IGT Testing Systems

Research, development and production of testing equipment for the printing and allied industries

# IGT Information leaflet W76
# FLEXO PRINTING
# IGT Global Standard Tester 2

Version: July 2006

**Introduction:**

To test dry properties of flexo inks a standard print on a substrate is necessary. Such a print must be made under standard printing conditions with a printing device following the flexo principle.
In flexo three types of ink are used: water based, solvent based and UV-drying inks
The water based and solvent based inks have a very low viscosity and dry very quickly. For these inks it is impossible to use an offset system like Global Standard Tester with inking unit. The UV-drying inks have a viscosity like a paste and dry only by exposure to UV-light. In principle this type of ink can be used with a system of Global Standard Tester with inking unit but there can be reasons (printing quality) to use a flexo system.
To print the flexo inks there is an accessory which can be used with the Global Standard Tester 2. The system can be used for all types of flexo inks. The principle of the system is a flexo printing system comparable to practice. The prints, made with this system can be used to test the dry properties like colour, adhesion, light fastness, chemical resistance, and so on.

**Principle:**

The flexo system for the Global Standard Tester 2 consists of an anilox roller with a doctoring system, a photopolymer printing form and an impression cylinder. The ink is applied to the anilox roller and the surplus is wiped off with the doctoring system. The ink is transferred from the anilox roller to the printing form and from the printing form to the substrate.


Fig. 1: flexo system

The anilox roller is placed on the top shaft of the Global Standard Tester 2 and the impression cylinder on the bottom shaft. The photopolymer is mounted on the sector. The substrate is stuck on the impression cylinder with a piece of tape. The anilox force, the printing force and the speed can be adjusted. Also the number of inkings of the printing form can be adjusted. There is a wide range of anilox rollers (ceramic and copper engraved). All these parameters make the system very flexible. All flexible substrates like paper, plastic films, foils and so on, can be printed.

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**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 follow the instructions of the manuals, IGT information leaflet W100 and the displays accurately.
- Handle the samples carefully.

Preparation:

1. Condition the substrate, the ink and the equipment during >6 hours in the standard atmosphere.

| **Materials / testing conditions** | | |
|---|---|---|
| 1 | IGT Global Standard Tester 2 | 412.000.000 |
| 2 | Anilox disc, 4 engravings *) | 402.227.412 |
| 3 | Doctor blade holder | 435.031.412 |
| 4 | Doctor blade flexo | 180.431.710.001 |
| 5 | Cartridges, empty | 160.200 |
| 6 | Hoses and coupling | 160.300 |
| 7 | Impression cylinder | 432.056.002.066 |
| 8 | Printing form photopolymer, 1.7 mm | 403.010.001 |
| 9 | Compressible mounting foam tape | 403.011.001 |
| 10 | Sector without clamps, Φ166 mm | 364.000.166 |
| 11 | Strips of substrate to be tested, 55 x 200 mm, 3 strips per sample | |
| 12 | (Disposable) ink pipettes | |
| 13 | Lint free rags | |
| 14 | Velvet | |
| 15 | Cleaning solvent of ink | |
| 16 | Ethanol | |
| Anilox- and printing force | | Dependent to the use |
| Printing speed | | Dependent to the use |
| Number of revolutions | | Dependent to the use |

► The numbers 1 thru 10 are available at IGT Testing Systems.
► The numbers 3 thru 9 can be obtained as Flexo Set for Global Standard Tester 2, article number 453.000.412.
*) for other anilox discs ask IGT Testing Systems
►*This leaflet contains article numbers per January 1st, 2006*◄.

2. Cut the substrate strips (preferable 50 x 200 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 substrate
3. Select the menu “Flexo” in the display.
4. If not present on the Global Standard Tester, mount the round sector. See W100.
5. If not present on the sector, mount the photopolymer on it with the double sided foam tape. See W100.
6. Clean the anilox roller with velvet with ethanol.
7. Place the anilox roller on the top printing disc shaft of the tester.
8. Place the impression cylinder on the bottom printing disc shaft.
9. For continuous working with water based and solvent based inks:
   9.1 Shake the bottle with flexo ink (water based or solvent based) well.
   9.2 Fill the cartridge with ink and mount it on the Global Standard Tester. See W100.
10. For some tests only with water and solvent based inks: shake the bottle with flexo ink (water based and solvent based) well and fill a (disposable) pipette.
11. For working with UV-inks: fill a (disposable) pipette.
12. Degrease the doctor blade with rags with ethanol. Mount the doctor blade in the doctor blade holder. See W100.
13. Slide the doctor blade holder with the blade downward and pointing to the right on the two pins of the mounting plate.
14. Check the functioning of the flexo system following the instructions in the chapter “Execution”.

Execution:

1. If desired, set the printing speed, anilox force, printing force and the number of revolutions on the desired values. See note 1.
2. Attach a test strip on the impression cylinder with a piece of tape at the beginning and at the end of the test strip.
3. Select “Make print” in the display.
4. Press the side buttons to move the sector into the starting position, the doctor blade holder downward and the printing disc into starting position.

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5. For continuous working with water or solvent based ink: press one of the buttons 1 – 4 to apply a few drops of ink on the printing disc.
6. For some prints only with water-based ink, solvent based ink or UV drying ink: apply some drops of ink on the printing disc with a (disposable) pipette.
7. Press the side buttons to distribute the ink on the engraved anilox disc, to ink the photopolymer and to make a print.
8. Press "Enter" to lift the doctor blade from the anilox roller.
9. For water based inks only: Directly take off the anilox disc from the shaft and clean it with water and a soft brush or velvet or put it directly into a tray with water and clean it later on.
10. For solvent based inks only: Take off the anilox disc from the shaft and clean it with velvet with the solvent of the ink.
11. For UV-drying inks only:
    11.1 Take off the print directly from the impression cylinder, tape it on a flat strip (e.g. board) and dry it with the UV-dryer.
    11.2 Take off the anilox disc from the shaft and clean it with velvet with the cleaning solvent of the ink.
12. Clean the photopolymer with rags and ethanol.
13. Clean the doctor blade with rags and ethanol.
14. For water and solvent based ink only: remove the test strip from the impression cylinder and let it dry according to the type of ink.
15. Measure the test result as described in the chapter "Assessment".
16. Repeat the points 1 through 16 for every strip. It is recommended to execute the test at least three times per combination of ink and substrate.
17. After having finished the tests clean and store all parts as described in the manual.
18. Make an accurate record of the conditions and the results of the test.

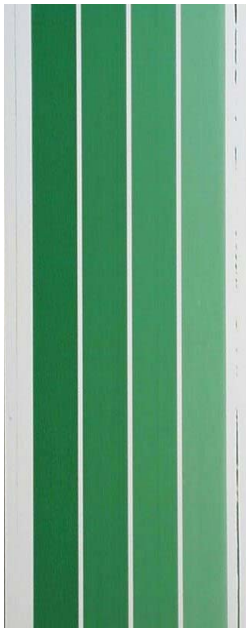

Fig. 2: flexo print

Assessment:

1. For colour measurement: check the colour visually in comparison with the original sample or measure the colour with a spectrophotometer.
2. For dry properties in general: check the desired dry property according to the testing method valid for that property
3. Repeat points 1 or 2 for each test strip.
4. Calculate the average and if required the standard deviation. In some cases it may be useful to mention the highest and lowest value as well.

**Notes:**

1. The testing conditions are dependent to the combination of ink and substrate. Also the viscosity has its influence on the right choice of the conditions. In general it can be said:
   - The lower the viscosity the higher the speed.
   - The rougher the substrate, the higher the printing force

   As a general advice the test can be started with the following conditions:
   - Anilox force: 100 N
   - Printing force 100 N
   - Speed: 0.5 m/s
   - Number of revolutions:
     - For water based inks: 3x
     - For solvent based inks: 0x
     - For UV-drying inks: 0 – 3 x

   When more revolutions are used, it is advised to use an anilox disc with a lower volume.

2. There is a wide range of anilox discs available. For an overview of the discs ask IGT Testing Systems or the local agent.

3. The outer diameter of the printing form cylinder with printing form on it, must be 170 mm. For other thickness than the standard IGT photopolymers of 1.7 mm another printing form cylinder has to be used. The article number of such a cylinder is 364.000.xxx in which xxx = diameter in mm.

4. No dried ink may remain in the cells of the disc. In the case there is dried ink in the cells clean the disc with velvet saturated with the solvent of the ink. Another method is to leave the disc overnight in ethyl acetate and afterwards cleaning with a velvet saturated with the solvent.

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.