FIELD TESTING REPORT
CFIS System

Date:	**15 December 2016**
Operator:	**Zied Driss**
Lab File:	**1448-2016-1215 Princeton University_Camfil**
Site:	***Princeton University, Princeton, NJ, USA***

Title:

Field testing per ISO 29462 of (20) MERV 13 (F7) air filters identified as Camfil Hi-Flo ES filter at the Princeton University site in Princeton, NJ, USA. These air filters were installed on 09 June 2016 and tested in place on 15 December 2016.

Purpose:

This field test will evaluate the performance of an air filtration device in a "Real Life" environment when tested in accordance with ISO 29462, 2013 Field testing of general ventilation filtration devices and systems for in situ removal efficiency by particle size and resistance to airflow

Protocol:

The testing protocol outlined in the ISO 29462 2013, was followed throughout this field test. The equipment used during this testing consisted of a calibrated TSI-3330_CF11396, 1.0 lpm, 14-channel particle counter and an Alnor/TSI_EBT730 to measure the airflow velocity and resistance. Sampling probes used upstream and downstream of the test filter were sized for isokinetic air sampling and positioned in place using tripods. All particle sampling was completed within the prescribed requirements of the testing protocol.

Background:

A number of filter manufacturers are promoting filtration products that use filter media that will not perform in service as well as it performs in standard laboratory testing. Because of this discrepancy, filtration users think they are purchasing a product that will deliver level of filtration based on a laboratory test report. However, these products do not achieve the level of particle removal efficiency shown in the laboratory test report when the filters are installed in the users' system. This field test method will provide the filtration owner the reliable information they need to understand differences between "Real Life" filter efficiency and "Test Report" filter efficiency.

Test Conditions:

Filter Installation Date:	**09 June 2016**
Filter Test Date:	**15 December 2016**
Start of Test Time:	**09:17**
Location of Tested Filter:	**R2/C2**
Distance from Filter to:	
Up Stream Probe:	**12 (in)**
Down Stream Probe:	**12 (in)**
Air Make Up:	**100% Outdoor Air**

Site Contact:

Name:	**Art Murphy**
Position:	**Project Energy Engineer**
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Phone:	**609-258-9298**
Email:	**amurphy@princeton.edu**

Site Description:

Company:	**Princeton University**
Building:	**Lewis Thomas**
Air Handler	**4**
Miscellaneous Comments:	

Test Filter Description:

Filter Manufacturer:	**Camfil**
Filter Type:	**Pocket Filter**
Filter Model:	**Hi-Flo ES**
Media Type:	**Fine (Fiberglass)**
Media Color:	**Green**
Rated Efficiency:	**MERV 13 (F7)**
Total Filter Face Area (ft^2):	**80.1**

Part Number	Quantity	Filter Size(H x W x D x #Poc) (in)
405618A22	**20**	**24x24x22 x 10**

Comments	No Prefilter is required

Test Equipment Description:

Equipment	Manufacturer / Model	Calibration Date	Other Information
Particle Counter	**TSI-3330_CF11396**	**29 Mar 2016**	**1.0 lpm; 14 channels; 5% Coincidence 3000000 (p/l)**
Temperature / RH AHU	**Omega UWRH-2-NEMA**	**15 Aug 2016**	**S/N 1403461**
Temperature / RH PC	**Omega UWRH-2**	**15 Aug 2016**	**S/N 1403546**
Air Velocity	**Alnor/TSI_EBT730**	**26 Apr 2016**	**N/A**
Differential Pressure	**Alnor/TSI_EBT730**	**26 Apr 2016**	**N/A**

All test equipment is calibrated per manufacturer recommendations and is checked for consistency before testing.

Temperature / RH Data:

Location	Temp (°F)	T Range (°F)	RH (%)	RH Range (%)
Air Handler	**10**	**32-100**	**9**	**10-80**
Particle Counter	**10**	**32-100**	**9**	**10-80**

The temperature and relative humidity measurements were not within acceptable ranges to conduct a successful test.

Particle Counter Zero Test (Total Counts in One Minute):

Measured Counts	Calculated Concentration (p/ft^3)	Maximum Concentration (p/ft^3)
2	**57**	**283**

The particle counter zero test calculated concentration is below the Maximum Concentration limit. The system PASSES the test.

System Zero Check:

Upstream Concentration (p/ft^3)	Measured Counts	Calculated Concentration (p/ft^3)	Allowable Concentration (p/ft^3)
987302	**8**	**226**	**481**

The system zero test calculated concentration is below the Allowable Concentration limit. The system PASSES the test.

Velocity and Resistance Data:

	Velocity Test Before (fpm)	Velocity Test After (fpm)	Overall Average Velocity (fpm)	Resistance to Air Flow (inWG)
Average	**591**	**599**	**595**	**0.23**
Standard Deviation	**167**	**181**		**0.02**
CV (%)	**28**	**30**		**8.72**
Maximum	**857**	**980**		**0.28**
Minimum	**283**	**276**		**0.09**

The average velocity readings taken before and after the efficiency measurements were consistent indicating that the velocity through the air handling unit was stable during testing. The air velocity traverse individual readings are shown in Appendix 1 of this report. The coefficient of variation indicates velocity gradient or turbulence in the air handling unit. Profile Data is shown below and data is looking at the up-stream side of the filter bank.

Velocity Profile Test Data BEFORE Efficiency Testing: (fpm)

	C1	C2	C3	C4	C5
R1	**803**	**593**	**756**	**499**	**640**
R2	**857**	**346**	**554**	**385**	**816**
R3	**651**	**524**	**319**	**556**	**698**
R4	**677**	**745**	**283**	**557**	**559**

Velocity Profile Test Data AFTER Efficiency Testing: (fpm)

	C1	C2	C3	C4	C5
R1	**980**	**580**	**647**	**403**	**579**
R2	**890**	**276**	**527**	**344**	**815**
R3	**649**	**548**	**419**	**555**	**739**
R4	**637**	**778**	**404**	**611**	**595**

Pre-Screening of Particle Concentration - Up-Stream Variation with Time:

Size Range (µm)	Differential Data, 20-sec count at: R2/C2)					Average	Standard Deviation	CV (%)	Max CV (%)	Pass / Fail
	1	2	3	4	5					
0.30 - 0.35	6805	6599	6705	6999	6903	6802	158	2	25	Pass
0.35 - 0.40	2591	2563	2574	2696	2751	2635	84	3	25	Pass
0.40 - 0.45	878	815	869	881	845	858	28	3	25	Pass
0.45 - 0.55	472	457	456	429	504	464	27	6	25	Pass
0.55 - 0.70	159	156	172	150	165	160	8	5	25	Pass
0.70 - 1.00	71	76	74	83	81	77	5	6	25	Pass
1.00 - 1.30	14	27	14	16	21	18	6	30	50	Pass
1.30 - 1.60	4	8	8	2	8	6	3	47	50	Pass
1.60 - 2.20	23	20	30	17	19	22	5	23	50	Pass
2.20 - 3.00	9	4	11	5	6	7	3	42	50	Pass
3.00 - 4.00	0	2	3	6	0	2	2	113	50	Fail
4.00 - 5.50	0	1	1	0	0	0	1	137	50	Fail
5.50 - 7.00	0	1	1	0	0	0	1	137	50	Fail
7.00 - 10.00	0	0	0	0	0	0	0	N/A	50	Fail

The variation of upstream particulate in time is acceptable to conduct a successful test. The variability of upstream particulates above the 2.20 - 3.00 channel did not meet the statistical variability.

Minimum Upstream Concentration:

Size Range (µm)	Average (p)	Measured Particle Concentration (p/ft³)	Minimum Particle Concentration (p/ft³)	Pass / Fail
0.30 - 0.35	6802	577834	1047	Pass
0.35 - 0.40	2635	223845	1047	Pass
0.40 - 0.45	858	72888	1047	Pass
0.45 - 0.55	464	39417	1047	Pass
0.55 - 0.70	160	13592	1047	Pass
0.70 - 1.00	77	6541	1047	Pass
1.00 - 1.30	18	1529	1047	Pass
1.30 - 1.60	6	510	1047	Fail
1.60 - 2.20	22	1869	1047	Pass
2.20 - 3.00	7	595	1047	Fail
3.00 - 4.00	2	170	1047	Fail
4.00 - 5.50	0	0	1047	Fail
5.50 - 7.00	0	0	1047	Fail
7.00 - 10.00	0	0	1047	Fail

The minimum upstream particulate concentration is acceptable to conduct a successful test. The number of particulates above the 1.00 - 1.30 µm channel were too low to achieve statistically valid count data. Thus, the calculation for particulates above the 1.00 - 1.30 µm channel and larger will not be reported.

Pre-Screening of Particle Concentration - Up-Stream Variation with Location:

Size Range (µm)	Differential Data, 20-sec count at:					Average	Standard Deviation	CV (%)	Max CV (%)	Pass / Fail
	R2-C3	R2-C5	R3-C4	R4-C3	R4-C5					
0.30 - 0.35	6934	6964	6769	6892	6977	6907	84	1	25	Pass
0.35 - 0.40	2637	2687	2507	2560	2648	2608	73	3	25	Pass
0.40 - 0.45	831	886	875	904	826	864	34	4	25	Pass
0.45 - 0.55	498	465	487	448	418	463	32	7	25	Pass
0.55 - 0.70	163	166	164	169	168	166	3	2	25	Pass
0.70 - 1.00	93	83	94	77	94	88	8	9	25	Pass
1.00 - 1.30	20	15	15	24	14	18	4	24	50	Pass
1.30 - 1.60	9	6	6	3	6	6	2	35	50	Pass
1.60 - 2.20	28	19	17	24	21	22	4	20	50	Pass
2.20 - 3.00	7	6	8	5	3	6	2	33	50	Pass
3.00 - 4.00	2	0	1	2	1	1	1	70	50	Fail
4.00 - 5.50	1	1	0	1	0	1	1	91	50	Fail
5.50 - 7.00	0	0	0	0	0	0	0	N/A	50	Fail
7.00 - 10.00	0	0	0	0	0	0	0	N/A	50	Fail

There are variation of space failures in the data. Care must be taken to choose a test location that is representative of the AHU and not necessarily the highest or lowest count location.

Particle Concentration Limit:

Count Number	Cumulative Data, (20-sec Sample)	Upstream Concentration (p/ft³)	Max Concentration (p/ft³)
1	11026	936665	
2	10729	911434	
3	10918	927490	
4	11284	958582	
5	11303	960196	
Average		938873	42450000

The average upstream concentration is less than the maximum acceptable concentration of the particle counter.

No dilution system was necessary for this test.

Down-Stream Particle Count Data (Average of 6 counts per data set):

Size Range (µm)	DS1	DS2	DS3	DS4	Average
0.30 - 0.35	**3410**	**3464**	**3404**	**3338**	**3404**
0.35 - 0.40	**1171**	**1204**	**1192**	**1166**	**1183**
0.40 - 0.45	**355**	**363**	**362**	**342**	**356**
0.45 - 0.55	**167**	**174**	**181**	**169**	**173**
0.55 - 0.70	**55**	**51**	**53**	**46**	**51**
0.70 - 1.00	**31**	**22**	**19**	**18**	**22**
1.00 - 1.30	**6**	**3**	**3**	**2**	**4**
1.30 - 1.60	**3**	**1**	**0**	**0**	**1**
1.60 - 2.20	**16**	**2**	**1**	**2**	**5**
2.20 - 3.00	**12**	**1**	**0**	**1**	**4**
3.00 - 4.00	**6**	**1**	**1**	**0**	**2**
4.00 - 5.50	**4**	**0**	**0**	**0**	**1**
5.50 - 7.00	**1**	**0**	**0**	**0**	**0**
7.00 - 10.00	**1**	**0**	**0**	**0**	**0**
Totals	**5238**	**5286**	**5216**	**5084**	**5206**

Appendix 2 - Upstream and Downstream Count Data

Up-Stream Particle Count Data (Average of 6 counts per data set):

Size Range (µm)	US1	US2	US3	Average
0.30 - 0.35	**6988**	**6961**	**6747**	**6899**
0.35 - 0.40	**2697**	**2693**	**2564**	**2651**
0.40 - 0.45	**890**	**908**	**858**	**885**
0.45 - 0.55	**475**	**487**	**482**	**481**
0.55 - 0.70	**173**	**172**	**161**	**169**
0.70 - 1.00	**85**	**86**	**86**	**86**
1.00 - 1.30	**18**	**19**	**17**	**18**
1.30 - 1.60	**6**	**6**	**7**	**6**
1.60 - 2.20	**20**	**16**	**16**	**17**
2.20 - 3.00	**6**	**6**	**5**	**6**
3.00 - 4.00	**2**	**2**	**2**	**2**
4.00 - 5.50	**0**	**0**	**0**	**0**
5.50 - 7.00	**0**	**0**	**0**	**0**
7.00 - 10.00	**0**	**0**	**0**	**0**
Totals	**11360**	**11356**	**10945**	**11220**

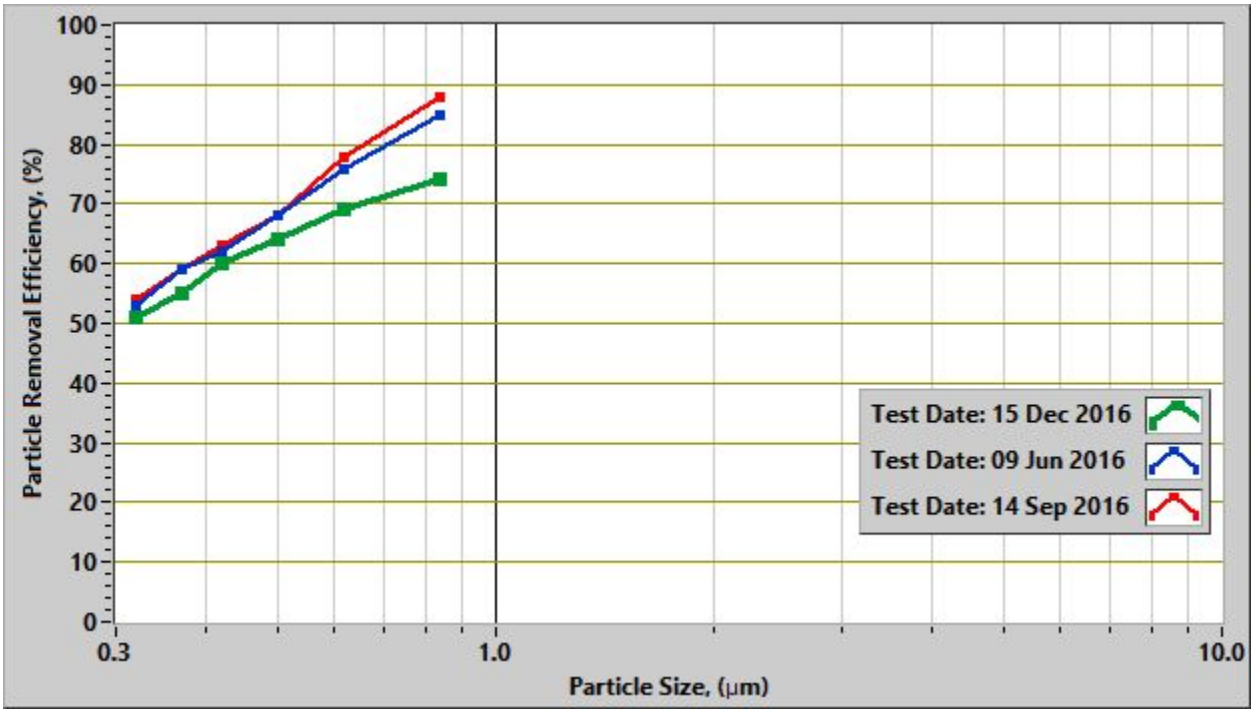
Appendix 2 - Upstream and Downstream Count Data

Filter Efficiency Calculations:

Size Range (µm)	Eff-1 (%)	Eff-2 (%)	Eff-3 (%)	Average Efficiency (%)	Standard Deviation	95% Upper Confidence Limit	95% Lower Confidence Limit	CV (%)
0.30 - 0.35	51	51	50	51	0.40	52	49	0.8
0.35 - 0.40	56	56	54	55	1.00	58	53	1.9
0.40 - 0.45	60	60	59	60	0.60	61	58	0.9
0.45 - 0.55	64	64	64	64	0.30	64	63	0.5
0.55 - 0.70	69	70	69	69	0.30	70	69	0.4
0.70 - 1.00	69	76	78	74	5.00	87	62	6.8
1.00 - 1.30	75	84	85	82	5.70	96	67	6.9
1.30 - 1.60	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1.60 - 2.20	55	91	91	79	20.60	100	28	26.1
2.20 - 3.00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
3.00 - 4.00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
4.00 - 5.50	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
5.50 - 7.00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
7.00 - 10.00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

The statistically valid particle removal efficiency data is shown in the table above. The data which does NOT meet the statistical requirements as set forth in the test protocol are shown as "N/A".

Graphical Results, Camfil Hi-Flo ES Particle Removal Efficiency vs Size Graph:



The particulate removal efficiency for the Camfil Hi-Flo ES filter is shown above in the statistically valid ranges.

Filter installation date: 09 June 2016

Conclusion / Comments:

This is the final testing of the Camfil Hi-Flo ES MERV 13 pocket filters installed at Princeton University. The measured particle removal efficiency of the Camfil Hi-Flo ES is typical of a filter that would meet ASHRAE 52.2 MERV 13 performance in the laboratory. This MERV 13 level of particle removal meets the customer requirement for filter efficiency.

The resistance to airflow for the Camfil Hi-Flo ES MERV 13 pocket filter solution remains very low (0.23 inWG) and has remained 67% lower than the Tri-Dim comparable solution (0.69 inWG) installed in AHU 3.

Filter Performance While in Service:

	15 Dec 2016	14 Sep 2016	09 Jun 2016
Eff - Particle Size, 0.30 - 0.35 µm	**51**	**54**	**53**
Eff - Particle Size, 0.35 - 0.40 µm	**55**	**59**	**59**
Eff - Particle Size, 0.40 - 0.45 µm	**60**	**63**	**62**
Eff - Particle Size, 0.45 - 0.55 µm	**64**	**68**	**68**
Eff - Particle Size, 0.55 - 0.70 µm	**69**	**78**	**76**
Eff - Particle Size, 0.70 - 1.00 µm	**74**	**88**	**85**
Eff - Particle Size, 1.00 - 1.30 µm	**82**	**93**	**N/A**
Eff - Particle Size, 1.30 - 1.60 µm	**N/A**	**95**	**N/A**
Eff - Particle Size, 1.60 - 2.20 µm	**79**	**97**	**N/A**
Eff - Particle Size, 2.20 - 3.00 µm	**N/A**	**99**	**N/A**
Eff - Particle Size, 3.00 - 4.00 µm	**N/A**	**N/A**	**N/A**
Eff - Particle Size, 4.00 - 5.50 µm	**N/A**	**N/A**	**N/A**
Eff - Particle Size, 5.50 - 7.00 µm	**N/A**	**N/A**	**N/A**
Eff - Particle Size, 7.00 - 10.00 µm	**N/A**	**N/A**	**N/A**
Resistance to Air Flow (inWG)	**0.23**	**0.23**	**0.21**
Air Velocity (fpm)	**595**	**603**	**560**
Temp (°F)	**10**	**83**	**64**
RH (%)	**9**	**37**	**42**

Photos:

Up Stream Photo:

Down Stream Photo:

Acknowledgements:

Camfil would like to thank the facility owners for the opportunity to conduct this field-testing. This testing has closely followed the industry standard protocol for testing, but, as with all field study data, changes in test conditions can have a significant effect on the results. Great care has been taken to minimize these effects, but they cannot be totally eliminated. If there are any questions with this data or the procedure, please contact the Camfil R&D department.

End of Report

Appendix Data

Appendix 1 - Velocity and Resistance to Airflow Data:

Initial Velocity Readings (fpm)	Final Velocity Readings (fpm)		Resistance to Air Flow Readings (inWG)
593	1002		0.21
1012	958		0.23
854	921		0.22
860	858		0.23
624	709		0.22
677	589		0.21
674	579		0.23
679	694		0.25
774	799		0.23
715	756		0.22
656	689		0.23
392	407		0.23
269	219		0.23
422	333		0.20
523	532		0.21
662	627		0.22
797	635		0.21
714	659		0.24
580	567		0.20
527	487		0.22
402	504		0.26
236	334		0.28
193	314		0.26
373	493		0.22
587	598		0.26
527	624		
598	618		
513	491		
358	363		
412	325		
442	341		
555	464		
578	496		
701	662		
820	808		
811	821		
813	814		
583	664		
479	545		
638	644		
668	682		

Appendix 2 - Upstream and Downstream Count Data:

Count ID	0.30 - 0.35	0.35 - 0.40	0.40 - 0.45	0.45 - 0.55	0.55 - 0.70	0.70 - 1.00	1.00 - 1.30	1.30 - 1.60	1.60 - 2.20	2.20 - 3.00	3.00 - 4.00	4.00 - 5.50	5.50 - 7.00	7.00 - 10.00
Z-System	4	1	2	1	0	0	0	0	0	0	0	0	0	0
Z-PC	1	1	0	0	0	0	0	0	0	0	0	0	0	0
US-Time	6805	2591	878	472	159	71	14	4	23	9	0	0	0	0
US-Time	6599	2563	815	457	156	76	27	8	20	4	2	1	1	0
US-Time	6705	2574	869	456	172	74	14	8	30	11	3	1	1	0
US-Time	6999	2696	881	429	150	83	16	2	17	5	6	0	0	0
US-Time	6903	2751	845	504	165	81	21	8	19	6	0	0	0	0
US-Space	6934	2637	831	498	163	93	20	9	28	7	2	1	0	0
US-Space	6964	2687	886	465	166	83	15	6	19	6	0	1	0	0
US-Space	6769	2507	875	487	164	94	15	6	17	8	1	0	0	0
US-Space	6892	2560	904	448	169	77	24	3	24	5	2	1	0	0
US-Space	6977	2648	826	418	168	94	14	6	21	3	1	0	0	0
DS1	3418	1228	377	175	55	41	15	5	39	31	19	10	2	3
DS1	3432	1157	382	138	61	29	10	4	21	13	2	6	1	1
DS1	3357	1112	335	164	44	34	3	1	4	7	2	1	1	0
DS1	3389	1171	372	167	55	27	0	1	5	4	2	0	1	1
DS1	3343	1186	342	176	57	21	3	3	4	5	4	0	0	1
DS1	3518	1170	322	183	60	32	7	6	21	10	5	4	0	1
US1	6866	2542	942	486	167	99	13	7	29	7	2	0	0	0
US1	7061	2751	859	468	169	84	27	11	13	5	5	0	0	0
US1	6923	2722	927	502	179	84	17	2	17	1	3	1	0	0
US1	7010	2750	816	460	172	87	10	5	25	7	1	0	0	0
US1	7023	2700	904	447	161	75	24	9	22	7	2	1	0	0
US1	7044	2716	890	488	188	83	15	2	13	10	1	0	0	0
DS2	3474	1195	373	169	43	24	2	0	0	0	0	0	0	0
DS2	3403	1221	356	182	49	22	0	3	5	2	1	1	0	0
DS2	3418	1141	384	177	51	22	4	2	1	4	2	1	2	0
DS2	3489	1250	340	180	56	20	6	1	2	0	1	0	0	0
DS2	3599	1171	376	171	57	22	3	0	1	1	1	0	0	0
DS2	3399	1249	350	167	51	22	2	2	1	0	0	1	0	0
US2	7042	2740	890	471	188	77	17	10	17	7	2	0	0	0
US2	6950	2672	903	491	152	97	14	7	14	6	0	0	0	0
US2	6986	2747	911	493	185	91	20	4	22	6	1	0	0	0
US2	6849	2658	919	499	167	87	15	6	12	6	4	0	0	0
US2	6879	2671	900	483	175	83	28	3	16	4	2	0	0	0
US2	7062	2671	924	487	166	81	22	8	17	5	1	0	0	0
DS3	3511	1212	347	193	48	14	3	0	0	0	1	2	0	0
DS3	3320	1230	344	185	51	23	3	1	4	1	0	1	0	0
DS3	3406	1202	370	160	57	20	3	0	0	0	0	0	0	0
DS3	3411	1165	389	200	47	22	4	0	1	0	1	0	0	0
DS3	3461	1203	365	171	54	20	2	0	0	0	0	0	0	0
DS3	3318	1143	356	175	61	17	1	0	1	1	3	0	0	0
US3	6747	2529	831	492	186	95	14	6	24	3	0	0	0	0
US3	6772	2630	855	468	155	79	15	6	13	7	2	1	0	0
US3	6685	2515	867	481	150	77	20	5	16	5	0	0	0	0
US3	6759	2548	925	467	166	72	19	7	19	2	4	2	0	0
US3	6835	2591	838	504	141	94	14	10	12	5	1	0	0	0
US3	6683	2573	833	479	168	96	20	7	11	6	2	0	0	0
DS4	3322	1143	328	179	44	19	1	1	0	2	1	1	0	0
DS4	3377	1164	369	180	44	16	2	1	0	0	0	0	0	0
DS4	3297	1099	362	156	51	15	2	0	4	2	0	1	0	0
DS4	3339	1198	329	162	44	16	2	0	1	0	0	0	0	0
DS4	3410	1174	331	172	41	26	4	0	5	0	2	0	0	0
DS4	3283	1216	336	163	50	14	1	0	0	0	0	0	0	0

Appendix 3 - Pre-Testing Inspection Report:

Filter Installation Pre-testing Inspection Form						
1. Air Handling Unit		**AHU1**	**AHU2**	**AHU3**	**AHU4**	**Comments**
a.	Adequate overall air tightness?	Yes	Yes	Yes		
b.	Doors have adequate seals (very little air leakage)?	No	No	No		
c.	Doors available on both sides of air filter banks?	No	No	No		
d.	Doors have provision for opening / closing from inside AHU?	No	No	No		
e.	Minimum of 24" (u/s, d/s) of filter banks for probe placement for probe placement & measurement?	No	No	No		Downstream is approximately 5in
f.	Minimum of 24" (u/s, d/s) of equipment (i.e. coils, fan, etc.) for probe placement?	Yes	Yes	Yes		
g.	Sample ports located & labeled (up/down stream) of filter banks?	No	No	No		Need to drill holes for probes
h.	Adequate overall interior cleanliness?	Yes	Yes	Yes		
i.	Adequate overall exterior access to AHU?	Yes	Yes	Yes		
j.	Any hazardous conditions (i.e. slip, head knockers, standing water, or chemical)?	No	No	No		
k.	Adequate guards provided on the fans & motors?	Yes	Yes	Yes		
l.	Can the airflow through the filters be set to a constant value for the duration of the test?	Yes	Yes	Yes		
m.	Are there any restrictions on AHU access (time, confined spaces, training, etc.)?	No	No	No		
2. Local instrumentation		**AHU1**	**AHU2**	**AHU3**	**AHU4**	**Comments**
a.	Are differential pressure gauges working properly & calibrated?	No	No	No		We have not seen any
b.	Are pressure taps properly aligned (no bends, breaks, or clogs)?	No	No	No		We have not seen any
c.	Is there a velocity gauge working properly & calibrated?	No	No	No		We have not seen any
d.	Is there a Temperature gauge working properly & calibrated?	No	No	No		We have not seen any
e.	Is there a RH gauge working properly & calibrated?	No	No	No		We have not seen any
3. Filter / Frames		**AHU1**	**AHU2**	**AHU3**	**AHU4**	**Comments**
a.	Proper seating/sealing of test filters?	Yes	Yes	Yes		
b.	Clamping hardware in place?	Yes	Yes	Yes		
c.	Filters free of damage?	Yes	Yes	Yes		
4. Utilities		**AHU1**	**AHU2**	**AHU3**	**AHU4**	**Comments**
a.	Available electric outlet for instrument power?	Yes	Yes	Yes		
b.	Adequate working internal lighting?	Yes	Yes	Yes		

