SUTHERLAND INK RUB TESTER

Illustrated is the Sutherland Ink Rub Tester showing two-pound and four-pound weights to which test specimens are attached, the scoring device, and an optional heated weight. The receptacle is the same voltage as the instrument. 110 volts single phase is standard. 220 volts optional at extra cost.

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Procedure for Operation of Sutherland Ink Rub Tester

Description

The tester is a motor-driven instrument for moving a weighted test strip over a printed specimen through an arc. The Sutherland Ink Rub Tester, the industry standard for decades, has recently undergone some significant changes to enhance its utility and reliability. Combined with a new ASTM (American Society for Testing and Materials) recommended practice for its use, the Tester is in an excellent position to enjoy even more widespread use in the coming years. The result of this work is an affordable abrasion testing instrument that retains all the features that made it an industry standard plus improvements that ensure it will remain the industry standard. The cover shows the new tester.

The stroke of the tester has been shortened, which increases the precision and more closely simulates abrasion damage found in the field. Research and other published work in the print-abrasion-testing arena have shown that quick strokes simulate some types of rub damage (most notably shipping damage). One of the biggest problems with the use of the Sutherland has been the lack of a well-publicized test procedure for its use. While a procedure is available with the instrument, there was no nationally available method that could be readily referenced. This has now been corrected with the introduction by ASTM of ASTM D-5264, "Standard Practice for Abrasion Resistance of Printed Materials by the Sutherland Ink Rub Tester" (copies available from ASTM, 1916 Race Street, Philadelphia, PA 19103-1187). This method spells out the proper procedure for using the Sutherland Tester. Included in this method is the recommendation to use standard "receptors" of known abrasiveness when conducting a test.

The Sutherland motor now has two speeds; the first speed (42 cycles per minute) is the same as the older models, while the second speed (85 cycles per minute) is faster. This allows increasing the severity of the test without increasing the number of rubs. These new improvements will reduce the long test times needed for certain types of substrates (plastics, UV varnishes, printed films, etc.).

The Sutherland was also modified to incorporate a digital counter with a fiber optic sensor to ensure the accuracy of the number of rubs for a given test. Simply enter the number of rubs desired and the instrument will stop automatically at exactly the correct number of strokes.

A single mounting pad for the test strip is now cut to fit the weight. It was found by using a 2-inch (5cm) by 4-inch (10cm) pad on the bottom of the weight that precision of the test is increased. Two-pound and 4-pound weights and scoring fixture are included.

A supply of 80×80-count bleached muslin cloth has been found useful in testing wet smear, wet rub, and wet bleed.

The Sutherland Ink Rub Tester is designed to evaluate the scuffing or rubbing resistance of the printed or coated surface of paper, paperboard, film, etc. The test results are reproducible.

The following tests may be made with the instrument:

A. Dry Rub
B. Wet Rub
C. Wet Bleed or Transfer
D. Wet Smear
E. Functional Rub

Test Specimen

The test requires two pieces of stock, the printed test specimen and a test receptor, which is usually unprinted. Cut a test specimen, approximately six by three inches, representing average ink lay and coverage. When the printed area permits, the six-inch direction should be cut across the grain of the sheet, but must not cross pressed or cut scores.

Prepare test strips of unprinted material from the same shipment of stock used in printing the test samples. Cleanly cut 2×7-inch strips for the four-pound weight are prepared by placing the strip face down against the end pin of scoring device and scoring at the white dot positions to facilitate bending the strip to conform to the test block.

To prepare samples for the two-pound weight, 2×5¼-inch strips are placed face down against the end pin of the scoring device and scored at the red dot position to facilitate bending the strip to conform to the test weight.

Procedure

A. Dry Rub

Clip a 2×7-inch test strip to the four-pound test block, with the printing surface away from the rubber pads. Mount the test specimen securely, print side up, on the rubber pad of the base plate.

Using a camel-hair brush, brush both the test strip and the test specimen thoroughly before starting the test. Place the weights over the sample, making sure that the 2×4-inch rubber pad of the test block is over the ink area being tested, that both surfaces are free of dirt. Preset the tester for ten strokes, or for any number of strokes selected as standard for a particular printed surface.

1. Plug in the power cord to the correct voltage and/or turn on the unit. The display will show 000 and is ready to set.

   If you leave the machine sit idle, after two (2) minutes it will automatically shut off. Push reset to restart. Reset will also stop the machine at any point in the test if depressed.
2. COUNT BUTTON. Press the count button to set the number of strokes you desire. Each time you depress the count button it will advance one number. When held down it will count up to 10, then move up by tens to 110. At 110 it will count by 100's to 910. At any time you stop the count it will again count to 10 by single digits. Press "Reset" to remove the count number readout.
3. START AND STOP BUTTON. This controls the starting and stopping of the motor. While in the start or run mode the COUNT push button is deactivated. When running, the push button will illuminate and will be ready to accept an input from an opto device input. (NOTE: The RUN mode will not start if the displays read 0's.) After the RUN mode has counted down to 0's, the display will reset back to the number that was displayed at the time of the last start cycle and turn off motor.
4. SPEED 1 and SPEED 2 BUTTON. The machine will run in the slow speed unless you press the speed button. This push button, when pressed, changes the speed of the motor. When the switch is illuminated, the motor is set for SPEED 2. The motor's speed may be changed at any time, but when in the RUN mode, the motor will shut off for a moment to prevent kickback.
5. RESET BUTTON. This button will reset the entire board. When pressed, the display will reset to 0's, the motor will shut off and the speed will be set to SP1. This push button may be pressed at any time.

   When the rub has been completed, examine both the test strips for signs of transfer. The two pieces should be stapled together and used for visual reference and interpretation. They should be marked plainly with the number of rubs given. Place the test block on its side after using; do not place it on the machine or lay it on the rubber base.

B. Wet Rub

Mount the strips in the same manner as for dry rubs, using the two-pound test block. Preset the tester for one rub. Place three to six drops of water on the printed surface so that they will be covered by the test block. Place the block in position and immediately press the "restart" button. After one stroke, examine both surfaces for color transfer. Repeat single strokes until ink failure is noted or the surface of the sample shows fuzz or abrasion.

C. Wet Bleed or Transfer

Mount a 2×5¼-inch strip on the two-pound test block with the felt or smooth side out, and saturate the blotter with water (an eyedropper is convenient). Place the wet blotter on the sample to be tested and leave in place for four minutes. Remove the block without rubbing and examine for ink transfer to the blotter.

D. Wet Smear

Use a water-saturated blotter on the two-pound block and actuate the tester for one stroke. Examine the blotter for color transfer. In cases where extreme water resistance is required, more rubs may be specified. An alternate procedure consists of mounting a 2×6-inch piece of 80×80-count bleached muslin on the two-pound test block over a blotter as specified above. This procedure has been found particularly useful since it eliminates the effects of surface abrasion on the blotting paper.

E. Functional Rub

Functional Rub is a term of embracing a number of miscellaneous uses for the Sutherland Ink Rub Tester. An ink which is acceptable under the outlined test procedures may fail under exposure to foreign liquids or pastes. For example, certain inks might be tested to conform to specifications such as "one rub, cod liver oil" or "three rubs, Jones Antacid Toothpaste."

In reporting functional rubs, the operator must specify the number of rubs, the time of contact before rubbing, and the special conditions and testing mediums employed.

Evaluation of Tests

A practical approach should be emphasized in test evaluation. Few, if any, inks will pass rubbing, wet or dry, without a slight transfer of color. Decisions on the suitability of an ink are best made by running comparative tests, checking an acceptable sample at the same time and under the same conditions.

A quantitative method of evaluating samples for rub damage has been developed. The test strip (receptor) is measured (zeroed) with a densitometer or a spectrophotometer before the rub test. After the test, the strip is measured again with either the change in density (densitometer) or delta E (CIE L*a*b* spectrophotometer) reported. The larger the number, the greater the rub damage.

Consideration must be given to the time interval between printing and testing, particularly with slow-drying inks. Also, prints should be protected from dust and dirt between printing and testing.

An attempt should be made to use test samples which are representative of the run, i.e., eliminating the use of sheets with excessive anti-offset materials, or sheets taken from the top of a load which may have collected dust or foreign material.

New Rubber Pads

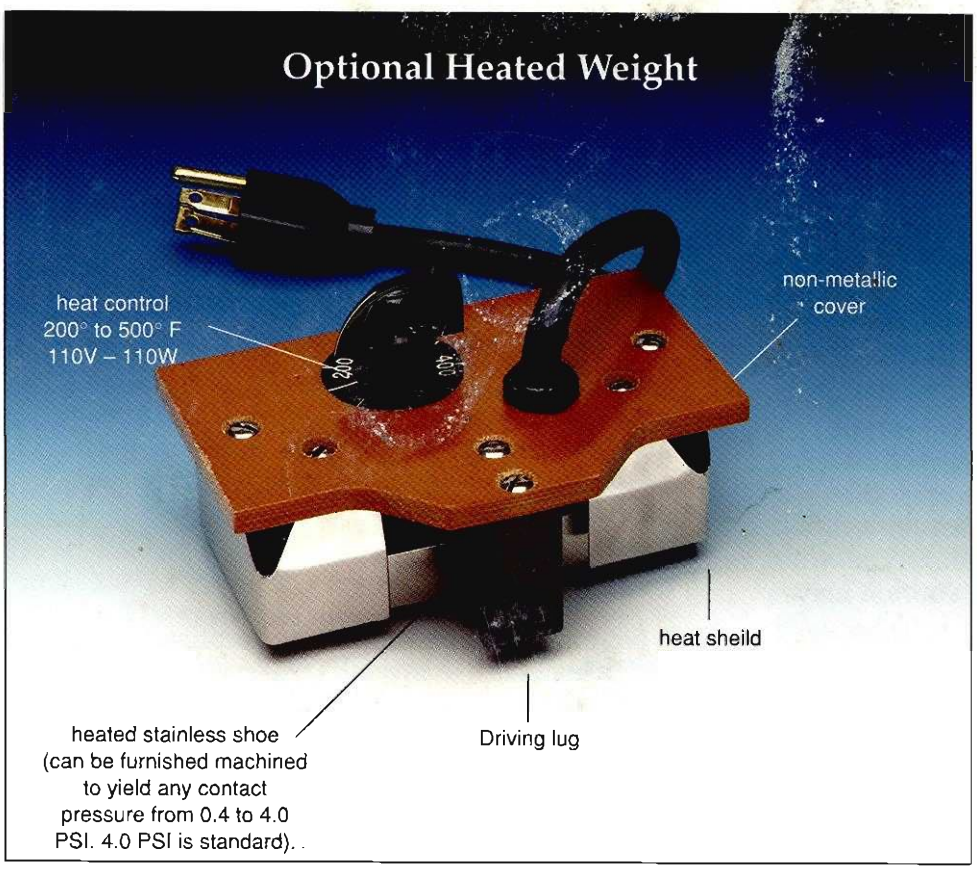
The pads should be changed when they become hard or damaged from age and use. Recommendation is a six (6) month minimum. These can be ordered from **DANILEE COMPANY, P.O. BOX 30384, CORPUS CHRISTI, TX 78463-0384, Phone (512) 853-9614, FAX (512) 853-9614.**

To replace pads, clean metal surface with solvent such as naptha. Remove protective backing from pressure-sensitive surface. Press this surface to the metal in the proper location.

Rub Chart

	Size of Test Strip Block (Inches)	Suggested No. of Strokes	Strip Nat'l	Contract Time Before Rub
Dry Rub-Ink	4 lb. 2 × 7	10	test sheet	0
Dry Rub-Varnish	4 lb. 2 × 7	25	test sheet	0
Wet Rub	2 lb. 2 × 5¼	*	test sheet	0
Wet Bleed	2 lb. 2 × 5¼	0	Std Blotter	4 Min
Wet Smear	2 lb. 2 × 5½	*	Std Blotter or Muslin	0

*Repeat one-stroke rubs until sample fails.



Designed for use with the Sutherland Ink Rub Tester

This heated weight provides a uniform test for evaluating the "hot abrasion" resistance of printed cartons, labels and periodicals. Where required, rub resistance specifications may now be based on number of strokes at a given temperature as well as pressure.

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