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Copper — Hydrogen embrittlement test

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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.

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It has been approved by the Member Bodies of the following countries :

Austria	India	Spain
Belgium	Japan	Sweden
Canada	Netherlands	Switzerland
Chile	New Zealand	Thailand
Czechoslovakia	Norway	Turkey
Egypt, Arab Rep. of	Portugal	United Kingdom
France	Romania	U.S.A.
Hungary	South Africa, Rep. of	U.S.S.R.

No Member Body expressed disapproval of the document.

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Copper — Hydrogen embrittlement test

1 SCOPE AND FIELD OF APPLICATION

This International Standard specifies the procedure for the hydrogen embrittlement testing of deoxidized and oxygen free high conductivity coppers.

2 REFERENCES

ISO/R 398, *Bend test for copper and copper alloys.*

ISO 2625, *Copper and copper alloys — Reverse bend testing of wire.*

3 PRINCIPLE

Preparation of a test piece and heating in an atmosphere containing hydrogen. If oxygen is present in the metal, reaction occurs which causes embrittlement. Cooling of the test piece out of contact with air.

Embrittlement is then revealed by close bending or reverse bending, or by microscopic examination.

4 TEST PIECES

4.1 Close-bend test piece

This shall be of a convenient length and either of the full section or of a convenient thickness or diameter not greater than 12 mm (0.5 in). Any edges shall be rounded and smoothed. Test pieces not of the full section shall contain some part of the original surface of the material.

4.2 Reverse bend test piece

This shall be of convenient length, with a thickness or diameter not exceeding 2,5 mm (0.1 in). Any edges shall be rounded and smoothed. Test pieces not of the full section shall contain some part of the original surface of the material.

4.3 Test piece for microscopic examination

This shall be of convenient size and shall include an outside surface of the material on at least one face.

5 PROCEDURE

5.1 Exposure in hydrogen

Heat the test piece, prepared as above, in a furnace with an atmosphere containing not less than 10 % of hydrogen, maintained at a temperature between 825 and 875 °C for a period of 30 min, and cool in the furnace atmosphere or quench in water.

5.2 Testing for embrittlement

5.2.1 *Close-bend test*

Carry out the close-bend test at ambient temperature. Bend the test piece, AB in the figure, by steady pressure applied at right angles to the length, until the end A takes the position indicated by C. The original surface of the material shall be at the outside of the bend (see Figure).

Bending will normally be carried out in two stages. For the first stage, either of the methods shown in ISO/R 398 may be used to bend the test piece to a V-shape. The choice of method will determine the minimum length of the test piece.

In the second stage, bring the two legs of the test piece into contact by steady pressure applied across the open end of the V, for example by closing in a vice. After bending, inspect the stressed surface visually for the presence of cracks.