INTERNATIONAL STANDARD

ISO 9455-5

Second edition
2014-07-01

Soft soldering fluxes — Test methods —

Part 5:
Copper mirror test

Flux de brasage tendre — Méthodes d'essai —

Partie 5: Essai au miroir de cuivre

Reference number
ISO 9455-5:2014(E)

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

Published in Switzerland

Contents

Page

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.

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).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

The committee responsible for this document is ISO/TC 44, *Welding and allied processes*, Subcommittee SC 12, *Soldering materials*.

This second edition cancels and replaces the first edition (ISO 9455-5:1992), which has been technically revised.

Requests for official interpretations of any aspect of this International Standard 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.

ISO 9455 consists of the following parts, under the general title *Soft soldering fluxes — Test methods*:

- *Part 1: Determination of non-volatile matter, gravimetric method*
- *Part 2: Determination of non-volatile matter, ebulliometric method*
- *Part 3: Determination of acid value, potentiometric and visual titration methods*
- *Part 5: Copper mirror test*
- *Part 6: Determination and detection of halide (excluding fluoride) content*
- *Part 8: Determination of zinc content*
- *Part 9: Determination of ammonia content*
- *Part 10: Flux efficacy test, solder spread method*
- *Part 11: Solubility of flux residues*
- *Part 13: Determination of flux spattering*
- *Part 14: Assessment of tackiness of flux residues*
- *Part 15: Copper corrosion test*

- *Part 16: Flux efficacy tests, wetting balance method*
- *Part 17: Surface insulation resistance comb test and electrochemical migration test of flux residues*

Soft soldering fluxes — Test methods —

Part 5:
Copper mirror test

1 Scope

This part of ISO 9455 specifies a qualitative method for assessing the aggressiveness of a flux towards copper. The test is applicable to all fluxes of type 1 as defined in ISO 9454-1.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 9454-1, *Soft soldering fluxes — Classification and requirements — Part 1: Classification, labelling and packaging*

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*

3 Principle

For flux samples in the form of a solid or paste, and for flux-cored solder, a flux test solution containing 25 % (m/m) of solids is prepared. For liquid flux samples, the liquid is used full strength as the flux test solution. The flux test solution is then evaluated in terms of its attack on a copper film previously vacuum deposited onto a glass plate (copper mirror). A rosin reference solution, which should not cause removal of the copper film, is used as a control. The object of the test is to determine the flux reactivity due to the presence of free halide activators.

NOTE The presence of amines in the flux can cause misleading results in that the flux appears to pass the test, when in fact it has a highly reactive composition.

4 Reagents

Use only reagents of recognized analytical grade and only distilled, or deionized, water.

4.1 Acetone.

4.2 Propan-2-ol.

4.3 Degreasing agent, such as a suitable neutral organic solvent such as acetone or petroleum ether.

4.4 Rosin reference solution, 25 % (m/m), prepared by dissolving 25 g of W-W grade colophony in 75 g of propan-2-ol (see 4.2).

4.5 Ethylenediaminetetraacetic acid (EDTA), 0,1 % (m/m) solution.

5 Apparatus

Usual laboratory apparatus and, in particular, the following.

5.1 Temperature/humidity oven, capable of maintaining a temperature of 25 °C and a relative humidity of (50 ± 5) %.

5.2 Copper mirrors. Thoroughly clean a number of glass test plates, approximately 25 mm × 50 mm or bigger (e.g. 50 mm × 75 mm) in size, degrease them, if necessary, using the degreasing agent (see 4.3) and dry them.

Deposit copper, by vacuum deposition, onto one surface of the dry test plates to a thickness of approximately 50 nm. The transmittance of the plate to normal incident monochromatic light at a wavelength of 500 nm shall be between 5 % and 15 %.

Copper mirror test plates complying with these requirements are available commercially[1] and can be used instead.

Store the copper mirrors under dry nitrogen until use.

5.3 Soxhlet extraction apparatus.

6 Procedure

6.1 Preparation of the flux test solution

6.1.1 Liquid flux samples

Use liquid flux samples at full strength as the flux test solution.

6.1.2 Solid flux samples

6.1.2.1 Prepare by dissolution with propan-2-ol (see 4.2, but see also 6.1.2.2), a flux test solution containing 25 % by mass of the solid flux sample.

6.1.2.2 If it is found that the flux is not soluble in propan-2-ol, then use another suitable water miscible solvent and give details of this solvent in the test report [see Clause 8, item f)].

6.1.3 Flux-cored solder

6.1.3.1 Cut a length of the flux-cored solder with a mass of approximately 150 g and seal the ends by crimping. Wipe the surface clean with a cloth moistened with acetone (see 4.1). Place the sample in a beaker, add sufficient water to cover the sample, and boil for 5 min to 6 min. Remove the sample, rinse it with acetone (see 4.1), and allow to dry.

While protecting the solder surface from contamination, cut the sample into short lengths (maximum 19 mm) using a razor blade so as not to crimp the cut ends. Place the cut segments into the extraction tube of a clean Soxhlet extraction apparatus (see 5.3) and extract the flux with propan-2-ol (see 4.2, but see also 6.1.2.2) until the return condensate is clear.

---

[1] Copper mirror test plates suitable for this test method may be obtained from Evaporated Metal Films Corporation, Ithaca, New York, USA. This information is given for the convenience of users of this document and does not constitute an endorsement by ISO of the product named.