



JAPANESE
INDUSTRIAL
STANDARD

Translated and Published by
Japanese Standards Association

JIS P 8121-1 : 2012

(JAPAN TAPPI/JSA)

**Pulps — Determination of drainability —
Part 1: Schopper-Riegler method**

ICS 85.040

Reference number : JIS P 8121-1 : 2012 (E)

PROTECTED BY COPYRIGHT

Date of Establishment: 2012-06-20

Date of Public Notice in Official Gazette: 2012-06-20

Investigated by: Japanese Industrial Standards Committee
Standards Board
Technical Committee on Paper and Pulp

JIS P 8121-1 : 2012, First English edition published in 2013-12

Translated and published by: Japanese Standards Association
Mita MT Building, 3-13-12, Mita, Minato-ku, Tokyo, 108-0073 JAPAN

In the event of any doubts arising as to the contents,
the original JIS is to be the final authority.

© JSA 2013

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from the publisher.

Printed in Japan

PROTECTED BY COPYRIGHT

Contents

	Page
Introduction	1
1 Scope	1
2 Normative references	1
3 Terms and definitions	2
4 Principle	2
5 Apparatus and water	2
6 Preparation of sample	3
7 Procedure	3
8 Calculation and expression of results	4
9 Test report	4
Annex A (normative) Type I Schopper-Riegler apparatus	5
Annex B (normative) Maintenance of Type I Schopper-Riegler apparatus	10
Annex JA (normative) Type J Schopper-Riegler apparatus	11
Annex JB (normative) Maintenance of Type J Schopper-Riegler apparatus	14
Annex JC (informative) Comparison table between JIS and corresponding International Standard	15

Foreword

This translation has been made based on the original Japanese Industrial Standard established by the Minister of Economy, Trade and Industry through deliberations at the Japanese Industrial Standards Committee according to the proposal for establishment of Japanese Industrial Standard submitted by Japan Technical Association of the Pulp and Paper Industry (JAPAN TAPPI)/Japanese Standards Association (JSA) with the draft being attached, based on the provision of Article 12 Clause 1 of the Industrial Standardization Law.

Consequently **JIS P 8121:1995** has been withdrawn and partially replaced with this Standard.

This **JIS** document is protected by the Copyright Law.

Attention is drawn to the possibility that some parts of this Standard may conflict with patent rights, applications for a patent after opening to the public or utility model rights. The relevant Minister and the Japanese Industrial Standards Committee are not responsible for identifying any of such patent rights, applications for a patent after opening to the public or utility model rights.

JIS P 8121 series consists of the following 2 parts under the general title “*Pulps – Determination of drainability*”:

Part 1: Schopper-Riegler method

Part 2: "Canadian Standard" freeness method

Pulps — Determination of drainability — Part 1 : Schopper-Riegler method

Introduction

This Japanese Industrial Standard has been prepared based on the second edition of **ISO 5267-1** published in 1999 with some modifications of the technical contents.

The portions with continuous sidelines or dotted underlines are the matters in which the contents of the corresponding International Standard have been modified. A list of modifications with explanations is given in Annex JC.

1 Scope

This Standard specifies a method for the determination of the drainability of a pulp suspension in water in terms of the Schopper-Riegler (SR) number.

The Schopper-Riegler test is designed to provide a measure of the rate at which a dilute suspension of pulp may be dewatered. It has been shown that the drainability is related to the surface conditions and swelling of the fibres, and constitutes a useful index of the amount of mechanical treatment to which the pulp has been subjected.

In principle, this method is applicable to all kinds of pulp in aqueous suspension. However, in practice, the Schopper-Riegler test provides acceptable results only if a sufficiently dense mat of fibres is formed on the wire screen. For this reason, the test is not recommended for some extremely short-fibred pulps, such as those from well-beaten hardwoods, as most of the fibres will pass through the wire screen, resulting in anomalous reduction of the SR number. The most reliable results are obtained within the range of 10°_SR to 90°_SR number.

The results of this test do not necessarily correlate with the drainage behaviour of a pulp material on a commercial paper machine.

NOTE : The International Standard corresponding to this Standard and the symbol of degree of correspondence are as follows :

ISO 5267-1 : 1999 *Pulps — Determination of drainability — Part 1 : Schopper-Riegler method* (MOD)

The symbols which denote the degree of correspondence in the contents between the relevant International Standard and **JIS** are IDT (identical), MOD (modified), and NEQ (not equivalent) according to **ISO/IEC Guide 21-1**.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this Standard. The most recent editions of the standards (including amendments) indicated below shall be applied.

JIS P 8220-1 Pulps — Laboratory wet disintegration — Part 1 : Disintegration of chemical pulps

JIS P 8225 *Pulps — Determination of stock concentration*

NOTE : Corresponding International Standard : **ISO 4119** : 1995 *Pulps — Determination of stock concentration* (MOD)

JIS Z 8801-1 Test sieves — Part 1 : Test sieves of metal wire cloth

ISO 14487 *Pulps — Standard water for physical testing*

3 Terms and definitions

For the purpose of this Standard, the following terms and definitions apply.

3.1 Schopper-Riegler number scale

the volume of water collected from a side orifice based on this test method, expressed in °SR unit

A discharge of 1 000 ml corresponds to a Schopper-Riegler number scale of 0°SR and a discharge of 0 ml to a Schopper-Riegler number scale of 100°SR.

3.2 stock

aqueous suspension of disintegrated pulp

4 Principle

Draining, through a fibre mat formed during the test on a wire screen, of a given volume of pulp in aqueous suspension into a funnel provided with a bottom and a side orifice. Collection of the discharge from the side orifice in a measuring cylinder, graduated in Schopper-Riegler numbers. Obtaining the Schopper-Riegler number scale of the pulp by the volume of the collected discharge.

5 Apparatus and water

Ordinary laboratory apparatus and water, and the following shall be used.

5.1 Schopper-Riegler apparatus Type I or Type J Schopper-Riegler apparatus shall be in accordance with Annex A or Annex JA. The maintenance of Type I or Type J Schopper-Riegler apparatus shall be in accordance with Annex B or Annex JB.

5.2 Measuring cylinder for Schopper-Riegler number scale, having a scale for directly reading the Schopper-Riegler number.

5.3 Measuring cylinder, capable of measurement in millilitres, with an error of less than ±1.0 ml for readings up to and excluding 100 ml, less than ±2.0 ml for readings in the range of 100 ml to 250 ml and less than ±5.0 ml for readings exceeding 250 ml.

5.4 Standard water, specified in ISO 14487.

NOTE : In ISO 14487, the water purified so as to be not more than 0.25 mS/m in electrical conductivity at 25 °C is defined as the standard water.

6 Preparation of sample

The dissolved component and pH of the water used for measurement influence greatly the de-watering of pulp suspension, therefore the standard water specified in 5.4 shall be used in the test.

Take a sample of aqueous suspension of disintegrated pulp. If the concentration is not known exactly, dilute the suspension to a mass fraction of approximately 0.22 % with standard water and determine the stock concentration in accordance with **JIS P 8225**. Then dilute the suspension to a mass fraction of $0.20 \% \pm 0.01 \%$ and adjust the temperature to $20.0\text{ }^{\circ}\text{C} \pm 0.5\text{ }^{\circ}\text{C}$. Throughout the preparation of the sample, take care to avoid the formation of air bubbles in the suspension.

With time, an aqueous pulp suspension, withdrawn from the stock preparation system or laboratory pulp evaluation equipment, can undergo a change in Schopper-Riegler number. To avoid the effect of this reversion phenomenon, pulp suspensions subjected to testing more than 30 min after sampling shall first be 1.2 % to 1.5 % concentration treated in the disintegration apparatus specified in **JIS P 8220-1** for 6 000 revolutions (cumulative) of the propeller.

NOTE : The test result is sensitive to the quantity of pulp fines, or “crill”, in the suspension. Thickened pulp samples may lose some of this fibre fraction. To avoid such losses during the course of thickening, the filtrate should be recirculated through the pulp-pad until the filtrate is clear, and the pulp redispersed by disintegration apparatus as specified in **JIS P 8220-1**. This procedure should be used to concentrate dilute pulp suspension to the mass fraction required for the Schopper-Riegler test.

“Crill” refers to the fines which are produced when pulp is refined, and which include plenty of intercellular layer.

7 Procedure

Clean the funnel and drainage chamber of the Schopper-Riegler apparatus (5.1) thoroughly and finally rinse with water. Place the drainage chamber in the seat of the funnel. Adjust the temperature of the apparatus by rinsing it with water at $20.0\text{ }^{\circ}\text{C} \pm 0.5\text{ }^{\circ}\text{C}$.

Place the sealing cone in the closed position and position the SR measuring cylinder (5.2) or measuring cylinder (5.3) beneath the side orifice.

Whilst stirring, transfer $1\ 000\text{ ml} \pm 5\text{ ml}$ of homogeneous pulp suspension to a clean measuring cylinder. Mix the sample by closing the top of the cylinder by hand and turning it end-over-end for two cycles. Avoid introducing air into the stock at this stage.

Pour the sample rapidly but smoothly into the drainage chamber. In the case of using Type I Schopper-Riegler apparatus direct the stream against the shaft and the wings of the sealing cone to avoid a vortex. In the case of using Type J Schopper-Riegler apparatus, direct the stream against the shaft of the sealing cone.

Raise the sealing cone 5 s after all the pulp suspension has been added. Read the SR