IGT and Rheology

For reproducible measurements

Rheology measurements are a major factor in the development and production of printing inks, raw materials for inks and other pasty liquids. Important factors for offset printing inks are tack (or stickiness of the ink), water pick-up, water release and viscosity.

To ensure a consistent quality of an ink, IGT Testing Systems has developed a series of devices to measure in an efficient, reliable and reproducible way, some of the rheological properties of offset printing inks and related materials. All devices are fully computer controlled.

APPLICATIONS

The fields of application are Quality Control, Research and Development and troubleshooting. Because of the high repeatability and reproducibility of measurements by the IGT tack devices, these are widely used by companies operating at an international level. The measured tack values can be reliable exchanged between facilities to ensure a homogeneous quality throughout the world.

The IGT tack testers are used on the following fields:

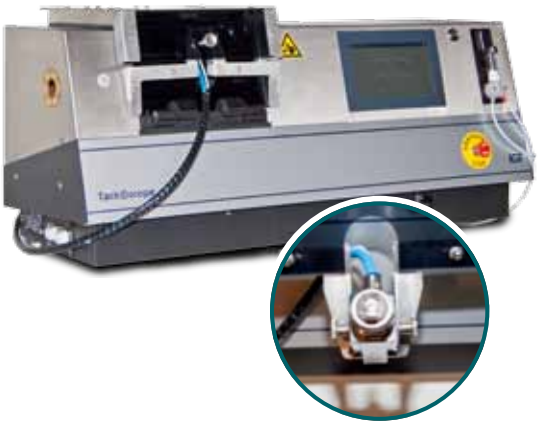
- Printing ink industry
- Security printers
- Paper mills
- Pigment-, Resin- and Varnish industry
- Chemical industry
- Raw materials
- Training Centres, Universities and Research Institutes

The IGT tack and other ink testers

- TackOscope 3 model SC
- TackOscope 3 model LC
- TackTester 450
- Misting device
- HydrOscope
- Laray viscometer
- CloudOscope

IGT Tack devices

Modern design, easy to operate



TackOscope III, model SC

All TackOscope's are equipped with TackMonitor software providing full control over the test procedures, data processing and storage of test results. The results are shown graphically on the display of the device. It is possible to export the data for further analysis direct by to a remote computer or by using a USB-memory stick.

TackOscope III, model LC

The influence of the dampening solution on the ink can be tested on the TackOscope III LC. The behavior of the ink can be assessed, as well as the influence of the dampening fluid. An amount of dampening solution is sprayed onto a specified ink film, the ink-water balance is evaluated via a built-in camera. A chromium band on the centre roller simulates the offset plate, plate cleaning starts once the proper emulsion has formed. The built-in camera registers the percentage of plate cleaning.

TackTester 450

An accurate tack measuring instrument for the production environment. A rigid construction stainless steel housing for easy cleaning and easy to operate, computer controlled with touch screen display to shows tack, speed, temperature and the combined graphs. The speed is adjustable from 50-450 m/min. Easy calibration and data export via USB are other featurs of this low cost device.

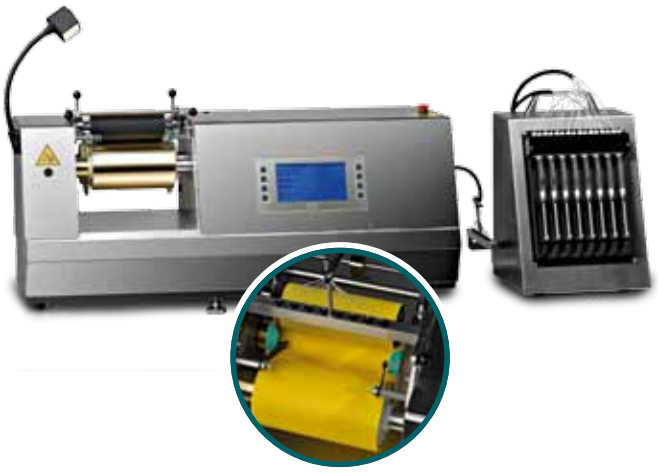
Misting device

An accessory can be added to the IGT TT450 to determine the misting tendency of offset inks. A roll of paper is fed under the ink splitting nip which generates spatter and misting. The slowly moving reel collects the globules and the mist over a period of 30 minutes. After the measuring time the paper can be removed for evaluation either by scanner or visually.

IGT

IGT Cloud point and Viscosity

Pre-programmed test conditions



Hydroscope

This device uses tack as function of emulsification. A torque sensor provides information about the change in rheology of the ink as function of emulsification. The HydrOscope tests are based on emulsification of ink and dampening fluid on a roller system, similar to the conditions on a printing press. In terms of droplet size and droplet distribution, the emulsified ink from the HydrOscope is fundamentally different from testers with stirrers. The ink emulsion created on the HydrOscope offers a very close correlation with emulsified ink as found on-press. The HydrOscope enables the user to build a database based upon known performance of ink-fount combinations and enables the inkmaker to detect and predict combinations which can cause ink/water related problems during printing.

CloudOscope

The CloudOscope is an advanced tester to determine the cloud point of a resin. The cloud point is the temperature at which a heated, homogeneous resin/oil mixture starts to become cloudy when it is being cooled down again. The cloud point temperature is a characteristic value in the quality control of synthetic resins for printing inks. Deviations in cloud point can lead to sedimentation in the varnish, differences in drying speed, loss of gloss and tack stability. Low cloud point temperatures are an indication for improved compatibility of oil and resin. The method is accordance with in ASTM D6038 and the Eurocommit Method for Cloud Point Testing.

Laray viscometer

The Laray Viscometer is designed to measure the viscosity of viscous materials, like offset inks, varnishes, high viscous oils and others with a viscosity between 2 and 200 Pa.s. In principle the Laray Viscometer measures the relative velocity of two parallel surfaces, separated by a thin film of the measured material when a certain force (weight) is applied on the rod. This movement is hindered by the viscosity of the tested material; the falling time is measured at different weights. The Laray Viscometer measures viscosity according to the falling rod principle conform ISO, ASTM or DIN. It measures the time to fall between 2 points with a distance of 100 mm. The rod and collar are accurately manufactured and calibrated. Both, rod and collar, are temperature controlled by means of a water bath. Different weights make it possible to test between 100 - 1000 g in steps of 50 g. The Laray Viscometer will be delivered with viscosity calculation software.

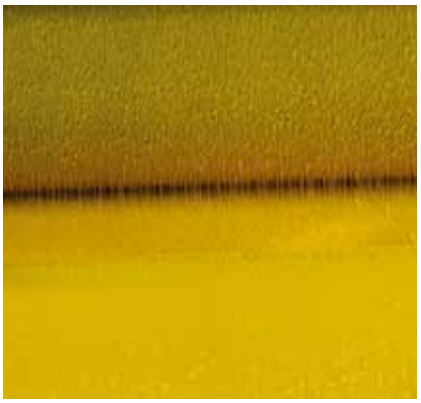
IGT

IGT and Rheology

For awide range of printing inks and pastes

ABOUT TACK

Tack relates to the force required to split a thin fluid film of a printing ink or vehicle between two rapidly separating surfaces. It is a rheological parameter indicative of internal cohesion of the fluid. Tack is a criterion for the classification of ink and its raw materials. Tack is not a material property that can be derived from the fundamental physical properties, however, it is, together with the viscosity and the waterbinding capacity, an essential characteristic for the prediction of the behaviour of an ink in the printing press.

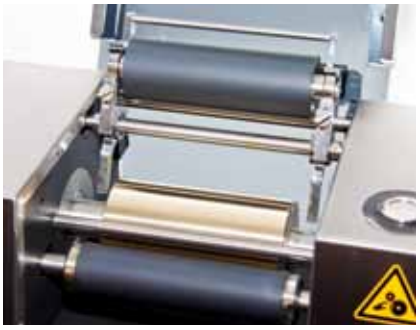


Parameters affecting tack

- Dimensions, hardness, weight and elasticity parameters of elastomeric rollers
- Surface properties of rollers
- Influence of the ink or vehicle on the properties of the elastomeric rollers
- Nip pressure
- Roller speed
- Temperature of rollers and environment
- Ink film thickness
- Condition of the elastomeric rollers due to the cleaning process
- Condition of the elastomeric rollers due to long-term use
- Properties of the test sample

All IGT tack devices are based on three roller systems according to ASTM D 4361 and ISO 12634 with a driver centre roller, a distribution roller (oscillating roller for distribution of the ink) and a measuring roller (connected with the tack sensor).

The behavior of an ink on the press plays an essential role in the stability of the printing process. Knowing the tack is required to prevent problems during the printing process. The relatively long roller system over which the ink has to be transported from ink tray to substrate is required to obtain an ink film of an appropriate thixotropy. The ink transfer is highly influenced by the rheological properties, the viscosity and the tack. The tack of the ink is affected by factors such as the composition of the ink and the temperature, all of which are important for the printing process. In case of insufficient tack (low tack), the transport will slow down, maybe even fail totally. In case of a too high tack ("stiff" tack) there is a risk that the transfer from rubber blanket to substrate does not occur (sufficiently), resulting in a non-uniform print result. When paper is brought into contact with printing ink with a too high tack, it can cause delamination or picking of the paper.



IGT and Rheology

Quality control and research

	TT	TOS Improved		TOS 2	TOS 3	
	450	Model SC	Model WC	Model S	Model SC	Model LC
Application	QC	R&D/QC	R&D/QC	R&D/QC	R&D/QC	R&D/QC
Initial tack	•	•	•	•	•	•
Tack stability	•	•	•	•	•	•
Misting	•	•	•	•	•	•
Misting analysis unit	optional					
Pigment bleeding test			•			
Plate simulation test			•			•
Ink/water balance test			•			•
Influence of fount on tack			•			•
Automated measuring sequence	•				•	•
Automated test protocols	•	•	•		•	•
LithOscope accessory						internal
Readout in N/m (INKO), Tack	•				•	•
Measuring range TACK	0-1000	0-600	0-600	0-600	0-600	0-600
Speed range m/min	50-450	20-350	20-350	20-350	20-350	20-350
Speed	m/min or rpm	m/min	m/min	m/min	m/min or rpm	m/min or rpm
Automated speed calibration	•	•	•	•	•	•
Temperature range (°C)	15-45	15-45	15-45	15-45	15-45	15-45
Protective cover	•				•	•
Integrated temperature sensor	•			optional	•	•
Internal computer	•				•	•
Touch screen operation	•				•	•
Windows compatible software	optional	optional	optional	optional	•	•
Export of data to Excel	•	optional	optional	optional	•	•
USB connection	•				•	•
Inter/intra instrument correlation function in software	•	optional	optional	optional	•	•
Comparison of graphs in software	•	optional	optional	optional	•	•
Recorder connection	•	•	•	optional		
Roller geometry according ISO12643	•	•	•	•	•	•
Auto lift on measuring roller		optional	optional	optional	•	•
Auto lift on distribution roller					•	•
Quick change system measurement-roller	•	•	•	•	•	•
Quick change system distribution-roller	•				•	•
Independent Motor driven oscillation system	•					
Shear driven oscillation system		•	•	•	•	•
Central cylinder	Brass	Brass	Brass+Chromium	Brass	Brass	Brass+Chromium
Distribution- en measuring roller	Conventional or UV Rubber					
Calibration	Certified weight	3 Certified weights				
Total weight (kg)	50	53	53	55	69	71
Dimensions LxWxH (mm³)	600x500x300	895x270x310		800x300x300		
Thermostatic bath	external	external	external	external	internal	internal

IGT and Rheology

Excellent reproducibility

TECHNICAL DATA

TackOscope II, Improved

- Weight: 55 kg
- Dimensions (LxWxH): 895 x 270 x 310 mm³
- Electrical ratings :
  110 - 115 or 230 - 250 V / 50 - 60 Hz
- Noise level <70 dB(A)
- Testing speeds: 0 - 350 m/min
- Tack range: 0 - 600 tack

TackOscope III, model SC en LC

- Weight: 55 kg
- Dimensions (LxWxH): 800 x 300 x 300 mm³
- Electrical ratings :
  110 - 115 or 230 - 250 V / 50 - 60 Hz
- Noise level <70 dB(A)
- Testing speeds 0 - 350 m/min
- Tack range: 0 - 600 tack

Hydroscope

- Weight: 64 kg
- Dimensions: (LxWxH): 780 x 350 x 450 mm³
- Electrical ratings 115 or 230V, 50 - 60 Hz,
  500 VA
- Noise level <70 dB(A)
- Operational speed 5 - 50 m/min,
  steps of 5 m/min
- Cleaning speed centre roller 50 m/min
- Measuring range 0 - 600 Tack
- Operation temperature range 20° - 25 °C

Tack Tester 450

- Weight: 50 kg
- Dimensions (LxWxH): 600 x 500 x 300 mm³
- Electrical ratings: 115 - 230 V / 50 - 60 Hz
- Noise level <70 dB(A)
- Testing speeds: 50 - 450 m/min

CloudOscope

- Weight: 20 kg
- Dimensions (HxWxD): 280 x 440 x 380 mm³
- Electrical ratings:
  Mains: 115/230 V / 50 - 60 Hz
- Temp. range: 0 - 250°C, accuracy ± 0.2°C
- Stirring speed: 0 - 2000 rpm,
  accuracy ± 1 rpm
- Turbidity range: 0 - 1000 NTU

Laray Viscometer

- Weight: 15 kg
- Dimensions (HxWxD): 410 x 450 x 300 mm³
- Sound level < 70dB(A)
- Power supply
  Input transformer: 900/240 V (3.15 AT) /
  50 - 60 Hz
- Working conditions
  Temperature: 15° - 50°C

Agent

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