



IPC-TM-650 TEST METHODS MANUAL

Number 2.4.47	
Subject Flux Residue Dryness	
Date 1/95	Revision
Originating Task Group Flux Specifications Task Group (5-24a)	

1.0 Scope This test method specifies a qualitative method for assessment of the tackiness of soft soldering flux residues. The method is applicable to fluxes of types L and M. The method is particularly appropriate for applications where flux residues are left in place on soldered electronic and electrical equipment.

2.0 Applicable Documents

ISO 1634 Wrought-Copper and Copper Alloy Plate; Sheet and Strip

ISO 9453 Soft Solder Alloys

ISO 9455 Parts 1 and 2 Soft Soldering Fluxes

3.0 Test Specimen A minimum of 0.035 grams by weight is required per test for fluxes in solid or paste form. For liquid fluxes, a volume sufficient to contain a minimum of 0.035 grams of non-volatile matter is required per test. For samples of flux cored solder, a minimum 1 gram is required per test and for solder paste, a minimum of 0.5 grams is required per test.

4.0 Apparatus and Reagents

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

4.2 Acid Cleaning Solution Add cautiously, with stirring, 75 ml of sulfuric acid (density 1.84 g/ml) to 210 ml of water and mix. Cool, add 15 ml of nitric acid (density 1.42 g/ml) and mix the solution thoroughly.

4.3 Degreasing solvent, such as 2-propanol, acetone, toluene or petroleum ether.

4.4 Powdered chalk.

4.5 0.5 mm thick copper sheet complying with ISO 1634: Part 1, grad Cu - ETP, condition HA.

4.6 Acetone

4.7 Solder wire, or pellets, complying with QQ-S-ALLOY XXX or ISO 9453 grade S-Sn60Pb40.

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

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

4.10 Drying oven, suitable for use at 110 +/-2°C.

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

4.12 Soft brush, of diameter approximately 7 mm.

4.13 Ordinary laboratory apparatus.

5.0 Procedure

5.1 Preparation of Copper Test Pieces

5.1.1 From the sheet of half hard copper, approximately 0.5 mm thick (4.5), cut test pieces each 50 mm X 50 mm.

5.1.2 Clamp each of the test pieces, in turn, centrally onto the 27 mm die of the cupping device (4.9). Using the 20 mm diameter ball, make a depression in the center 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.

5.1.3 Immediately before the test, use the solvent (4.3) to degrease each test piece, and immerse the test pieces for 20 seconds in the acid cleaning solution (4.2). Remove the test pieces from the cleaning solution, wash well under running water, rinse in acetone (4.6) and dry by air blowing at room temperature.

5.1.4 Test For solid, paste and liquid flux samples:

5.1.4.1 Weigh 1.00 +/-0.05g of the solder wire or pellets (4.7), previously degreased in the solvent (4.3), and transfer it

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to the center of the depression in one of the cleaned copper test pieces (5.1).

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

5.1.4.2 If the flux under test is in solid or paste form—weigh between 0.035g and 0.040g of the solid or paste flux and add this to the solder in the depression of the test piece.

5.1.4.3 If the flux under test is in liquid form—first determine its non-volatile matter content by the use of the method described in ISO 9455: Part 1 or Part 2. Then add the appropriate volume of the liquid flux, to contain between 0.035g and 0.040g of non-volatile matter, to the solder in the depression of the test piece. Evaporate the solvent at 60°C for 10 minutes in the drying oven (5.3).

Note: If the liquid flux has low non-volatile content, it may be necessary to add the flux in two increments, carrying out the evaporation procedure after each addition.

5.1.5 For flux cored solder samples. Degrease the surface of a suitable length of the cored solder sample, using a cloth dampened with the solvent (4.3). Weigh 1.00 +/-0.05g of the degreased sample, form it into a small flat coil and place it in the center of the depression in one of the cleaned copper test pieces (5.1).

5.1.6 For solder paste samples. Weigh 0.50 +/-0.05g of the solder paste sample into the center of the depression in one of the cleaned copper test pieces (5.1).

5.2 Heating the test piece.

5.2.1 Using the tongs (4.11), or other suitable means, carefully lower the prepared test piece from 7.1 onto the surface of the molten solder, maintained at 235 +/-5°C in the solder bath (4.8).

5.2.2 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 seconds. Remove the test piece carefully from the bath and allow it to cool, in air, in a horizontal position for 30 minutes.

5.3 Examination of the test piece. Dust the surface of the flux residue on the test piece liberally with the powdered chalk

(4.4). Lightly brush the chalked surface with the soft brush (4.12).

5.4 Evaluation 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."

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6.0 Notes

6.1 Safety Observe all appropriate precautions on MSDS for chemicals involved in this test method.