

## Introduction:

Absorption is the speed with which ink penetrates into paper after printing. For the offset process this property is very important. If the ink is absorbed too slowly or too fast, it may be the cause of problems. An absorption, which is too slow, may result in smearing because the ink does not dry fast enough. An absorption, which is too fast, may result in a reduction of the dry ink properties because too much binding agent has penetrated into the paper and mainly the pigments remain at the surface. Because of this, for instance, the abrasion resistance or gloss may be reduced. The varnish ability is influenced by the absorption as well. The test is important when using oxidative drying offset inks and varnishes. The absorption tests are usually carried out as comparative tests. The chosen absorption times may differ per type of paper.

This IGT information leaflet describes the method at a speed of 0.2 m/s for short until long interval times; W78 describes the method at 0.7 m/s for short until long interval times.

## Principle:

A strip of the paper to be tested is printed with an IGT printability tester under standard conditions with a set off ink. After certain times the strip is brought into contact with a blank strip of a standard set off paper. Part of the ink, which is still present at the surface of the printed strip, will smear on the set off strip. The more ink is being absorbed into the printed strip, the less ink will smear on the set off strip. The density of the smeared ink will be a value for the absorption. Since smearing mainly concerns the ink, which is at the top of the surface of the paper, the test strip is printed with a hard (aluminium) printing form.

The complete range of recommended set off times is about 0.1, 3, 6, 10, 15, 30, 60 and 120 s. The short interval times < 10 s can be tested with the IGT Global Standard Tester 2; all other times with the IGT Global Standard Testers 2, 3 and 3H. For paper with little absorption, longer times may be of importance.

If the penetration of an ink has to be tested, a standard paper will be printed with the ink to be tested. Further, the test is carried out as described in this information leaflet.

## 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 AIC2-5T2000, Global Standard Tester, High Speed Inking Unit 4 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 (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. Take off the brush from the tester.
4. **For AIC2-5T2000 only:**
  - 4.1. Mount the paper packing on the sector. See W100.
  - 4.2. Adjust the printing force for both printing disc shafts to 200 N and pay attention for the right backlash for both shafts. See W100.
  - 4.3. Adjust the printing speed to 0.2 m/s in the constant speed mode (□).
5. **For GST 2 only:**
  - 5.1. If not present, mount the sector with clamps. See W100.
  - 5.2. Mount the paper packing on the sector. See W100.
  - 5.3. Select the menu "Set off" in the display.

## Materials / testing conditions

1	IGT AIC2-5T2000	710.000.000
	or Global Standard Tester 2	412.000.000
2	IGT High Speed Inking Unit 4	466.000.710
3	(Top roller with 4 segments for conventional inks)	(466.003.003)
4	IGT ink pipette	408.000.200
5	Printing disc, aluminium, 10 mm, ø 65 mm (2x)	402.301
6	Packing, paper, 55 mm	404.001.005
7	Huber set off	404.520.068
8	Strips of art paper, code Ka, 55 mm	404.009.025
9	Sector with clamps (for GST2/3)	361.000.000
10	Strips of paper to be tested, preferable 55 x 340 mm, 3 strips per sample	
11	Densitometer (if required)	
12	Stopwatch (if required)	
13	Lint free rags	
14	Cleaning naphtha	
Printing- and set off force		200 N
Printing and set off speed		Constant, 0.7 m/s
Time between printing and set off		At choice
Ink film thickness (volume)		4.0 µm (0.14 cm <sup>3</sup> )
<ul style="list-style-type: none"> <li>▶ The numbers 1 thru 9 are available at IGT Testing Systems.</li> <li>▶ The numbers 5 thru 8 can be obtained as Set Off Set for AIC2-5T2000 and GST 2/3/3H, article number 484.000.710.</li> <li>▶ This leaflet contains article numbers per January 1st, 2006 ◀.</li> </ul>		

- 5.4. Select the sub menu "4 fields" or "10 fields":
  - "4 fields" for a test strip with 4 different interval times
  - "10 fields" for a test strip with 10 different interval times

NOTE: The menu "2 fields" is described in W78

- 5.5 **For menu "4 fields" only:** Adjust the speed to 0.2 m/s.

6. Shorten the set off strips Ka, to a length of 200 mm.
7. Check the functioning of the tester following the instructions in the chapter "Execution".
8. Fill the ink pipette with the set off ink.

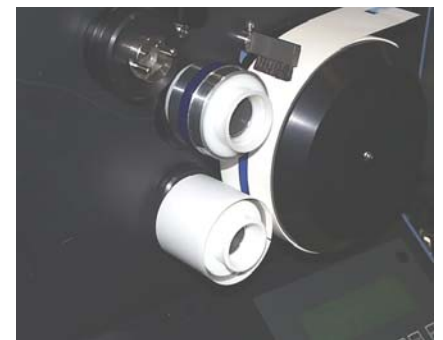


Fig. 1: Setting off on Global Standard Tester 2

9. Adjust the High Speed Inking Unit with the following settings:
  - Water bath: 23.0° C (73.4° F)
  - Top roller: 4-segmented, rubber for conventional inks
  - Mode: 2
  - Starting time: 5 s
  - Distribution time: 10s
  - Distribution speed: 1.2 m/s
  - Inking time printing discs: 5 s
10. Check the functioning of the High Speed Inking Unit.

## Execution:

1. Attach a test strip on the sector and fasten the end of the test strip on the sector with tape.
2. Mount a strip of the set off paper with a piece of tape at the beginning and the end of the strip on a clean printing disc.
3. Apply 0.14 cm<sup>3</sup> of ink to the inking unit and distribute the ink. NOTE: It is not advised to add some ink after a test.
4. Place a printing disc on the printing disc shaft of the inking unit and ink the printing disc during the preset time.
5. Take the printing disc from the inking unit and place it on the (top) printing disc shaft of the tester.

**6. For AIC2-5T2000 only:**

**6.1. For 2 short interval times only:**

- 6.1.1. Adjust the interval time. See W100.
- 6.1.2. Place the disc with the set off paper on it on the bottom shaft.
- 6.1.3. Turn the disc with the paper into the position that the beginning of the set off paper is pointing upwards.
- 6.1.4. Make a print during which the paper strip is printed and the ink is set off from the printed paper to the unprinted paper as well. See W100.

**6.2 For 1 long interval time only:**

- 6.2.1 Set the interval timer on 0 s.
- 6.2.2 Move the sector into starting position.
- 6.2.3 Move the printing disc into printing position
- 6.2.4 Start the stopwatch.
- 6.2.5 At a certain time (e.g. 10 s) make a print. See W100.
- 6.2.6 Take off the printing disc from the shaft and place the disc with the set off paper onto the same shaft.
- 6.2.7 Turn the disc into the position that the beginning of the set off paper is pointing toward the sector.
- 6.2.8 Move the sector into starting position.
- 6.2.9 After the desired time on the stopwatch, make a print during which the ink is set off from the printed paper to the unprinted paper. See W100.

**7. For GST2 only:**

**7.1. For 4 and 10 interval times only:**

- 7.1.1. Adjust the interval time.
- 7.1.2. Place the disc with the set off paper on it on the bottom printing disc shaft.
- 7.1.3. Turn the disc into the position that the beginning of the set off paper is pointing toward the sector.
- 7.1.4. Make a print in which the paper strip is printed and in a second rotation the ink is transferred from this strip to the blank paper strip. See W100. NOTE: If the interval time is < 5 s, keep pressed both the buttons until the end of the print. If the interval time is > 5s the side buttons can be released during counting down. When the interval timer has count down to about 2 s, press the side buttons again to rotate the sector a small part to set off the ink from the blanket to the unprinted paper. See W100.

7.1.5. Repeat point 8.6 for every interval time.

**7.2. For 1 long interval time only:**

- 7.2.1. For GST2 only: Set the interval timer on 0 s.
- 7.2.2. Start the stopwatch.
- 7.2.3. At a certain time (e.g. 10 s) make a print. See W100.
- 7.2.4. Take off the printing disc from the shaft
- 7.2.5. Place the disc with the set off paper onto the (upper) printing disc shaft.
- 7.2.6. Turn the disc into the position that the beginning of the set off paper is pointing toward the sector.
- 7.2.7. After the desired time on the stopwatch, make a print during which the ink is set off from the printed rubber strip to the unprinted paper. See W100.

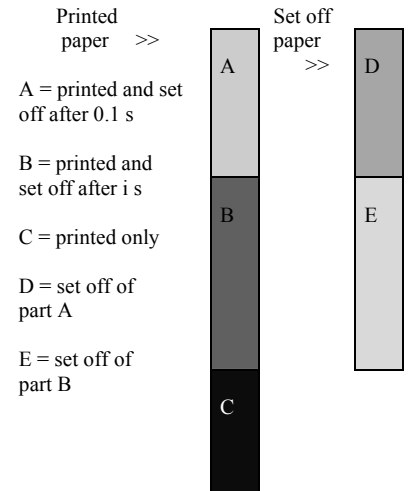
- 9. Take off the paper strip from the sector and the set off strip from the printing disc.
- 10. Mark the strips with the set off times.
- 11. Store the strips during > 4 hours in a safe and preferably to the standard atmosphere conditioned room.
- 12. Measure the test result as described in the chapter "Assessment".

- 13. Take the printing disc and the set off disc from the shaft and clean them with rags and naphtha.
- 14. Clean the rollers of the inking unit or use the next segment for the following test.
- 15. Repeat points 1 thru 14 for the next test strip. It is recommended to perform the test at least three times per sample.
- 16. After having finished the tests clean and store all parts as described in the manuals.
- 17. Make an accurate record of the conditions and the results of the test.

**Assessment:**

- 1. After > 4 hours after making the print measure the contrast density of the set off strips.
- 2. Calculate the average of the measured densities per set off time per type of paper.
- 3. If desired calculate spreading and/or standard deviation. Sometimes it may be useful to not the highest and lowest values as well.

- 4. If desired make a table or graph.



A = printed and set off after 0.1 s

B = printed and set off after i s

C = printed only

D = set off of part A

E = set off of part B

**Notes:**

- 1. The test results of the AIC2-5T2000, AIC2-5 and Global Standard Testers 2/3/3H compare well with one another on the condition that the tests have been carried out under the same testing conditions.
- 2. The maximum storage life of the Set off ink in the original, closed packing is 1 year; in an opened packing 3 months.

Fig. 2: Printed and set off strip (mode: 2 fields)

► In comparison to older IGT leaflets, this leaflet is valid for the AIC2-5T2000 and Global Standard Testers as mentioned

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.