



Camfil Farr
1 North Corporate Drive
Riverdale, NJ 07457
(973) 616-7300

ASHRAE® 52.2-2012 Test Results w/Appendix J Results

Filter Description

Manufacturer		Filter Model			Filter Part Number		
Camfil Farr		30/30 M8 4in			059413-001		
Filter Type		Media Type		Media Color		Media Area (ft ²)	
Pleated-Panel		Cotton/Polyester		Green		27.7	
Nominal Size	Actual Size						
HxWxD	Hgt (in)	Wid (in)	Dep (in)	Pleats/Pockets	UL Rating	LabFile	CrRef
24x24x4	23 3/8	23 3/8	3 3/4	22	Class 2	1481	1481

ASHRAE® 52.2-2012

Date:	04/15/2013		
Test Number:	2013-0415-1550		
Test Data	Test Results	Rated Values	
AirFlow (cfm)	1970	1970	
Nominal Vel (fpm)	493	493	
Initial ΔP (inWG)	0.27	0.27	
MERV	8	8	@1970cfm
E ₁ (0.3-1.0μm), (%)	7	n/a	
E ₂ (1.0-3.0μm), (%)	45	n/a	
E ₃ (3.0-10μm), (%)	71	≥ 70	
Final DP, (inWG)	1.0	1.0	
Arrestance, (%)	90	92	
DHC, (g)	179		
Temp, (F)	80	Test Aerosol	KCL
RH, (%)	37	Loading Dust	ASHRAE

ASHRAE® 52.2-2007(B) w/App J

Date:	04/22/2013		
Test Number:	2013-0422-0546		
Test Data	Test Results	Rated Values	
AirFlow (cfm)	1970	1970	
Nominal Vel (fpm)	493	493	
Initial ΔP (inWG)	0.25	0.27	
MERV-A	8A	8A	@1970cfm
E ₁ -A (0.3-1.0μm), (%)	9	n/a	
E ₂ -A (1.0-3.0μm), (%)	42	n/a	
E ₃ -A (3.0-10μm), (%)	70	≥ 70	
Final DP, (inWG)	1.0	1.0	
Arrestance-A, (%)	90	92	
DHC-A, (g)	187		
Temp, (F)	80	Test Aerosol	KCL
RH, (%)	30	Loading Dust	ASHRAE

Comments

Comments

Certified Test Per ASHRAE 52.2-2007 (B)

Operator

Particle Counter

Model

Approval:

Don Thornburg
Electronic Signature, Original on file

A. Acain

Climet

CI-500

Camfil Farr Permission Required for Distribution

ASHRAE® 52.2-2012 Test Results

Date: **04/15/2013**

Test Number: **2013-0415-1550**

Manufacturer

Filter Model

Filter Part Number

Camfil Farr

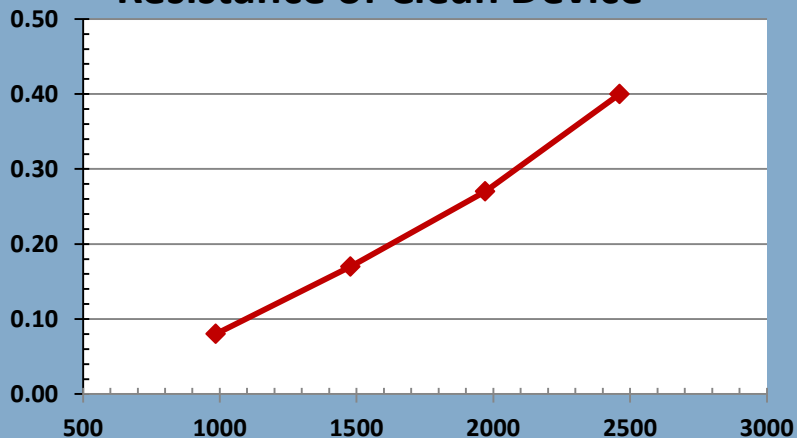
30/30 M8 4in

059413-001

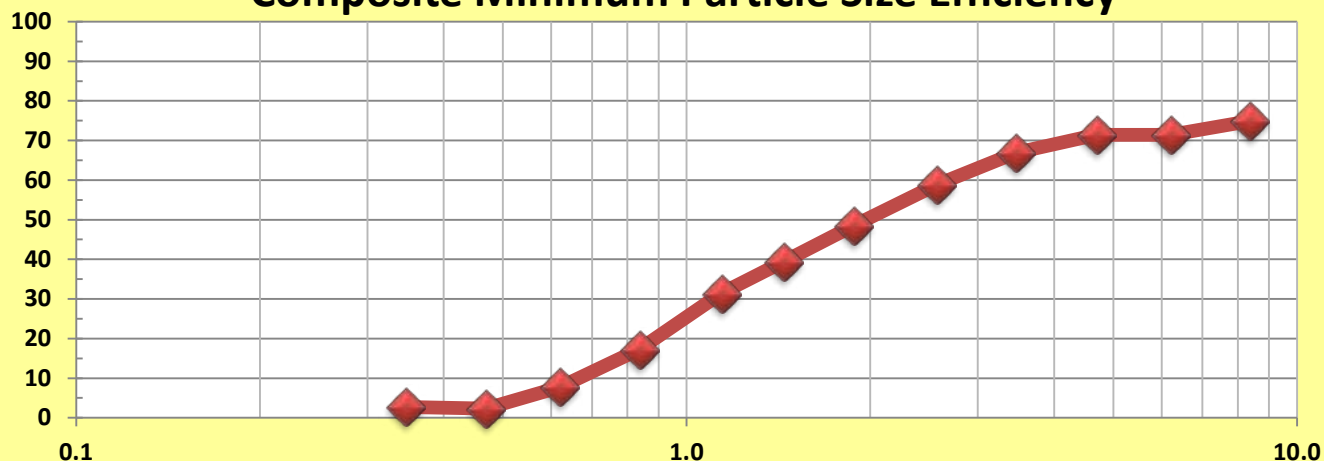
Clean Resistance Table

cfm	m ³ /s	inWG	Pa
985	0.46	0.08	20
1478	0.70	0.17	42
1970	0.93	0.27	67
2462	1.16	0.4	100

Resistance of Clean Device



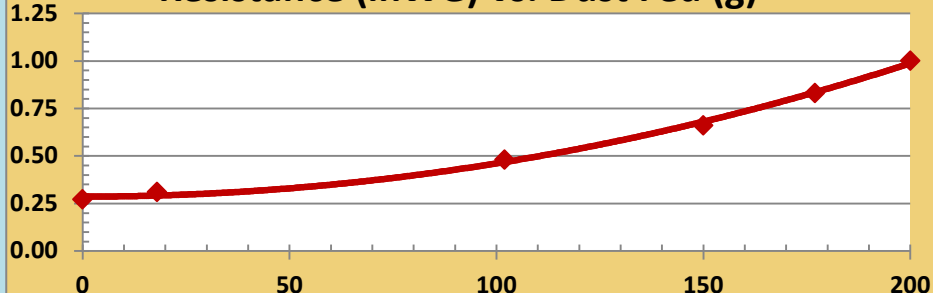
Composite Minimum Particle Size Efficiency



ΔP (inWG) vs. Dust Fed (g)

ΔP (inWG)	Dust Fed (g)
0.27	0
0.31	18
0.48	102
0.66	150
0.83	177
1.00	200

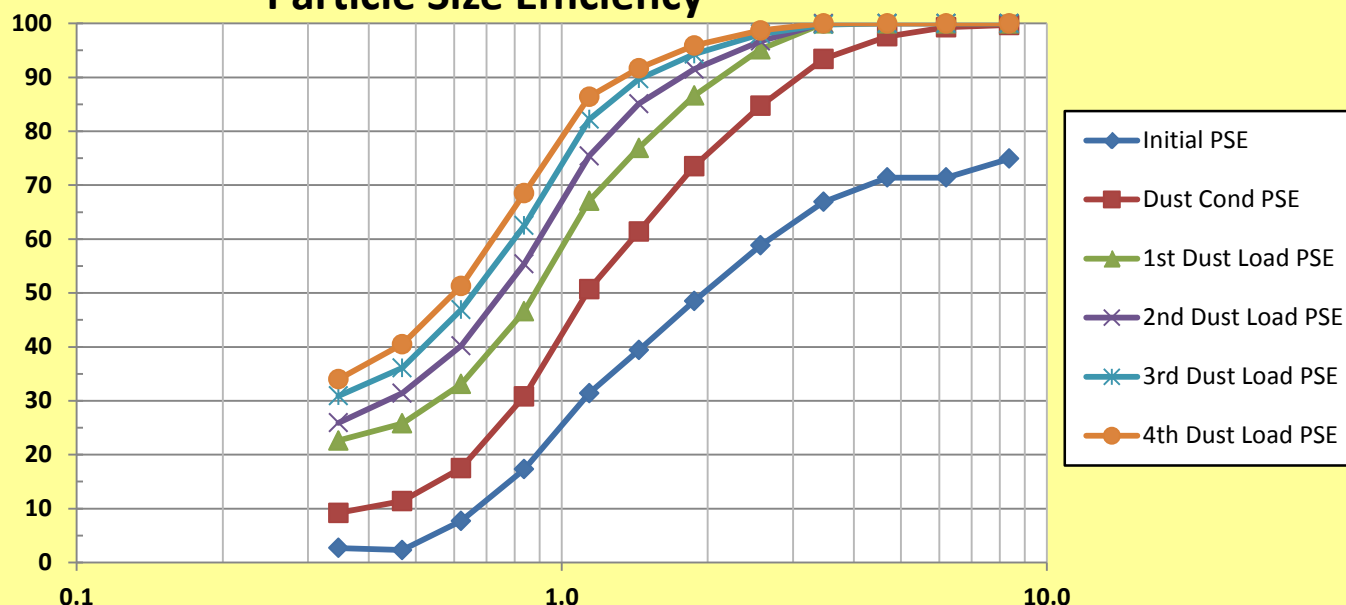
Resistance (inWG) vs. Dust Fed (g)



ASHRAE® 52.2-2012 Test Results

Date	04/15/2013				Test Number	2013-0415-1550							
Manufacturer	Camfil Farr				Filter Model	30/30 M8 4in				Filter Part Number	059413-001		
Efficiency Data Table	1	2	3	4	5	6	7	8	9	10	11	12	
Minimum Dia (µm)	0.3	0.4	0.55	0.7	1.0	1.3	1.6	2.2	3.0	4.0	5.5	7.0	0.35
Maximum Dia (µm)	0.4	0.55	0.7	1.0	1.3	1.6	2.2	3.0	4.0	5.5	7.0	10.0	0.45
Geometric Mean (µm)	0.35	0.47	0.62	0.84	1.14	1.44	1.88	2.57	3.46	4.69	6.20	8.37	0.40
Initial PSE	3	2	8	17	31	39	49	59	67	71	71	75	2
Dust Cond PSE	9	11	18	31	51	61	74	85	93	98	99	100	9
1st Dust Load PSE	23	26	33	47	67	77	87	95	100	100	100	100	24
2nd Dust Load PSE	26	31	40	55	75	85	92	97	100	100	100	100	27
3rd Dust Load PSE	31	36	47	63	82	90	94	98	100	100	100	100	32
4th Dust Load PSE	34	41	51	69	86	92	96	99	100	100	100	100	36
Composite Min PSE	3	2	8	17	31	39	49	59	67	71	71	75	2

Particle Size Efficiency



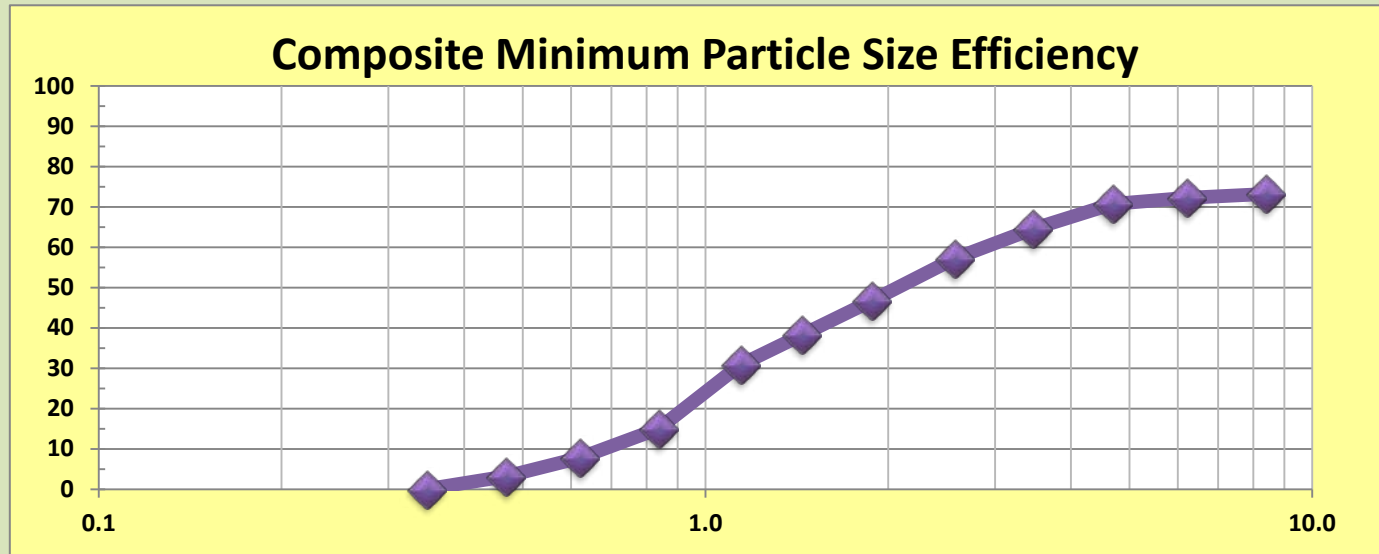
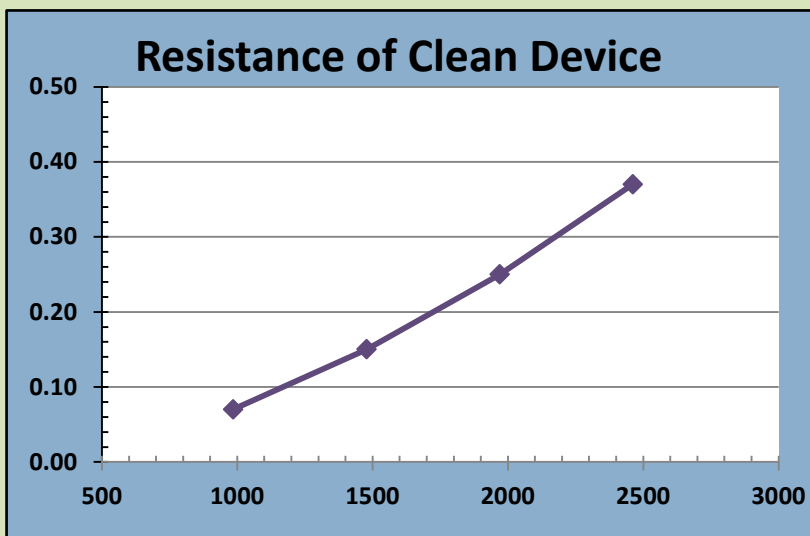
All testing is performed in compliance with the latest revision of ASHRAE Standard 52.2 in a state-of-the-art laboratory facility located at Camfil Farr's U.S. corporate headquarters in Riverdale, NJ. Test Reports without DHC values show efficiency only and the associated MERV value is a estimated value based on the single efficiency data shown. For more information, contact your local Camfil Farr representative or distributor.

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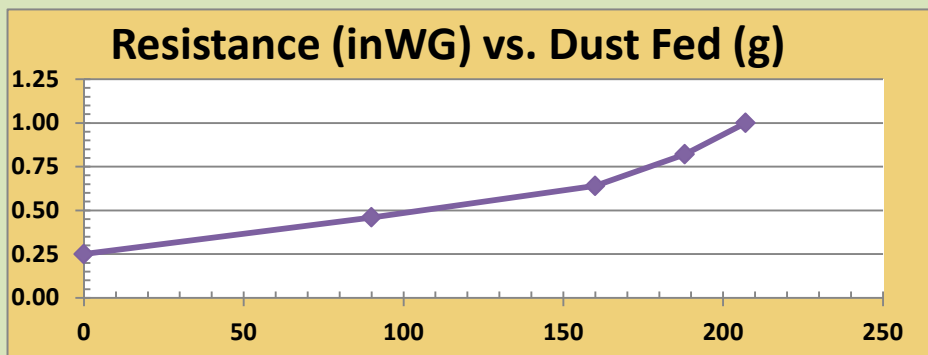
ASHRAE® 52.2-2012 Test Results w/ Appendix J Results

Date:	04/22/2013	Test Number:	2013-0422-0546
Manufacturer	Filter Model	Filter Part Number	
Camfil Farr	30/30 M8 4in	059413-001	

Clean Resistance Table			
cfm	m ³ /s	inWG	Pa
985	0.46	0.07	17
1478	0.70	0.15	37
1970	0.93	0.25	62
2462	1.16	0.37	92



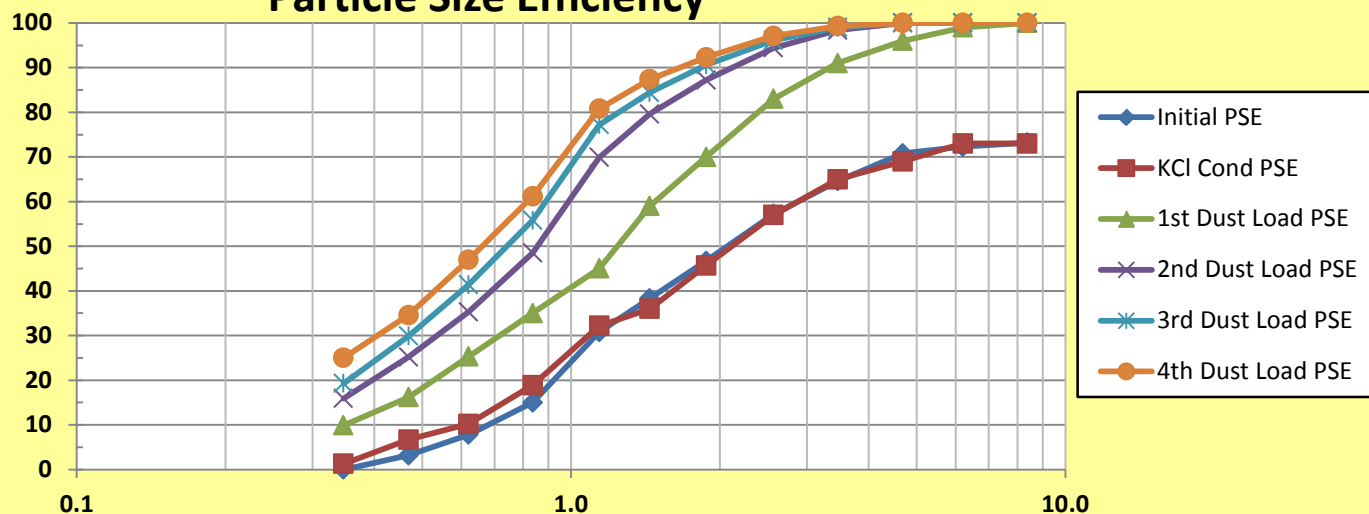
ΔP (inWG)	Dust Fed (g)
0.25	0
0.46	90
0.64	160
0.82	188
1.00	207



ASHRAE® 52.2-2012 Test Results w/ Appendix J Results

Date:			04/22/2013			Test Number:			2013-0422-0546				
Manufacturer				Filter Model						Filter Part Number			
Camfil Farr				30/30 M8 4in						059413-001			
Efficiency Data Table													
	1	2	3	4	5	6	7	8	9	10	11	12	
Minimum Dia (µm)	0.3	0.4	0.55	0.7	1.0	1.3	1.6	2.2	3.0	4.0	5.5	7.0	0.35
Maximum Dia (µm)	0.4	0.55	0.7	1.0	1.3	1.6	2.2	3.0	4.0	5.5	7.0	10.0	0.45
Geometric Mean (µm)	0.35	0.47	0.62	0.84	1.14	1.44	1.88	2.57	3.46	4.69	6.20	8.37	0.40
Initial PSE	0	3	8	15	31	38	47	57	65	71	72	73	2
KCl Cond PSE	1	7	10	19	32	36	46	57	65	69	73	73	5
1st Dust Load PSE	10	16	25	35	45	59	70	83	91	96	99	100	13
2nd Dust Load PSE	16	25	35	49	70	80	87	94	98	100	100	100	21
3rd Dust Load PSE	19	30	41	56	77	84	91	96	99	100	100	100	25
4th Dust Load PSE	25	35	47	61	81	87	92	97	99	100	100	100	30
Composite Min PSE	0	3	8	15	31	38	47	57	65	71	72	73	2

Particle Size Efficiency



Bkg Concentration (particles/cm ³)	Avg Cond Aerosol Conc (particles/cm ³)	Cumulative Cond Duration (minutes)	Cumulative Cond CT (particles-min/cm ³)	
1.5	2.84E+05	208	5.91E+07	
Large Particle Concentration (Particles ft ³)	Ratio Small to Large (>20,000)	Conditioning ΔP (inWG)	Same duct?	
142,000	56,559	Initial ΔP		
		Final ΔP		
		0.25	0.26	Yes

ASHRAE 52.2-2017 Test Results w/Appendix J Results

Filter Description							
Manufacturer		Filter Model			Filter Part Number		
Camfil USA		30/30 M8 2in			049880-005		
Filter Type		Media Type		Media Color	Media Area (ft ²)		
2in 30/30		Multi Layer Polyester		Green	17.3		
Nominal Size		Actual Size					
HxWxD	Hgt (in)	Wid (in)	Dep (in)	Pleats/Pockets	UL Rating		
24x24x2	23 3/8	23 3/8	1 3/4	29	Yes		

ASHRAE 52.2-2017				ASHRAE 52.2-2017 w/App J			
Test Report:		3030 M8 2in_88.xlsm		Test Report:		3030 M8 2in_92.xlsm	
Time:	10:40:15	Date:	Apr 17, 2017	Time:	15:15:20	Date:	Apr 25, 2017
Test Data		Test Results	Rated Values	Test Data		Test Results	Rated Values
AirFlow (cfm)		2000	1970	AirFlow (cfm)		2000	1970
Nominal Vel (fpm)		500	493	Nominal Vel (fpm)		500	493
Initial ΔP (inWG)		0.31	0.31	Initial ΔP (inWG)		0.30	0.31
MERV		8	8 @2000cfm	MERV-A		8A	8A @2000cfm
E ₁ (0.3-1.0μm), (%)		11	n/a	E ₁ -A (0.3-1.0μm), (%)		10	n/a
E ₂ (1.0-3.0μm), (%)		42	≥ 20	E ₂ -A (1.0-3.0μm), (%)		38	≥ 20
E ₃ (3.0-10μm), (%)		70	≥ 70	E ₃ -A (3.0-10μm), (%)		68	≥ 70
Final DP, (inWG)		1.0	1.0	Final DP, (inWG)		1.0	1.0
Arrestance, (%)		93	90	Arrestance-A, (%)		93	90
DHC, (g)		162.8		DHC-A, (g)		161	
Temp, (F)	77	Test Aerosol	KCL	Temp, (F)	75	Test Aerosol	KCL
RH, (%)	47	Loading Dust	ASHRAE	RH, (%)	45	Loading Dust	ASHRAE




Certified Test Per ASHRAE 52.2-2017		Operator	Particle Counter	Model
Approval:	Don Thornburg, R&D Manager Electronic Signature, Original on file	AA	TSI	OPS-3330



Camfil USA
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ASHRAE® 52.2-2017 Test Results

Date:	Apr 17, 2017	Test Report:	3030 M8 2in_88.xlsm
Manufacturer	Filter Model		Filter Part Number
Camfil USA	30/30 M8 2in		049880-005

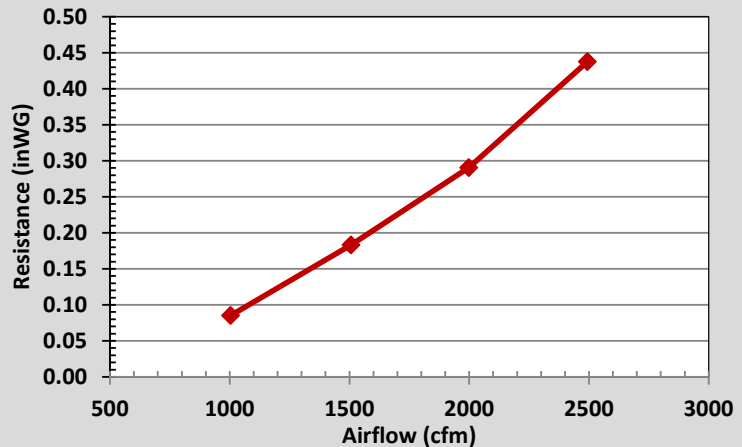
Clean Resistance Table

cfm	m ³ /s	inWG	Pa
1004	0.47	0.085203	21
1507	0.71	0.183266	46
1999	0.94	0.290574	72
2494	1.18	0.437669	109

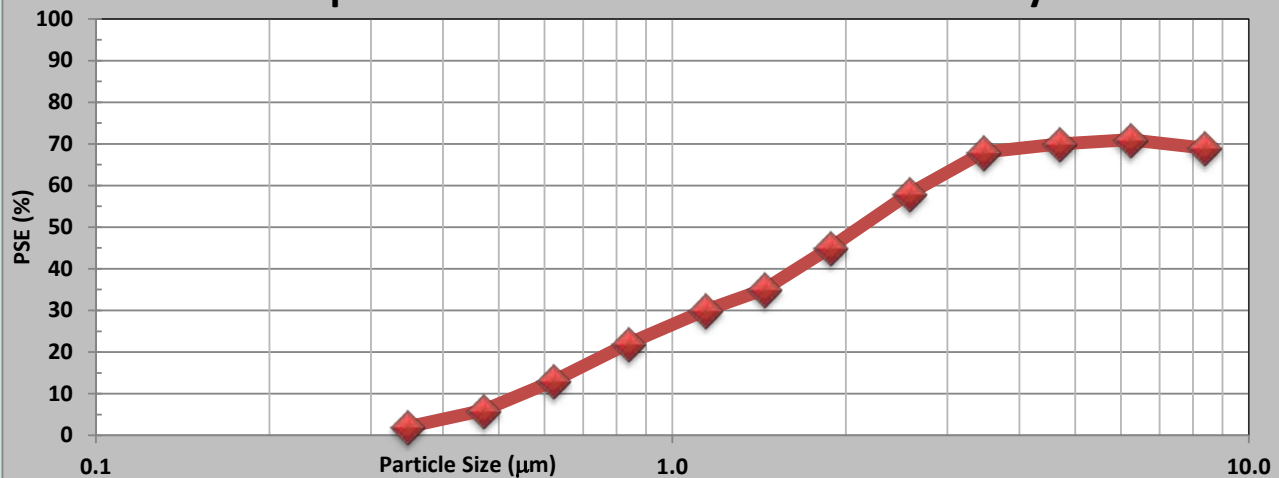
SE-04

248.8454

Resistance of Clean Device

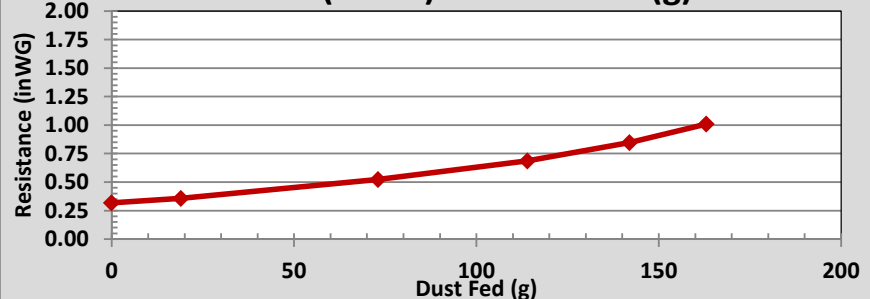


Composite Minimum Particle Size Efficiency



ΔP (inWG)	Dust Fed (g)
0.32	0
0.36	19
0.52	73
0.69	114
0.85	142
1.01	163

Resistance (inWG) vs. Dust Fed (g)

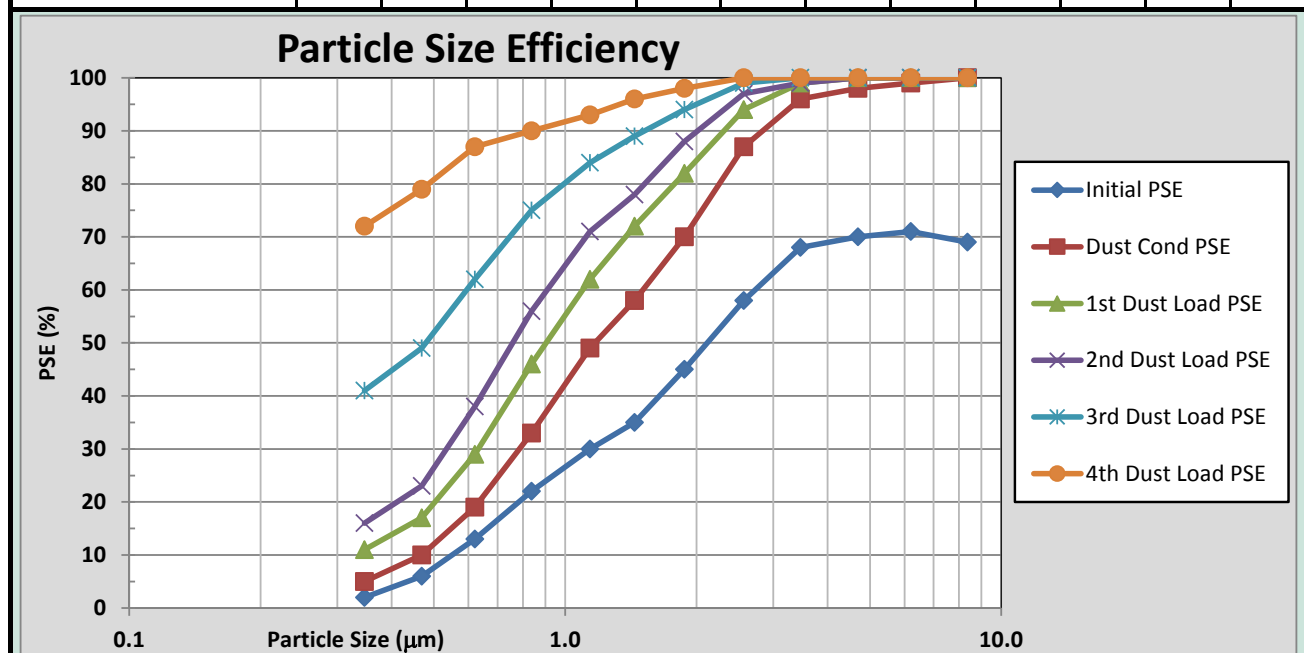




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ASHRAE® 52.2-2017 Test Results

Date:	Apr 17, 2017			Test Report:		3030 M8 2in_88.xlsm						
Manufacturer				Filter Model					Filter Part Number			
Camfil USA				30/30 M8 2in					049880-005			
Efficiency Data Table												
	1	2	3	4	5	6	7	8	9	10	11	12
Minimum Dia (µm)	0.3	0.4	0.55	0.7	1.0	1.3	1.6	2.2	3.0	4.0	5.5	7.0
Maximum Dia (µm)	0.4	0.55	0.7	1.0	1.3	1.6	2.2	3.0	4.0	5.5	7.0	10.0
Geometric Mean (µm)	0.35	0.47	0.62	0.84	1.14	1.44	1.88	2.57	3.46	4.69	6.20	8.37
Initial PSE	2	6	13	22	30	35	45	58	68	70	71	69
Dust Cond PSE	5	10	19	33	49	58	70	87	96	98	99	100
1st Dust Load PSE	11	17	29	46	62	72	82	94	99	100	100	100
2nd Dust Load PSE	16	23	38	56	71	78	88	97	99	100	100	100
3rd Dust Load PSE	41	49	62	75	84	89	94	99	100	100	100	100
4th Dust Load PSE	72	79	87	90	93	96	98	100	100	100	100	100
Composite Min PSE	2	6	13	22	30	35	45	58	68	70	71	69



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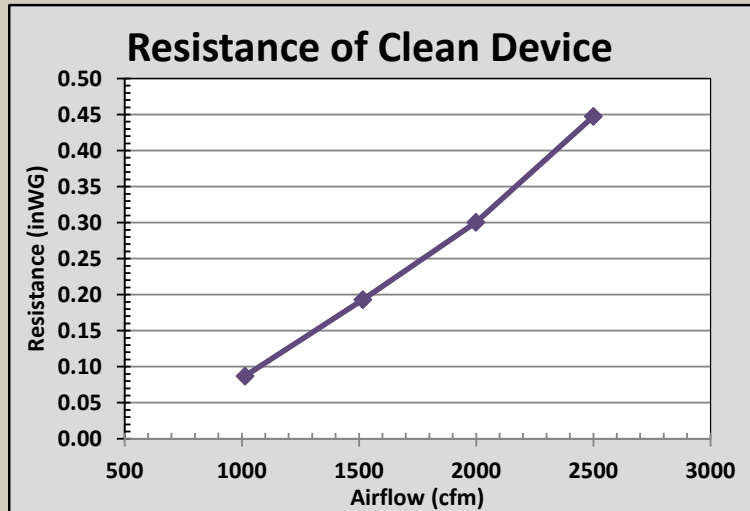


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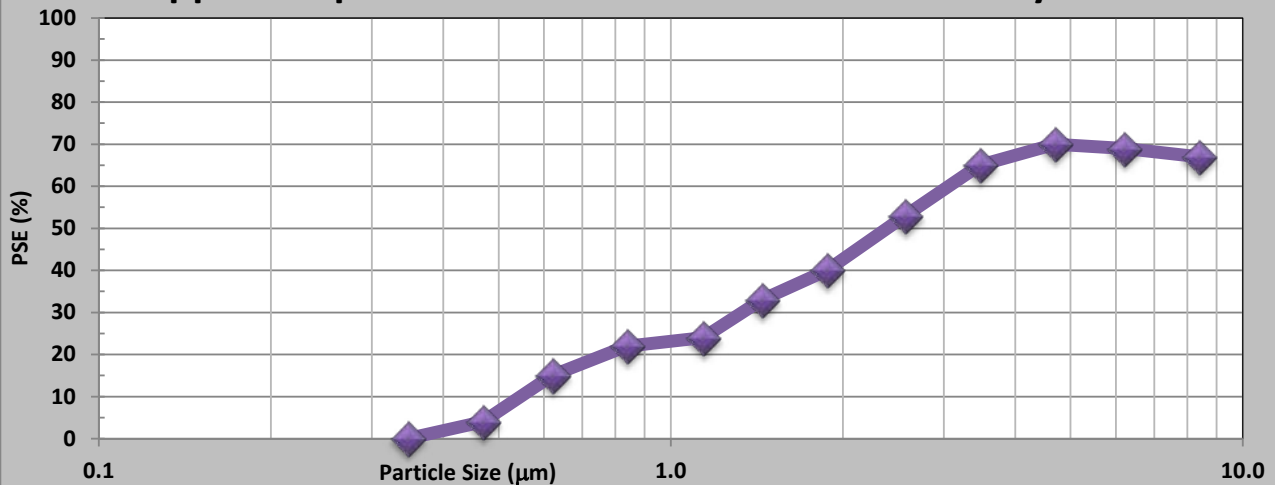
ASHRAE® 52.2-2017 Test Results w/ Appendix J Results

Date:	04/25/2017	Test Number:	3030 M8 2in_92.xlsm
Manufacturer	Camfil USA	Filter Model	30/30 M8 2in
		Filter Part Number	049880-005

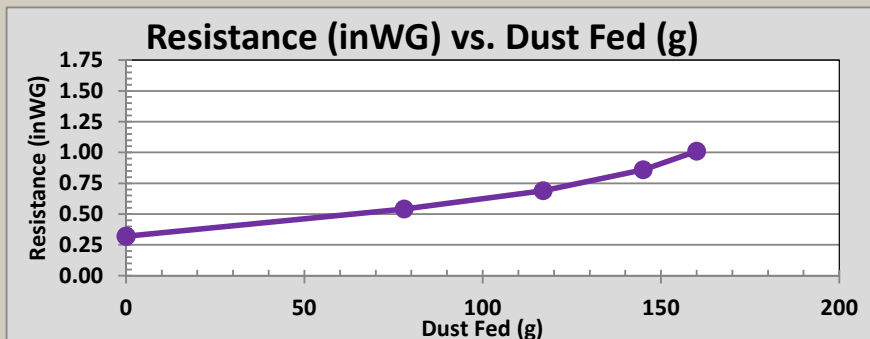
Clean Resistance Table			
cfm	m ³ /s	inWG	Pa
1014	0.48	0.087203	22
1517	0.72	0.193266	48
1999	0.94	0.300574	75
2501	1.18	0.447669	111



App J Composite Minimum Particle Size Efficiency



ΔP (inWG)	Dust Fed (g)
0.32	0
0.32	0
0.54	78
0.69	117
0.86	145
1.01	160



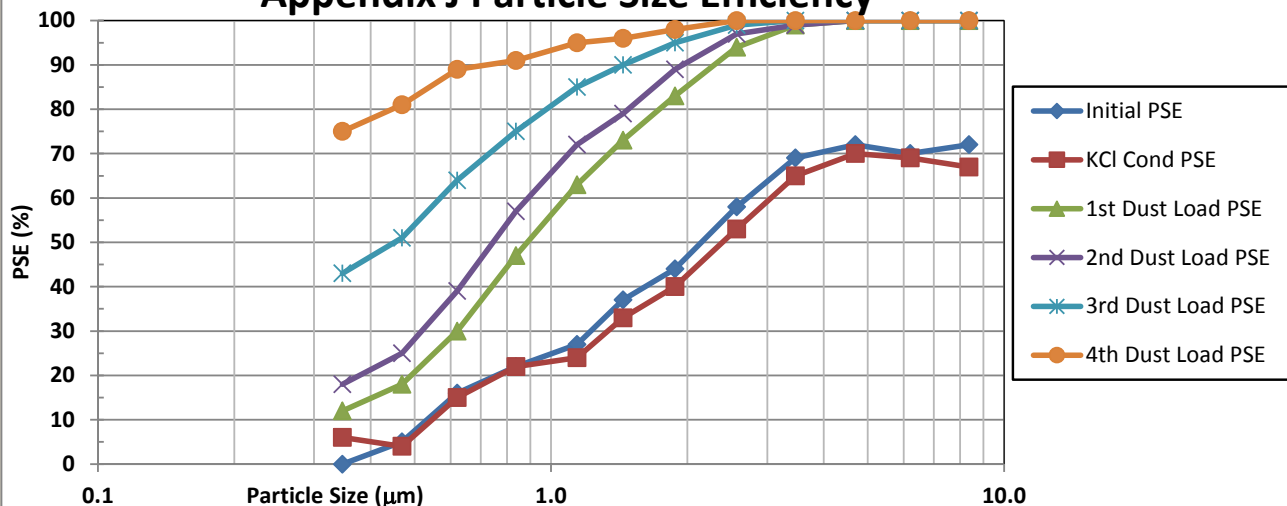


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ASHRAE® 52.2-2017 Test Results w/ Appendix J Results

Date:	04/25/2017			Test Number:			3030 M8 2in_92.xlsm						
Manufacturer				Filter Model						Filter Part Number			
Camfil USA				30/30 M8 2in						049880-005			
App J Efficiency Data Table													
	1	2	3	4	5	6	7	8	9	10	11	12	
	Minimum Dia (µm)	0.3	0.4	0.55	0.7	1.0	1.3	1.6	2.2	3.0	4.0	5.5	7.0
	Maximum Dia (µm)	0.4	0.55	0.7	1.0	1.3	1.6	2.2	3.0	4.0	5.5	7.0	10.0
	Geometric Mean (µm)	0.35	0.47	0.62	0.84	1.14	1.44	1.88	2.57	3.46	4.69	6.20	8.37
	Initial PSE	0	5	16	22	27	37	44	58	69	72	70	72
	KCl Cond PSE	6	4	15	22	24	33	40	53	65	70	69	67
	1st Dust Load PSE	12	18	30	47	63	73	83	94	99	100	100	100
	2nd Dust Load PSE	18	25	39	57	72	79	89	97	99	100	100	100
	3rd Dust Load PSE	43	51	64	75	85	90	95	99	100	100	100	100
4th Dust Load PSE	75	81	89	91	95	96	98	100	100	100	100	100	
Composite Min PSE	0	4	15	22	24	33	40	53	65	70	69	67	

Appendix J Particle Size Efficiency



Bkg Concentration (particles/cm ³)	Avg Cond Aerosol Conc (particles/cm ³)	Cumulative Cond Duration (minutes)	Cumulative Cond CT (particles-min/cm ³)	
316.0	5.68E+05	149	8.46E+07	
Large Particle Concentration (Particles ft ³)	Ratio Small to Large (>20,000)	Conditioning ΔP (inWG)		Same duct?
177,000	95,622	Initial ΔP	Final ΔP	
		0.31	0.31	No

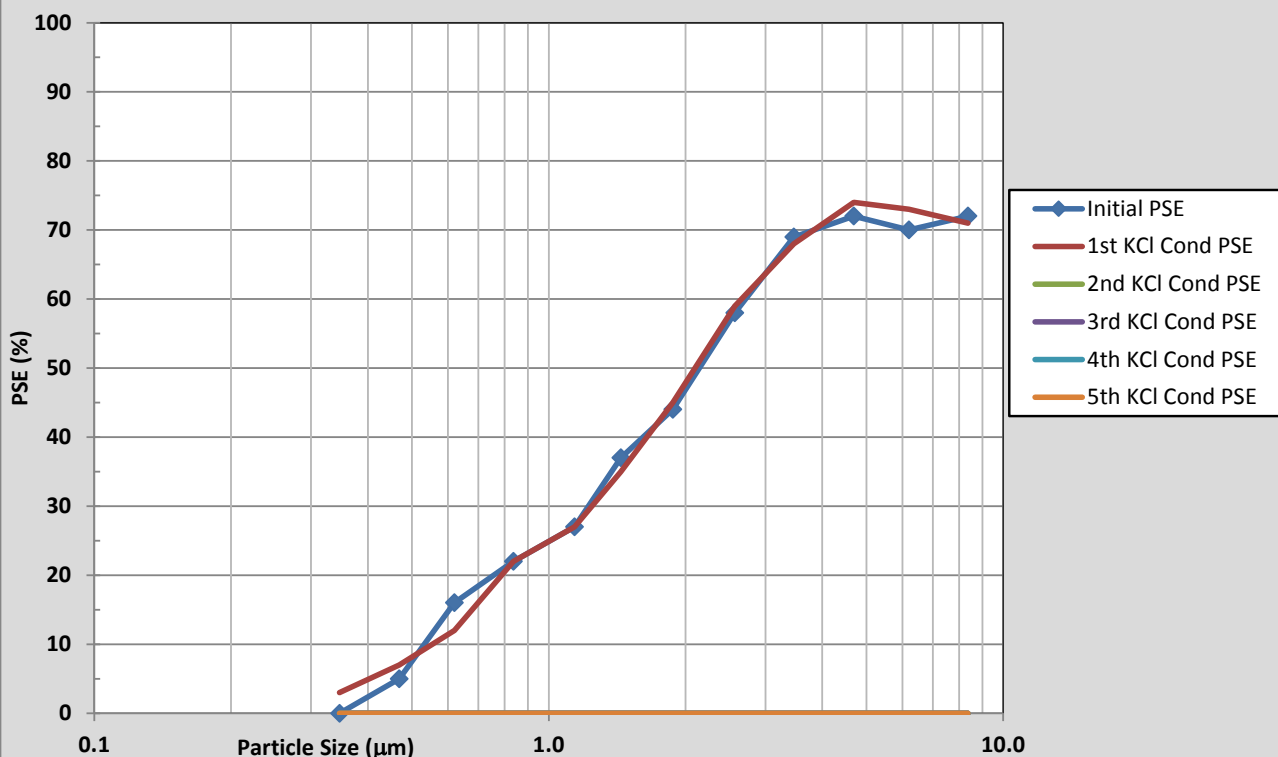


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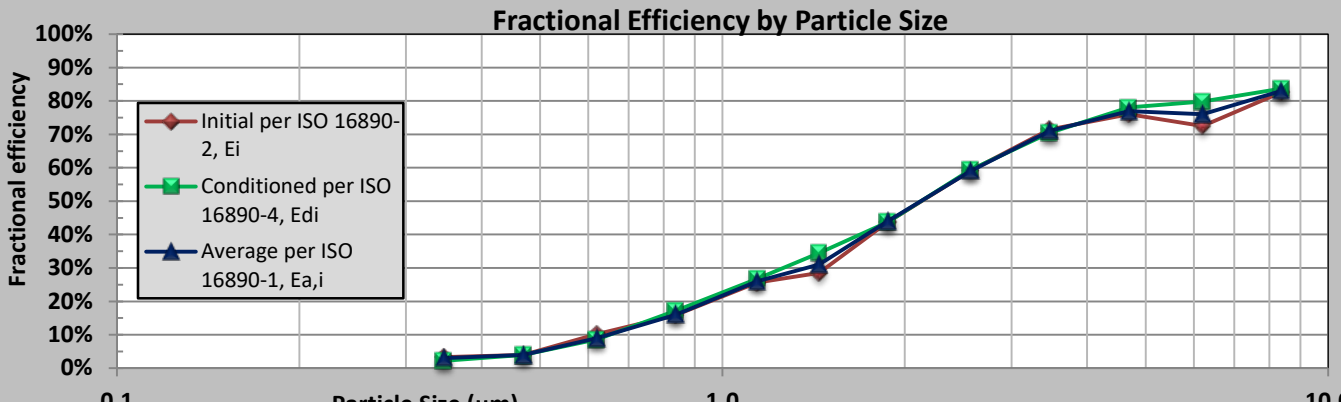
ASHRAE® 52.2-2017 Test Results w/ Appendix J Results

Date:	04/25/2017			Test Number:		3030 M8 2in_92.xlsm							
Manufacturer				Filter Model						Filter Part Number			
Camfil USA				30/30 M8 2in						049880-005			
KCI Conditioning Data Table													
	1	2	3	4	5	6	7	8	9	10	11	12	
	Minimum Dia (µm)	0.3	0.4	0.55	0.7	1.0	1.3	1.6	2.2	3.0	4.0	5.5	7.0
	Maximum Dia (µm)	0.4	0.55	0.7	1.0	1.3	1.6	2.2	3.0	4.0	5.5	7.0	10.0
	Geometric Mean (µm)	0.35	0.47	0.62	0.84	1.14	1.44	1.88	2.57	3.46	4.69	6.20	8.37
	Initial PSE	0	5	16	22	27	37	44	58	69	72	70	72
	1st KCI Cond PSE	3	7	12	22	27	35	45	59	68	74	73	71
	2nd KCI Cond PSE												
	3rd KCI Cond PSE												
	4th KCI Cond PSE												
	5th KCI Cond PSE												
	Final KCI Cond PSE	3	7	12	22	27	35	45	59	68	74	73	71

KCI Conditioning Particle Size Efficiency



ISO 16890-1:2016 - Air Filter Test Results Summary

Test Information									
Report ID			Report Date		Test Requested by			Supervisor	
USA-2008-5646R			27-Aug-2020		Manufacturer			Enrique Orosco	
Device Tested									
Manufacturer		Model		Part Number		How Test Sample Obtained & Date			
Camfil USA		30/30 M8 2in		049880-005		Manufacturer Supplied		14-Aug-2017	
Nom Size HxWxD (in)		Pleats/Pockets		Media Color		Media Charge		Media Adhesive	
24x24x2		29		Green		None		None	
Media Type			Media Area (ft ²)		Product Type			UL Rating	
Multi Layer Polyester			17.3		2in 30/30			UL 900	
Test Results Summary									
Resistance to Airflow					Fractional Efficiency and ISO Rating				
Airflow (cfm)	Measured Resistance (inWG)	Met Published value	Rated Initial Resistance (inWG)	Product Literature listed ISO 16890 Rating	Met Published value	ISO 16890 Rating			
1970	0.29		0.31	ISO ePM10 50%		ISO ePM10 50%			
Arrestance:	Initial:	70%	Average:	91%	ePM ₁	ePM _{1,min}	ePM _{2,5}	ePM _{2,5,min}	ePM ₁₀
Rated Final Resistance (inWG)			1.2		7%	7%	18%	18%	54%
Test Dust Capacity (TDC) (g)			393						
Test Information and Included Reports									
Test Type		Test ID		Test Date		Test Time		Test Operator	
Initial per ISO 16890-2		USA-2008-5646		27-Aug-2020		11:01		A. Acain	
Conditioned per ISO 16890-4		USA-2008-5701		3-Sep-2020		10:32		A. Acain	
Dust Loaded per 16890-3		USA-2008-5725		9-Sep-2020		1:41		A. Acain	
Fractional Efficiency by Particle Size									
									
Approvals									
		Certified Test Per ISO ISO 16890-1:2016				Test Organization		Camfil USA 1 N. Corporate Dr. Riverdale, NJ 07457 (973) 616-7300	
		Enrique Orosco, Lab Manager							
		Electronic Signature, Original on file							
Note:		The results of this test relate only to the test device in the condition stated herein. The performance results cannot by themselves be quantitatively applied to predict filtration performance in all "real life" environments.							

ISO 16890-1:2016 - Air Filter Test Results Details

Test Information

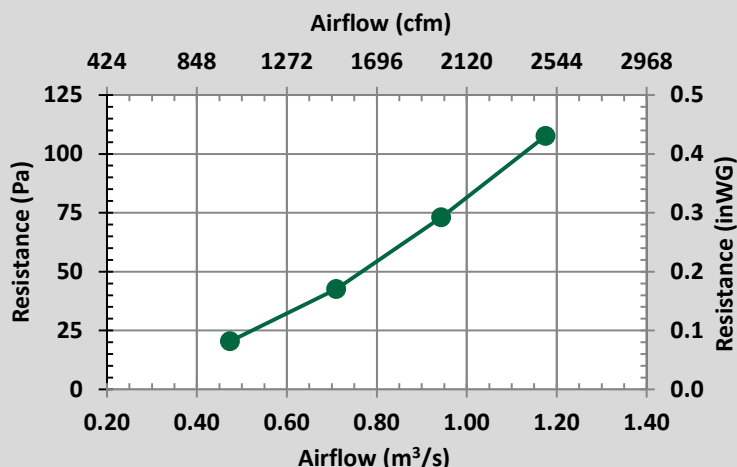
Report ID	Report Date	Test Organization	Supervisor
USA-2008-5646R	27-Aug-2020	Camfil USA	Enrique Orosco

Clean Resistance Table at 1.2kg/m³

Test Airflow			Resistance	
% Rated	m ³ /s	cfm	Pa	inWG
50%	0.47	1000	20	0.09
75%	0.71	1500	43	0.17
100%	0.94	2000	73	0.30
125%	1.18	2500	108	0.43

For complete Test Result Details and data, please review the individual test reports for ISO 16890-2, 16890-3, and 16890-4.

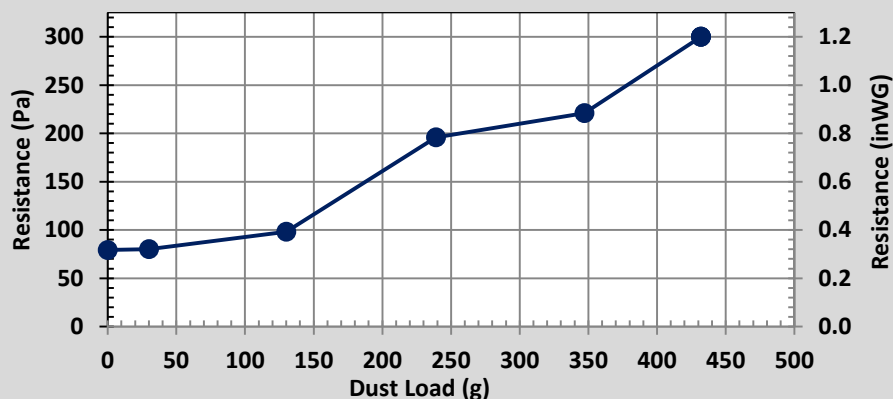
Resistance of Clean Device



Dust Captured Table

Resistance to Airflow		Dust Load (g)
Pa	inWG	
79	0.32	0
80	0.32	30
98	0.39	130
196	0.79	239
221	0.89	347
300	1.20	432

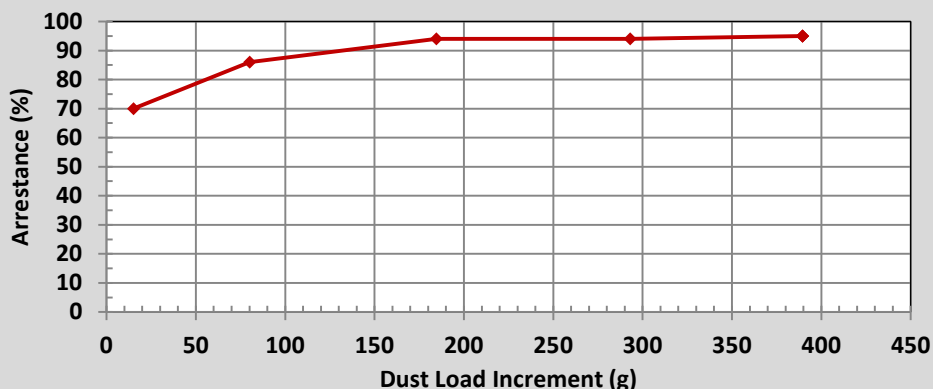
Resistance vs. Test Dust Captured



Arrestance Table

Arrestance (%)	Dust Load Increment (g)
70	15
86	80
94	185
94	293
95	390

Arrestance vs. Test Dust Captured



Note:

The results of this test relate only to the test device in the condition stated herein. The performance results cannot by themselves be quantitatively applied to predict filtration performance in all "real life" environments.

ISO 16890-1:2016 - Results Calculations

Report ID	Report Date	Test Organization	Supervisor
USA-2008-5646R	27-Aug-2020	Camfil USA	Enrique Orosco

Fractional Efficiency Values							
i	d_i	d_{i+1}	d_m	$\Delta \ln d_i$	E_i	$E_{D,i}$	$E_{A,i}$
1	0.30	0.40	0.35	0.29	3%	2%	3%
2	0.40	0.55	0.47	0.32	4%	4%	4%
3	0.55	0.70	0.62	0.24	10%	9%	9%
4	0.70	1.00	0.84	0.36	16%	17%	16%
5	1.00	1.30	1.14	0.26	26%	27%	26%
6	1.30	1.60	1.44	0.21	28%	34%	31%
7	1.60	2.20	1.88	0.32	44%	44%	44%
8	2.20	3.00	2.57	0.31	59%	59%	59%
9	3.00	4.00	3.46	0.29	72%	70%	71%
10	4.00	5.50	4.69	0.32	76%	78%	77%
11	5.50	7.00	6.20	0.24	73%	80%	76%
12	7.00	10.00	8.37	0.36	83%	84%	83%

Symbols and Units	
d_i	Lower limit particle diameter in a size range i , μm
d_{i+1}	Upper limit particle diameter in a size range i , μm
d_m	Geometric mean diameter of a size range, μm
$\Delta \ln d_i$	Logarithmic width of a particle diameter size range i
E_i	Initial fractional efficiency of particle size range i of the untreated and unloaded filter element, %
$E_{D,i}$	Fractional efficiency of particle size range i of the conditioned filter element, %
$E_{A,i}$	Average fractional efficiency of particle size range i , %

ISO 16890-1:2016 - Results Calculations

Report ID	Report Date	Test Organization	Supervisor
USA-2008-5646R	27-Aug-2020	Camfil USA	Enrique Orosco

Calculation of PM Efficiencies								
i	d _m	Δln d _i	q _{3u} (Urban Distribution)	q _{3u} *Δln d _i	E _{D,i} *q _{3u} * Δln d _i	E _{A,i} *q _{3u} * Δln d _i		
	μm	μm						
1	0.35	0.29	22.627%	0.065095	0.001424	0.001953	ePM _{1,min}	ePM ₁
2	0.47	0.32	19.891%	0.063343	0.002510	0.002534		
3	0.62	0.24	15.837%	0.038193	0.003301	0.003437	7%	7%
4	0.84	0.36	11.522%	0.041097	0.007042	0.006576		
	Sums:			0.207728	0.014277	0.014500		
5	1.14	0.26	8.503%	0.022309	0.005976	0.005800	ePM _{2,5, min}	ePM _{2.5}
6	1.44	0.21	7.618%	0.015817	0.005452	0.004903		
7	1.88	0.32	8.022%	0.025546	0.011180	0.011240	18%	18%
8	2.57	0.31	9.984%	0.030966	0.018402	0.018270		
	Sums:			0.302366	0.055287	0.054713		
i	d _m	Δln d _i	q _{3r} (Rural Distribution)	q _{3r} *Δln d _i		E _{A,i} *q _{3r} * Δln d _i		
	μm	μm						
1	0.35	0.29	9.412%	0.027077		0.000812		
2	0.47	0.32	8.395%	0.026733		0.001069		
3	0.62	0.24	7.432%	0.017924		0.001613		
4	0.84	0.36	7.014%	0.025016		0.004003		
5	1.14	0.26	7.628%	0.020013		0.005203		
6	1.44	0.21	8.833%	0.018340		0.005685		
7	1.88	0.32	10.804%	0.034406		0.015139		
8	2.57	0.31	13.726%	0.042573		0.025118		
9	3.46	0.29	16.708%	0.048067		0.034128		
10	4.69	0.32	19.542%	0.062233		0.047920	ePM ₁₀	
11	6.20	0.24	21.671%	0.052261		0.039719		
12	8.37	0.36	23.143%	0.082545		0.068512	54%	
	Sums:			0.457189		0.248921		

ISO 16890-2:2016 - Air Filter Test Results Summary

Test Information

Test Type	Test ID	Test Date	Test Time	Test Operator
Initial per ISO 16890-2	USA-2008-5646	27-Aug-2020	11:01	A. Acain

Device Tested

Manufacturer		Model	Part Number	Test Sample Obtained
Camfil USA		30/30 M8 2in	049880-005	Manufacturer Supplied
Nom Size HxWxD (in)	Pleats/Pockets	Media Color	Media Charge	Media Adhesive
24x24x2	29	Green	None	None
Media Type		Media Area (ft ²)	Product Type	UL Rating
Multi Layer Polyester		17.3	2in 30/30	UL 900
Device Condition	Clean Filter Testing		Other Information	

Test Results Summary

Airflow (cfm)	1970	Temperature (F)	75	Baro Pres (hPa)	100202	Test Aerosol	KCL
Face Velocity (fpm)	493	RH (%)	47	Air Density (kg/m ³)	119.31	Conditioning	N/A

Test Results

Measured Resistance (inWG)	0.29	Met Published value	Rated Initial Resistance (inWG)	0.31	Particle Size Range (µm)	Measured Efficiency	Expected Efficiency by particle size	Upstream Concentration (p/ft ³)
					0.30 - 0.40	3%	0%	1,161,104
					0.40 - 0.55	4%	5%	679,718
					0.55 - 0.70	10%	10%	325,587
					0.70 - 1.00	16%	20%	438,911
					1.00 - 1.30	26%	30%	175,989
					1.30 - 1.60	28%	35%	105,197
					1.60 - 2.20	44%	45%	272,465
					2.20 - 3.00	59%	55%	204,533
					3.00 - 4.00	72%	65%	136,600
					4.00 - 5.50	76%	70%	107,491
					5.50 - 7.00	73%	70%	50,546
					7.00 - 10.00	83%	70%	51,508

Device Front	Device Label	
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Other remarks	
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Particle Counter Information

Manufacturer	Model	Coincidence (p/dm ³)	Calibration Date(s)	Test Rig	Airflow Equipment
TSI	OPC-3330	300	22-Mar-2017 & 01-Apr-2017	17-Jun-2016	ABB Mass Flow

Approvals

	Certified Test Per ISO 16890-2:2016		Test Organization	Camfil USA 1 N. Corporate Dr. Riverdale, NJ 07457 (973) 616-7300
	Approval:	Don Thornburg, R&D Manager Electronic Signature, Original on file		

Note:

The results of this test relate only to the test device in the condition stated herein. The performance results cannot by themselves be quantitatively applied to predict filtration performance in all "real life" environments.

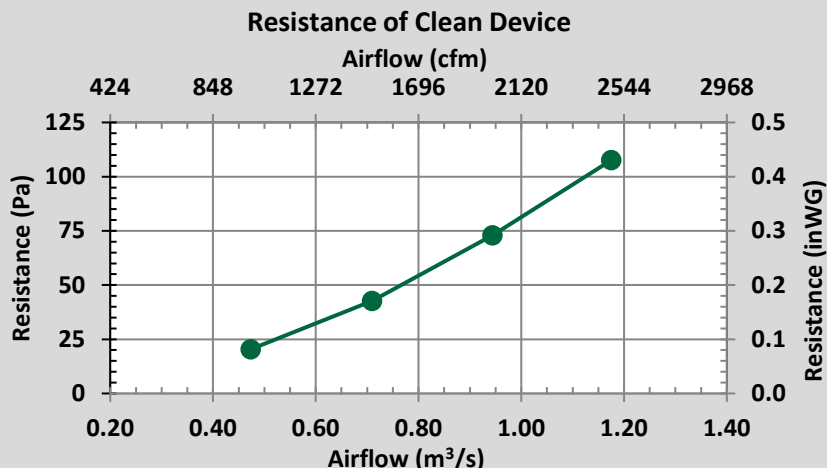
ISO 16890-2:2016 - Air Filter Test Results Details

Test Information

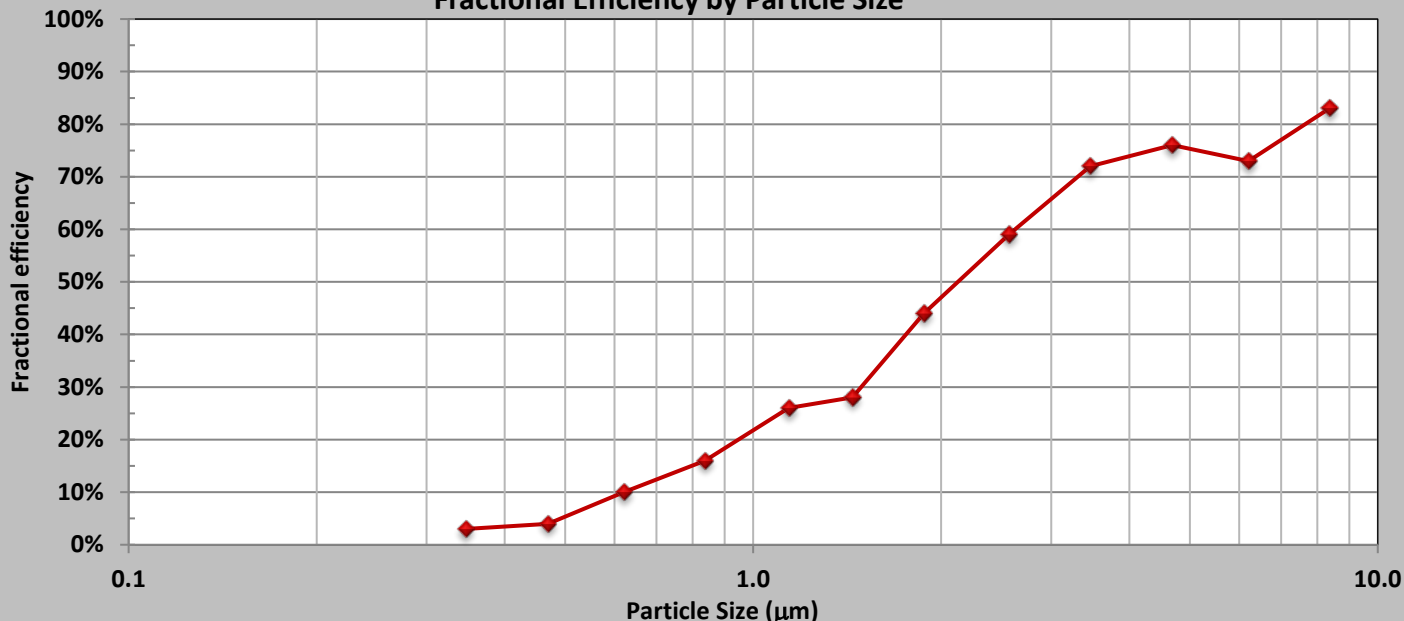
Test Type	Test ID	Test Date	Test Time	Test Operator	Test Organization
Initial per ISO 16890-2	USA-2008-5646	27-Aug-2020	11:01	A. Acain	Camfil USA

Clean Resistance Table at 1.2kg/m³

Test Airflow			Resistance	
% Rated	m ³ /s	cfm	Pa	inWG
50%	0.47	1000	20	0.08
75%	0.71	1500	43	0.17
100%	0.94	2000	73	0.29
125%	1.18	2500	108	0.43



Fractional Efficiency by Particle Size



Efficiency Data Table

Channel	1	2	3	4	5	6	7	8	9	10	11	12
Particle Size Boundaries (µm)	0.30	0.40	0.55	0.70	1.00	1.30	1.60	2.20	3.00	4.00	5.50	7.00
	0.40	0.55	0.70	1.00	1.30	1.60	2.20	3.00	4.00	5.50	7.00	10.00
Geometric Mean	0.35	0.47	0.62	0.84	1.14	1.44	1.88	2.57	3.46	4.69	6.20	8.37
Measured Efficiency	3%	4%	10%	16%	26%	28%	44%	59%	72%	76%	73%	83%

Note:

The results of this test relate only to the test device in the condition stated herein. The performance results cannot by themselves be quantitatively applied to predict filtration performance in all "real life" environments.



ISO 16890-3:2016 - Air Filter Test Results Summary

Test Information

Test Type	Test ID	Test Date	Test Time	Test Operator
Dust Loaded per 16890-3	USA-2008-5725	9-Sep-2020	1:41	A. Acain
Test Rig	Test Organization	Airflow Equipment		
Qualification Date	17-Jun-2016	Camfil USA	Equipment Type	ABB Mass Flow

Device Tested

Manufacturer	Model	Part Number	Test Sample Obtained
Camfil USA	30/30 M8 2in	049880-005	Manufacturer Supplied
Nom Size HxWxD (in)	Pleats/Pockets	Media Color	Media Charge
24x24x2	29	Green	None
Media Type	Media Area (ft ²)	Product Type	UL Rating
Multi Layer Polyester	17.3	2in 30/30	UL 900
Device Condition	Device previously tested per ISO 16890-2, conditioned per ISO 16890-4, tested again per ISO 16890-2.		Other Information

Test Results Summary

Airflow (cfm)	2000	Temperature (F)	76	Loading Dust	ISO 15957 L2
Face Velocity (fpm)	500	RH (%)	47	Barometric Pressure (hPa)	101897

Test Results

Measured Resistance (inWG)	0.30	Met Published value	Measured Final Resistance (inWG)	1.20	Initial Arrestance (%)	70%
Rated Initial Resistance (inWG)	0.31		Test Dust Capacity (g)	393	Final Arrestance (%)	91%

Test Device Photos

Device Front

Device Label

Other remarks

Approvals

	Certified Test Per ISO 16890-3:2016		Test Organization	Camfil USA 1 N. Corporate Dr. Riverdale, NJ 07457 (973) 616-7300
	Approval:	Don Thornburg, R&D Manager		
		Electronic Signature, Original on file		

Note:

The results of this test relate only to the test device in the condition stated herein. The performance results cannot by themselves be quantitatively applied to predict filtration performance in all "real life" environments.

ISO 16890-3:2016 - Air Filter Test Results Details

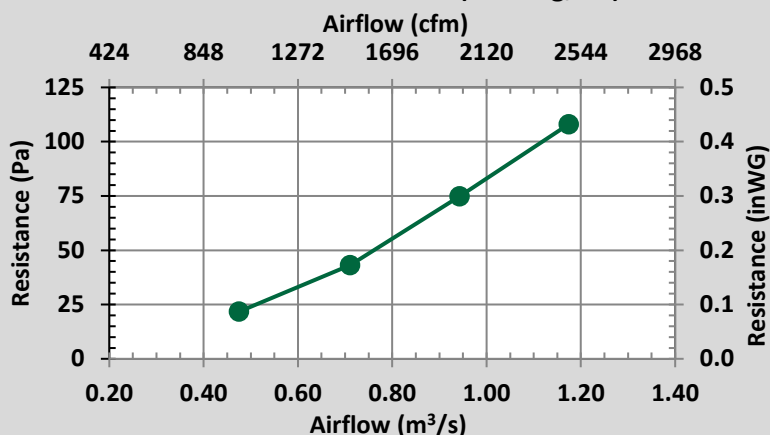
Test Information

Test Type	Test ID	Test Date	Test Time	Test Operator
Dust Loaded per 16890-3	USA-2008-5725	9-Sep-2020	1:41	A. Acain

Clean Resistance Table at 1.2kg/m³

Test Airflow			Resistance	
% Rated	m ³ /s	cfm	Pa	inWG
50%	0.48	1000	22	0.09
75%	0.71	1500	43	0.17
100%	0.94	2000	75	0.30
125%	1.17	2500	108	0.43

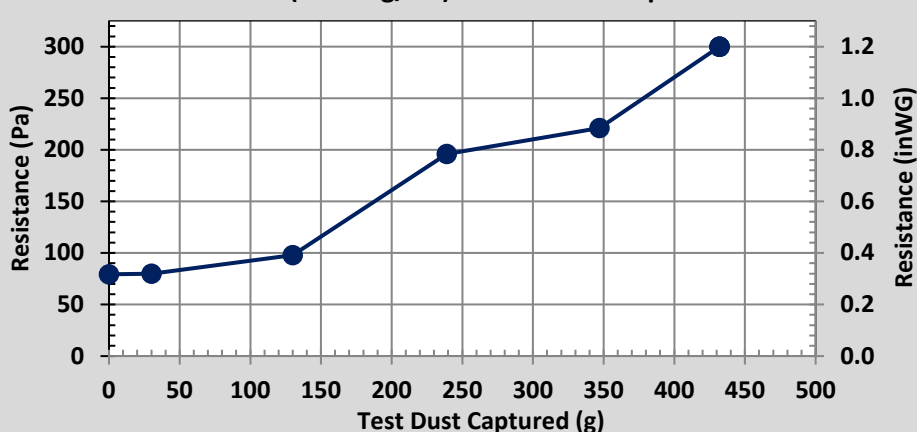
Resistance of Clean Device (at 1.2kg/m³)



Dust Captured Table

Resistance to Airflow		Dust Load (g)
Pa	inWG	
79	0.32	0
80	0.32	30
98	0.39	130
196	0.79	239
221	0.89	347
300	1.20	432

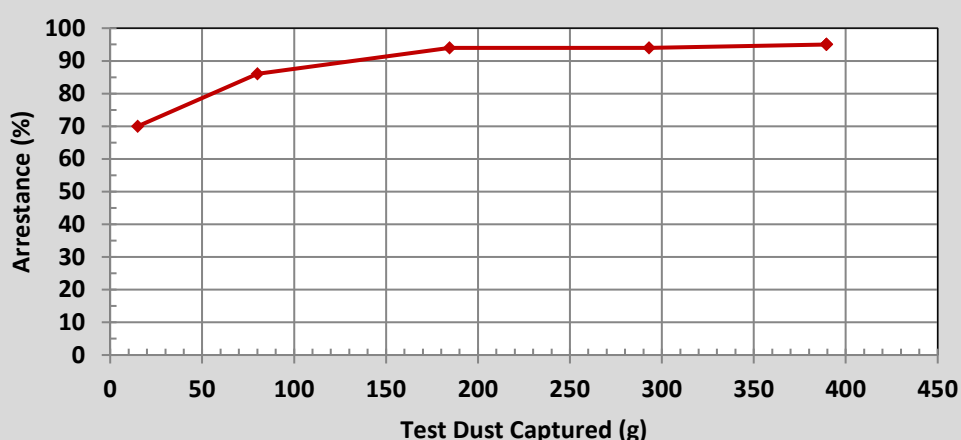
Resistance (at 1.2kg/m³) vs. Test Dust Captured



Arrestance Table

Arrestance (%)	Dust Load Increment (g)
70	15
86	80
94	185
94	293
95	390

Arrestance vs. Test Dust Captured



Note:

The results of this test relate only to the test device in the condition stated herein. The performance results cannot by themselves be quantitatively applied to predict filtration performance in all "real life" environments.

ISO 16890-3:2016 - Air Filter Test Results Details

Test Information

Test Type	Test ID	Test Date	Test Time	Test Operator
Dust Loaded per 16890-3	USA-2008-5725	9-Sep-2020	1:41	A. Acain

Device Tested

Manufacturer	Model	Part Number	Product Type	Test Sample Obtained
Camfil USA	30/30 M8 2in	049880-005	2in 30/30	Manufacturer Supplied

Test Conditions

Airflow (cfm)	2000	Device Condition	Device previously tested per ISO 16890-2, conditioned per ISO 16890-4, tested again per ISO 16890-2.			
Temperature (F)	76					
RH (%)	47					
Barometric Pressure (hPa)	101897	Acceptable Air Density Range* (kg/m ³)			Loading Dust	ISO 15957 L2
Test Air Density (kg/m ³)	121.10	Min	1.16	Max	1.24	

* No corrections are required as long as the test air density is within this range

Resistance to Airflow and Arrestance after each Dust Loading Phase

Dust Load	Date	Δp_1	Δm	m_{tot}	Δp_2	m_1	m_2	Δm_{ff}	m_d	A_j	A_m
		(inWG)	(g)	(g)	(inWG)	(g)	(g)	(g)	(g)	(%)	(%)
1	9-Sep-2020	0.32	30	30	0.32	2061.3	2070.2	8.9	0.2	69.7%	69.7%
2	9-Sep-2020	0.32	100	130	0.39	2070.2	2083.2	13.0	0.6	86.4%	82.5%
3	9-Sep-2020	0.39	109	239	0.79	2083.2	2089.6	6.4	0.5	93.7%	87.6%
4	9-Sep-2020	0.79	108	347	0.89	2089.6	2096.1	6.5	0.4	93.6%	89.5%
5	9-Sep-2020	0.89	85	432	1.20	2096.1	2100.4	4.3	0.0	94.9%	90.6%
6											
7											

Initial mass of Test Device (g):

4086.7

Final mass of Test Device (g):

4508.4

Symbols and Units

A_j	arrestance for loading j, %
A_m	average arrestance for the test, %
Δp_1	resistance to airflow before dust increment (air density 1.2 kg/m ³), inWG
Δp_2	resistance to airflow after dust increment (air density 1.2 kg/m ³), inWG
Δm	incremental mass of dust fed, g
m_{tot}	cumulative mass of dust fed, g
m_1	mass of final filter before dust increment, g
m_2	mass of final filter after dust increment, g
Δm_{ff}	mass gain of final filter, g
m_d	mass of dust in duct between test device and final filter, g

Note:

The results of this test relate only to the test device in the condition stated herein. The performance results cannot by themselves be quantitatively applied to predict filtration performance in all "real life" environments.

ISO 16890-4:2016 - Air Filter Test Results Summary

Test Information

Test Type	Test ID	Test Date	Test Time	Test Operator
Conditioned per ISO 16890-4	USA-2008-5701	3-Sep-2020	10:32	A. Acain
Device Tested				
Manufacturer	Model	Part Number	Test Sample Obtained	
Camfil USA	30/30 M8 2in	049880-005	Manufacturer Supplied	
Nom Size HxWxD (in)	Pleats/Pockets	Media Color	Media Charge	Media Adhesive
24x24x2	29	Green	None	None
Media Type	Media Area (ft ²)	Product Type	UL Rating	
Multi Layer Polyester	17.3	2in 30/30	UL 900	
Other Information	Device previously tested per ISO 16890-2, conditioned per ISO 16890-4		Other Information	

Test Results Summary

Airflow (cfm)		2000	Temperature (F)	75	Baro Pres (hPa)	100397	Test Aerosol	KCL
Face Velocity (fpm)		500	RH (%)	47	Air Density (kg/m³)	119.55	Conditioning	IPA Vapor
Test Results					Literature ISO 16890 Rating		ISO ePM10 50%	
Measured Resistance (inWG)	0.30	Met Published value	Rated Initial Resistance (inWG)	0.31	Particle Size Range (µm)	Measured Efficiency, E_D	Expected Efficiency by particle size	Upstream Concentration (p/ft³)
					0.30 - 0.40	2%	0%	5,974,005
Test Device Photos					0.40 - 0.55	4%	5%	3,374,207
					0.55 - 0.70	9%	10%	1,584,016
					0.70 - 1.00	17%	20%	2,026,127
					1.00 - 1.30	27%	30%	826,937
					1.30 - 1.60	34%	35%	499,339
					1.60 - 2.20	44%	45%	1,215,302
					2.20 - 3.00	59%	55%	861,455
					3.00 - 4.00	70%	65%	490,731
					4.00 - 5.50	78%	70%	326,125
					5.50 - 7.00	80%	70%	122,640
Device Front			Device Label		7.00 - 10.00	84%	70%	106,924
Other remarks								

Particle Counter Information

Manufacturer	Model	Coincidence (p/dm ³)	Calibration Date(s)	Test Rig	Airflow Equipment
TSI	OPC-3330	300	22-Mar-2017 & 01-Apr-2017	Qualification Date 17-Jun-2016	Equipment Type ABB Mass Flow

Approvals

	Certified Test Per ISO 16890-4:2016		Test Organization	Camfil USA 1 N. Corporate Dr. Riverdale, NJ 07457 (973) 616-7300
	Approval:	<i>Don Thornburg, R&D Manager</i> Electronic Signature, Original on file		

Note:

The results of this test relate only to the test device in the condition stated herein. The performance results cannot by themselves be quantitatively applied to predict filtration performance in all "real life" environments.

ISO 16890-4:2016 - Air Filter Test Results Details

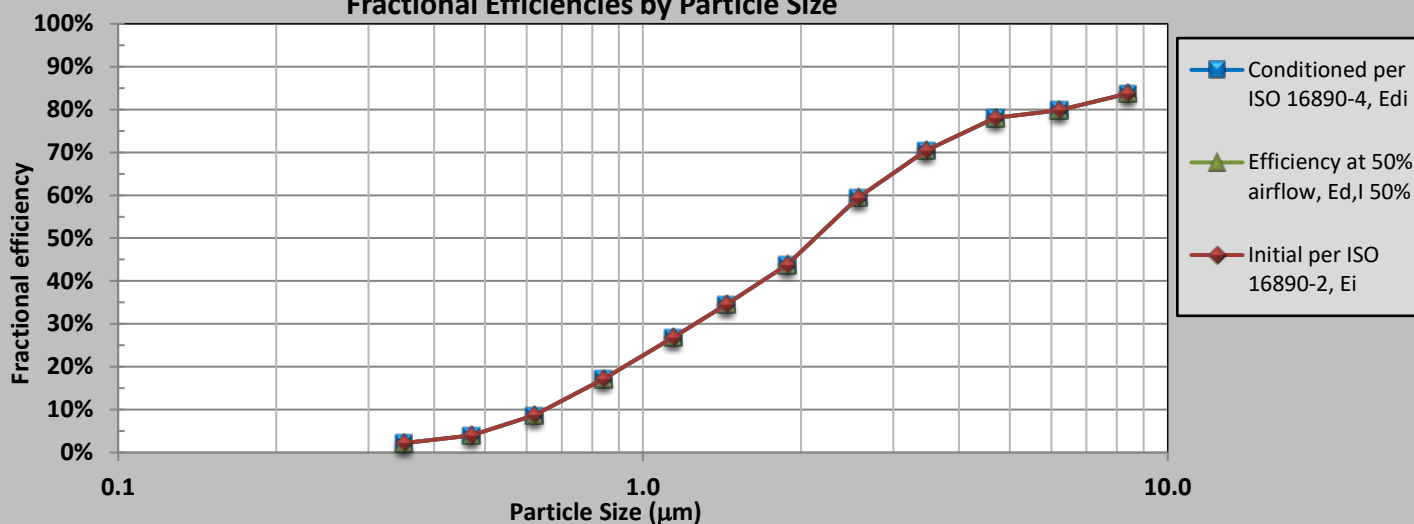
Test Information

Test Type	Test ID	Test Date	Test Time	Test Operator	Test Organization
Conditioned per ISO 16890-4	USA-2008-5701	3-Sep-2020	10:32	A. Acain	Camfil USA

Efficiency Data Table

Channel	1	2	3	4	5	6	7	8	9	10	11	12
Particle Size Boundaries (μm)	0.30	0.40	0.55	0.70	1.00	1.30	1.60	2.20	3.00	4.00	5.50	7.00
	0.40	0.55	0.70	1.00	1.30	1.60	2.20	3.00	4.00	5.50	7.00	10.00
Geometric Mean, (μm)	0.35	0.47	0.62	0.84	1.14	1.44	1.88	2.57	3.46	4.69	6.20	8.37
Efficiency, $E_{D,i}$	2%	4%	9%	17%	27%	34%	44%	59%	70%	78%	80%	84%
Efficiency, E_i	3%	4%	10%	16%	26%	28%	44%	59%	72%	76%	73%	83%
Efficiency at 50% Airflow, $E_{D,50,i}$	2%	4%	9%	17%	27%	34%	44%	59%	70%	78%	80%	84%
Efficiency at 0.4 μm , $E_{D,0,4}$	3%	Efficiency at 50% Airflow 0.4 μm , $E_{D,50,0,4}$				3%	Difference between $E_{D,0,4}$ and $E_{D,50,0,4}$			3%	PASS	

Fractional Efficiencies by Particle Size



Reporting Results

Temperature (F)				RH (%)				Baro Pres (hPa)		Range of Air Density (kg/m^3)			
Measured		Limits		Measured		Limits		Measured		Measured		Limits	
Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
72.5	73.2	64	82	44	47	35	55	1006.0	1007.0	1.20	1.20	1.16	1.24
Initial mass of Test Device (g):				451.1				Mass of empty IPA Trays (g):				1437.5	
Final mass of Test Device (g):				451.1				Mass of filled IPA Trays (test start) (g):				2279.5	
Differential mass of Test Device (g):				0.0				Mass of IPA Trays (after test) (g):				1527.2	
Time of Test Device Exposure (hr):				24				Mass of IPA used in test (g):				752.3	
Required Mass of IPA at Start (g):				786.0				Mass of IPA in Trays at Start (g):				842.0	

Note:

The results of this test relate only to the test device in the condition stated herein. The performance results cannot by themselves be quantitatively applied to predict filtration performance in all "real life" environments.

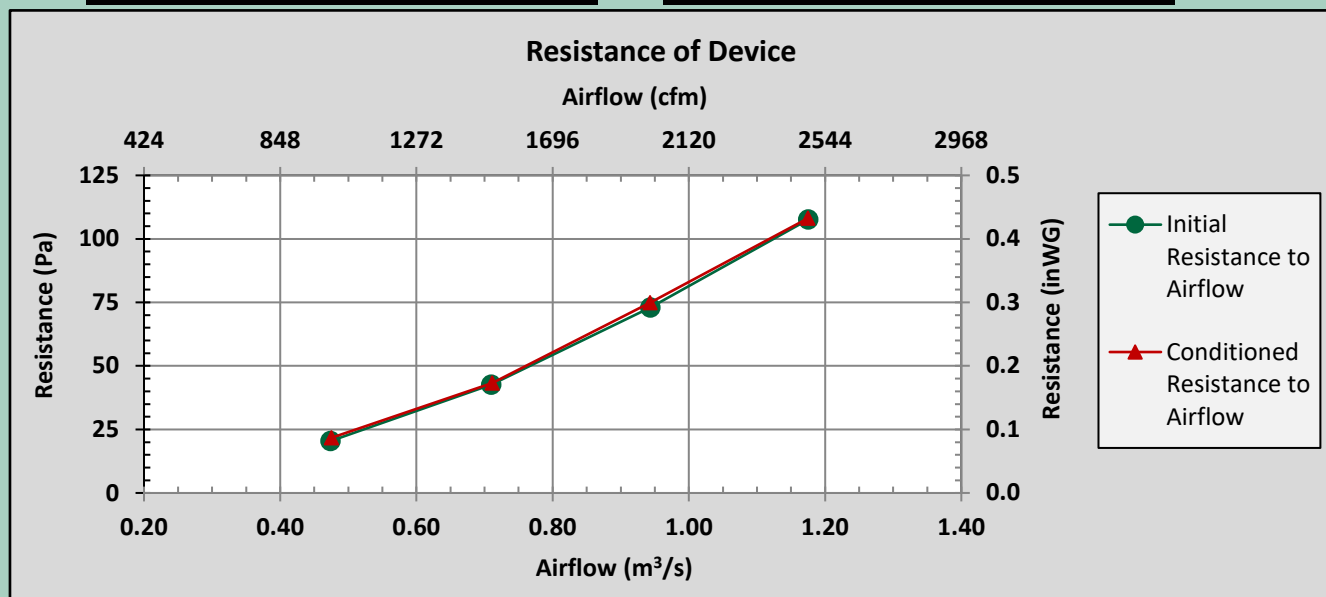
ISO 16890-4:2016 - Air Filter Test Results Details

Test Information

Test Type	Test ID	Test Date	Test Time	Test Operator	Test Organization
Conditioned per ISO 16890-4	USA-2008-5701	3-Sep-2020	10:32	A. Acain	Camfil USA

Clean Resistance at 1.2kg/m ³				
Test Airflow			Resistance	
% Rated	m ³ /s	cfm	Pa	inWG
50%	0.47	1000	20	0.08
75%	0.71	1500	43	0.17
100%	0.94	2000	73	0.29
125%	1.18	2500	108	0.43

Conditioned Resistance at 1.2kg/m ³				
Test Airflow			Resistance	
% Rated	m ³ /s	cfm	Pa	inWG
50%	0.48	1000	22	0.09
75%	0.71	1500	43	0.17
100%	0.94	2000	75	0.30
125%	1.17	2500	108	0.43



IPA Vapor Cabinet

Test Device Chamber Dimensions (in):	33.5x29.5x39.4	Number IPA Trays:	8
Test Device Chamber Volume (ft ³):	22.51	Tray Dimensions (in):	20.1x10.0
IPA Liquid Purity (%):	99.5	Total Tray Area (ft ²):	1.40



IPA Conditioning Cabinet



IPA Trays

Note:

The results of this test relate only to the test device in the condition stated herein. The performance results cannot by themselves be quantitatively applied to predict filtration performance in all "real life" environments.