

**Determination of the turbidity reduction
according to NF EN 16713-1 §7.2.4 with derogation**

**Domestic swimming pools - Water systems - Part 1 : Filtration systems
Requirements and test methods : §7.2.4 Turbidity reduction test**

Sample ref. POOL TIGER

CUSTOMER IDENTIFICATION	
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<i>Contact</i>	Mr Joakim SATERVI
<i>Purchase order nb</i>	Agreement on DEV_00005182.00 of 03.12.19

IFTS REFERENCES	
<i>Purchase order nb</i>	ARC_00005227
<i>IFTS Order n.</i>	AFF_00004341
<i>Quotation n.</i>	DEV_00005182.00

Written by
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Validated and signed by
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REVISION TABLE			
<i>Date</i>	<i>Version</i>	<i>Reason for revision</i>	<i>Revision Description</i>
20/02/2020	RA_2020_00005428	Initial release	

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1 - SCOPE

SOLANA SPA GROUP AB has requested IFTS (Institut de la Filtration et des Techniques Séparatives) as per purchase order number Agreement on DEV_00005182.00 of 03.12.19 to evaluate the performance of a specified number of samples according to NF EN 16713-1 §7.2.4 with derogation : Domestic swimming pools - Water systems - Part 1 : Filtration systems - Requirements and test methods §7.2.4 Turbidity reduction test.

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>
POOL TIGER	ECH_00033016
IFTS filters 20 µm (x4)	



Sample ref. : POOL TIGER and IFTS filters 20µm
supplied by SOLANA SPA GROUP AB

3- Turbidity reduction test according to NF EN 16713-1 §7.2.4 with derogation

3.1 Test conditions for both tests (with/without POOL TIGER)

The following test conditions have been applied :

Standard NF EN 16713-1 §7.2.4 with derogation*

Multipass circulation of contaminant

Test liquid : Filtered water

Temperature : 23 +/- 3 °C

Contaminant : ISO CTD (ISO 12103-1 A4)

Initial contaminant concentration : 50 mg/L

Test flow rate : 4,54 m³/h

Test volume V₂ = 100 L

Test flow rate Q₁ = 75,71 L/min

Filter volume without sample (V₁) = 5,86 L

Test duration (t₁) = V₂/Q₁ x 40 = 52,8 min

Cycle duration V₂/Q₁ = 1,3 min

Upstream sampling every 2 cycles for turbidity measurement

Filter in test = 2 new IFTS filters 20 µm

*Derogation in terms of cycles number, 40 instead of 20.



Fig.1 : Pictures of test rig

3.2 TEST RESULTS WITHOUT POOL TIGER

3.2.1 Test parameters

Test duration (t1)	Test flow rate (Q1)	Filter volume with sample (Vbypass)	Test volume (V2)
min	m3/h	L	L
53,0	4,54	5,86	100

Initial cleanliness	Initial upstream turbidity restricted level (TBup,r)	Initial upstream turbidity (TBup,0)	Final upstream turbidity
FNU	FNU	FNU	FNU
0,482	17,8	16,76	2,42

Test duration (t1) = V2/Q1 x 20

Initial upstream turbidity (TBup,0) = TBup,r x (1 - (Vbypass / V2))

3.2.2 Filtration performances

Initial ΔP	Final ΔP	Turbidity reduction efficiency after 40 cycles	Comments
kPa	kPa	%	/
46,9	48,0	88,09	/

EN 16713-1 standard specifies a turbidity reduction of at least 50%.

The turbidity reduction of the tested assembly is of 88,09%

3.2.3 Detailed test results without POOL TIGER

Test identification

Test date : 20/02/2020	Operator : ML
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Filter identification

Filter ref. : IFTS filters 20µm without POOL TIGER	IFTS n. : ECH_00033016
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Test parameters

Test fluid : Microfiltered water	Temperature : 23,1 °C
Test dust : ISO CTD (ISO 12103-1 A4)	Batch n. : 13835C
Specific flowrate : 4,54 m3/h	Test volume : 100 L
Test flow rate : 75,75 L/min	
Injected mass : 5 g	Initial concentration : 50 mg/L

Test results

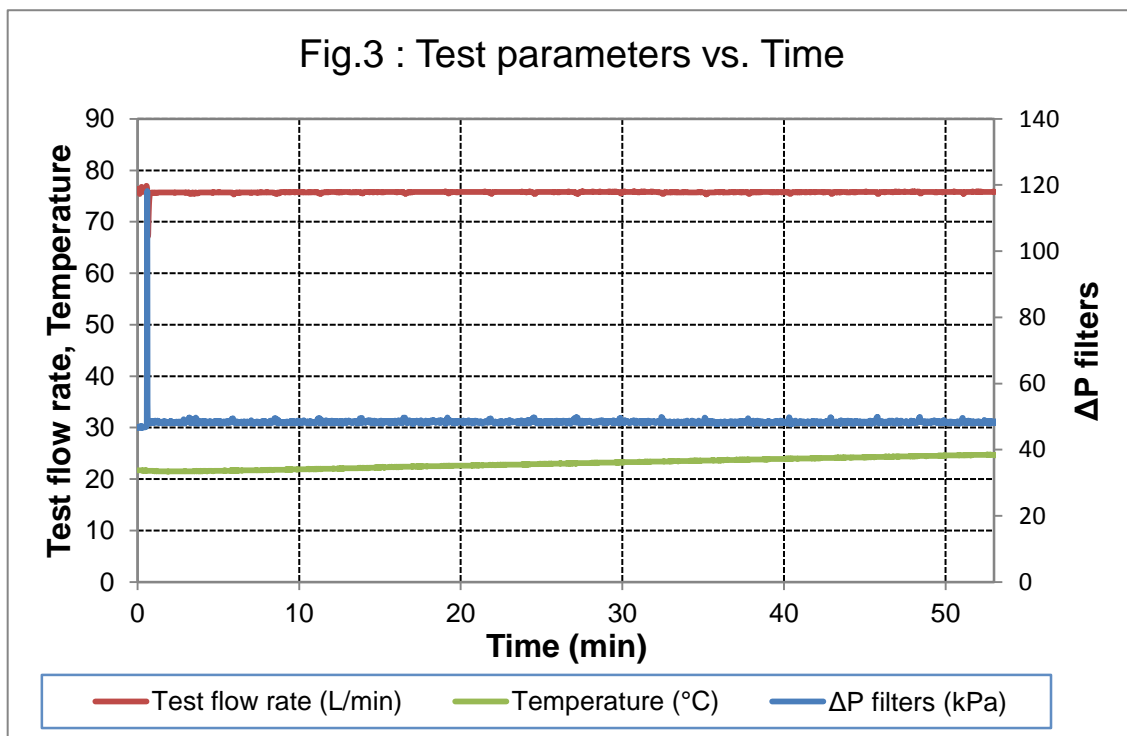
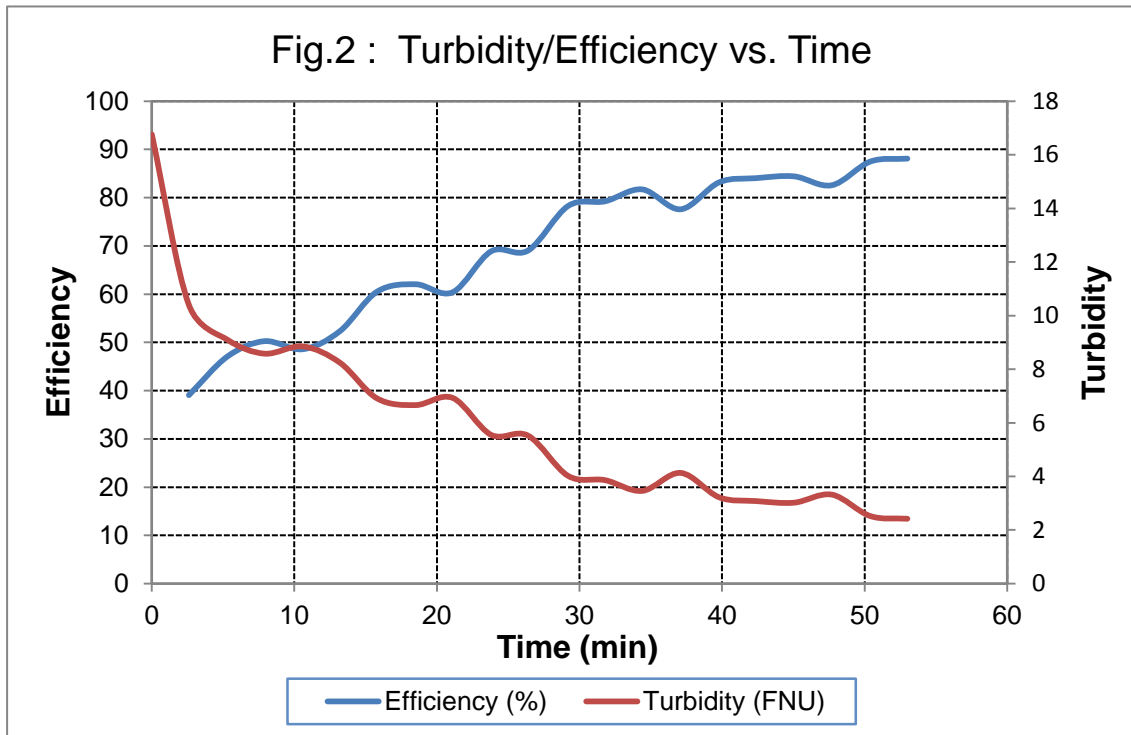
Table 1 : Differential pressure results

Assembly differential pressure (kPa)		
Initial	Final	Increase
46,9	48	1,1

Table 2 : Turbidity

Initial turbidity (FNU)	0,482	
Time (min)	Turbidity (FNU)	Efficiency (%)
0	16,76	/
2,6	10,4	39,07
5,3	9,1	47,06
7,9	8,58	50,25
10,6	8,85	48,59
13,2	8,24	52,34
15,8	6,91	60,51
18,5	6,66	62,05
21,1	6,93	60,39
23,8	5,55	68,87
26,4	5,52	69,05
29,2	4,02	78,27
31,8	3,86	79,25
34,4	3,46	81,71
37,1	4,13	77,59
39,8	3,22	83,18
42,4	3,08	84,04
45,1	3,02	84,41
47,7	3,32	82,57
50,4	2,52	87,48
53,0	2,42	88,09

Turbidity reduction efficiency after 40 cycles (%) : 88,09



3.3 TEST RESULTS WITH POOL TIGER

3.3.1 Test parameters

Test duration (t1)	Test flow rate (Q1)	Filter volume with sample (Vbypass)	Test volume (V2)
min	m3/h	L	L
53,0	4,52	6,66	100

Initial cleanliness	Initial upstream turbidity restricted level (TBup,r)	Initial upstream turbidity (TBup,0)	Final upstream turbidity
FNU	FNU	FNU	FNU
0,07	16,9	15,77	1,6

Test duration (t1) = V2/Q1 x 20

Initial upstream turbidity (TBup,0) = TBup,r x (1 - (Vbypass / V2))

3.3.2 Filtration performances

Initial ΔP	Final ΔP	Turbidity reduction efficiency after 40 cycles	Comments
kPa	kPa	%	/
47,4	48,9	90,25	/

EN 16713-1 standard specifies a turbidity reduction of at least 50%.

The turbidity reduction of the tested assembly is of 90,25%

3.4.3 Detailed test results with POOL TIGER

Test identification

Test date : 20/02/2020	Operator : ML
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Filter identification

Filter ref. : IFTS filters 20µm with POOL TIGER	IFTS n. : ECH_00033016
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Test parameters

Test fluid : Microfiltered water	Temperature : 22,8 °C
Test dust : ISO CTD (ISO 12103-1 A4)	Batch n. : 13835C
Specific flowrate : 4,52 m3/h	Test volume : 100 L
Test flow rate : 75,35 L/min	
Injected mass : 5 g	Initial concentration : 50 mg/L

Test results

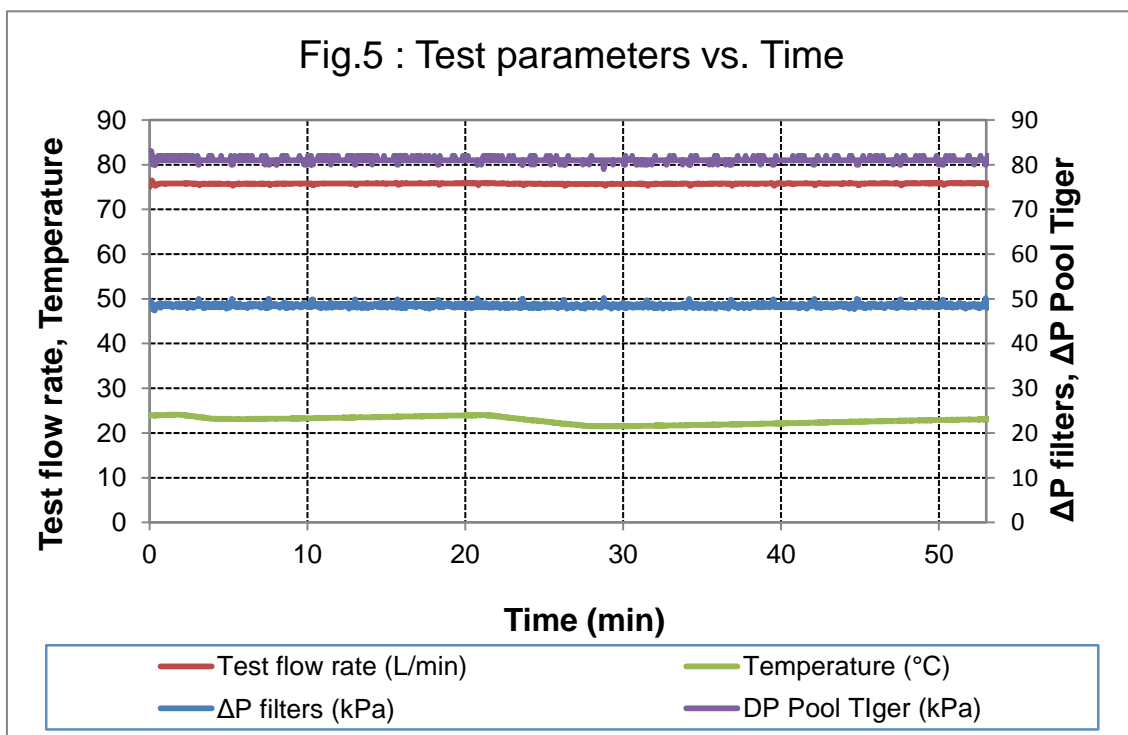
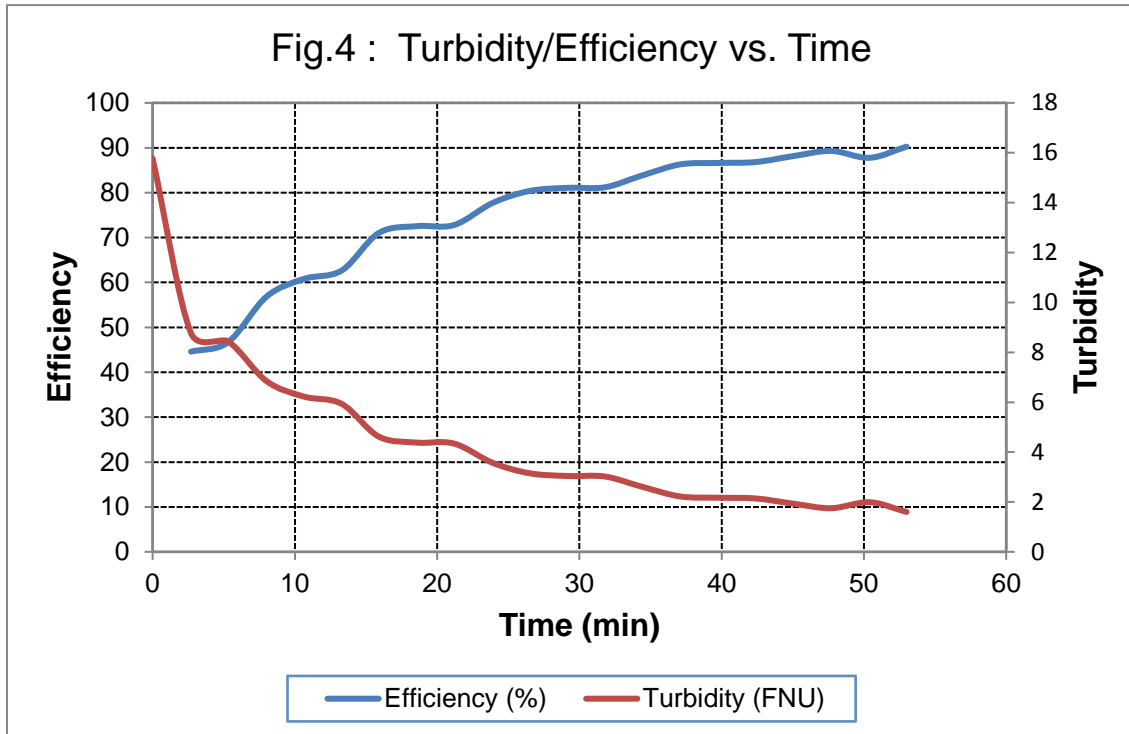
Table 3 : Differential pressure results

Assembly differential pressure (kPa)		
Initial	Final	Increase
47,4	48,9	1,5

Table 4 : Turbidity

Initial turbidity (FNU)	0,070	
Time (min)	Turbidity (FNU)	Efficiency (%)
0,00	15,77	/
2,70	8,77	44,59
5,30	8,44	46,69
8,00	6,85	56,82
10,60	6,23	60,76
13,30	5,93	62,68
15,90	4,62	71,02
18,60	4,38	72,55
21,20	4,34	72,80
23,90	3,57	77,71
26,50	3,15	80,38
29,20	3,04	81,08
31,80	3,02	81,21
34,40	2,61	83,82
37,10	2,22	86,31
39,80	2,17	86,62
42,40	2,14	86,82
45,05	1,93	88,15
47,70	1,75	89,30
50,40	1,99	87,77
53,00	1,60	90,25

Turbidity reduction efficiency after 40 cycles (%) : 90,25



3.5 Comparison with/without POOL TIGER

Table 5 : Efficiency results

	Test without POOL TIGER	Test with POOL TIGER
Time (min)	Efficiency (%)	Efficiency (%)
0,00	/	/
2,70	39,07	44,59
5,30	47,06	46,69
8,00	50,25	56,82
10,60	48,59	60,76
13,30	52,34	62,68
15,90	60,51	71,02
18,60	62,05	72,55
21,20	60,39	72,80
23,90	68,87	77,71
26,50	69,05	80,38
29,20	78,27	81,08
31,80	79,25	81,21
34,40	81,71	83,82
37,10	77,59	86,31
39,80	83,18	86,62
42,40	84,04	86,82
45,05	84,41	88,15
47,70	82,57	89,30
50,40	87,48	87,77
53,00	88,09	90,25

