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

GB/T 15260-2016

Replacing GB/T 15260-1994

**Corrosion of metals and alloys - Test methods for intergranular
corrosion of nickel alloys**

金属和合金的腐蚀 镍合金晶间腐蚀试验方法

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Foreword

This Standard is drafted in accordance with the rules given in GB/T 1.1-2009. This Standard replaces GB/T 15260-1994 "Test methods for intergranular corrosion of nickel alloys"; compared with GB/T 15260-1994, main technical changes are as follows: - ADD the sampling requirements; - MODIFY the general title of the clause in the original standard from "Sample preparation" TO "Sampling and preparation"; SPECIFY the dimension of the recommended sample according to different methods; - MODIFY the schematic diagram of the test device in the original standard; - MODIFY the "glass bracket" in the original standard TO "sample bracket"; RETAIN the schematic diagram of bracket in the original standard; RECOMMEND two kinds of glass bracket; - DELETE the "boiling debris" in the original standard; ADD the relevant content to the test solution of Method A; - MODIFY the "heating device" in the original standard; - DELETE subclause

8.4 of Method A in the original standard; - ADD the test duration and density constant of the recommended alloy in Method A; - ADD the method for inspecting the effect of steam escape on the acid concentration and the criteria for re-testing in Method A; - MODIFY the normal annealed material in Method A in the original standard TO the solid solution material; - ADD the relevant clauses of the test report. This Standard is proposed by China Iron and Steel Industry Association. This Standard is under the jurisdiction of National

Technical Committee on Steel of Standardization Administration of China (SAC/TC 183).
Drafting organizations of this Standard. Pangang Group Jiangyou Changcheng Special Steel Co., Ltd., Metallurgical Industry Information Standards Institute, Zhejiang JIULI Hi-Tech Metals Co., Ltd., Iron and Steel Research Institute. Main drafters of this Standard. Wu Jie, Hu Jin, Hou Jie, Chu Yanli, Zhou Pingjiang, Corrosion of metals and alloys - Test methods for intergranular corrosion of nickel alloys

1 Scope

GB/T 15260-2016 is the Chinese national standard on corrosion of metals and alloys - test methods for intergranular corrosion of nickel alloys, in the field of metallurgy. 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 29 August 2016 by the General Administration of Quality Supervision, Inspection and Quarantine of the People's Republic of China; Standardization Administration of China, and has been in force since 1 July 2017. Classification: ICS 77.060, CCS H25. 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.

This Standard specifies the samples, test equipment, scope of application, test solution, test procedures, evaluation of test results and test report of test methods for intergranular corrosion of nickel alloys (iron nickel base, nickel base). This Standard includes the following four test methods.

- a) Method A. ferric sulfate (III) - sulfuric acid test;
- b) Method B. copper - copper sulfate - 16 % sulfuric acid test;
- c) Method C. hydrochloric acid test;
- d) Method D. nitric acid test. This Standard applies to nickel alloys used in corrosive environments. The choice of the four methods, the sensitization treatment system of the alloy and the criteria for the results are negotiated by the supply and demand parties of the alloy.

2 Normative references

The following documents are indispensable for the application of this document. For dated references, the only dated edition applies to this document. For undated references, the latest edition (including all modifications) applies to this document.

GB/T 622 Chemical reagent - Hydrochloric acid

GB/T 625 Chemical reagent - Sulfuric acid

GB/T 626 Chemical reagent - Nitric acid

GB/T 665 Chemical reagent - Copper sulfate pentahydrate

3.1 Sampling and preparation

3.1.1 For the recommended sample of Method A, C and D, the total area is 500 mm² ~ 2000 mm², the ratio of the area of the sample to the area of the two faces shall not be more than 20 %. The welding samples shall include welds, heat affected zones and base metals, both of which are not more than 13 mm.

3.1.2 The dimension of the recommended bending sample of Method B. the length is 80 mm ~ 100 mm, the width is 20 mm, the thickness is 3 mm ~ 4 mm (samples with a width or a thickness less than the recommended dimension shall be taken according to the actual dimension). Pipes with an outside diameter of not more than 40 mm shall be taken at 25 mm in length. In Method B, it shall take the original surface as the outer surface of bending.

3.1.3 The sample shall be taken in the direction of the forging, and the surface shall be as close as possible to the surface of the material in use. If necessary, the surface of the sample is allowed to be machined, and the surface roughness is generally $Ra \leq 0.80 \mu m$.

3.1.4 When cutting the sample, it shall remove the deformed metal by grinding or machining before the test. The sample shall be prevented from overheating during machining.

3.1.5 The sample shall be degreased by non-chlorinated solvents, rinsed and dried before the test.

3.2 Sensitization treatment of samples

3.2.1 For samples require sensitization treatment before the test, the surface needs to be cleaned before the sensitization treatment, to remove carbon-containing lubricants, grease, etc. To obtain a clean surface, mild surface grinding or pickling shall be carried out, followed by washing with non-chlorinated solvents, rinsing and drying.

3.2.2 The sensitization system shall be negotiated by both supply and demand parties.

3.2.3 The sensitization treatment shall be carried out before the sample is finished.

3.2.4 For samples that do not require sensitization treatment, the test shall be carried out in a state where the final conditions of use are simulated. For alloy materials that need to be welded or heat-treated, they shall be treated as much as possible with the same treatment as the material being manufactured or used.

3.2.5 Before the test, remove the scale of the sensitized sample by grinding.

3.3 Test equipment

3.3.1 Test devices Figure 1 and Figure 2 are two recommended test devices. Figure 1 is a

ground flask with a capacity of 1 L and Soxhlet or Aster's condenser with at least four condensed The precision of the analysis balance shall not be less than

0.001 g.

4 Method A. ferric sulfate (III) - sulfuric acid test

4.1 Scope of application This method is suitable for the determination of the susceptibility of nickel alloys to intergranular corrosion in ferric sulfate (III) - sulfuric acid test solution.

4.2 Test solution

4.2.1 Preparation of 600 mL of test solution. POUR 400 mL of distilled or deionized water INTO the flask; ADD slowly 236 mL of sulfuric acid (excellent grade) as specified in GB/T 625 TO the flask (to prevent bruising).

4.2.2 WEIGH 25 g of ferric sulfate (excellent grade) and add to the sulfuric acid solution.

4.2.3 To prevent bruising, it is recommended to use debris of pure aluminum oxide to be added to the test solution.

4.2.4 INSTALL the condenser on the flask and pass through the cooling water; HEAT the solution to boil until all the sulfuric acid is dissolved.

4.2.5 It shall protect the eyes and wear rubber gloves in the operation. PLACE the test flask in a fume hood.

4.3 Test procedures

4.3.1 MEASURE the sample dimension (including the internal dimensions of all holes), accurate to

0.1 mm; CALCULATE the total exposed area.

4.3.2 WEIGH the sample, accurate to

0.001 g.

4.3.3 PLACE the sample on the glass bracket in the test solution. It is recommended that one sample be placed in a flask. Samples of the same grade can also be tested in the same flask, but the amount of test solution shall be ensured to be greater than 20 mL/cm², but the samples shall not be in contact with each other.

4.3.4 The test shall be carried out continuously. See Table 1 for the recommended test duration and density constant of part of alloy materials. Table

1 Recommended test duration and density constant of part of alloy materials Alloy Test duration/h Density/(g/cm³) Grade Unified digital number NS1101 H08800 120