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Soft soldering fluxes — Test methods —

Part 14:

Assessment of tackiness of flux residues

Flux de brasage tendre — Méthodes d'essai —

Partie 14: Détermination du pouvoir collant des résidus de flux



Reference number
ISO 9455-14:1991(E)

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 voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 9455-14 was prepared by Technical Committee ISO/TC 44, *Welding and allied processes*, Sub-Committee SC 12, *Soldering and brazing materials*.

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 of halide content*
- *Part 8: Determination of zinc content*
- *Part 9: Determination of ammonia content*
- *Part 10: Flux efficacy tests, solder spread method*
- *Part 11: Solubility of flux residues*
- *Part 12: Steel tube corrosion test*

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- *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: Determination of surface insulation resistance of flux residues (Comb test)*

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Soft soldering fluxes — Test methods —

Part 14:

Assessment of tackiness of flux residues

1 Scope

This part of ISO 9455 specifies a qualitative method for the assessment of the tackiness of the residues of a soft soldering flux after a soldering process. The method is applicable to all fluxes, solder pastes and flux cored solder wires. The method is particularly appropriate for applications where flux residues are left in situ on electrical and electronic equipment.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO 9455. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of ISO 9455 are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 1634-1:1987, *Wrought copper and copper alloy plate, sheet and strip — Part 1: Technical conditions of delivery for plate, sheet and strip for general purposes*.

ISO 9453:1990, *Soft solder alloys — Chemical compositions and forms*.

3 Principle

The flux is melted on a copper sheet test piece in contact with a standard mass of solder. In the case of flux cored solders and solder pastes, a standard mass of the material is melted on the copper test piece. After the test piece has cooled to room temperature, the flux residues are tested for tackiness using chalk powder.

4 Reagents and materials

In the test use only reagents of recognized analytical quality and only distilled, or deionized, water.

4.1 Acid cleaning solution.

Add cautiously, with stirring, 75 ml of sulfuric acid (ρ 1,84 g/ml) to 210 ml of water and mix. Cool, add 15 ml of nitric acid (ρ 1,42 g/ml) and mix the solution thoroughly.

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

4.3 **Powdered chalk**.

4.4 **0,5 mm thick copper sheet**, complying with ISO 1634-1 grade Cu — ETP, condition HA.

4.5 **Acetone**.

4.6 **Solder wire, or pellets**, complying with ISO 9453, grade S-Sn60Pb40.

5 Apparatus

Usual laboratory apparatus and, in particular, the following.

5.1 **Solder bath**, either circular with diameter not less than 120 mm, or rectangular with dimensions not less than 100 mm × 75 mm, containing tin-lead solder having a liquidus less than 200 °C. The depth of the solder in the bath shall be not less than 40 mm. The bath shall be capable of being maintained at a temperature of (235 ± 5) °C.

5.2 Cupping device.

This shall be fitted with a 27 mm diameter die and a 20 mm diameter ball.

5.3 Drying oven, suitable for use at $(110 \pm 2) ^\circ\text{C}$.

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

5.5 Soft brush, of diameter approximately 7 mm.

6 Test pieces

From the sheet of half hard copper, approximately 0,5 mm thick (4.4), cut test pieces each 50 mm $\times$ 50 mm. Clamp each of the test pieces, in turn, centrally on to the 27 mm die of the cupping device (5.2).

Using the 20 mm diameter ball, make a depression in the centre of each test piece 3 mm deep, by forcing the ball into the die. One corner of the test piece may be bent up to facilitate handling with the tongs.

Immediately before the test, use the solvent (4.2) to degrease each test piece, and immerse the test pieces for 20 s in the acid cleaning solution (4.1).

Remove the test pieces from the cleaning solution, wash well under running water, rinse in acetone (4.5) and dry by air blowing at room temperature.

7 Procedure

7.1 Preparation of the test pieces

7.1.1 For solid, paste and liquid flux samples, weigh $1,00 \text{ g} \pm 0,05 \text{ g}$ of the solder wire or pellets (4.6), previously degreased in the solvent (4.2), and transfer it to the centre of the depression in one of the cleaned copper test pieces (clause 6).

NOTE 1 This may conveniently be done, if solder wire is used, by forming the wire into a tight spiral.

According to the form of the flux under test, continue with the preparation of the test piece by following the procedure given in either a) or b) as follows:

a) If the flux under the test is in solid or paste form — weigh between 0,035 g and 0,040 g of the solid or paste flux and add this to the solder in the depression of the test piece;

b) If the flux under test is in liquid form — add 0,30 ml of the flux to the solder in the depression of the test piece. Evaporate the solvent at $60 ^\circ\text{C}$ for 10 min in the drying oven (5.3).

7.1.2 For flux cored solder samples, degrease the surface of a suitable length of the cored solder sample, using a cloth dampened with the solvent (4.2). Weigh $1,00 \text{ g} \pm 0,05 \text{ g}$ of the degreased sample, form it into a small flat coil and place it in the centre of the depression in one of the cleaned copper test pieces (clause 6).

7.1.3 For solder paste samples, weigh $0,50 \text{ g} \pm 0,05 \text{ g}$ of the solder paste sample into the centre of the depression in one of the cleaned copper test pieces (clause 6).

7.2 Heating the test piece

Using the tongs (5.4) or other suitable means, carefully lower the prepared test piece from 7.1 on to the surface of the molten solder, maintained at $235 ^\circ\text{C} \pm 5 ^\circ\text{C}$ in the solder bath (5.1).

Allow the test piece to float on the solder bath until the solder melts and leave the test piece in this position for a further 5 s. Remove the test piece carefully from the bath and allow it to cool, in air, in a horizontal position for 30 min.

8 Examination of the test piece

Dust the surface of the flux residue on the test piece liberally with the powdered chalk (4.3).

Lightly brush the chalked surface with the soft brush (5.5).

9 Expression of results

If the chalk powder is easily removed by brushing, the flux is deemed to be "not tacky".

If the chalk powder cannot be removed by brushing, or can be removed only with difficulty, the flux is deemed to be "tacky".