

## Introduction

When inks are used on a two-colour offset printing press the second ink film is printed over the first ink film while it is still completely wet. For multi colour presses the same can be said for the other colours. In order to do so the inks have to be trapped on tack and/or viscosity. The systems for measuring tack and/or viscosity measure these ones as it is in the tin, without the influence of absorption by the paper.

On the printing press, as soon as the ink is printed on the paper the low viscosity components of the ink will penetrate into the paper and the viscosity and tack of the ink will increase rapidly.

The longer the ink is on the paper, the bigger this increase of viscosity and tack will be. The time interval between individual prints differs considerably in various types of presses. In practice these interval times are between about 0,03 and 3 s. For proper adjustment of ink for wet-on-wet printing a printability tester is essential, operating from very short time intervals upwards.

Although in practice water is used and an emulsion is formed, this method gives very good results for testing wet-on-wet printing. The method can be used to test inks and paper as well.

The method can be used to test inks and paper as well and also to test the ink trap mottle. This phenomenon is shown as an uneven printing quality, caused by a wrong trapping of the ink in tack and/or viscosity and is also influenced by an uneven absorption of the ink by the paper.

There are 2 methods:

- W46 with a printing form with rubber of 85 Shore A for smooth papers.
- W69 with a printing form with rubber of 65 Shore A for smooth and rather rough papers.

## Principle

A set of two colours of offset inks is printed on each other on paper in both the colour sequences and with different interval times. The results are observed visually or with the help of a densitometer. The best print quality and the best ink transfer show the right colour sequence. The test results are assessed visually or with the help of density measurements followed by the calculation of Prucell.

Also for a four colour series of offset inks the inks always must be tested in sets of two colours.

With the AIC2-5T2000 the tests are carried out with 2 interval times on one strip.

With the Global Standard Tester 2 it is possible to make the trials with 2, 4 or 10 different interval times on one test strip. With the settings for 2 interval times it is possible to work with the very short interval times. In most of the cases the short interval times of 0,1, 1 and/or 3 s will be used. This can be realized in the mode of 2 fields at 1 m/s.

If the test is used to test inks, it is advised to use the reference paper, IGT code C2846.

## Method of operation

- It is recommended to execute the test in the standard atmosphere; to most standards it is  $23,0 \pm 1,0$  °C and  $50 \pm 2\%$  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 equipment during > 6 hours in the standard atmosphere.
2. If necessary 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 for both printing disc shafts to 625 N and pay attention for the right backlash for both shafts. See W100.
  - 3.2. Adjust the printing speed to 1 m/s in the constant speed mode (□).
  - 3.3. Adjust the desired interval time.
4. **For GST 2 only:**
  - 4.1. Select the menu "Wet-on-wet" in the display.
  - 4.2. Select the submenu for 2, 4 or 10 fields:
    - "2 fields" for a test strip with 2 different interval times (printing speed 1 m/s).
    - "4 fields" for a test strip with 4 different interval times (printing speed 1 or 0,2 m/s).
    - "10 fields" for a test strip with 10 different interval times (printing speed 0,2 m/s).
  - 4.3. Adjust the desired interval time. See W100.

## Materials / testing conditions

1	IGT AIC2-5T2000 or IGT Global Standard Tester 2	710.000.000 412.000.000
2	IGT High Speed Inking Unit 4 or IGT inking unit AE FOUR	466.000.710 465.000.710
3	Top roller with 4 segments for conventional inks	466.003.003
4	IGT ink pipette (2x)	408.000.200
5	Printing disc, rubber, 85 Shore A, 50 mm, (2x) (W46) or Printing disc, rubber, 65 Shore A, 50 mm, (2x) (W69)	402.634 402.687
6	Strips of reference paper, IGT code C2846, 55 mm	404.009.029

If desired paper strips to be tested (55\*340 mm<sup>2</sup>, 4-6 strips per set of inks)

Inks to be tested

Densitometer (if required)

Lint free rags and cleaning naphtha

Printing force	625 N
Printing speed	Constant, 0,2 or 1 m/s
Interval times between 2 colours	at choice
Ink film thickness (volume)	2,4 µm (0,10 cm <sup>3</sup> )

► The numbers 1 thru 6 are available at IGT Testing Systems.

- 4.4. **For the menu 4 interval times only:** Set the printing speed on 0,2 or 1 m/s.
- 4.5. **For the menu 4 and 10 interval times only:** take off the brush from the tester to prevent contact of the brush with the printed ink film on the substrate.
5. Fill the ink pipettes with the inks to be tested.
6. **For High Speed Inking Unit 4 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.

## Execution

1. Adjust the desired interval time. See W100.
2. Mount a test strip on the sector by attaching the beginning of the test strip into the front clamp and fixing the end of the test strip on the sector with a piece of tape.
3. Apply 0,10 cm<sup>3</sup> of both inks to two separate segments of the top roller of the inking unit and distribute the inks during the preset or desired times.  
**NOTE:** This volume is an indication if coated paper like reference paper IGT code C2846 is used.  
**NOTE:** Due to the drying of the ink it is not advised to add some ink after a test.
4. Place the printing discs on the printing disc shafts of the inking unit and ink the discs during the preset or desired times.
5. Take the printing discs from the inking unit and place them on the printing disc shafts of the tester: the 1<sup>st</sup> colour at the top shaft and the 2<sup>nd</sup> colour at the bottom shaft.
6. Make a print. See W100.  
**NOTE:** if the menus for 4 or 10 interval times of the GST2 are used, a separate print of the single colours must be made as well.
7. Take the printing discs from the tester, clean them with rags and naphtha and let them dry.
8. Take off the printed paper strip from the sector and let it dry for > 1 hour.
9. Clean the rollers of the inking unit or use the next segments for the following test.
10. Repeat the points 2 thru 9 for the next test strip in the opposite colour sequence. It is recommended to perform the test at least 2 times per sample in both colour sequences.
11. If desired, repeat the points 1 thru 10 for other interval times.
12. Repeat the points 1 thru 11 for the other types of ink or paper.

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13. After having finished the tests, clean and store all parts as described in the manuals.
14. Examine or measure the results as pointed out in the chapter "Assessment".
15. Make an accurate record of the conditions and the results of the test.
16. Make an accurate record of the conditions and the results of the test and refer to the printing disc used and method:
  - 16.1. W46: Printing disc with rubber, 85 Shore A.
  - 16.2. W69: Printing disc with rubber, 65 Shore A.

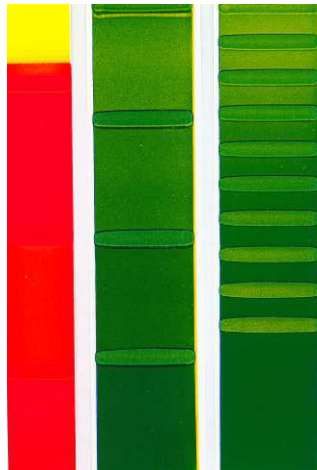


Fig. 1: wet-on-wet prints with 2, 4 and 10 fields

### 1. WET ON WET VISUALLY

- 1.1. Judge the differences between the prints for different interval times of both colour sequences. The colour sequence with the smallest difference between the prints of different interval times is the best colour sequence.

### 2. WET ON WET DENSITOMETRICALLY (PURCELL)

- 2.1. After > 1 hour after making the print measure the contrast density of all parts (both single colours and both colours) of the strips with the densitometer set for the 2<sup>nd</sup> colour.
- 2.2. Calculate the average of the measured densities per part.
- 2.3. Calculate the % of ink transfer with the formula:

$$F = \frac{D_{(1+2)} - D_1}{D_2} \times 100 \%$$

In which:

- $D_{(1+2)}$  = density of both colours together
- $D_1$  = density of 1<sup>st</sup> colour
- $D_2$  = density of 2<sup>nd</sup> colour

- 2.4. The highest % of ink transfer is the best colour sequence.

### 3. INK TRAP MOTTLE VISUALLY

Compare the printing results with a self-made scale or compare with the results of other papers and give a number or description of the result.

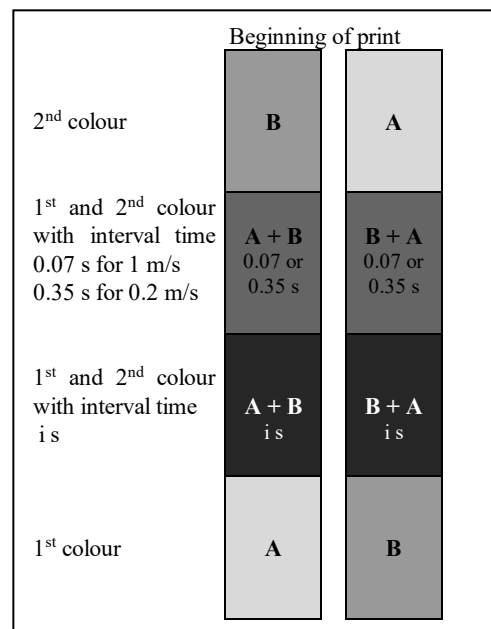


Fig. 2 Wet-on-wet printing with 2 fields

- In comparison to older IGT leaflets, this leaflet is valid for the AIC2-5T2000 and Global Standard Tester as mentioned.
- 2012: The inking unit AE FOUR and the remarks for the ink trap mottling are introduced into this leaflet.
- 2017: The leaflet contains some text corrections. Ink trap mottle is assessment visually only.