



IPC-TM-650 TEST METHODS MANUAL

1.0 Scope This test method is designed to determine powder particle size distribution in creams by image analysis.

2.0 Applicable Documents None

3.0 Test Specimen

10 grams of solder paste

4.0 Equipment/Apparatus

Thinner

5.0 Procedure

5.1 Preparation

5.1.1 Stencil some solder cream onto a glass slide using a 5 or 6 mm diameter, 0.1 mm thick stencil.

5.1.2 Apply a little thinner to the solder paste and gently disperse the paste over an area about 20 mm diameter, using a glass rod. Cover with a 22 mm diameter cover glass and gently press to give a monolayer dispersion of powder particles under the cover glass.

It is important to get a good dispersion without a lot of bubbles or particle agglomerates. If the paste you are examining has a high metal content, remove some of the stencilled paste before dispersing it. The standard stencils are suitable for 85–86% metal paste.

5.1.3 Label the glass slide with the powder batch number.

5.2 Images for Analysis The next step is to put 10 or 15 images from each sample into an image directory.

5.2.1 Start up the image analyzer.

5.2.2 Set up the microscope illumination for X10 and select the X10 objective.

5.2.3 Put the slide on the microscope, focus, swing the binocular eyepiece to the left sending the light to the TV camera, and refocus on the screen.

5.2.4 Ensure that there are no agglomerations or badly out-

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of-focus particles and then capture the image.

5.2.5 Capture 10 images covering the slide in a systematic way without consciously selecting areas (other than avoiding agglomerations and areas of very low particle density).

5.2.6 Record the number of the slide and remove from the microscope.

5.2.7 Put the next slide on the microscope and repeat the process.

5.2.8 When all the samples have been recovered, swing the eyepiece back and switch off the microscope.

5.2.9 Comments

– Do not change the illumination between samples.

– Record a series of samples at the same magnification.

5.3 Image Analysis

5.3.1 When images from the required number of samples have been entered, select 'Multi Sample Size' on the menu (or 'One Sample Size' for a single sample). An image in red and blue will then come up on the screen.

5.3.2 Using the left and center buttons on the mouse, adjust the thresholds until the red areas correspond to the particles to be measured. Selecting the right hand button allows you to vary the line on the screen where the intensity plot is measured. Adjust the top threshold so that it is about halfway down the intensity minima. Press center and right buttons on the mouse simultaneously.

5.3.3 You should now see a green rectangle on a grey image. If there is no rectangle, press the left hand button until one appears.

5.3.4 A particle is measured if the top of the particle lies within the rectangle, so the size and position of the rectangle must be adjusted so that the sides are half a particle diameter from the sides of the screen, and the base of the rectangle a whole particle diameter from the bottom of the screen. The top of the rectangle should lie along the top of the screen. The

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Table 1

Type 1	+150µm _____	+75 µm _____	+20 µm _____	-20 µm _____
Type 2	+ 75 µm _____	+45 µm _____	+20 µm _____	-20 µm _____
Type 3	+ 45 µm _____	+25 µm _____	+20 µm _____	-20 µm _____
Type 4	+ 38 µm _____	+20 µm _____	-20 µm _____	
Type 5	+ 30 µm _____	+15 µm _____	-15 µm _____	
Type 6	+ 15 µm _____	+ 5 µm _____	- 5 µm _____	

middle button on the mouse swaps between 'moving' and 'growing' the rectangle. When the rectangle is set, press the right hand button on the mouse to proceed.

5.3.5 On the keyboard that now comes up on the screen, select the number of samples being processed.

5.3.6 On the next keyboard select the number of particles to be measured (200 for type 1-4 and 400 for type 5-6 is suggested).

5.3 Evaluation Express the masses of the powder above, within, and below the nominal size range as percentages of the mass of the original sample. Enter data in Table 1.