



3040 E. Cornwallis Road • PO Box 12194 • Research Triangle Park, NC 27709-2194 • USA
Telephone +1.919.541.6941 • Fax +1.919.541.6936 • mko@rti.org • www.rti.org

ASHRAE 145.2 GAS-PHASE AIR CLEANER TEST REPORT

Manufacturer:	Air Filter Company
Product Name:	Media Filter for VOCs
Challenge:	Toluene
RTI Report No.	BR04201603

Test Laboratory:
RTI
3040 Cornwallis Road
Research Triangle Park, NC 27709
919-541-6941
mko@rti.org

Gas-Phase Air Cleaner Performance Report Summary

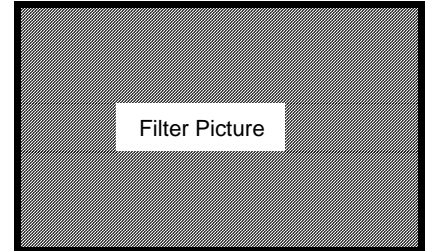
This report applies to the tested device only.

Laboratory Data

RTI Report No.	<u>BR04201603</u>	Date	<u>20-Apr-16</u>
Test Laboratory	<u>Research Triangle Institute</u>		
Operator	<u>Pope</u>	Supervisor	<u>Owen</u>
Analyzers:	Brand <u>RAE Systems</u>	Model	<u>ppbRAE</u>

Device Manufacturer's Data

Manufacturer	<u>Air Filter Company</u>
Product Name	<u>Media Filter for VOCs</u>
Product Model	<u>#ABC-123</u>
Test requested by	<u>RTI</u>
Sample obtained from	<u>Air Filter Company</u>



Device Description

Nominal Dimensions (in.):	<u>24 x 24 x 12</u> (height x width x depth)		
Generic name	<u>Rigid cell</u>	Media type/color	<u>carbon</u>
Other attributes	<u>30 pleats of fibrous media with sorbent pellets</u>		

Test Conditions

Airflow (cfm)	<u>2000</u>	Temperature (F)	<u>76</u>	RH (%)	<u>76</u>
Face Velocity (fpm)	<u>500</u>				
Initial Pressure Drop (in. wg)	<u>0.40</u>	Final Pressure Drop (in. wg)	<u>NA</u>		
Challenge Gas	<u>Toluene</u>	@	<u>400</u> ppb &	<u>50</u> ppm	
Remarks	<u></u>				

Resistance Test (Pressure Drop Curve)

Airflow (cfm)	<u>1000</u>	<u>1500</u>	<u>2000</u>	<u>2500</u>	<u>2750</u>
Pressure Drop (in. wg.)	<u>0.10</u>	<u>0.22</u>	<u>0.40</u>	<u>0.60</u>	<u>0.70</u>

Initial Efficiency Test Results

Average Efficiency	<u>90</u> %	Penetration	<u>0.10</u>
Upstream Concentration (avg.)	<u>401</u> ppb		

Capacity Test Results

Upstream Concentration	<u>50.3</u> ppm (average)		
Total Challenge time (min)	<u>240</u>	Total Desorption Time (min)	<u>30</u>
Capacity	<u>406.2</u> g at time	<u>60</u> min	<u>875.0</u> g at time <u>240</u>
Efficiency at test end	<u>8</u> % at time	<u>240</u> min	

Initial Efficiency Test

TABULATED DATA SUMMARY

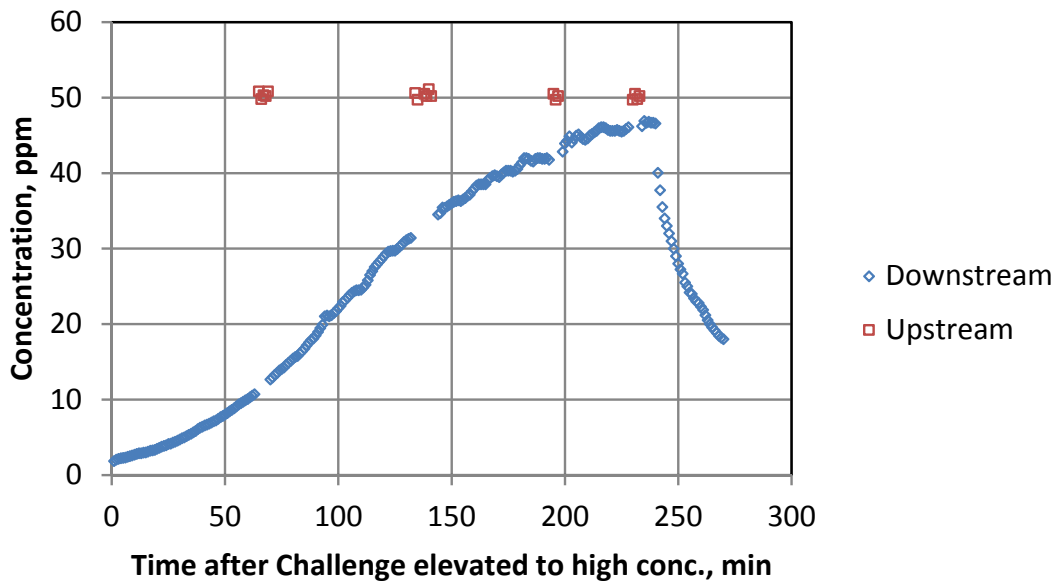
RTI Report Number: BR04201603
 Product Manufacturer: Air Filter Company
 Nominal Dimensions (in): 24 x 24 x 12
 Airflow (cfm): 2000
 Contaminant: Toluene

Upstream Concentration Average 401 ppb
 Rig Background Concentration 3 ppb
 Penetration Average 0.10
 Average Efficiency (%) 90 %

Time (min)	Downstream (ppb)	Upstream (ppb)	Comment	Time (min)	Downstream (ppb)	Upstream (ppb)	Comment
0			gas turned on				
1		405					
2		397		35	46		
3		402		36	46		
4		407		37	39		
5		396		38	42		
6	19			39	50		
7	19			40	41		
8	21			41	41		
9	18			42	43		
10	22			43	46		
11	24			44	41		
12	26			45	46		
13	28			46	46		
14	28			47	48		
15	32			48	51		
16	32			49	44		
17	24			50	56		
18	32			51	55		
19	26			52	51		
20	30			53	56		
21	31			54	50		
22	27			55	59		
23	30			56	51		
24	32			57	60		
25	38			58	53		
26	42			59	57		
27	45			60	60		Capacity Test begun
28	44						
29	47						
30	43						
31	42						
32	41						
33	45						
34	41						

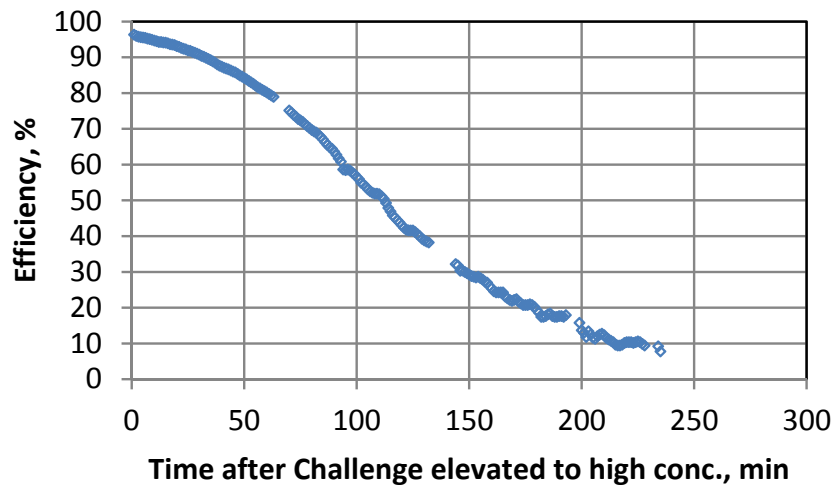
CAPACITY TEST RESULTS

Concentrations



Challenge gas was turned off at 240 minutes

Efficiency



Standard Capacity Test

TABULATED DATA SUMMARY

Upstream Concentration Average 50.3 ppm RTI Report Number: BR04201603
 Rig Background Concentration 0.01 ppm
 Correlation Test Correction Factor 1.01
 Airflow Rate 2000 cfm

Time (min)	Downstream (ppm)	Upstream (ppm)	Penetration	Efficiency (%)	Comment			Capacity, g
0					gas increased to high conc.			
1	1.9		0.04	96				7.4
2	2.0		0.04	96				14.7
3	2.2		0.04	96				21.9
4	2.2		0.04	96				29.1
5	2.3		0.05	96				36.3
6	2.3		0.05	95				43.5
7	2.4		0.05	95				50.7
8	2.5		0.05	95				57.9
9	2.6		0.05	95				65.1
10	2.7		0.05	95				72.2
11	2.8		0.06	94				79.3
12	2.9		0.06	94				86.5
13	2.9		0.06	94				93.6
14	3.0		0.06	94				100.7
15	3.0		0.06	94				107.8
16	3.1		0.06	94				114.9
17	3.2		0.06	94				121.9
18	3.3		0.06	94				129.0
19	3.3		0.07	93				136.1
20	3.5		0.07	93				143.1
21	3.6		0.07	93				150.1
22	3.8		0.07	93				157.1
23	3.9		0.08	92				164.1
24	3.9		0.08	92				171.0
25	4.1		0.08	92				178.0
26	4.2		0.08	92				184.9
27	4.3		0.09	92				191.8
28	4.4		0.09	91				198.7
29	4.6		0.09	91				205.6
30	4.7		0.09	91				212.4
31	4.9		0.10	90				219.3
32	5.0		0.10	90				226.1
33	5.2		0.10	90				232.8
34	5.3		0.11	90				239.6
35	5.5		0.11	89				246.3
36	5.7		0.11	89				253.1
37	5.8		0.12	89				259.7

Standard Capacity Test

TABULATED DATA SUMMARY

Upstream Concentration Average 50.3 ppm RTI Report Number: BR04201603
 Rig Background Concentration 0.01 ppm
 Correlation Test Correction Factor 1.01
 Airflow Rate 2000 cfm

Time (min)	Downstream (ppm)	Upstream (ppm)	Penetration	Efficiency (%)	Comment			Capacity, g
38	6.1		0.12	88				266.4
39	6.3		0.12	88				273.0
40	6.4		0.13	87				279.6
41	6.6		0.13	87				286.2
42	6.7		0.13	87				292.7
43	6.8		0.14	87				299.3
44	7.0		0.14	86				305.8
45	7.1		0.14	86				312.3
46	7.2		0.14	86				318.7
47	7.4		0.15	85				325.2
48	7.7		0.15	85				331.6
49	7.8		0.16	85				338.0
50	8.0		0.16	84				344.3
51	8.2		0.16	84				350.7
52	8.4		0.17	83				357.0
53	8.6		0.17	83				363.2
54	8.9		0.18	83				369.5
55	9.1		0.18	82				375.7
56	9.4		0.19	82				381.8
57	9.5		0.19	81				388.0
58	9.7		0.19	81				394.1
59	9.9		0.20	81				400.1
60	10.1		0.20	80				406.2
61	10.3		0.21	80				412.2
62	10.5		0.21	79				418.2
63	10.7		0.21	79				424.1
64								429.9
65		50.8						435.7
66		49.8						441.5
67		50.3						447.3
68		50.2						453.1
69		50.8						458.9
70	12.7		0.25	75				464.7
71	12.9		0.26	75				470.3
72	13.3		0.26	74				475.9
73	13.5		0.27	73				481.4
74	13.9		0.28	73				486.9
75	14.1		0.28	72				492.4
76	14.3		0.28	72				497.8

Standard Capacity Test

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Rig Background Concentration 0.01 ppm
Correlation Test Correction Factor 1.01
Airflow Rate 2000 cfm

Time (min)	Downstream (ppm)	Upstream (ppm)	Penetration	Efficiency (%)	Comment		Capacity, g
77	14.6		0.29	71			503.2
78	14.9		0.30	71			508.5
79	15.1		0.30	70			513.8
80	15.4		0.31	70			519.1
81	15.6		0.31	69			524.3
82	15.8		0.31	69			529.5
83	16.1		0.32	68			534.6
84	16.4		0.33	68			539.7
85	16.8		0.33	67			544.8
86	17.2		0.34	66			549.8
87	17.6		0.35	65			554.7
88	17.9		0.36	65			559.6
89	18.1		0.36	64			564.4
90	18.5		0.37	64			569.2
91	19.0		0.38	63			574.0
92	19.5		0.39	62			578.6
93	19.9		0.40	61			583.2
94	21.0		0.42	59			587.7
95	21.1		0.42	58			592.1
96	21.0		0.42	59			596.5
97	21.2		0.42	58			600.8
98	21.5		0.43	58			605.2
99	21.7		0.43	57			609.5
100	22.1		0.44	57			613.8
101	22.4		0.45	56			618.0
102	22.9		0.46	55			622.1
103	23.2		0.46	54			626.2
104	23.5		0.47	54			630.2
105	23.9		0.47	53			634.2
106	24.1		0.48	53			638.2
107	24.3		0.48	52			642.1
108	24.5		0.49	52			646.0
109	24.5		0.49	52			649.8
110	24.5		0.49	52			653.7
111	24.8		0.49	51			657.5
112	25.2		0.50	50			661.3
113	25.8		0.51	49			665.0
114	26.5		0.53	48			668.7
115	27.0		0.54	47			672.2

Standard Capacity Test

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 Airflow Rate 2000 cfm

Time (min)	Downstream (ppm)	Upstream (ppm)	Penetration	Efficiency (%)	Comment			Capacity, g
116	27.6		0.55	46				675.6
117	27.9		0.56	45				679.0
118	28.3		0.56	44				682.4
119	28.6		0.57	44				685.6
120	29.0		0.58	43				688.9
121	29.3		0.58	42				692.0
122	29.6		0.59	42				695.2
123	29.7		0.59	42				698.3
124	29.7		0.59	42				701.3
125	29.7		0.59	42				704.4
126	29.9		0.60	41				707.5
127	30.2		0.60	41				710.5
128	30.5		0.61	40				713.5
129	30.9		0.61	39				716.5
130	31.1		0.62	39				719.3
131	31.3		0.62	39				722.2
132	31.4		0.63	38				725.0
133								727.6
134		50.6						730.2
135		49.7						732.8
136								735.4
137								738.0
138		50.5						740.6
139		50.2						743.2
140		51.1						745.8
141		50.2						748.4
142								751.0
143								753.6
144	34.5		0.69	32				756.2
145	34.7		0.69	32				758.6
146	35.4		0.71	30				760.9
147	35.4		0.70	30				763.1
148	35.6		0.71	30				765.3
149	35.8		0.71	30				767.5
150	36.0		0.72	29				769.7
151	36.2		0.72	29				771.8
152	36.3		0.72	29				773.9
153	36.4		0.72	28				776.0

Standard Capacity Test

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Rig Background Concentration 0.01 ppm
Correlation Test Correction Factor 1.01
Airflow Rate 2000 cfm

Time (min)	Downstream (ppm)	Upstream (ppm)	Penetration	Efficiency (%)	Comment			Capacity, g
154	36.3		0.72	29				778.1
155	36.5		0.73	28				780.1
156	36.7		0.73	28				782.2
157	37.0		0.74	27				784.2
158	37.1		0.74	27				786.2
159	37.6		0.75	26				788.1
160	38.0		0.76	25				790.0
161	38.4		0.76	25				791.8
162	38.5		0.77	24				793.6
163	38.5		0.77	24				795.4
164	38.5		0.77	24				797.1
165	38.5		0.77	24				798.9
166	39.1		0.78	23				800.6
167	39.4		0.78	23				802.3
168	39.6		0.79	22				803.9
169	39.7		0.79	22				805.5
170	39.6		0.79	22				807.1
171	39.5		0.79	22				808.7
172	39.8		0.79	22				810.3
173	40.1		0.80	21				811.8
174	40.3		0.80	21				813.3
175	40.3		0.80	21				814.8
176	40.3		0.80	21				816.3
177	40.2		0.80	21				817.8
178	40.3		0.80	21				819.3
179	40.6		0.81	20				820.8
180	41.0		0.82	19				822.2
181	41.4		0.82	19				823.6
182	42.0		0.84	17				824.9
183	42.0		0.84	17				826.1
184	41.9		0.83	18				827.4
185	41.6		0.83	18				828.6
186	41.5		0.83	18				829.9
187	41.9		0.83	18				831.2
188	42.0		0.84	17				832.5
189	42.0		0.84	17				833.7
190	41.9		0.83	18				835.0
191	41.9		0.83	18				836.2
192	42.0		0.84	17				837.5

Standard Capacity Test

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 Rig Background Concentration 0.01 ppm
 Correlation Test Correction Factor 1.01
 Airflow Rate 2000 cfm

Time (min)	Downstream (ppm)	Upstream (ppm)	Penetration	Efficiency (%)	Comment			Capacity, g
193	41.8		0.83	18				838.7
194								839.9
195		50.5						841.1
196		49.7						842.3
197		50.2						843.5
198								844.7
199	42.8		0.85	16				845.9
200	43.9		0.87	14				846.9
201	44.3		0.88	13				847.9
202	44.9		0.89	12				848.7
203	44.0		0.88	13				849.6
204	44.5		0.89	13				850.5
205	45.0		0.89	12				851.3
206	45.1		0.90	11				852.1
207	44.8		0.89	12				852.9
208	44.5		0.89	12				853.8
209	44.4		0.88	13				854.6
210	44.6		0.89	12				855.5
211	45.0		0.90	12				856.3
212	45.2		0.90	11				857.1
213	45.4		0.90	11				857.8
214	45.6		0.91	10				858.6
215	46.0		0.91	10				859.2
216	46.1		0.92	9				859.9
217	46.1		0.92	9				860.5
218	46.0		0.91	10				861.1
219	45.7		0.91	10				861.8
220	45.6		0.91	10				862.5
221	45.6		0.91	10				863.2
222	45.6		0.91	10				863.9
223	45.7		0.91	10				864.6
224	45.6		0.91	10				865.3
225	45.5		0.90	11				866.0
226	45.6		0.91	10				866.7
227	45.8		0.91	10				867.4
228	46.1		0.92	9				868.0
229								868.6
230		49.7						869.3
231		50.5						869.9

Standard Capacity Test

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 Rig Background Concentration 0.01 ppm
 Correlation Test Correction Factor 1.01
 Airflow Rate 2000 cfm

Time (min)	Downstream (ppm)	Upstream (ppm)	Penetration	Efficiency (%)	Comment		Capacity, g
232		49.8					870.5
233		50.2					871.1
234	46.2		0.92	9			871.7
235	46.9		0.93	8			872.3
236	46.7		0.93	8			872.8
237	46.8		0.93	8			873.3
238	46.7		0.93	8			873.9
239	46.7		0.93	8			874.4
240	46.6		0.93	8	Gas Off		875.0
241	40.0						
242	37.7						
243	35.5						
244	34.0						
245	33.0						
246	32.0						
247	31.0						
248	30.0						
249	29.0						
250	28.0						
251	27.2						
252	26.7						
253	25.5						
254	25.0						
255	24.2						
256	24.0						
257	23.4						
258	23.0						
259	22.8						
260	22.3						
261	21.9						
262	21.2						
263	20.5						
264	20.0						
265	19.6						
266	19.2						
267	18.8						
268	18.5						
269	18.2						
270	18.0						