



# IPC-TM-650 TEST METHODS MANUAL

**1.0 Scope** This test specifies a standard procedure for determining the viscosity of solder paste in the range of 50,000 to 300,000 centipoise.

**2.0 Applicable Documents** None

**3.0 Test Specimen** Paste to be tested shall be stabilized at 25°C ± 1°C for a minimum of 24 hours prior to testing. The paste volume shall be sufficient to fill the viscometer receptacle to about 60% of its depth.

**4.0 Equipment/Apparatus** The equipment used shall be a spiral pump viscometer (Malcom, Brookfield Viscometer or Rheometer with Spiral Adaptor accessory, or equivalent). Set the instrument rotational speed for 10 rpm. Other equipment may be used provided the results can be empirically correlated as mutually agreed upon. Additional shear rates may be specified by the user or supplier.

## 5.0 Procedure

### 5.1 Preparation

**5.1.1** Open the container(s), remove any internal cover, scrape off paste adhering to the lids or internal cover(s) and the container wall(s) and add this to the paste in the container(s).

**5.1.2** Using a spatula, stir the paste gently for 1 to 2 minutes to homogenize it, taking care to avoid the introduction of air.

**5.1.3** Transfer sufficient paste to the viscometer receptacle to fill this to about 60% of its depth. Place the receptacle in the temperature controlled unit on the viscometer and allow it to stabilize at 25 ± 0.25°C for 15 minutes minimum and 15 minutes maximum.

Number <b>2.4.34.3</b>	
Subject <b>Solder Paste Viscosity—Spiral Pump Method (Applicable at Less Than 300,000 Centipoise)</b>	
Date <b>1/95</b>	Revision
Originating Task Group <b>Solder Paste Task Group (5-24b)</b>	

## 5.2 Test

**5.2.1** Immerse the instrument sensor into the sample in accordance with the equipment manufacturer’s instructions. The solder paste shall not cover the pump outlet.

**5.2.2** Turn on chart recorder and set instrument to run at one specific shear rate. Take reading when output has been stable for at least 1 minute.

**5.3 Evaluation** Record data in Table 1 “Test Report on Solder Paste.”

## 6.0 Notes

**6.1 Test Equipment Sources** The equipment sources described below represent those currently known to the industry. Users of this test method are urged to submit additional source names as they become available, so that this list can be kept as current as possible.

### 6.1.1 Spiral Pump Viscometer Equipment

Brookfield Engineering Laboratories, Inc.  
11 Commerce Boulevard  
Middleboro, MA 02346 USA  
(800) 628-8139

Malcom Instruments Corp.  
26226 Industrial Blvd.  
Hayward, CA 94545  
(510) 293-0580  
(510) 293-0584 - fax

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**Table 1 Test Report on Solder Paste**

Enter appropriate information in top portion of report and complete report by entering the test results or checkmarks in the appropriate spaces.

**Inspection Purpose:**

Qualification  
 Quality Conformance A  
 Quality Conformance B  
 Shelf-Life Extension  
 Performance

QPL I.D. Number: \_\_\_\_\_  
 Manufacturer's Identification: \_\_\_\_\_  
 Manufacturer's Batch Number: \_\_\_\_\_  
 Date of Manufacture: \_\_\_\_\_  
 Original Use-By Date: \_\_\_\_\_  
 Revised Use-By Date: \_\_\_\_\_

Date Inspection Completed: \_\_\_\_\_ Overall Results:  Pass  Fail  
 Inspection Performed by: \_\_\_\_\_ Witnessed by: \_\_\_\_\_

Inspections	User's Actual Requirement	Test Result	P/F (*)	Tested by & Date
Material				
Visual				
Metal Content				
Viscosity				
Solder Ball				
Slump				
Alloy				
Flux				
Powder Size				
% In Top Screen				
% In Next Screen				
% In Bottom Screen				
% In Receiver Bottom				
Max. Powder Size				
Powder Shape				
Tack				
Wetting				

\* P/F = PASS/FAIL; enter P if test results are within tolerance of actual requirement; otherwise, enter F