the inner flame (the flame temperature is about 800 °C); turn off the Bunsen burner after holding for 5 s; test the continuous burning time of the hose sample; take the arithmetic mean of 3 hose samples as the continuous burning time of the hose; check whether the test results meet the requirements of No. 17 in Table 4.

7.1.2.2 When all the inspection items meet the requirements, judge it as qualified.

7.1.3 Sampling inspection

7.1.3.1 Sampling inspection shall be carried out batch by batch. The inspection batch shall consist of products of the same material, produced by the same process, and of the same specification and model, and the batch shall be the one-time delivery quantity.

7.1.3.2 The sampling plan shall be carried out according to GB/T 2828.1, or be determined by the manufacturer.

7.1.3.3 The inspection items shall be carried out according to Table 16.

7.1.3.4 When the inspection items meet the requirements, judge it as qualified.

7.2 Type inspection

7.2.1 Inspection conditions

In any of the following situations, type inspection shall be carried out:

a) when a new product, or an old product produced by a transfer factory, is identified and finalized and put into mass production;

b) when the product is significantly changed in material, process, structure, etc., which is enough to affect the performance of the product, after formal production;

c) when production is resumed after more than 1 year of production suspension;

d) at least once a year during normal production;

e) when there is significant difference between the exit-factory inspection results and the last type inspection results.

7.2.2 Inspection items

The inspection items are in accordance with Table 16.

7.2.3 Determination rules

When all the inspection items meet the requirements, judge it as qualified.

7.3 Non-conformity classification of inspection items

See Table 16 for the non-conformity classification of inspection items.

8 Marking, packaging, transportation and storage

8.1 Marking

The protecting coat of the hose shall have clear and difficult-to-alter trademark, model, standard number, hose name, corrugated tube stainless steel material designation, manufacturer's name and production batch number; the hose joint shall have the trademark, material designation and joint connection size (such as $G^{1}/_{2}$, etc.).

8.2 Packaging

8.2.1 The single package of the hose shall be marked with the name of the manufacturer, the production site, the name of the hose, and the trademark, and shall be accompanied by a certificate of conformity and installation and use instructions.

8.2.2 The installation and use instructions shall include the hose standard number, hose structure, usage conditions, usage methods of fasteners, installation requirements and precautions.

8.2.3 Each set of hoses shall be packaged separately, to ensure that there is no collision between the packaged products. The outer packaging can be fully enclosed carton or wooden box, and the marking of the packaging box shall comply with the regulations in GB/T 191.

8.3 Transportation

The transportation of the hose shall comply with the regulations in GB/T 9577.

8.4 Storage

The storage of the hose shall comply with the regulations in GB/T 9576.

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