



Standard Practice for Determination of Fusion Temperature of Dry Electrostatic Heat-Fixing Toners¹

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1. Scope

1.1 This practice covers a procedure that is used to determine the fusion temperature of dry electrostatic heat-fixing toners using a micro hot stage.

1.2 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of whoever uses this standard to consult and establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.* See Section 7 for specific precautionary statements.

2. Referenced Documents

2.1 ASTM Standards:

D 2117 Test Method for Melting Point of Semicrystalline Polymers by the Hot Stage Microscopy Method²

F 335 Terminology Relating to Electrostatic Copying³

3. Terminology

3.1 Definitions of Terms Specific to This Standard:

3.1.1 *fusion point*—in a dry electrostatic heat fixing toner, the minimum temperature at which the solid material starts to exhibit a plastic flow.

4. Significance and Use

4.1 Dry electrostatic heat-fixing toners may be composed of polymer binders, black pigments, and other such additives that are necessary for the proper performance for the use intended, particularly in those copiers using heat-fusing techniques for image fixing. Toners characteristically do not have a sharp melting point but instead exhibit a broad temperature range of melting.

4.2 The user should be aware that the fusion point is one of several physical characteristics of certain heat-fixing toners. Similar fusion temperature results obtained through this practice on two different toners (between lots or from one manufacturer to another) should not be considered a guarantee of equal performance characteristics when subsequently utilized in a copier.

5. Apparatus

5.1 *Micro Hot Stage and Microscope*, controlled, of 40 to 50× power⁴ or suitable alternative.⁵

6. Materials

6.1 *Test Reagent Set*, containing substances with known micromelting points for checking the accuracy of the micro hot stage thermometer.⁶

7. Precautions

7.1 The user should be aware that not all heat-fixing toners exhibit a uniform plastic flow. Some toners will exhibit a rapid initial plastic flow while other toners may exhibit a slower, gradual plastic flow.

8. Sampling

8.1 The dry toner to be tested should be free of any clumps of toner. Should any clumps of toner be present that cannot be broken up under the gentle pressure of a spatula, reject the toner sample and choose another.

9. Calibration

9.1 The micro hot stage apparatus and the thermometer should be checked regularly with test reagents having known melting points. To ensure maximum accuracy, record at least three readings over the range of the thermometer. Make a calibration chart using a minimum of three readings and plot the actual reading obtained against the correct temperature found for the thermometer used.

9.2 The dial of the heat control (variable transformer) of the micro hot stage apparatus is generally graduated. Therefore, it is essential that the temperature gradient produced by the various settings of the control be predetermined to enable a specific heating to be maintained when making fusion point determinations. These temperature gradients should be periodically checked and any revisions with regard to the heat control dial and rate of heating should be recorded.

¹ Precision and Bias This practice is under the jurisdiction of ASTM Committee F-5 on Business Copy Products and is the direct responsibility of Subcommittee F05.04 on Electrostatic Copy Products.

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² *Annual Book of ASTM Standards*, Vol 08.01.

³ *Annual Book of ASTM Standards*, Vol 15.09.

⁴ A Kofler Micro Hot Stage, available from Arthur H. Thomas Co., Philadelphia, PA, has been found suitable for use. All equipment necessary for this test, including the microscope and the variable transformer, are included.

⁵ The Fisher-Johns instrument or the Mettler FP-2, operated in accordance with the manufacturer's instructions and used with a microscope of 40 to 50× power has been found suitable for use.

⁶ Also available from Arthur H. Thomas Co., Philadelphia, PA.