



Standard Practice for Preparing Prints of Paste Printing Inks With an Offset Color Proofing Press¹

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1. Scope

1.1 This practice covers the procedure for preparing laboratory prints of paste inks utilizing an offset color Proofing Press. The initial method was developed by the National Printing Ink Research Institute².

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

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 optical density.

1.6 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 and health practices and determine the applicability of regulatory limitations prior to use.* Specific precautions are given in Section 7.

2. Referenced Documents

2.1 ASTM Standards:

D 6073 Test Method for Relative Setting of Headset Inks by

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

the Sinvatrol Tester³

2.2 *ANSI Standards*⁴:

PH 2.17 Geometric Conditions for Reflection Density

PH 2.18 Spectral Conditions for the Measurement of Optical Density

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

CGATS.4 Graphic Technology—Graphic Arts Reflection Densitometry Measurements—Terms, Equations, Image Elements and Procedures

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

3. Summary of Practice

3.1 The equipment is set up as described in Annex A1. In order to make a print, the test ink is metered onto a brayer, rolled out evenly on the distribution plate according to a specified pattern, and then transferred to the printing plate. The appropriate stock is clipped onto the impression plate, and the blanket cylinder is rolled over the inked plate six times followed by once over the stock.

3.2 After the print is set, it is checked against the target optical density instrumentally or by visual comparison with a standard print. Subsequent prints are made until the target optical density has been achieved.

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.

³ *Annual Book of ASTM Standards*, Vol 06.02.

⁴ Available from American National Standards Institute, 13th Floor, 11 W. 42nd Street, New York, NY 10036 or Committee on Graphic Arts Technical Standards, 1899 Preston White Drive, Reston, VA 20191-4367.

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.

5. Apparatus

5.1 *Offset Color Proof Press*⁵, having a press bed approximately 914 mm (36 in.) long and 260 mm (10 1/4 in.) wide, and a blanket⁶ (impression) cylinder having a circumference of approximately 370 mm (14 1/2 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. 1). The standard printing plate is 100 by 152 mm (4 by 6 in.).

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

5.3 *Torque Screw Driver*.

5.4 *Ink Knives*.

5.5 *Brayer*^{5,6}, with a 63.5-mm (2 1/2-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 ANSI Standard PH 2.17, having a set of Status T filters conforming to ANSI Standard 2.18, and used according to CGATS.4.

NOTE 1—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), hand-held, calibrated according to manufacturer's instructions and used according to CGATS.5.

6. Materials

6.1 *Ink Sample*.

6.2 Specification for the target optical density; alternatively, a reference print to be matched.

6.3 *Printing Substrate* such as paper or paperboard cut to approximately 140 by 210 mm (5 1/2 by 8 1/2 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.

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. In case of contact, wash skin with water; flush eyes for 15 min with water and call a physician. See supplier's Material 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. Procedure for Dry Offset Printing

8.1 Prepare the Offset Proofing Press as described in Annex A1.

8.2 Clean press with appropriate solvent and lint-free rag or tissue. Remove lint from blanket and printing plate using a camel hair brush.

8.3 Place guide tracks against printing plate and place a 140 by 210-mm (5 1/2 by 8 1/2-in.) piece of test stock on the impression plate.

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

8.5 Using an ink knife or a pipet, apply the ink to the brayer evenly across the roller.

8.6 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.

8.7 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.

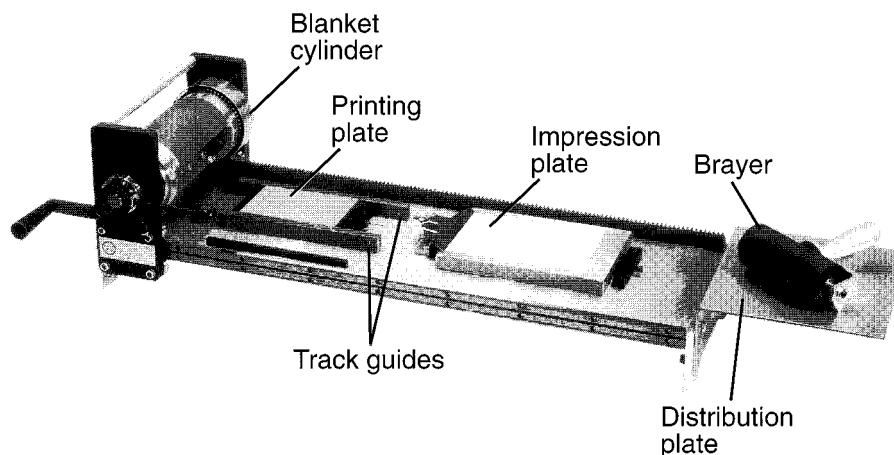


FIG. 1 Offset Printing Press

⁵ The apparatus used to develop this method was the Little Joe Offset Color Proofing Press.

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

8.8 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.

8.9 Repeat 8.7 and 8.8 to ink the brayer and again apply ink to the printing plate. Push guide tracks away from printing plate.

8.10 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.

8.11 Repeat 8.10 (apply ink to the blanket) for six blanket passes over the printing plate (Blanket is inked in forward motion only).

8.12 Repeat 8.7 (inking the brayer), 8.8 (inking the printing plate), and 8.9.

8.13 Prepare first print by engaging the blanket cylinder and rolling it over the printing plate and the paper on the impression plate in a rapid continuous motion.

8.14 Discard this print.

8.15 Repeat 8.7 (inking the brayer), 8.8 (inking the plate), 8.9, and 8.13 (making the print), and keep this print.

8.16 Examine the print from 8.15, preferably under a standard light source. If the operator believes the target density has been reached, prepare three more prints following the directions in 8.15. If the density is wrong, clean the press and start this procedure at 8.3 with a different amount of ink.

8.17 Once four acceptable prints have been made, clean the press with an appropriate solvent and lint-free rags or tissues.

8.18 For inks that dry by penetration or oxidation, lay the “good” prints out singly on a bench top or clip to a line. Wait

an appropriate amount of time prior to making test measurements, for example, 15 to 30 min for initial densitometric or spectrophotometric evaluations, 72 h for chemical resistance tests.

NOTE 2—For heat-set inks, apply heat or run through the Sinvatrol in accordance with Test Method D 6073. Energy-curable inks should be run through a UV lamp or other appropriate apparatus.

NOTE 3—For letterpress printing, follow the procedure for dry offset printing with the following exceptions: In 8.3, tape or otherwise mount the stock on the blanket cylinder, not on the impression plate. Skip 8.10-8.12. In 8.13, roll the blanket cylinder containing the stock over the inked printing plate and then stop.

9. Instrumental Verification of Optical Density

9.1 If the print is black, white, or a process color, use a densitometer with the appropriate filter and black backing. Otherwise, use a hand-held spectrophotometer. After the print has set sufficiently (15 to 30 min), make five measurements, one in each corner 25 mm (1 in.) from each edge and one in the center, and compute the mean. A transparent template with five holes can be constructed for this purpose. Compute grand mean of mean reading per print to arrive at mean reading per test.

9.2 A small decrease in optical density may occur between the initial measurements taken after prints were made and those taken 24 h later. This density decrease should be accounted for so that the final dry average density matches the target optical density.

9.3 When comparing results between laboratories, densitometers must be calibrated to the same reference standard.

10. Keywords

10.1 Offset Proof Press; paste printing inks; printing inks; proofing of inks

ANNEX

(Mandatory Information)

A1. SETTING UP A PROOF PRESS

NOTE A1.1—For printing UV inks, see Footnote 6.

A1.1 Tighten blanket to 150 mm/litres (6-in.-pounds) using a torque screw driver.

A1.2 Use the standard 100 by 150-mm (4 by 6-in.) printing plate. Mark the bottom of the plate “Leading Edge” and “Trailing Edge” and position it in this manner for every test. Mark outline of plate on bed to maintain plate position.

A1.3 Mark each guide track “Far” or “Near” and mark their positions on the bed to maintain position.

A1.4 A smooth noncompressible shim should be placed on top of the impression plate to provide a smooth surface for printing. This may necessitate removal of one of the metal shims under the impression plate.

A1.5 Adjust height and level of printing and impression

plates to produce uniform print for a Proof Press in the following manner:

A1.5.1 Hand tighten screw on printing plate and position guide tracks against plate.

A1.5.2 Clean all surfaces with appropriate solvent and lint-free rags or tissues.

A1.5.3 Apply 0.6 mL or 0.6 g of ink to the brayer uniformly directly from the pipet or with an ink knife.

A1.5.4 Roll out the ink on the ink distribution plate until a uniform film is obtained. Minimize time to prevent excessive drying.

A1.5.5 To prepare brayer for application of ink to the printing plate, roll brayer diagonally from corner to corner of the ink distribution plate to make a single “X” pattern. Then move brayer from top to bottom and bottom to top without lifting (2 passes) along middle of the ink distribution plate. Turn the brayer 180° (feet point in opposite direction) and roll

brayer diagonally from corner to corner of the ink distribution plate to make a single “X” pattern. Then move brayer from top to bottom and bottom to top without lifting (2 passes) along middle of the ink distribution plate.

A1.5.6 Apply ink to printing plate with 6 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 the last pass (dressing pass) should be less than the pressure for the previous 5 passes. Push guide tracks away from printing plate.

A1.5.7 Disengage blanket cylinder by turning handle on top of carriage counter clockwise to the stop position.

A1.5.8 Roll blanket cylinder to a position located about 12 mm ($\frac{1}{2}$ in.) past leading edge of printing plate. Engage blanket cylinder by turning handle on top of carriage clockwise to stop position.

A1.5.9 Maintain blanket in this position on printing plate for 1 s to produce an ink stripe on blanket and an ink free stripe on the printing plate.

A1.5.10 Disengage blanket cylinder and roll ahead to position 12 mm ($\frac{1}{2}$ in.) before trailing edge of printing plate. Engage cylinder and make a stripe as in A1.5.8 and A1.5.9.

A1.5.11 Measure the width of each stripe on the far and near side of the printing plate (a total of four measurements). Proper press set up requires that both stripes have a constant width of 8 mm ($\frac{5}{16}$ in.).

A1.5.12 If the stripes are not consistent, add shims under the printing plate. After each adjustment, clean the printing plate and blanket and reapply ink to the plate as described in A1.5.4-A1.5.6. If too much time has elapsed, allowing the ink to dry, the ink distribution plate must be cleaned and fresh ink applied following A1.5.2-A1.5.6.

NOTE A1.2—Shims should be metal or plastic. Do not use paper because it is compressible.

A1.5.13 Clean the press with appropriate solvent and lint-free gars or tissues.

A1.5.14 Place stock to be proofed 108 by 279 mm (approximately $4\frac{1}{4}$ by 11 in.) beneath the paper clamp and on top of shim positioned on impression plate.

A1.5.15 Apply ink to printing plate following A1.5.2-A1.5.6.

A1.5.16 Engage blanket cylinder and roll over entire printing plate stopping before reaching impression plate. Disengage cylinder. Bring cylinder over impression plate and produce two stripes on the paper in the same manner as used to make the stripes on the printing plate in A1.5.8-A1.5.10.

A1.5.17 As in A1.5.12, add shims under the impression plate, if necessary, to obtain two stripes with a constant width of 8 mm ($\frac{5}{16}$ in.).

A1.6 Adjusting height and level of printing and impression plates to produce uniform print for a Proof Press.

A1.6.1 Follow A1.5.1-A1.5.17 to produce stripes with the following provisions to allow for the mechanical differences:

A1.6.1.1 Put the impression handle in the 3 o'clock position.

A1.6.1.2 Install the set-up bracket on the print head frame facing the operator.

A1.6.1.3 On the set-up bracket, turn the set screw down until the impression handle is locked in the 3 o'clock position.

A1.6.1.4 On the hexagonal metal bracket under the impression handle, turn the set screw down so that the impression handle can be lowered to the 4 o'clock position.

A1.6.1.5 Follow the instructions in A1.5 with one exception. The stripes will be made by lifting the impression handle up to the 3 o'clock position.

A1.6.1.6 After the printing and impression plate height is set, put the impression handle in the 3 o'clock position and turn the bottom set screw up until the impression handle is locked in the 3 o'clock position, and

A1.6.1.7 Remove the set-up bracket.

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