

**Filtration efficiency and retention capacity test
according to NF P 90-319 § 4 with derogations
Domestic swimming pools — Filtration groups and systems —
Test method for evaluating the filtration efficiency, the retention capacity
and the mechanical resistance**

§ 4 Measure of filtration efficiency and retention capacity

Sample ref. Street recycled glass (1)

CUSTOMER IDENTIFICATION	
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<i>Purchase order nb</i>	PO acc. to DEV_00005868.01

IFTS REFERENCES	
<i>Purchase order nb</i>	ARC_00005973
<i>IFTS Order n.</i>	AFF_00004971
<i>Quotation n.</i>	DEV_00005868.01

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Validated and signed by
Test Manager

REVISION TABLE			
<i>Date</i>	<i>Version</i>	<i>Reason for revision</i>	<i>Revision Description</i>
02/12/2020	RA_2020_00006469	Initial release	

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1 - SCOPE

NATURE WORKS TECNOLOGIAS has requested IFTS (Institut de la Filtration et des Techniques Séparatives) as per purchase order number PO acc. to DEV_00005868.01 to evaluate the performance of a specified number of samples according to NF P 90-319 §4 with derogations - Domestic swimming pools - Filtration groups and systems - Test method for evaluating the filtration efficiency, the retention capacity and the mechanical resistance §4 : Filtration efficiency and retention capacity.

The data contained in the following paragraphs establishes the report of the test performed on the sample identified in paragraph 2 of this document. A separate test report is issued for any other test requested as per the purchase order. This test has been performed with qualified personnel using thoroughly selected equipments in order to comply with test conditions summarized in paragraph 3 of this document. IFTS is accredited by the COFRAC to carry out tests and perform modular activities dealt with by the ISO/IEC 17025.

2 - TEST SAMPLE

<i>Sample ref.</i>	<i>IFTS ref.</i>
Street recycled glass (1)	ECH_00036249



Sample ref. : Street recycled glass (1)
supplied by NATURE WORKS TECNOLOGIAS

4- TEST RESULTS

4.1 Test end criteria

	Test end criteria	Actual value	End criteria
Final ΔP - Initial ΔP (hPa)	500	20	No
Test duration (min)	≥ 360	390	Yes
Upstream pressure (hPa)	3000	2100	No

4.2 Filtration performances

Retention capacity at Final ΔP (g)	Filtration ratio 80% (μm)	Filtration efficiency 45 μm (%)	Comments
79,7	3,30	99,8	/

The global filtration rating and the global filtration efficiency are calculated based on total counting data relative to all the test duration at 5 mg/L.

4.3 Filtration performances

TEST IDENTIFICATION

Test date : 01/12/2020	Operator : RZ	IFTS Number : ECH_00036249
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FILTER IDENTIFICATION

Sample ref. : Street recycled glass (1)	Tool ref. : IFTS Column (height : 205 cm ; diameter : 15,4 cm)
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OPERATING CONDITIONS

Test fluid	Type : Microfiltered water	Temperature (°C) : 23,0
Initial cleanliness level	Upstream : 483,5 > 1 µm/mL	Downstream : 303,2 > 1 µm/mL

Test contaminant Type : ISO 12103-1 A4 (ISO CTD) Batch n. : 14151C

Period	Filter test		Contaminant injection				Particle counting			
	Initial flow rate (L/min)	6,2	Flow rate (L/h)	Concentration (mg/L)			Counter	Sensor	Flow rate (mL/min)	Volume (mL)
Counting	Volume (L)	41,91		Initial	Final	Average				
Counting	Concentration (mg/L)	4,5	10,0	174,0	163,0	168,5	PAMAS 2132	Waterviewer	25	25
Clogging		51,8	10,0	1857,0	2004,0	1930,5				

Test parameters evolution (Fig. 5)
TEST RESULTS
Differential pressure at test flow rate
 ΔP column (hPa) : < 2

Filtering media (hPa) : 110

 Clean assy (hPa) : 110
 Final filtering media ΔP (hPa) : 130

Table 1 : Clogging curve (Fig. 4)

Period n.	1		2		3		4		5	
Concentration (mg/L)	-	4,518	51,76	4,518	51,76	4,518	51,76	4,518	51,76	4,518
Test duration (min)	0	30	90	120	180	210	270	299	360	390
Differential pressure (hPa)	110	110	110	110	120	120	120	120	130	130
Injected mass (g)	0	0,843	19,85	20,99	40	41,14	60,15	60,96	80,3	-

Total injected mass : 80,3 g
 Final test concentration (CF I) : 15,23 mg/L
 Non-retained mass : 0,64 g
 Retention capacity : 79,7 g

- Término de filtración: Pérdida de Carga
- Término técnico: Filtering media (hPa)

- Cálculo: Presión Entrada - Salida
- Valor: 110 hPa

- Término de filtración: Poder de filtración
- Término técnico: Retention Capacity (%)
- Cálculo: Masa Retenida (79,7 g) / Masa Inyectada (80,3 g) = 0,9925 x 100%

- Valor: 99,25 %

Raw counting results (Fig. 1-2-3)

Samp

Table 2 : Average filtration ratio and efficiency vs. Test period
Cumulative counts (#/mL)

Counting period	Particle size (µm)		R10		R11		R12		R13		R14		R15		R16		R17	
	>1 µm	R10 E%	>2 µm	R11 E%	>5 µm	R12 E%	>10 µm	R13 E%	>20 µm	R14 E%	>30 µm	R15 E%	>40 µm	R16 E%	>50 µm	R17 E%		
Upstream initial counts	483,5		219		17,72		4,64		0,912		0,288		0,08		0,04			
1	Upstream	13917	6,012	9067	7,013	2173	13,2	259,5	41,03	28,41	190	7,423	271,2	2,297	363,7	0,815	387	
	Downstream	2315	83,37	1293	85,74	164,6	92,42	6,324	97,56	0,149	99,47	0,027	99,63	0,006	99,73	0,002	99,74	
2	Upstream	14658	6,774	9613	7,769	2408	13,66	331,7	32,1	39,82	167,3	10,46	475,6	3,078	1539	1,088	∞	
	Downstream	2164	85,24	1237	87,13	176,2	92,68	10,33	96,88	0,238	99,4	0,022	99,79	0,002	99,94	0	100	
3	Upstream	18396	3,681	12039	4,037	2861	6,136	351,2	15,36	39,34	141,5	10,23	464,8	2,936	734	1,086	271,5	
	Downstream	4997	72,84	2982	75,23	466,3	83,7	22,87	93,49	0,278	99,29	0,022	99,78	0,004	99,86	0,004	99,63	
4	Upstream	23034	2,945	15263	3,123	3619	4,236	414,1	9,947	44,36	83,28	11,37	450	3,215	381,8	1,122	266,5	
	Downstream	7821	66,04	4888	67,97	854,2	76,4	41,63	89,95	0,533	98,8	0,025	99,78	0,008	99,74	0,004	99,62	
5	Upstream	20125	3,988	13518	4,097	3454	4,885	433,4	8,886	47,68	59,9	12,29	438,9	3,62	905	1,256	314	
	Downstream	5046	74,93	3299	75,59	707,1	79,53	48,77	88,75	0,796	98,33	0,028	99,77	0,004	99,89	0,004	99,68	
Average	Upstream	18026	4,034	11900	4,343	2903	6,129	358	13,78	39,92	100,1	10,35	415,4	3,029	612,3	1,073	374,9	
	Downstream	4469	75,21	2740	76,98	473,7	83,68	25,99	92,74	0,399	99	0,025	99,76	0,005	99,84	0,003	99,73	





