



Standard Test Method for Drying Time of Oxidative-Drying Printing Inks by Squalene Resistance¹

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1. Scope

1.1 This test method covers the procedure for determining the drying time of oxidative-drying printing inks (also referred to as “sheetfed inks”) by squalene resistance of printed ink films.

1.2 This test method is applicable to all paste inks that dry primarily by oxidation regardless of the substrate on which they are printed. With appropriate changes in the test fluid, it may also be used with paste inks that dry by other mechanisms, such as heatset or ultraviolet light.

1.3 This test method utilizes a modified rub tester and is intended to serve as a “referee” procedure when laboratories, using less rigorous test procedures (see Appendix X1), cannot agree on their results.

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.*

2. Referenced Documents

2.1 ASTM Standards:

D 4332 Practice for Conditioning Containers, Packages, or Packaging Components for Testing²

D 5264 Test Method for Abrasion Resistance of Printed Materials by the Sutherland Rub Tester²

3. Terminology

3.1 Definition of Terms Specific to This Test Method:

3.1.1 *squalene oil*—an organic liquid ($C_{30}H_{50}$ unsaturated aliphatic hydrocarbon) that imitates the action of skin oil.

3.1.2 *Discussion*—Squalene dissolves vehicle components in a typical oxidative-drying ink system but not when fully polymerized.

3.1.3 *blanket*—a composite structure, normally a rubber-like layer supported by one or more fabric or foam layers, or both.

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 15.09.

4. Summary of Test Method

4.1 The test print is affixed to the base of the rub tester. The removable one-half pound weight of the instrument is fitted with a piece of rubber blanket and covered with an absorbent towel to which a small amount of squalene oil has been added. The weighted, oil-impregnated towel is allowed to rub back and forth over the test print for a prescribed number of cycles.

4.2 The receptor towel is examined for evidence of ink transfer from the print. Results may be related qualitatively to an agreed upon standard, or, the intensity of the stain can be measured quantitatively with a colorimeter, spectrophotometer, or other reflectance type device.

5. Significance and Use

5.1 Inadequate setting or drying of sheetfed inks, or both, can cause blocking of stacked prints with subsequent loss of product. “Setting” of an ink refers to the rapid rise in viscosity of the printed ink film, sometimes accompanied by surface drying, that prevents transference of the undried ink film to adjacent surfaces under light pressure. “Setting” is a property of the ink-substrate combination. Inadequate drying may be due to several factors, but the primary causes are: (1) omission of metallic driers from the ink, improper ink formulation (2) unusual ink-substrate interactions, and (3) use of a fountain solution that is too acidic. If the test prints are made on a standard laboratory proof press, where there is no application of fountain solution, then only the first three possible causes can be evaluated. If the prints have been made on a commercial production printing press or some other acceptable means of introducing the fountain solution into the ink agreed upon, then the effect of fountain solution can be determined. It will often be necessary to run several tests to isolate the specific cause of a drying problem.

5.2 This test method is suitable for most combinations of oxidative drying inks and substrates. Because this test method relies on a visual assessment of the extent of drying, very light colors and clear varnishes may present difficulties in quantifying the extent of drying. In such cases, the supplier and the customer should agree upon an alternative method of assessing the drying properties of the ink.

6. Apparatus

6.1 *Rub Tester*, conforming to Test Method D 5264 but