INTERNATIONAL STANDARD

**ISO 9455-15**

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# Soft soldering fluxes — Test methods —

## Part 15: Copper corrosion test

*Flux de brasage tendre — Méthodes d'essai —*

*Partie 15: Essai de corrosion du cuivre*



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# Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation on the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.



This document was prepared by Technical Committee ISO/TC 44, *Welding and allied processes*, Subcommittee SC 12, *Soldering materials*.

This second edition cancels and replaces the first edition (ISO 9455-15:1996), which has been technically revised.



The main changes compared to the previous edition are as follows:

— the use of lead-free solders has been included;

— the requirements for the apparatus have been updated;

— the test report has been updated;

— the figures in Annex A have been re-arranged;

— this document has been editorially revised.

A list of all parts in the ISO 9455 series can be found on the ISO website.

Requests for official interpretations of any aspect of this document should be directed to the Secretariat of ISO/TC 44/SC 12 via your national standards body. A complete listing of these bodies can be found at www.iso.org.

 

# Soft soldering fluxes — Test methods —

# Part 15: Copper corrosion test

## 1 Scope

This document specifies a qualitative method for determination of the corrosive properties of flux residues on a copper substrate when subjected to controlled environmental conditions. The test is applicable to type 1 fluxes, as defined in ISO 9454-1.

## 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 197-1, *Copper and copper alloys — Terms and definitions — Part 1: Materials*

ISO 9453, *Soft solder alloys — Chemical compositions and forms*

ISO 9455-1, *Soft soldering fluxes — Test methods — Part 1: Determination of non-volatile matter, gravimetric method*

ISO 9455-2, *Soft soldering fluxes — Test methods — Part 2: Determination of non-volatile matter, ebulliometric method*

IEC 60068-2-78, *Environmental testing — Part 2-78: Tests — Test Cab: Damp heat, steady state*



## 3 Terms and definitions

No terms and definitions are listed in this document.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— IEC Electropedia: available at http://www.electropedia.org/

— ISO Online browsing platform: available at http://www.iso.org/obp

## 4 Principle

A pellet of solder is melted in contact with the flux to be tested on a test piece of copper sheet. The test piece is then exposed to a controlled temperature/humidity environment and the resulting corrosion of the copper, if any, is assessed using a low-power microscope.

## 5 Reagents and materials

Only reagents of recognized analytical quality and only distilled or deionized water shall be used.

**5.1 Ammonium peroxodisulfate solution**, prepared as follows.

Dissolve 250 g of ammonium peroxodisulfate [$(NH_4)_2S_2O_8$] in water and add cautiously 5 ml of sulfuric acid (density 1,84 g/ml). Mix, cool, dilute to 1 l and mix. This solution shall be freshly prepared before use.

**5.2 Sulfuric acid**, 5 % (by volume) solution.

Add cautiously, with stirring, 50 ml of sulfuric acid ($\rho$ = 1,84 g/ml) to 400 ml of water and mix. Cool, dilute to 1 l and mix well.

**5.3 Degreasing solvent**, such as acetone or petroleum ether.

**5.4 0,5 mm thick copper sheet**, phosphorus deoxidized, complying with ISO 197-1.

**5.5 Solder wire or pellets**, complying with ISO 9453, Sn63Pb37, Sn60Pb40, Sn96,5Ag3Cu0,5 or any other solder alloy as agreed between the user and the supplier.

## 6 Apparatus

Usual laboratory apparatus and, in particular, the following.

### 6.1 Solder bath

Heat solder pot so that solder bath stabilizes at (235 ± 5) °C in the case of Sn63Pb37 and Sn60Pb40 alloy, or at (255 ± 3) °C for Sn96,5Ag3Cu0,5, or at (35 ± 3) °C higher than the liquidus temperature of any other solder alloy as agreed between the user and the supplier. For solder alloys except Sn63Pb37 and Sn60Pb40, the temperature of the solder pot may be approximately 40 °C higher than the liquid temperature of each alloy.



**6.2 Humidity chamber**, conforming to the temperature and humidity requirements of IEC 60068-2-78, test Cab.



**6.3 Cupping device** (e.g. an Erichsen cupping machine or equivalent cupping device).

The device shall be fitted with a 27 mm diameter die and a 20 mm diameter steel ball (see Figure 1).

**6.4 Drying oven** (air circulating), suitable for use at (60 ± 2) °C.

**6.5 Low-power stereomicroscope**, capable of ×20 magnification, equipped with quartz-halogen illumination.

**6.6 Tongs or other suitable mechanical device**, to lift the test piece from the surface of the molten solder bath.

## 7 Preparation of test pieces

From a sheet of copper 0,5 mm thick (5.4), cut square test pieces 50 mm × 50 mm each.

Clamp each of the test pieces, in turn, centrally onto the 27 mm diameter die of the cupping device (6.3). Using the 20 mm diameter steel ball, make a 3 mm deep depression in the centre of each test piece by forcing the ball into the die (see Figure 1). One corner of the test piece may be bent up to facilitate handling with the tongs (6.6).