~~Designation:D6073–96 (Reapproved 2001)~~ Designation: D 6073 – 08

Standard Test Method for Relative Setting of Heatset Printing Inks by the ~~Sinvatrol~~Heatset Tester[1]

This standard is issued under the fixed designation D 6073; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

~~1.1This test method describes the procedure for determining the relative setting speed of heatset inks using a specific tester.~~ *

1.1 This test method describes the procedure for determining the relative setting speed of heatset inks using a specific tester consisting of a forced hot air oven and print delivery system.

1.2 This test method is applicable to printing inks intended to be dried by the application of heat and for which a suitable reference standard is available.

1.3 Although heatset inks are normally printed by the offset process, this test method specifies the direct letterpress mode because the higher ink film thicknesses obtained tend to amplify subtle differences in ink setting speed.

~~1.4This tester[2] reads temperature and belt speed in nonmetric terms; therefore, instrument settings in this test method are stated first in U.S. Customary Units (inch pound units of measurements). The values given in parentheses are for information only.~~

~~1.5~~

1.4 This tester reads temperature and belt speed in nonmetric terms; therefore, instrument settings in this test method are stated first in U.S. Customary Units (inch pound units of measurements). The values given in parentheses are for information only.

1.5 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

1.6 *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:* [2]

D 1316~~Test Method for Fineness of Grind of Printing Inks by the NPIRI Grindometer~~ Test Method for Fineness of Grind of Printing Inks By the NPIRI Grindometer

D 6846 Practice for Preparing Prints of Paste Printing Inks with a Printing Gage

3. Terminology

3.1 *Definitions of Terms Specific to This Standard:*

3.1.1 ~~*heatset printing ink*~~heatset printing ink, *n*—an ink typically containing aliphatic hydrocarbon solvents that evaporate at elevated temperatures.

4. Summary of Test Method

4.1 A printing gage is used to prepare a laboratory print containing both the test sample and a standard ink. The freshly prepared print is immediately subjected to forced hot air in the tester, which is initially set at 350°F (177°C) and a belt speed of 30 fpm (0.15 m/s).

4.2 The print is cooled, overlaid with a clean sheet of stock, passed through the printing apparatus, and examined for setoff.

4.3 The process is repeated at different belt speeds or temperatures until either the test sample or the standard exhibits setoff

---

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

~~Current edition approved Dec. 10, 1996. Published February 1997.~~

Current edition approved Feb. 15, 2008. Published April 2008. Originally approved in 1996. Last previous edition approved in 2001 as D 6073 - 96 (2001).

[2] ~~The sole source of supply of the tester, Sinvatrol known to the committee at this time is the Flint Ink Corp., 25111 Glendale, Detroit, MI 48239. If you are aware of alternative suppliers, please provide this information to ASTM Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee,[1] which you may attend.~~

[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

***A Summary of Changes section appears at the end of this standard.**

and the other does not, or it is established that both are the same. The sample is then reported to dry faster than, slower than, or equal to the standard.

5. Significance and Use

5.1 The setting speed of heatset printing inks is important because it influences the efficiency of the drying process. This test method provides a means for comparing the setting of a heatset ink directly against a standard at the same conditions of temperature and exposure time. While the method does not determine the setting speed of an ink on a production press, it is useful for specification acceptance between the supplier and the customer.

5.2 The setting speed of a printing ink depends on a number of variables such as the stock on which it is printed, the film thickness on the print, the temperature of the forced air, the rate of air flow, and the time that the print is subjected to heat. For these reasons, it is important to conduct the tests under conditions that are controlled and as realistic as practical.

6. Apparatus

6.1 *Tester,* equipped with a forced hot air oven and print delivery system. The air temperature can be adjusted between 100 and 600°F (38 and 315°C) and the speed of the print delivery unit between 0 and 100 fpm (0 and 0.5 m/s). The print delivery system allows the print to be exposed to hot air from the top and bottom at the same time.

6.2 *Laboratory Flatbed Printing Apparatus*.

6.3 *Printing Gage,*[3] conforming to Practice D 6846, consisting of a type-high block of steel 0.918 in. (23.3 mm) in height; the top surface is precision-machined to contain a single constant-depth path approximately 3 by 7½ in. (76 by 190 mm), which is inked by means of a drawdown blade. A milled depth of 0.4 mils (10 µm) is recommended for coated paper and other smooth substrates. Deeper plates may be necessary for rougher substrates. Typical path depths and corresponding ink film thicknesses are given in Table 1.

TABLE 1 Relationship Between Gage Depth and Ink Film Thickness

Machined Depth of Gage		Ink Film Thickness		
		On Gage[A]	On Substrate	
mils	µm	µm	Letterpress,[B] µm	Dry Offset,[C] µm
0.2[D]	5	4	2	1
0.3	7.5	6	3	1.5
0.4[D,E]	10	8	4	2
0.6[D]	15	12	6	3

[A] Presuming 80 % path fillage.
[B] Presuming 50 % ink transfer from gage to substrate.
[C] Presuming 50 % ink transfer both to blanket and to substrate.
[D] Available on the 3-path FPBAA Plate C. Each path is 1¼ by 4 in. (3.2 ca by 10 cm).
[E] Available on the single-path gage[4](described in 6.3).

6.4 *Drawdown Blade,*[3]4 in. (102 mm) in length, so as to span the width of the printing gage.

6.5 *Metal Surface*, to cool the print immediately after it has passed through the tester.

6.6 *Metal Block,*[3]type-high, of similar top dimensions as the printing gage.

7. Materials

7.1 *Standard Heat-set Ink*, as agreed upon between the supplier and the customer. The standard ink must be of the same color and transfer characteristics as the test ink. This ink should not be so old that changes in properties have occurred since its manufacture.

7.2 *Printing Substrate*, such as paper, paperboard or other as agreed upon between the supplier and customer, cut to 8½ by 11 in. (216 by 280 mm) or other size appropriate to the printing apparatus.

7.3 *Carrier*, consisting of a sheet of cardboard approximately 8½ by 11 in. (216 by 280 mm), with a hole cut in the center that is slightly larger than the size of the print produced by the laboratory printing apparatus.

7.4 *Setoff Sheet*, cut to the same size as the printing substrate (7.2). If the printing substrate is paper, film or foil, use the same material. If paperboard, use coated paper 5 to 6 mils (1.1 to 1.4 µm) in thickness.

7.5 *Wash-up Materials*, including an appropriate solvent and lint free rags or tissues.

[3] Annual Book of ASTM Standards, Vol 06.02.

[3] The sole source of supply of the apparatus known to the committee at this time is the Precision Gage and Tool Co., 375 Gargrave Rd., Dayton, OH 45449. If you are aware of alternative suppliers, please provide this information to ASTM International Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee,[1] which you may attend.