FG505A-Aerobic Biodisintegration Test

The Biodisintegration Test determines the percent of a product that disintegrates to less than one mm after a 14-day incubation with activated sludge mixed liquor. This test can be used to assess the potential for a product to biologically disintegrate under aerobic conditions found in sewers as well as municipal and onsite wastewater treatment systems. The sample was rinsed in twenty liters of 22°C±3°C tap water for thirty seconds, prior to introduction into one liter of activated aerobic 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 Suspended Solids (TSS) were determined gravimetrically and was found to be 2,960 mg/L. Since the sludge is in the range of 2000 - 4500 mg/L, the sludge was used as received after the required prep. One liter of sludge was transferred into a 2.8-liter Fernbach triple-baffled flask and the wipe was placed in the sludge in triplicate. A blank and two USP 100% cotton controls were also treated in the same manner. Foam plugs were inserted into the flask neck and the flasks were placed on a New Brunswick Innova 2350 two-inch orbital shaker and set to seventy-five rpm. The lab temperature was monitored on a daily basis and the samples were shaken for fourteen days according to the method. Each day the solids that collected on the sides of the flask were sprayed down with tap water. After fourteen days, the blank, cotton controls, and samples were 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 blank and two cotton controls **passed** at 100% biodisintegrated. 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 fourteen days.

Analyzed by: NJS
Quality review by: ESB
Date(s) of testing: November 16 - 30, 2023

Table 8. **FG505A-Aerobic Biodisintegration - Flushable wipe**

Day #	Lab Temp (°C)
1	22.0 °C
2	
3	
4	22.0 °C
5	22.5 °C
6	22.0 °C
7	
8	
9	
10	
11	22.0 °C
12	22.0 °C
13	22.5 °C
14	22.5 °C
Average	22.2°C
SD	0.2588

Activated Sludge was obtained from: City of Appleton

TSS mg/L	Wastewater		pH= 7.43	TSS mg/L	Activated sludge		pH= 7.18
	A	B	C		A	B	C
Dried Wt.(g)	1.3919	1.3932	1.3913	Dried Wt.(g)	1.3993	1.4001	1.4008
Paper Wt.(g)	1.3852	1.3866	1.3847	Paper Wt.(g)	1.3845	1.3851	1.3862
Volume (mL)	20	20	20	Volume (mL)	5	5	5
TSS mg/L	335	330	330	TSS mg/L	2960	3000	2920
		Average	332			*Average*	2960

Sample	Final Date	Initial Wt.(g)	Final Wt.(g)	% Wt. Loss	Comments		
Blank	11/30/2023	1.0000	0.0000	100			
Control 1	11/30/2023	1.0322	0.0000	100	*Average*	100.0%	Pass
Control 2	11/30/2023	1.0455	0.0000	100	*SD*	0	
01711-23-01a	11/30/2023	1.2650	0.0000	100	*Average*	100.0%	Pass
01711-23-01b	11/30/2023	1.2650	0.0000	100	*SD*	0	
01711-23-01c	11/30/2023	1.2650	0.0000	100			
	Control Ave.	1.0389					
	Control SD	0.0094					

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°C±3°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 42,495 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°C±3°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 9. 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: NJS
Quality review by: ESB
Date(s) of testing: November 15 – December 13, 2023

Table 9. **FG506A-Anaerobic Biodisintegration - 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		17	
4		18	
5	35.0 °C	19	35.0 °C
6	35.0 °C	20	35.0 °C
7	35.0 °C	21	35.0 °C
8		22	35.0 °C
9		23	35.0 °C
10		24	
11		25	
12	35.0 °C	26	35.0 °C
13	35.0 °C	27	35.0 °C
14	35.0 °C	28	35.0 °C
Average	35.0 °C		
SD	0		

Anaerobic digester sludge was obtained from: City of Appleton

	A	B	C	pH= 7.25
Tare Wt. (g)	1.2770	1.2771	1.2814	
Initial Wt. (g)	5.2321	5.4493	5.4226	
Dried Wt. (g)	1.4459	1.4535	1.4574	
% total solids	4.2704	4.2280	4.2500	
		Average	4.2495	
		SD	0.0212	

Sample	Final Date	Initial Wt. (g)	Final Wt. (g)	% Wt Loss	Comments		
Blank	12/13/2023	1.0000	0.0000	100.00			
Control 1	11/29/2023	1.0352	0.0000	100.00	*Average*	100.0%	Pass
Control 2	12/13/2023	1.0458	0.0000	100.00	SD	0	
01711-23-01a	12/13/2023	1.2650	0.0000	100.00	*Average*	100.0%	Pass
01711-23-01b	12/13/2023	1.2650	0.0000	100.00	SD	0	
01711-23-01c	12/13/2023	1.2650	0.0000	100.00			
	Control Ave	1.0405					
	Control SD	0.0075					

FG507-Municipal Sewage Pump Test

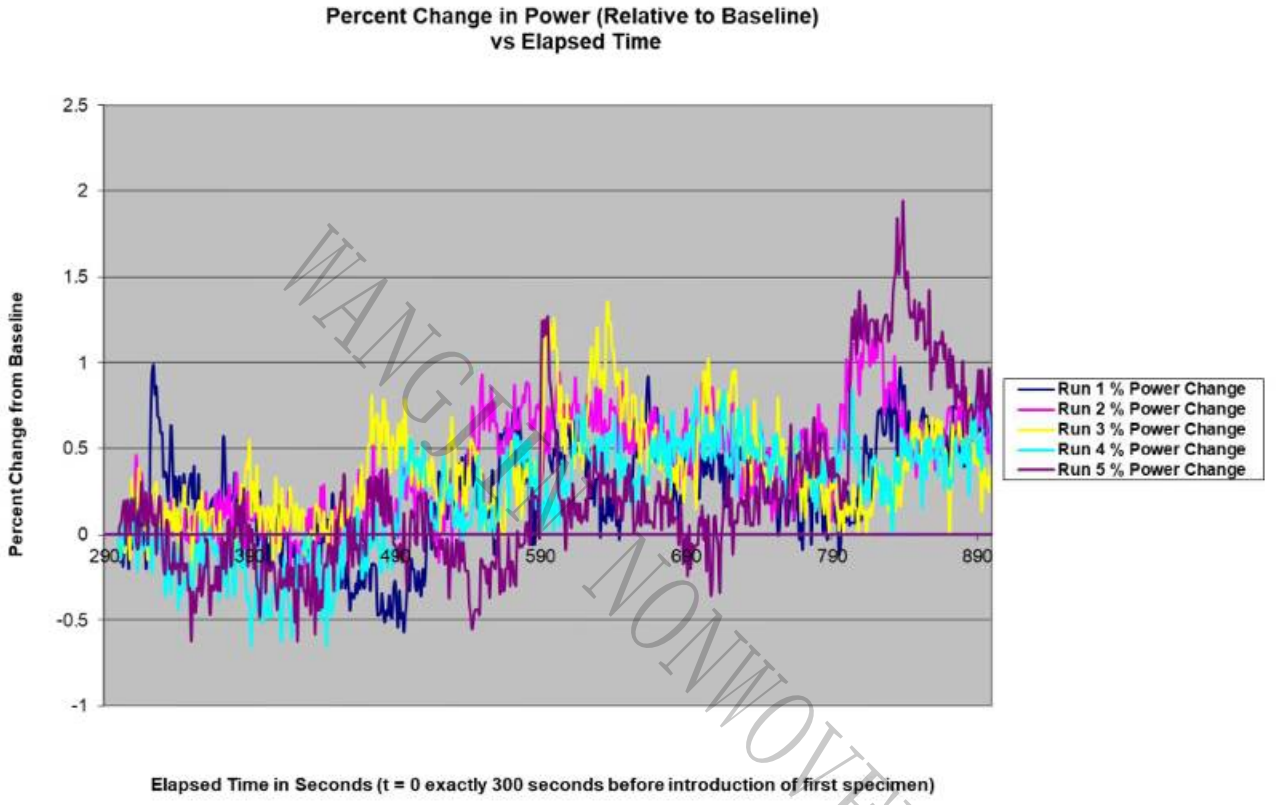
This test assesses the compatibility of products with municipal sewage pumping systems. 300 samples of Flushable wipe were soaked in twenty liters of 22ºC±3ºC tap water, thirty samples per twenty-liter bucket, for one hour prior to introduction into the ITT Flygt (Model C-3085.183) municipal pump at a starting flow rate of 336±5 gallons per minute (**gpm**). The pump was allowed to run for at least thirty minutes to equilibrate the flow and power consumption. The data acquisition system was activated five minutes prior to sample introduction. The samples were introduced into the pump every ten seconds for ten minutes, which totaled sixty samples per run, of which, five separate runs were conducted. The pump was allowed to run and data acquired five minutes after the last wipe introduction. This product **passed** the Acceptance Criteria of < 5% increase of power over baseline. The data is presented in Table 10 and the power graph is contained in Table 11.

Table 10. **FG507-Municipal Sewage Pump Test - Flushable wipe**

	RUN 1	RUN 2	RUN 3	RUN 4	RUN 5	Average	Std. Dev
Baseline Power (kW)	2.82	2.83	2.84	2.84	2.84	2.83	0.008
Baseline Flow (GPM)	336.0	334.7	336.8	336.7	337.1	336.3	0.980
Average Power Change (%)	0.24	0.41	0.37	0.21	0.22	0.29	0.091
Average Flow Change (%)	-0.12	-0.08	-0.27	-0.11	-0.17	-0.15	0.074
Starting Temperature (°C)	17.0	17.6	18.3	19.0	19.6	18.3	1.040
Ending Temperature (°C)	17.4	18.1	18.7	19.4	20.0	18.7	1.030
Pass/ Fail Criteria	**Criterion**					**Results**	
Municipal Pump	Based upon integration of the power curves, the average power increase over baseline for the 5 runs must not exceed 5%.					**Pass**	

Analyzed by: NJS/JJB
Quality review by: ESB
Date(s) of testing: November 28, 2023

Table 11. **FG507-Municipal Sewage Pump Power Graph - Flushable wipe**



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-TL007. Uncertainties are not included in the final calculations. Additional information is available upon request.