ISO 5011 Test Results

Certified to the ISO 5011 Air Filtration Standard

Cold Air Intake Kit

1994-02
Dodge Ram Cummins 2500/3500
L6-5.9L

Part Numbers:
75-5044 (Cotton Filter)
75-5044D (Dry Filter)

S&B Filters, Inc. ● 787 South Wanamaker Avenue ● Ontario, California 91761 ● (909) 947-0015 ● (909) 947-0603 ● www.sbfilters.com

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 Top Table demonstrates the results of the testing for up to three (3) samples per filter type (part number). 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 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 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.

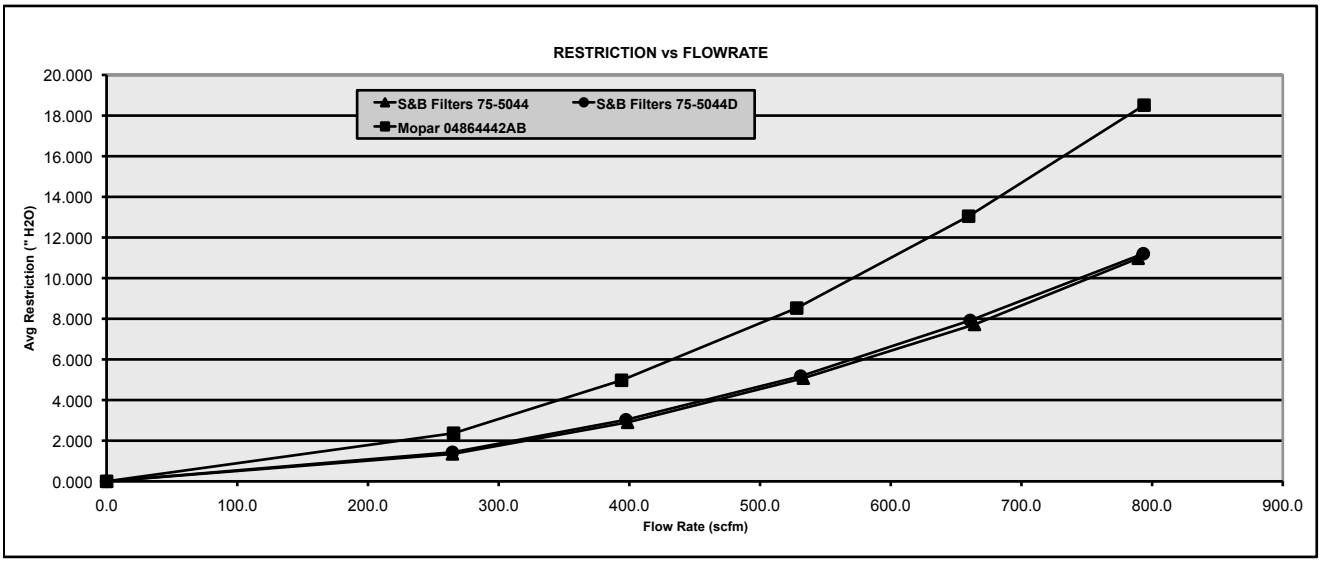
ISO 5011 Air Filtration Standard

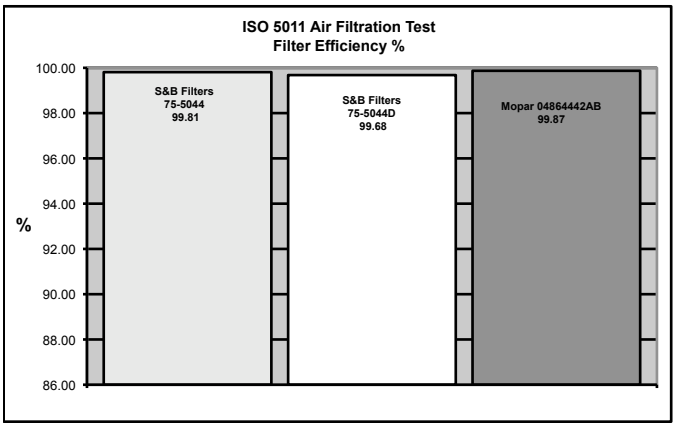
Intake Kit Comparison

S&B Filters75-5044

Test Number 330

Air Filter Mfg. & Part #	INITIAL RESTRIC. ("H2O)	CAPACITY (grams)	EFFICIENCY (%)	Air Flow scfm	Net Restriction (Inches of H2O)	% Less Restrictive than 04864442ABMopar
Filter #1 S&B Filters 75-5044	5.9	274.7	99.81	0.0 264.6 398.6 533.1 664.1 789.4	0.000 1.347 2.903 5.075 7.719 10.976	0.0% 43.1% 41.6% 40.5% 40.8% 40.7%
Filter #2 S&B Filters 75-5044D	6.1	163.8	99.68	0.0 264.6 397.4 531.1 660.8 793.3	0.000 1.429 3.028 5.175 7.918 11.201	0.0% 39.6% 39.1% 39.3% 39.3% 39.5%
Filter #3 Mopar 04864442AB	18.8	406.5	99.87	0.0 265.5 394.0 528.1 659.6 793.8	0.000 2.367 4.973 8.526 13.047 18.512	





ISO 5011 Air Filtration Test
Air Flow Summary

94'-02' Dodge Ram 5.9L Cummins Diesel

S&B Filters Part Number **75-5044** Flows:

40.5% Better Than **OE** at Rated CFM
41.3% Better Than **OE** Across CFM Spectrum

S&B Filters Part Number **75-5044D** Flows:

39.3% Better Than **OE** at Rated CFM
39.4% Better Than **OE** Across CFM Spectrum

The Capacity and Efficiency tests for S&B Filters KF-1035 and KF-1035D were conducted at a higher CFM (653CFM).

AVERAGE ENVIRONMENTAL CONDITIONS & TEST SPECIFICATIONS

Temperature:	71.07	deg F
Relative Humidity:	50.43	%
Baro Pressure:	28.96	mmHg
Test Stand:	# 1	
Inlet Size:	3.75	inches

Housing:	uni con	
Contaminant:	Coarse	
Contam. Lot #:	5457C	
Dust Feed Rate:	18.28	grams/minute
Rated Flow:	529	cfm

Testing was conducted based on the ISO 5011 Air Filtration standard.

Determination of Gasoline and Diesel Engine Air Consumption

CFM Calculator: Enter Data in Blue Shaded Areas

Engine Displacement (cubic inches)	**360.0**
RPM at maximum horse power	**2,900**
Cycle Factor:	**2**
Enter "2" for 4 Cycle Diesel and Gasoline	
Enter "1" for 2 Cycle Diesel and Gasoline	
Volumetric Efficiency:	**1.75**
Naturally Aspirated Gasoline & Diesel Engines Enter "0.8"	
Super Charged Engines Enter "1.30"	
Turbocharged Engines Enter "1.75"	

Liters to CID Converter

Liters:	5.9
Cubic Inches:	360.0

Vehicle Information

Model Year	1994-2002
Make	Dodge
Model	Ram 2500,3500
Engine Specs	L6 Turbo Diesel

Based on the information entered above, the estimated CFM of the vehicle at maximum Horse Power is:	**529**

CYCLE FACTOR	Cycle Factor
4 Cycle Gasoline and Diesel Engine	2
2 Cycle Gasoline and Diesel Engine	1

VOLUMETRIC EFFICIENCY	Volumetric Efficiency (Approximate)
Naturally Aspirated Gasoline & Diesel Engines	0.8
Supercharged Engines	1.30
Turbocharged Engines	1.75

Note: The 1.75 volumetric efficiency is applicable only at top governed engine speed under full load conditions.

EQUATION

The following is a method of determining approximated gasoline and diesel engine air flow requirement:

$$\text{Air Flow (CFM)} = \frac{\text{Displacement (cubic inches)}}{1728} \times \frac{\text{RPM}}{\text{Cycle Factor}} \times \text{Volumetric Efficiency}$$

EXAMPLE

Information necessary to calculate air consumption:

Ford F250 7.3L V8 Diesel Truck

4 cycle, 2800 RPM@Maximum HP, 445.4 (cubic inches) displacement, turbocharged

$$\text{Air Flow (CFM)} : \frac{445.4}{1728} \times \frac{2800}{2} \times 1.75 = 631 \text{ CFM}$$

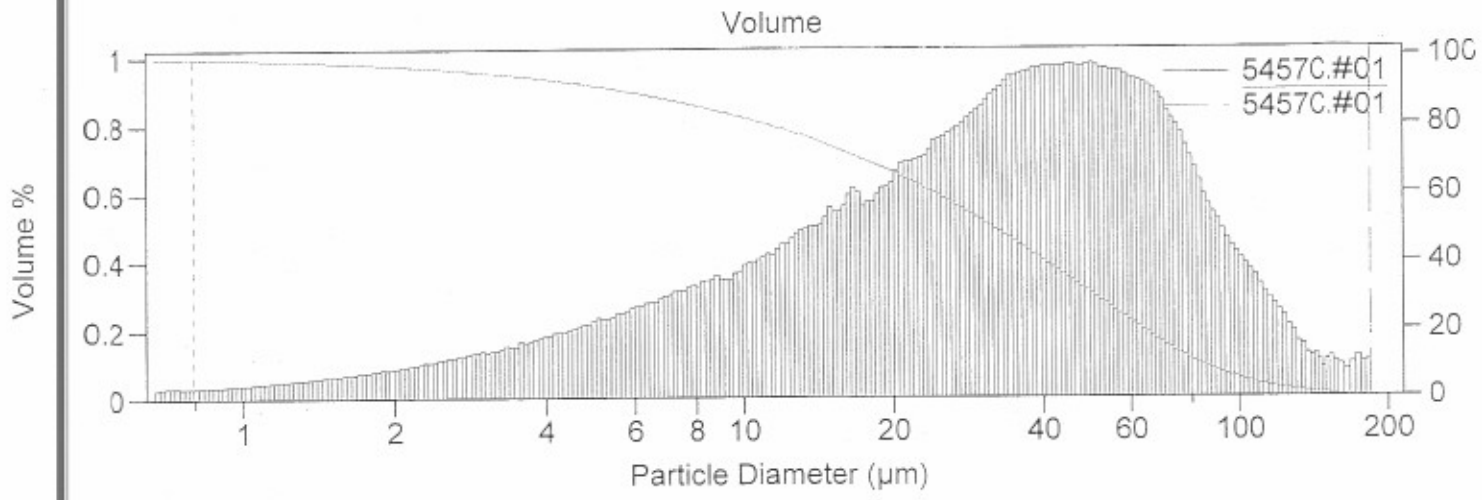
COULTER® MULTISIZER AccuComp® 1.19

17 Apr 2007

POWDER TECHNOLOGY, INC.

PTI
POWDER TECHNOLOGY INC.
14581 Ewing Avenue South Burnsville, Minnesota 55306
Phone: 952-894-8737

Filename: 5457C.#01 Sample Number: 200
Group ID: 5457C
Sample ID: ISO 12103-1, A4 COARSE TEST DUST
Comment: SAE COARSE TEST DUST, NIST TRACEABLE
Operator: LHA
Electrolyte: ISOTON II
Dispersant: TYPE IC
Aperture Size: 400 µm 5457d.#01
200 µm 5457d.#02
100 µm 5457d.#03
30 µm 5457d.#04
Acquired: 17:51 4 Apr 2007
Serial Number: 33
Edited size data



LC= 0.794 µm UC= 184.4 µm {99.75%}

Volume Statistics (Geometric) 5457C.#01

Calculations from 0.794 µm to 184.4 µm

Volume	4.967e9 µm^3		
Mean:	25.84 µm	S.D.:	47.4 µm
Median	31.56 µm	Variance:	2250 µm^2
Mean/Median Ratio:	0.819		
Mode:	49.89 µm		
Spec. surf. area:	0.476 m^2/ml		

% >	10	25	50	75	90
Size µm	82.30	55.98	31.56	14.15	5.778

Cumulative Volume Micron size	Numeric data% less than
1	0.6
2	2.5
3	4.5
4	6.6
5	8.6
7	12.7
10	18.3
20	34.3
40	60.2
80	89.2
120	97.4
180	99.9
200	100.0

MATERIAL SAFETY DATA SHEET

Section 1: Product/Company Information

Identity: Arizona sand including Arizona Road Dust, Arizona Silica, AC Fine and AC Coarse Te Dusts, SAE Fine and Coarse Test Dusts, J726 Test Dusts, ISO Ultrafine, ISO Fine, ISO Medium a ISO Coarse Test Dusts, MIL STD 810 Blowing Dust.

Mfg. Name: Powder Technology Inc.
14331 Ewing Avenue S.
Burnsville, MN 55306

Emergency Number: (952) 894-8737
Number for Info: (952) 894-8737
Date Updated: 2 March 2006

Section 2: Emergency and First Aid

Eyes: Immediately flush eye thoroughly with water. Get medical attention if irritation persists.

Skin: N/A

Inhalation: Remove person to fresh air. If breathing is difficult, administer oxygen. If not breathing, give artificial respiration. Seek medical help if coughing and other symptoms do not subside.

Ingestion: Do not induce vomiting. If conscious, have the victim drink plenty of water and call a physician if discomfort is experienced.

Section 3: Composition Information

Typical chemical composition:

Chemical	CAS Number	Percent of Weight
SiO_2	14808-60-7	68-76%
Al_2O_3	1344-28-1	10-15%
Fe_2O_3	1309-37-1	2-5%
Na_2O	1313-59-3	2-4%
CaO	1305-78-8	2-5%
MgO	1309-48-4	1-2%
TiO_2	13463-67-7	0.5-1.0%
K_2O	12136-45-7	2-5%

Loss on Ignition 2 - 5 %

All components of this material are included on the TSCA Inventory.

Section 8: Fire and Explosion Hazard Data

Flash Point: None

Auto ignition Temperature: Not combustible

Flammable Limits: N/A

Extinguishing Media: Not Combustible

Hazardous Combustion Products: None

Lower Explosive Limit: None

Upper Explosive Limit: None

Special Fire Fighting Procedures: None

Unusual Fire and Explosion Hazards: None

Section 9: Stability and Reactivity Data

Stability:	Product is stable
Incompatibility (Materials to Avoid):	Strong Acids
Hazardous Decomposition:	Will not occur
Hazardous Polymerization:	Will not occur

Section 10: Handling and Storage

Handle and store in a manner so that airborne dust does not exceed applicable exposure limits. Use adequate ventilation and dust collection. Use exposure control and personal protection methods as described in Section 12.

Section 11: Toxicological Information

Conditions aggravated by exposure: Eye disease, Skin disorders and Chronic Respiratory conditions.

Section 12: Exposure Control/Personal Protection

Respiratory Protection:	Use local exhaust or general dilution ventilation to control dust levels below applicable exposure limits. Minimize dispersal of dust into the air. Use appropriate NIOSH approved respiratory protection for respirable crystalline silica.
Eye Protection:	Wear safety glasses with side shields or goggles to avoid contact with the eyes. In extremely dusty environments and unpredictable environments, wear tight-fitting unvented or indirectly vented goggles to avoid eye irritation or injury