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1002
ISO/IEC 17025

Vokes Air AB
512 85 SVENLJUNGA

Testing of Air Filter according to EN779:2012

(3 appendices)

A test according to EN 779:2012 was carried out by request from Vokes Air AB.

Tested item

Vokes Air AB, Revo ll F7, art no: 3550704875, F7, 592 mm x 592 mm x 635 mm, 8 pocket air filter.
Vokes Air AB, Revo ll F7, art no: 3550704875 filter medium samples (for discharging test).

The items were handed to SP by Vokes Air AB and were received by SP on December 3, 2012.

The items were without visible defects.

Date and Place

The test was carried out at SP's laboratory of Energy Technology in Borås, Sweden on December 14-17, 2012. Discharging test was carried out on December 6-7, 2012.

Test method

The test was carried out according to standard EN 779:2012 "Particulate air filters for general ventilation – Determination of the filtration performance".

Note: The average 0.4 µm efficiency of the untreated samples, $E_{U,i}$, is compared with the initial 0.4 µm efficiency, E_i of the filter. If the average efficiency of these untreated samples, $E_{U,i}$, is outside the range of ($E_i \pm 8$) % two more samples shall be tested and included in a new average calculation. Only three samples were tested.

Results

The results are presented in appendix 1 and are valid only for the items tested.

Measurement equipment

- Pressure gauge Furness model 318, SP's inventory no. 901 568 (static P Filter)
- Pressure gauge Furness model 318, SP's inventory no. 901 569 (static P Flow)
- Pressure gauge Furness FC012, SP's inventory no. 201 691 (ΔP Filter)
- Pressure gauge Furness FC012, SP's inventory no. 201 690 (ΔP Flow)
- Particle counter Las-X II, SP's inventory no. 701 378
- Barometer, Testo 511, SP's inventory no. 701 274
- Temperature and RH, Testo 635, SP's inventory no. 900 065
- Weighing scale, Mettler PC16, SP's inventory no. 202 741
- Flow meter, MFS-C-315, SP's inventory no. 202 193
- Flow meter, MFS-C-50, SP's inventory no. 202 190
- Kr-85 Aerosol Neutralizer, TSI, SP's inventory no. 202 635

Uncertainty of measurement

The uncertainty of the Air flow is better than ± 5 %
The uncertainty of the Pressure Drop is better than ± 3 %
The uncertainty of the Temperature is better than ± 0.5 ºC
The uncertainty of the Relative Humidity is better than ± 3 % RH
The uncertainty of the Atmospheric Pressure is better than ± 1 mbar
The uncertainty of the Measured mass is better than ± 0.5 g

The method error in determination of the filtration efficiency is:
η = 0-90 %: ± 0.1 of penetration value [%]
η = 90-99 %: ± 0.2 of penetration value [%]
η = 99-99.99 %: ± 0.5 of penetration value [%]
η > 99.99 %: ± 1 of penetration value [%]

The uncertainty of the filtration efficiency according to EN 779:2012 is presented in the appendix.

SP Technical Research Institute of Sweden
Energy Technology - Combustion and Aerosol Technology

Performed by

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Appendices

1. Test report according to EN779:2012
2. Picture of tested item
3. Interpretation of test reports according to section 13.2 in EN779:2012

Appendix 1

Testing organisation: SP Technical Research Institute of Sweden Report no.: PX27501D

EN 779:2012 AIR FILTER RESULTS

GENERAL

Test no.: SP201212141	Date of test: 14/12/2012 - 17/12/2012	Supervisor: CM
Test requested by: Vokes Air AB		Device receiving date
Device delivered by: Vokes Air AB		03/12/2012

DEVICE TESTED

Model: Revo II F7 592x592x635mm 8P, Art. No: 3550704875	Manufacturer: Vokes Air AB	Construction: Pocket filter, 8 pockets
Type of media: Synthetic	Net effective filtering area: 6.0 m²	Filter dimensions (width x height x depth): 592 mm x 592 mm x 635 mm

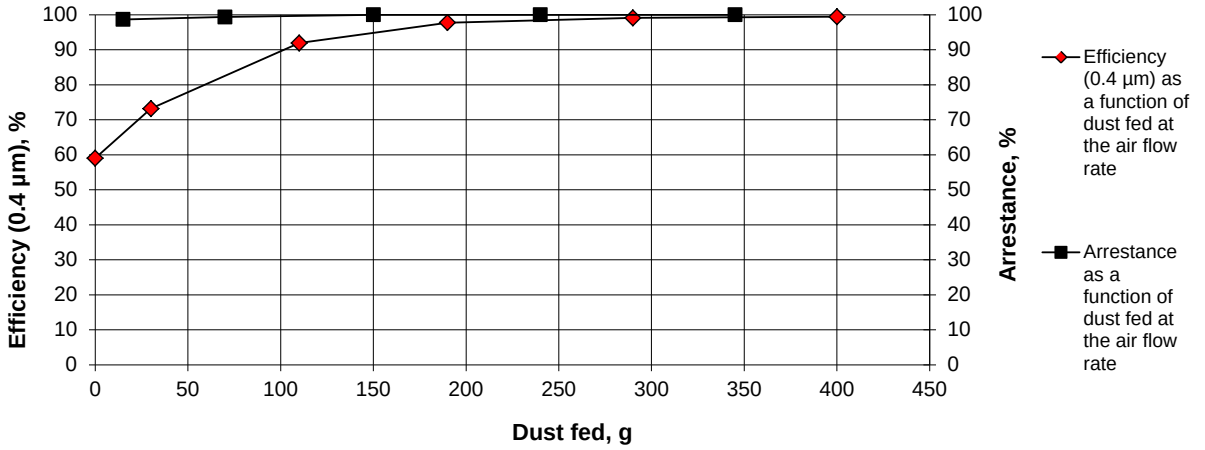
TEST DATA

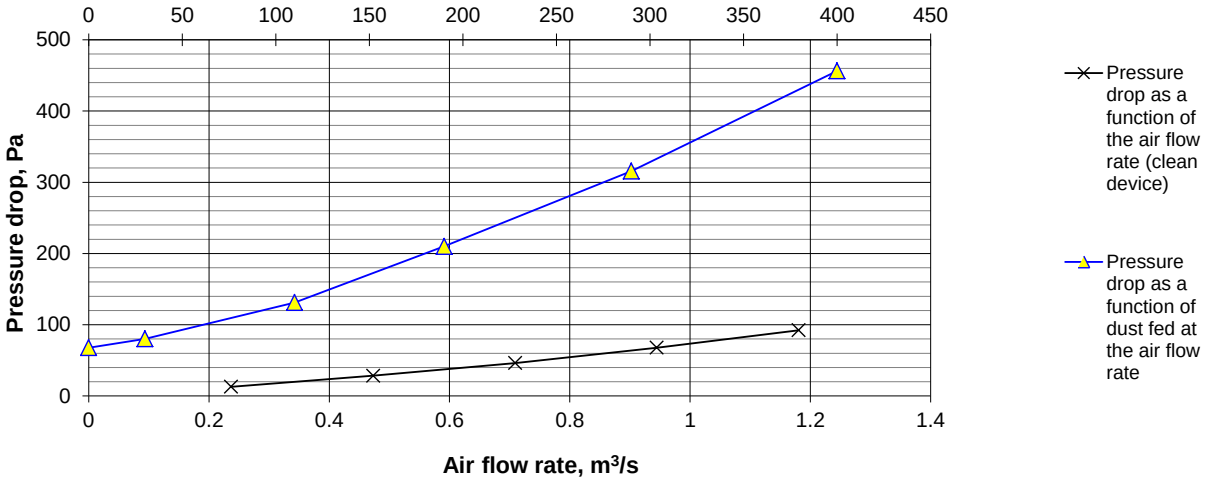
Test air flow rate: 0.944 m^3/s	Test air temperature: 24 to 33 °C	Test air relative humidity: 10 to 18 %	Test aerosol: DEHS	Loading dust: ASHRAE 52/76

RESULTS

Initial pressure drop: 68 Pa	Initial arrestance: 99 %	Initial efficiency (0.4 µm): 59 %	Test dust capacity: 225 / 313 / 390 g	Untreated/ discharged efficiency of media (0.4 µm): 73 % / 38%
Final test pressure drop: 250 / 350 / 450 Pa	Average arrestance: >99% / >99% / >99%	Average efficiency (0.4 µm): 87% / 90% / 92%	Filter class (450 Pa): F7	Remarks:

Note: The performance results are only valid for the tested item and cannot by themselves be quantitatively applied to predict efficiency and lifetime in service





Appendix 1

EN779:2012 - Efficiency after different dust loading phases

Air filter: Revo II F7 592x592x635mm 8P, Art. No: 3550704875
Test no.: SP201212141
Test aerosol: DEHS
Air flow rate: 0.944 m^3/s

Particle size		Efficiency %					
Interval	Mean	Pressure drop, Pa and Dust fed, g					
		68 Pa	80 Pa	131 Pa	210 Pa	315 Pa	456 Pa
µm	µm	0 g	30 g	110 g	190 g	290 g	400 g
0.10 - 0.12	0.11	60.4 ± 2.5	67.1 ± 4.4	83.7 ± 1.3	92.1 ± 1.0	95.4 ± 4.4	97.0 ± 3.0
0.12 - 0.15	0.13	56.1 ± 0.5	64.3 ± 1.5	82.0 ± 0.9	92.0 ± 0.5	96.7 ± 0.3	98.2 ± 0.3
0.15 - 0.20	0.17	52.0 ± 1.3	62.1 ± 1.0	81.6 ± 0.6	92.5 ± 0.2	96.9 ± 0.3	98.4 ± 0.2
0.20 - 0.25	0.22	51.2 ± 1.0	62.5 ± 0.8	83.7 ± 0.4	94.0 ± 0.3	97.6 ± 0.4	98.7 ± 0.2
0.25 - 0.35	0.30	53.2 ± 0.7	66.6 ± 1.0	87.2 ± 0.1	95.5 ± 0.3	98.4 ± 0.2	99.2 ± 0.1
0.35 - 0.45	0.40	59.0 ± 1.2	73.2 ± 0.7	91.9 ± 0.5	97.7 ± 0.2	99.1 ± 0.2	99.4 ± 0.1
0.45 - 0.60	0.52	67.2 ± 1.4	81.3 ± 0.8	95.5 ± 0.4	98.8 ± 0.1	99.5 ± 0.1	99.7 ± 0.1
0.60 - 0.75	0.67	73.8 ± 2.7	86.4 ± 1.6	97.4 ± 0.3	99.3 ± 0.2	99.7 ± 0.1	99.7 ± 0.1
0.75 - 1.00	0.87	81.1 ± 1.1	91.4 ± 0.5	98.7 ± 0.2	99.5 ± 0.2	99.7 ± 0.1	99.8 ± 0.2
1.00 - 1.50	1.22	87.0 ± 0.8	95.9 ± 0.9	99.3 ± 0.4	99.7 ± 0.3	99.8 ± 0.2	99.7 ± 0.2
1.50 - 2.00	1.73	92.3 ± 1.0	97.7 ± 0.4	99.8 ± 0.1	99.8 ± 0.1	99.8 ± 0.1	100.0 ± 0.1
2.00 - 3.00	2.45	97.9 ± 2.0	99.6 ± 0.5	100.0 ± 0.0	99.9 ± 0.2	100.0 ± 0.0	100.0 ± 0.0
NOTE	The uncertainty of the measured efficiencies is reported on a 95 % confidence level.						

EN779:2012 - Average efficiency at different final test pressure drops

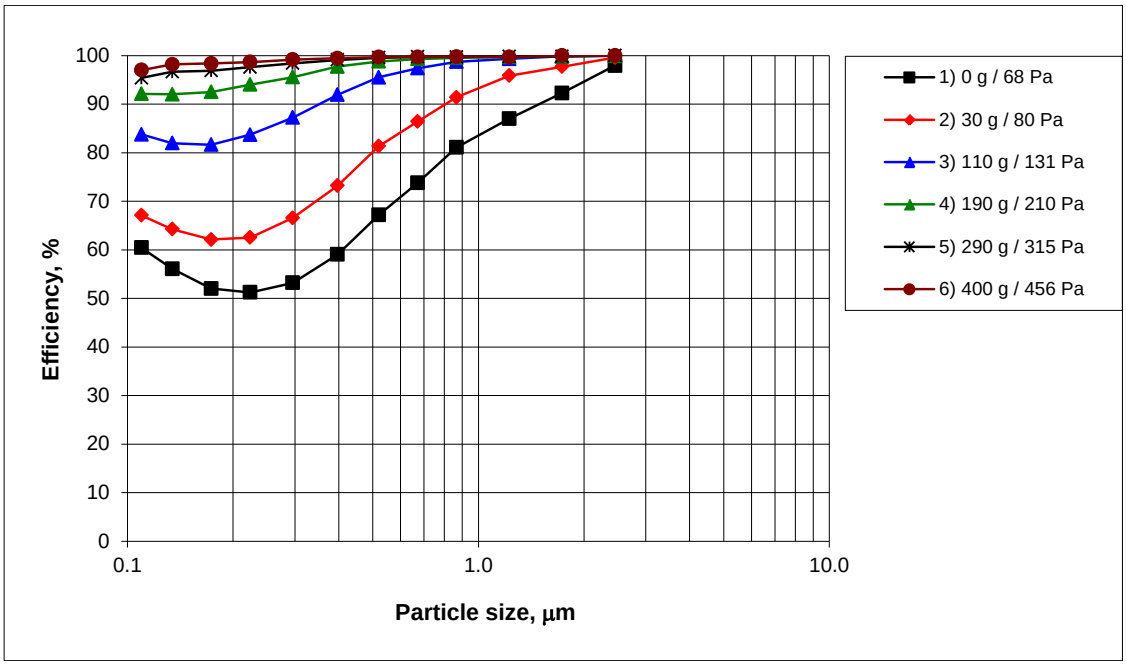
Air filter: Revo II F7 592x592x635mm 8P, Art. No: 3550704875
Test no.: SP201212141
Test aerosol: DEHS
Air flow rate: 0.944 m^3/s

Particle size		Average efficiency %		
Interval	Mean	Final test pressure drop		
µm	µm	250 Pa	350 Pa	450 Pa
0.10 - 0.12	0.11	80.8 ± 3.7	84.8 ± 3.6	87.2 ± 2.8
0.12 - 0.15	0.13	79.2 ± 1.1	83.9 ± 0.8	86.7 ± 0.6
0.15 - 0.20	0.17	78.4 ± 0.7	83.4 ± 0.6	86.4 ± 0.5
0.20 - 0.25	0.22	79.6 ± 0.7	84.6 ± 0.5	87.4 ± 0.4
0.25 - 0.35	0.30	82.5 ± 0.5	86.9 ± 0.4	89.4 ± 0.3
0.35 - 0.45	0.40	86.9 ± 0.6	90.4 ± 0.4	92.2 ± 0.4
0.45 - 0.60	0.52	91.1 ± 0.5	93.5 ± 0.4	94.8 ± 0.3
0.60 - 0.75	0.67	93.6 ± 0.8	95.4 ± 0.6	96.3 ± 0.5
0.75 - 1.00	0.87	95.9 ± 0.4	97.0 ± 0.3	97.6 ± 0.3
1.00 - 1.50	1.22	97.7 ± 0.6	98.3 ± 0.5	98.6 ± 0.4
1.50 - 2.00	1.73	98.8 ± 0.3	99.1 ± 0.2	99.3 ± 0.2
2.00 - 3.00	2.45	99.7 ± 0.3	99.8 ± 0.2	99.8 ± 0.2
Test dust capacity		225 g	313 g	390 g
NOTE	The uncertainty of the measured efficiencies is reported on a 95 % confidence level.			

Appendix 1

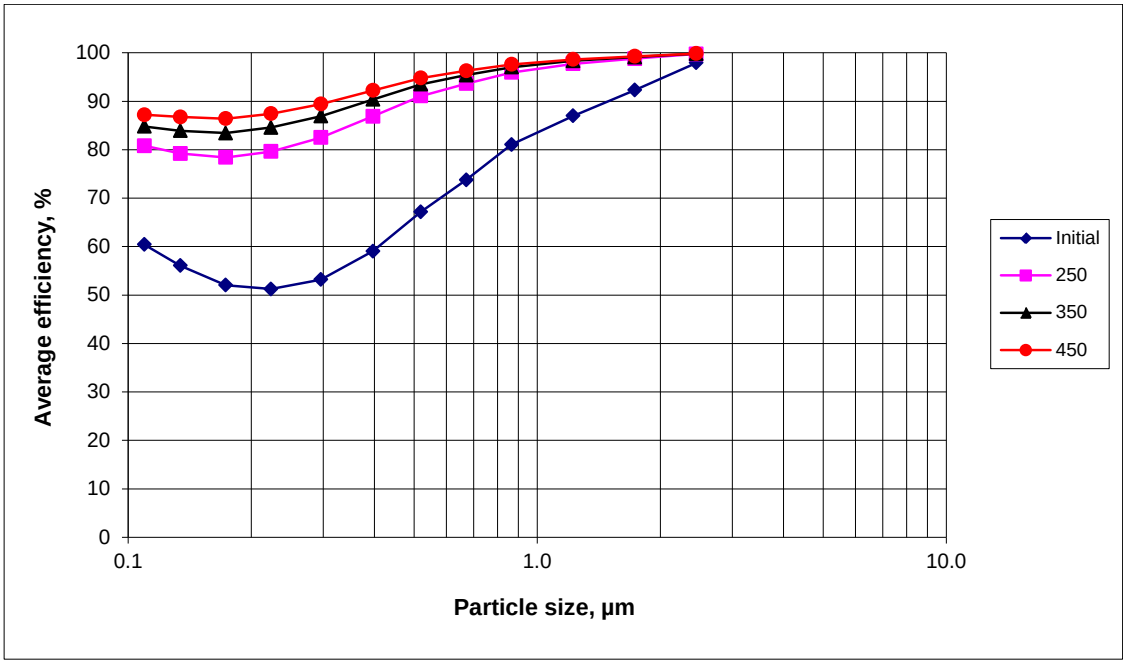
EN779:2012 - Efficiency after different dust loading phases

Air Filter: Revo II F7 592x592x635mm 8P, Art. No: 3550704875
Test no.: SP201212141
Test aerosol: DEHS
Air flow rate: 0.944 m^3/s



EN779:2012 - Initial and average efficiency at different final test pressure drops

Air Filter: Revo II F7 592x592x635mm 8P, Art. No: 3550704875
Test no.: SP201212141
Test aerosol: DEHS
Air flow rate: 0.944 m^3/s



Appendix 1

EN779:2012 - Air flow rate and pressure drop after different dust loading phases

Air filter: Revo ll F7 592x592x635mm 8P, Art. No: 3550704875

Test no.: SP201212141

Test aerosol: DEHS

Air flow rate: 0.944 m^3/s

Date	Dust fed	Air flow meter				Filter							
	m_{tot}	t_f	p_{sf}	dp_f	q_m	t	φ	p_a	ρ	q_v	Δp	$\Delta p_{1.20}$	
	g	°C	Pa	Pa	kg/s	°C	%	kPa	kg/m^3	m^3/s	Pa	Pa	
Clean filter													
14/12/2012	0	24.0	32	32	0.28	24.0	11.8	99.5	1.164	0.237	13	13	
14/12/2012	0	24.7	86	127	0.55	24.7	11.6	99.5	1.162	0.473	29	28	
14/12/2012	0	24.7	156	285	0.82	24.7	11.6	99.6	1.163	0.709	47	46	
14/12/2012	0	24.2	238	506	1.10	24.2	12.1	99.7	1.166	0.945	68	68	
14/12/2012	0	24.1	326	790	1.38	24.1	12.3	99.7	1.167	1.180	93	92	
Clean filter pressure drop is proportional to $(q_v)^n$, where n = 1.2156													
Dust loading phase													
14/12/2012	30	28.9	253	498	1.084	28.9	9.9	99.7	1.148	0.944	81	80	2
14/12/2012	30	30.5	256	496	1.079	30.5	8.7	99.7	1.142	0.945	81	80	1
17/12/2012	110	28.7	298	495	1.077	28.7	17.9	99.1	1.140	0.945	132	131	2
17/12/2012	110	30.1	296	492	1.071	30.1	16.5	99.1	1.135	0.944	133	131	1
17/12/2012	190	30.7	343	492	1.071	30.7	15.6	99.1	1.133	0.945	212	210	2
17/12/2012	190	32.1	350	490	1.066	32.1	14.5	99.1	1.128	0.945	212	210	1
17/12/2012	290	31.6	423	491	1.068	31.6	15.2	99.2	1.131	0.945	319	316	2
17/12/2012	290	32.5	424	489	1.065	32.5	14.5	99.2	1.128	0.944	319	315	1
17/12/2012	400	32.6	524	490	1.066	32.6	14.3	99.3	1.128	0.945	462	456	2
17/12/2012	400	33.6	525	488	1.062	33.6	13.9	99.3	1.125	0.945	461	455	1

2 = after dust increment

1 = before next dust increment

Symbols and units

dp_f	air flow meter differential pressure, Pa	q_m	mass flow rate, kg/s
m_{tot}	cumulative mass of dust fed to filter, g	q_v	air flow rate filter, m^3/s
Δp	measured filter pressure drop, Pa	t_f	temperature at air flow meter, °C
$\Delta p_{1.20}$	filter pressure drop at air density 1.20 kg/m^3, Pa	t	temperature upstream of filter, °C
p_a	absolute air pressure upstream of filter, kPa	φ	relative humidity upstream of the filter, %
p_{sf}	air flow meter static pressure, kPa	ρ	air density upstream of filter, kg/m^3

Appendix 1

EN779:2012 - Pressure drop and arrestance after different dust loading phases

Air filter: Revo II F7 592x592x635mm 8P, Art. No: 3550704875

Test no.: SP201212141

Test aerosol: DEHS

Air flow rate: 0.944 m^3/s

Date	Δp_1	dm	m_{tot}	Δp_2	m_1	m_2	Δm	m_d	A	A_m
	Pa	g	g	Pa	g	g	g	g	%	%
14/12/2012	68	30	30	80	2203.9	2204.3	0.4	0.0	98.7	98.7
17/12/2012	80	80	110	131	2204.3	2204.8	0.5	0.0	99.4	99.2
17/12/2012	131	80	190	210	2204.8	2204.8	0.0	0.0	100.0	99.5
17/12/2012	210	100	290	316	2204.8	2204.8	0.0	0.0	100.0	99.7
17/12/2012	315	110	400	456	2204.8	2204.8	0.0	0.0	100.0	99.8

Symbols and units

A	arrestance, %
A_m	average arrestance, %
dm	dust increment, g
Δp_1	pressure drop before dust increment (air density 1.20 kg/m³), Pa
Δp_2	pressure drop after dust increment (air density 1.20 kg/m³), Pa
m_d	dust in duct after device, g
m_1	mass of final filter before dust increment
m_2	mass of final filter after dust increment
m_{tot}	cumulative mass of dust fed to filter, g
Δm	mass gain of final filter, g

Mass of tested item:

Clean filter:	1 913.1	g
After complete test:	2 310.3	g

Test dust

ASHRAE 52/76, Particle Technology Ltd.

Batch no: 7944

Appendix 1

EN779:2012 - Efficiency and pressure drop of untreated filter material at 100 % nominal velocity

Air filter: Revo ll F7 592x592x635mm 8P, Art. No: 3550704875
Test no.: SP201212061
Test aerosol: DEHS
Discharging method: Isopropanol
Air flow rate: 15.0 l/s
Media velocity: 0.16 m/s
Size of material sample: 9.24 dm²

Particle size µm		Sample 1	Sample 2	Sample 3	Average
		Efficiency %			
Interval	Mean	Pressure drop			
		50 Pa	49 Pa	49 Pa	49 Pa
0.10 - 0.12	0.11	69.5 ± 5.6	69.7 ± 5.6	71.2 ± 6.4	70.1
0.12 - 0.15	0.13	68.2 ± 1.4	66.6 ± 1.7	66.8 ± 1.7	67.2
0.15 - 0.20	0.17	67.1 ± 0.9	64.1 ± 1.8	64.4 ± 0.7	65.2
0.20 - 0.25	0.22	66.4 ± 1.5	64.2 ± 1.6	65.2 ± 1.1	65.3
0.25 - 0.35	0.30	68.6 ± 1.1	67.4 ± 1.3	66.2 ± 1.1	67.4
0.35 - 0.45	0.40	74.0 ± 0.9	73.5 ± 1.3	71.9 ± 1.0	73.1
0.45 - 0.60	0.52	80.8 ± 1.0	79.4 ± 0.7	78.8 ± 0.7	79.6
0.60 - 0.75	0.67	85.7 ± 0.7	84.7 ± 0.7	83.7 ± 1.5	84.7
0.75 - 1.00	0.87	89.7 ± 0.9	89.3 ± 0.8	89.3 ± 0.8	89.4
1.00 - 1.50	1.22	93.9 ± 0.9	93.9 ± 0.6	93.7 ± 1.3	93.8
1.50 - 2.00	1.73	96.9 ± 0.2	96.2 ± 0.5	96.8 ± 0.9	96.7
2.00 - 3.00	2.45	99.1 ± 0.6	99.1 ± 0.7	99.3 ± 0.9	99.2
NOTE	The uncertainty of the measured efficiencies is reported on a 95 % confidence level.				

EN779:2012 - Efficiency and pressure drop of discharged filter material at 100 % nominal velocity

Air filter: Revo ll F7 592x592x635mm 8P, Art. No: 3550704875
Test no. SP201212061
Test aerosol: DEHS
Discharging method: Isopropanol
Air flow rate: 15.0 l/s
Media velocity: 0.16 m/s
Size of material sample: 9.24 dm²

Particle size µm		Sample 1	Sample 2	Sample 3	Average
		Efficiency %			
Interval	Mean	Pressure drop			
		50 Pa	50 Pa	48 Pa	49 Pa
0.10 - 0.12	0.11	35.7 ± 8.9	41.1 ± 4.0	42.9 ± 7.9	39.9
0.12 - 0.15	0.13	28.2 ± 1.9	30.3 ± 2.1	29.2 ± 2.6	29.2
0.15 - 0.20	0.17	25.3 ± 2.0	27.0 ± 2.3	26.0 ± 1.3	26.1
0.20 - 0.25	0.22	25.5 ± 2.4	27.5 ± 2.5	26.5 ± 2.5	26.5
0.25 - 0.35	0.30	30.2 ± 1.6	31.2 ± 1.7	31.8 ± 1.8	31.1
0.35 - 0.45	0.40	37.5 ± 2.2	38.6 ± 1.7	38.0 ± 0.8	38.0
0.45 - 0.60	0.52	47.6 ± 1.4	48.4 ± 1.6	46.7 ± 1.5	47.6
0.60 - 0.75	0.67	53.6 ± 1.4	59.3 ± 2.8	54.8 ± 0.8	55.9
0.75 - 1.00	0.87	65.1 ± 0.6	67.7 ± 0.9	64.9 ± 2.3	65.9
1.00 - 1.50	1.22	76.1 ± 1.0	78.4 ± 1.5	75.3 ± 1.3	76.6
1.50 - 2.00	1.73	86.2 ± 1.0	86.9 ± 1.4	84.8 ± 1.7	86.0
2.00 - 3.00	2.45	95.8 ± 1.3	96.4 ± 1.1	95.0 ± 1.1	95.7
NOTE	The uncertainty of the measured efficiencies is reported on a 95 % confidence level.				

Appendix 1

EN779:2012 - Efficiency and pressure drop of untreated filter material at 50 % nominal velocity

Air filter: Revo ll F7 592x592x635mm 8P, Art. No: 3550704875
Test no.: SP201212061
Test aerosol: DEHS
Discharging method: Isopropanol
Air flow rate: 7.52 l/s
Media velocity: 0.08 m/s
Size of material sample: 9.24 dm²

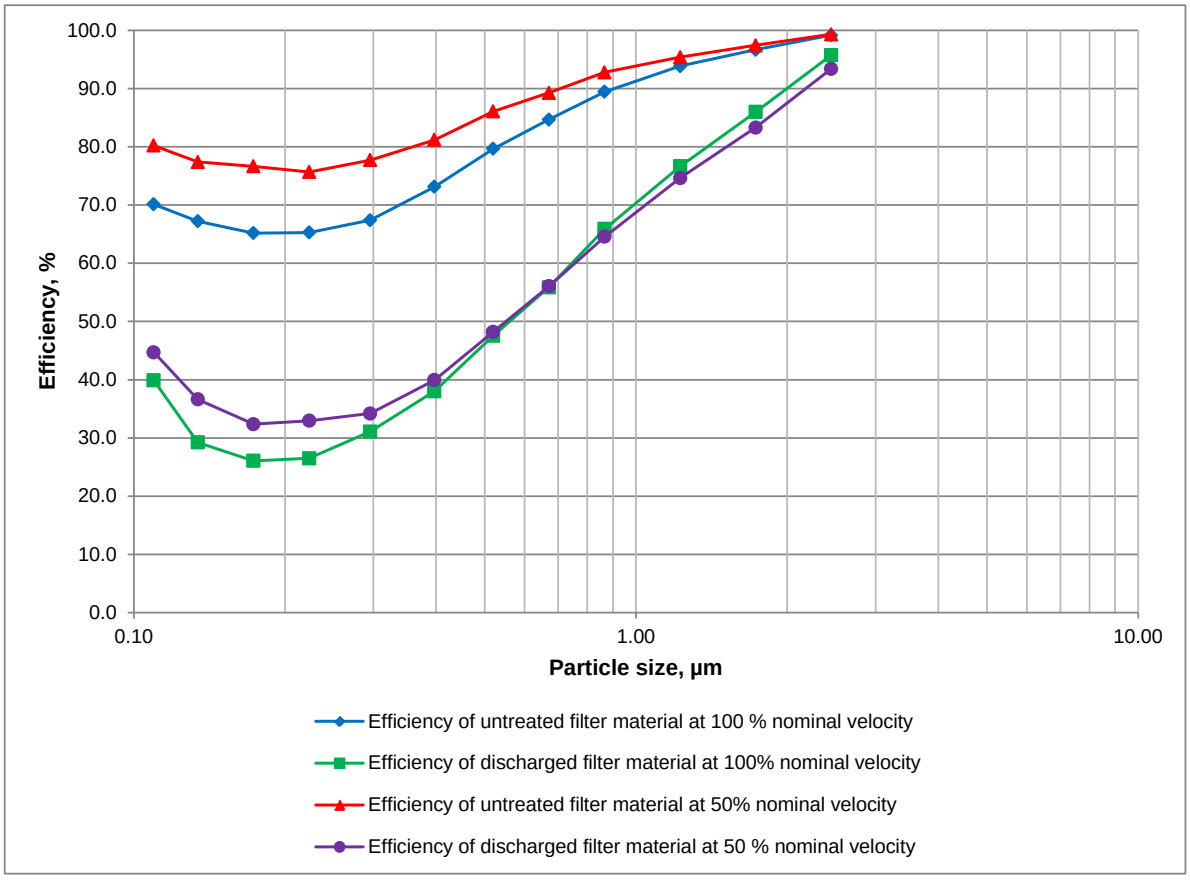
Particle size µm		Sample 1	Sample 2	Sample 3	Average
		Efficiency %			
Interval	Mean	Pressure drop			
		25 Pa	25 Pa	25 Pa	25 Pa
0.10 - 0.12	0.11	82.3 ± 2.5	81.5 ± 3.5	76.9 ± 4.4	80.2
0.12 - 0.15	0.13	77.9 ± 1.3	77.0 ± 1.4	77.2 ± 1.1	77.4
0.15 - 0.20	0.17	76.5 ± 0.7	76.5 ± 0.7	76.9 ± 1.5	76.6
0.20 - 0.25	0.22	75.4 ± 1.3	74.9 ± 1.1	76.7 ± 1.0	75.7
0.25 - 0.35	0.30	77.6 ± 0.5	77.4 ± 1.2	78.1 ± 0.9	77.7
0.35 - 0.45	0.40	81.4 ± 0.7	81.2 ± 0.7	80.9 ± 0.9	81.2
0.45 - 0.60	0.52	85.7 ± 0.8	86.0 ± 0.8	86.6 ± 0.5	86.1
0.60 - 0.75	0.67	89.3 ± 1.2	89.1 ± 0.7	89.4 ± 1.0	89.3
0.75 - 1.00	0.87	92.8 ± 0.5	92.7 ± 0.6	92.8 ± 0.8	92.8
1.00 - 1.50	1.22	95.3 ± 0.5	95.6 ± 0.6	95.2 ± 0.6	95.4
1.50 - 2.00	1.73	97.3 ± 0.3	97.2 ± 0.5	97.7 ± 0.3	97.4
2.00 - 3.00	2.45	99.2 ± 0.3	99.2 ± 0.5	99.5 ± 0.6	99.3
NOTE	The uncertainty of the measured efficiencies is reported on a 95 % confidence level.				

EN779:2012 - Efficiency and pressure drop of discharged filter material at 50 % nominal velocity

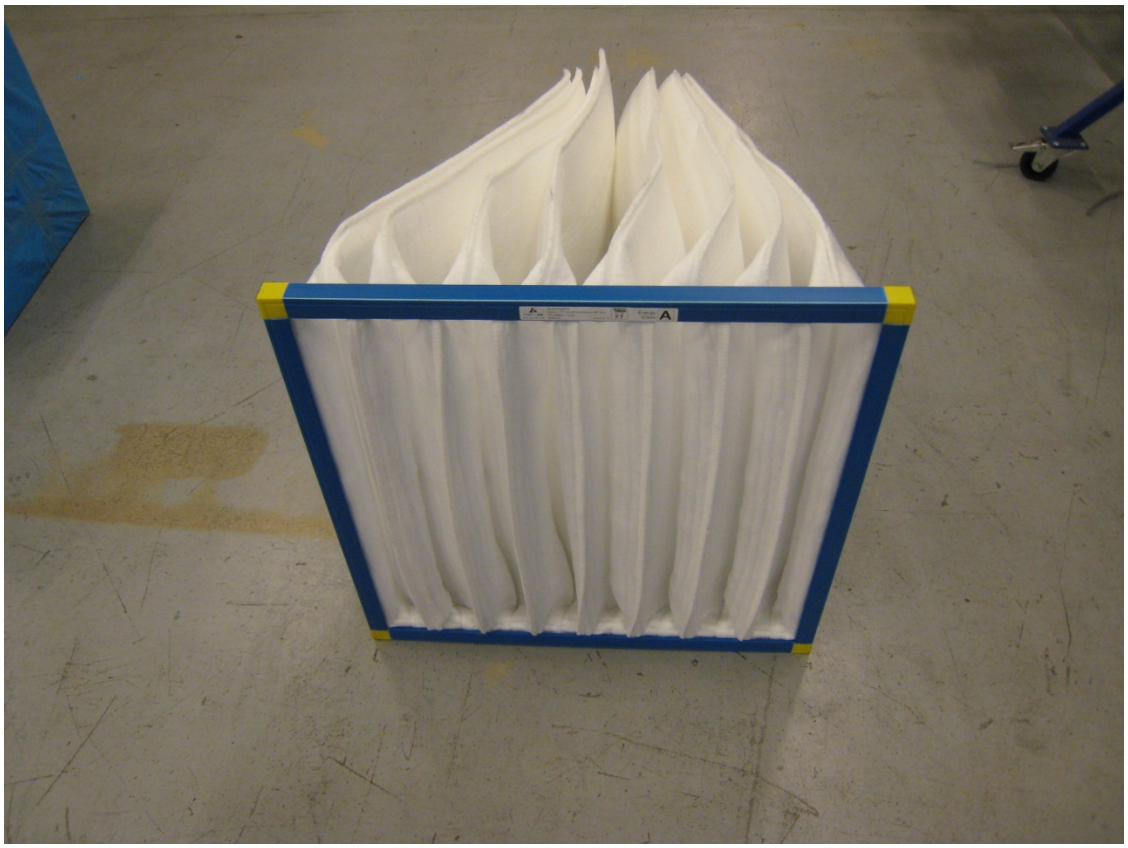
Air filter: Revo ll F7 592x592x635mm 8P, Art. No: 3550704875
Test no. SP201212061
Test aerosol: DEHS
Discharging method: Isopropanol
Air flow rate: 7.52 l/s
Media velocity: 0.08 m/s
Size of material sample: 9.24 dm²

Particle size µm		Sample 1	Sample 2	Sample 3	Average
		Efficiency %			
Interval	Mean	Pressure drop			
		24 Pa	24 Pa	24 Pa	24 Pa
0.10 - 0.12	0.11	45.2 ± 11.6	40.6 ± 19.2	48.3 ± 6.6	44.7
0.12 - 0.15	0.13	37.2 ± 3.0	33.4 ± 1.7	39.3 ± 4.4	36.6
0.15 - 0.20	0.17	32.6 ± 2.0	29.5 ± 1.5	35.0 ± 4.4	32.4
0.20 - 0.25	0.22	33.9 ± 1.5	30.8 ± 2.7	34.2 ± 4.1	33.0
0.25 - 0.35	0.30	34.5 ± 3.1	32.1 ± 1.7	36.0 ± 4.4	34.2
0.35 - 0.45	0.40	41.3 ± 2.7	37.5 ± 1.6	41.0 ± 4.3	39.9
0.45 - 0.60	0.52	48.7 ± 1.7	46.2 ± 2.2	49.8 ± 2.7	48.2
0.60 - 0.75	0.67	55.6 ± 2.8	53.9 ± 0.7	58.7 ± 3.2	56.0
0.75 - 1.00	0.87	66.2 ± 2.4	61.8 ± 1.4	65.7 ± 2.3	64.6
1.00 - 1.50	1.22	75.4 ± 1.6	72.7 ± 2.1	75.8 ± 2.0	74.6
1.50 - 2.00	1.73	83.6 ± 2.0	81.6 ± 0.8	84.7 ± 0.8	83.3
2.00 - 3.00	2.45	93.9 ± 2.3	91.7 ± 1.9	94.6 ± 1.7	93.4
NOTE	The uncertainty of the measured efficiencies is reported on a 95 % confidence level.				

Appendix 1


100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Efficiency, %
0.10
1.00
10.00
Particle size, µm
Efficiency of untreated filter material at 100 % nominal velocity
Efficiency of discharged filter material at 100% nominal velocity
Efficiency of untreated filter material at 50% nominal velocity
Efficiency of discharged filter material at 50 % nominal velocity

Appendix 2



Appendix 3

The interpretation of test reports – according to EN779:2012 13.2 Interpretation of test reports

This brief review of the test procedures, including those for addressing the testing of electrostatically charged filters, is provided for those unfamiliar with EN 779 procedures. It is intended to assist in understanding and interpreting the results in the test report/summary. (For further details of procedures the full EN 779 document should be consulted).

Many types of air filter rely on the effects of passive static electric charges on the fibers to achieve high efficiencies, particularly in the initial stages of their working life. Environmental factors encountered in service may affect the action of these electric charges so that the initial efficiency may drop substantially after an initial period of service. In many cases this is offset or countered by an increase in efficiency ("mechanical efficiency") as dust deposits in filter media. In the later stages of operating life the efficiency may increase to equal or exceed the initial efficiency. The reported untreated and conditioned (discharged) efficiencies show the extent of the electrical charge effect on initial performance. It should not be assumed that the measured conditioned (discharged) efficiency represents real life behaviour. It merely indicates the level of efficiency obtainable with the charge effect completely removed and with no compensating increase in mechanical efficiency.

For reasons of consistency filter efficiencies are measured using artificially generated clouds of synthetic DEHS material (droplets) with closely controlled particle size. These efficiency measurements are repeated after the filter has been loaded with ASHRAE loading dust until the resistance has risen to a value of 250 Pa in the case of the coarse (G) procedure and with up to a value of 450 Pa for the fine and medium (F and M) procedure. Test dust capacities measured in this way may be used for to compare performances and for rankings but should not be assumed to simulate real life operating conditions as the properties of dusts encountered in service conditions vary very widely.