



Standard Test Method for Volatile Organic Compound (VOC₄₀) Content of Non-Heatset Paste Printing Ink Systems at 40°C¹

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1. Scope

1.1 This test method covers the determination of the volatile organic compound (VOC₄₀) content of non-heatset printing ink systems of the paste type using a baking cycle of 1 h at 40°C.

1.2 This test method is applicable to paste printing inks and vehicles that dry primarily by absorption, polymerization, or related means without the application of heat. Such systems do not contain appreciable quantities of low-boiling solvents that evaporate readily at ordinary room temperatures.

NOTE 1—The 40°C baking temperature in this test method is the same as that specified in Bay Area Method 30. The temperature of heating is 110°C in several related test methods, for example, D 2369, D 4713 and EPA Reference Method 24. VOC determinations are reviewed in ASTM Manual Series MNL 4.²

1.3 *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.*

2. Referenced Documents

2.1 ASTM Standards:

- D 1475 Test Methods for Density of Paint, Varnish, Lacquer and Related Products³
- D 2369 Test Methods for Volatile Content of Coatings³
- D 3792 Test Method for Water Content of Water-Reducible Paints by Direct Injection into a Gas Chromatograph³
- D 3960 Practice for Determining Volatile Organic Compound (VOC) Content of Paints and Related Coatings³
- D 4017 Test Method for Water in Paints and Paint Materials by Karl Fischer Method³
- D 4713 Test Methods for Nonvolatile Content of Heatset and Liquid Printing Ink Systems⁴
- E 1 Specification for ASTM Thermometers⁵

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 Brezinski, J. J., *Manual on Determination of Volatile Organic Compounds in Paints, Inks, and Related Coatings*, ASTM Manual Series MNL4, ASTM, 1989.

³ *Annual Book of ASTM Standards*, Vol 06.01.

⁴ *Annual Book of ASTM Standards*, Vol 06.02.

⁵ *Annual Book of ASTM Standards*, Vol 14.03.

E 145 Specification for Gravity-Convection and Forced-Ventilation Ovens⁶

E 691 Practice for Conducting an Interlaboratory Study to Determine the Precision of Test Methods⁶

2.2 Other Standards:

EPA Federal Reference Method 24—Determination of Volatile Matter Content, Water Content, Density, Volume Solids, and Weight Solids of Surface Coatings⁷

Method 30—Determination of Volatile Organic Compounds (VOC) in Solvent-Based Non-Heatset Inks⁸

3. Terminology

3.1 *Definitions*—Definitions pertaining to this test method are covered in Practice D 3960.

4. Summary of Test Method

4.1 The test material is spread in a weighing dish to a nominal thickness corresponding to about 115 g/m². The weight percent of total volatile compounds is determined after heating at 40°C for one h.

4.2 The typical paste ink does not contain water or exempt solvents; in such cases, the volatile organic content is the same as the total volatile content. If the test sample is based on an emulsion system or is suspected of containing more than 5 % water, the water content is determined by the Karl Fischer method or by gas chromatography.

4.3 The density of the test sample is measured, and the volatile organic content in weight percent at 40°C is converted to units of grams per litre or pounds per gallon. Alternatively, if the water content was found to be greater than 5 %, the volatile organic content is calculated in accordance with Note 3.

5. Significance and Use

5.1 VOC content data are required by various regulatory agencies. This test method determines the volatile organic content of non-heatset paste printing ink systems at 40°C in accordance with Bay Area Method 30. This temperature is considered more realistic in terms of end use than the 110°C

⁶ *Annual Book of ASTM Standards*, Vol 14.02.

⁷ Available from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.

⁸ Available from Bay Area Quality Measurement District (BAAQMD), 939 Ellis Street, San Francisco, CA 94109.