INTERNATIONAL STANDARD

ISO 5269-1

Third edition
2005-02-01

Pulps — Preparation of laboratory sheets for physical testing —

Part 1: Conventional sheet-former method

Pâtes — Préparation des feuilles de laboratoire pour essais physiques —

Partie 1: Méthode de la formette conventionnelle

Reference number
ISO 5269-1:2005(E)

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Published in Switzerland

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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. 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.

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.

ISO 5269-1 was prepared by Technical Committee ISO/TC 6, *Paper, board and pulps*, Subcommittee SC 5, *Test methods and quality specifications for pulps*.

This third edition cancels and replaces the second edition (ISO 5269-1:1998), of which the Introduction, Clauses 1, 2, 5 and 7 and the Bibliography have been revised.

ISO 5269 consists of the following parts, under the general title *Pulps — Preparation of laboratory sheets for physical testing*:

— *Part 1: Conventional sheet-former method*

— *Part 2: Rapid-Köthen method*

Introduction

It has been agreed that the ultimate aim of standardization of the preparation of laboratory sheets should be to develop one method which is internationally acceptable and which, if possible, permits the use of different types of sheet-making apparatus.

For practical reasons, it has not proved possible to achieve this at present. Therefore, as an interim measure, in view of the widespread use of equipment described in this part of ISO 5269, it has been decided to provide agreed guidance on the use of different types of equipment in order to achieve consistency of results with each method.

To avoid creating too many levels of results, the method specified in this part of ISO 5269 should preferably be used with the Valley beater or PFI mill methods of laboratory beating according to ISO 5264-1 and ISO 5264-2, respectively. The method specified in ISO 5269-2[2] (Rapid-Köthen method) should preferably be used with the PFI mill method of laboratory beating according to ISO 5264-2.

Pulps — Preparation of laboratory sheets for physical testing —

Part 1:
Conventional sheet-former method

1 Scope

This part of ISO 5269 specifies a method, using a conventional sheet former, for the preparation of laboratory sheets of pulp for the purpose of carrying out subsequent physical tests on these sheets in order to assess the relevant properties of the pulp itself.

This part of ISO 5269 is applicable to most kinds of pulp. It is not suitable for some pulps with very long fibres, such as those made from unshortened cotton, flax and similar materials.

This method is not suitable for the preparation of laboratory sheets for the determination of diffuse blue reflectance factor (ISO brightness) in accordance with ISO 3688[1].

WARNING — When long-fibred pulp is used in the unshortened form, the sheet formation may not always be satisfactory.

2 Normative references

The following referenced documents are indispensable for the application 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*

ISO 3310-1, *Test sieves — Technical requirements and testing — Part 1: Test sieves of metal wire cloth*

ISO 5263-1, *Pulps — Laboratory wet disintegration — Part 1: Disintegration of chemical pulps*

ISO 5263-2, *Pulps — Laboratory wet disintegration — Part 2: Disintegration of mechanical pulps at 20 °C*

ISO 5263-3, *Pulps — Laboratory wet disintegration — Part 3: Disintegration of mechanical pulps at* $\geqslant$ *85 °C*

ISO 5264-1, *Pulps — Laboratory beating — Part 1: Valley beater method*

ISO 5264-2, *Pulps — Laboratory beating — Part 2: PFI mill method*

ISO 5635, *Paper — Measurement of dimensional change after immersion in water*

ISO 8787, *Paper and board — Determination of capillary rise — Klemm method*

3 Principle

A circular, square or rectangular sheet is formed from a pulp suspension on a wire screen under suction. The sheet is subjected twice to a pressure of 410 kPa. The sheet is dried in conditioned air and in contact with a drying plate, to which it adheres so that it does not shrink.

4 Equipment

4.1 Sheet former, consisting of three main parts.

4.1.1 Upper section, comprising a stock container, with a mark located 350 mm ± 1 mm above a wire screen (see 4.1.3). It is furnished with a rubber gasket to prevent leakage. The cross-section of the container shall be circular, square or rectangular, and constant throughout the height. If the container is rectangular, the shorter side shall be not less than 120 mm and the ratio of the longer to the shorter side shall not exceed 2,5. If the container is circular, it shall be not less than 158 mm in diameter. It shall be of such height that water will not splash over the edge when the stirrer (4.2) is operating.

4.1.2 Lower section, comprising a drainage vessel, consisting of an upper and a lower part. The upper part shall have the same cross-section as the stock container (see 4.1.1), and its shape shall be such that the flow of liquid through the wire screen is uniform over the whole area. The lower part may be of smaller cross-section but shall be positioned symmetrically in relation to the upper part. The lower part shall be fitted with a valve, which is connected to a draining pipe with a water seal at its lower end. The vertical distance from the top of the wire screen to the overflow of the water seal shall be 800 mm ± 5 mm. The lower part and the drainage valve shall be large enough to permit water in the stock container between the level mark and the wire screen to empty within 4,0 s ± 0,2 s. The lower part of the drainage container shall be provided with a water inlet tube. The design shall incorporate a means of releasing vacuum after the sheet has been formed.

4.1.3 Frame, with a perfectly flat, plain-woven metallic wire screen, to be placed horizontally between the upper section (4.1.1) and the lower section (4.1.2). The screen shall be clean, undamaged and fitted without wrinkles and corrugations. It shall have a nominal size of aperture of 125 µm, according to ISO 3310-1. The preferred diameter of the wire shall be 90 µm with a permissible range between 77 µm and 104 µm. The wire screen is backed by a coarser wire screen, which, in turn, may be backed by a rigid framework.

4.2 Stirrer, made of any non-corroding, rigid material, consisting of a perforated plate and furnished with vanes to keep the plate parallel to the wire screen (see 4.1.3) and to minimize swirling during stirring. The total area of the holes (diameter 10 mm to 20 mm) shall be about 30 % of the area of the plate; the holes shall be evenly spaced. The dimensions of the plate shall be such that there is a clearance of 2 mm to 3 mm between the plate and the stock container (see 4.1.1). All edges shall be rounded and smoothed to avoid the accumulation of fibres. The stirrer shall also have a stop that maintains a distance of about 20 mm between the wire screen and the plate in its lowest position.

An air agitation system may be used, provided that it produces bubbles of sufficient size and that they do not cling to the fibres or cause pin-holes in the sheet.

NOTE The following is an example of an agitation system. It uses compressed air and has at least eight inlet holes, each with a diameter of 1,0 mm ± 0,2 mm and equally spaced (max. 70 mm) in the upper section (4.1.1). The distance between the inlet holes and the wire screen is 10 mm ± 2 mm when the sheet former is operating. The inlet holes are connected to each other by air channels, 8 mm in diameter, located parallel to the sides of the sheet former so that the depth of the inlet holes (wall thickness) is 5 mm ± 2 mm. The air pressure is regulated to 100 kPa above atmospheric pressure. The agitation time is 5,0 s ± 0,5 s.

4.3 Couching equipment, comprising either

a) **a couch weight** having a plane bottom of the same area as the wire screen (see 4.1.3) and having a mass corresponding to a pressure of between 1 kPa and 5 kPa on the surface of the laboratory sheet; or

b) **an automatic couching system,** comprising a diaphragm to which air pressure is applied; or

c) **a couch roll** (mass 13,0 kg, length 178 mm, diameter 102 mm) and a couch plate to protect the sheets.

Unless an automatic couching system is used, a couch plate shall be used to protect the sheet from distortion when the couch weight is placed on it. The total mass of the couch plate and couch weight shall be within the limits given above.

4.4 Blotters, made of fully bleached chemical pulp or rag pulp, having neutral pH, and free from sizing agents, chemical additives, visible contraries and fluorescent contaminant (see Note 1). The blotters shall have the same dimensions as the laboratory sheets or, if the laboratory sheets are circular, neither the length nor width of the blotters shall be less than the sheet diameter nor shall the area of the blotters exceed that of the sheet by more than 35 %. If the sheets are square or rectangular, no blotter dimension in the plane of the blotter shall be less than the corresponding sheet dimension nor shall the area of the blotters exceed that of the sheet by more than 35 %. The grammage of the blotters shall be 250 g/m^2 ± 25 g/m^2; the Klemm absorbency, measured in accordance with ISO 8787, shall be 70 mm ± 20 mm and the dimensional changes caused by soaking, measured in accordance with ISO 5635, shall not exceed 3 % in any direction. The water uptake of the blotters shall be 450 g/m^2 ± 50 g/m^2.

The water uptake is determined as follows. Weigh a conditioned test piece, 40 mm × 40 mm, and immerse it in deionized or distilled water at 23 °C for 2 s. After removal, drain the test piece by holding it vertically from one corner for 30 s and determine the difference in mass before and after immersion. Calculate the water uptake as the mass of water absorbed, in grams per square metre of conditioned blotter.

NOTE 1 For sheets made of highly beaten pulps, the wet strength of the blotters may be insufficient. In such cases, blotters containing wet-strength agents may be used, but only if it has been proved that these agents do not infiltrate the laboratory sheet. If the blotters contain wet-strength agents, this should be mentioned in the test report.

NOTE 2 Practical tests have shown that, in some cases, the blotters can have a wide absorbency variation across the sheet and that this can result in wrinkled sheets.

4.5 Drying plates, of the same size as the formed sheet, made of corrosion-resistant metal or another suitable material, such as rigid plastic, glazed or polished on at least one side. The surfaces of the drying plates should be such that the wet sheets adhere easily to them. The plates shall be flat and free from any perceptible bulges or distortions.

4.6 Template, to facilitate the stacking of laboratory sheets. This shall be designed to fit the shape of the laboratory sheets and to ensure that they are placed centrally on each other in the press (4.8).

4.7 Separating plates, of the same size as the blotters (4.4) or larger, made of corrosion-resistant material or plastic, to separate laboratory sheets of different kinds. The use of separating plates is optional.

4.8 Press, capable of exerting a uniform pressure of 410 kPa ± 10 kPa over the area of a laboratory sheet and of maintaining this pressure for 5 min. The maximum number of laboratory sheets to be pressed simultaneously shall be adjusted to the capacity of the press.

4.9 Means to keep the test sheets in close contact with the drying plates (4.5) during the entire drying so that the laboratory sheets do not shrink. (See also Note 1 in 6.3.)

4.10 Conditioning cabinet or **suitable room,** with adequate air circulation, capable of maintaining the same atmospheric conditions, specified in ISO 187, as those under which the sheets will be tested. During the period when the sheets are still wet, the relative humidity may be allowed to exceed the limit and the temperature may be allowed to fall a few degrees below the limit.

5 Preparation of sample

Unbeaten pulps shall be disintegrated in accordance with ISO 5263. If the sample is a chemical pulp, disintegrate in accordance with ISO 5263-1, if the sample is a mechanical pulp not exhibiting any latency, disintegrate in accordance with ISO 5263-2, and if the sample is a mechanical pulp that exhibits latency, disintegrate in accordance with ISO 5263-3. Laboratory beaten pulps shall be treated as specified in the relevant International Standard (ISO 5264-1 or ISO 5264-2). Slush pulps taken from mill streams do not require any pretreatment.