INGEDE Method 7	Visual inspection for recovered paper for deinking Unbaled delivery	INGEDE International Association of the Deinking Industry

April 2009

8 Pages

Introduction

For paper mills using recovered paper for deinking, the quality of recovered paper is very important. Therefore it is desired to inspect as many deliveries as possible. Gravimetric inspection is very accurate but also time consuming. However, the time available for entry inspection is relatively short.

This method provides a practical, quick, reliable and impartial procedure to quantify the portion of unusable material and the composition of a delivery. It mainly applies to recovered paper grade 1.11 according to EN 643 but can also be used for other grades.

1 Scope

This INGEDE method describes a procedure to visually inspect the quality of recovered paper for deinking which is delivered unbaled. The method is suitable for assessing the main components of a recovered paper delivery and for contents of total unwanted material from 1 % to 8 %.

2 Terms and definitions

Reference surface:

Surface of a pile of recovered paper after unloading which is used for the visual inspection.

3 Principle

The method describes the inspection of unbaled deliveries of recovered paper with visual counting of unwanted material and subsequent conversion to their content by weight. The portion of accepted papers is visually assessed by estimation. Both conversion and estimation need verification by a gravimetric inspection on a regular basis

4 Equipment and auxiliaries

Option: Moisture measuring device

5 Procedure

The following quality parameters are to be checked: general condition at the time of delivery, odour, mould and rotting, recovered paper composition (percentages of the various accepted papers and unusable materials), moisture, and age.

The conditions mentioned below are applicable to entry inspection as a whole unless specified otherwise in the instructions for individual control parameters.

5.1 Inspection site and conditions for inspection

5.1.1 Location

Entry inspection may either be performed in warehouse halls or outdoors. Visual inspections carried out outdoors may be strongly affected by the prevailing weather conditions.

5.1.2 Illumination

The reference surface should be exposed to antiglare, neutral white illumination with a nominal light intensity of 200 lux (minimum).

5.1.3 Reference surface

It is essential to keep the reference surface constant or – if this is not possible – to relate the results to the standard reference surface. The standard reference surface depends on the plant premises and should measure at least 30 m^2.

The recovered paper should be performed preferably after unloading unless it is obvious that this particular delivery is to be refused.

With dump trucks and 20 ft. containers with a volume of about 33 m^3, an unloading angle smaller than 60° and simultaneous forward motion of the truck during unloading usually ensure sufficient loosening up of the recovered paper delivery and, at the same time, a surface of the pile of about 30 m^2.

For walking floor trucks or container sizes which result in a different surface of the unloaded material it has to be ensured that the inspection surface is related to the standard reference surface.

5.1.4 Distance for inspection

The reference surface should be observed from a distance not exceeding 2 metres.

5.1.5 Observation Inspection angle

The inspection angle should be as close as possible to 90 degrees.

5.2 Behaviour of the recovered paper during unloading

An assessment of the general condition of the delivered recovered paper requires observation of the unloading process at close range in compliance with applicable safety provisions. During unloading, particular attention is to be paid to untypical sounds, recovered paper flow behaviour and formation of dust. Untypical sounds are indicative of contaminated containers or major fractions of non-paper components. The moisture content of the delivered paper affects flow behaviour and sounds to be perceived when the paper hits the ground during unloading. Formation of dust may indicate an incorrect disposal at press rooms or extended storage prior to delivery. The perception of untypical behaviour should trigger a more thorough inspection.

5.3 Odours, mould and rotting

The unloaded delivery should be examined at close range from various sides. Particular attention is to be paid to untypical odours and indications of mould and rotting. Untypical odours comprise all odours which are not characteristic of paper and may be attributed to cross contamination or mould. Reasons for these can be unsuited collection systems, organic waste, excessive moisture, unsuited storage and so on.

5.4 Recovered paper composition

With this method, a characterisation of recovered paper according to the following list is possible:

- Accepted paper
  - Newspapers
  - Magazines
  - Other accepted papers
- Total unwanted material
  - Unwanted papers
    - Unbleached papers and boards
    - Dyed papers
    - Papers not suitable for deinking
    - Laminated papers
    - …
  - Non-paper components
    - Light non-paper components
    - Heavy non-paper components

As a minimum, the inspection should differentiate between total unwanted material and accepted papers. More details according to the list is possible. If a further detailing is desired, it should be done by gravimetric inspection according to INGEDE Method 14.

Examples for further details:

Other accepted papers: Catalogues, flyers, office papers.

Light non-paper components: CD’s, plastic bags, hard plastics, other synthetic materials, synthetic papers, textiles.

Heavy non-paper components: Glass, metal, wood, sand, building materials.

All data provided refer to the complete delivery unless stated otherwise. Attention has to be paid that the total of all components assessed add up to 100%.

If the delivery contains a significant amount of papers not suitable for deinking, a more thorough inspection or further analyses are recommended.

5.4.1 Assessment of unwanted material

The most important step is the assessment of the fractions of unwanted papers as well as of non-paper components.

The numbers of items of any of these components visible on the observation surface are counted. For unwanted papers, the unit for counting are size equivalents of ISO A 4 format; for non-paper components, the unit for counting are weight equivalents of 100 grams.

Subsequent conversion to weight is to be done by means of conversion tables or by weighting factors (see Annex), thus yielding the proportion of the individual components in weight per cent.

5.4.2 Assessment of accepted papers

If no further detailing is wanted, the portion of accepted papers is 100% minus the portion of total unwanted material.

For a more detailed assessment of the accepted paper, their composition is to be estimated. It is recommended to start with the proportion of papers which are not newspapers, magazines or the like.

Following that, newspaper and magazine fractions are assessed. If this is done by estimating the newspaper/magazine ratio (e.g. 60:40, total = 100) the results have to be related to their real content by taking the contents of the other fractions – unwanted material and other accepted papers – into account.

Flyers inserted in newspapers are calculated as newspapers.

5.5 Moisture

Optionally, moisture can be checked. At five representative spots distributed as evenly as possible along the sides of the pile of unloaded recovered paper, moisture tests are to be carried out which are able to detect potential conspicuous moistening. In the case of excessive moistening, the moisture content should be measured.

5.6 Age

Optionally, the age of the prints can be determined. Inspection staff is to pick one sample newspaper of legible date of issue from each of five representative and evenly distributed spots along the sides of the recovered paper pile. The newspaper’s age is then determined by the number of months between the date of issue and the delivery date.

6 Report

The inspection report should comprise the following data:

Clear identification of delivery:

- Log number / weight number / order number
- Date and time of delivery
- Supplier company
- Recovered paper grade according to delivery documents
- Kind of delivery (loose or bales)

Optional:

- Recovered paper grade according to inspection
- Sorting place / point of collection / source
- Shipping company
- Licence plate number / wagon number
- Name / signature of inspector

Analytical result:

- Sum of unwanted material
- Noticeable defects according to age / moisture

Optional:

- More differentiation see 5.4 (INGEDE Method 7) resp. 4.2 (INGEDE Method 14)
- Comments

In cases of refused deliveries, photographs showing the evidence provide a helpful tool

7 References

7.1 Cited Standards and methods

EN 643 – European List of Standard Grades of Recovered Paper and Board

ISO 287 (EN 20287) – Paper and board – Determination of moisture content – Oven-drying method

INGEDE Method 14 – Gravimetric determination of recovered paper composition

7.2 Literature and other related documents

European Declaration on Paper Recycling 2006 - 2010;
www.paperrecovery.org/publications/erpc_publications.asp

Guidelines" Responsible Management of Recovered Paper";
www.paperrecovery.org/publications/erpc_publications_positions.asp?folderid=513#:

- Guidelines on responsible sourcing and quality control
- Guidelines for Responsible Sourcing and Supply of Recovered Paper
- Recovered Paper Quality Control, Guidelines
- Best Practices for the Global Inspection of Recovered Paper
- Best Practices: Recovered Paper Baling Conditions
- Guidelines for paper mills for the control of moisture content in recovered paper
- Guidelines for paper mills for the control of the content of unusable materials in recovered paper

7.3 Sources

This method was published for the first time in December 1999. Harald Hiltensberger, at that time of Haindl Papier Schongau, had provided the major contribution.

Contact:
INGEDE e. V. (International Association of the Deinking Industry)
Office
Gerokstr 40
74321 Bietigheim-Bissingen, Germany
Tel. +49 7142 7742-81
Fax +49 7142 7742-80
E-Mail office@ingede.org
www.ingede.org

Annex

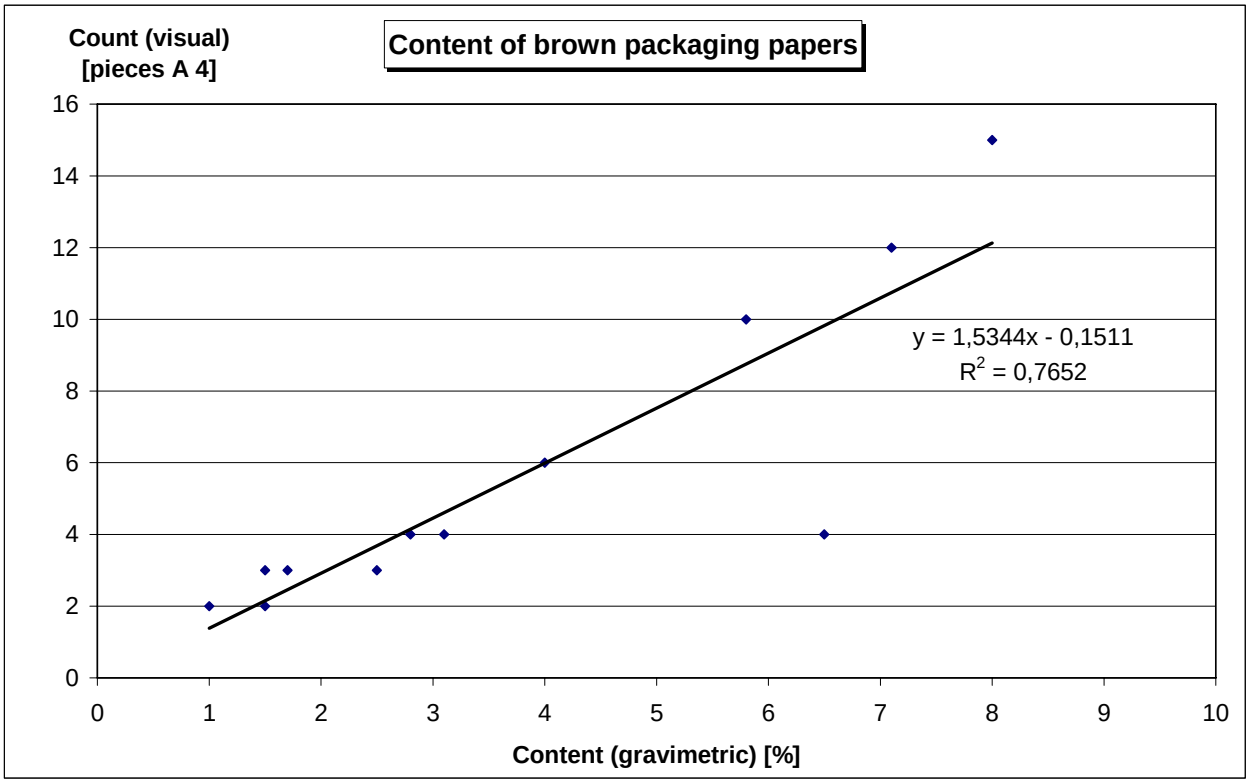
Gravimetric verification

1 Development of conversion systems for unwanted materials

When starting with the utilisation of INGEDE Method 7 every user has to start from the very beginning. It is not feasible to use conversion tables or weighting factors from other mills or plants.

Deliveries have to be inspected both visually – counting in case of unwanted material, estimation in case of accepted papers – and gravimetrically. The pairs of data received by comparing the same parameters give a correlation of the visual vs. the gravimetric result.

Example: Brown packaging



Correlations are considered acceptable if the coefficient of correlation r is superior to r = 0.75 (equivalent to $R^2 = 0.5625$).

Attention: Both conversion tables and weighting factors are only valid for a certain reference surface. This surface has to be clearly indicated on the documents.

1.1 Conversion tables

The most common method is using conversion tables. These can be set up by using the correlations for the individual parameters and the equation of the regression line ($y = m * x + c$) where x is the gravimetric content and y is the visual count. In order to calculate the gravimetric content from the visual result, it is necessary to transform the equation to: $x = (y - c) / m$. Alternatively, the gravimetric content y may be determined geometrically by using the correlation chart. A ready made conversion table can look like follows

Parameter	Unit											
Packaging paper & board	Pieces A 4	0	1	2	3	4	5	6	7	8	9	10
	% by weight	x_{p0}	x_{p1}	x_{p2}	x_{p3}	x_{p4}	x_{p5}	x_{p6}	x_{p7}	x_{p8}	x_{p9}	x_{p10}
Dyed papers	Pieces A 4	0	3	6	9	12	15	18	21	24	27	30
	% by weight	x_{d0}	x_{d1}	x_{d2}	x_{d3}	x_{d4}	x_{d5}	x_{d6}	x_{d7}	x_{d8}	x_{d9}	x_{d10}
Other unwanted papers	Pieces A 4	0	3	6	9	12	15	18	21	24	27	30
	% by weight	x_{o0}	x_{o1}	x_{o2}	x_{o3}	x_{o4}	x_{o5}	x_{o6}	x_{o7}	x_{o8}	x_{o9}	x_{o10}
Heavy non-paper components	100 gr equivalents	0	0,2	0,4	0,6	1	1,5	2	3	5	7	10
	% by weight	x_{h0}	x_{h1}	x_{h2}	x_{h3}	x_{h4}	x_{h5}	x_{h6}	x_{h7}	x_{h8}	x_{h9}	x_{h10}
Light non-paper components	100 gr equivalents	0	0,2	0,4	0,6	1	1,5	2	3	5	7	10
	% by weight	x_{l0}	x_{l1}	x_{l2}	x_{l3}	x_{l4}	x_{l5}	x_{l6}	x_{l7}	x_{l8}	x_{l9}	x_{l10}

1.2 Weighting factors

Alternatively to conversion tables, weighting factors can be used. The weighting factor is the reciprocal of the slope m of the regression line.

1.3 Regular check of the conversion system

The data obtained from the gravimetric verification should also be used to regularly check the correctness of the conversion system. These checks are recommended every 100 verifications. With these checks it is possible to detect systematic or creeping mutations of the conversion tables or weighting factors. Since the reasons for these mutations are multiple, it is up to the users to decide about the proper actions – be it more training of the inspection staff, optimising the inspection site, adaptation of the conversion system and so on.

2 Estimation of accepted papers composition

Determining the composition of the accepted papers is done by estimating since counting is not feasible for their usually large amount. Proper estimation requires more training for the inspection staff than proper counting. The estimation can be regarded as sufficient if the relative deviation from the gravimetric content is not higher than 20 %.