ISO 5011 Test Results

Air Intake Kit for

2013+ Cummins 6.7L

Part Numbers 75-5068 and 75-5068D

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ISO 5011, Second Edition
Air Filter or Intake Kit Test Report

The test data presented in the following report represents the restriction of airflow, efficiency and dust loading capacity. The filters tested were procured from various distributors or provided by customers. The tests were performed in accordance with ISO 5011. The following were measured in accordance with the test: (1) Pressure Drop for Clean Element, Initial Efficiency and Dust Loading Capacity. The Flow Rate used to conduct the Dust Loading and Capacity test(s) is listed under the *Average Environmental Conditions and Test Specifications*. PTI ISO Course Test Dust was utilized and the particle data sheet for the batch is attached.

The test sequence begins with measuring the pressure drop of a clean filter as a function of the airflow rate which is measured in cubic feet per minute (CFM). Subsequently, the cumulative efficiency and dust loading capacity are measured. The termination point when measuring for capacity is shown at the bottom of the report under the heading *Termination ^P*. The results of the tests are recorded in the top table and charts shown on the next page. The filters are inspected before and after the tests are performed.

The Efficiency represents the amount of dust (contaminants) that was stopped by the filter during each test. The Capacity measures the dust holding capability of the filter.

During the test, the filter is loaded with dust until it reaches a terminal pressure drop increase of 10 inches of water (28”H2O for Heavy Duty Vehicles) across the filter element (please refer to the Average Environmental Conditions and Test Specifications at the bottom of the next page to verify the pressure drop utilized on this particular test). The maximum inches of H2O that our test equipment can measure is 50.1 inches of H2O.

The Line Graph shows the pressure drop as a function of the airflow rate for the clean filter(s). The computer controlled test equipment initiates the test at close to zero (0) cubic feet per minute (CFM) and then increases the CFM gradually until the CFM termination point is reached. During the test, the restriction of the filter is measured in inches of water (“H2O) as it relates to the air flow rate (CFM). Visual inspections of filters are performed to insure against dust leakage and manufacturing flaws.

The Bar Graph illustrates the cumulative efficiency for the filter(s) tested.

Definition of Terms & Test Protocol

Restriction

Restriction measures how difficult it is for the air to get through the filter and is measured in inches of H2O. Instead of referring to restriction, the industry uses "air flow" to describe the effect of restriction. They say for example, that a High Performance Filter "flows better" than the OEM paper filter. On a line graph, the lower the restriction of a filter the better the air flow.

Efficiency

Efficiency is measured in % and is the amount of dirt/contaminants that the filter stops from going into the engine.

Capacity

Capacity is the total amount of contaminants/dirt the filter will hold before reaching its termination point. The termination point is a predefined restriction point that is used as the cut-off point when measuring how much dirt a filter will hold. For typical vehicles, 10”H2O is used at the termination point. For heavy duty trucks, this number is 28”H2O.

Note: Testing was conducted based on the ISO 5011 testing standard; however, variances from the actual test procedures may exist. The intent of the testing is to show comparative test results at a specific point in time between various products that are intended for similar use. Tests are conducted under a climate-controlled environment; however, changes in temperature and humidity between tests may occur which could alter the actual test results. Test results may or may not represent how the product will perform in conditions outside of the laboratory. Upon request, S&B will update test data if a competitor improves or makes a material change to its product. The decision to re-test a competitor’s is completely up to the discretion of S&B Filters.

ISO 5011 Test Results - S&B Filters Intake for 2013+ Dodge Cummins 6.7L

Test Result Summary: S&B Filters vs Stock

		% Less Restrictive (Improvement in Airflow) versus Stock at Rated CFM			
Part Number	**Description**	Front (Ram Air) Inlet Closed, Side Open	Front (Ram Air) Inlet Open, Side Closed	Both Inlets Open	**Efficiency Rating**
Stock	Baseline	-	-	-	99.81%
75-5068	Intake w/ Cleanable Filter	29.3%	43.8%	54.6%	99.55%
75-5068D	Intake w/ Dry Filter	29.9%	42.1%	51.7%	99.49%

Temperature	68.8	deg F
Relative Humidity	-	%
Baro Pressure	28.94	mmHg
Test Stand	#1	
Inlet Size	3.75	inches
Housing	-	
Contaminant	-	
Contam. Lot #	-	
Dust Feed Rate	-	grams/ minute
Rated Flow	580	cfm

Baseline
Front (Ram Air) Inlet Closed, Front Closed

Part Number	Airflow (scfm)	Net Restriction " of H2O
OE	0.0	0.0
Stock System	289.5	4.6
	438.5	10.0
Test #47	579.8	17.4
	718.9	27.1
	872.0	38.5

Baseline
Front (Ram Air) Inlet Open, Side Closed

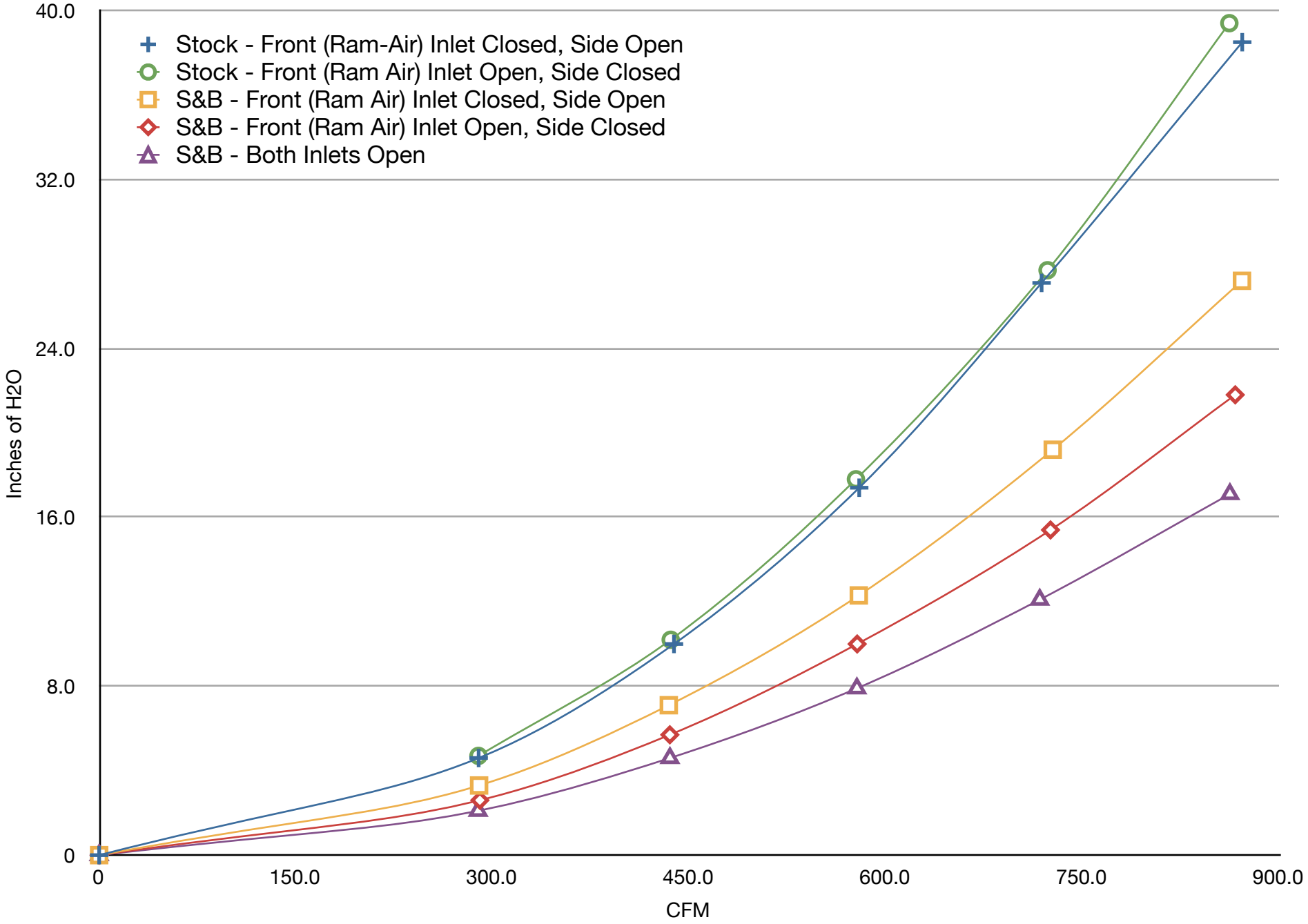
Part Number	Airflow (scfm)	Net Restriction " of H2O
OE	0.0	0.0
Stock System	289.3	4.7
	436.0	10.2
Test #33	577.3	17.8
	723.5	27.7
	862.1	39.4

Detailed Airflow Data for S&B

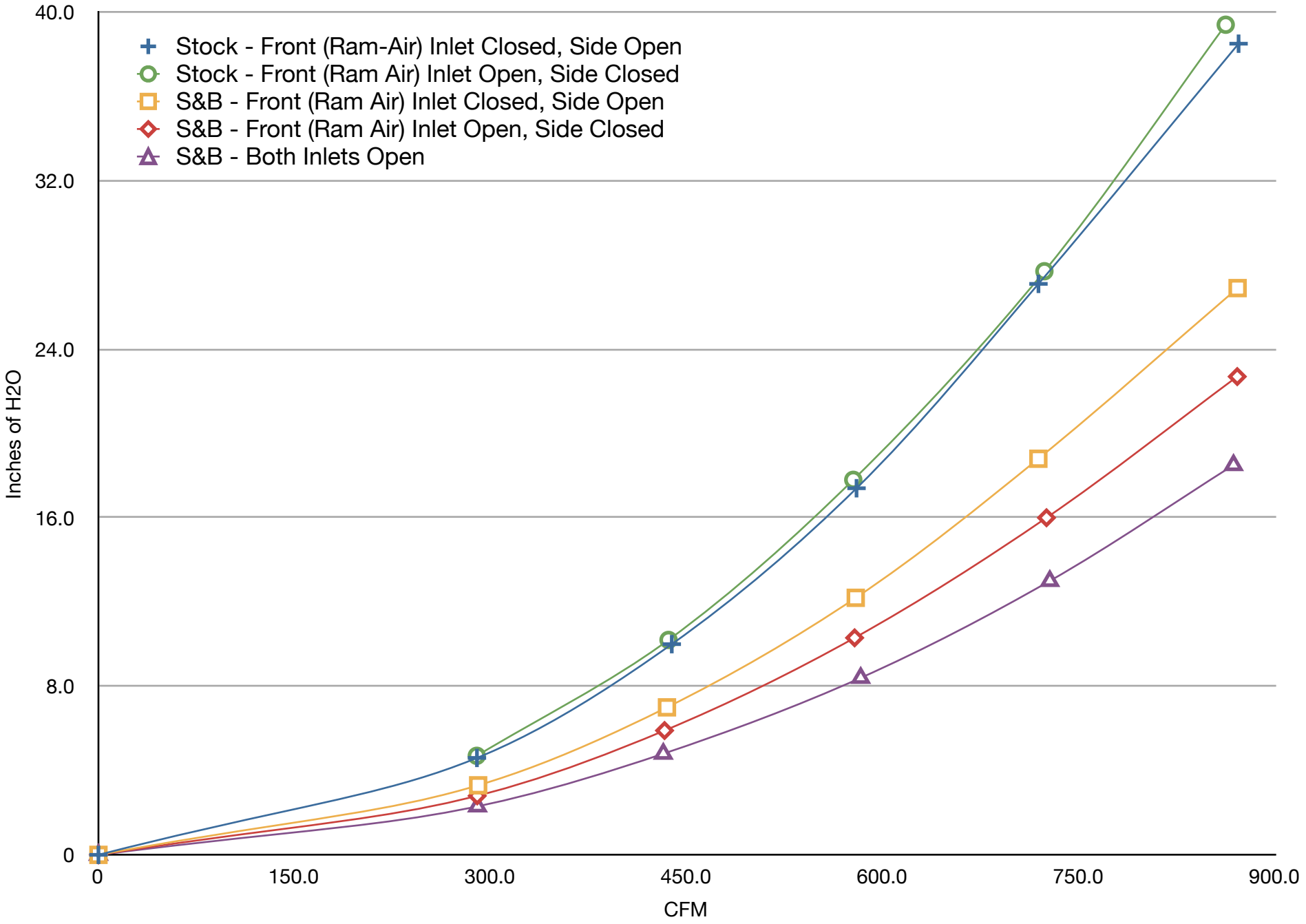
Part Number	Airflow (scfm)	Net Restriction " of H2O	% Less Restrictive than Stock	Part Number	Airflow (scfm)	Net Restriction " of H2O	% Less Restrictive than Stock
75-5068	0.0	0.0	0.0%	75-5068D	0.0	0.0	0.0%
w/ Cleanable Filter	289.8	3.3	28.3%	w/ Dry Filter	290.4	3.3	28.3%
Test #26	434.5	7.1	29.0%	Test #28	434.8	7.0	30.0%
Inlet Position:	579.5	12.3	29.3%	*Inlet Position:*	579.2	12.2	29.9%
Front (Ram Air) Inlet Closed, Side Open	727.4	19.2	29.2%	Front (Ram Air) Inlet Closed, Side Open	718.8	18.8	30.6%
	871.8	27.2	29.4%		871.2	26.9	30.1%
75-5068	0.0	0.0	0.0%	75-5068D	0.0	0.0	0.0%
w/ Cleanable Filter	290.4	2.6	44.7%	w/ Dry Filter	289.7	2.8	40.4%
Test #19	435.3	5.7	44.1%	Test #23	433.0	5.9	42.2%
Inlet Position:	578.2	10.0	43.8%	*Inlet Position:*	578.3	10.3	42.1%
Front (Ram Air) Inlet Open, Side Closed	725.7	15.4	44.4%	Front (Ram Air) Inlet Open, Side Closed	725.1	16.0	42.2%
	866.6	21.8	44.7%		870.9	22.7	42.4%
75-5068	0.0	0.0	0.0%	75-5068D	0.0	0.0	0.0%
w/ Cleanable Filter	289.1	2.1	54.3%	w/ Dry Filter	289.9	2.3	50.0%
Test #20	435.4	4.6	54.0%	Test #24	432.0	4.8	52.0%
Inlet Position:	578.0	7.9	54.6%	*Inlet Position:*	583.0	8.4	51.7%
Both Inlets Open	717.5	12.1	55.4%	Both Inlets Open	727.6	13.0	52.0%
	862.5	17.1	55.6%		868.1	18.5	51.9%

NOTE: Resistance to flow measured at approximately 580 cfm. Testing conducted in a climate controlled environment.

Resistance to Flow Curve for Intake w/ CLEANABLE Filter
(A lower restriction curve translates into better airflow.)



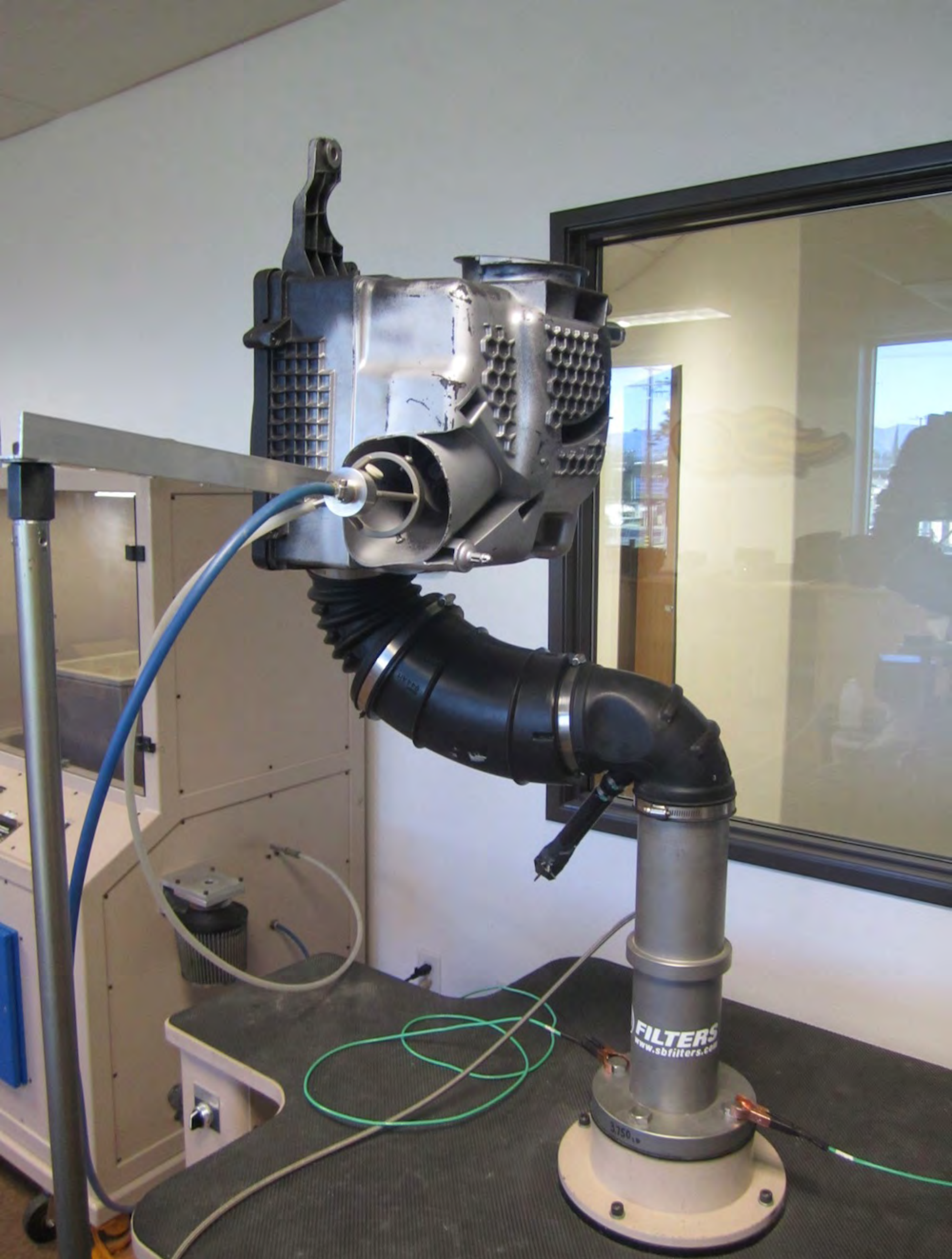
Resistance to Flow Curve for Intake w/ DRY Filter
(A lower restriction curve translates into better airflow.)



Supporting Testing Detail

See the following pages for additional images & details taken during testing.

(Note: The graph on test 383-48 cut off after 1244.2 grams of dust fed instead of going to 1497.8 grams)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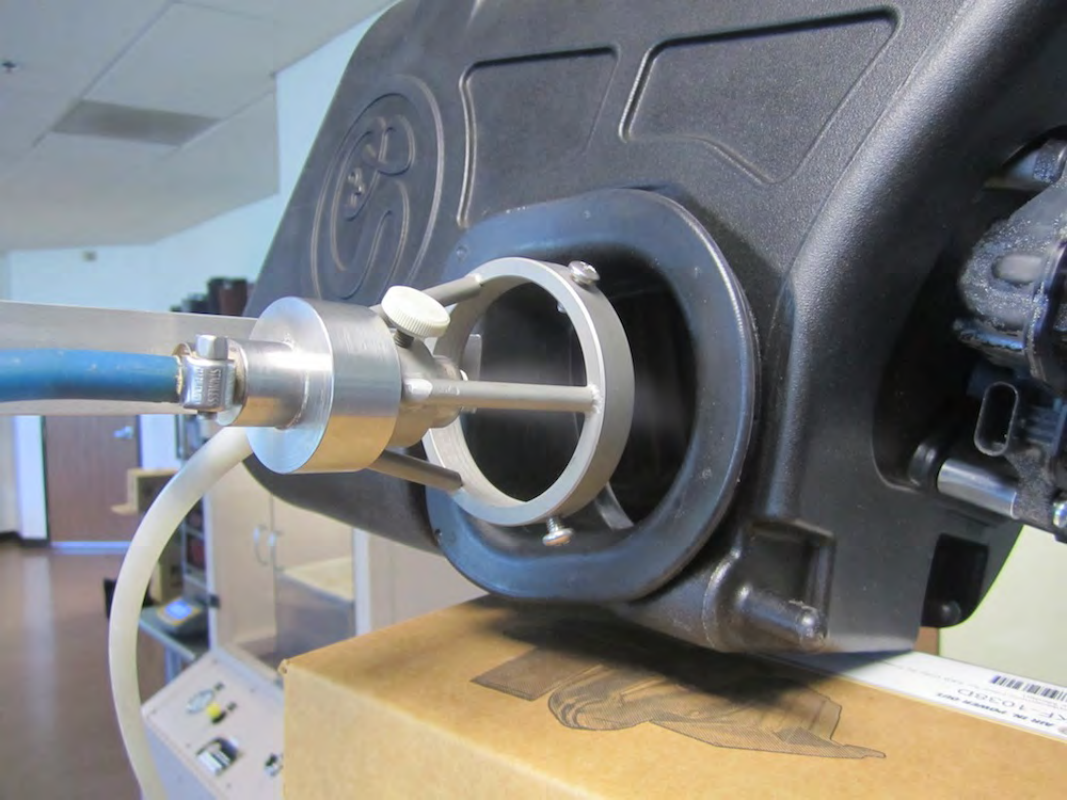

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Air Flow Test Report

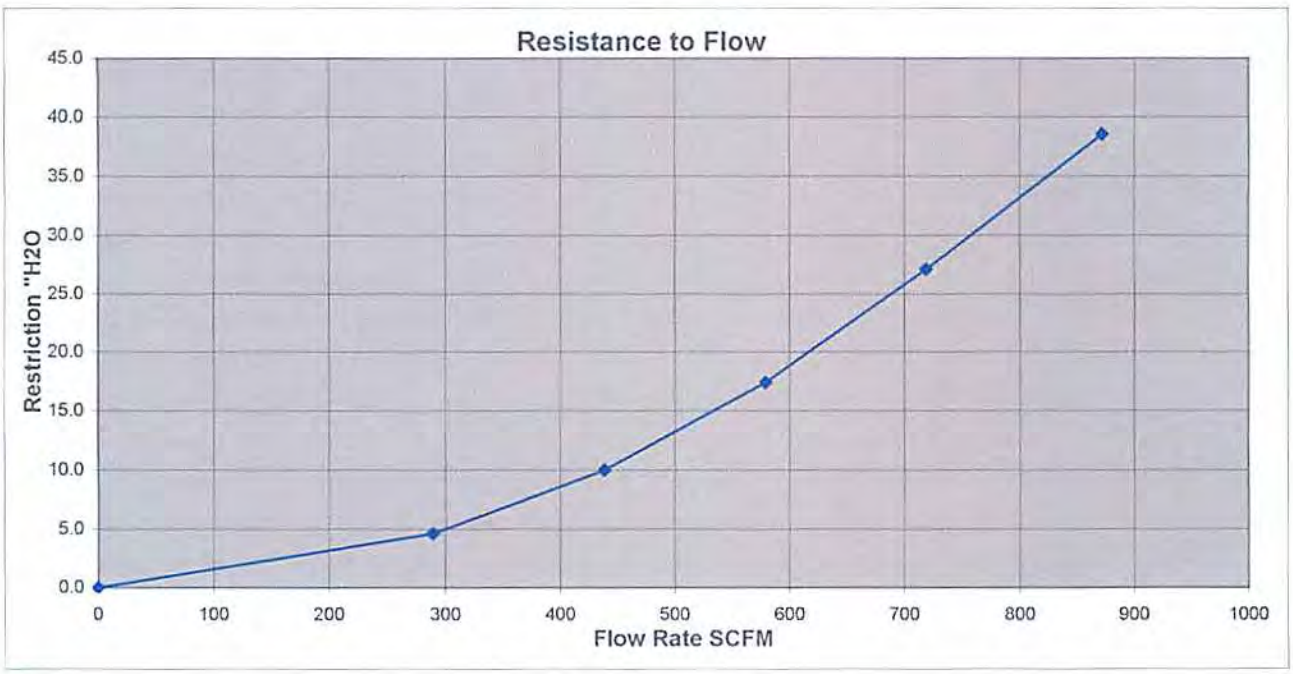
Test Number: 383 **Report Date:** 1/10/2014
Sample Number: 47 **Tech:** RMO
Filter Description: Mopar 53034051AB
Test Description:
2013-14 Cummins 6.7L OE Intake & Filter, No Sensors, Front Closed

Test Conditions

Flow:	580 SCFM	**Temperature:**	69.07 DEG. F
Barometric Pressure:	28.99 IN. Hg	**Humidity:**	51.02 %

Test Results

Flow	Restriction IN. H2O		
SCFM	Gross	Tare	Net
0	0	0	0.0
289.474	4.614	0	4.6
438.479	10.014	0	10.0
579.774	17.389	0	17.4
718.909	27.089	0	27.1
871.96	38.533	0	38.5



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Air Flow Test Report

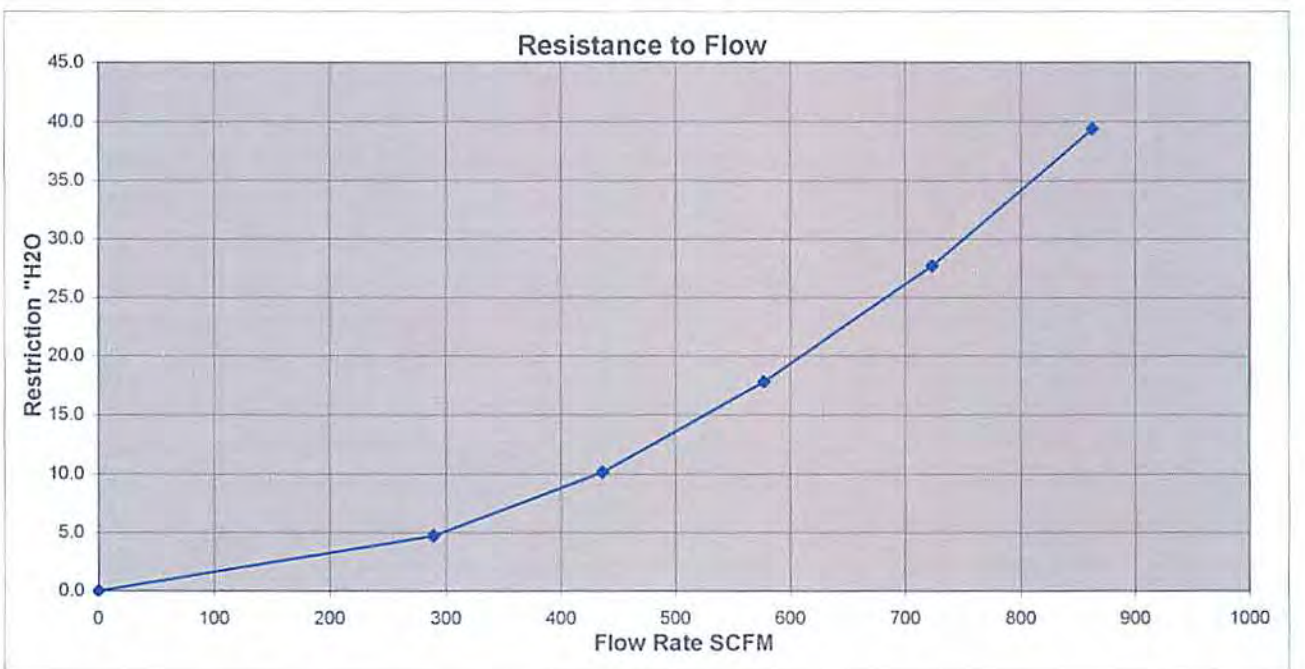
Test Number: 383 **Report Date:** 1/3/2014
Sample Number: 33 **Tech:** RMO
Filter Description: Mopar 53034051AB
Test Description:
2013-14 Cummins 6.7L OE Intake and Filter, No Sensors, Side Closed

Test Conditions

Flow:	580 SCFM	**Temperature:**	69.51 DEG. F
Barometric Pressure:	28.82 IN. Hg	**Humidity:**	50.3 %

Test Results

Flow	Restriction IN. H2O		
SCFM	Gross	Tare	Net
0	0	0	0.0
289.34	4.745	0	4.7
435.986	10.178	0	10.2
577.283	17.789	0	17.8
723.45	27.704	0	27.7
862.127	39.394	0	39.4



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Air Flow Test Report

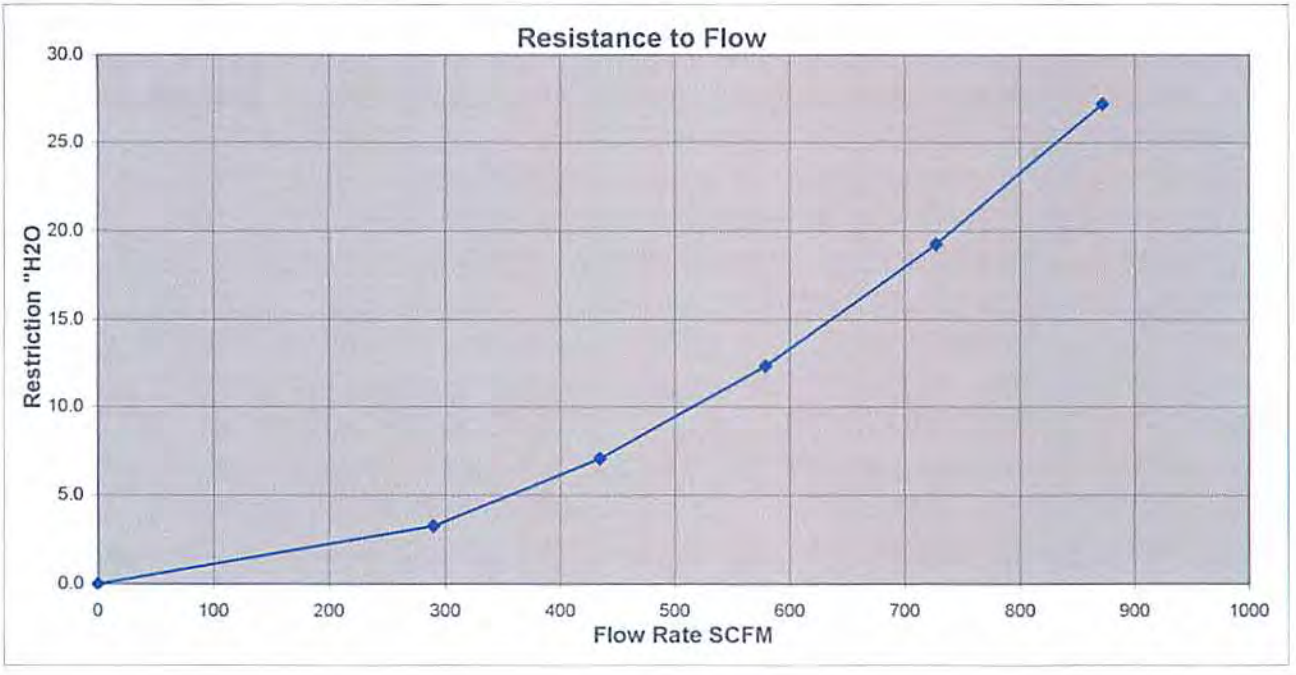
Test Number: 383
Report Date: 1/2/2014
Sample Number: 26
Tech: RMO
Filter Description: KF-1037
Test Description:
75-5068 Production, No Sensors, Front Closed

Test Conditions

Flow:	580 SCFM	Temperature:	68.54 DEG. F
Barometric Pressure:	28.99 IN. Hg	Humidity:	52.94 %

Test Results

Flow	Restriction IN. H2O		
SCFM	Gross	Tare	Net
0	0	0	0.0
289.82	3.252	0	3.3
434.537	7.065	0	7.1
579.469	12.34	0	12.3
727.408	19.247	0	19.2
871.752	27.208	0	27.2



Air Flow Test Report

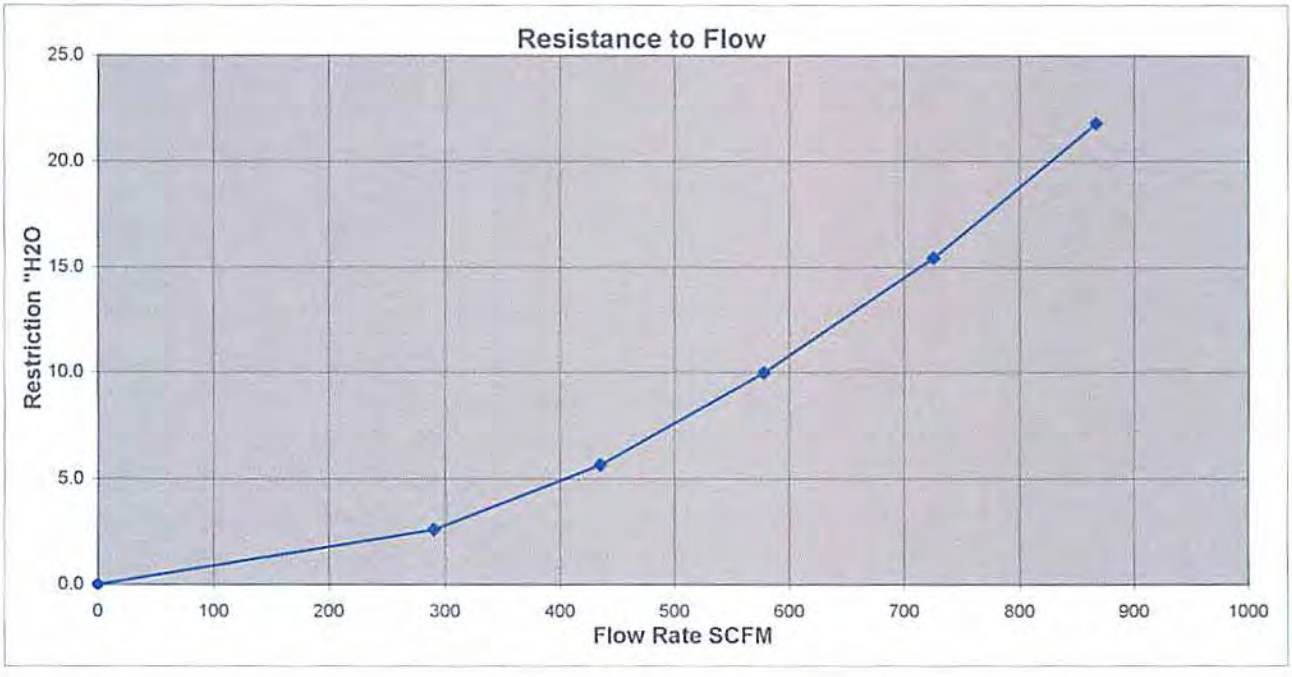
Test Number: 383
Report Date: 11/13/2013
Sample Number: 19
Tech: RMO
Filter Description: KF-1037
Test Description:
75-5068 Production, No Sensors, Side Closed

Test Conditions

Flow:	580 SCFM	**Temperature:**	66.78 DEG. F
Barometric Pressure:	28.81 IN. Hg	**Humidity:**	49.69 %

Test Results

Flow	Restriction IN. H2O		
SCFM	Gross	Tare	Net
0	0	0	0.0
290.412	2.612	0	2.6
435.321	5.664	0	5.7
578.224	9.988	0	10.0
725.696	15.445	0	15.4
866.613	21.809	0	21.8



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Air Flow Test Report

Test Number: 383
Sample Number: 20
Filter Description: KF-1037
Test Description:
75-5068 Production, No Sensors, Both open

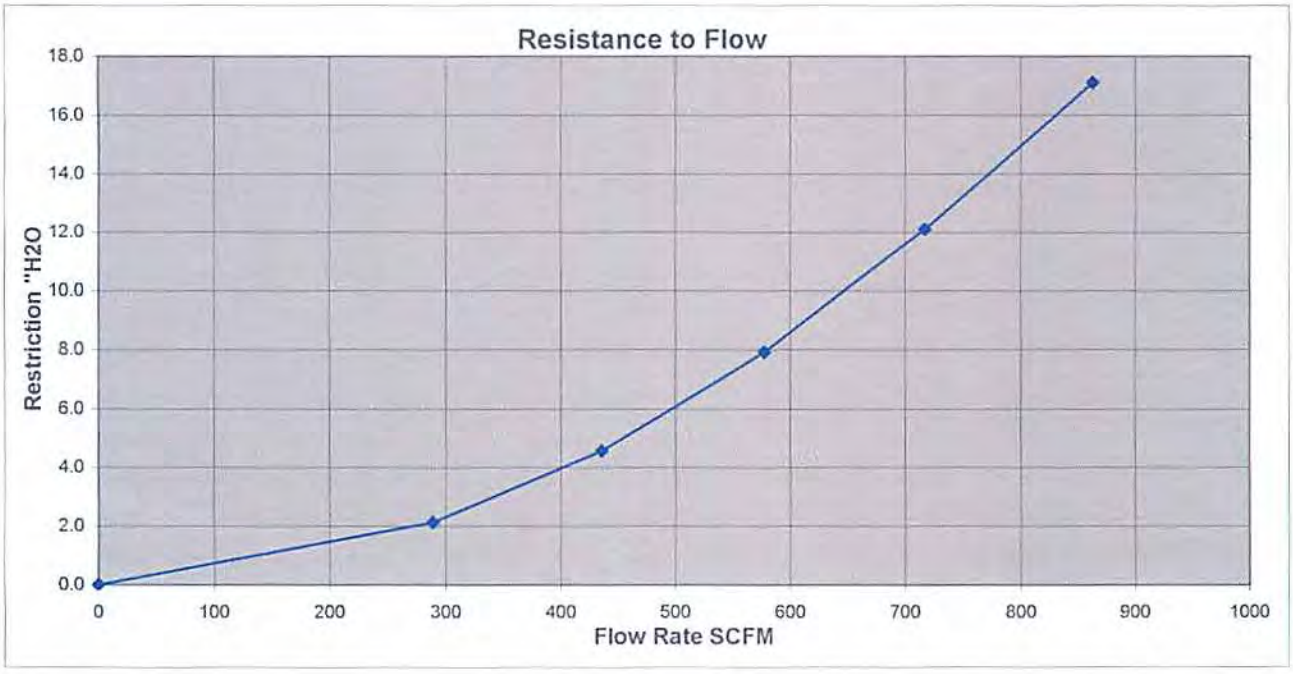
Report Date: 1/13/2014
Tech: RMO

Test Conditions

Flow:	580 SCFM	**Temperature:**	68.71 DEG. F
Barometric Pressure:	28.70 IN. Hg	**Humidity:**	49.6 %

Test Results

Flow	Restriction IN. H2O		
SCFM	Gross	Tare	Net
0	0	0	0.0
289.081	2.124	0	2.1
435.404	4.564	0	4.6
578	7.925	0	7.9
717.49	12.093	0	12.1
862.548	17.101	0	17.1



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Air Flow Test Report

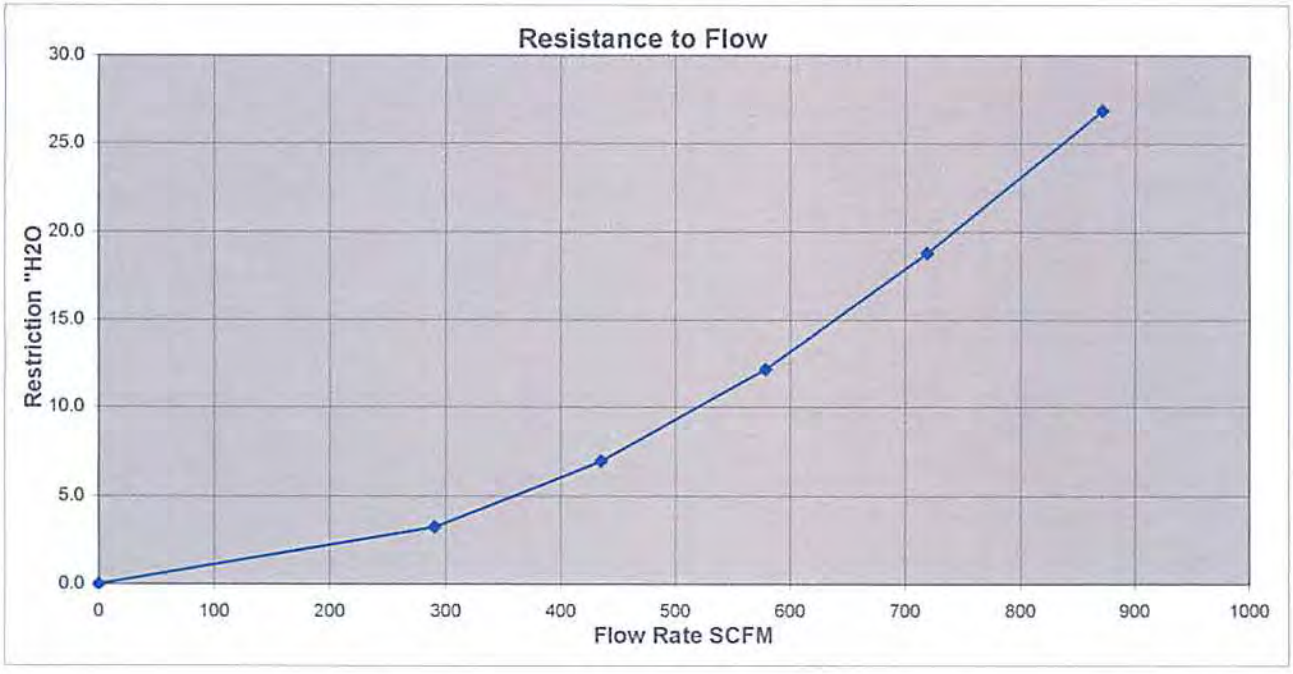
Test Number: 383 **Report Date:** 1/10/2014
Sample Number: 28 **Tech:** RMO
Filter Description: KF-1037D
Test Description:
75-5068 Production, No Sensors, Front Closed

Test Conditions

Flow:	580 SCFM	**Temperature:**	68.75 DEG. F
Barometric Pressure:	28.90 IN. Hg	**Humidity:**	53.73 %

Test Results

Flow	Restriction IN. H2O		
SCFM	Gross	Tare	Net
0	0	0	0.0
290.39	3.25	0	3.3
434.797	6.979	0	7.0
579.18	12.166	0	12.2
718.834	18.782	0	18.8
871.208	26.859	0	26.9



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Air Flow Test Report

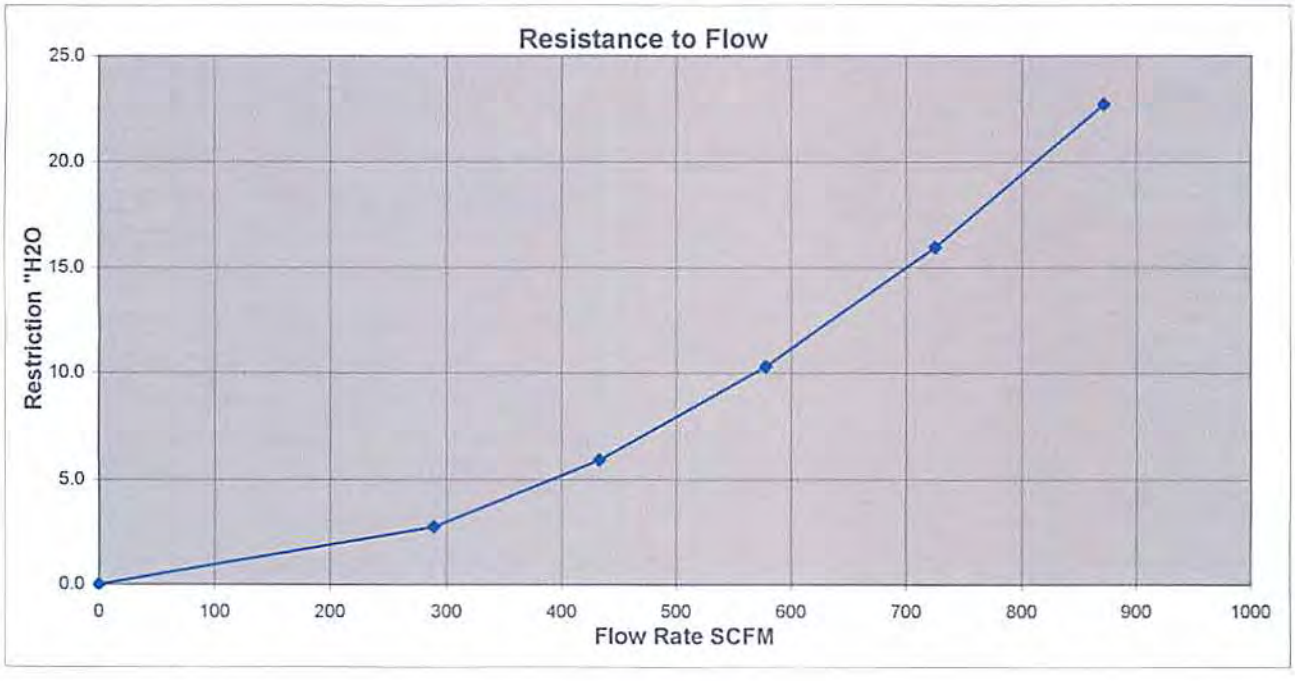
Test Number: 383
Report Date: 1/13/2014
Sample Number: 23
Tech: RMO
Filter Description: KF-1037D
Test Description:
75-5068 Production, No Sensors, Side Closed

Test Conditions

Flow:	580 SCFM	Temperature:	66.78 DEG. F
Barometric Pressure:	29.00 IN. Hg	Humidity:	50.52 %

Test Results

Flow	Restriction IN. H2O		
SCFM	Gross	Tare	Net
0	0	0	0.0
289.672	2.762	0	2.8
432.955	5.922	0	5.9
578.304	10.316	0	10.3
725.061	15.95	0	16.0
870.942	22.736	0	22.7



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Air Flow Test Report

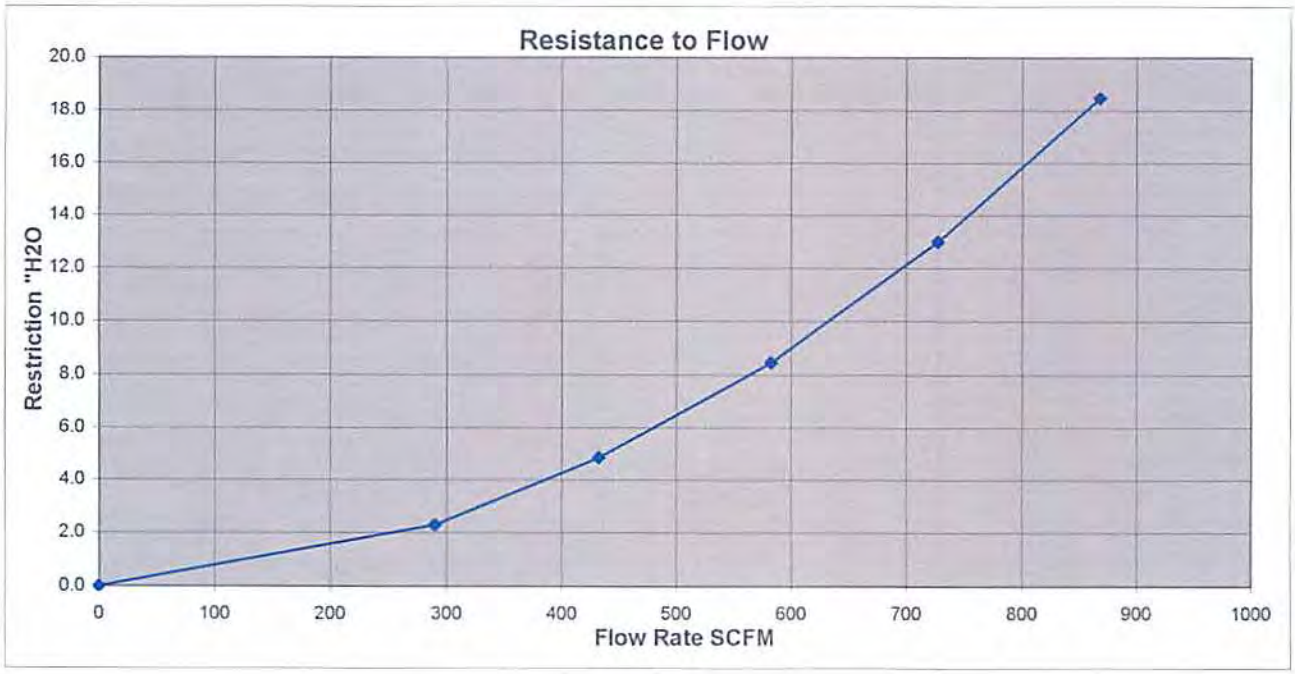
Test Number: 383 **Report Date:** 1/13/2014
Sample Number: 24 **Tech:** RMO
Filter Description: KF-1037D
Test Description:
75-5068 Production, No sensors, Both sides open

Test Conditions

Flow:	580 SCFM	**Temperature:**	67.04 DEG. F
Barometric Pressure:	28.98 IN. Hg	**Humidity:**	51.24 %

Test Results

Flow	Restriction IN. H2O		
SCFM	Gross	Tare	Net
0	0	0	0.0
289.893	2.293	0	2.3
431.996	4.843	0	4.8
582.973	8.447	0	8.4
727.59	12.99	0	13.0
868.086	18.475	0	18.5



Air Filter Capacity & Efficiency Test Report

Test Number: 383
Sample Number: 48
Filter Description: Mopar 53034051AB

Tech: RMO
Report Date: 1/10/2014

Test Description: 2013-14 Cummins 6.7L OE Intake & Filter, No Sensors, Front Closed

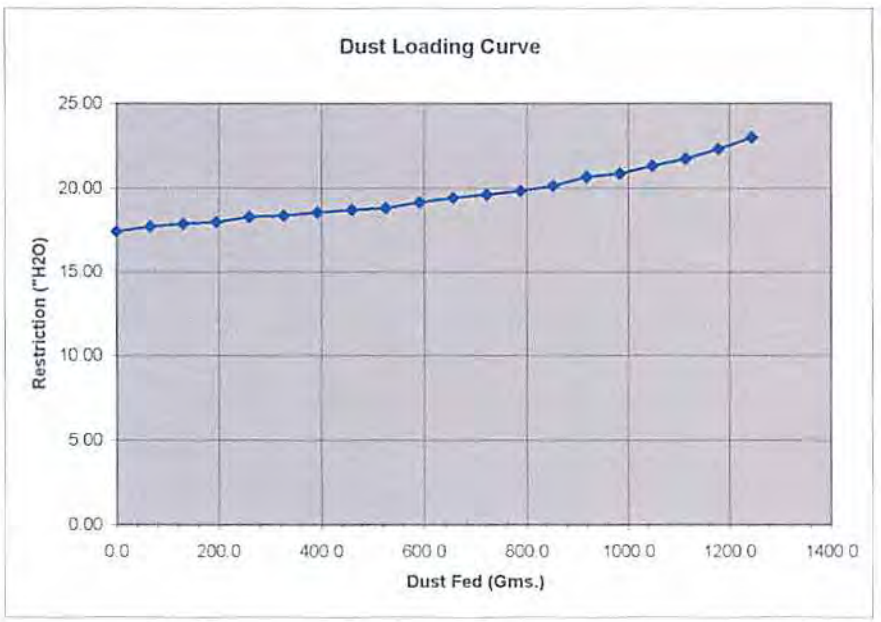
Test Conditions

Barometric Pressure:	29 IN. Hg	**Relative Humidity:**	52.84 %
Air Flow Setpoint:	580 SCFM	**Type Of Dust:**	Coarse
Test Procedure:	ISO 5011	**Batch #:**	11558C
Air Flow Type:	Steady	**Temperature:**	67.11 DEG. F
Test Endpoint:	27.42 IN. H2O	**Dust Feed Rate:**	16.24 Gms/Min

Test Results

Initial Restriction: 17.42 IN. H2O **Accumulative Capacity:** 1500.84 Grams

	Accumulative							
	Assembly	Blanket						
Start	5741.8	145.450						
End	7239.6	147.800						
Gain	1497.8	2.350	0	0	0	0	0	0
Efficiency	99.81							



Restriction IN. H2O	Time	Dust Fed Gms.
17.42	0	0.0
17.71	4	65.7
17.87	8	130.6
17.97	12	195.3
18.30	16	259.9
18.36	20	326.3
18.56	24	392.4
18.70	28	458.5
18.83	32	524.3
19.15	36	590.7
19.43	40	656.9
19.62	44	721.8
19.83	48	787.8
20.15	52	852.3
20.67	56	917.8
20.87	60	984.0
21.34	64	1048.7
21.73	68	1114.5
22.29	72	1179.0
23.00	76	1244.2

Air Filter Capacity & Efficiency Test Report

Test Number: 383
Sample Number: 27
Filter Description: KF-1037

Tech: RMO
Report Date: 1/2/2014

Test Description: 75-5068 Production, No Sensors, Front Closed

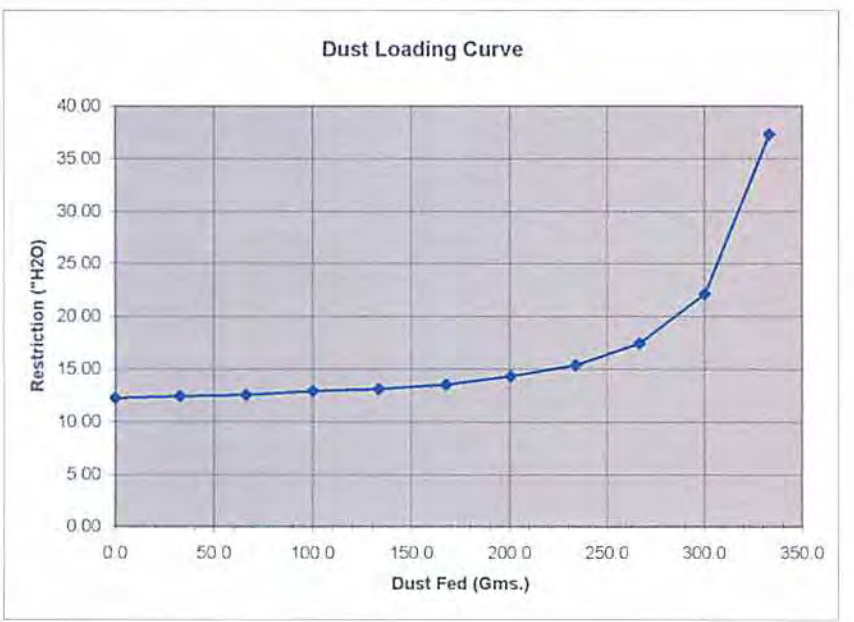
Test Conditions

Barometric Pressure:	28.98 IN. Hg	**Relative Humidity:**	51.94 %
Air Flow Setpoint:	580 SCFM	**Type Of Dust:**	Coarse
Test Procedure:	ISO 5011	**Batch #:**	11558C
Air Flow Type:	Steady	**Temperature:**	68.65 DEG. F
Test Endpoint:	22.26 IN. H2O	**Dust Feed Rate:**	16.24 Gms/Min

Test Results

Initial Restriction: 12.26 IN. H2O **Accumulative Capacity:** 331.707 Grams

	Accumulative							
	Assembly	Blanket						
Start	5633.9	147.800						
End	5963.0	149.300						
Gain	329.1	1.500	0	0	0	0	0	0
Efficiency	99.55							



Restriction IN. H2O	Time	Dust Fed Gms.
12.26	0	0.0
12.45	2	33.0
12.58	4	66.5
12.93	6	100.3
13.10	8	133.7
13.54	10	167.8
14.31	12	200.8
15.35	14	233.9
17.42	16	266.9
22.08	18	300.3
37.33	20	333.2

Air Filter Capacity & Efficiency Test Report

Test Number: 383
Sample Number: 29
Filter Description: KF-1037D

Tech: RMO
Report Date: 1/10/2014

Test Description: 75-5068 Production, No Sensors, Front Closed

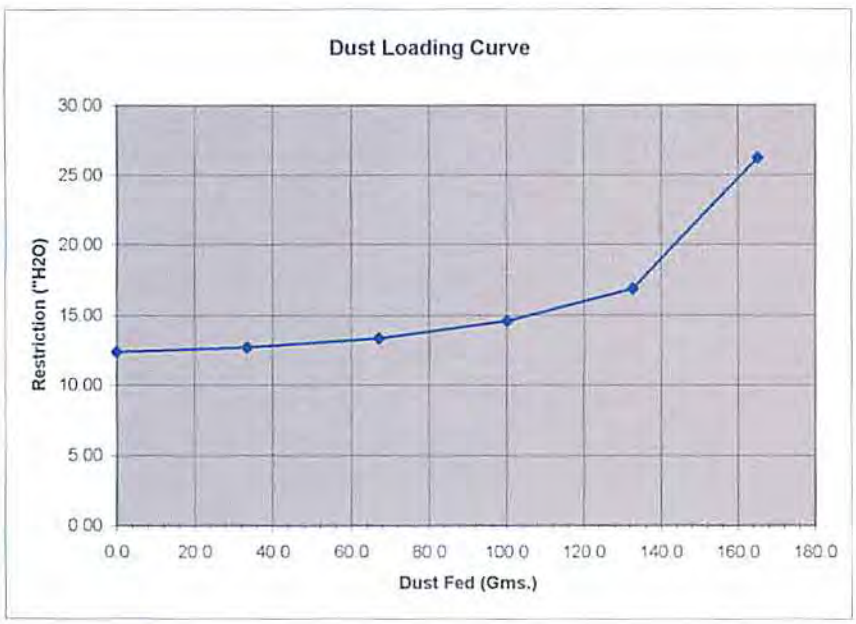
Test Conditions

Barometric Pressure:	28.9 IN. Hg	**Relative Humidity:**	51.23 %
Air Flow Setpoint:	580 SCFM	**Type Of Dust:**	Coarse
Test Procedure:	ISO 5011	**Batch #:**	11558C
Air Flow Type:	Steady	**Temperature:**	68.87 DEG. F
Test Endpoint:	22.37 IN. H2O	**Dust Feed Rate:**	16.24 Gms/Min

Test Results

Initial Restriction: 12.37 IN. H2O **Accumulative Capacity:** 164.36 Grams

	Accumulative							
	Assembly	Blanket						
Start	5482.6	149.430						
End	5645.4	150.280						
Gain	162.8	0.850	0	0	0	0	0	0
Efficiency	99.49							



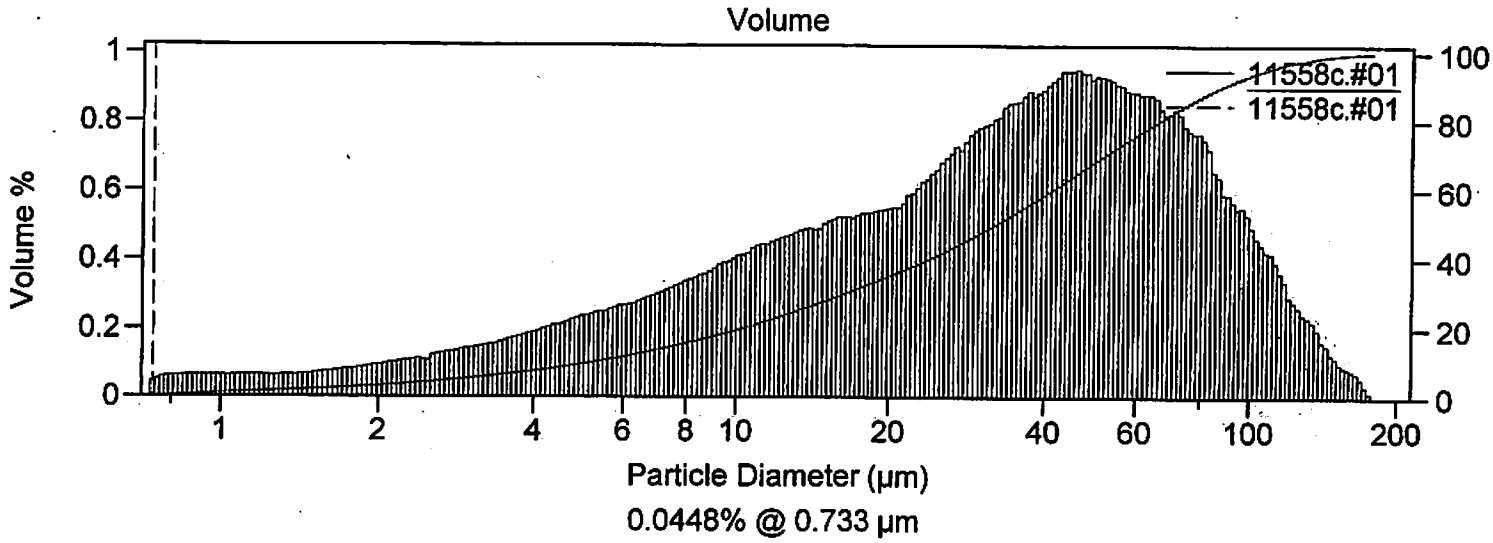
Restriction IN. H2O	Time	Dust Fed Gms.
12.37	0	0.0
12.70	2	33.5
13.34	4	67.2
14.58	6	100.2
16.86	8	132.8
26.24	10	165.2

COULTER® MULTISIZER AccuComp® 1.19

POWDER TECHNOLOGY, INC.

PTI
POWDER TECHNOLOGY INC.
14331 Ewing Avenue South Burnsville, Minnesota 55306
Phone: 952-894-8737

Filename:	11558c.#01	Sample Number:	267
Group ID:	11558C		
Sample ID:	11558C		
Comment:	ISO 12103-1, A4 COARSE TEST DUST, NIST TRACEABLE		
Operator:	JDF		
Acquired:	14:36 19 Dec 2012		
Edited size data			



Volume Statistics (Geometric) 11558c.#01

Calculations from 0.725 µm to 178.2 µm

Volume	9.932e9 µm^3		
Mean:	25.09 µm	S.D.:	51 µm
Median:	31.83 µm		
Mean/Median Ratio:	0.788		
Mode:	46.48 µm		

11558c.#01

Particle Diameter µm	Volume % <	Particle Diameter µm	Volume % <
1	0.898	200	100.00
2	3.20		
3	5.40		
4	7.60		
5	9.81		
7	13.97		
10	19.79		
20	35.51		
40	59.09		
80	87.58		
120	97.39		
180	100.00		

COULTER® MULTISIZER AccuComp® 1.19

POWDER TECHNOLOGY, INC.

11558c.#01

Channel Number	Particle Diameter µm	Cum < Volume %	Diff Number %	Cum < Number %	Diff Volume %
1	0.725	0	26.96	0	0.333
7	0.825	0.333	20.93	26.96	0.377
13	0.938	0.711	14.29	47.89	0.379
19	1.068	1.09	9.97	62.18	0.389
25	1.215	1.48	6.66	72.15	0.383
31	1.382	1.86	4.79	78.80	0.407
37	1.572	2.27	3.73	83.59	0.467
43	1.789	2.74	2.91	87.32	0.536
49	2.035	3.27	2.28	90.23	0.620
55	2.315	3.89	1.72	92.51	0.690
61	2.634	4.58	1.38	94.23	0.810
67	2.997	5.39	1.04	95.61	0.901
73	3.409	6.29	0.808	96.65	1.03
79	3.879	7.33	0.630	97.46	1.19
85	4.413	8.51	0.485	98.09	1.34
91	5.021	9.86	0.365	98.57	1.49
97	5.712	11.34	0.270	98.94	1.62
103	6.498	12.96	0.203	99.21	1.79
109	7.393	14.75	0.153	99.41	2.00
115	8.411	16.75	0.116	99.56	2.23
121	9.570	18.98	0.088	99.68	2.47
127	10.89	21.45	0.065	99.77	2.70
133	12.39	24.15	0.047	99.83	2.87
139	14.09	27.02	0.034	99.88	3.02
145	16.03	30.04	0.024	99.91	3.15
151	18.24	33.20	0.017	99.94	3.26
157	20.75	36.46	0.012	99.95	3.52
163	23.61	39.98	0.009	99.97	4.02
169	26.86	44.00	0.007	99.98	4.50
175	30.56	48.50	0.005	99.98	4.90
181	34.77	53.40	0.004	99.99	5.23
187	39.56	58.63	0.003	99.99	5.53
193	45.00	64.16	0.002	99.99	5.64
199	51.20	69.80	0.001	100.00	5.48
205	58.25	75.28	0.001	100.00	5.27
211	66.27	80.55	0.001	100.00	4.92
217	75.40	85.46	0.0032	100.00	4.42
223	85.78	89.89	0.0017	100.00	3.47
229	97.60	93.36	9.3E-5	100.00	2.76
235	111.0	96.12	4.4E-5	100.00	1.92
241	126.3	98.04	1.9E-5	100.00	1.21
247	143.7	99.25	6.2E-6	100.00	0.584
253	163.5	99.83	1.2E-6	100.00	0.155

Powder Technology Inc.
14331 Ewing Avenue South
Burnville, MN, U.S.A.
55306
Tel: 001-952-894-8737

SAFETY DATA SHEET

This safety data sheet complies with the requirements of Regulation (EC) No. 1907/2006.

SECTION 1. IDENTIFICATION OF THE SUBSTANCE / MIXTURE AND OF THE COMPANY / UNDERTAK

Product identifier : **Arizona Sand**

Product Code(s) : Arizona sand including Arizona Test Dust; Arizona Test Dust Fractions, Arizona Road Dust; Arizona Silica; AC Fine and AC Coarse Test Dusts; SAE Fine and Coarse Test Dusts; J726 Test Dusts; ISO 12103-1, A1 Ultrafine Test Dust; ISO 12103-1, A2 Fine Test Dust, ISO 12013-1, A3 Medium Test Dust; ISO 12103-1, A4 Coarse Test Dust; MIL STD 810F Blowing Dust

Relevant identified uses of the substance or mixture and uses advised against

: Primarily used for testing filtration products as well as other automotive, aerospace and military mechanical components.
Use pattern: professional use.

Details of the supplier of the safety data sheet:

Powder Technology Inc.
14331 Ewing Avenue South
Burnsville, MN, U.S.A.
55306

Telephone : 001-952-894-8737

Emergency Telephone Number

: Not available.

SECTION 2. HAZARDS IDENTIFICATION

Classification of the substance or mixture

Solid - tan/brown/light brown/reddish brown. No odour.

Most important hazards: The preparation is classified as dangerous in accordance with Directive 1999/45/EC. Classification:
T - Toxic
Carc.Cat.2; R49 - May cause cancer by inhalation.
Xn - Harmful
R48/20 - Harmful: danger of serious damage to health by prolonged exposure through inhalation.

Label elements

Toxic

Hazardous components which must be listed on the label: Quartz (SiO_2); titanium dioxide.

Restricted to professional users.

R-phrase(s):
R49 - May cause cancer by inhalation.
R48/20 - Harmful: danger of serious damage to health by prolonged exposure through inhalation.

SAFETY DATA SHEET

This safety data sheet complies with the requirements of Regulation (EC) No. 1907/2006.

S-phrase(s):
S53 - Avoid exposure - obtain special instructions before use.
S22 - Do not breathe dust.
S36/37/39 - Wear suitable protective clothing, gloves and eye/face protection.
S26 - In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
S45 - In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).
S35 - This material and its container must be disposed of in a safe way.

Other hazards

Other hazards which do not result in classification:
Burning produces obnoxious and toxic fumes. Inhalation of fumes may result in metal fume fever, a flu-like illness. Ingestion may cause gastrointestinal irritation, nausea, vomiting and diarrhea. Product dust may be irritating to eyes, skin and respiratory system. Dust contact with the eyes can lead to mechanical irritation.

Environmental precautions: Not expected to be harmful to aquatic organisms. No data is available on the product itself. Avoid release to the environment.

PBT assessment: This preparation contains no substance considered to be persistent, bioaccumulating nor toxic (PBT).

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Substances

Not applicable

Mixtures

Chemical nature: Mixture - Arizona Sand is a naturally occurring material containing the following inorganic substances in powdered form:

The following substances shall be indicated according to legislation:

Chemical name	CAS #	EC No.	Concentration	EU Classification
Quartz (SiO2)	14808-60-7	238-878-4	68.0 - 76.0	T - Toxic Carc.Cat.2;R49 Xn - Harmful R48/20 (self classified)
Aluminium oxide	1344-28-1	215-691-6	10.0 - 15.0	None assigned. Substances for which there are Community workplace exposure limits.
Diiron trioxide	1309-37-1	215-168-2	2.0 - 5.0	None assigned. Substances for which there are Community workplace exposure limits.
Calcium oxide	1305-78-8	215-138-9	2.0 - 5.0	Xi - Irritant R37/38 - R41 (self classified)
Potassium chloride	7447-40-7	231-211-8	2.0 - 5.0	None assigned. Substances for which there are Community workplace exposure limits.
Disodium oxide	1313-59-3	215-208-9	2.0 - 4.0	C - Corrosive; R35 (self classified)
Magnesium oxide	1309-48-4	215-171-9	1.0 - 2.0	None assigned. Substances for which there are Community workplace exposure limits.
titanium dioxide	13463-67-7	236-675-5	0.5 - 1.0	Xn - Harmful Carc.Cat.3; R40 (self classified)

For the full text of the R phrases mentioned in this section, see Section 2 or 16.

SAFETY DATA SHEET

This safety data sheet complies with the requirements of Regulation (EC) No. 1907/2006.

SECTION 4. FIRST-AID MEASURES

Description of first aid measures

Ingestion : If swallowed, seek medical advice immediately and show this container or label. Do NOT induce vomiting. Never give anything by mouth to an unconscious person.

Inhalation : If breathed in, move person into fresh air. If breathing is irregular or stopped, administer artificial respiration. In the case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

Skin contact : IF ON SKIN: Wash with plenty of soap and water. Remove/Take off immediately all contaminated clothing. If irritation or symptoms develop, seek medical attention.

Eye contact : In the case of contact with eyes, rinse immediately with plenty of water and seek medical advice.

Most important symptoms and effects, both acute and delayed

: May cause cancer by inhalation.
Harmful: danger of serious damage to health by prolonged exposure through inhalation.
Inhalation of fumes may result in metal fume fever, a flu-like illness.
Ingestion may cause gastrointestinal irritation, nausea, vomiting and diarrhea.
Product dust may be irritating to eyes, skin and respiratory system.
Dust contact with the eyes can lead to mechanical irritation.

Indication of any immediate medical attention and special treatment needed

: Treat symptomatically.

SECTION 5. FIRE-FIGHTING MEASURES

Extinguishing media

Suitable extinguishing media

: Foam; Dry chemical; Water spray; Carbon dioxide (CO_2).

Unsuitable extinguishing media

: Do not use a solid water stream as it may scatter and spread fire.

Special hazards arising from the substance or mixture

: Not flammable under normal conditions of use. The pressure in sealed containers can increase under the influence of heat. In the event of fire the following can be released: Metal oxides.

Advice for firefighters

Protective equipment for fire-fighters

: Wear self-contained breathing apparatus and protective suit. Fight fire with normal precautions from a reasonable distance.

Special fire-fighting procedures

: Move containers from fire area if safe to do so. Cool closed containers exposed to fire with water spray. Do not allow run-off from fire fighting to enter drains or water courses. Dike for water control.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures

: Wear suitable protective equipment. Keep people away from and upwind of spill/leak.

Environmental precautions : Avoid contamination of natural waterways.

Methods and material for containment and cleaning up

: Ventilate the area. Prevent further leakage or spillage if safe to do so. Remove all sources of ignition. Pick up and transfer to properly labelled containers. Clean up promptly by scoop or vacuum. Avoid dust formation. Contact the proper local authorities.

SAFETY DATA SHEET

This safety data sheet complies with the requirements of Regulation (EC) No. 1907/2006.

Reference to other sections

: Refer to protective measures listed in sections 7 and 8. Refer to Section 13 for disposal of contaminated material.

SECTION 7. HANDLING AND STORAGE

Precautions for safe handling

: Restricted to professional users. Avoid exposure - obtain special instructions before use.

Use only in well-ventilated areas. Wear suitable protective equipment. For personal protection see section 8. Do not breathe dust. Avoid contact with skin, eyes and clothing. Keep away from extreme heat and flame. Avoid contact with incompatible materials. Avoid and control operations which create dust. Keep containers closed when not in use. Wash thoroughly after handling. Empty containers retain residue.

Conditions for safe storage, including any incompatibilities

: Store in cool/well-ventilated place. Keep away from heat. Inspect periodically for damage or leaks. Protect against physical damage. Store away from incompatible materials. Storage area should be clearly identified, clear of obstruction and accessible only to trained and authorized personnel. Keep containers dry and tightly closed to avoid moisture absorption and contamination.

Specific end use(s)

: Primarily used for testing filtration products as well as other automotive, aerospace and military mechanical components.

SECTION 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Control Parameters

Exposure Limits:

Chemical Name	Exposure Limits	Type	Notes
Aluminium oxide	10 mg/m³ (TWA)	France (OEL)	None.
	2.5 mg/m³ (inhalable); 1.2 mg/m³ (respirable dust) (TWA)	Poland (OEL)	None.
	10 mg/m³ (TWA)	Spain (OEL)	None.
Calcium oxide	2 mg/m³ (TWA)	France (OEL)	None.
	2 mg/m³ (TWA)	Italy (OEL)	Recommended exposure limit based on ACGIH TLVs
	2 mg/m³ (dust) (TWA) 6 mg/m³ (dust) (STEL)	Poland (OEL)	None.
	2 mg/m³ (TWA)	Spain (OEL)	None.
	2 mg/m³ (TWA) 6 mg/m³ (STEL)	The United Kingdom (The United Kingdom (WELs))	None.

SAFETY DATA SHEET

This safety data sheet complies with the requirements of Regulation (EC) No. 1907/2006.

Diiron trioxide	5 mg/m³ (TWA)	France (OEL)	(as Fe)
	5 mg/m³ (TWA) 10 mg/m³ (STEL)	Poland (OEL)	(as Fe)
	5 mg/m³ (fumes) (TWA) 10 mg/m³ (fumes) (STEL)	The United Kingdom (The United Kingdom (WELs))	(as Fe)
Disodium oxide	None known.	European Union (OEL)	None.
Magnesium oxide	10 mg/m³ (fumes) (TWA)	France (OEL)	None.
	5 mg/m³ (Fumes); 10 mg/m³ (dust) (TWA)	Poland (OEL)	None.
	10 mg/m³ (dust and fume) (TWA)	Spain (OEL)	None.
	10 mg/m³ (inhalable); 4 mg/m³ (Fumes; Respirable dust) (TWA) 30 mg/m³ (inhalable); 12 mg/m³ (Fumes; Respirable dust) (STEL)	The United Kingdom (The United Kingdom (WELs))	None.
Potassium chloride	Bulgaria: 5 mg/m³ (TWA) Lithuania: 5mg/m³ (TWA)	European Union (OEL)	None.
	5 mg/m³ (TWA)	Latvia (OEL)	None.
Quartz (SiO2)	0.1 mg/m³ (inhalable) (TWA)	France (OEL)	None.
	0.025 mg/m³ (respirable dust) (TWA)	Italy (OEL)	Recommended exposure limit based on ACGIH TLVs
	2 mg/m³ (inhalable) (TWA) 0.3 mg/m³ (respirable dust) (STEL)	Poland (OEL)	None.
	0.1 mg/m³ (respirable dust) (TWA)	Spain (OEL)	None.
	0.1 mg/m³ (TWA) 0.3 mg/m³ (respirable dust) (STEL)	The United Kingdom (The United Kingdom (WELs))	None.
titanium dioxide	10 mg/m³ (TWA)	France (OEL)	None.
	10 mg/m³ (TWA)	Italy (OEL)	Recommended exposure limit based on ACGIH TLVs
	10 mg/m³ (TWA)	Poland (OEL)	None.
	10 mg/m³ (TWA)	Spain (OEL)	None.
	10 mg/m³ (inhalable); 4 mg/m³ (respirable dust) (TWA)	The United Kingdom (The United Kingdom (WELs))	None.

SAFETY DATA SHEET

This safety data sheet complies with the requirements of Regulation (EC) No. 1907/2006.

Exposure controls

Ventilation and engineering measures : Use only in well-ventilated areas. Apply technical measures to comply with the occupational exposure limits. Where reasonably practicable this should be achieved by the use of local exhaust ventilation and good general extraction. In case of insufficient ventilation wear suitable respiratory equipment.

Respiratory protection : Where occupational exposure limits are exceeded, workers must wear a suitable, approved respirator with a N95 or HEPA filter.
The filter class for the respirator must be suitable for the maximum expected contaminant concentration (gas/vapour/aerosol/particulates) that may arise when handling the product. If this concentration is exceeded, self-contained breathing apparatus must be used. The type of respiratory protection will depend on the conditions of use (see also EN 149).

Skin protection : Wear protective gloves. The suitability for a specific workplace should be discussed with the producers of the protective gloves. The selected protective gloves have to satisfy the specifications of EU Directive 89/689/EEC and the standard EN 374 derived from it.

Eye / face protection : Wear eye/face protection. Wear as appropriate: Tightly fitting safety goggles. See also EN 166.

Other protective equipment : Wear sufficient clothing to prevent skin contact. Ensure that eyewash stations and safety showers are close to the workstation location.

General hygiene considerations : Do not breathe dust. Avoid contact with skin, eyes and clothing. Do not eat, drink or smoke when using this product. Wash thoroughly after handling. Remove and wash contaminated clothing before re-use. Handle in accordance with good industrial hygiene and safety practice.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties

Appearance	: solid - tan/brown/light brown/reddish brown
Odour	: No odour.
Odour threshold	: No information available.
pH	: No information available.
Flash point	: Not applicable. Non-flammable.
Flashpoint (Method)	: No information available.
Lower flammable limit (% by vol.)	: Not applicable.
Upper flammable limit (% by vol.)	: Not applicable.
Flammability (solid, gas)	: Not considered flammable.
Auto-ignition temperature	: No information available.
Decomposition temperature	: No information available.
Oxidizing properties	: None.
Explosive properties	: Not explosive
Initial boiling point and boiling range	: 2212°C
Melting/Freezing point	: 1615°C (+/- 75°C)
Relative density	: 2.65
Solubility in water	: insoluble
Other solubility(ies)	: No information available.
Vapour pressure	: Not applicable.

SAFETY DATA SHEET

This safety data sheet complies with the requirements of Regulation (EC) No. 1907/2006.

Vapour density : Not applicable.

Partition coefficient: n-octanol/water
: No information available.

Viscosity : Not applicable.

Evaporation rate (BuAe = 1) : No information available.

Other Information

Volatiles (% by weight) : Not applicable.

Volatile organic Compounds (VOC's)
: Not applicable.

Other physical/chemical comments
: No additional information.

SECTION 10. STABILITY AND REACTIVITY

Reactivity : Not normally reactive.

Chemical stability : Stable under normal conditions.

Possibility of hazardous reactions
: Hazardous polymerisation does not occur.

Conditions to avoid : Incompatible products Do not use in areas without adequate ventilation. Avoid moisture. Extreme heat.

Incompatible materials : Oxidizing agents; Halocarbons; Acids; Water .

Hazardous decomposition products
: In the event of fire the following can be released: Metal oxides.

SECTION 11. TOXICOLOGICAL INFORMATION

Information on Toxicological effects:

Acute toxicity : According to the classification criteria of the European Union, this product is not considered as being an acutely toxic chemical.

Irritation : According to the classification criteria of the European Union, this product is not considered as being an irritant. May cause mechanical irritation.

Corrosivity : According to the classification criteria of the European Union, this product is not considered as being a corrosive material.

Sensitisation : According to the classification criteria of the European Union, this product is not considered as being an allergic respiratory sensitiser.
According to the classification criteria of the European Union, this product is not considered as being an allergic skin sensitiser.

Mutagenicity : According to the classification criteria of the European Union, the product is not considered as being a germ cell mutagen. Contains no ingredient listed as a mutagen.

SAFETY DATA SHEET

This safety data sheet complies with the requirements of Regulation (EC) No. 1907/2006.

Carcinogenicity : The preparation is classified as dangerous in accordance with Directive 1999/45/EC.
Classification:
T - Toxic. Carc.Cat.2; R49 - May cause cancer by inhalation. Contains: Crystalline silica, quartz. IARC concluded that there was "sufficient evidence in humans for the carcinogenicity of crystalline silica in the forms of quartz or cristobalite from occupational sources", and that there is "sufficient evidence in experimental animals for the carcinogenicity of quartz and cristobalite." The overall IARC evaluation was that "crystalline silica inhaled in the form of quartz or cristobalite from occupational sources is carcinogenic to humans (Group 1)." The IARC evaluation noted, "Carcinogenicity was not detected in all industrial circumstances studies. Carcinogenicity may be dependent on inherent characteristics of the crystalline silica or on external factors affecting its biological activity or distribution of its polymorphs." For further information on the IARC evaluation, see IARC Monographs on the Evaluation of Carcinogenic Risks to Humans, Volume 68, and "Silica, Some Silicates." (1997).

Reproductive toxicity : According to the classification criteria of the European Union, this product is not considered as being toxic to reproduction. Contains no ingredient listed as toxic to reproduction.

Repeated dose toxicity : The preparation is classified as dangerous in accordance with Directive 1999/45/EC.
Classification:
Xn - Harmful: Harmful: danger of serious damage to health by prolonged exposure through inhalation.

Contains: Crystalline silica, quartz. Repeated or prolonged inhalation of fine dusts may cause severe scarring of the lungs, a disease called silicosis, and alveolar proteinosis (lower lung disease).

Silicosis is caused by the inhalation and retention of respirable crystalline silica dust. Silicosis can exist in several forms, chronic (or ordinary), accelerated, or acute. Chronic or Ordinary Silicosis (often referred to as Simple Silicosis) is the most common form of silicosis, and can occur after many years of exposure to relatively low levels of airborne respirable crystalline silica dust. It is further defined as either simple or complicated silicosis. Simple silicosis is characterized by lung lesions (shown as radiographic opacities) less than 1 centimeter in diameter, primarily in the upper lung zones. Often, simple silicosis is not associated with symptoms, detectable changes in lung function or disability.

Simple silicosis may be progressive and may develop into complicated silicosis or progressive massive fibrosis (PMF). Complicated silicosis or PMF is characterized by lung lesions (shown as radiographic opacities) greater than 1 centimeter in diameter. Although there may be no symptoms associated with complicated silicosis or PMF, the symptoms, if present, are shortness of breath, wheezing, cough and sputum production. Complicated silicosis or PMF may be associated with decreased lung function and may be disabling.

Advanced complicated silicosis or PMF may lead to death. Advanced complicated silicosis or PMF can result in heart disease secondary to the lung disease (corpumonale). Accelerated Silicosis can occur with exposure to high concentrations of respirable crystalline silica over a relatively short period; the lung lesions can appear within five (5) years of initial exposure. Progression can be rapid. Accelerated silicosis is similar to chronic or ordinary silicosis, except that lung lesions appear earlier and progression is more rapid.

SAFETY DATA SHEET

This safety data sheet complies with the requirements of Regulation (EC) No. 1907/2006.

Toxicological data : No data is available on the product itself. See below for individual ingredient acute toxicity data.

Chemical name	LC_{50}(4hr) inh, rat	LD_{50} (Oral, rat)	LD_{50} (Rabbit, dermal)
Quartz (SiO2)	No information available.	No information available.	No information available.
Aluminium oxide	No information available.	> 5000 mg/kg	No information available.
Diiron trioxide	No information available.	> 10,000 mg/kg	No information available.
Calcium oxide	No information available.	> 2000 mg/kg	> 2500 mg/kg
Potassium chloride	No information available.	No information available.	No information available.
Disodium oxide	No information available.	No information available.	No information available.
Magnesium oxide	No information available.	No information available.	No information available.
titanium dioxide	> 6820 mg/m³	> 25,000 mg/kg	> 10,000 mg/kg

Routes of exposure : Eye contact; Skin contact; Ingestion; Inhalation.

Effects of acute exposure : Inhalation: May cause irritation of the mucous membranes. Inhalation of dust may cause shortness of breath, tightness of the chest, a sore throat and cough. Contains crystalline silica; prolonged exposure by inhalation of particles can cause serious lung damage, including silicosis. Acute Silicosis can occur with exposures to very high concentrations of respirable crystalline silica over a very short time period, sometimes as short as a few months. The symptoms of acute silicosis include progressive shortness of breath, fever, cough and weight loss. Acute silicosis is fatal.

Skin contact: Not an irritant. May cause mechanical irritation.

Eye contact: Description of possible hazardous to health effects is based on experience with this product. According to the classification criteria of the European Union, the product is not considered as being an eye irritant. However, this product can cause mechanical irritation of the eyes. Can scratch the eyes causing immediate or delayed irritation, inflammation of the cornea, redness and tearing.

Ingestion: Ingestion may cause gastrointestinal irritation, nausea, vomiting and diarrhea.

Potential Chronic Health Effects : None known or reported by the manufacturer.

Other important hazards : None known or reported by the manufacturer.

SECTION 12. ECOLOGICAL INFORMATION

Ecotoxicity : Ecological injuries are not known or expected under normal use. Ingredients present in this product are not considered acutely toxic for the environment. There is no data available for this product. The product should not be allowed to enter drains or water courses, or be deposited where it can affect ground or surface waters.

Persistence and degradability : The product itself has not been tested.

Bioaccumulation potential : The product itself has not been tested.

SAFETY DATA SHEET

This safety data sheet complies with the requirements of Regulation (EC) No. 1907/2006.

Mobility in soil : The product itself has not been tested.

Results of PBT and vPvB assessment

: This mixture contains no substance considered to be persistent, bioaccumulating nor toxic (PBT).

Other Adverse Environmental effects

: None known.

Water contaminating class (Germany)

: 1 (self classified)

SECTION 13. DISPOSAL CONSIDERATIONS

Waste Treatment Methods:

Handling for Disposal : Handle in accordance with good industrial hygiene and safety practice. Refer to protective measures listed in sections 7 and 8.

Methods of Disposal : Dispose of in accordance with the European Directives on waste and hazardous waste. Waste must be classified and labelled prior to recycling or disposal. According to the European Waste Catalogue, Waste Codes are not product specific, but application specific. Waste codes should be assigned by the user based on the application for which the product was used.

SECTION 14. TRANSPORTATION INFORMATION

Regulatory Information	UN Number	UN proper shipping name	Transport hazard class(es)	Packing Group	Label
ADR/RID	None	not regulated	Not regulated	None	
EU ADR/RID Classification Code	Not applicable.				
EU ADR / RID Hazard Identification Number	Not applicable.				
ADR/RID Additional information	Not classified as dangerous for conveyance in the meaning of the regulations for the transport of dangerous goods by road and rail.				
ICAO/IATA	None	Not regulated.	Not regulated	None	
ICAO/IATA Additional information	None.				
IMDG	None	Not regulated.	Not regulated	None	
IMDG Additional information	None.				

Special precautions for user : Appropriate advice on safety must accompany the package.

SAFETY DATA SHEET

This safety data sheet complies with the requirements of Regulation (EC) No. 1907/2006.

Environmental hazards : This product does not meet the criteria for an environmentally hazardous mixture, according to the IMDG Code. See ECOLOGICAL INFORMATION, Section 12.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

: This information is not available.

SECTION 15. REGULATORY INFORMATION

Safety, health and environmental regulations/legislation specific for the substance or mixture

: 1. Substances presenting a health or environmental hazard within the meaning of Directive 67/548/EEC.
2. Classification according to European directive on classification of hazardous preparations 1999/45/EC.
3. This safety data sheet complies with the requirements of Regulation (EC) No. 1907/2006.
4. In accordance with the legislation of the United Kingdom.
5. German legislation on water endangering substances VwVwS (see Section 12).
6. Tables of occupational diseases according to the Labor Code, National Institute of Research and Safety (INRS, France - RG 25 - Diseases resulting from inhalation of mineral dust containing crystalline silica (quartz, cristobalite, tridymite), crystalline silicates (kaolin, talc), graphite or coal.

Chemical safety assessment : A chemical safety assessment has not been carried out by the Manufacturer of this product.

SECTION 16. OTHER INFORMATION

Legend :

ADR: European Agreement concerning the International Carriage of Dangerous Goods by Road
CAS: Chemical Abstract Services
EC: European Community
EN: European Standard
EU: European Union
IATA: International Air Transport Association
IBC: Intermediate Bulk Container
ICAO: International Civil Aviation Organisation
IMDG: International Maritime Dangerous Goods
Inh: Inhalation
IUCLID: International Uniform ChemicaL Information Database
LC: Lethal Concentration
LD: Lethal Dose
OECD: Organisation for Economic Co-operation and Development
RID: Regulations concerning the International Carriage of Dangerous Goods by Rail
SDS: Safety Data Sheet

Information Source :

1. Material Safety Data Sheet from manufacturer.
2. Canadian Centre for Occupational Health and Safety, CCInfoWeb Databases, 2012 (Chempendium, RTECs, HSDB, INCHEM).
3. European Chemicals Bureau, Existing Chemicals Work Area, EINECS Information System, 2012.
4. European Chemicals Agency, Classification Legislation, 2012.
5. OECD - The Global Portal to Information on Chemical Substances - eChemPortal, 2012.
6. Health and Safety Executive; Respirable crystalline silica - Phase 2 - Carcinogenicity; EH75/5; 2003.

Preparation Date (dd/mm/yyyy)

: 18/04/2012

SAFETY DATA SHEET

This safety data sheet complies with the requirements of Regulation (EC) No. 1907/2006.

R-Phrases (Full text) : R35 - Causes severe burns.
R37/38 - Irritating to respiratory system and skin.
R40 - Limited evidence of a carcinogenic effect.
R41 - Risk of serious damage to eyes.
Refer to section 2 for additional R phrases not listed here.

Other special considerations for handling

: Provide adequate information, instruction and training for operators.

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