



Designation: D6487 – 10 (Reapproved 2019)

Standard Practice for Preparing Prints of Paste Printing Inks Using a Hand Operated Laboratory Flat-Bed Press¹

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1. Scope

1.1 This practice covers the procedure for preparing prints of paste inks using a hand operated flat-bed laboratory proof press. The initial method was developed by the National Printing Ink Research Institute.²

1.2 This practice is applicable to the preparation of single-color solid-area prints by the dry offset process (also known as Letterset) on a flat substrate such as paper or metal. It can readily be adapted to print by direct letterpress.³

NOTE 1—The proofing press described in this practice can also be used with printing gages in accordance with Practice D6846.

1.3 This practice is applicable primarily to lithographic and letterpress inks that dry by oxidation or penetration. With the addition of appropriate drying or curing equipment, it is also applicable to other systems such as heat-set or energy-curable.

1.4 The instructions in this practice are intended to minimize the within-print and among-operator variability inherent in hand operations.

1.5 This practice does not measure the actual film thickness on the print, but evaluates film thickness equivalence by visual or instrumental comparisons of reflection density.

1.6 The values stated in SI units are to be regarded as the standard. The values given in parentheses are for information only.

1.7 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the users of this standard to establish appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use.* Specific precautions are given in Section 7.

¹ This practice 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.

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² “The NPIRI Standard Procedure for Preparing Little Joe Prints,” *American Ink Maker*, March 1994, pp. 42-50.

³ The apparatus used to develop this method was the Little Joe Offset Color Proofing Press.

1.8 *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. Referenced Documents

2.1 ASTM Standards:⁴

D6073 Test Method for Relative Setting of Heatset Printing Inks

D6846 Practice for Preparing Prints of Paste Printing Inks with a Printing Gage

D7305 Test Method for Reflection Density of Printed Matter

2.2 ANSI Standards:⁵

PH 2.30 Viewing Conditions for Graphic Arts and Photography—Color Prints, Transparencies and Photomechanical Reproductions

CGATS.5 Graphic Technology—Spectral Measurements and Colorimetric Computation for Graphics Arts Images

3. Summary of Practice

3.1 Prints are prepared by metering the test ink onto a brayer, rolled out evenly, on the distribution plate according to a specified pattern, and then transferred to the printing plate. The substrate is clipped onto the impression plate, and the blanket cylinder is rolled over the inked plate six times followed by once over the substrate.

3.2 After the print is dry to the touch, it is evaluated versus the target reflection density instrumentally or by visual comparison with a standard reference print. Subsequent prints can be made if the target reflection density has not been achieved or if a visual assessment indicates that either more or less ink is needed.

⁴ 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.

⁵ Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, http://www.ansi.org.

4. Significance and Use

4.1 Laboratory proofing of ink is necessary to establish a reproducible prediction of print appearance and performance properties, most of which are highly sensitive to ink film thickness. The apparatus described in this practice has found wide use for routine control proofing because it provides an economical method for producing reasonably large prints at film thicknesses comparable to those obtained on production presses.

4.2 This practice does not duplicate the dynamics of a high speed press, nevertheless, it is useful for quality control and for specification acceptance between the producer and the user where there is an agreed upon specification for reflection density or standard reference print.

5. Apparatus

5.1 *Laboratory Flat-Bed Proof Press*³, having a press bed approximately 914 mm (36 in.) long and 260 mm (10¼ in.) wide, and a blanket⁶ (impression) cylinder having a circumference of approximately 370 mm (14½ in.) such that the cylinder can make two revolutions down the length of the bed. Integral components include a distribution plate, printing plate, inking track guides, and impression plate (see Fig. A1.1). The standard printing plate is 100 by 152 mm (4 by 6 in.).

5.2 *Ink Pipette*, or balance accurate to 0.001 g ink.

5.3 *Torque Screw Driver*.

5.4 *Ink Knives*.

5.5 *Brayer*, with a 63.5-mm (2½-in.) diameter and 152-mm (6-in.) length.

5.6 *Standard Daylight*, preferably a D 50 light source conforming to ANSI Standard PH 2.30.

5.7 *Reflection Densitometer (optional)*, conforming to Test Method D7305.

NOTE 2—The filter systems in typical densitometers are suitable only for use with black, white, and the three process colors (yellow, magenta and cyan).

5.8 *Spectrophotometer (optional)*, calibrated according to manufacturer's instructions and used according to CGATS.5.

6. Materials

6.1 *Ink Sample*.

6.2 *Reference Print (optional)*.

6.3 *Printing Substrate* cut to approximately 140 by 210 mm (5½ by 8½ in.).

6.4 *Solvent*, appropriate to ink system.

6.5 *Lint-free Rags or Tissue*.

6.6 *Shim Stock*, metal or plastic, the same size as the printing plate and 0.5, 1, 2, 5 or 10 mils in thickness.

⁶ For printing ultra violet (UV) systems, use a special blanket and brayer formulated for the purpose.

7. Hazards

7.1 **Warning**—Since solvents may be hazardous to the skin and eyes, wear rubber gloves and safety glasses during cleanup to avoid solvent contact with skin and eyes. See supplier's Safety Data Sheets for further information on each solvent used.

7.2 *Equipment Cautions*—Avoid any operation that will scratch the metal distribution and printing plates or damage the rubber blanket on the impression cylinder.

8. Flatbed Press Set Up

8.1 Prepare the proof press as described in Annex A1 as seen in Fig. A1.1.

9. Procedure for Dry Offset Printing (Letterset)

9.1 Inspect and ensure that the printing plate, blanket and print roll out area are clean and free from lint.

9.2 Place guide tracks against printing plate and place a 140 by 210-mm (5½ by 8½ in.) piece of test substrate on the impression plate.

9.3 Determine the approximate amount of ink that will give the proper density. If uncoated paper, start with 0.6 mL or 0.6 g of ink. For coated paper, start with 0.4 mL or 0.4 g of ink.

9.4 Using an ink knife or a pipette, apply the ink to the brayer evenly across the roller.

9.5 Roll the ink on the distribution plate with the brayer until a uniform ink film is created and the entire distribution plate has been used.

9.6 Once a uniform film exists, roll the brayer from corner to corner of the ink distribution plate to make a single "X" pattern. Then move the brayer from top to bottom and bottom to top without lifting (2 passes) along the middle of the distribution plate. Turn brayer 180° (feet to point in opposite direction) and repeat "X" pattern and top to bottom and bottom to top motion.

9.7 Apply ink to printing plate with six passes of brayer using a smooth motion (one pass is motion in one direction only, left to right or right to left). Do not lift brayer between passes. Pressure applied will depend on the ink rheology but last pass (dressing pass) should be less than the pressure for the previous five passes. Push guide tracks away from printing plate.

9.8 Repeat 9.6 and 9.7 to ink the brayer and again apply ink to the printing plate. Push guide tracks away from printing plate.

9.9 Apply ink to the blanket by engaging cylinder, and pass in forward motion over printing plate stopping before the impression plate. Disengage cylinder and return.

9.10 Repeat 9.9 (apply ink to the blanket) for six blanket passes over the printing plate (blanket is inked in forward motion only).

9.11 Repeat 9.6 (inking the brayer), 9.7 (inking the printing plate), and 9.8.