



Test Method for Volatile Content of Non-Heatset Web Offset Printing Inks¹

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1. Scope

1.1 This test method describes a procedure for determination of the weight percent volatile content of non-heatset web offset printing inks. Test specimens are heated at $110^{\circ} \pm 1^{\circ}\text{C}$ for 60 min.

1.2 This test method is also applicable to non-heatset web offset printing ink vehicles. It is not applicable to ultra-violet (UV) or electron beam cured materials, which must be cured by exposure to UV light or an electron beam as part of the test for volatile content.

NOTE 1—Vehicle is the liquid portion of the printing ink. Any substance that is dissolved in the liquid portion of the ink is a part of the vehicle.

1.3 This test method is based on Test Method D 2369, in which the allowable ranges are $\pm 0.1\text{g}$ for specimen weight and $\pm 5^{\circ}\text{C}$ for oven temperature. Interlaboratory studies have shown that specimen weight and oven temperature must both be more tightly controlled in order to improve the precision of test results for non-heatset web-offset inks. Such inks contain a wide range of high boiling hydrocarbons and often have a volatile content below 20 %.

1.4 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use. For a specific hazard statement see Note 5.*

2. Referenced Documents

2.1 ASTM Standards:

D 2369 Test Method for Volatile Content of Coatings²

D 362 Specification for Industrial Grade Toluene³

E 145 Specification for Gravity-Convection and Forced-Ventilation Ovens⁴

E 691 Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method⁴

2.2 Other Standards:

EPA Reference Method 24 - Determination of Volatile Matter Content, Density, Volume Solids, and Weight Solids of Surface Coatings⁵

3. Summary of Test Method

3.1 A specimen size of $0.300 \pm 0.001\text{ g}$ is weighed into an aluminum foil dish, dispersed in 3 mL of toluene, and heated in an oven at $110 \pm 1^{\circ}\text{C}$ for 60 min. The percent volatile is calculated from the loss in weight.

4. Significance and Use

4.1 This test method is the procedure of choice for determining volatile content of non-heatset web offset inks. This information is useful to the ink manufacturer and user and to environmental interests as part of the determination of the mass of volatile organic compounds emitted from the ink.

NOTE 2—Since these inks do not contain water or any materials currently classified by US EPA as negligibly photochemically reactive (exempt solvents), volatile organic compound content is the same as volatile content. The volatile organic compounds in these inks are high boiling hydrocarbon oils which are, according to US EPA guidelines, 95 % retained in the printed substrate or oxidized into the ink film. Therefore, the mass of volatile organic compound emitted from the ink would be calculated as only 5 % of the volatile organic compound content of the ink as derived from the results of this test method.

5. Apparatus

5.1 *Aluminum Foil Dishes*, 58 mm in diameter by 18 mm high with a smooth (planar) bottom surface. Precondition the dishes for 30 min. in an oven at $110 \pm 1^{\circ}\text{C}$ and store in a desiccator prior to use. Use tongs or rubber gloves or both, to handle the dishes.

5.2 *Desiccator*, equipped with a general purpose desiccant such as anhydrous calcium sulfate.

5.3 *Forced Draft Oven*, Type IIA or Type IIB as specified in Specification E 145.

NOTE 3—Be sure the shelves are level.

5.4 *Ink Knives or Taper Knives*, suitable for transferring the small specimen from the original sample container to the aluminum dish.

5.5 *Paper Clips*, bent for use as stirrers. Precondition the bent paper clips along with the aluminum foil dishes, as described in 5.1.

5.6 *Analytical Balance*, capable of weighing to 0.0001 g.

¹ This test method is under the jurisdiction of ASTM Committee D-1 on Paint and Related Coatings, Materials, and Applications and is the direct responsibility of Subcommittee D01.56 on Printing Inks.

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² Annual Book of ASTM Standards, Vol 06.01.

³ Annual Book of ASTM Standards, Vol 06.03.

⁴ Annual Book of ASTM Standards, Vol 14.02.