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 and smoothness play an important role in the mottle and are caused by the production process and the components in the paper.

There can be three kinds of mottle:
• Back trap (print) mottle: an uneven printing result, caused by an uneven ink absorption of the paper. A testing method is described in this information leaflet. An alternative and easier, but sometimes less accurate method has been described in IGT information leaflet W58.
• Water interference mottle: an uneven printing result, caused by an insufficient and uneven water absorption of the paper, followed by an uneven ink absorption. This testing method has been described in IGT information leaflet W59.
• Ink trap mottle: an uneven printing result, 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. This method has been described in IGT information leaflet W69 (rubber 65 Shore A) and W46 (rubber 85 Shore A).

Principle:
A paper is printed under standard conditions with an IGT printability tester, after certain times the ink is set off from the printed paper to 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 analysing system.

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 ± 2% rh.
• For the operation of the Global Standard Tester, the High Speed Inking Unit 4 and the 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 (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 paper.
3. Select the menu “Mottle” in the display.
4. Select the submenu “Back trap mottle” in the display.
5. Note the testing conditions in the display and collect the items mentioned.
6. Press the button “Enter” to select the next menu.
7. Take off the brush from the tester.
8. Place a printing disc on the (top) shaft of the tester.
9. Check the functioning of the Global Standard Tester following the instructions in the chapter “Execution”.
10. Fill the ink pipette with the mottle test ink.
11. Adjust the High Speed Inking Unit with the settings as mentioned in note 2.
12. Check the functioning of the High Speed Inking Unit.

Materials / testing conditions

<table>
<thead>
<tr>
<th>Item Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>IGT Global Standard Tester 2 or IGT Global Standard Tester 3</td>
</tr>
<tr>
<td>2</td>
<td>IGT High Speed Inking Unit 4 (with 4 segmented toproller for conventional inks)</td>
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<tr>
<td>3</td>
<td>IGT ink pipette</td>
</tr>
<tr>
<td>4</td>
<td>Printing disc, covered with rubber blanket, 50 mm wide (5 x)</td>
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<tr>
<td>5</td>
<td>Huber mottle test ink</td>
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<tr>
<td>6</td>
<td>Strips of paper to be tested, preferable 55 x 340 mm, 3 strips per sample</td>
</tr>
<tr>
<td>7</td>
<td>Reference mottle scale or mottle analysing system (if desired)</td>
</tr>
<tr>
<td>8</td>
<td>Lint free rags</td>
</tr>
<tr>
<td>9</td>
<td>Cleaning naphtha</td>
</tr>
</tbody>
</table>

Printing force: 500 N (preset)  
Printing speed: 0.2 m/s (preset)  
Time between printing and set offs: 10 s (preset)  
Ink film thickness: 8.0 µm

The numbers 1 thru 5 are available at IGT Testing Systems. The numbers 4 and 5 can be obtained as Mottle Test Set (set off) for Global Standard Tester 2, 3 and 3H, article number 487.412.

Execution:
1. Attach a test strip on the sector and fasten the end of the test strip on the sector with tape.
2. Apply 8 µm of ink to the inking unit and distribute the ink. See note 3 or the manual of the inking unit.
3. Place a printing disc on the printing disc shaft of the inking unit and ink the printing disc during the preset time.
4. Take the printing disc from the inking unit and place it on the (top) printing disc shaft of the tester and turn it into the position that the seem in the rubber blanket is toward the sector.
5. Select “Make print” in the display.
6. Press the side buttons to move the sector into the starting position again. From the moment of setting off the ink the timer starts counting down from 10 s to 0 s.
7. After the sector has stopped in the starting position, release the side buttons.
8. Directly replace the printing disc by a clean one and turn it into the position that the seem of the blanket is toward the sector.
9. 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 set off is made from the printed paper to the clean printing disc and the sector moves into the starting position. From the moment of setting off the ink the timer starts counting down from 10 s to 0 s.
10. After the sector has stopped in the starting position, release the side buttons.
11. Repeat the points 8, 9 and 10 for three times.
12. Press “Enter” to finish the test for this test sample.
13. Remove the test strip from the sector.
14. Measure the test result as described in the chapter “Assessment”.
15. Take the printing disc from the shaft and clean all printing discs with rags and naphtha.
16. Clean the rollers of the inking unit or use the next segment discs with rags and naphtha.
17. Repeat points 1 thru 16 for every test strip.

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W57 for IGT Global Standard Tester 2, 3 and 3H

18. After having finished the tests, clean and store all parts as described in the manuals.
19. Make an accurate record of the conditions and the results of the test.

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 analysing**
   Measure the printing result with the image analyser.

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

2. It is advised to use the following settings for the High Speed Inking Unit 4:
   - Water bath: 23.0°C (73.4°F)
   - Toproller: 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 discs: 5 s

3. To reach an ink film thickness of 8 µm on the High Speed Inking Unit 4 with a 4-segmented toproller a quantity of 0.348 cm³ has to be applied. It is not advised to add some ink after a test.

4. The maximum storage life of the Mottle test ink in the original, closed packing is 1 year; in an opened packing 3 months.

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.