

Introduction:

Most commonly picking of paper is defined as the damage of the paper surface during the printing operation. At the time the printing form is lifted off the paper the ink is exerting a certain force on the paper. This force is increasing with an increase in the viscosity and tack of the ink and the printing speed. When this force exceeds a certain value, the surface of the paper will be damaged. This test can be used to determine the delamination of paperboard as well.

The pick velocity is defined as the velocity at which picking starts in this test method (this is not the velocity on the printing press in practice); the pick resistance is characterized by the product of pick velocity in m/s and viscosity in Pa.s of the pick test oil used. This product is also called the VVP (Viscosity Velocity Product), which has a constant value for a certain paper or paper board. Using the VVP it is possible to compare the test results of different papers and paperboards obtained with different grades of pick test oil under certain conditions. Also it is possible to eliminate differences in temperature within certain limits.

The determination of the pick velocity and the pick resistance is one of the most widely used tests performed on the IGT printability testers.

The pick test is standardized internationally for using an aluminium printing disc in e.g. ISO 3783, Tappi 514 and in many countries as well; in the Netherlands in NEN 3095.

The information leaflet W75 describes the method with a printing disc with rubber of 85 Shore A and W38 with a grooved disc (Westvaco method).

Principle:

Using the IGT-printability tester a print is made on the paper to be tested with pick test oil at an increasing speed. The first damaging of the print is observed and from a table the speed where picking begins is read. The VVP is calculated as the product of the speed where picking begins and the viscosity of the pick test oil used.

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, High Speed Inking Unit 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 pick test oil and the equipment during >6 hours in the standard atmosphere.
2. Cut the paper strips (preferable 55 x 340 mm, 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.
3. Mount the packing on the sector. See W100.
4. Adjust the printing force of the upper printing disc shaft to 350 N and pay attention for the right backlash. See W100.
5. Adjust the speed to increasing speed (▲), end speed at choice.
6. Check and if needed, move the slide in front of the sector into the increasing speed mode (▲).

7. Adjust the settings for the High Speed Inking Unit 4. See note 3.
8. Fill the ink pipette with the desired IGT pick test oil.

Materials / testing conditions		
1	IGT AIC2-5 from type AA	414
2	IGT High Speed Inking Unit 4	466.410.000
3	IGT Ink pipette	408.200
4	Printing disc, aluminium, 10 mm	402.301
5	Pick test oil, low viscosity	404.004.010
	or pick test oil medium viscosity	404.004.020
	or pick test oil high viscosity	404.004.030
6	Packing, paper, 55 mm	404.001.005
7	Pick Start Viewer	441.000.xxx
8	Velocity table	437.005
9	Thermometer, accuracy 0.1 °C or F	
10	Ruler	
11	Strips of paper to be tested, preferable 55 x 340 mm, 5 strips per sample	
12	Lint free rags	
13	Cleaning naphtha	
Printing force		350 N
Printing speed		Increasing, end speed at choice
Pick test oil film thickness		8.0 µm
The numbers 1 thru 8 are available at IGT Testing Systems. The numbers 4 thru 8 can be obtained as Pick Testing Set for Global Standard Tester P, 1 and 1-W, article number 441.000.107 (110 V) or 441.000.108 (220 V).		

Execution

1. Apply 8.0 µm of pick test oil to the inking unit or add a little bit of pick test oil to maintain this layer and distribute the pick test oil. See note 4 or the manual of the inking unit.
2. Place the printing disc on the printing disc shaft of the inking unit and ink the printing disc.
3. Adjust the printing speed of the tester, if necessary.
4. Attach a test strip in the front clamp of the sector.
5. Take the printing disc from the inking unit and place it on the upper printing disc shaft of the tester.
6. Turn the sector into starting position.
7. Press one of the side buttons to start the motor.
8. Move the printing disc into printing position against the test strip.
9. Press the other side button as well to make a print.
10. After the sector has stopped, release the side buttons.

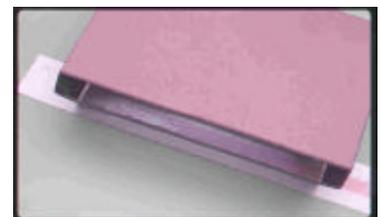


Fig. 1: pick start viewer

11. Move the printing disc out of printing position.
12. Remove the test strip from the sector.
13. Measure the temperature with an accuracy of 0.1°C or F.
14. Measure the pick test result immediately after printing as explained in the chapter "Assessment" (also see notes 5.1 and 5.2).
15. Take the printing disc from the shaft and clean it with rags and naphtha.
16. Repeat points 1 thru 15 for every test strip.
17. After having finished the tests, clean and store all parts as described in the manuals.

W31 for IGT AIC2-5 from type AA

18. Make an accurate record of the conditions and the results of the tests.

Assessment

- 1.1. For picking: place the test strip under the opening of the pick start viewer. Looking from above into the viewer assess the test strip and mark the point where picking begins.
- 1.2. For delamination: bend the test strip towards the tested side in such a way that the test strip is a part of a circle with a diameter of 80 mm.
2. Measure the distance between the starting point of the print (= the centre of the initial print contact line) and the point where picking or delamination begins.
3. Derive the pick velocity in m/s from the velocity table belonging to the printability tester (see note 2 and table 2) or with the formula:

$$V_p = 0.005 \times V_e \times d$$
 herein is: V_p = velocity at point d (in m/s)
 V_e = set end speed (in m/s)
 d = distance from beginning of the print to beginning of picking or delamination
4. If desired, calculate the Velocity Viscosity Product (VVP) in N/m with the formula:

$$VVP = V_p \times \eta$$
 Herein is: V_p = velocity at point d (in m/s)
 η = viscosity in Pa.s at temperature T
 (see table 1)
5. Repeat points 1 thru 4 for each test strip.
6. 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.
7. Describe the appearance of the type of picking. See note 7.

Notes:

- 1 The test results of the AIC2-5 and Global Standard Tester P, 1 and 1-W compare well with one another, on the condition that they have been carried out under the same conditions. Specially pay attention for the type of printing disc used!
- 2 By using modern, very accurate measuring systems the velocity table for the AIC2-5 and Global Standard Testers has been changed a little bit in comparison to the one of the AIC2-5 until August 2001.
- 3 It is advised to use the following settings for the High Speed Inking Unit 4 by the use of a 4 segmented top roller:
 Water bath : 23.0 °C (73.4 °F)
 Mode : 3

Starting time	: 10 s
Distribution time	: 30 s
Distribution speed	: 0.5 m/s
2nd distribution speed	: 0.3 m/s
Inking time printing discs	: 30 s

- 4 To reach a film thickness of 8 µm of pick test oil on the High Speed Inking Unit the following quantities can be used:
- 4.1 Use of 4-segmented top roller. 0.279 cm³ per segment. After every trial 0.017 cm³ has to be added. After a maximum of 4 trials the system has to be cleaned.
- 4.2 For other types and use of top rollers see manual.
- 5.1 If picking or delamination occurs within 20 mm from the starting point of the print the test has to be repeated at a lower speed. In case the lowest speed has been applied already a change to a lower grade of the pick test oil is necessary.
- 5.2 If picking occurs only at the end of the test strip the test has to be repeated at a higher speed. In case the highest speed has been applied already a change to a higher grade of the pick test oil is necessary.
6. The viscosity of the pick test oils is temperature dependent. The Velocity Viscosity Product (VVP) may be used to compensate these differences. See table 1.

Table 1: Viscosity (Pa.s) of pick test oils

<u>°C</u>	<u>lv</u>	<u>mv</u>	<u>hv</u>
20	22.5	68	145
20,5	21.7	65,3	139,2
21	20.8	62,7	133,9

21,5	20	60	127,5
22	19.2	57,4	121,7
22,5	18.3	54,7	115,9
23	17,5	52	110
23,5	16,8	50	105,5
24	16	48	101
24,5	15,3	46	96,5
25	14,5	44	92

lv = low viscosity
mv = medium viscosity
hv = high viscosity

7. It may be useful to describe the point where picking begins. Especially in coated papers and cardboards there may occur initial deformation or delamination in the test strip, followed by loosened coating particles or fibres before the actual overall damaging of the paper surface takes place.
8. The maximum storage life of the pick test oil in the original packing is 3 years, in an opened packing 1 year.

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.

Table 2: velocity table

? End speed in m/s	Distance in mm																	
	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200
	Velocity in m/s																	
0.5	0.075	0.10	0.125	0.15	0.175	0.20	0.225	0.25	0.275	0.30	0.325	0.35	0.375	0.40	0.425	0.45	0.475	0.50
1.0	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00
1.5	0.225	0.30	0.375	0.45	0.525	0.60	0.675	0.75	0.825	0.90	0.975	1.05	1.125	1.2	1.275	1.35	1.425	1.50
2.0	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	1.10	1.20	1.30	1.40	1.50	1.60	1.70	1.80	1.90	2.00
3.0	0.45	0.60	0.75	0.90	1.05	1.20	1.35	1.50	1.65	1.80	1.95	2.10	2.25	2.40	2.55	2.70	2.85	3.00
4.0	0.60	0.80	1.00	1.20	1.40	1.60	1.80	2.00	2.20	2.40	2.60	2.80	3.00	3.20	3.40	3.60	3.80	4.00