

## Introduction

Mottling is the uneven appearance, mostly in solid areas: small dark and light areas appearing in the surface of paper (board) caused by ink, paper or press work.

As this definition says mottle is influenced by many parameters: type of ink, colour sequence, construction of printing press, speed, rubber blanket, damping water and the most important one: the type of paper. Variations in the surface characteristics as absorption, smoothness and cloudiness play an important role in the mottle and are caused by the production process and the components in the paper.

This information leaflet W57 describes the **Back trap mottle**:

Paper is printed and the ink of the printed strip is set off 4 times to 4 clean printing forms with interval times of 10 s. After the last set off the test result is assessed by an offline analysing system or visually.

There are some more types of mottling. These methods are described in the following W-leaflets:

### 1. PRINT MOTTLE (W58)

Print mottle is an alternative and easier, but sometimes less accurate method than the back trap mottle. A paper strip is printed 4 times with the same printing disc.

### 2. WATER INTERFERENCE MOTTLE (W59)

Water interference mottle is the uneven printing result, caused by insufficient and uneven water absorption of the paper, followed by uneven ink absorption.

### 3. INK TRAP MOTTLE (W46/W49-AMS)

Ink trap mottle is the uneven printing result caused by a wrong trapping in tack and/or viscosity of the ink and is also influenced by an uneven absorption of the ink by the paper.

## Principle

A paper is printed under standard conditions with an IGT printability tester. Thereafter the ink is set off 4 times from the printed strip to 4 clean printing forms. The result is observed as a degree of unevenness in the print quality. This can be done visually in comparison with a self made scale or other papers and with an (off line) analysing system.

## 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

- Condition the papers, the ink and the equipment during >6 hours in the standard atmosphere.
- 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.
- Remove the brush from the tester.
- For AIC2-5T2000 only:
  - Adjust the printing force of the top printing disc shaft to 500 N and pay attention for the right backlash. See W100.
  - Adjust the printing speed to 0,2 m/s in the constant speed mode (□).
- For GST2/3H only:
  - Select the menu "Back trap mottle" in the display.
- Fill the ink pipette with the mottle test ink.
- 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
- For Inking Unit AE FOUR only: see manual and W100.

## Materials / testing conditions

1	IGT AIC2-5T2000 or IGT Global Standard Tester 2 or IGT Global Standard Tester 3H	710.000.000 412.000.000 467.000.000
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	408.000.200
5	Printing disc with rubber blanket, 50 mm wide (5 x)	402.089
6	IGT mottle test ink	404.800.010

Off line analyzing System (if desired)  
Strips of paper to be tested, preferable 55\*340 mm<sup>2</sup>, 3 strips per sample  
Stopwatch (for AIC2-5T2000)  
Reference mottle scale (if desired)  
Lint free rags and cleaning naphtha

Printing force	500 N
Printing speed	Constant, 0,2 m/s
Time between printing and set off's	10 s
Number of set off's	4x
Ink film thickness (volume)	8,0 µm (0,35 cm <sup>3</sup> )

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

## Execution

- 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.
- Apply 0,35 cm<sup>3</sup> of ink to a segment of the top roller of the inking unit and distribute the ink during the preset or desired time.  
**NOTE:** Due to drying of the ink it is not advised to add some ink after a test.
- Place a printing disc on the printing disc shaft of the inking unit and ink the printing disc during the preset or desired time.
- Take the printing disc from the inking unit and place it on the (top) printing disc shaft of the tester.
- Turn the printing disc into the position that the seam in the rubber blanket is toward the sector.
- For AIC2-5T2000 only:
  - Turn the sector into starting position.
  - Start the stopwatch.
  - Press one of the side buttons to start the motor.
  - Move the printing disc into printing position against the test strip.
  - At a certain time, e.g. 10 s after having started the stopwatch, make a print.
  - Directly move the printing disc out of printing position.
  - Directly move the sector into starting position.
  - Directly replace the printing disc by a clean one.
  - Directly turn the disc into the position that the seam of the blanket is toward the sector.
  - Directly press one of the side buttons to start the motor.
  - Directly move the printing disc into printing position against the test strip.
  - After 10 s after having made the print, make a "print" to set off the ink from the printed strip to the clean printing disc.
  - Repeat the points 6.6 thru 6.12 for the second, third and fourth clean printing disc.
- For GST only:
  - Make a print, keep pressed both side buttons to move the sector into the starting position again and release the side buttons.  
**NOTE:** From the moment of printing the timer starts counting down from 10 s to 0 s.
  - Directly replace the printing disc by a clean one.
  - Directly turn the disc into the position that the seam of the blanket is toward the sector.
  - Before the timer in the display has reached 0 s, press the side buttons. As soon as the timer has count down to 0, a "print" is made to set off the ink from the printed paper to the clean printing disc and the sector is moved into the starting position; at this moment release the side buttons.  
**NOTE:** From the moment of printing the timer starts counting down from 10 s to 0 s.
  - Repeat the points 7.2 thru 7.4 for the second, third and fourth clean printing disc.
  - Press "Enter" to finish the test for this test sample.



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8. Take the printing disc from the shaft and clean all printing discs with rags and naphtha and let them dry.
9. Clean the rollers of the inking unit or use the next segment for the following test.
10. Remove the test strip from the sector.
11. Measure the test result as described in the chapter "Assessment".
12. Repeat points 1 thru 11 for every test strip.
13. After having finished the tests, clean and store all parts as described in the manuals.
14. Make an accurate record of the conditions and the results of the test and refer to W57.

### Assessment

#### 1. 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.

#### 2. IMAGE ANALYZING

Measure the printing result with an off line analyzing system.

### **Notes:**

1. Due to the quick altering of the rubber blanket of the printing disc and the sensitivity of the test, the maximum life time of the rubber blanket for this test is 1 month or even shorter after the first use.
2. The maximum storage life of the Mottle test ink in the original, closed packing is 1 year; in an opened packing 3 months.

- 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 inking unit AE FOUR as well and contains some small text corrections.
- 2017: This leaflet is valid for the AIC2-5T2000 and GST 2/3H only and the leaflet contains some small text corrections.