

Dighton Carbon SA  
Dir. Matthijs Johan Lek  
12 rue du Port  
**CH - 1204 Genf**

Ihre Zeichen	Ihre Nachricht vom	Unsere Zeichen	Telefon (- Durchwahl)	Datum
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### **Precertificate for the comparative investigations of 5 filters for drinking water**

Dear Mr. Lek,

in order to conduct comparative investigations, the Customer Dighton Carbon SA has provided the following filter models:

1. "Barier-Premia" filter (produced by ZAO METTEM-Tekhnologii, Russia).
2. "MAXTRA Aluna XL" filter (produced by BRITA, Germany).
3. "Geizer-Aquarius" filter (produced by OOO Akvatoriya, Russia).
4. "Aquafor-Garri B100-5" filter (produced by OOO Aquafor, Russia).
5. "ZF-5" filter, modification version No. 1 (produced by OOO Holding "Golden Formula", Russia).

The filters mentioned above will hereinafter be referred as "Barier", "BRITA", "Geizer", "Aquafor" and "ZF-5" filters.

### Scope of investigations

The investigations have been conducted by the following analytical parameters:

1. Permanganate value
2. Oxidizability
3. Color value (SAK 436nm)
4. Color value (SAK 254nm)
5. Turbidity
6. Hardness
7. Chemical oxygen demand (COD)
8. pH-Value
9. Odor (sensory quality)
10. Color (sensory quality)
11. Turbidity (sensory quality)
12. Sediment / particle (sensory quality)
13. Benzene (C<sub>6</sub>H<sub>6</sub>)
14. Hexadecane
15. Octadecane
16. Eicosane
17. Chloroform

18. Carbon tetrachloride (CCl<sub>4</sub>)
19. anionic surfactants
20. Formaldehyde (Methanal)
21. 2,4-dichlorophenoxyacetic acid
22. Phenol index
23. Arsenic (As)
24. Cadmium (Cd)
25. Lead (Pb)
26. Copper (Cu)
27. Zinc (Zn)

### Results and Conclusions

As to filtration effectiveness, the filters have been ranked as follows:

- “ZF – 5” filters ranked No.1 by 22 elements.
- “Barrier” filters ranked No.1 by 10 elements.
- “Aquaphor” filters ranked No.1 by 4 elements.
- “Brita” filters ranked No.1 by 4 elements.
- “Geysler” filters ranked No.1 by 3 elements.

So the absolute advantage by sorption abilities has been shown by “ZF -5” filters having the “Golden Formula” trademark.

At the present time ion-exchange resins are used for removing metals from water in filters. However, in doing so ion-exchange resins show aside undesirable effect: they extract useful salts from water, e.g. calcium, magnesium and potassium. In the given case we observe a new phenomenon in water purification, namely: “ZF – 5” filters show the largest sorption activity in respect to heavy metals though remaining inert to hardness salts. We believe that this phenomenon should be considered as positive.

Detailed analytical results and conclusions you'll get during the next days.

Best regards  
NovaBiotec Dr. Fechter GmbH



Dipl.-Ing. Bert Kühl  
(Managing director)

GCO sol.	Lsg. вещество/параметр, substance/parameter, Substanz/Parameter	размер, unit, Einheit	концентрация, concentration, Konzentration:					порядок ранжировки, ranking list, Rangliste:						
			модельных раствор, test solution, Testlösung	Аквафор Aquaphor	Барьер Barier	Брита Brita	Гейзер Geizer	ZF-5 ZF-5	Аквафор Aquaphor	Барьер Barier	Брита Brita	Гейзер Geizer	ZF-5 ZF-5	
		номер проба, sample No., Labor-Nr.	<b>18521</b>	<b>18516</b>	<b>18517</b>	<b>18518</b>	<b>18519</b>	<b>18520</b>	1 = лучший, best, Bester / 5 = худший, worst, Schlechtester					
2.1	перманганатной окисляемости, permanganate value, Permanganatindex	mg/l KMnO4	36	39	34	36	38	24	5	2	3	4	1	
	/Oxidierbarkeit	mg/l O2	9,0	9,8	8,5	9,0	9,5	6,0	5	2	3	4	1	
	цветности, color value, Färbung (SAK 436nm)	1/m	0,96	0,96	0,95	0,93	0,9	0,53	5	4	3	2	1	
	цветности, color value, Färbung (SAK 254nm)	1/m	11,5	11,6	10,3	10,8	10,8	5,85	4	2	3	3	1	
	мутность, turbidity, Trübung	NTU	5,4	3,5	3,5	3,9	3,6	3,4	2	2	4	3	1	
	жёсткость, hardness, Härte	mmol/l	3,24	2,28	2,18	2,04	1,96	3,20	2	3	4	5	1	
	ХПК, chemical oxygen demand, chemischer Sauerstoffverbrauch (CSB)	mg/l	27	25	24	25	25	22	3	2	3	3	1	
	pH величина, pH-value, pH-Wert	-	7,99	6,25	6,13	6,04	6,01	7,89	2	3	4	5	1	
	<b>сенсорный, sensory quality, Sensorik:</b>													
	запах, odor, Geruch	1- неощутимый, not observable, nicht wahrnehmbar	2	1	1	1-2	1(-2)	1	1	1	3	2	1	
	цветности, color value, Färbung	2-ощутимый, observable, wahrnehmbar	2	1-2	1-2	2	1-2	1	2	2	3	2	1	
	мутность, turbidity, Trübung	3-вятный оощутимый, pronounced, stark wahrnehmbar	1-2	1	1	1	1	1	1	1	1	1	1	
	осадок/частица, sediment/particles, Bodensatz/Partikel		2	1	1	1	1	1	1	1	1	1	1	
			<b>18491</b>	<b>18486</b>	<b>18487</b>	<b>18488</b>	<b>18489</b>	<b>18490</b>						
2.2	бензол, benzene, Benzol	mg/l	0,092	0,004	0,002	0,024	0,050	0,029	2	1	3	5	4	
	гексадекан, hexadecane, Hexadecan	mg/l	0,023	0,001	0,002	0,004	0,001	0,000	2	3	4	2	1	
	октадекан, octadecane, Octadecan	mg/l	0,046	0,003	0,004	0,005	0,003	0,000	2	3	4	2	1	
	эйкозан, icosane, Eicosan	mg/l	0,047	0,002	0,004	0,007	0,004	0,000	2	3	4	3	1	
	хлороформ, chloroform, Chloroform (Trichlormethan)	mg/l	4,30	1,10	0,52	1,90	3,20	2,60	2	1	3	5	4	
	четырёххлористый углерод, Carbon tetrachloride, Tetrachlormethan	mg/l	0,053	0,025	0,0082	0,028	0,040	0,031	2	1	3	5	4	
			<b>18464</b>	<b>18465</b>	<b>18460</b>	<b>18461</b>	<b>18462</b>	<b>18463</b>						
2.3	АПАВ, anionic surfactants, anionische Tenside	mg/l	< 0,02	< 0,02	< 0,02	< 0,02	< 0,02	< 0,02	1	1	1	1	1	
	формальдегид, formaldehyde, Formaldehyd (Methanal)	mg/l	0,060	0,031	0,043	0,030	0,041	0,008	3	5	2	4	1	
	2,4-Д, 2,4-dichlorophenoxyacetic acid, 2,4-Dichlorphenoxyessigsäure, (2,4-D)	mg/l	0,0021	0,00140	0,00019	0,0010	0,00130	0,00041	5	1	3	4	2	
	фенол (фенольный индекс), phenolic index, Phenolindex	mg/l	0,07	0,01	< 0,01	0,03	0,02	0,02	2	1	4	3	3	
			<b>18416</b>	<b>18417</b>	<b>18418</b>	<b>18419</b>	<b>18420</b>	<b>18421</b>						
2.4	мышьяк, arsenic, Arsen, As	mg/l	0,099	0,12	0,11	0,11	0,12	0,11	2	1	1	2	1	
	свинец, lead, Blei, Pb	mg/l	0,29	0,12	0,31	0,25	0,26	0,11	2	5	3	4	1	
	кадмий, cadmium, Cadmium, Cd	mg/l	0,0097	0,010	0,014	0,013	0,012	0,008	2	5	4	3	1	
	медь, copper, Kupfer, Cu	mg/l	3,8	4,1	5,9	5,6	4,7	3,1	2	5	4	3	1	
	цинк, zinc, Zink, Zn	mg/l	47	52	63	61	57	40	2	5	4	3	1	
									количество занимать первое место, No. of rank first, Anzahl 1. Platz:	4	10	4	3	22
									итог, sum, Summe:	66	66	82	84	39
									сечение, average, Durchschnitt:	2,4	2,4	3,0	3,1	1,4