

INTERNATIONAL
STANDARD

ISO
5350-2

Second edition
1998-08-15

**Pulp — Estimation of dirt and shives —
Part 2:
Inspection of mill sheeted pulp**

*Pâtes — Estimation des impuretés et bûchettes —
Partie 2: Examen des pâtes en feuilles*



Reference number
ISO 5350-2:1998(E)

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 5350-2 was prepared by the European Committee for Standardization (CEN) in collaboration with ISO Technical Committee TC 6, *Paper, board and pulps*, Subcommittee SC 5, *Test methods and quality specifications for pulp*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This second edition cancels and replaces the first edition (ISO 5350-2:1990), of which it constitutes a technical revision.

ISO 5350 consists of the following parts, under the general title *Pulp — Estimation of dirt and shives*:

- *Part 1: Inspection of laboratory sheets*
- *Part 2: Inspection of mill sheeted pulp*
- *Part 3: Inspection by reflected light*

Annex A forms an integral part of this part of ISO 5350. Annex B is for information only.

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Foreword

The text of EN ISO 5350-2:1998 has been prepared by Technical Committee CEN/TC 172 "Pulp, paper and board", the secretariat of which is held by DIN, in collaboration with Technical Committee ISO/TC 6 "Paper, board and pulps".

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by January 1999, and conflicting national standards shall be withdrawn at the latest by January 1999.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

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Introduction

This European Standard is based on visual inspection, and an informative Annex B is added where the inspection is performed using instrumental devices. This is justified by the present state of instrumental development. For the time being, the visual inspection is the main part of this European Standard and the instrumental procedure forms an Annex B. This will eventually be changed when more experience with instrumental devices is gained and it has been shown that such equipment can estimate dirt and shives to an acceptable level of precision at least equal to visual inspection.

Estimation of dirt and shives by a visual technique is a well established method in the pulp and paper industry and the estimation of these contraries is important for trade purposes.

1 Scope

This part of EN ISO 5350 specifies the method for the estimation by transmitted light of dirt and shives in pulp manufactured in sheets. It does not apply to unbleached kraft pulps or to any other sheeted pulps that are too opaque to allow for the estimation of the minimum size or for minimum contrast specks to be counted in accordance with this European Standard. The maximum grammage for most pulp sheets is in the range 800 g/m² to 1000 g/m².

Part 1 of this European Standard deals with the estimation of dirt and shives in all kinds of pulp. It is based on inspection of laboratory sheets.

NOTE: Even by the use of this part of the European Standard the opacity of the pulp sheet may not allow for all of the contraries to be counted. It is recommended to ensure that all contraries are visible by marking a small spot at the surface of the sheet, and checking the visibility of this spot when viewing the sheet from the other side.

This European Standard is not intended for recycled pulp.

2 Normative References

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

EN ISO 5350-1

Pulp – Estimation of dirt and shives – Part 1: Inspection of laboratory sheets (ISO 5350-1 : 1998)

EN 20638

Pulps – Determination of dry matter content (ISO 638 : 1978)

EN 27213

Pulps – Sampling for testing (ISO 7213 : 1981)

3 Definitions

For the purposes of this European Standard, the following definitions apply:

3.1 sheet: a sheet of pulp taken from a bale, or a part of a roll of pulp.

3.2 test piece: an area taken for inspection.

3.3 contrary (in pulp): any unwanted particle, of specified minimum size and having a contrasting opacity, with respect to the surrounding area of the sheet, according to the comparison chart given in Annex A.

3.3.1 dirt: any non-fibrous contrary.

3.3.2 shive: sliver of wood, or fibre bundle.

4 Principle

The test pieces to be examined are inspected in transmitted light. The area of all contraries larger than a specified value and showing contrasting opacity, with respect to the surrounding area of the sheet, according to the comparison chart presented in annex A are estimated. The areas of the contraries are added and the total area of dirt and shives is reported as square millimetre per kilogram of oven-dry pulp (mm²/kg).

NOTE: If required, the areas of dirt and shives in different classes can also be reported.

5 Apparatus

5.1 Viewing table with an illumination device suitable for inspecting the test pieces in transmitted artificial daylight. The luminance as measured at the surface of the viewing table, shall be 2500 cd/m² to 3000 cd/m². Daylight or direct light from any external source should be avoided.

NOTE: The luminance can be measured by a luminance meter.

5.2 Comparison chart: A film with a series of black and grey spots of different shapes, areas and contrasts. This shall be used for visual inspection or for calibration of an instrumental device. The chart is included in Annex A of this European Standard.

6 Preparation of sample

6.1 Sampling

If the dirt count is to represent the dirt in a lot of pulp, the number of sheets to be inspected and the method of taking them shall be in accordance with EN 27213.

6.2 Selection of areas for inspection

In order to ensure that the results are representative of the sample received, take a number of areas (test pieces) evenly distributed over both sides and over the different parts of the sample so that the total mass to be inspected is at least 300 g, the total area not being less than 0,5 m².

NOTE: The specks are likely to be unevenly distributed in the pulp and the result can vary considerably depending on how the test pieces are selected. It is important that these areas are evenly distributed over the whole sample if this is larger than 300 g oven-dry pulp.

It is very time consuming to examine a pulp with a very high dirt count, so if it is found by a preliminary test that the number of contraries exceeds 300 per kilogram oven-dry pulp, the amount to be inspected can be reduced to 100 g oven-dry pulp. This shall be reported with the result.

7 Procedure

7.1 Determination of dry matter content

Determine the dry matter content of the sample in accordance with EN 20638.

7.2 Wetting of the sample

Evenly wet the test pieces in order to make them transparent. Wetting of the test pieces may be omitted if the sheets are transparent enough to ensure that all contraries are visible, but omission of the wetting procedure shall be reported together with the result.

7.3 Examination

Examine the test pieces (6.2) visually using the viewing table. Use the comparison chart in Annex A as an aid. Only contraries having an area of $\geq 0,04 \text{ mm}^2$ shall be noted.

Classify the contraries according to their area. Distinguish between dirt and shives if required. Ensure that no contraries are counted twice.

Do not count any atypical, non representative piece of dirt, such as a crushed insect or a blotch of dirt, but report it separately together with the result.

7.4 Classification of contraries

It is usual to report only the total area, though when required the contrary area in each class can be reported. In this case the classification given in table 1 shall be used. Size class 5 can be deleted if agreed upon, but this shall be stated in the test report.

Table 1: Recommended classification of contraries according to area

size class	area mm^2	logarithmic mean area mm^2
1	above 5	-
2	1,00 to 4,99	2,234
3	0,40 to 0,99	0,629
4	0,15 to 0,39	0,242
5	0,04 to 0,14	0,075

8 Expression of results

8.1 Calculation

For all contraries (or separately as dirt and shives) calculate the total area, or the area in each size class according to the formula:

$$X = \frac{\sum c_i \cdot n_i}{b} \quad (1)$$

where

X is the total area of contraries (or of the contraries in each class), expressed in square millimetre per kilogram (mm^2/kg) of oven-dry pulp;

c_i is the logarithmic mean area of each class, indicated in table 1, expressed in square millimetre (mm^2);

n_i is the number of contraries in the class;

b is the oven-dry mass of the test pieces, expressed in kilogram (kg).

The logarithmic mean areas are given in table 1.

For contraries exceeding 5 mm^2 $c_i \cdot n_i$ is replaced by the contraries' true areas, which shall be evaluated separately for each contrary and stated in the report.

NOTE: The logarithmic mean area of a class is justified, as there is a tendency towards enrichment of contraries towards the lower limit of the class.

EXAMPLE

If 8 contraries are counted within the size class 0,15 to 0,39, their area $c_i \cdot n_i$ is calculated as follows:

$$8 \times 0,242 \text{ mm}^2 \approx 1,9 \text{ mm}^2$$

8.2 Results

Report the total area of contraries to the nearest integer. Results below 5 mm²/kg shall be reported to one decimal place.

NOTE: On request, the result can be expressed separately for each size class, or separately for dirt and shives. However, if the count is reported by categories, the categories containing few contraries will be subject to much higher sampling uncertainty.

8.3 Precision

It is difficult to obtain exact precision data for a visual dirt count because of the subjective nature of the test method. However, five laboratories, by circulating three sets of pulp sheets, found coefficients of variation between 17 % and 61 % with a mean of 49 %. The mean area of contraries was 36 mm²/kg.

9 Test report

The test report shall refer to this European Standard and state:

- a) all information necessary for complete identification of the sample or lot;
- b) the grammage of the pulp sheets (as estimated);
- c) the result expressed in square millimetre of contraries per kilogram of oven-dry pulp. On request, the result can be divided into classes according to size and/or nature, i.e. dirt or shives;
- d) the mass of pulp inspected in grams;
- e) information whether the result is based on visual inspection or on an instrumental procedure;
- f) any optional points observed in the course of the test;
- g) any departure from this European Standard, or any circumstances regarded as optional that may have affected the result.

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Annex A (normative)

Comparison chart

Use the chart here enclosed.

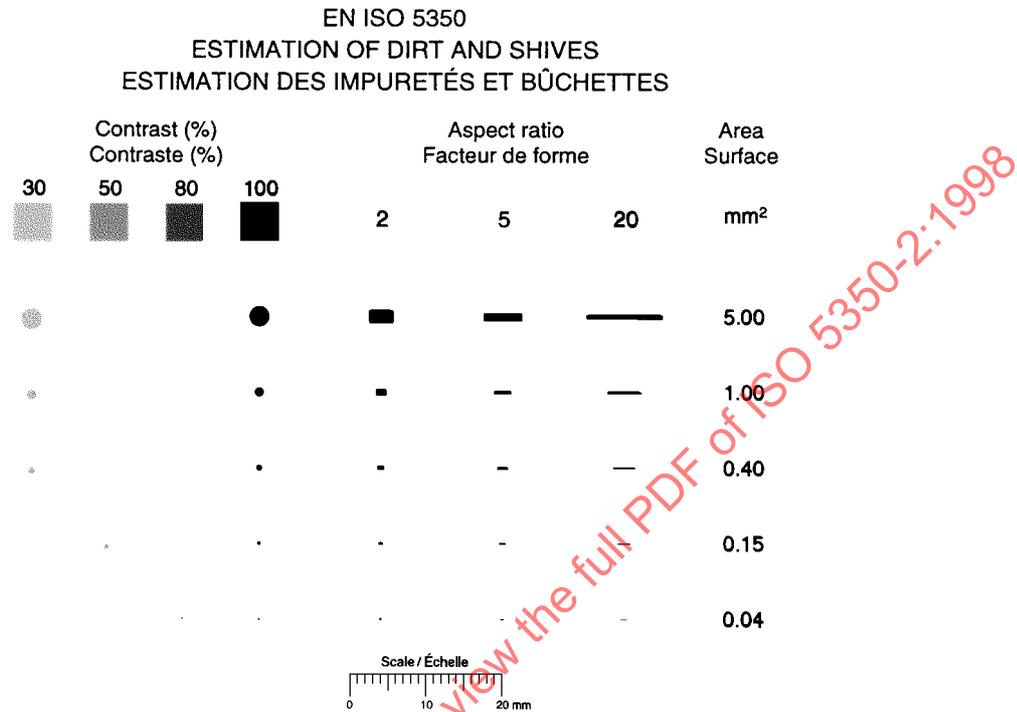


Figure A.1: EN ISO 5350 Pulp – Estimation of dirt and shives, Comparison chart

NOTE: In the official three language versions of this European Standard this chart will be in the form of a positive film and will be enclosed in an envelope attached to this page.

The left part of the chart is intended for calibration of an instrumental device and as an aid for visual inspection. The spots having the minimum contrast to be considered in each size class are indicated, i. e. 30 %, 50 % and 80 % minimum contrast for contraries equal to or larger than respectively 0,40 mm², 0,15 mm² and 0,04 mm².

The spots on the right hand indicate contraries of different aspect ratios. The contrast ratio is 100 %. This part of the chart is to be used as an aid for size classification.

Copies of this part of ISO 5350 printed by ISO include a comparison chart reproduced on transparent film (see 5.2). Users having only an electronic copy, or a printed copy reproduced from an electronic copy, may obtain an original transparent film comparison chart from the ISO Central Secretariat (price code: A).

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