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Graphic technology — Determination of tack of paste inks and vehicles by a rotary tackmeter

Technologie graphique — Détermination du tirant des encres, à l'aide d'un tackomètre rotatif

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Contents

Page

Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 130, *Graphic technology*.

This second edition cancels and replaces the first edition (ISO 12634:1996), which has been technically revised.

The document has been entirely revised with regard to instrument specifications and test method settings.

Introduction

On the market, a number of three-roller tackmeters are available that differ in design features such as roller weight, geometry and composition of the distribution system. Instruments of different types do not give the same apparent tack readings. Instruments of the same type will only give apparent tack readings within tolerance, provided that they are maintained and calibrated properly and in the same manner.

Tack is a property indicative of internal cohesion of fluids and the adhesion to surfaces. It varies with measuring conditions, primarily separation velocity, splitting area, force applied, film thickness and temperature. Tack also varies with changes in other rheological properties of the fluid as a result of time and interactions with the separating surfaces.

This document refers to tack measurement of paste inks and their vehicles only, not involving fountain solution. During offset printing, the ink on a press may contain fountain solution and form an emulsion. The amount of fountain solution within the ink partly depends on the composition of both the ink and the fountain solution, the forces present, and the relative position of the ink in the roller train. The tack of an emulsion partly depends on the composition of both the ink and the fountain solution and the ratio of ink and fountain solution.

The tack value is a well-established criterion for assessing a paste ink or vehicle, although the parameter tack is poorly defined. The tack cannot be regarded as a material property that can be derived from basic physical phenomena. However, the tack influences the behaviour of ink in a printing press.

Parameters that affect tack include:

— dimensions, hardness and elasticity parameters of elastomeric rollers;

— surface properties of rollers;

— nip pressure;

— roller speed;

— temperature of rollers and environment;

— temperature of the sample;

— ink film thickness;

— influence of the ink or vehicle on the properties of the elastomeric coverage of the rollers (e.g. absorption of solvents);

— 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.

The tack of printing inks and vehicles influences their transfer properties, as manifested by throughput in roll milling, picking of paper during printing and wet trapping in multicolour printing. Although a tack measurement does not completely predict the transfer performance of an ink or a vehicle, it provides a meaningful parameter for quality control, development and research.

Parameters that are affected by tack include:

— pick;

— ink trap;

— mottle.

Respecting all differences, this document specifies a method that allows users of comparable equipment to obtain comparable results when working under the same conditions.

The previous version of this document referred mainly to the manufacturers' recommendations for test method specifications such as speed, ink film thickness and temperature. As a result, there was a huge increase in the number of small differences according to user, region, instrument, etc. This new revision standardizes the settings across two platforms, Geometry A and Geometry B, for the purpose of communication. Individual users can still use the familiar settings for internal use. If the deviating settings are used for external communication, the deviation has to be described in the communication.

Mechanical instruments have been excluded from this document.

In this method, a procedure has been added to perform a periodic test with reference material to check deterioration of the materials used, such as rubbers and inks.

Graphic technology — Determination of tack of paste inks and vehicles by a rotary tackmeter

1 Scope

This document specifies the test procedure for determining the tack value of neat paste inks and vehicles which have low volatility and are unreactive under normal room conditions during the timespan required for testing.

This document contains a basic description of Inkometer®[1] and Inkomat®[2] (Geometry A) and TackOscope®[3] and TackTester®[4] (Geometry B).

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 187, *Paper, board and pulps — Standard atmosphere for conditioning and testing and procedure for monitoring the atmosphere and conditioning of samples*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— IEC Electropedia: available at http://www.electropedia.org/

— ISO Online browsing platform: available at http://www.iso.org/obp

3.1
breaking-in
<roller conditioning> preparation process for new rollers where these are running in an (or another) ink system to condition the *elastomer* (3.10) until constant readings are achieved

3.2
central roller
temperature controlled metallic roller used in a three-roller tack tester for ink distribution and as ink transfer roller to the *measuring roller* (3.7)

3.3
distribution roller
elastomer covered roller used in a three-roller tack tester for ink distribution over the *central roller* (3.2)

1) Inkometer® is an example of a suitable product available commercially. This information is given for the convenience of users of this document and does not constitute an endorsement by ISO of this product.

2) Inkomat® is an example of a suitable product available commercially. This information is given for the convenience of users of this document and does not constitute an endorsement by ISO of this product.

3) TackOscope® is an example of a suitable product available commercially. This information is given for the convenience of users of this document and does not constitute an endorsement by ISO of this product.

4) TackTester® is an example of a suitable product available commercially. This information is given for the convenience of users of this document and does not constitute an endorsement by ISO of this product.

3.4
flying
ink fly
tendency of a printing *ink* (3.5) or vehicle to be ejected as large globules from a roller distribution system

Note 1 to entry: Flying is generally most severe during rapid roller acceleration, which occurs when switching immediately from zero (or a slow speed) to a high-operating speed. After some time of running, no more flying appears and the ejected droplets become a mist and eventually, an aerosol.

3.5
ink
fluid to be tested under the conditions of this document

Note 1 to entry: This can be a commercial printing ink, a modified ink for the purpose of the test, a vehicle, a varnish or other materials which create a tack reading under the conditions as specified in this document.

3.6
ink system
range of *inks* (3.5) which are comparable with regard to varnish system and liquid base

Note 1 to entry: For paste inks, there are, e.g. oxidative/setting and UV curing systems. Different ink systems generally require the use of different elastomer materials to avoid interaction of inks and elastomeric materials on short and long term.

3.7
measuring roller
elastomer covered roller used in a three-roller tack tester connected to the measuring device of the tack tester

3.8
misting
tendency of a printing ink or vehicle to be ejected as fine droplets from a roller distribution system

Note 1 to entry: Misting is generally most severe at high operating speeds and with fluids that produce long filaments. After a longer running time, the mist becomes so fine that it creates an aerosol.

3.9
reference material
liquid with well-known tack properties, used to execute a reference test on a regular basis or for comparative testing

Note 1 to entry: *Inks* (3.5) and *rubbers* (3.10) change properties in time. To prevent jumps in results between current and new materials, they should be tested at least once together.

Note 2 to entry: A distinction can be made between reference material, as material with well-known and publicly available specifications and control material which is kept for comparison only and for which the absolute values do not have to be known.

3.10
rubber
elastomer
elastic material covering the *distribution* (3.3) and the *measuring rollers* (3.7)

Note 1 to entry: In practice, some elastomers are rubber and some may be produced from polymeric materials. In common use, the word rubber is used for both.

3.11
tack
restoring force between two rotating rollers of a given width caused by the splitting of an *ink* (3.5) or vehicle film on rapidly separating roller surfaces

Note 1 to entry: Tack is a property indicative of internal cohesion of the fluid. It is not a fixed number but varies with operating conditions, primarily separation velocity, splitting area, force applied by the measuring roller and film thickness. Tack also varies with changes in other rheological properties of the ink or vehicle as a result of time, temperature and interactions with the separating surfaces. Different manufacturers' tackmeters may use different tack scales.

3.12
tackmeter squeal
high-pitched whine or squeal noted when running high tack fluids or at high rotating speeds or both

Note 1 to entry: A squeal usually results in unstable readings or in unreliable/wrong values. If readings are taken where squeal occurs, this has to be recorded in the report.

4 Apparatus

4.1 Applicability

This document describes the method as used on the models of the current testers. Most of the described procedures will also be applicable in analogy to older models but may require additional steps to be executed or recalculation of settings to bring them into conformance with this document. It is important to contact the supplier to confirm compliance with this document before using devices of (very) old age or of non-standard construction. The mechanical instruments have been excluded from this document. This document is based on the content of ASTM D4361.

4.2 Tackmeter

An electrically driven device to generate a uniform ink film with well-known thickness over the surface of all three rollers to be used to measure splitting forces (tack) of fluids. It shall consist of:

— a metallic central roller which is electrically driven with a constant, adjustable speed; the speed can be expressed in m/min or in revolutions per minute. The central roller shall be temperature controlled with an accuracy of ±0,1 °C;

— an elastomer covered distribution roller which shall oscillate during the ink distribution and may oscillate during the measurement phase of the tack measurement;

— an elastomer covered measuring roller;

— a force sensor capable to measure the force induced by the ink on the roller system in at least three relevant digits;

— a tack reading mechanism by means of a display, computer, printer, recorder or a combination thereof;

— a calibration device for the specific tackmeter.

The ink distributing surface area A of the rollers shall be known to the nearest 0,1 cm^2.

The distributing surface area A is calculated as shown in Formula (1):

$$A = \sum_{1}^{n} (\pi \times d_n \times l_n) \quad (1)$$

where

d_n is the diameter of roller number (n);

l_n is the effective (ink containing) length of roller number (n);

n is the number of rollers.

4.3 Central roller

Metallic roller with an internal temperature conditioning system with a diameter as specified in Annex B for either Geometry A or Geometry B.

4.4 Distribution roller

An elastomer covered roller, with a specified weight and diameter as specified in Annex B for either Geometry A or Geometry B and a width of the measuring roller plus more than twice the oscillation distance as specified in the instruments datasheet. The hardness of the covering shall be in conformance with Annex B. Different rollers for conventional or energy-curing applications shall be used. The roller shall be broken-in according to Annex C.

Elastomers deteriorate with use and time; the device shall therefore be positioned in a location with no direct sunlight. The elastomer-covered rollers shall be covered by an opaque cover when not in use and shall be replaced before deterioration starts to influence the results.

Depending on the solvent used and the cleaning procedure, the surface of the roller may sooner or later become glazed. In this case, the roller has to be cleaned carefully with a suitable solvent or has to be replaced because of the ink transfer or ink distribution and, with these, the tack will be considerably affected.

Deterioration might be recognized by cracks, glazing, changing hardness, the increase of distribution time, uneven ink distribution or inability to zero the instrument. Replace the roller no later than three years after its first use.

4.5 Measuring roller

An elastomer covered roller with a diameter as specified in Annex B and a width in correspondence with the width of the central roller as specified in Annex B. It shall have a hardness of the covering in conformance with Annex B. Different rollers for conventional or energy curing applications shall be used. The roller shall be broken-in according to Annex C.

Elastomers deteriorate with use and time; the device shall therefore be positioned in a location with no direct sunlight. The elastomer-covered rollers shall be covered by an opaque cover when not in use and shall be replaced before deterioration starts to influence the results.

Depending on the solvent used and the used cleaning procedure, the surface of the roller may sooner or later get glazed. In this case, the roller has to be cleaned carefully with a suitable solvent or has to be replaced because of the ink transfer or ink distribution and with these, the tack will be considerably affected.

Deterioration might be recognized by cracks, glazing, changing hardness, the increase of distribution time, uneven ink distribution or inability to zero the instrument. Replace the roller no later than three years after its first use.

4.6 Ink pipette

An ink pipette for applying an accurate quantity of ink to the distribution roller, with a resolution of at least 0,01 ml, but preferably 0,001 ml.

The ink application may vary from operator to operator. For that, it is recommended to verify the applied amount of ink from the ink pipette on a regular basis for very high accuracy.

4.7 Additional materials and devices

4.7.1 Cleaning aids

Lint-free rags or soft tissues.

It is practical to use white or light-tinted materials to be able to see if there is still ink coming off from the cleaned roller.

4.7.2 Solvents

In accordance to the ink and the elastomeric materials used, e.g.:

— for conventional inks, petroleum ether with a boiling range of 80 °C to 140 °C and a Kauri-Butanol value of 30 to 40 and less than 1 % benzene content, white spirit;

— for UV inks ethyl alcohol, iso-propylalcohol or ethylacetate or other suitable solvents.

NOTE 1 The supplier can be contacted for information concerning the correct solvents to prevent damage which will result in differences in ink transfer.

Cleaning liquids containing surfactants or non-volatile components shall not be used or a second solvent shall be used to remove the residue.

NOTE 2 The majority of the standard cleaning solvents for rubber blankets for printing presses contain preservatives or surfactants for the blanket which evaporate very slowly, if at all. Evaporation times may be over 1 h which makes these unsuitable for the purpose of these tests.

NOTE 3 It has to be recognized that the same cleaning solvents are sold in different countries under different brand names and that solvents with the same name may have different ingredients in different countries.

The test results depend on the dryness and cleanliness of all the rollers. The drying time of a roller after cleaning, depends on the evaporation rate and on the penetration of the solvent into the surface of the roller. Never let an ink or a vehicle dry completely on the rollers of the tackmeter. Take care not to damage the rollers during the cleaning process or by leaving them in contact when they are not rotating.

4.7.3 Timer

A timer or stopwatch with an accuracy of 1 s.

4.7.4 Temperature control system

An integrated or external system to control the temperature of the roller system. The system shall be able to control the temperature of the rollers to within ±0,1 °C of the set temperature.

Due to the internal friction of the ink on the roller system, the system also generates heat by itself, so the system shall be able to heat or chill the roller.

4.7.5 (Analytical) balance

An (analytical) balance with an accuracy of at least 0,01 g to weigh the required amount of ink in case no use is made of an ink pipette.

4.7.6 Reference materials

Reference inks or liquids to execute a reference test on a regular basis. Inks and elastomers change properties in time. To prevent jumps in results, current and new materials shall be tested at least once together. The reference materials should be chosen by the user in accordance with his specific needs.

This combination of materials can be used in a process calibration, not in instrument calibration. Reference can also be made through comparative testing round robins.

4.7.7 Thermometer

A (remote) thermometer or pyrometer to measure the temperature of the central roller while running.

4.7.8 Ink knife

Small blade, free from nicks and rough edges.

4.8 Inks

Depending on the purpose of the test, different types of ink or vehicles are normally used.

5 Principle

A rotary tackmeter consists of a roller system of at least three rollers. One roller, the central roller, is driven by a motor while another, the measuring roller, is connected to a sensor measuring the force at which the roller is displaced from its equilibrium position. The third, the distribution roller, is an oscillating roller used for sample distribution. Measurement of the restoring force induced by the splitting of the ink or vehicle film provides a value of tack.

A thin film of the test printing ink or vehicle is applied to the distribution roller of the tackmeter, which operates at speeds comparable to those on the roller trains of production printing presses. Readings may vary from instrument supplier to instrument supplier and from geometry to geometry.

The procedures in this test method are designed to give a single value for tack at a specific set of instrument conditions. Different film thickness and speeds are specified for Geometry A and Geometry B. Alternative conditions may be used by agreement between the supplier and the customer.

Depending on the geometry and model, the tack is determined with a direct-reading attachment, a digital readout, printer, computer or a recorder.

6 Conditioning, sampling and sample preparation

6.1 Calibration

Before regular use, the tackmeter shall be calibrated according to the manufacturer's instructions. Additionally, a routine test is recommended using an internal standard ink or vehicle or a reference ink with known performance. Never turn or push the zero button except during the calibration process. If the tack reading without ink is not below the minimum values specified in the manufacturer's documentation, this may be caused by one of the following: cleaning, aging, environment, location with respect to heat or air draught, levelling, temperature and calibration. These aspects shall be evaluated in the sequence listed here. Part of a regular calibration or test procedure can be a reference test as described in Annex A.

6.2 Conditioning (breaking-in) of the tackmeter rollers

After installation or when new rollers are installed, the elastomeric rollers need to be stabilized before use by repeated runs with material of the type to be tested. These runs shall be repeated until tests of a reference ink or vehicle show consistent results. In normal use with properly stabilized rollers, the tackmeter shall be conditioned by a preliminary run using ink or vehicle of the type to be tested in accordance with Annex C. If the ink or vehicle to be tested affects the roller material (e.g. radiation curable inks), separate sets of dedicated rollers shall be used.

6.3 Sampling

The sampling procedure is not covered by this document.

Make sure that the test samples taken are representative of the sample received or of the total lot to be evaluated.

Carefully select a sample which shall be homogenous and it shall not contain any coarse particles or skin. An amount of 10 ml is sufficient for two or three measurements including a conditioning test. Transfer to a clean container, protect with skin paper, close and seal.

6.4 Sample conditioning

Condition the samples to be tested as indicated in ISO 187 and keep them in the conditioned atmosphere throughout the test. Where it is recognized that the humidity does not influence the tack, the RH requirement can be omitted.

7 Procedure

7.1 Preparation and instrument settings

a) Operate the testers in accordance with the manufacturer's instruction manual provided with the instruments.

b) All tests shall be executed in a conditioned room in accordance with ISO 187. Where it is recognized that the humidity does not influence the tack, the RH requirement can be omitted.

   Humidity control is necessary for test samples that are sensitive to moisture or prone to misting.

c) Locate the tackmeter on a sturdy bench in a draft-free environment, out of direct sunlight. Level the tackmeter carefully on the bench.

d) Select the appropriate rubber rollers for the ink system to be used. Use only an instrument having rollers well broken-in for the type of ink system. The break-in procedure is given in Annex C. A separate set of broken-in rollers is mandatory for energy-curing systems. The necessity for separate sets of broken-in rollers or for extensive reconditioning when switching among different types of ink systems shall be determined in each laboratory.

e) Select the test in accordance with the application.

f) Set the temperature control system to the target temperature of (32,0 ± 0,2) °C. Make sure the central roller has the set temperature after a few minutes. If the temperature is set on an external water bath, this may require a slightly different temperature setting on the water bath controller. If the tackmeter does not have an internal temperature sensor, use an external pyrometer.

   Specific materials or applications may require temperature settings different from the value above. In this case, the settings shall be agreed upon between parties and they shall be recorded and communicated with the results.

g) When ready to conduct the test, transfer 1,5 ml to 2 ml of sample from the container to a clean glass plate; reseal and close the container. Gently shear the sample with an ink knife but do not aerate. Fill the ink pipette, taking care to avoid air bubbles from becoming trapped inside.

h) Before the first measurement of the day and before using a different ink system, clean all rollers and make a roller conditioning run of at least 10 min with an ink film of about 10 µm or more with a sample of an ink comparable to the ink to be used or with the ink to be tested. After the run, clean the roller system.

Referring to h), the ink film thickness is not important for the test. It should be sufficient to prevent it from drying within 10 min and causing another cleaning session. An alternative method is to make an additional test and discard the first result. This method may, however, not be suitable for a different ink system.

i) Bring the measurement roller and the distribution roller in contact with the central roller.

j) To reach temperature equilibrium, let the rollers run without ink the first time before starting the test, for at least 15 min at a low speed, for repeated tests. If the temperature control system has been switched on, this time can be reduced to 5 min. A further reduction of the running time is acceptable as long as the temperature equilibrium is reached.

7.2 Settings for specific tests not mentioned explicitly in this document

For some tests, using specific inks with high viscosity or other materials not being an ink or not having common ink properties, a different temperature or different speeds may be required. The temperature, speed and measuring times to be used shall be agreed upon with the end-user and shall be recorded.

Set the speed and temperature to the speed and temperature in accordance with the instructions of the standard or method for the test to be executed or to the mutually agreed settings. The set speed shall be recorded in the report.

Set the time of the test in accordance with the instructions of the standard or method for the test to be executed or the mutually agreed times. The time(s) shall be recorded in the report.

7.3 Inking of the central roller

An appropriate amount of ink shall be applied to the distribution roller. The exact amount of ink is specified in this document or the method describing the specific purpose of the test. It is recognized that for specific inks, other materials or specific test methods, a different ink film thickness is required. This shall be agreed upon between parties and recorded and communicated with the results. The ink amount can be specified in volume or in weight, depending on the application. To accurately apply a specific volume of the ink, an ink pipette shall be used. The required amount can be derived from the documentation provided with the equipment or calculated from Formula (1) and the specified ink film thickness.

Table B.1 provides the two volumes for an initial ink film thicknesses of 12,7 µm for Geometry A devices and 4,0 µm for Geometry B devices respectively. The occurrence of appreciable flying or misting will result in loss of sample volume from the rollers. Hence, the operating film thickness may be unknown.

NOTE 1 The exact amount of ink on each roller depends on a number of factors: adsorption of the roller, temperature of the ink, speed, weight of the measuring roller, roughness and condition of the roller, release factor of the rubber and some secondary factors like cleanliness of the rollers, ink distribution time and time between different steps of the process. As a consequence, the amount of ink applied does not guarantee a certain ink film on all the rollers.

The application of the ink shall be done in at least three stripes across the width of the distribution roller, evenly spread over the circumference of this roller, not closer than 10 mm from the edge of the roller. The required distribution time depends on the speed of the distribution, the side-wise oscillation of the roller, the diameter of the rollers and the application of the stripes of ink on the roller.

The distribution time shall be chosen as short and as constant as possible, preferably controlled by the device itself. If the unit is not equipped with such facility, a separate timer shall be used. Leaving the ink too long on the device and prolonged running at high speed will cause ink type dependent changes in the properties of the ink due to misting, drying and evaporation of the components. Appropriate time for ink distribution shall be chosen to ensure a homogeneous distribution of the ink. Once the time has been determined, this time shall be recorded and used for all tests. A common distribution time is 30 s.

NOTE 2 Although the ink distribution is done at low speed, it has to be recognized that a large amount of ink splitting takes place during this time and that the thixotropic behaviour can change. For critical applications or quick drying inks, it may be necessary to record the tack on a recorder or a PC from an earlier time than 30 s.

Solvent used to clean the rollers may penetrate into the coverage of the rollers. Time shall be allowed to ensure full evaporation of the solvent. To ensure this, it is recommended to bring the rollers in contact with the central roller immediately after cleaning and let them run at low speed continuously.

Evaporation of the solvents draw most of the energy required from the surface of the roller, therefore, metal rollers may cool several degrees while drying, especially while using fast evaporating solvents. The rollers shall be allowed to reach temperature equilibrium again before the next use, by letting them run for sufficient time but at least 3 min.

The transfer characteristics of rubber rollers can change for a variety of reasons. Among these are:

— using them for different applications or ink systems;

— bad cleaning practice;

— unsuitable cleaning solvents;

— storage and ageing.

Under circumstances, it is possible to restore the condition of a roller using the breaking-in procedure as described in 6.2 and Annex C.

7.4 Measuring tack

a) Set the temperature of the roller system to (32,0 ± 0,2) °C or to the mutually agreed temperature.

b) Set the testing speed of the device to 100 m/min or 400 r/min or to the mutually agreed speed.

Settings other than the specified 100 m/min or 400 r/min may be useful/necessary. These shall be mutually agreed between parties, recorded and communicated with the results. Common other settings are 200 m/min or 800 r/min for sheet-fed inks, 300 m/min or 1200 r/min for heatset offset inks.

NOTE To convert to linear speed in m/min, multiply r/min by 0,24; to convert to r/min, multiply m/min by 4,3.

c) Set the distribution time to 30 s (if automated). It may be required to use shorter distribution times. In this case, extra care shall be taken to the application of the ink on the rollers to ensure that the ink is fully distributed after the distribution time. Distribution times below 10 s are not recommended. Any deviating setting shall be recorded and communicated with the results.

d) Set the measuring time to be sufficiently long to accommodate j) to l) (if automated).

For several inks, the tack changes very soon after the start of the test. For this, it is recommended to read the tack after 10 s. The normal test requires 60 s. Many inks also change tack relatively fast. To get a more accurate indication of the tack behaviour, it is useful to read again after a slightly longer time of 120 s. The three values together describe the tack behaviour for most inks sufficiently.

e) Lift the measurement roller and the distribution roller.

f) Apply on the distribution roller in at least three stripes across the width of the roller for Geometry A, an amount of ink required to produce a film with a (12,7 ± 0,02) µm thickness and for Geometry B, an amount of ink required to produce a film with a (4 ± 0,02) µm thickness. In case a different ink film thickness is required by the type of material under test, this shall be agreed between parties and the values shall be recorded and communicated with the results.

g) Start the distribution.

h) After 30 s, engage the measurement roller (if not automated).

i) If the measurement tack squeal appears, the tack reading may become unstable or completely wrong. In that case, a different setting may solve the problem. The appearance of tack squeal shall be recorded in the report.

j) Read the tack T10 at 10 s after the start of measurement if deemed useful. If not deemed useful or another time is more appropriate, this shall be agreed by the parties and documented with the results.

k) Read the tack T60 at 60 s after the start of measurement.

l) Read the tack T120 at 120 s after the start of measurement if deemed useful. If not deemed useful or another time is more appropriate, this shall be agreed upon by parties and documented with the results.

m) Stop the measurement.

n) Clean the rollers carefully.

o) Disengage the rollers.

p) Repeat the test two more times.

If any of the requirements from this procedure is changed, this shall be recorded and communicated.

8 Evaluation

Calculate the mean of the measured values as Tm*t* for each of the measurements at the particular times. Where *t* is the time in s, e.g. Tm10 is the mean of the three T10 values, Tm60 is the mean of the three T60 values and Tm120 is the mean of the three T120 values.

9 Report

The report shall contain the following:

— a reference to this document, i.e. ISO 12634;

— the purpose of the test;

— the exact date and time of the test;

— the measuring apparatus, manufacturer and type;

— the room temperature and RH;

— the speed, instrument temperature, distribution time and measuring times settings;

— the type of rollers;

— the ink volume in millilitres or the ink layer thickness in micrometres (µm) and/or the ink mass in g, together with the specific mass of the ink;

— the means of all measuring results;

— the ink (designation, supplier, batch number, mass/specific density);

— any deviations from this document;

— any observations made during the test, e.g. occurrence of ink fly, misting or tackmeter squeal;

— any operations not specified in this document which might have influenced the result (e.g. solvent, drying times, type of balance, etc.).