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Number	
2.3.34	
Subject	
Solids Content, Flux	
Date	Revision
06/04	**C**
Originating Task Group	
Flux Specifications Task Group (5-24a)	

IPC-TM-650
TEST METHODS MANUAL

1 Scope This test method is designed to determine the residual solids content of flux after evaporation of the volatile chemicals from within the flux; typically 15% by weight minimum.

2 Applicable Documents

IPC J-STD-004 Requirements for Soldering Fluxes

3 Test Specimen A minimum of 6 grams by weight per test of liquid flux or flux extracted from solder paste, solder preforms or flux-cored wire (see 6.1).

4 Apparatus and Reagents

4.1 A circulating air drying oven capable of maintaining 50 to 85 ± 5 °C [122 to 185 ± 9 °F].

4.2 Glass pipettes.

4.3 Three glass petri dishes, 30 ml capacity.

4.4 Silica gel desiccant, or equivalent, in a glass desiccator.

4.5 Analytical balance with a resolution of of 0.001 g.

4.6 Solder Pot.

4.7 Stirrer.

5 Procedures Carry out the following procedures in triplicate.

5.1 Preparation

5.1.1 Place an empty glass petri dish in the drying oven for 30 to 60 minutes or until dry, then cool in the desiccator to room temperature.

5.1.2 Weigh the dish to the nearest 0.001 gram.

5.2 Test

5.2.1 Liquid Flux

5.2.1.1 Pipette approximately 6 grams (see 6.1) by weight of test flux specimen into the petri dish and weigh to the nearest 0.001 gram.

5.2.1.2 Heat in the drying oven maintained between 50 (± 5 °C) and 85 °C [122 (± 9 °F) and 185 °F] (see 6.2) for one hour + 15 min - 0 min, then reweigh after allowing the sample to come to room temperature in the desiccator.

5.2.1.3 Repeat heating and drying procedure until the mass is decreased by less than 0.005 gram from the previous weighing.

5.2.1.4 Evaluation Calculate the percentage residual solids as follows:

$$\frac{100 - m_2}{m_1}$$

where:
m_2 = the mass of residual after drying, in grams
m_1 = the mass of original test flux specimen, in grams

Report the average of the three determinations as the percentage solids.

5.2.2 Solder Paste, Solder Preforms or Flux-Cored Wire

5.2.2.1 Weigh a clean dry Petri dish = m_0.

5.2.2.2 Weigh the as-received sample to be reflowed to the nearest 0.001 gram (in the clean dry Petri dish) = m_1.

5.2.2.3 Using a solder pot, reflow the sample, let it cool, and remove any residue from the outside of the dish.

5.2.2.4 Remove the metal from the dish. Rinse the metal with appropriate solvent allowing the solvent to run off into the petri dish. Dry and weigh the metal = m_2.

5.2.2.5 m_3 = weight of flux in original sample = m_1-m_0-m_2.

5.2.2.6 Add enough solvent to the reflowed flux to dissolve it and spread it evenly over the bottom of the dish. This may require some gentle heating and/or stirring. Rinse the stirrer into the dish with additional solvent.

5.2.2.7 Heat in the drying oven for one hour, then reweigh after allowing the sample to come to room temperature in the desiccator.

5.2.2.8 Repeat heating and drying procedure until the mass is decreased by less than 0.005 gram from the previous weighing = m_4.

5.2.2.9 The weight of the solid portion of the flux is $m_4 - m_0$.

Calculate the Solids Content (%) of the flux portion of the solder paste, solder perform, or flux cored solder:

$$\frac{m_4 - m_0}{m_3} \times 100$$

5.3 Reporting

5.3.1 Report the average of the three determinations as the percentage solids.

6 Notes

6.1 Sample Size Larger sample sizes of approximately 18 grams may be required to obtain accurate data on low solids (<15%) fluxes.

6.2 Many low-solids liquid fluxes may contain adipic acid which sublimates relatively quickly at 85 °C [185 °F]. It is recommended to validate that the drying method used does not sublimate flux acids, which can be verified by analyzing samples of the raw flux and the dried flux to ensure that the same ratio and amount of flux acids are still present in the dried samples.

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