

Introduction:

To test the dry properties of an ink as e.g. colour, density, light fastness, chemical resistance and so on, a print on a substrate is necessary. After drying the desired property can be measured.

Most of these printability tests are performed on the base of a known ink film thickness on the printing form (printing disc); the real amount of ink on the paper is not known. In many cases it is better to know exactly the amount of ink on the paper because small differences can influence the properties too much. For that reason it is advised to make the print in combination with the ink transfer in g/m^2 . Direct measurement on the printed paper is not possible. For that reason the ink transfer is calculated in g/m^2 from the difference in weight of the printing form before and after printing and the sizes of the print.

The test in this leaflet is described for an ink to be tested on a standard, very smooth paper as APCO II/II. The method can be used to test very smooth papers with a (standard) ink as well.

The following listing shows the different methods, dependent to the roughness of the paper used:

- W50 rubber 85 Shore A for very smooth papers
- W72 rubber 65 Shore A for smooth/rough papers
- W80 rubber blanket for very rough papers
- W81 aluminium for letterpress

All these tests are described for conventional offset inks. For UV-inks special printing forms, top roller for the inking unit and a UV dryer have to be used. Consult IGT Testing Systems for the right articles.

Principle:

The paper strip is printed with an ink on the printability tester. Before and after printing the printing form (disc) is weighed on a precision scale with an accuracy of 0.1 mg or better. From these weights and the sizes of the print the ink transfer as g/m^2 can be calculated.

After drying the ink the printed samples can be used for further determination of dry properties as e.g. colour measurement, abrasion resistance, chemical resistance, light fastness and so on.

Method of operation:

- It is recommended to execute the test in the standard atmosphere; to most standards it is 23.0 ± 1.0 °C (73.4 ± 1.8 °F) and $50 \pm 2\%$ rh.
- For the operation of the AIC2-5T2000, Global Standard Tester, High Speed Inking Unit 4 and ink pipette follow the instructions of the manuals, IGT information leaflet W100 and the displays accurately.
- Handle the samples carefully.

Preparation

1. Condition the papers, the ink and equipment during > 6 hours in the standard atmosphere.
2. Cut the paper strips (preferable 55 x 340 mm, 3 strips per sample) and mark them with top and/or bottom side, machine and/or cross direction and a code for the type of material.
3. For AIC2-5T2000 only:
 - 3.1. Adjust the printing force of the upper printing disc shaft to 625 N and pay attention for the right backlash. See W100.
 - 3.2. Adjust the printing speed to 0.2 m/s in the constant speed mode (□).
4. For GST2/3/3H only: Select the menu "Colour/density" in the display.
5. Check the functioning of the tester following the instructions in the chapter "Execution".
6. Fill the ink pipette with the ink to be used.

Materials / testing conditions		
1	IGT AIC2-5T2000 or IGT Global Standard Tester 2 or IGT Global Standard Tester 3 or IGT Global Standard Tester 3H	710.000.000 412.000.000 416.000.000 467.000.000
2	IGT High Speed Inking Unit 4	466.000.710
3	(Top roller with 4 segments for conventional inks)	(466.003.003)
4	IGT ink pipette	408.000.200
5	Printing disc, with coated rubber, 85 Shore A, 50 mm, ø 68 mm	402.333
6	Strips of art paper, 340 x 55 mm, APCO II/II, IGT code Ka	404.009.025
7	Ink to be tested	
8	If desired, strips of paper to be tested, preferable 55 x 340 mm, 3 strips per sample	
9	Lint free rags	
10	Cleaning naphtha	
11	Precision scale, accuracy 0.1 mg or better	
12	Measurement instrument for the desired property as e.g. densitometer, spectrophotometer	
Printing force		625 N
Printing speed		Constant, 0.2 m/s
Ink film thickness (volume)		2.4 μ m (0.10 cm^3)
▶ The numbers 1 thru 6 are available at IGT Testing Systems. ▶ This leaflet contains article numbers per January 1st, 2006 ◀.		

7. Adjust the High Speed Inking Unit with the following settings:
 - Water bath: 23.0° C (73.4° F)
 - Top roller: 4-segmented, rubber for conventional inks
 - Mode: 2
 - Starting time: 5 s
 - Distribution time: 10 s
 - Distribution speed: 1.2 m/s
 - Inking time printing disc: 5 s
8. Check the functioning of the High Speed Inking Unit.

Execution

1. Apply 0.10 cm^3 of ink to the inking unit and distribute the ink. It is not advised to add some ink after a test.
2. Place the printing disc on the printing disc shaft of the inking unit and ink the disc during the preset time.
3. Mount a test strip on the sector of the printability tester.
4. Remove the disc from the inking unit and place it on the precision scale. Note the weight of the disc with the ink in 0.1 mg or better (weight = G_1 g).
5. Take the disc from the precision scale and place it on the (top) shaft of the printability tester.
6. Make a print. See W100.
7. Take off the printing disc from the shaft and place it on the precision scale. Note the weight of the disc with the ink in 0.1 mg or better (weight = G_2 g).
8. Clean the printing disc with rags and naphtha.
9. Remove the printed strip from the sector.
10. Measure the length (L) and the width (W) of the print in cm.
11. Calculate the ink transfer as described in the chapter "Assessment".
12. Clean the rollers of the inking unit or use the next segment for the following test.
13. Repeat the points 1 thru 12 for the next test. It is recommended to perform the test at least three times.
14. After finishing the tests clean and store all parts as described in the manuals.
15. Make an accurate record of the conditions and the results of the test.

Assessment

1. Calculate the ink transfer with the formula:

$$\text{Ink transfer} = \{10,000 / (L * W)\} * (G_1 - G_2)$$

Here in is:

L = length of the print in cm

W = width of the print in cm

G₁ = weight in g of printing disc with ink before printing

G₂ = weight in g of printing disc with ink after printing

2. Measure the desired property.
3. Calculate the average and if desired, the standard deviation. Sometimes it can be useful to mention the highest and lowest values as well.

Notes:

1. The test results of the AIC2-5T2000, AIC2-5 and Global Standard Testers 2, 3 and 3H compare well with one another on the condition that the tests have been carried out under the same testing conditions.

► *In comparison to older IGT leaflets, this leaflet is valid for the AIC2-5T2000 and Global Standard Testers as mentioned*

This information leaflet has been compiled with the utmost care. However, may you find any inadequacies or if there are any comments, we kindly request you to send these to IGT Testing Systems, Sales Department.