

ICS 91.120.10

CCS Q25



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

GB/T 25996-2019

Replacing GB/T 25996-2010

**Test method for thermal insulations on external stress
corrosion cracking of austenitic stainless steel**

绝热材料对奥氏体不锈钢外部应力腐蚀开裂的试验方法

Issued on: October 18, 2019

Implemented on: September 1, 2020

**Issued by: State Administration for Market Regulation;
Standardization Administration of China**

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1 Scope

GB/T 25996-2019 is the Chinese national standard on test method for thermal insulations on external stress corrosion cracking of austenitic stainless steel, in the field of construction materials and building. The /T suffix marks it as a recommended standard: it is not compulsory by itself, but it becomes binding as soon as a contract, a tender or a customer specification calls it up - which in practice is how most foreign buyers meet it. It was issued on 18 October 2019 by the State Administration for Market Regulation; Standardization Administration of China, and has been in force since 1 September 2020. Classification: ICS 91.120.10, CCS Q25. This page is published from the official record of the standard held by the Chinese standards administration: the identification, the dates, the classification and the issuing body are taken from there. The clause text, the tables and the numeric limits are in the document itself, which is delivered complete in English translation.

1.1 This Standard specifies the terms and definitions, instruments and equipment, reagents and materials, preparation of stainless steel specimens, preparation of thermal insulation specimens, test methods, qualification verification of sensitized stainless steel specimens for test, inspection of stainless steel specimens after test, test results, test report of test

method for thermal insulations on external stress corrosion cracking of austenitic stainless steel.

1.2 This Standard applies to thermal insulations and products for covering austenitic stainless steel, which mainly include mineral wool, calcium silicate, composite silicate, expanded perlite, foamed asbestos, foam glass, aerogel, and thermal insulation fireproof coatings. It also applies to cement and adhesives.

1.3 This Standard provides two test methods, i.e. Dana method and drip method. The applicability is as follows: - Dana method applies only to wicking-type insulations; drip method applies to all insulations that can be cut or shaped into test specimens; - When the insulation can be heat treated into a wicking-type insulation, it can be tested by either Dana method or drip method; - When the insulation cannot be treated into a wicking-type insulation or the heat treatment temperature is higher than the manufacturer's recommended temperature, use drip method for test.

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 Metallic materials - Tensile testing at ambient temperature

4.1.6 Thermocouple type thermometer.

4.1.7 Precision bending machine.

4.1.8 Wet belt sander: The belt specification is P80.

4.1.9 Stainless steel bolt: 65 mm long, 5 mm in diameter, with insulating washer and stainless steel nut.

4.1.10 Microscope: X10 ~ X30.

4.1.11 Drill bit: phi 7 mm.

4.1.12 Magnifier: X10 ~ X20.

4.1.13 Electric saw.

4.1.14 Box-type resistance furnace: The maximum temperature is not lower than 1200 °C.

4.2 Instruments and equipment for drip method

4.2.1 Heating device: The outer diameter of the heating tube is 38 mm, and the temperature of the outer wall is the water boiling point temperature ± 6 °C.

4.2.2 Multi-channel peristaltic pump or other water supply device: It is used to supply 250

mL/d sodium chloride solution, distilled water or deionized water to each sample.

4.2.3 Glass bottle: 1 L.

4.2.4 Specimen holder.

4.2.5 Thermocouple type thermometer.

4.2.6 Cylindrical sampler: The outer diameter is

4.2.7 Precision bending machine.

4.2.8 Box-type resistance furnace: The maximum temperature is not lower than 1200 °C.

4.2.9 Wet belt sander: The belt specification is P80.

4.2.10 Stainless steel bolt: 65 mm long, 5 mm in diameter, with insulating washer and stainless steel nut.

4.2.11 Microscope: X10 ~ X30. where: δ - the deflection of the stainless steel specimen after applying a certain stress, in millimeters (mm); S - the elastic stress, in megapascals (MPa); R - the bending radius, in millimeters (mm); h - the thickness of the stainless steel plate, in millimeters (mm); L - the length of the straight part of the stainless steel specimen, in millimeters (mm); E - the elastic modulus, in megapascals (MPa); L0 - the distance between the two inner planes of the U-shaped stainless steel specimen after applying stress, in millimeters (mm).

7.1 General requirements

7.1.1 During the entire preparation process, clean polyethylene gloves shall be worn to avoid direct contact with the thermal insulation with bare hands and to prevent chloride ion pollution.

7.1.2 If the surface and the interior of the thermal insulation are different, the thermal insulation shall be tested at the location determined to be the most likely to cause corrosion.

7.1.3 When the thermal insulation can be heat treated into a wicking-type insulation, the heat treatment shall be carried out at the temperature recommended by the manufacturer. If necessary, the treatment temperature can be the maximum use temperature of the thermal insulation.

7.2 Preparation of samples of thermal insulation with consistent surface and interior

7.2.1 CUT the thermal insulation into sample blocks of 102 mm x 178 mm x 38 mm. USE the sampler to drill a hole in the center of each sample block, and then CUT it into two parts to make samples of 102 mm x 89 mm x 38 mm, of which the quantity if not less than four. INSTALL each sample on the corresponding bolted stainless steel specimen. If they do not match each other, USE a clean chlorine-free water-resistant abrasive paper to grind the

sample to fit the stainless steel specimen, and BLOW the polished sample with air to electronic transformer are connected by copper wires.

8.1.3 PLACE the temperature measurement end of the thermocouple in the middle of the bottom of the stainless steel specimen concave, COVER the thermocouple with aluminum powder, and then DROP a few drops of epoxy adhesive on the aluminum powder to make the contact tip of the thermocouple reliably adhere to the stainless steel specimen.

8.1.4 FILL the crystallizing dish with distilled or deionized water until the level is about 13 mm below the bottom of the stainless steel specimen groove. TURN ON the power and heat up. When the temperature reaches the water boiling point temperature, start timing. The test duration is $28 \text{ d} \pm 6 \text{ h}$. In the event of a power outage during the 28-day test, the time taken for the power outage shall be compensated.

8.1.5 ADJUST the water level of each specimen in time according to the temperature. The increase of the water level will decrease the temperature. The amount of water required to control each specimen is $200 \text{ mL/d} \sim 600 \text{ mL/d}$.

8.1.6 After the test, TURN OFF the power to cool the stainless steel specimens, DISCONNECT the electrical wires, and REMOVE the stainless steel specimens from the thermal insulation sample.

8.1.7 At the same time, carry out the qualification verification of sensitized stainless steel test specimens for test in accordance with 9.2.

8.2 Drip method (arbitration method)

8.2.1 PLACE each stainless steel specimen on the heating tube, with the opening downward; APPLY the thermal grease between the stainless steel specimen and the heating tube to bring them into close contact with each other; INSTALL the bolts and nuts in accordance with 6.10.

8.2.2 WET the thermal insulation sample to be tested with distilled water or deionized water. If it cannot be made wet, immerse it for 10 min. Take it out and place it on the stainless steel specimen and fix it, and make them fully contact.

8.2.3 INSERT the drip tube that is connected to each glass bottle through the peristaltic pump IN the center of the thermal insulation sample, START the peristaltic pump, ADJUST the dripping speed, and ENSURE that each thermal insulation sample is evenly dripped with $(250 \pm 25) \text{ mL}$ of water every day. During the test, $(250 \pm 25) \text{ mL}$ of water is added to the glass bottle corresponding to each thermal insulation sample every day.

8.2.4 TURN ON the heating device. The temperature of the outer wall of the tube shall be controlled at the water boiling point temperature $\pm 6 \text{ }^{\circ}\text{C}$. After the temperature is reached, start the timer. The test duration is $28 \text{ d} \pm 6 \text{ h}$. In the event of a power outage during the 28-day test, the time taken for the power outage shall be compensated.