
**Pulps — Estimation of dirt and shives —
Part 3:
Inspection by reflected light**

Pâtes — Estimation des impuretés et bûchettes —

Partie 3: Examen par lumière réfléchie



Foreword

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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 5350-3 was prepared by Technical Committee ISO/TC 6, *Paper, board and pulps*, Subcommittee SC 5, *Test methods and quality specifications for pulp*.

ISO 5350 consists of the following parts, under the general title *Pulps — 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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Introduction

This part of ISO 5350 is complementary to ISO 5350-1, which concerns inspection of laboratory sheets by transmitted light and ISO 5350-2, which concerns inspection of mill sheets by transmitted light.

NOTE — The result of inspection by reflected light represents only the number of specks visible on the surface, or near the surface of the pulp sheet. Particles which are embedded in the sheet might not be detected.

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Pulps — Estimation of dirt and shives —

Part 3: Inspection by reflected light

1 Scope

This part of ISO 5350 specifies a method for the estimation by reflected light of the visible dirt and shives in pulps. It is in principle applicable to all kinds of dry pulp delivered in sheets or rolls.

NOTE — Pulps with an apparent high dirt count are preferably inspected by instrumental means.

2 Normative reference

The following standard contains provisions which, through reference in this text, constitute provisions of this part of ISO 5350. At the time of publication, the edition indicated was valid. All standards are subject to revision, and parties to agreements based on this part of ISO 5350 are encouraged to investigate the possibility of applying the most recent edition of the standard indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 7213:1981, *Pulps — Sampling for testing*.

3 Definitions

For the purposes of this part of ISO 5350, the following definitions apply.

3.1 dirt: Any non-fibrous particle which is visible on the sheet, and which has a marked contrast or colour with respect to the rest of the sheet.

3.2 shive: Sliver of wood, or fibre bundle, which is visible and which has a colour in contrast with the rest of the sheet. A shive usually has an aspect ratio (ratio of maximum length to minimum width) of at least 3:1 with a long axis of 1 mm or greater.

4 Principle

The samples to be investigated are inspected on both sides in reflected light, and specks (dirt and shives) larger than or equal to 0,15 mm² are counted and classified according to area. The specks are expressed either as the number in each class or as the total area per square metre of pulp.

By special agreement, dirt and shives as small as 0,04 mm² may be included.

5 Apparatus

5.1 Illumination device, a suitable light source or a viewer for the investigation of the sheets in reflected light. The light must be strong enough to ensure the detection of all specks larger than 0,15 mm² (or 0,04 mm²). A lamp with a magnifying lens may be used. The viewer illustrated in annex B is an example of such a device.

For grooved pulp sheets, care should be taken to position the light source so that pulp ridges do not cast shadows.

5.2 Comparison chart, with a series of spots of different shapes and areas on a transparent film. This chart is included in this part of ISO 5350 (see annex A).

Do not use the illustration in annex A (or any copy thereof) because reproduction may change the size of the specks.

5.3 Template: depending on the design of the illumination device, one or two auxiliary templates may be useful. These can be made, for example, of black paperboard, opaque plastic, or steel. See 6.2.

6 Preparation of sample

6.1 Sampling

If the count is to represent the dirt and shives in a lot of pulp, the number of sheets to be inspected and the method of selecting them shall be in accordance with ISO 7213. This requires the sampling of at least 10 bales or rolls with one specimen being randomly selected from each bale or roll, avoiding the sheets at the top and bottom of the bale or the outside of the roll. The total area of each specimen shall be at least 0,25 m² to provide a total surface area for inspection of at least 0,5 m², both sides included. See note 1 in 6.2.

The areas to be inspected must not be touched by bare hands. Avoid contamination from dust etc. As a protection, place additional sheets on top and bottom of the sheets to be inspected.

6.2 Selection of areas for inspection

Mark a number of areas of known size distributed over the different parts of each specimen, with equal representation of both sides, so that the total area to be inspected is at least 0,5 m².

NOTES

1 The specks may be unevenly distributed in the pulp and the result can vary considerably depending upon how the areas to be inspected are selected. It is important that the areas for inspection are distributed over the whole specimen if the specimen is larger than 0,5 m², both sides included.

2 It is very time-consuming to examine big areas of dirty pulp. Therefore, the area to be inspected can be reduced in some cases. Proceed with samples of dirty pulp as follows: make a rough estimation of the number of specks on one-half of the area to be investigated (0,25 m²). If the number exceeds 50, the area to be inspected may be reduced to 0,25 m², both sides included. The use of a suitable template facilitates the inspection of the area to be inspected.

7 Procedure

Examine the areas selected for counting. Use the comparison chart (5.2) to estimate the area of each speck. Record the estimated area of each individual speck.

When counting specks in a grooved pulp sheet, the sheet should be viewed from directly above, at right angles to the plane of the sheet, in order to eliminate the effect of the sheet area represented by the sides of the grooves.

Combine the areas of the counted specks to give the speck area for the whole inspected sample area.

If, however, the number of specks is to be reported separately for certain groups, combine the numbers of the specks in the groups given below.

Group	Area mm ²
1	> 5,00
2	1,00 – 4,99
3	0,40 – 0,99
4	0,15 – 0,39
5	0,04 – 0,14

If necessary, circle the specks to ensure that all specks are counted and none is counted twice.

If a speck is visible in the selected areas on both sides, it should be counted twice.

Disregard specks smaller than 0,15 mm² or 0,04 mm² (see note 1 below).

NOTES

- 1 Specks smaller than 0,15 mm² are not counted unless a special agreement is made to include all dirt larger than or equal to 0,04 mm².
- 2 The dirt and shives may be counted separately if required.
- 3 During the count, if an atypical piece of dirt is encountered, which is obviously unusual, for example, a crushed insect or a blotch of dirt which is definitely determined as not being representative of the sample (ascertained by looking over additional sheets), ignore it.

8 Expression of results

Calculate the dirt and shives content using the formula

$$X = \frac{a}{b}$$

where

- X is the dirt and shives content, expressed in square millimetres per square metre of surface of pulp;
- a is the total area of specks found in the inspected sample area, expressed in square millimetres;
- b is the inspected sample area, expressed in square metres.

Alternatively, calculate the number of specks for every group separately using the formula

$$Y = \frac{c}{b}$$

where

- Y is the dirt and shives content in the group concerned, expressed in number per square metre of surface of pulp;
- c is the number of specks of dirt and shives found in the inspected area, in the classified group;
- b is the inspected sample area, expressed in square metres.

Report the total area of dirt and shives or, if necessary, the number of specks in the different groups in accordance with clause 7 and to the nearest unit.

9 Test report

The test report shall give the following particulars:

- a) all the information necessary for complete identification of the sample or lot;
- b) reference to this part of ISO 5350;
- c) the results, expressed in square millimetres of specks per square metre of pulp sheet surface, or expressed as the number of specks, separately for each group, per square metre of pulp;
- d) if the result is to represent the dirt and shives in a lot of pulp, list the results for the separate bales (in addition, the average numbers may be given);
- e) any particular points observed in the course of the test;
- f) any departure from this part of ISO 5350, or any circumstances regarded as optional that may have affected the results.

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Annex A (normative)

Comparison chart

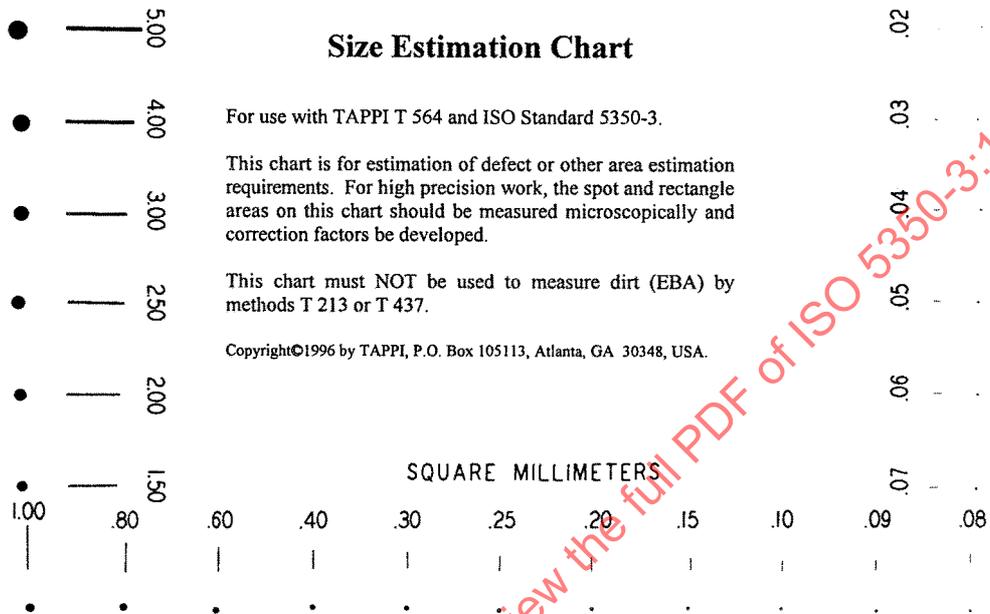


Figure A.1

NOTES

- 1 The use of this transparent chart will yield results different from charts which have an opaque background.
- 2 This chart differs from the charts included in ISO 5350-1 and ISO 5350-2. This is due to the difference in the principle of the three parts of ISO 5350. The results are expressed as numbers of specks (dirt and shives) in the given classes in ISO 5350-1 and ISO 5350-2, while they are expressed also as areas of specks in this part of ISO 5350. Therefore, there is a need for a more detailed comparison chart in this part of ISO 5350. The concept of area of specks will be introduced in future revisions of ISO 5350-1 and ISO 5350-2 and consequently the comparison charts will then be revised.

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) or from the copyright owner, TAPPI (price to be discussed directly with TAPPI).

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