International Standard 6509

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Corrosion of metals and alloys — Determination of dezincification resistance of brass

Corrosion des métaux et alliages — Détermination de la résistance à la dézincification du laiton

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Foreword

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Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council.

International Standard ISO 6509 was developed by Technical Committee ISO/TC 156, *Corrosion of metals and alloys*, and was circulated to the member bodies in February 1980.

It has been approved by the member bodies of the following countries :

Australia	Finland	Portugal
Austria	France	Romania
Belgium	Germany, F.R.	South Africa, Rep. of
Brazil	Hungary	Spain
Bulgaria	India	Sweden
Canada	Mexico	United Kingdom
China	Norway	USA
Egypt, Arab Rep. of	Poland	USSR

The member body of the following country expressed disapproval of the document on technical grounds :

Czechoslovakia

Printed in Switzerland

Corrosion of metals and alloys — Determination of dezincification resistance of brass

1 Scope and field of application

This International Standard specifies a method for the determination of the dezincification resistance of brass exposed to fresh or saline waters.

The method may be used for control or research purposes, but the field of application is not specified.

2 Principle

Exposure of test pieces to copper(II) chloride solution followed by microscopic examination.

3 Reagents and materials

Use only reagents of recognized analytical grade and distilled water or water of equivalent purity.

3.1 Copper(II) chloride, 1 % (*m*/*m*) solution, freshly prepared.

Dissolve 12,7 g of copper(II) chloride dihydrate ($CuCl_2.2H_2O$) in water and make up the volume to 1 000 ml.

3.2 Phenolic resins, or other non-conducting material with similar properties, for embedding the test pieces.

3.3 Ethanol, for cleaning the test pieces.

4 Apparatus (see figure 1)

4.1 Beaker, of glass, covered with suitable plastic foil, for example polyethylene, secured with elastic thread or another method of sealing using non-metallic material.

4.2 Thermostatically controlled water or oil bath, capable of being controlled at 75 ± 5 °C.

4.3 Optical microscope, with a scale.

5 Test pieces

5.1 The test pieces shall be taken in such a way, for example by sawing and grinding with light pressure, that the properties of the materials are unaffected.

5.2 Not less than two test pieces shall be taken from each sample supplied for testing.

5.2.1 For forgings and castings, at least one test piece shall be taken from the area with the thinnest section and at least one from the area with the thickest section.

5.2.2 In the case of materials with a specific extrusion or rolling direction, for example plates or bars, surfaces both parallel and perpendicular to the extrusion or rolling direction shall be tested. In addition, in the case of rods, all test pieces, whether transverse or longitudinal, shall be cut in such a way as to include points midway between the axis and the periphery.

5.3 The area of each test piece to be exposed shall be approximately 100 mm^2. If the size of the component or the cross-section of the rod to be tested is too small to provide test areas of this size, the largest possible test area shall be taken.

6 Preparation of test pieces

6.1 The test pieces shall be embedded in the phenolic resin (3.2), and the test surfaces ground using wet abrasive paper, finishing with 500 grade or finer. (See figure 2.)

6.2 The test surfaces shall be cleaned with the ethanol (3.3) prior to testing.

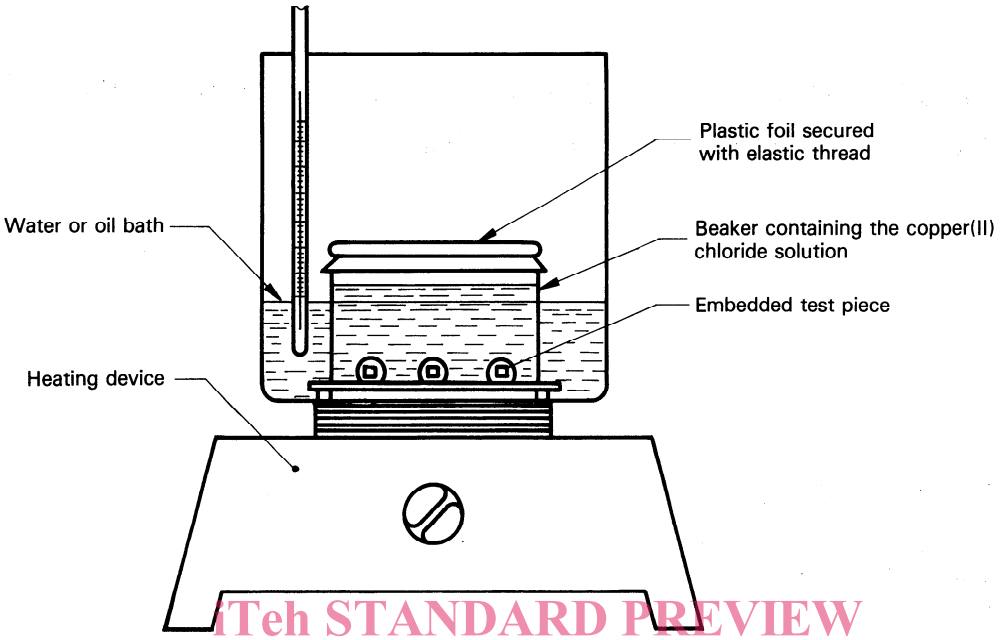

Figure 1 — Example of test apparatus

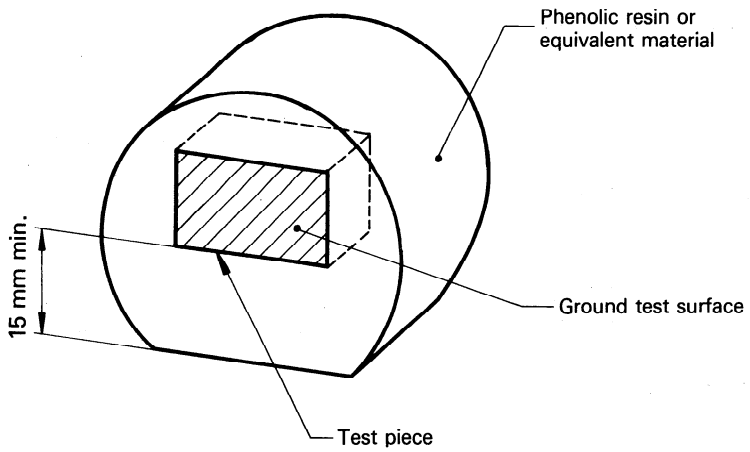

Figure 2 — Embedded test piece with one test surface

7 Procedure

7.1 Positioning of test pieces for test

The test pieces shall be placed in the beaker (4.1) containing the copper(II) chloride solution (3.1) so that the test surfaces are vertical and at least 15 mm above the bottom of the beaker. The plastic foil shall then be placed over the beaker and secured.

NOTE — $250 \begin{smallmatrix} + 50 \\ - 10 \end{smallmatrix}$ ml of the copper(II) chloride solution are required per 100 mm^2 of exposed surface of the test piece.

7.2 Operating conditions

7.2.1 The beaker containing the test pieces shall be placed in the thermostatically controlled bath (4.2), the temperature of which shall be maintained at 75 ± 5 °C during the entire exposure period.

7.2.2 Different alloys shall not be tested simultaneously in the same beaker.

7.3 Duration of test

The test pieces shall be exposed continuously for 24 h. At the end of this period, they shall be removed from the beaker, washed in water, rinsed in the ethanol and allowed to dry.

7.4 Preparation of sections for microscopic examination

Microscopic examination of the test pieces shall be carried out as soon as possible after exposure. If the test pieces are stored before microscopic examination, they shall be kept in a desiccator. Each test piece shall be sectioned at right angles to the exposed test surface and ground and polished for microscopic examination. The total length of section through the exposed surface shall be not less than 5 mm. If the dimensions of the test piece make this impossible, the section shall be taken to provide the maximum possible total length.

7.5 Microscopic examination

7.5.1 The microsection prepared from each test area shall be examined using an optical microscope and the maximum depth of dezincification shall be recorded. The appropriate magnification shall be used to provide the greatest accuracy of measurement.

7.5.2 The length of the section examined shall be the maximum possible length. If there is evidence of edge effects, for example a greater depth of dezincification along the line of the interface between the mounting material and the brass, the maximum depth of dezincification shall be measured at a sufficient distance from the interface to render such edge effects negligible.

7.5.3 For some purposes, assessment of the characteristics of dezincification distribution, for example whether the depth of the dezincified zone is constant (layer dezincification) or varies greatly (localized dezincification) and whether the attack is limited to a single phase in the alloy, as well as measurements of the average depth of dezincification, may be required in addition to measurement of the maximum depth of attack. In such cases, the methods to be used shall be laid down in the International Standards which refer to this test or shall be agreed between the parties concerned.

8 Acceptance limits

Acceptance limits shall be laid down in the International Standards which refer to this test or shall be agreed between the parties concerned.

9 Test report

Unless otherwise specified, the test report shall contain the following information for each material or product being tested :

a) the type of product, material and manufacturer;

b) the number of test pieces, and the total area of exposed test surfaces in square millimetres;

c) the length of section examined;

d) the magnification employed for microscopic examination;

e) the maximum depth of dezincification and, if required, the average depth and method of measuring it;

f) if required, the characteristics of dezincification distribution (see 7.5.3);

g) other information necessary for assessment;

h) the time and place of testing, and the name and title of the person responsible for the test.

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