

STUDY REPORT No.24.0023/1En

SUBJECT: FLUSHABILITY ASSESSMENT - IWSFG

SAMPLES / OBJECTS

Samples designation:

- Sirilclean

To note:

- Samples received at CTP on: 30/01/2024
- The above samples designation, also mentioned in this report, comes from information provided by the customer. It is not the responsibility of the CTP.
- Samples have been taken and dispatched by the customer.
- The remains of samples are kept during 3 months at least.

ORDER

Your references: Your agreement on quotation dated on 26/01/2024

Customer: M. CHRISTINAR

Company: DALIAN RUIGUANG NONWOVEN GROUP
No.2 Longshui Road
Youyi Block
Jinzhou District
116100 DALIAN
CHINA

TESTS

Laboratory: FLUSHABILITY LABORATORY

In charge of the study: Laurence LEROY

Visa

Schedule: Tests performed on weeks 08 to 12, 2024



This report concerns only the samples submitted for study.
The copy of this report is authorized in the uncut version only
This report is made of 9 pages (cover included) and 6 appendices.

CONTENTS

1. INTRODUCTION	3
2. SAMPLE REFERENCE	3
3. TESTING METHODS	3
4. RESULTS AND COMMENTS	4
5. CONCLUSION.....	8
APPENDICES.....	9

1. INTRODUCTION

The objective of this study is to evaluate a product according to IWSFG Flushability Specifications, 2020. This test protocol is published by the International Water Services Flushability Group.

The IWSFG Specification sets out 5 critical criteria that need to be addressed:

1. Environmental protection;
2. Toilet and drain line clearance;
3. Disintegration;
4. Settling; and
5. Biodisintegration

To be recognized as suitable for flushing and to be so marked, labelled or marketed, the product should meet all 5 of the critical criteria.

2. SAMPLE REFERENCE

The following product has been tested:

- **SILRICLEAN - 195 mm x 142 mm**

Sampling was performed by the customer. Sample was sent by the customer.

3. TESTING METHODS

A summary description of the tests is given below.

Additional technical information is reported on the summary sheet result.

- **Criteria 1. Environmental protection**

A fibre analysis is performed according to ISO 9184-1 through ISO 9184-5 (1990) (id TAPPI/ANSI test Method T 401 om-15). If fibers are identified as "Plastic", then the percentage by weight of the synthetic fiber identified as plastic shall be 1% or below. The sample is disintegrated, stained with specific reagents and observed under a microscope to identify synthetic fibres.

- **Criteria 2. Toilet and drain line clearance**

The purpose of the test is to determine the likelihood that a product will successfully clear toilet and drainage pipe systems.

The proposed test system consists of toilets and drainlines representative of those found in Western Europe. Each test consists of 35 toilet flushes using a specified loading sequence of product based on the habits and practices of a family of four using moist toilet tissue. This sequence includes empty flushes, product with dry toilet tissue, and product with simulated fecal matter and dry toilet tissue.

- **Criteria 3. Disintegration**

The test is performed according to IWSFG 2020 PAS 3.

The purpose of the test is to assess the potential for a product to disintegrate when it is subjected to mechanical agitation in water.

The product is placed in an oscillating box containing 4.0 liters of tap water and that is rotated at 18

rpm. After 30 minutes of oscillation, the contents of the box is passed through a 25mm perforated plate sieve, rinsed for 1 minute. Any remains of product on the top and underside surface of the sieve is recovered, visually examined and analyzed gravimetrically. 5 replicates are performed.

- **Criteria 4. Settling**

The purpose of the test is to assess whether a product settles in septic tanks, onsite aerobic systems and settling chambers that are associated with municipal wastewater treatment plants.

The test product is cut into 100mm x 100mm squares, flushed through a test drainline before adding into a beaker with 1 liter of tap water and introduced in a column filled with tap water.

- **Criteria 5. Biodisintegration**

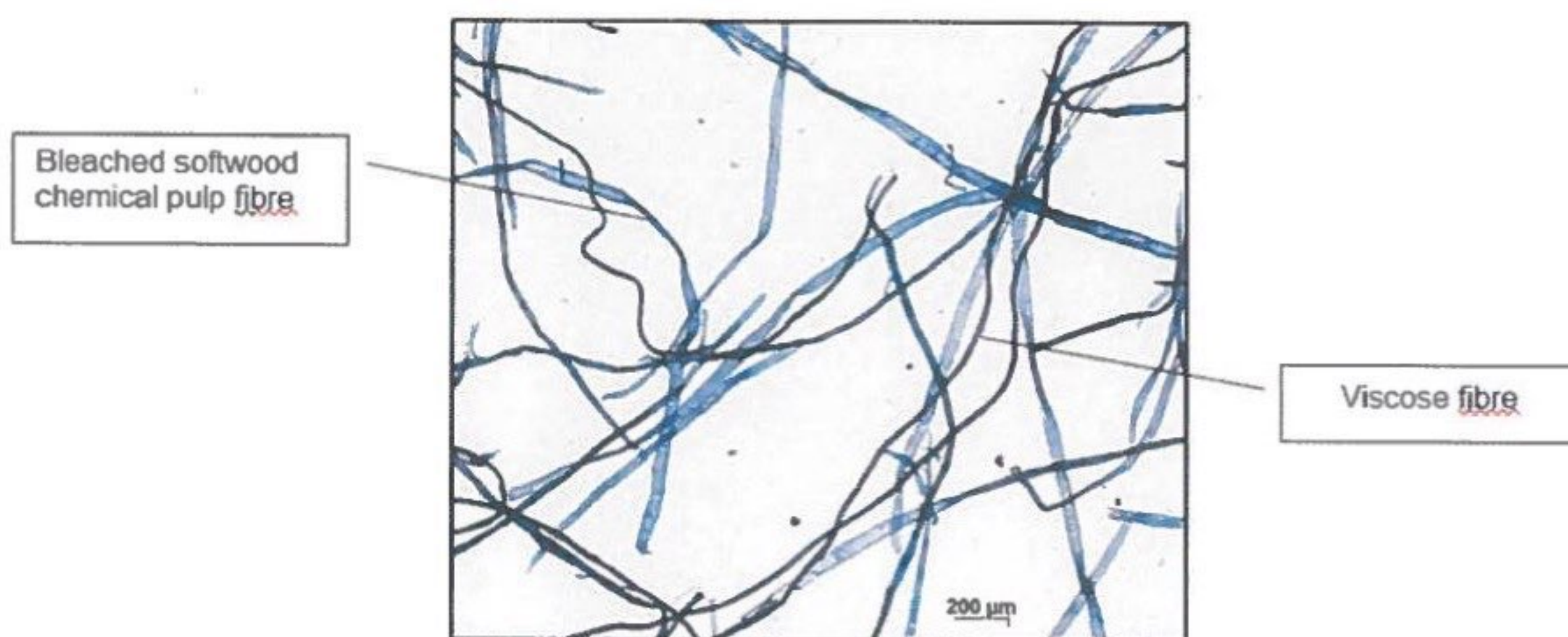
The purpose of the test is to assess the potential for a product to biologically disintegrate under anaerobic conditions typically found in sewers as well as onsite and municipal wastewater treatment systems.

This test measures the total mass of a product retained on a 1mm sieve after being incubated in anaerobic sludge for 28 days at 35°C +/- 2 °C.

4. RESULTS AND COMMENTS

Sheet result with all details on test procedures are given in Appendix.

- **Criteria 1. Environmental protection**



Global view of fibres analysis

Result:

The sample is composed of a majority of bleached softwood chemical pulp fibers (65-70%) with viscose fibres (30-35%). No fibre was identified as plastic fibre.

Acceptance criteria (*):

- If the fiber type is identified as synthetic, then the Species Principal shall be identified. If the fiber is identified as "Plastic", then the percentage by weight of the synthetic fiber identified as plastic shall be 1% or below.

PASSED

(*) Publicly Available Specification (PAS) 1: 2020 Criteria for Recognition as a Flushable Product

• Criteria 2. Toilet and drain line clearance

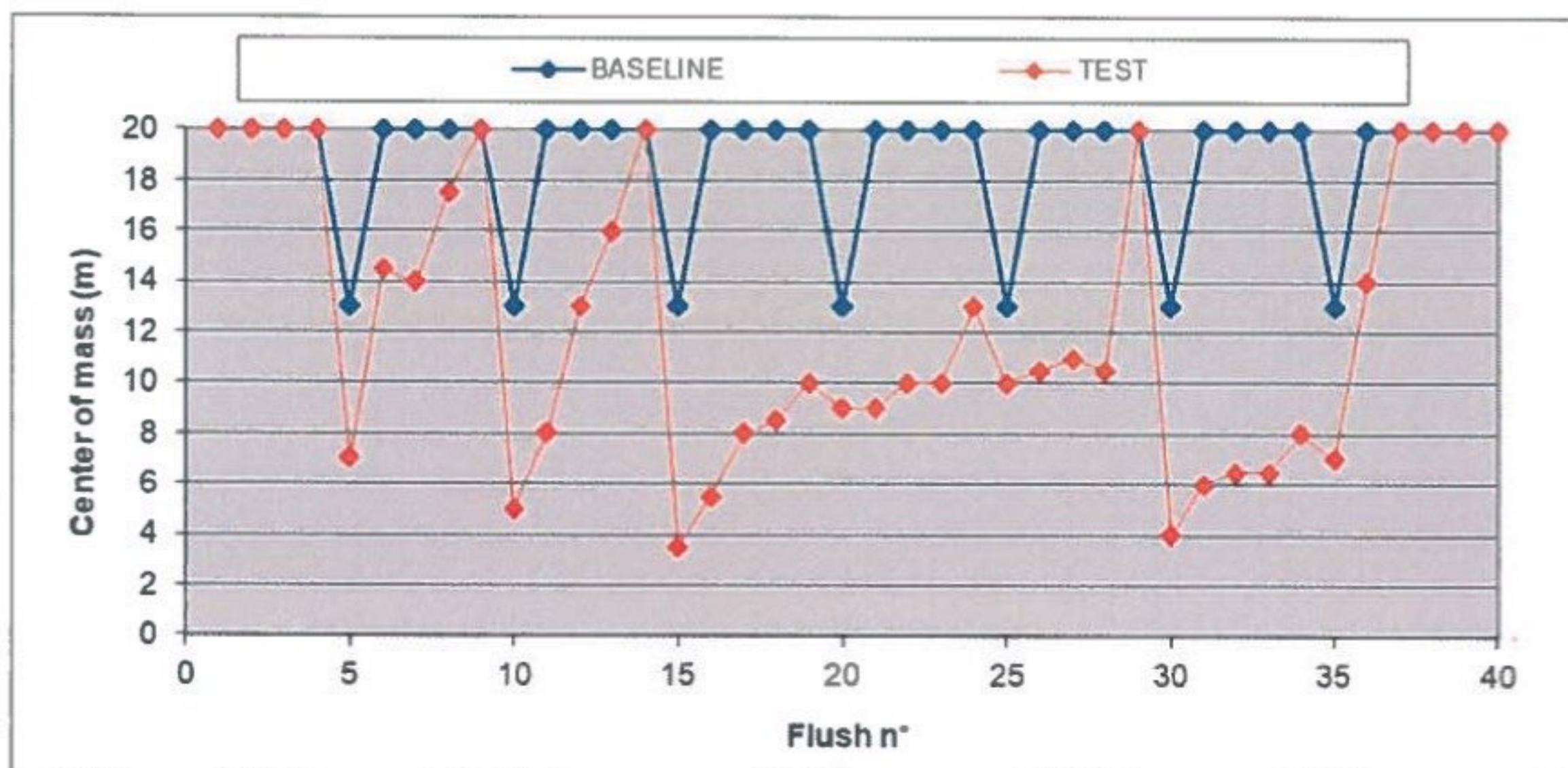
Test conditions:

Flush volume used for the test: 4.5 litres

Use of SFM (simulated faecal material) and dry toilet tissue in the loading sequence.

Result:

- Evacuation from the toilet bowl:
 - No flush associated with clog
 - No second flush required to evacuate the product from the bowl
- Distance of the centre of mass of the flushed material from the toilet:
Note that the baseline is established with no product introduced (only dry toilet tissue and SFM)



Acceptance criteria (*):

• Toilet Clearance: No toilet flush containing product shall be associated with clogs that require use of a plunger to clear product and excess water from the bowl and trap	PASSED
• Drain-line Clearance: The travel distance of the centre of mass of the flushed material in the drain-line does not consistently decrease over the course of five consecutive flushes.	PASSED

(*) Publicly Available Specification (PAS) 1: 2020 Criteria for Recognition as a Flushable Product

• Criteria 3. Disintegration

Results:

Percentage of material passing through the 25 mm sieve after 30 minutes:

After 30 min	REPL 1	REPL 2	REPL 3	REPL 4	REPL 5	AVERAGE
RETAINED						
Dry mass (g)	0,0000	0,0000	0,0000	0,0000	0,0000	
% mass	0,0%	0,0%	0,0%	0,0%	0,0%	
PASSED THROUGH						
% mass	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%
					SD	0,0%

The material is mostly in the form of fibres and fibres agglomerates at the end of the test. On average for the 5 replicates, 100% of the material is passing through the 25 mm sieve after 30 minutes of agitation in water.



Product after 30 min of agitation in slosh box (on a 25 mm grid) and retained by the 25 sieve

Acceptance criteria:

- The percentage of the total initial dry mass of the sample passing through the 25 mm sieve for the five test specimens after 30 minutes of testing shall be greater than 80%.

PASSED

(*) Publicly Available Specification (PAS) 1: 2020 Criteria for Recognition as a Flushable Product

• Criteria 4. Settling

Test conditions:

Test performed in tap water

Result:

Average settling velocity: 18 mm/s

The product stays at the bottom of the column after 24 hours.

Acceptance criteria (*):

· In at least 90% of the tests, the specimens should settle at an average velocity of at least 1 mm/second	PASSED
· the specimen or disintegrated parts of the specimens tested should not become sufficiently buoyant to rise more than 300 mm from the bottom of the column within 24 hours.	PASSED

(*) Publicly Available Specification (PAS) 1: 2020 Criteria for Recognition as a Flushable Product

• **Criteria 5. Biodisintegration**

Test conditions:

The product is introduced in anaerobic sludge collected in a municipal treatment plant and incubated during 28 days at 35°C. The percentage of mass retained on a 1mm sieve after being incubated is determined.

Result:

Average percent of the initial dry mass passing through the sieve after 28 days: 100%

Product residue after 28 days in anaerobic sludge

Acceptance criteria (*):

· The average percent of initial dry mass passing through the 1 mm sieve after 28 days should exceed 95%	PASSED
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(*) Publicly Available Specification (PAS) 1: 2020 Criteria for Recognition as a Flushable Product

5. CONCLUSION

The product **SILRICLEAN** has been assessed according to the IWSFG Flushability Specifications, 2020.

The product **SILRICLEAN** meets the following criteria:

- ☒ Criteria 1. Environmental protection
- ☒ Criteria 2. Toilet and drain line clearance
- ☒ Criteria 3. Disintegration
- ☒ Criteria 4. Settling
- ☒ Criteria 5. Biodegradation

Consequently, the product **SILRICLEAN** is recognized as suitable for flushing according to the IWSFG Flushability Specifications, 2020.

APPENDICES

The following documents are enclosed:

- 1 summary sheet result per test
- 1 attestation of flushability

IWSFG Criterion 1: Environmental protection

Test conducted at CTP Grenoble, France for DALIAN RUIGUANG NONWOVEN GROUP

Date of the test: 14/03/2024

Sample:

Silriclean

Dimensions: 195 mm x 142 mm

Additional ref: none



Equipment setup and test protocol:

Determination of the fibrous composition according to TAPPI/ANSI Test Method T 401

Staining with Herzberg staining solution

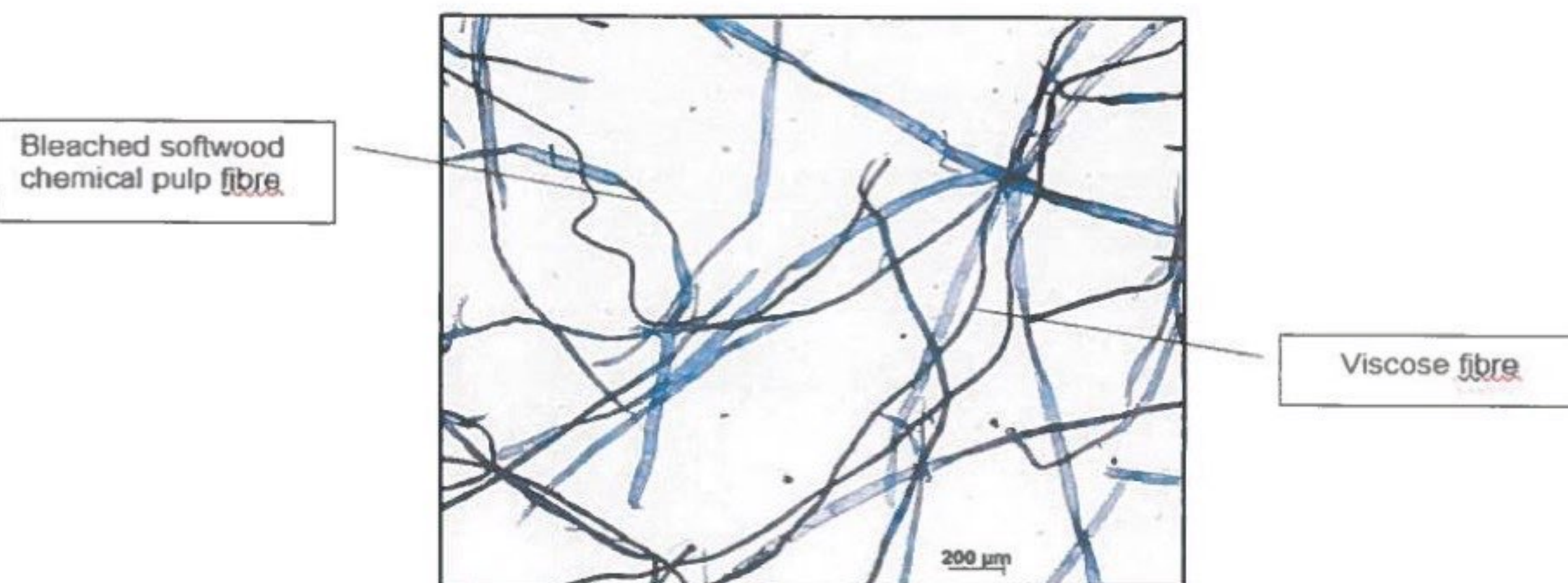
Recognition of fibre types according to their colour and morphology

Counting the junctions of the different types of fibres with the counting line and conversion of the numbers obtained into percentage in weight using the corresponding weight factors.

Results:

Bleached softwood chemical pulp	65-70%
Viscose (regenerated cellulose)	30-35%
Bleached hardwood chemical pulp	Traces
Plastic fibres	Absence

Photographs (magnification x 50):



Acceptance criteria:

- If the fiber type is identified as synthetic, then the Species Principal shall be identified. If the fiber is identified as "Plastic", then the percentage by weight of the synthetic fiber identified as plastic shall be 1% or below.

PASSED

(*) Publicly Available Specification (PAS) 1: 2020 Criteria for Recognition as a Flushable Product

IWSFG Criterion 2: Toilet and Drain Line Clearance

Test conducted at CTP Grenoble, France for DALIAN RUIGUANG NONWOVEN GROUP

Date of the test: 01/03/2024

Sample:

Silriclean

Dimensions: 195 mm x 142 mm

Additional ref: none



Equipment setup:

Toilet type: Wash-down (Roca Meridian)

Pipe diameter: 100 mm

Pipe slope: 1,65%

Number of 90° bends: 3

Total length: 20 m

Loading protocol:

Simulated fecal material (SFM): Dog food based SFM, 3 pieces of 55g

Dry toilet tissue (TT): 2,91 g (one implement = 6 sheets)

Tested product: 6,02 g (moist product)

Flush sequence:

Flush volume: 4.5 L

Beginning: 4.4 L

End: 4.4 L

Room temperature: 20,5°C

Flush 1: 1 product article + 1 TT

Flush 2: empty flush

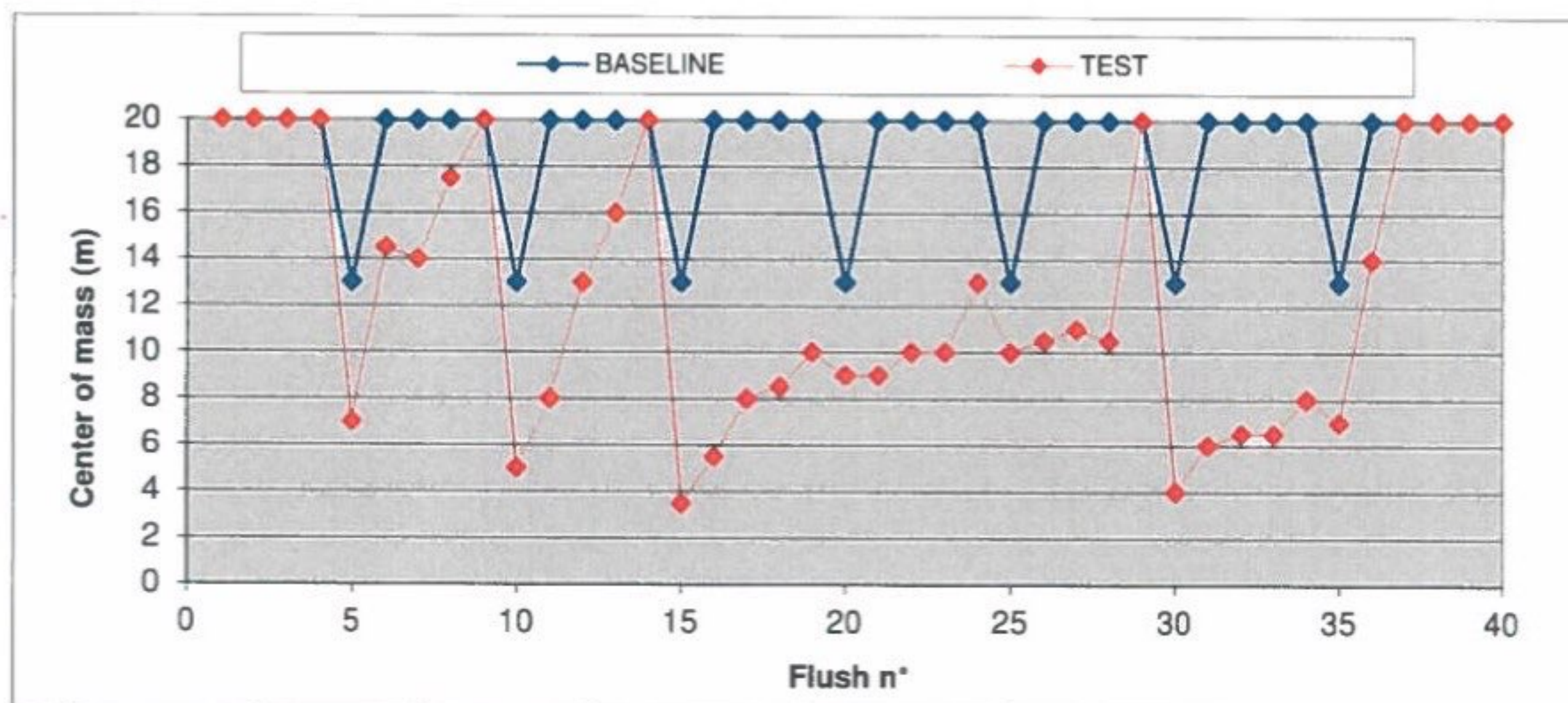
Flush 3: 1 product article + 1 TT

Flush 4: empty flush

Flush 5: SFM + 1 product article + 1 TT

repeated 7 times (35 flushes)

Results:



Flushes containing product associated with clogs : 0

Second flush required to evacuate product: 0

Acceptance criteria (*):

· Toilet Clearance: No toilet flush containing product shall be associated with clogs that require use of a plunger to clear product and excess water from the bowl and trap	PASSED
· Drain-line Clearance: The travel distance of the centre of mass of the flushed material in the drain-line does not consistently decrease over the course of five consecutive flushes.	PASSED

(*) Publicly Available Specification (PAS) 1: 2020 Criteria for Recognition as a Flushable Product

IWSFG Criterion 3: Disintegration

Test conducted at CTP Grenoble, France for DALIAN RUIGUANG NONWOVEN GROUP

Date of the test: 29/02/2024

Sample:

Silriclean

Dimensions: 195 mm x 142 mm

Additional ref: none



Equipment setup and test protocol:

+/- 11° oscillating table, 18 rpm, 3 boxes

9L rectangular box containing 4L of tap water at room temperature

Room temperature (start): 21,5°C

Room temperature (end): 21,5°C

Number of articles per box: 1 article

Pre-rinsing procedure: Bucket swirling

Number of replicates: 5

Rinsing procedure: 1 min @4L/min

Sieve: 25 mm perforated plate sieve

Recovery of material by pouring into bucket then to sieve

Results:

Water temperature (start): 22,1°C

Water temperature (end): 21,8°C

Drying procedure: 24h at 102°C

Initial dry mass: 1,934 g

After 30 min	REPL 1	REPL 2	REPL 3	REPL 4	REPL 5	AVERAGE
RETAINED						
Dry mass (g)	0,0000	0,0000	0,0000	0,0000	0,0000	
% mass	0,0%	0,0%	0,0%	0,0%	0,0%	
PASSED THROUGH						
% mass	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%
					SD	0,0%

Photographs:

Product in the slosh box (view on a 25 mm grid):

@ 10 min

@ 30 min



Product retained on the 25 mm sieve:



Acceptance criteria:

- The percentage of the total initial dry mass of the sample passing through the 25 mm sieve for the five test specimens after 30 minutes of testing shall be greater than 80%.

PASSED

(*) Publicly Available Specification (PAS) 1: 2020 Criteria for Recognition as a Flushable Product

IWSFG Criterion 4: Settlement

Test conducted at CTP Grenoble, France for DALIAN RUIGUANG NONWOVEN GROUP

Date of the test : 04/03/2024

Sample:

Silriclean

Dimensions: 195 mm x 142 mm

Additional ref: none



Equipment setup and test protocol:

200 mm diameter plastic column, 150 cm in height, graduations spaced at 1.0 m

Room temperature: 21,8°C

Product article cut in dimensions 10 cm x 10 cm and swirled for 30s in water prior to testing

Number of replicates: 10

Test in tap water:

The product floats in tap water: **NO**

Necessity to swirl the product in raw waste water: **NO**

Results:

	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10	Mean
Additional water necessary	No	No	No	No	No	No	No	No	No	No	
Time to settle (s)	47	44	74	71	61	51	41	58	55	82	
Settling velocity (mm/s)	21,3	22,7	13,5	14,1	16,4	19,6	24,4	17,2	18,2	12,2	18,0
Product stays at the bottom after 24 hours	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	

Photograph:

Product in the column after 24 hours



Acceptance criteria (*):

· In at least 90% of the tests, the specimens should settle at an average velocity of at least 1 mm/second	PASSED
· the specimen or disintegrated parts of the specimens tested should not become sufficiently buoyant to rise more than 300 mm from the bottom of the column within 24 hours.	PASSED

(*) Publicly Available Specification (PAS) 1: 2020 Criteria for Recognition as a Flushable Product

IWSFG Criterion 5: BIODISINTEGRATION

Test conducted at CTP Grenoble, France for DALIAN RUIGUANG NONWOVEN GROUP

Date of the test : 22/02/2024 to 21/03/2024

Sample:

Silriclean

Dimensions: 195 mm x 142 mm

Additional ref: none



Equipment setup:

2 L amber glass bottles containing 1 L of anaerobic sludge

Incubator temperature: 35°C

Number of articles per flask: 1

Positive control: cotton

Blank: anaerobic sludge only

Pre-rinsing procedure: non pre-rinsing

Sieve: mesh sieve 1 mm

Sampling time: 14 days (control) and 28 days

Sludge collection:

Sludge collected at Fontanil Cornillon municipal wastewater treatment plant

Liquid mesophilic methanisation (37°C) - Stay time: approx. 30 days - Capacity 500 000 inhabitants

pH = 7,4 (adjusted : NO)

TSS = 89 000 mg/l (needed to be adjusted : YES)

Adjustment of TSS by diluting

TSS after ajustment = 8 900 mg/l

Storage in hot conditioned room (30°C) before use

Results:

Starting dry mass:

Sample: 1,934 g

	CONTROL	CONTROL	CONTROL	CONTROL	FLASK 1	FLASK 2	FLASK 3
Sampling time (days)	14	14	28	28	28	28	28
Starting dry mass	1,4624	1,4699	1,3520	1,7330	1,9336	1,9336	1,9336
RETAINED							
Dry mass (g)	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000
% mass	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%
PASSED THROUGH							
% mass	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%

Average percent of the initial dry mass that passes through the 1 mm sieve:

100,0%

SD: 0,0%

Residues after 28 days in anaerobic sludge:

NO RESIDUE

Acceptance criteria (*):

- The average percent of initial dry mass passing through the 1 mm sieve after 28 days should exceed 95%

PASSED

(*) Publicly Available Specification (PAS) 1: 2020 Criteria for Recognition as a Flushable Product

Flushability Assessment IWSFG

The considered sample

SILRICLEAN

Tested on March, 2024

For Company DALIAN RUIGUANG NONWOVEN GROUP

is notified being in accordance with the IWSFG Flushability Specifications published by the International Wastewater Services Flushability Group, November 2020.

Sampling was performed by the customer. Samples were sent by the customer. Results are valid only for the samples assessed.

They do not apply:

- . For products converted from tested raw materials
- . For raw materials used to manufacture the tested converted products.

The results of the measurements are recorded in the report n° 24.0023/1EN


Dr Laurence LEROY
Manager of Flushability Laboratory
Conformity Assessment Division

Grenoble, April 9, 2024

