

September 20, 2023

Page 1 of 16

SGS-IPS 01221-23

Report to: Hangzhou Nbond Nonwovens Co., Ltd.
No.16 Hongda Road
Yuhang Economic and Technological Development Zone, Hangzhou
Zhejiang, China

Sample description: One Wipe Sample with specifications of 20*15cm*80pieces/pack and a date of manufacture of 2023.07.15, manufactured by Hangzhou Bonyee Daily Necessity Technology Co., Ltd.

Date received: August 11, 2023

Test requested: INDANA/EDANA (GD4) FG501, FG504, FG506A, IWSFG PAS3:2020-Slosh Box Disintegration, TAPPI/ANSI T 401

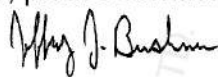
Purchase Order: 30492631

Analysis of One Wipe Sample

SGS-IPS Testing performed the testing listed above on one wipe sample provided and identified by Hangzhou Nbond Nonwovens Co., Ltd., or by a third party acting at the Client's direction. The results are summarized in Tables 1-9 on the following pages. This report reflects that the ISO 17025 accreditation stamp is **only** for the INDANA/EDANA Flushability Assessment (GD4) FG501 - FG506A test methods, the IWSFG PAS3:2020, and not the TAPPI/ANSI T 401 method. The revised report is due to the customers request to the individual's name from the report.

If you have any questions, please contact us.

Authorized by:



Jeffrey Bushner
Connectivity & Products
Lab Manager

Signed



Nick Severin
Connectivity & Products
Senior Technical Manager



Flushability Results Summary

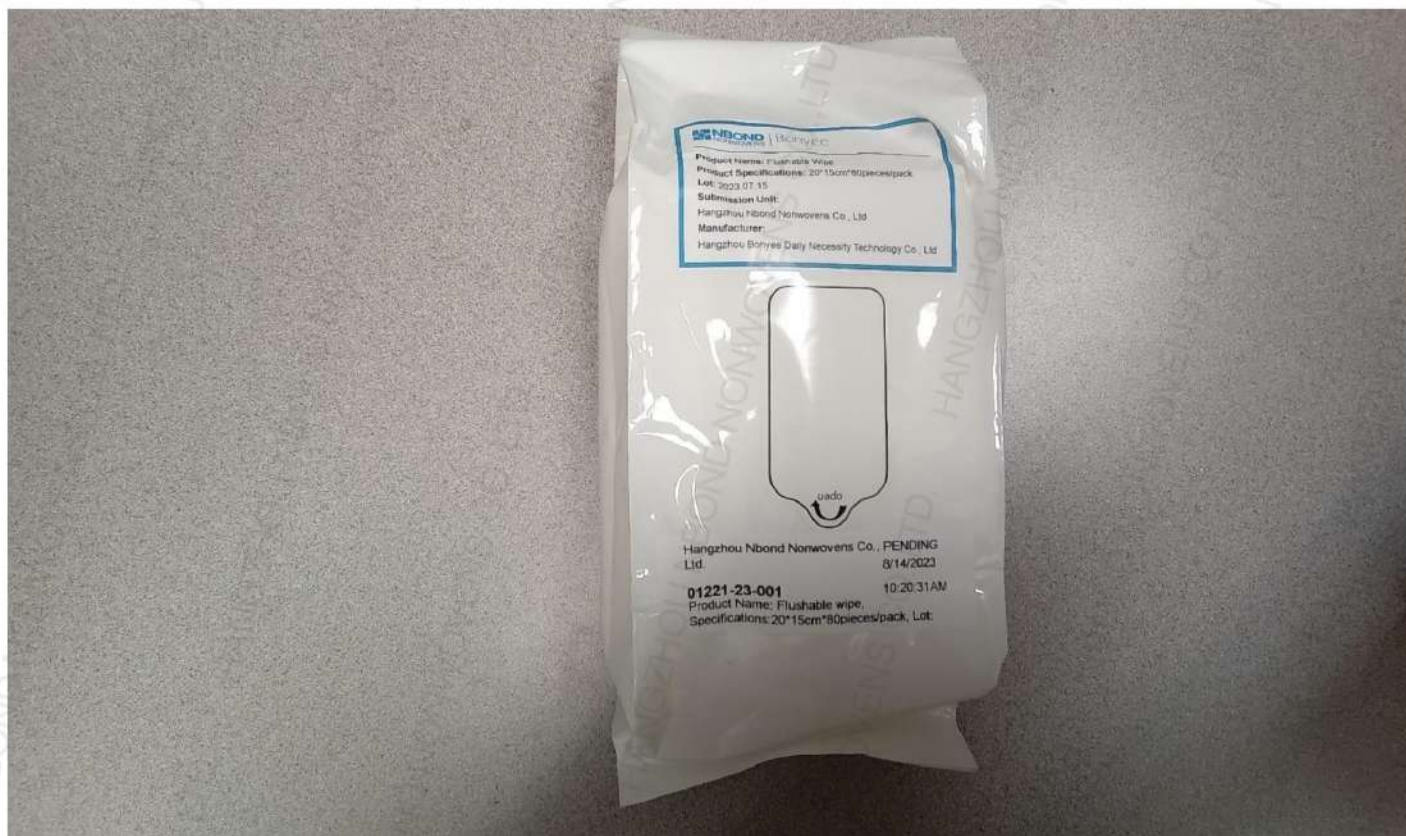
IWSFG PAS1:2020 – Criteria for Recognition as a Flushable Product	Flushable wipe
FG501-Toilet Bowl and Drain-line Clearance Test-GD4	Pass
IWSFG PAS3:2020 Disintegration Method-Slosh Box	Pass
FG504-Settling Test-GD4	Pass
FG506A-Anaerobic Biodisintegration Test-GD4	Pass
TAPPI/ANSI T 401 Fiber Analysis	Pass

The submitted sample(s) passed all the required tests and can be labeled as “**FLUSHABLE**” per IWSFG PAS1:2020 – Criteria for Recognition as a Flushable Product.



Sample Identification Photo Appendix

01221-23-001 – Flushable wipe



IWSFG PAS3:2020-Slosh Box Disintegration Test

The purpose of this test is to assess the potential for a product to disintegrate when it is subjected to mechanical agitation in water or wastewater (optional). The samples were pre-conditioned using the specified toilet bowl and drain line method, then dried in an oven at 105°C to determine the average dry weight. Five pre-conditioned samples were then placed in the slosh box in four liters of 20°C±2°C tap water in the method specified three-compartment slosh box for two rounds of testing. The temperatures of the room and the tap water are taken before and after the testing procedure. The slosh box was set to eighteen rpm and allowed to agitate for thirty minutes. The wipe samples were agitated in five replicates as described in the method. The slosh box contents were poured through a 25-mm sieve with a blank spacer ring beneath it and rinsed for one minute with a hand sprayer at a rate of four liters per minute. The remaining products were carefully placed in a tared aluminum pan, dried in a 105°C oven for two hours, and statistically compared to the average dry weight of five wipe samples. The Flushable wipe sample **passed** the IWSFG PAS3:2020 - Slosh Box Disintegration Test method criteria of >80 passing through the 25-mm sieve. The summarized results are in Table 1, with confirming photos in Tables 2-4.



Table 1. IWSFG PAS3:2020-Slosh Box Disintegration Summary – Flushable wipe

Rock Angle Measurement

Date of last measurement: 7/31/2023

Degrees to front: 11.1

Degrees to back: 11.0

Digital Level: IPS-0787

Analyst: NJS

Dimensions

(mm): 200mm x 150mm

Total weight of five dried samples: 6.4885 grams

Sample	Time (min.)		25mm	Start Lab Temp	End Lab Temp	Start Water Temp	End Water Temp
01221-23-001	30 min.		0.0000	21.5°C	21.5°C	19.8°C	20.3°C
	30 min.		0.0000	21.5°C	21.5°C	19.8°C	20.3°C
	30 min.		0.0000	21.5°C	21.5°C	19.8°C	20.3°C
	30 min.		0.0000	21.5°C	21.5°C	19.8°C	20.3°C
	30 min.		0.0000	21.5°C	21.5°C	19.8°C	20.3°C
SUM			0.0000				

Sample	Time (min.)	%<25mm	Wipe #	Pan Tare (g)	OD + Pan (g)	Dried Wipe (g)
01221-23-001	30 min.		1	1.2883	1.2883	0.0000
	30 min.		2	1.2901	1.2901	0.0000
	30 min.		3	1.2942	1.2942	0.0000
	30 min.		4	1.2890	1.2890	0.0000
	30 min.		5	1.2874	1.2874	0.0000
% thru sieve		100.0%	Pass			

Analyzed by: NJSQuality review by: ESBDate(s) of testing: August 14, 2023

Table 2. **Slosh Box After 30 Minutes - Product Name: Flushable wipe**



Table 3. Sieve Before Rinsing - Product Name: Flushable wipe



Table 4. Sieve After Rinsing - Product Name: Flushable wipe



FG501-Toilet Bowl and Drain-line Clearance Test (GD4)

This method is used to determine the likelihood that a product will successfully clear the toilet and drainage lines in a building. The sample was tested on a Kohler Cimarron toilet connected to a 100 mm (four inch) clear PVC piping, 22.15 meters in length with a 2% slope, including two ninety-degree turns at 5 and 14 meters, two forty-five degree turns at 7 and 7.5 meters, and marked every 0.5 meters. The flush volume is six liters (1.6 gallons) or less, which is checked prior to testing and immediately after conclusion of testing. Two wipes were used in the flushing sequence per the client's instructions. The dimension of the wipe used was 200mm x 150mm. The baseline data and validation was conducted with six sheets of a 4-inch-by-4-inch Quilted Northern bath tissue (**unit dose**) and Simulated Fecal Matter (**SFM**), and showed that the current toilet and drain-line configuration consistently moved product down the drain-line and passed the Center of Mass criteria for the Toilet Bowl and Drain-line Clearance Test method FG501. The Flushable wipe sample **passed** the FG501 - Toilet Bowl and Drain-line Clearance test. The summarized results of the submitted sample are in Table 5. The Center of Mass Graph is located in Table 6.

Table 5. FG501-Drain-line Summary - Product Name: Flushable wipe

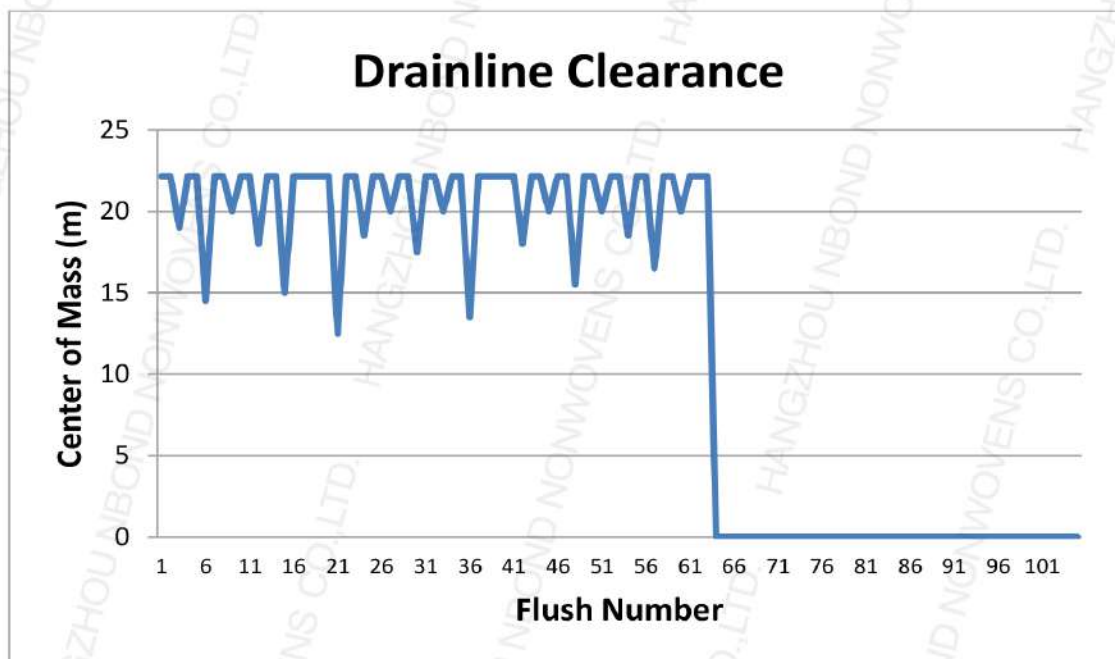
Study:	01221-23-001		
Customer:	Hangzhou Nbond Nonwovens Co., Ltd.		
Test Condition:	Ambient		
Toilet:	Kohler-USA		
Drainline Slope:	2%		
Drainline Length (m):	22.15		
Sample(s):	Flushable wipe		



Table 5. **FG501-Drain-line Summary – Product Name: Flushable wipe (continued)**

		IPS Balances: IPS-0873		IPS-1704			
Test Date:	8/16/2023	TP Unit #	Weight (g)		SFM #	Weight (g)	
Run by:	NJS	1	2.61		1	52.33	
		2	2.60		2	51.99	
TP used:	Quilted Northern	3	2.61		3	52.45	
Ave Mass of TP:	2.61	Ave	2.61		Ave	52.26	
		SD	0.0058		SD	0.2386	
						Weight (g)	Loading #
SFM used:	Feclone BFPS-7	Starting flush volume*		3 pieces of SFM:		156.77	
Ave Mass of SFM:	52.26	Flush #	Weight (g)	Volume (gallon)			
		1	5326.1	1.41	1 unit dose of TP	2.61	T2-1
Wipes used:	2	2	5341.8	1.41			
Ave DW wipe mass:	1.30	3	5366.7	1.42	2 unit doses TP + 3 SFM	161.98	T2-5
Wipe Dry Weight	Weight (g)	Ave	5344.9	1.41			
1	1.29	SD	20.4730	0.0054	1 unit dose TP + # wipes	5.20	T4-1+3
2	1.29						
3	1.30				3 SFM + 2 UD + # wipes	164.58	T4-5
4	1.29						
5	1.29	Ending flush volume*					
6	1.31	Flush #	Weight (g)	Volume (gallon)			
7	1.29	1	5388.9	1.42			
8	1.31	2	5248.7	1.39			
9	1.31	3	5314.8	1.40			
10	1.30	Ave	5317.5	1.40			
Ave DW mass:	1.30	SD	70.1380	0.0185			
SD	0.0096	*Range: 5009g to 5609g					

Table 6. **Center of Mass Graph - Product Name: Flushable wipe**



Analyzed by: NJS

Quality review by: ESB

Date(s) of testing: August 16, 2023



FG504-Settling Test (GD4)

The purpose of this test is to assess whether a product settles in sumps, septic tanks, onsite aerobic systems and settling chambers that are associated with pump stations and municipal wastewater treatment plants. Ten replicates, each four-inch-by-four-inch, of the samples were cut with a precision die and used in the test. Four, eight-inch diameter, clear, settling columns, were set up with 115 cm timing marks, with the lower timing mark located 30 cm above the bottom of the columns. Valves are located in the middle and at the bottom of the columns to facilitate ease of dispensing one liter of water to introduce the sample product, and to drain and clean the columns at the conclusion of testing. Stainless steel wire mesh baskets are located at the bottom of the settling column attached to fifty-pound test line weighted with stainless steel washers, to keep the lines against the column so as not to interfere with the test. The wipe samples were stirred for thirty seconds in twenty liters of $22^{\circ}\text{C} \pm 3^{\circ}\text{C}$ tap water prior to introduction into the settling column. It was determined that the product sank in twenty liters of $22^{\circ}\text{C} \pm 3^{\circ}\text{C}$ tap water after five minutes. Therefore, the wipe samples were not stirred in twenty liters of untreated, sieved, wastewater for thirty seconds prior to introduction into the test column, to help facilitate sinking. The ten replicate samples were timed in the 115-cm timing zone and allowed to settle for twenty-four hours, to see if any samples rose above the thirty-cm mark. There was one round of testing, based on the performance of the sample. The Average Settling Velocity of the Flushable wipe samples were greater than the 0.1 cm/sec minimum requirement for FG504 - Settling Test method, at least 95% of the wipes settled to the base of the column, and at least 95% of the ten wipe samples did not rise above the bottom 30 cm mark after twenty-four hours. The results are summarized in Table 7.



Table 7. **FG504-Settling Test Summary - Product Name: Flushable wipe**

Determination Type	Tap Water-1
Sample Description	Flushable wipe
Sheets	10
Dimensions	4" x 4"

Settling Distance (cm) **115**

Test start date	8/14/2023	
Sample ID	01221-23-001	
Replicate	Time (sec.)	Vel. (cm/sec)
1	64.33	1.79
2	55.91	2.06
3	62.25	1.85
4	53.04	2.17
5	43.92	2.62
6	54.21	2.12
7	79.06	1.45
8	49.77	2.31
9	43.02	2.67
10	56.88	2.02
Average	56.24	2.11
Percent failed to settle	0%	
Percent settled (24 hrs.)	100%	
Comments	Pass	
Test Start	8/14/2023	
Air Temp (°C)	21.0 °C	
Water Temp (°C)	20.8 °C	
Test End - 24 hr	8/15/2023	
Air Temp (°C)	21.0 °C	
Water Temp (°C)	20.9 °C	

Analyzed by: NJS
Quality review by: ESB
Date(s) of testing: August 14-15, 2023



FG506A-Anaerobic Biodisintegration Test

The Anaerobic Biodisintegration Test determines the percent of a product that disintegrates to less than one mm after being incubated for 28 days in anaerobic digester sludge. This test can be used to assess the potential for a product to biologically disintegrate under anaerobic conditions found in sewers as well as municipal and onsite wastewater treatment systems. The sample was rinsed in $22^{\circ}\text{C} \pm 3^{\circ}\text{C}$ tap water for thirty seconds, prior to introduction into 1.5 liters of activated anaerobic digester sludge from the City of Appleton Wastewater Treatment plant in Appleton, WI. The sludge was strained through a one mm stainless steel sieve. The pH was taken and determined to be in the acceptable range of 6 to 9 pH units. The Total Solids (TS) were determined gravimetrically and was found to be 39,088 mg/L. Since the sludge should be in the range of 8000 -10000 mg/L, the sludge was volumetrically diluted with untreated wastewater that was strained through a two mm stainless steel sieve to be within the acceptable range. During this process, the sludge had limited exposure to the atmosphere by sealing the sludge bucket with an airtight lid. 1.5 liters of sludge were transferred into one half gallon glass jugs and the wipe sample was placed in the sludge in triplicate. A blank and two USP 100% cotton controls were also treated in the same manner. Fermentation airlocks filled with water were inserted into the vessel neck and the glass jugs were placed in a Hotpack Corporation incubator set at $35^{\circ}\text{C} \pm 3^{\circ}\text{C}$. The incubator temperature was monitored on a daily basis and the samples were incubated for twenty-eight days according to the method. After fourteen days, one of the cotton controls was poured through a one mm sieve and rinsed with tap water for two minutes at a rate of four liters per minute, to determine whether the sludge was active enough. After fourteen days, the first cotton control was 100% biodisintegrated, indicating that the sludge was biologically active for the study. After twenty-eight days, the blank, cotton control, and samples were each poured through a one mm sieve and rinsed with tap water for two minutes at a rate of four liters per minute. The remaining solids were placed in a tared, aluminum weighing dish and dried at 105°C in an oven. The results are tabulated below in Table 8. The Flushable wipe sample **passed** the criteria of greater than 95% of the material passing through the one mm sieve after twenty-eight days.

Analyzed by: NJSQuality review by: ESBDate(s) of testing: August 15 – September 12, 2023

Table 8. **FG506A-Anaerobic Biodisintegration - Product Name: Flushable wipe**

Day #	Incub. Temp (°C)	Day #	Incub. Temp (°C)
1	35.0 °C	15	35.0 °C
2	35.0 °C	16	35.0 °C
3	35.0 °C	17	36.0 °C
4		18	
5		19	
6	35.0 °C	20	
7	35.0 °C	21	35.0 °C
8	35.0 °C	22	35.0 °C
9	35.0 °C	23	35.0 °C
10	35.0 °C	24	35.0 °C
11		25	
12		26	
13	35.0 °C	27	35.0 °C
14	35.0 °C	28	35.0 °C
Average	35.1 °C		
SD	0.2294		

Anaerobic digester sludge was obtained from:

City of Appleton

	A	B	C
Tare Wt. (g)	1.2988	1.2971	1.2934
Initial Wt. (g)	5.4452	5.2589	5.1785
Dried Wt. (g)	1.4609	1.4523	1.4449
% total solids	3.9094	3.9174	3.8995
	Average	3.9088	
	SD	0.0090	

pH= 7.19

Sample	Final Date	Initial Wt. (g)	Final Wt. (g)	% Wt Loss	Comments		
Blank	9/12/2023	1.0000	0.0000	100.00			
Control 1	8/29/2023	1.0412	0.0000	100.00	Average	100.0%	Pass
Control 2	9/12/2023	1.5680	0.0000	100.00	SD	0	
01221-23-01a	9/12/2023	1.2986	0.0000	100.00	Average	100.0%	Pass
01221-23-01b	9/12/2023	1.2986	0.0000	100.00	SD	0	
01221-23-01c	9/12/2023	1.2986	0.0000	100.00			
	Control Ave	1.3046					
	Control SD	0.3725					

TAPPI/ANSI T 401 Fiber Analysis

Table 9. **TAPPI/ANSI T 401 Fiber Analysis - Product Name: Flushable wipe**

Fiber Type	Softwood	Raw Count	1410
Bleaching	Bleached	Weight Factor	0.90
Pulp Process	Kraft	Final Count	1269
		% by Weight	72.0%
Species:			
Principal - [Spruce and/or Hemlock]			
Some - Fir, Douglas-fir, Hard Pine (Except Red & Scotch), Larch			
Fiber Type	Hardwood	Raw Count	27
Bleaching	Bleached	Weight Factor	0.45
Pulp Process	Kraft	Final Count	12
		% by Weight	0.7%
Species:			
Principal - <u>Populus</u> spp.			
Fiber Type	Synthetic	Raw Count	907
Bleaching		Weight Factor	0.53
Pulp Process	Chemical	Final Count	481
		% by Weight	27.3%
Species:			
Principal - Rayon			

Method(s) and Notes:

TAPPI/ANSI T 401 om-20 Fiber Analysis of Paper and Paperboard.



Revised Report to Hangzhou Nbond Nonwovens Co., Ltd.
SGS-IPS 01221-23

September 20, 2023
Page 16 of 16

Analyzed by: WJR & PGW

Quality Review by: ESB

Date(s) of testing: September 12-14, 2023

Notes: These results relate only to the item(s) tested. Unless otherwise noted, sampling was performed by the customer. Sample information is provided and confirmed by the client. SGS is not liable for the accuracy, suitability, reliability and/or integrity of the information. This report shall not be reproduced except in full, without written approval of SGS-IPS Testing. A full discussion of calculated uncertainties is presented in IPS-TL016. Uncertainties are not included in the final calculations. Additional information is available upon request.

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