

Introduction

In laser printing/photocopying the toner is heated to have a good adhesion on the substrate. This adhesion is influenced by the type of printer, toner and paper. To use the printed documents the adhesion must be good. To check the adhesion a print with pick test oil can be made on the laser printed/photocopied substrate. It can be checked if the toner is pulled off from the surface.

In IGT information leaflet W55 the method has been described for a constant speed of 0,4 m/s, according to EN 12283. If the toner is not pulled off from the paper and it must be known if there are differences in toner adhesion, the test can be carried out at higher constant speeds.

An alternative method to find out at what the differences are is to carry out the test at an increased speed, so the toner is pulled off at different speed levels. This method with increasing speed has been described in this IGT information leaflet W56.

Principle

The paper is laser printed/photocopied. A strip of this toner printed paper is printed with pick test oil at an increasing speed on an IGT printability tester. After printing the densities are measured at several locations where the print has been made with pick test oil (toner has been pulled off) at a different speed and at the location where no print has been made with the pick test oil (toner has not been pulled off). The densities are used in a formula to calculate the percentage of toner, which has been pulled off from the surface of the paper at the different speeds.

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 during > 6 hours in the standard atmosphere.
- Print a stack of 10 sheets of a standard paper, the sheets of the papers to be tested and 5 sheets of the standard paper with a maximum density on a laser printer or photocopier.
- Condition the papers, the pick test oil and the equipment during > 6 hours in the standard atmosphere.
- Cut the paper strips (preferable 55×340 mm², 5 strips per sample) and mark them with top and/or bottom side, machine and/or cross direction and a code for the type of material.
- Mount the packing on the sector. See W100.
- For AIC2-5T2000 only:
 - Adjust the printing force for the top printing disc shaft to 800 N and pay attention for the right backlash. See W100.
 - Adjust the desired printing speed in the increasing speed mode. (▲).
- For GST P/1/1W only:
 - Select the menu "Toner adhesion" in the display.
- For High Speed Inking Unit only (see note 2):

Adjust the unit with the following settings:

- ☐ Water bath: 23,0 °C
- ☐ Top roller: 4-segmented, rubber for conventional inks
- ☐ Mode: 3
- ☐ Startup time: 5 s
- ☐ Distribution time: 30 s
- ☐ Distribution speed: 0,5 m/s
- ☐ 2nd distribution time: 10 s
- ☐ 2nd distribution speed: 0,2 m/s
- ☐ Inking time printing discs: 20 s

NOTE: Due to the temperature sensitivity of the pick test oil it is preferred to use the High Speed Inking Unit 4 with water bath above the inking unit AE FOUR.

Execution

- Apply 0,30 cm³ of pick test oil to a segment of the top roller of the inking unit or add 0,03 cm³ of pick test oil to maintain this layer and distribute the pick test oil during the preset or desired time.

NOTE 1: Do not add pick test oil more than 4 times.

NOTE 2: For another type of top roller see the manual of the inking unit.
- Place the printing disc on the printing disc shaft of the inking unit and ink the printing disc during the preset or desired time.
- If desired, adjust the printing speed of the tester.

Materials / Testing conditions		
1	IGT AIC2-5T2000 or IGT Global Standard Tester P or IGT Global Standard Tester 1 or IGT Global Standard Tester 1W	710.000.000 470.000.000 410.000.000 415.000.000
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, 20 mm, ø 65 mm	402.302
6	Pick test oil, medium viscosity	404.004.020
7	Packing, paper, 55 mm	404.001.005
8	Ruler for density measurements	404.001.026
Photocopier or laser printer Densitometer "Standard paper", 15 sheets A4 Paper to be tested, 5 sheets A4 per type Lint free rags and cleaning naphtha		
Printing force		800 N
Printing speed		Increasing, end speed at choice
Pick test oil film thickness (volume)		8 µm (0,30 cm ³)
► The numbers 1 thru 8 are available at IGT Testing Systems..		

- Attach a test strip into the front clamp of the sector, laser printed side up.
- Take the printing disc from the inking unit and place it on the top printing disc shaft of the tester
- Make a print. See W100.
- Remove the test strip from the sector.
- Measure the test result as explained in the chapter "Assessment".
- Take the printing disc from the shaft and clean it with rags and naphtha and let it dry.
- Repeat the points 1 thru 9 for every strip. It is recommended to perform the test at least 5 times per sample.
- After having finished the tests, clean and store all parts as described in the manuals.
- Make an accurate record of the conditions and the test results of the test and refer to W56.

Assessment

- Mark points on the test strip after 40, 60, 80, 100, 120, 160 and 180 mm from the beginning of the print OR place the ruler on the strip with the beginning of the ruler at the beginning of the print (= the centre of the initial print contact line) and the coves on the print (see fig.1).
- Measure the densities on the toner which has not been subjected to the pick test ($D_{\text{solid black}}$) and on the toner which has been subjected to the pick test (D_{IGT}) at the locations as mentioned in point 1. Measurements have to be made 10 times on every single strip.
- Calculate the toner adhesion as:

$$\text{Toner adhesion} = (D_{\text{IGT}} : D_{\text{solid black}}) * 100\%$$

In which:
 D_{IGT} = density of toner which has been subjected to the pick test
 $D_{\text{solid black}}$ = density of toner which has not been subjected to the pick test
- If desired make a graph of the test results.
- Repeat the points 1 thru 4 for every test strip.
- Calculate the average and if desired the standard deviation. Sometimes it can be useful to mention the highest and lowest values as well.

Fig. 1: Ruler on test strip

Note:

The maximum storage life of the pick test oil in the original, closed packing is 3 year; in an opened packing 1 year.

- 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 AE FOUR as well; the ruler for measuring the density at different locations on the sample has been introduced and the leaflet contains some small text corrections.
- 2017: This leaflet is valid for the AIC2-5T2000 and GST P/1/1W only and contains some small text corrections.