

**Testing of adhesives
for their deposition propensity
in PM dryer sections****1 Purpose and scope of application**

This INGEDE Method is designed to evaluate the propensity of adhesives to form deposits in the dryer sections of paper machines. It relies on adsorption mechanisms at metal plates to simulate the deposition behaviour. The method is intended for the assessment of pressure sensitive labels and of filtrates containing a sufficient amount of finely dispersed and colloidal adhesive particles.

2 Equipment

The following items are required for testing:

- Standard disintegrator according to ISO 5263
- Rapid-Köthen handsheet former according to DIN 54358 (02.81)
- Mercury lamp
- Fluorescence stereo microscope
- Beakers
- Drainage screen (150 µm) in filter chamber (e.g. freeness tester)
- Potato press
- Frit, Ø 90 mm, with suction flask and water pump
- Paper filter, Ø 90 mm, e.g. Selecta round filter No. 595
- Mirror-finished chromium-plated metal plate, Ø 120 mm
- Paper cover sheets and carrier board according to DIN 54 358
- Colorant: Fluorol 7Ga LC5550, supplier: Lambda Physik
- Bleached long fibre pulp

3 Sampling and sample preparation

Samples are prepared to obtain a filtrate containing only finely dispersed and colloidal substances (particle size < 150 µm).

Using tap water, 12 g sample material is defibrated for a period of 5 minutes in a standard disintegrator at a speed of 3000 min⁻¹, 4 % consistency and a temperature of 40 °C. When testing samples to study their behaviour during treatment of recovered graphic papers, deinking chemicals are added into the disintegration process. The deinking chemicals used are 0.6 % of 100 % NaOH, 0.7 % of 100 % H₂O₂, 1.8 % alkali silicate solution and 0.8 % of 100 % oleic acid in relation to o.d. pulp.

After disintegration, the fibre suspension is transferred completely to a beaker and diluted to a volume of 1,333 ml using 40 °C water, which corresponds to a consistency of 0.9 %.

Coarsely dispersed particles (fibres, macro stickies etc.) are separated by dewatering in a drainage screen (freeness tester). A large number of substances are obtained in the filter cake. The filter cake is then mechanically dewatered once more using a commercial potato press. The filtrate obtained is again transferred to the drainage screen.

4 Adsorption at metal plates

After obtaining finely dispersed substances from the sample material, 12 g bleached chemical pulp are transferred to the disintegrator and mixed during 5 min with the filtrate containing potentially sticky particles. Per suction filter, 33.5 g of the fibre suspension are diluted to 500 ml using tap water. Using a fibreglass filter, two handsheets are formed in a frit of 90 mm diameter. The aim is to produce an extremely sticky-laden sheet with a grammage of approximately 60 g/m².

The filter papers are carefully and completely removed from the handsheets without damaging the filter cake.

To simulate deposition in the dryer section on a laboratory scale, the suction filter side of the sheet is covered with a flat, mirror-glazed chromium plated metal plate. The sheets are dried in a Rapid-Köthen drying cabinet at a temperature of 93 ± 4 °C for 8-10 minutes. When dry, the sheet is carefully removed from the plate, leaving the metal plate with more or less stickies adsorbed to it.

5 Evaluation

For evaluation, the hydrophobic particles adsorbed at the metal plate are stained with a fluorescent colorant (Fluorol 7Ga LC5550, supplier: Lambda Physik) which selectively adsorbs primarily at hydrophobic particles. Non-adsorbed colorant is removed by rinsing with de-ionised running water.

The fluorescent particles are then visually assessed under ultraviolet light in a fluorescence stereo microscope. The images magnified $\times 100$ are evaluated on an xy-table which enables a number of areas to be viewed simultaneously. The amounts of particles adsorbed at the plates and which are visible under the microscope are assessed qualitatively. They are categorised into high, average and low amounts of adsorbed

material according to a scale. Two plates per sample are taken as a basis for classification.

It is recommended using reference plates with high and low amounts of adsorbed stickies to facilitate categorisation.

6 Test report

The test report shall include the origin of the original sample, the sample pre-treatment, the assessment of the quantity of adsorbed material, and peculiarities, if any (e.g. a strikingly large number of small or large areas, or filming).

7 Comments

The INGEDE Method was developed and tested under the INGEDE projects 46 96 PTS "*Studies into the deposition behaviour of potentially sticky material in recovered paper treatment and in the paper machine*" and 53 97 PTS "*Studies into the behaviour of redispersible adhesives during recovered paper treatment including their accumulation in circuit waters and products*".

8 Sources

ISO 5263: Pulps – Laboratory wet disintegration
DIN 54358-T01: Preparation of laboratory sheets for physical testing – Rapid-Köthen method (in German)

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