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## **Copper alloys — Ammonia test for stress corrosion resistance**

*Alliages de cuivre — Essai à l'ammoniaque pour la résistance à la corrosion sous contrainte*

## Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

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. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 6957 was prepared by Technical Committee ISO/TC 26, *Copper and copper alloys*.

Annexes A and B of this International Standard are for information only.

This is a preview of ISO 6957:1988. [Click here to purchase the full version from the ANSI store.](#)

# Copper alloys – Ammonia test for stress corrosion resistance

## 1 Scope

This International Standard specifies a test, using an ammoniacal atmosphere, for the detection of applied or residual stresses in copper alloy products which can cause failure of the material in service or storage through stress corrosion cracking. The method can also be used for testing assemblies and partial assemblies (of limited size).

This method is relatively simple to carry out and its severity can be regulated by changing the pH value of the solution producing the ammoniacal atmosphere.

The appropriate pH-value for the test shall be specified in the product specification or agreed upon with respect to the alloy and its application.

In annex A, recommendations are given for the choice of pH-values to be used for some frequently occurring applications.

## 2 Principle

Exposure of test pieces to an ammoniacal atmosphere for 24 h, followed by examination for cracks at a magnification of  $\times 10$  to  $\times 15$ .

## 3 Reagents and materials

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

**3.1 Ammonium chloride**, 4 mol/l solution, for the preparation of the test solution.

Dissolve 107 g  $\pm$  0,1 g of ammonium chloride ( $\text{NH}_4\text{Cl}$ ) in water, make up the volume to 500 ml and keep the solution in a closed vessel.

**3.2 Sodium hydroxide**, 30 to 50 % (*m/m*) solution, for adjusting the pH-value.

**3.3 Clean organic solvent** (for example, trichloroethylene) or **hot alkaline solution**, for degreasing the test pieces.

**3.4 Sulfuric acid**, 5 % (*m/m*) solution, for cleaning the test pieces.

**3.5 Hydrogen peroxide**, 30 % (*m/m*) solution, for addition to the pickling solution.

## 4 Apparatus

Ordinary laboratory apparatus and

**4.1 pH-meter.**

**4.2 Closed vessel** (such as a desiccator).

**4.3 Equipment for examining test pieces at  $\times 10$  to  $\times 15$  magnification.**

## 5 Definitions

For the purpose of this International Standard, the following definitions apply.

**5.1 stress corrosion:** A process involving conjoint corrosion and straining of the metal due to residual or applied stresses.

**5.2 applied stress:** Stress in a body due to application of an external load.

**5.3 residual stress:** Stress remaining within a body as the result of plastic deformation.

## 6 Test media

**6.1** Slowly add sodium hydroxide solution (3.2) to ammonium chloride solution (3.1) to give a test solution with the specified pH-value  $\pm$  0,05 (see annex A). Maintain the solution at ambient temperature and dilute with water up to a volume of 1 000 ml. Check the pH-value with the pH-meter (4.1) after dilution. Prepare the solution preferably in a fume cupboard in a laboratory and store it in a closed vessel. Before use, check the pH-value again, and adjust it if necessary.

**6.2** The pickling solution for cleaning test pieces before and after testing shall be 5 % (*m/m*) sulfuric acid (3.4). If necessary, for cleaning test pieces after testing, a small amount of hydrogen peroxide solution (3.5) may be added to the pickling solution (for example, 20 to 50 ml of hydrogen peroxide solution per litre of pickling solution).