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Pulps — Preparation of laboratory sheets for physical testing —

Part 3: Conventional and Rapid-Köthen sheet formers using a closed water system

Pâtes — Préparation des feuilles de laboratoire pour essais physiques —

Partie 3: Formettes conventionnelle et Rapid-Köthen, à circuit d'eau fermé

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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 5269-3 was prepared by Technical Committee ISO/TC 6, *Paper, board and pulps*, Subcommittee SC 5, *Test methods and quality specifications for pulps*.

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*

— *Part 3: Conventional and Rapid-Köthen sheet formers using a closed water system*

Introduction

This part of ISO 5269 specifies two procedures for the preparation of laboratory sheets using a closed water system; one based on the conventional sheet former and the other on the Rapid-Köthen sheet former. Since the two procedures are based on different principles for forming and drying of the sheets, the results from testing of laboratory sheets prepared using the conventional sheet former and the Rapid-Köthen sheet former will not give the same results, see Annex A. For this reason, the sheet former used shall be reported.

The purpose of the preparation of laboratory sheets is to carry out subsequent physical tests on these, in order to assess the relevant properties of the pulp itself.

This part of ISO 5269 is intended for use when preparing laboratory sheets from pulps with a high fines content, such as mechanical and chemimechanical pulps, as well as for pulps prepared from recycled fibres, for which ISO 5269-1 and ISO 5269-2, using an open water system, in general cannot be used to prepare representative sheets (see [5] in the Bibliography).

Pulps — Preparation of laboratory sheets for physical testing —

Part 3:
Conventional and Rapid-Köthen sheet formers using a closed water system

1 Scope

This part of ISO 5269 specifies two procedures for preparing a closed water system which is in retention equilibrium, to be used for the preparation of laboratory sheets from pulps with a high fines content. One procedure is applicable to the preparation of laboratory sheets using the conventional sheet former and the other using the Rapid-Köthen sheet former. The sheets prepared prior to attaining retention equilibrium are discarded.

This part of ISO 5269 is especially applicable to mechanical and chemimechanical pulps, as well as to pulps prepared from recycled fibres, i.e. pulps with a high fines content for which retention of fines is poor when using the open water system as described in ISO 5269-1 or ISO 5269-2. This part of ISO 5269 is not applicable to some very long-fibred pulps, such as those from unshortened cotton, flax and similar materials.

After retention equilibrium is attained, the preparation of laboratory sheets for testing the physical properties follows the procedures described in ISO 5269-1 (conventional sheet former) or ISO 5269-2 (Rapid-Köthen sheet former), whichever is relevant.

This part of ISO 5269 is generally not applicable for the preparation of laboratory sheets from chemical pulps for which ISO 5269-1 or ISO 5269-2 are used.

This part of ISO 5269 is not applicable for the preparation of laboratory sheets for measuring ISO brightness. These sheets can be prepared in accordance with ISO 3688[3].

NOTE The procedures for forming, pressing and drying are different when using the conventional sheet former and Rapid-Köthen sheet former, see Annex A.

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 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 ⩾ 85 °C*

ISO 5269-1:2005, *Pulps — Preparation of laboratory sheets for physical testing — Part 1: Conventional sheet-former method*

ISO 5269-2:2004, *Pulps — Preparation of laboratory sheets for physical testing — Part 2: Rapid-Köthen method*

3 Principle

White water at retention equilibrium is produced by preparing laboratory sheets of defined grammage using a closed water system.

This white water is then used to prepare the sheets which will be used for physical testing, in either the conventional sheet former or the Rapid-Köthen sheet former.

NOTE The physical properties of sheets made in accordance with this International Standard using a closed water system in retention equilibrium will differ, in general, from the properties of sheets made in accordance with ISO 5269-1 or ISO 5269-2 using an open water system.

4 Apparatus

Use either a conventional sheet former or a Rapid-Köthen sheet former.

4.1 Conventional sheet former.

All the items described in 4.1 to 4.10 in ISO 5269-1:2005, and the following.

4.1.1 Circulating water system for the conventional sheet former, consisting of a reservoir placed under the drainage vessel to collect the circulating water and a pumping system which allows the sheet former to be filled from below the wire and also from above the wire. The water in the closed water system shall be in motion to avoid sedimentation of the fines. All parts of the system that come into contact with the water shall be of a non-corrosive material (plastic or stainless steel).

4.2 Rapid-Köthen sheet former.

All the items described in 4.1 to 4.2.6 in ISO 5269-2:2004, and the following.

4.2.1 Circulating water system for the Rapid-Köthen sheet former, consisting of a water reservoir, facilities to recirculate the water and a pumping system which allows the sheet former to be filled from above the wire. The water in the closed water reservoir shall be in motion to avoid sedimentation of the fines. All parts of the system that come into contact with the water shall be of a non-corrosive material (plastic or stainless steel).

5 Preparation of sample

5.1 Disintegration

Disintegrate mechanical and chemimechanical pulps in accordance with ISO 5263-2 or ISO 5263-3, whichever is relevant. ISO 5263-3 shall be used if the pulp exhibits latency. Disintegrate pulps made from recycled fibres in accordance with ISO 5263-2.

Some chemical pulps, e.g. straw pulps, can have a high fines content. If, for that reason, this part of ISO 5269 is to be used, disintegrate the chemical pulp in accordance with ISO 5263-1.

For slush pulp taken from mill streams, follow the instructions of the relevant part of ISO 5263.

5.2 Dilution

Dilute the stock with water to a mass fraction of between 0,2 % and 0,5 %. Use the stock for forming sheets with a minimum of delay.

It is recommended to use a mass fraction between 0,2 % and 0,3 % for stocks that tend to produce flocs.

NOTE Within the limits of normal tap water, the quality of the water used does not have any influence on the physical properties of the laboratory sheets prepared.

6 Procedure for the conventional sheet former

6.1 Preparation of white water in retention equilibrium

For sheets to be used for testing the general physical properties, the grammage is 60,0 g/m^2 ± 2,0 g/m^2 on an oven-dry basis. If sheets are to be used for tests requiring another grammage, sheets shall be made to the required grammage to an accuracy of ± 3 %.

Close the water system and fill the water reservoir with tap water at room temperature, 20 °C ± 5 °C. Use the closed water system and the stock prepared in 5.2. When preparing the sheets, fill the lower section of the sheet former from the bottom with water up to the wire screen. Then fill from the top and, before the water level arrives at the mark located (350 ± 1) mm above the wire screen, add the required amount of the stock. Prepare at least 10 laboratory sheets having a nominal grammage of 60,0 g/m^2 to attain a closed water system in a state of retention equilibrium (the retention of fines). Check that the state of equilibrium is attained by weighing the dried sheets. During the build-up of the white water to retention equilibrium, the mass of the sheets increases. When the oven-dry mass of the sheets remains constant even when additional sheets are prepared, the retention equilibrium is attained. Reject the laboratory sheets prepared to attain the retention equilibrium.

If sheets of a grammage of 60 g/m^2 are required, from the mass of the last sheet, either determine the amount of stock which will produce a laboratory sheet of this oven-dry grammage, or adjust the stock concentration so that a sheet of this oven-dry grammage can be produced using a vessel of known fixed volume. Prepare the sheets in accordance with 6.2.

If sheets of a higher grammage are required, using the white water prepared above, prepare further sheets at the higher grammage until the new retention equilibrium is achieved. From the mass of the last sheet, determine the amount of stock required or adjust the stock concentration as above. Prepare the sheets in accordance with 6.2.

NOTE On a conditioned basis, the grammage of laboratory sheets having a grammage of 60 g/m^2 is approximately 65 g/m^2.

6.2 Preparation of laboratory sheets for physical testing

With the exception that the sheet former shall be filled from the bottom up to the wire screen level, and from the top from the screen up to the 350 mm mark, using the white water prepared in 6.1, use the procedure described in ISO 5269-1 and prepare laboratory sheets of the required grammage for physical testing.

Before testing, condition the laboratory sheets in accordance with ISO 187[1]. The testing should be performed in accordance with ISO 5270[4].

7 Procedure for the Rapid-Köthen sheet former

7.1 Preparation of white water in retention equilibrium

For sheets to be used for testing the general physical properties, the grammage is 75 g/m^2 ± 2 g/m^2 on an oven-dry basis. If sheets are to be used for tests requiring another grammage, the grammage is 140 g/m^2 ± 4 g/m^2, calculated on an oven-dry basis.

Close the outlet and fill the closed water reservoir with tap water at room temperature, 20 °C ± 5 °C. Start the recirculation pump. Use the closed water system and the stock prepared in 5.2 and start to prepare sheets. The sheet former is always filled from the top. Prepare at least eight laboratory sheets having a nominal grammage of 75 g/m^2 to attain a closed water system in a state of retention equilibrium (the retention of fines). Check that the state of equilibrium is attained by weighing the dried sheets. During the build-up of the white water to retention equilibrium, the mass of the sheets increases. When the oven-dry mass of the sheets remains constant even when additional sheets are prepared, the retention equilibrium is attained. Reject the laboratory sheets prepared to attain the retention equilibrium.