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/m². Direct measurement on the printed paper is not possible. For that reason the ink transfer is calculated in g/m² from the difference in weight of the printing form before and after printing and the sizes of the print.
The test in leaflet W50 is described for an ink to be tested on a standard, very smooth paper as C2846, a replacement of 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 very smooth/rough papers.
W80 rubber blanket for very rough papers.

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/m² 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 and 50 ± 2% rh.
- For the operation of the AIC2-5T2000, Global Standard Tester, Inking Unit 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 the equipment during >6 hours in the standard atmosphere.
2. Cut the paper strips and mark them with top and/or bottom side, machine and/or cross direction and a code for the type of paper.
3. For AIC2-5T2000 only:
   3.1. Adjust the printing force of the top 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 GST 2/H only:
   4.1. Select the menu "Colour/density" in the display.
5. Fill the ink pipette with the ink to be used.
6. For High Speed Inking Unit only:
   Adjust the unit with the following settings:
   - Water bath: 23,0 °C
   - Top roller: 4-segmented, rubber for conventional inks
   - Mode: 2
   - Startup time: 10 s
   - Distribution time: 20 s
   - Distribution speed: 0,5 m/s
   - Inking time printing discs: 15 s
7. For inking unit AE FOUR only: see manual or W100.

Materials / Testing conditions		
1	IGT AIC2-5T2000	710.000.000
	or IGT Global Standard Tester 2	412.000.000
	or IGT Global Standard Tester 3H	467.000.000
2	IGT High Speed Inking Unit 4	466.000.710
	or IGT inking unit AE FOUR	465.000.710
3	Top roller with 4 segments for conventional inks	466.003.003
4	IGT ink pipette	408.000.200
5	Printing disc, rubber, 85 Shore A, 50 mm (W50)	402.634
	or Printing disc, rubber, 65 Shore A, 50 mm (W72)	402.687
	or Printing disc, rubber blanket, 50 mm (W80)	402.089
6	Strips of reference paper, 55 mm, IGT code C2846 (ISO 2846)	404.009.029
	or Strips of reference paper, 55 mm, IGT code C2846 (ISO 2846) with black band	404.009.030
Ink to be tested		
If desired, strips of paper to be tested, preferable 55*340 mm², 3 strips per sample		
Lint free rags and cleaning naphtha		
Precision scale, accuracy 0,1 mg or better		
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) (guide line)		2,4 µm (0,10 cm³)
►The numbers 1 thru 6 are available at IGT Testing Systems.		

Execution

1. Apply 0,10 cm³ of ink to a segment of the top roller of the inking unit and distribute the ink during the preset or desired time.
   NOTE: The amount of ink mentioned above is a guide line to reach an ink transfer of about 1 g/m². Dependent to the type of paper, the type of ink and/or the desired ink film thickness this amount of ink must be changed.
   NOTE: 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 or desired time.
3. Attach a test strip into the front clamp of the sector.
4. Remove the printing disc from the inking unit.
5. For ink transfer and mileage: Weigh the disc on the precision scale (weight = G_1 g).
6. Place the printing disc on the top printing disc shaft of the tester.
7. Make a print. See W100.
8. Take the printing disc from the shaft.
9. For ink transfer and mileage: Weigh the disc on the precision scale (weight = G_2 g).
10. Clean the printing disc with rags and naphtha and let it dry.
11. Remove the printed strip from the sector.
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 per sample.
14. After finishing the tests clean and store all parts as described in the manuals.
15. After 24 hours measure the desired properties as density or colour. Ink transfer and mileage can be measured directly. See assessment.
16. Make an accurate record of the conditions and the results of the test and refer to the printing disc used:
    16.1. W50: Printing disc with rubber 85 Shore A.
    16.2. W72: Printing disc with rubber 65 Shore A.
    16.3. W80: Printing disc with rubber blanket.

►►

Assessment

1. For ink transfer:
   1.1. Measure the length (L) and the width (W) of the print in cm.
   1.2. Calculate the ink transfer in g/m² with the formula:

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

   Here in is:
   L = length of the print in cm
   W = width of the print in cm
   G_1 = weight in g of printing disc with ink before printing
   G_2 = weight in g of printing disc with ink after printing

2. For mileage: Calculate the mileage (ink film thickness) in µm with the formula:

$$\text{Ink film thickness in µm} = \frac{\text{Ink transfer in g/m}^2}{\text{Density of ink in g/cm}^3}$$

3. Measure the desired property after 24 hours.
4. Calculate the average and if desired, the standard deviation. Sometimes it can be useful to mention the highest and lowest values as well.

► *2006: In comparison to older IGT leaflets, this leaflet is valid for the AIC2-5T2000 and Global Standard Testers as mentioned.*
► *2012: This leaflet is valid for the AMSTERDAM and AE FOUR as well; a note about the ink film thickness has been included; the leaflet contains some small text corrections.*
► *2017: This leaflet is valid for the AIC2-5T2000 and GST 2/3H only; the leaflet contains some small text corrections.*

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