

*This report removes and supersedes the test report n° 150820, to be returned or destroyed*

**SAND QUALIFICATION**  
**According to NF P 90-319 (with derogation)**  
**Granular filter media — Test methods —**  
**Measurement of filtration efficiency and retention capacity**



Filter ref.: Hi-tech glass filter media 20 m/h

<b>CUSTOMER IDENTIFICATION</b>	
<i>Company</i>	<b>NATURE WORKS WATER TECHNOLOGIES</b>
<i>Address</i>	Poniente, 5 - 3590 ALTEA (ALICANTE) - SPAIN
<i>Contact</i>	<b>Mr Guillermo GIL VENEZIANI</b>
<i>Purchase Order nb</i>	Accepted quotation nb 141131

<b>IFTS REFERENCES</b>	
<i>IFTS order number</i>	9185
<i>Quotation nb</i>	141131
<i>Test date</i>	24/03/2015
<i>Date of receipt of samples</i>	13/03/2015

*Written by*  
**The Test Engineer,**  
**Hafedh SAIDANI**

*Validated and signed by*  
**The Test Manager,**  
Date: 21/04/2015

Confidential document prepared for the attention of

**NATURE WORKS WATER TECHNOLOGIES**

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## 1 - SCOPE

NATURE WORKS WATER TECHNOLOGIES has requested IFTS (Institut de la Filtration et des Techniques Séparatives) to evaluate the performance of a specified number of samples according to NF P 90-319 (with derogation) : Granular filter media — Test methods — Measurement of 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

Sample Ref.	IFTS Ref.
<b>Hi-tech glass filter media</b>	<b>6566</b>



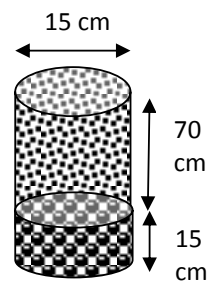
**Fig.1:** Hi-tech glass filter media  
 supplied by NATURE WORKS WATER TECHNOLOGIES

### 3- TEST CONDITIONS

The following conditions have been applied to determine the filtration efficiency and the retention capacity of the test filter medium:

**The filter medium is initially washed one time (back washing at 30 m/h (8,7 L/min)).**

- Procedure : NF P 90-319 (with derogation)
- (\*) Derogation to the NF P 90-319 : Constant flow rate during the test
- IFTS bench : -
- Test fluid : Microfiltered water
- Flow rate : 5,84 L/min (20 m/h)
- Temperature : 23 °C (+/- 2°C)
- Test powder : specified according to ISO 12103-A4 (ISO CTD)
- Basic Upstream :
  - Counting phase : 5,84 mg/L
  - Clogging phase : 110,20 mg/L
- On line particle counting : 5, 10, 20, 30, 40, 45, 50 and 60  $\mu\text{m}$
- Height/diameter of filtration sand : 70 cm / 15 cm
- Height/diameter of support sand\* : 15 cm / 15 cm



#### End of test criteria

- Final  $\Delta P$  = 500 hPa or
- Maximum test duration as specified by the customer reached or
- Internal leakage detected



**Fig. 2:** Picture of the test rig

## 4- TEST RESULTS

### 4.1 End of test criteria

	End of test conditions	Actual value	End of test criteria
final $\Delta P$ (hPa)	500	530	YES
Test duration (min)	$\leq 360$	365	NO
Internal leakage	Leak	No leakage	NO

### 4.2 Filtration performances

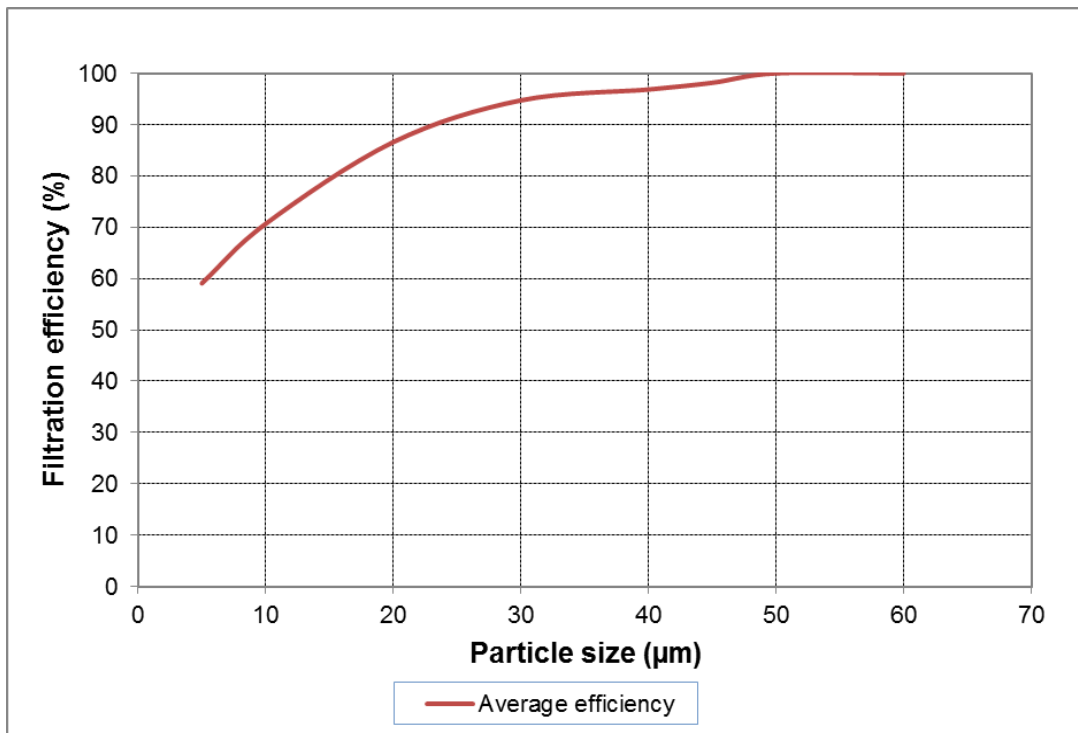
Customer Ref.	IFTS Ref.	Initial $\Delta P$ (hPa)	Final $\Delta P$ (hPa)	Apparent capacity (g) at final $\Delta P$	Average filtration efficiency (%)		
					>5 $\mu m$	> 10 $\mu m$	> 45 $\mu m$
Hi-tech glass filter media	6566	0,06	530	219,0	59,07	70,66	98,17

Some internal leakage occurring up to + 500 mbar

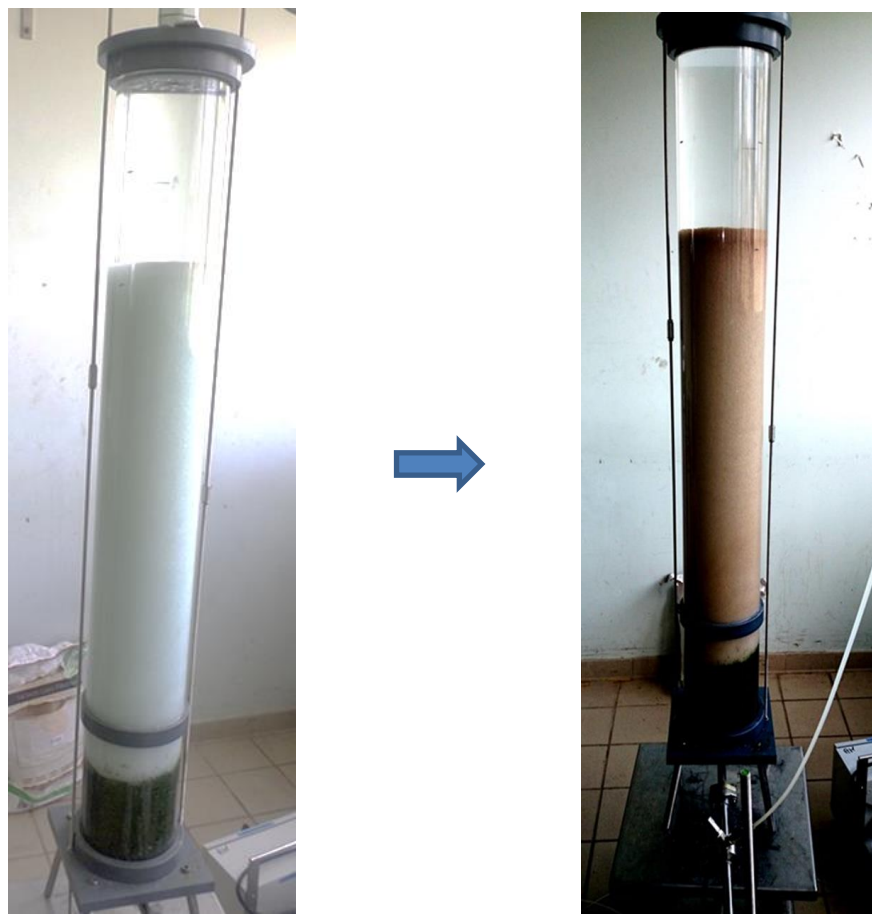
### 4.3 Sand fluidization

Customer Ref.	IFTS Ref.	Dried sand height* (cm)	Sand height* Filtration mode (cm) @ 20 m/h	Back washing	
				flow rate (m/h)	Bed expansion (%)
Hi-tech glass filter media	6566	75	74	30,0	6

(\*) without support sand : height of support sand : 15 cm



**Fig. 3:** Average filtration efficiency vs. particle size



**Fig. 4:** Picture of the granular material before and after the test

# *APPENDIX*

**TEST REPORT N° 150820-a-A**
**Granular filter media — Test methods — Measurement of filtration efficiency and retention capacity**
**According to NF P 90-319 (with derogation)**
**TEST IDENTIFICATION**

Test date : 24/03/2015	Operator : ml	IFTS sample number : 6566
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**FILTER IDENTIFICATION**

Housing ref. : Supplied by IFTS	Filter sample ref. : Hi-tech glass filter media
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**OPERATING CONDITIONS**

Test fluid	Type : Microfiltered water	Temperature (°C) : 21,9							
Test contaminant	Type : ISO CTD	Batch number : 12295C							
Fluid circuit									
	<b>Filter test</b>	<b>Contaminant injection</b>	<b>Particle counting</b>						
Period	Flow rate (L/min) 5,84 Volume (L) 10	Flow rate (L/h) 10	Concentration (mg/L) Initial 426 Final 383 Average 405			Counter HIAC 8000	Sensor HRLD400	Flow rate (mL/min) 20	Volume (mL) 20
Counting	Concentration (mg/L) 12,2	12	3518	2916	3217				
Clogging	110,2								
Test parameters evolution (see figure 5)									

**TEST RESULTS**

Differential pressure at test flow rate		Housing (hPa) : 100		Clean assy (hPa) : 160,0					
Granular media (hPa) : 60,0		Final ΔP granular media (hPa) : 530							
Table 1 : Clogging curve (see figure 4)									
Test period n.	1	2	3	4	5	6	7	8	9
Initial concentration (mg/L)	-	12,2	110,2	12,2					
Test time (min)	0	29	368	395					
Test flow rate (L/min) :	5,8	5,8	5,8	5,8					
Differential pressure (bar) :	0,15	0,15	0,63	0,6					
Injected mass (g) :	0	1,95	219	221					
Injected mass :		<b>C<sub>R</sub> = 219 g</b>							

Derogation to NFP 90 319: Test performed at constant flow rate

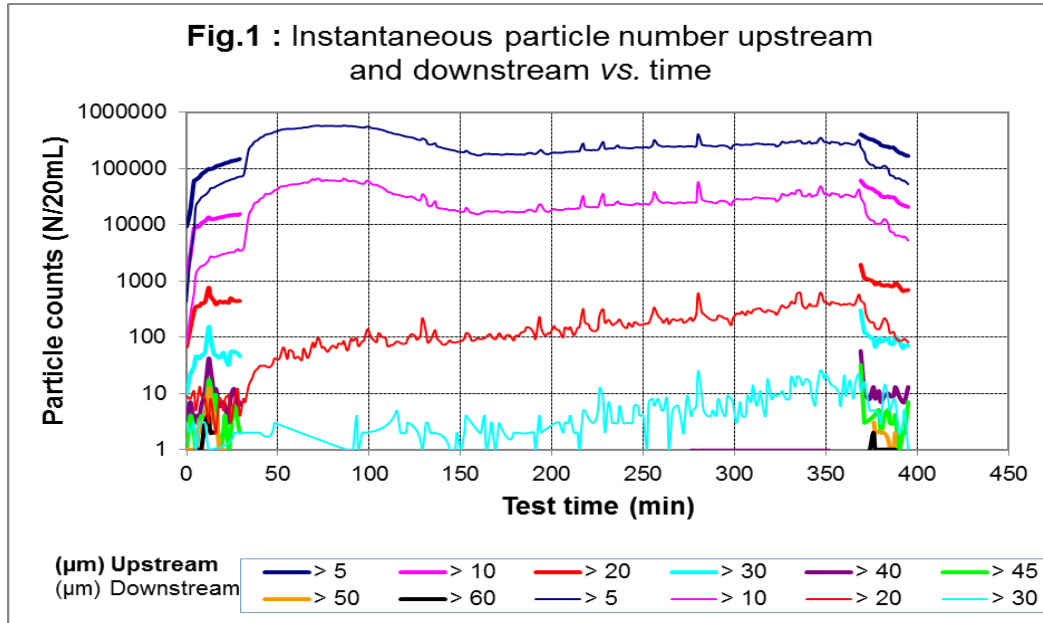
**TEST RESULTS**

Filter ref. Hi-tech glass filter media ( IFTS : 6566)

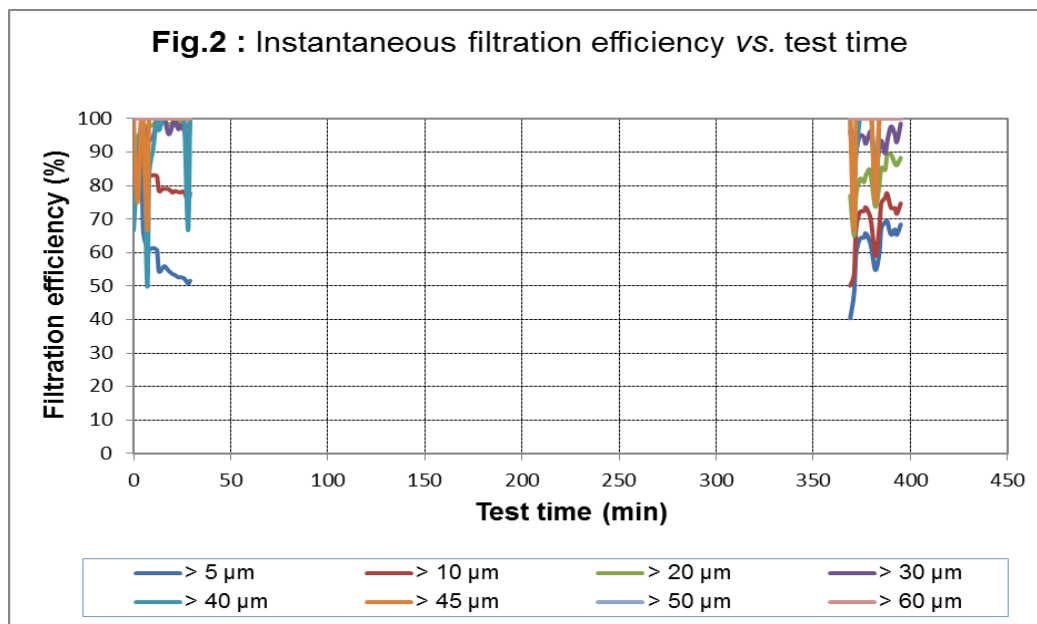
Raw counting data (see figure 1-2-3)																			
Table 2 : Filtration ratio and efficiency* vs. test period																			
Cumulative counts (N/mL)																			
Period	Δp (bar)			> 5 μm	> 10 μm	> 20 μm	> 30 μm	> 40 μm	> 45 μm	> 50 μm	> 60 μm								
1	0,15	Up	E (%)	5510	55,19	653,3	79,37	22,39	98,51	2,85	97,26	0,54	95,93	0,24	98,72	0,14	100	0,05	100
		Down		2469		134,8		0,33		0,08		0,02		0,003		0,00		0,00	
2	0,6	Up	E (%)	13400	60,58	1761	67,62	46,71	81,22	5,03	93,39	0,62	97,62	0,25	97,67	0,12	100	0,04	100
		Down		5283		570,1		8,77		0,33		0,01		0,01		0,00		0,00	
Average		Up	Eff.	9455	<b>59,07</b>	1207	<b>70,66</b>	34,55	<b>86,6</b>	3,94	<b>94,74</b>	0,58	<b>96,86</b>	0,25	<b>98,17</b>	0,13	<b>100</b>	0,05	<b>100</b>
		Down		3876		352,5		4,55		0,21		0,02		0,01		0,00		0,00	

\*Note: Efficiency value is rounded to 100% when above 99.995

Sample Ref. : Hi-tech glass filter media (IFTS N. 6566)

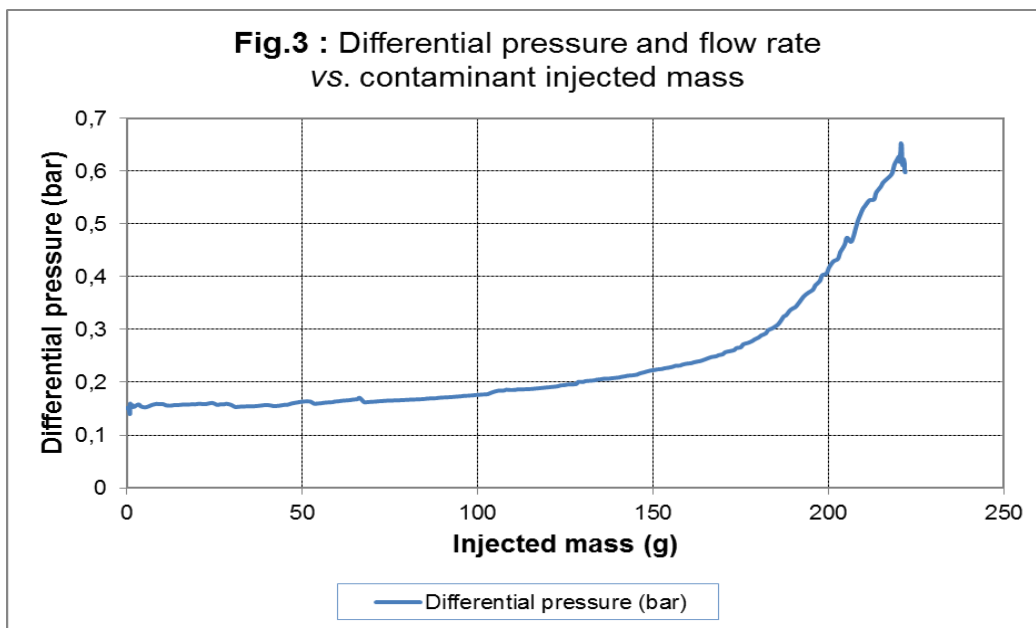


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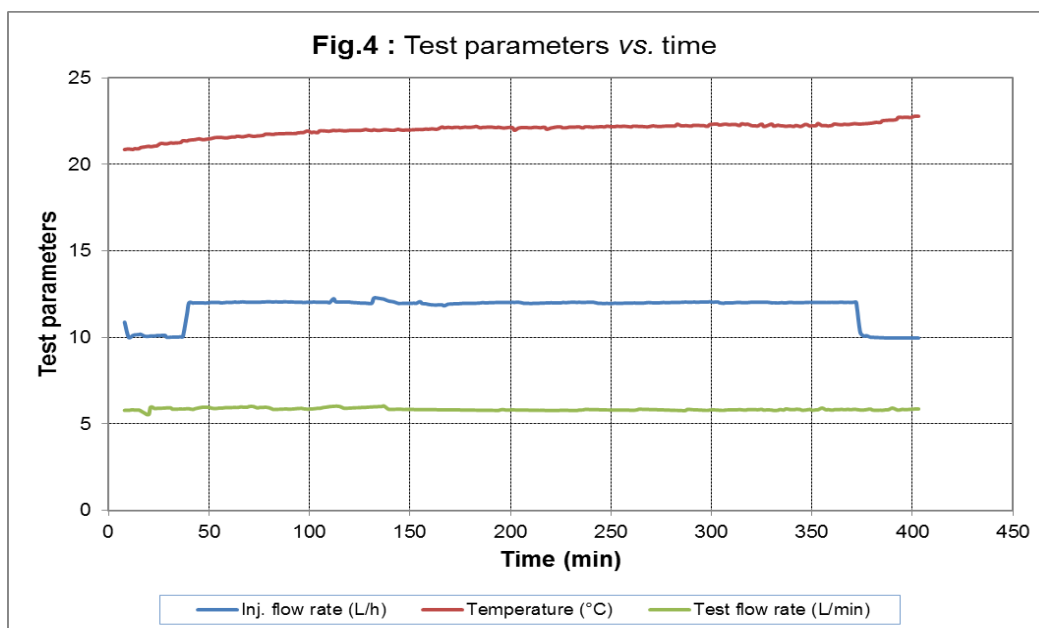




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