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Standard Test Method for Determination of Open Time of Oxidative Printing Inks and Overprint Varnishes by a Manual Method¹

This standard is issued under the fixed designation D7734/D7734M; 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

1.1 This test method covers a manual procedure for determining the stay open time of oxidative drying printing inks and overprint varnishes by a finger transfer method. Open is defined as a wet ink/varnish film.

1.2 The amount of time required to reach the endpoint is recorded in hours.

1.3 Typical inks and overprint varnishes that dry by oxidation are oil based sheetfed offset, letterpress, and screen inks.

1.4 The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system are not necessarily exact equivalents; therefore, to ensure conformance with the standard, each system shall be used independently of the other, and values from the two systems shall not be combined.

1.5 *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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.6 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Summary of Test Method

2.1 Inks and overprint varnishes are applied to a glass surface using a wet film applicator and checked at time intervals using a finger transfer method to determine the time that the ink/varnish are no longer open.

3. Significance and Use

3.1 When formulating printing inks and overprint varnishes that dry primarily by oxidation it is important to know the stay

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open time so that premature drying does not occur on the printing press rollers and other components.

3.2 The applied ink or OPV film used for testing is thicker than the film printed on the substrate and nominally represents the film on the printing press rollers.

4. Apparatus

4.1 *Clean Dry Uniform Glass Plate*, approximately 20 cm wide by 25 cm long [8 by 10 in.].

4.2 *Machined Wet Film Applicator*, with the appropriate clearance gap typically in a range of 12 to 75 μm [0.5 to 3.0 mils] which provides a wet film thickness of 6 to 35 μm [0.25 to 1.5 mils].

4.3 *Stop Watch or Timer*, with alarm.

4.4 *Ink Knife(s)*.

5. Reagents and Materials

5.1 *Clean up Solvent*.

5.2 *Clean up Rags*.

6. Preparation of Apparatus

6.1 Ensure that the wet film applicator is clean and free of nicks or other defects.

6.2 Ensure that the glass plate surface is clean, uniformly level and free of any dust, solvent or residue.

7. Conditioning

7.1 Nominal laboratory standard conditions of $23 \pm 2^\circ\text{C}$ [$73 \pm 3.5^\circ\text{F}$] temperature and $50 \pm 5\%$ relative humidity level are recommended for this test. Deviations from these conditions will affect results.

7.2 Glass plate should be located free from drafts or excessive air movement.

8. Procedure

8.1 Select the appropriate clearance gap that will provide a wet film thickness in the range of 12 to 75 μm [0.5 to 3.0 mils] or as agreed upon by seller and purchaser.

8.2 Place the applicator on the glass and apply approximately an 8 cm [3 in.] wide sample of the ink or overprint

varnish in front of gap in the pulling direction. The amount of ink needs to be sufficient to produce a wet film about 15 to 20 cm [6 to 8 in.] long.

8.3 Grasp the sides of the applicator with the fingers and draw down at a uniform speed (approximately 25 mm/s) with sufficient pressure to maintain direct surface contact of the applicator with the glass plate.

8.4 Clean applicator immediately with cleaning solvent and rags.

8.5 Set the timer for one hour.

NOTE 1—One hour time intervals are the maximum suggested test cycle time for most printing inks and overprint varnishes.

NOTE 2—Optional shorter cycle times of 15 to 30 minutes may be more applicable for some fast drying inks or overprint varnishes.

NOTE 3—It is important to have a record of temperature and relative humidity as these parameters can have a direct affect on the test results.

8.6 At the end of each time interval, check the surface condition of the film surface by first touching a fingertip to the film and then to an adjacent clean portion of the glass next to the ink or overprint drawdown. Use sufficient finger pressure to ensure transfer of the ink or overprint varnish film to the fingertip. Do not use excessive pressure such that it would break through a film that has a dried surface (but is wet underneath). Also do not twist the finger while checking the test specimens.

NOTE 4—Some test sample film surfaces may exhibit a wet colorless liquid referred to as “sweating.” This phenomena should be noted in the final report. Sweating may occur during the final film surface drying stage

with the use of higher levels of certain types of anti-oxidant compounds.

8.7 Repeat step 8.6 every hour (or other time interval as indicated in Note 2) as long as the ink or overprint varnish film transfers to the finger tip and then to the clean glass plate area. Always use a new area on the test film surface and glass surface for each finger test.

8.8 The ink or overprint varnish film is considered no longer open when there is no transfer of ink or varnish to the fingertip.

NOTE 5—When the endpoint is approaching, the film may be tacky yet not transfer to the finger. If this occurs, the applied film is no longer considered open.

9. Report

9.1 Open time is recorded as the number of hours elapsed between the initial wet film application and when the ink/varnish no longer transfers to the finger.

9.2 Record the laboratory test temperature and relative humidity percentage.

9.3 Record occurrence of sweating if observed.

10. Precision and Bias

10.1 *Precision*—A round robin to supply reproducibility data is forthcoming.

10.2 *Bias*—Bias has not been determined at this time.

11. Keywords

11.1 open time; overprint varnishes; oxidation; printing inks

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