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Method of copper sulfate-sulfuric acid test for stainless steels

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Foreword

This translation has been made based on the original Japanese Industrial Standard revised by the Minister of International Trade and Industry through deliberations at Japanese Industrial Standards Committee in accordance with the Industrial Standardization Law. Consequently **JIS G 0575 : 1980** is replaced with **JIS G 0575 : 1999**.

In this revision, the comparison and conformity with International Standard (**ISO 3651-2**) are executed and this text was prepared for a proposal document of International Standard.

Attention is drawn to the possibility that some parts of this Standard may conflict with a patent right, application for a patent after opening to the public, utility model right or application for registration of utility model after opening to the public which have technical properties. The relevant Minister and the Japanese Industrial Standards Committee are not responsible for identifying the patent right, application for a patent after opening to the public, utility model right or application for registration of utility model after opening to the public which have the said technical properties.

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Method of copper sulfate-sulfuric acid test for stainless steels

Introduction This Japanese Industrial Standard, which has been in force since its establishment in 1970, recently came under review with the aim of ensuring its conformity with **ISO 3651-2**. As a result, the parts compatible with corresponding **ISO** are adopted without any modification in their technical contents. The major points of this revision are as follows:

- a) Ferritic and ferritic-austenitic (duplex) stainless steels are added to the grades of steel applicable, so as to ensure its conformity with **ISO**.
- b) Provision for welded test pieces is added to that for test pieces, so as to ensure its conformity with **ISO**.
- c) The condition of heat treatment for sensitization is revised by defining it either as maintaining the test piece for 30 min at $700\text{ }^{\circ}\text{C} \pm 10\text{ }^{\circ}\text{C}$ followed by rapid cooling in water or as maintaining the test piece for 10 min at $650\text{ }^{\circ}\text{C} \pm 10\text{ }^{\circ}\text{C}$ followed by rapid cooling in water, so as to ensure its conformity with **ISO**.
- d) The condition of bending in bend test is revised so as to ensure its conformity with **ISO**.
- e) Provision for test report information is added, so as to ensure its conformity with **ISO**.
- f) The portions in the International Standard which were found difficulty to incorporate into this Standard at the stage of this review for the conformity are adopted in Annexes to this Standard for the convenience of users; Annex A (normative) *The 40 % sulfuric acid / ferric sulfate (III) test (Streicher test)*, Annex B (informative) *The 35 % sulfuric acid / copper sulfate test* and Annex C (informative) *Examples of application*.

1 Scope This Japanese Industrial Standard specifies a method for the evaluation of the susceptibility of ferritic, austenitic and ferritic-austenitic (duplex) stainless steels to intergranular corrosion by immersing the test piece in a boiling copper sulfate-sulfuric acid solution and by subsequent examination of cracks produced by bend test.

Remarks : The International Standard corresponding to this Standard is as follows:

ISO 3651-2 *Determination of resistance to intergranular corrosion of stainless steels—Part 2 : Ferritic, austenitic and ferritic-austenitic (duplex) stainless steels—Corrosion test in media containing sulfuric acid*

2 Normative references The following standards contain provisions which, through reference in this Standard, constitute provisions of this Standard. The most recent editions of the standards indicated below shall be applied.

JIS G 0572 *Method of ferric sulfate-sulfuric acid test for stainless steels*

JIS H 3100 *Copper and copper alloy sheets, plates and strips*

JIS K 8951 *Sulfuric acid*

JIS K 8983 *Copper (II) sulfate pentahydrate*

JIS R 6251 *Abrasive cloths*

JIS R 6252 *Abrasive papers*

JIS R 6253 *Waterproof abrasive papers*

JIS R 6254 *Endless abrasive belts*

3 Test apparatus The test apparatus shall be in accordance with the following:

- a) **Test container:** A glass flask (capacity: approximately 1 l), connected by taper-grinding to a glass vertical reflux condenser having a sufficient cooling area.
- b) **Heater:** A heater capable of keeping the test solution gently boiling throughout the test period.

4 Test solution The test solution shall be prepared as follows: Dissolve 100 g of Special Grade copper sulfate (II) pentahydrate specified in **JIS K 8983** in 700 ml of distilled or deionized water, add 100 ml of Special Grade reagent (sulfuric acid having a density of about 1.84 g/ml) specified in **JIS K 8951**, and dilute to 1 000 ml of copper sulfate-sulfuric acid solution with distilled or deionized water. This shall be followed by the addition of C 1 100 copper chips of **JIS H 3100** or those equivalent, the amount of which shall be sufficient to remain even after the completion of the test.

5 Test piece The test piece shall be prepared as follows:

a) **Unwelded test piece**

- 1) The shape and dimensions of the test piece used shall be as specified in Table 1.
- 2) Cutting of the test piece shall, in general, be made by sawing. Where shearing is used, the sheared edges shall be refinished by machining or grinding to remove the portion affected by shearing.
- 3) Any scale on the test piece shall be descaled by machining or grinding.
- 4) The outside crest to be bent of the test piece shall be either dry-polished with the grit size P220 or finer abrasive cloth or paper specified in **JIS R 6251**, **JIS R 6252** or **JIS R 6254**, or wet-polished with grit size P150 or finer paper specified in **JIS R 6253**.
- 5) The surface-finished test piece shall be degreased in suitable solvent or cleaning agents (nonchlorinated) followed by drying.