

---

**Gravure printing tests with the  
IGT gravure attachment**

---

This test may be carried out with the IGT printability testers  
A1, starting from type Q, A2, starting from type Q, A1-3, A2-3, AC2, AIC2 and AIC2-5.

**INTRODUCTION**

In general it is very difficult to carry out small-scale gravure printing tests. It is very difficult to keep the ink with its volatile solvents constant during a test. The commercially available laboratory presses are always printing from a reel, thus requiring quite a quantity of paper for each test.

There is a need for a machine that is providing a reasonable forecast about conditions that will be encountered in practice, while using little ink and paper. In the IGT solution the existing IGT printability tester is enhanced with the IGT gravure printing attachment, thus enabling the adjustment of printing force and speed, which are important for gravure printing as well.

The attachment can be applied for testing of paper as well as ink. In stead of paper one may read substrate, as many other materials such as foils and fabrics can be tested with the attachment as well.

**PRINCIPLE**

The IGT gravure printing attachment consists of an electro-mechanically engraved gravure forme and a doctor blade holder with doctor blade. The gravure forme (gravure strip) is attached to the sector of the printability tester and the doctor blade holder with doctor blade is placed in the brushhole. Ahead of the doctor blade there is a nylon metering blade that is spreading the ink evenly over the gravure forme. The substrate is attached to a rubber covered printing disc by means of adhesive tape. A few drops of ink are placed in the nip between gravure forme and metering blade, the ink is distributed over the forme and a print is made on the paper, all in one revolution. The advantage of this method is that the short time between applying ink to the forme and the actual printing keeps evaporation of solvent to a minimum, so that the composition of the ink remains constant.

For a good printing quality one of the most important properties of paper and other substrates is the evenness. This quality feature comes out clearest in the light middle tones. The testing of this parameter is carried out with a printing forme with a light middle tone engraving. For these tests there is a special IGT gravure ink, with properties that remain the same during many months contrary to regular gravure inks.

The applications concerning testing of inks are related to assessment of colour or density and other properties of printing quality caused by ink. For this purpose a printing forme is available with engravings in four tone values.

## APPARATUS AND MATERIALS

(While ordering materials be sure to state the type and serial number of the printability tester on which the test is to be carried out.)

- 1 \* IGT printability tester A1, starting from type Q, A2, starting from type Q, A1-3, A2-3, AC2, AIC2 or AIC2-5.
- 2 \* IGT gravure printing attachment consisting of:
  - gravure printing form with one light tone value
  - gravure printing form with four tone values
  - doctor blade holder with doctor blade, auxiliary doctor blade and nylon metering blade.
- 3 \* IGT gravure ink.
- 4 \* Printing disc, covered with rubber, preferably uncoated,
  - for A1 and A2 : 20 mm wide
  - for A1-3, A2-3, AC2 and AIC2 : 32 mm wide
  - for AIC2-5 : 50 mm wide.
- 5 Cotton wool and/or velvet and ethylacetate or other good solvents for cleaning.

The with \* marked articles can be obtained through IGT/Reprotest.

## PROCEDURE

It is recommended to execute the test under standard conditions, because of the influence of temperature and relative humidity on the properties of paper and ink.

The standard atmosphere according to most standards is:

23.0°C ? 1.0°C (73.4°F ? 1.8°F) and 50.0% ? 2.0% RH.

### 1 PREPARATION

1.1 Cut teststrips of the materials to be tested and mark them with a felt-tip marker to distinguish top and/or bottom side, machine and/or cross direction and a code for the type of material.

The sizes of the test strips are preferably:

\* for A1 and A2 : 25 x 200 mm

\* for A1-3, A2-3, AC2 and AIC2 : 35 x 200 mm

\* for AIC2-5 : 55 x 200 mm

1.2 If needed, prepare IGT gravure ink as described under note 2.

1.3 Mount the required gravure forme on the sector in the packing clamps and tighten the strip by means of the tightening screw(s). Take care that the largest un-engraved part of the gravure strip is positioned towards the front of the sector. See note 3.

1.4 Mount the nylon metering blade and the doctor blade together with the auxiliary doctor blades in the doctor blade holder as shown in figures 3 and 4.

Take care that the top side of the (auxiliary) doctor blades is flush with the top of the doctor blade holder.

This is done by placing the holder upside down on the table and sliding the (auxiliary) blades into the slits of the holder and securing them by tightening the socket screws.

Be sure that the narrowed part of the doctor blade is pointing in proper direction.

Also refer to note 4.

1.5 Turn the sector ANTI-CLOCKWISE into the starting position. See note 5.

1.6 Remove the brush from the brushhole of the printability tester.

1.7 Put the shaft of the doctor blade holder in the brushhole and allow the doctor blades to rest freely on the printing forme on the sector.

1.8 Check whether the doctor blades are touching evenly across the width of the printing forme. If this is not the case the doctor blade concerned is mounted wrongly and must be mounted again.

1.9 Secure the doctor blade holder with the socket screw of the brushholder.

1.10 Attach a teststrip to the printing disc by means of adhesive tape.

1.11 Place the printing disc on the top printing shaft.

1.12 Adjust the printing force:

\* for the forme with four tonal values : 100 N/10 mm

\* for the forme with the light middle tone : 30 N/10 mm

(i.e. for a 50 mm wide disc this is 500 N resp. 150 N).

Check and readjust if needed the backlash at this point.

1.13 Adjust the speed to 0.2 m/s, constant speed. See note 6.

1.14 Remove the teststrip from the printing disc.

1.15 Loosen the socket screw of the brushholder.

1.16 Lift the doctor blades from the printing forme by turning the doctor blade holder upwards and away from the gravure forme.

1.17 Secure the doctor blade holder in lifted position with the socket screw of the brushholder.

1.18 Clean the printing forme thoroughly with cotton wool and/or velvet and an adequate solvent. See note 7.

## 2 EXECUTION

- 2.1 Attach a teststrip on the printing disc by means of adhesive tape at begin and end.
- 2.2 Turn the sector ANTI-CLOCKWISE into starting position. See note 5.
- 2.3 Hold the doctor blade holder firmly and loosen the socket screw in the brushholder.
- 2.4 Carefully turn the doctor blade holder downwards till the doctor blades are resting freely on the printing forme.  
The doctor blade pressure is caused by the own weight of the doctor blade holder.
- 2.5 Secure the doctor blade holder with the socket screw in the brushholder.
- 2.6 Turn the printing disc in such a way that the begin of the teststrip is placed in the highest point of the printing disc and move the printing disc into printing position against the gravure forme.
- 2.7 Apply a few drops of gravure ink in the nip between metering blade and the gravure forme. See note 6. (Shake or stirr the ink well before use).
- 2.8 Start the sector and make a print onto the teststrip.
- 2.9 Move the printing disc out of printing position.
- 2.10 Remove the teststrip from the printing disc.
- 2.11 Clean the printing forme and doctor blades thoroughly with cotton wool and/or velvet and an adequate solvent. Take care to avoid solvent flowing between gravure forme and sector. See note 7.
- 2.12 Assess the printing result as described in paragraph 3.
- 2.13 Repeat points 2.1 thru 2.12 for further tests. The test has to be carried out at least two times.
- 2.14 Make an accurate record of the conditions of the test.

## 3 ASSESSMENT

- 3.1 Gravure forme with four tonal values:  
Assess the printing result visually or measure the density and/or colour in the areas required.
- 3.2 Gravure forme with light middle tone:  
Check the printing result for missing dots, possibly in comparison with a self-made scale of reference samples.

## NOTES

1 For the execution of this test on printability testers A1 or A2 the equipment must be manufactured in 1970 or after. These are the A1 and A2 testers starting with type Q.

### 2 IGT-gravure ink

2.1 For the testing of paper quality there is a standard IGT-gravure ink available. This ink is delivered in three bottles containing the components of the ink:

- a) resin solution A
- b) pigment B
- c) diluent C.

2.2 The contents of the bottles are to be mixed by the user, in the following way:

- a) Put the resin solution in a beaker.
- b) Add the pigment B slowly while continuously stirring the resin solution A (possibly with a mixer).
- c) After all pigment has been added continue stirring for at least 15 minutes more.
- d) To obtain a lower viscosity diluent C must be added. The following table shows some of the viscosities:

parts resin solution A with pigment B	parts diluent C	viscosity DINcup 4
1	0	? 40 s
1	0.1	? 28 s
1	0.2	? 22 s
1	0.3	? 20 s
1	0.4	? 18 s
1	0.5	? 16 s

- e) Pour the mixture into a sealable bottle and keep this sealed as much as possible.

2.3 \* The inkmixture has a shelf life of 6 months.

- \* Shake the ink well before use.
- \* Seal the bottle after use.
- \* The ink is flammable.
- \* Cleaning agent for the ink is ethylacetate.

3 Sometimes tests with the light middle tone gravure forme do not show enough difference between grades of paper. If that is the case it is possible that one of the four steps of the four tone forme shows a better difference.

4 Before starting tests with a new doctor blade it is recommended to turn the doctor blade at least 25 times against the printing forme and to make a trial print as described in paragraph 2 "Execution". In case there are stripes in the print repeat this action of 25 turns against the forme and making a trial print, till the quality is acceptable.

- 5 To avoid damage of the doctor blade and the forme the sector is to be turned ANTI-CLOCKWISE only, while the doctor blade is in contact with the printing forme.
- 6 The print quality of the four tone gravure forme may be influenced by the viscosity of the ink and the printing speed.  
In case of mottling (especially in the deeper parts of the engraving) increasing the viscosity or printing speed may be improved. When the speed is increased there is danger of spattering of the ink.  
When the ink transfer is too low a decrease in viscosity may lead to an improvement of the print quality.
- 7 No dried ink may remain in the cells of the printing forme. It is recommended to clean the forme thoroughly immediately after the tests with cotton wool and the right solvent. Sometimes some ink remains in the screen. In this case it is recommended to use a piece of velvet instead of cotton wool.

## SUMMARY OF TESTING CONDITIONS IGT GRAVURE TESTS

### a) Gravure forme with four tonal values.

Printability tester	A1/A2	A1-3/A2-3
Printing disc	aluminium, covered with rubber, preferably uncoated	aluminium, covered with rubber, preferably uncoated
Disc width	20 mm	32 mm
Printing force	200 N	320 N
Speed	constant, 0.2 m/s	constant, 0.2 m/s
Ink	practice ink	practice ink
Amount of ink on printing forme	a few drops	a few drops
Printability tester	AC2/AIC2	AIC2-5
Printing disc	aluminium, covered with rubber, preferably uncoated	aluminium, covered with rubber, preferably uncoated
Disc width	32 mm	50 mm
Printing force	320 N	500 N
Speed	constant, 0.2 m/s	constant, 0.2 m/s
Ink	practice ink	practice ink
Amount of ink on printing forme	a few drops	a few drops

### b) Gravure forme with light middle tone

Printability tester	A1/A2	A1-3/A2-3
Printing disc	aluminium, covered with rubber, preferably uncoated	aluminium, covered with rubber, preferably uncoated
Disc width	20 mm	32 mm
Printing force	60 N	100 N
Speed	constant, 0.2 m/s	constant, 0.2 m/s
Ink	IGT gravure ink	IGT gravure ink
Amount of ink on printing forme	a few drops	a few drops
Printability tester	AC2/AIC2	AIC2-5
Printing disc	aluminium, covered with rubber, preferably uncoated	aluminium, covered with rubber, preferably uncoated
Disc width	32 mm	50 mm
Printing force	100 N	150 N
Speed	constant, 0.2 m/s	constant, 0.2 m/s
Ink	IGT gravure ink	IGT gravure ink
Amount of ink on printing forme	a few drops	a few drops

## IGT/Reprotest

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

P.O.Box 12688  
1100 AR Amsterdam  
The Netherlands  
tel. +31 20 40 99 300  
fax +31 20 69 74 842



fig.1 gravure attachment on A2-3

fig.2 gravure attachment on AIC2-5

fig.3 blades in holder for  
A1/A2/A1-3/A2-3

fig.4 blades in holder for  
AC2/AIC2/AIC2-5

fig.5 print of printing forme with four tonal values

---

Version: January 1994

page 9

---

IGT/Reprotest

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

P.O.Box 12688  
1100 AR Amsterdam  
The Netherlands  
tel. +31 20 40 99 300  
fax +31 20 69 74 842