



ISO 5011 Test Results

Certified to the ISO 5011 Air Filtration Standard

Cold Air Intake Kit

2007-08 Ford F150 V8-4.6L

Part Numbers:

75-5022 (Cotton Filter)

75-5022D (Dry Filter)

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 ΔP* . 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.

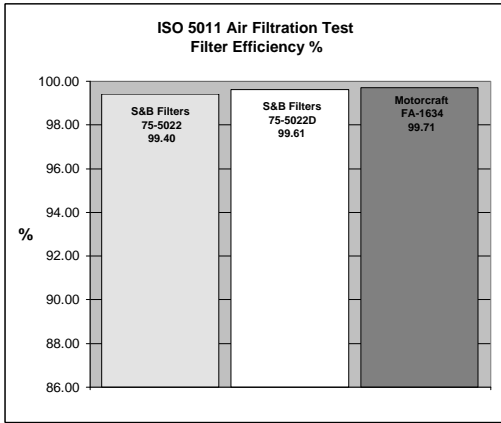
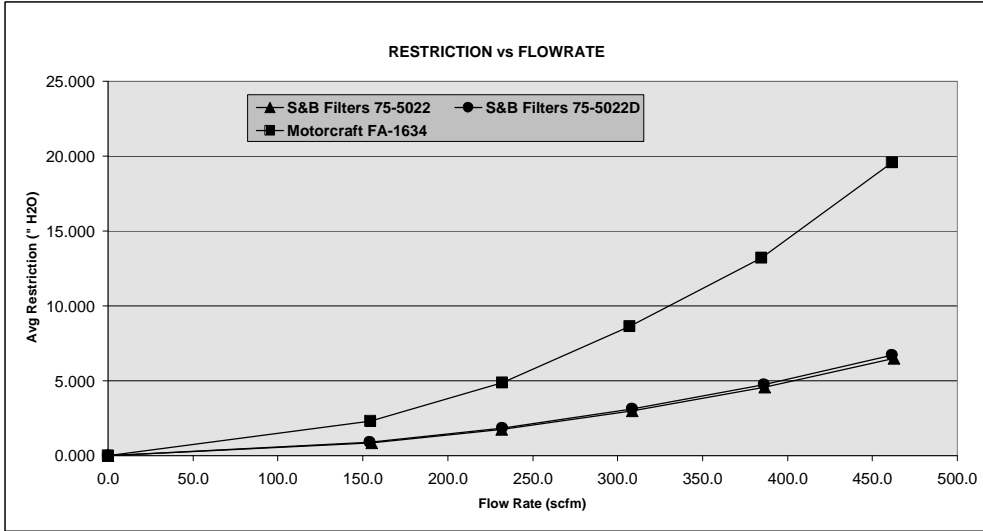
Capacity

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 Filters 75-5022
Test Number 329**

Air Filter Mfg. & Part #	INITIAL RESTRICT. ("H ₂ O)	CAPACITY (grams)	EFFICIENCY (%)	Air Flow scfm	Net Restriction (Inches of H ₂ O)	% Less Restrictive than FA-1634/Motorcraft
Filter #1	2.3	234.0	99.40	0.0	0.000	0.0%
S&B Filters 75-5022				155.1	0.834	63.8%
				231.7	1.770	63.7%
				308.5	2.999	65.2%
				386.5	4.583	65.3%
				462.8	6.493	66.8%
Filter #2	2.4	296.7	99.61	0.0	0.000	0.0%
S&B Filters 75-5022D				154.0	0.880	61.8%
				232.2	1.827	62.5%
				308.6	3.118	63.8%
				386.4	4.760	64.0%
				461.4	6.724	65.8%
Filter #3	2.6	345.6	99.71	0.0	0.000	
Motorcraft FA-1634				154.5	2.306	
				232.3	4.874	
				306.9	8.615	
				384.7	13.222	
				461.4	19.565	



**ISO 5011 Air Filtration Test
Air Flow Summary**

07-'08' Ford F-150 4.6L

S&B Filters Part Number 75-5022 Flows:

65.2% Better Than OE at Rated CFM
65.0% Better Than OE Across CFM Spectrum

S&B Filters Part Number 75-5022D Flows:

63.8% Better Than OE at Rated CFM
63.6% Better Than OE Across CFM Spectrum

The capacity and efficiency tests for S&B Filters KF-1031 and KF-1031D were conducted at a higher CFM (381 CFM)

AVERAGE ENVIRONMENTAL CONDITIONS & TEST SPECIFICATIONS

Temperature:	71.03 deg F	Housing:	uni con
Relative Humidity:	50.53 %	Contaminant:	Coarse
Baro Pressure:	28.94 mmHg	Contam. Lot #:	10210C
Test Stand:	#1	Dust Feed Rate:	10.67 grams/minute
Inlet Size:	3.275 inches	Rated Flow:	309 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)	280.7
RPM at maximum horse power	4,750
Cycle Factor:	2
Enter "2" for 4 Cycle Diesel and Gasoline Enter "1" for 2 Cycle Diesel and Gasoline	
Volumetric Efficiency:	0.8
Naturally Aspirated Gasoline & Diesel Engines Enter "0.8" Super Charged Diesel Engines Enter "1.30" Turbocharged Diesel Engines Enter "1.75"	

Liters to CID Converter

Liters:	4.6
Cubic Inches:	280.7

Vehicle Information

Model Year	2007
Make	Ford
Model	F-150
Engine Specs	4.6L V8 gas 248HP

Based on the information entered above, the estimated CFM of the vehicle at maximum Horse Power is:	309
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CYCLE FACTOR	
	Cycle Factor
4 Cycle Diesel and Gasoline Engine	2
2 Cycle Diesel and Gasoline Engine	1

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

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

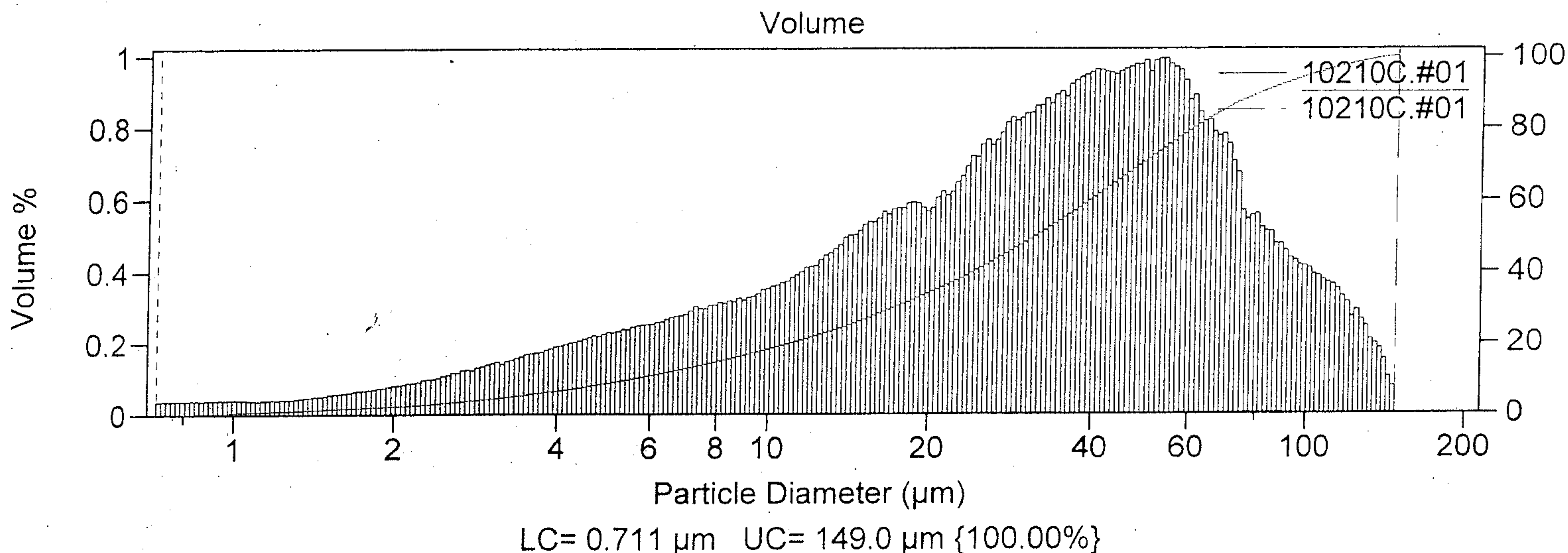
EQUATION	
The following is a method of determining approximated gasoline and diesel engine air flow requirement:	
Air Flow (CFM) = $\frac{\text{Displacement (cubic inches)}}{1728} \times \frac{\text{RPM}}{\text{Cycle Factor}} \times \text{Volumetric Efficiency}$	

EXAMPLE	
Information necessary to calculate air consumption:	
Ford F250 7.3L V8 Diesel Truck	
4 cycle, 2800 RPM, 443.1 (cubic inches) displacement, turbocharged	
Air Flow (CFM) : $\frac{443.1}{1728} \times \frac{2800}{2} \times 1.75 = 628 \text{ CFM}$	



14331 Ewing Avenue South Burnsville, Minnesota 55306
Phone: 952-894-8737

Filename: 10210C.#01 Sample Number: 200
 Group ID: 10210C
 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 10210d.#01
 200 µm 10210d.#02
 100 µm 10210d.#03
 30 µm 10210d.#04
 Acquired: 23:04 16 Feb 2009
 Serial Number: 123
 Edited size data



Volume Statistics (Geometric)

10210C.#01

Calculations from 0.711 µm to 149.0 µm

Volume: 4.886e9 µm³
 Mean: 25.25 µm S.D.: 46.6 µm
 Median: 31.23 µm Variance: 2170 µm²
 Mean/Median Ratio: 0.808
 Mode: 54.13 µm
 Spec. surf. area: 0.477 m²/ml

% >	10	25	50	75	90
Size µm	81.25	54.43	31.23	13.97	5.507

Micron Size	Cumulative Volume % less than
1	0.6
2	2.4
3	4.5
4	6.7
5	8.9
7	13.0
10	18.4
20	34.5
40	60.7
80	89.5
120	97.9
180	100.0
200	100.0

POWDER TECHNOLOGY, INC.

10210C.#01

Channel Number	Particle Diameter µm	Diff Number %	Cum < Number %	Diff Volume %	Cum < Volume %
1	0.711	22.30	0	0.187	0
6	0.790	16.92	22.30	0.194	0.187
11	0.876	12.82	39.22	0.201	0.380
16	0.973	9.40	52.05	0.201	0.581
21	1.080	6.67	61.45	0.196	0.782
26	1.199	5.22	68.12	0.209	0.978
31	1.331	4.42	73.34	0.243	1.19
36	1.477	3.71	77.75	0.279	1.43
41	1.640	3.15	81.46	0.324	1.71
46	1.820	2.66	84.61	0.374	2.03
51	2.020	2.24	87.27	0.430	2.41
56	2.243	1.91	89.51	0.503	2.84
61	2.489	1.64	91.42	0.590	3.34
66	2.763	1.36	93.06	0.670	3.93
71	3.067	1.11	94.42	0.745	4.60
76	3.405	0.919	95.52	0.846	5.35
81	3.779	0.746	96.44	0.939	6.19
86	4.195	0.601	97.19	1.03	7.13
91	4.657	0.477	97.79	1.12	8.16
96	5.169	0.373	98.27	1.20	9.29
101	5.738	0.290	98.64	1.27	10.48
106	6.369	0.228	98.93	1.37	11.76
111	7.070	0.182	99.16	1.50	13.13
116	7.848	0.140	99.34	1.57	14.63
121	8.712	0.107	99.48	1.65	16.20
126	9.670	0.085	99.59	1.80	17.84
131	10.73	0.068	99.67	1.96	19.64
136	11.92	0.055	99.74	2.16	21.60
141	13.23	0.045	99.80	2.43	23.76
146	14.68	0.036	99.84	2.67	26.19
151	16.30	0.028	99.88	2.85	28.86
156	18.09	0.021	99.91	2.92	31.71
161	20.08	0.016	99.93	3.04	34.63
166	22.29	0.013	99.94	3.44	37.66
171	24.74	0.011	99.96	3.81	41.10
176	27.47	0.009	99.97	4.12	44.91
181	30.49	0.007	99.98	4.30	49.03
186	33.84	0.005	99.98	4.53	53.33
191	37.57	0.004	99.99	4.76	57.86
196	41.70	0.003	99.99	4.78	62.63
201	46.29	0.002	99.99	4.87	67.40
206	51.38	0.002	100.00	4.92	72.27
211	57.03	0.001	100.00	4.50	77.19
216	63.31	0.001	100.00	3.98	81.69
221	70.27	0.0041	100.00	3.25	85.67
226	78.01	0.0024	100.00	2.67	88.91
231	86.59	0.0015	100.00	2.28	91.58
236	96.12	9.8E-5	100.00	2.02	93.85
241	106.7	6.4E-5	100.00	1.80	95.88

MATERIAL SAFETY DATA SHEET

Section 1: Product/Company Information

Identity: Arizona sand including Arizona Test Dust, 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 12103-1, A3 Medium Test Dust and ISO 12103-1, A4 Coarse Test Dust, 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: 9 January 2008

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 ₂ O ₃	1344-28-1	10-15%
Fe ₂ O ₃	1309-37-1	2-5%
Na ₂ O	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 ₂ O	12136-45-7	2-5%

Loss on Ignition 2 - 5 %

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

Section 4: Hazardous Ingredients/Identity Information

This product contains free silica. Inhalation of dust may be harmful to your health. NIOSH has recommended a PEL of 0.05 mg/m^3 as determined by a full shift sample up to 10 hours working day, 40 hours per week.

H.M.I.S. ratings: Health – * Flammability – 0 Reactivity - 0

* see Section 5 of this MSDS for further information on health effects

Section 5: Hazard Identification

Potential Health Effects: Potential health effects may vary depending upon the duration and degree of exposure. To reduce or eliminate health hazards associated with this product, use exposure controls or personal protection methods as described in Section 12.

Eye Contact: (Acute/Chronic) Exposure to airborne dust may cause immediate or delayed irritation or inflammation of the cornea.

Inhalation: (Chronic) Inhalation exposure to free silica may cause delayed lung injury, including silicosis, a disabling and potentially fatal lung disease, and/or cause or aggravate other lung diseases or conditions.

Carcinogenic Potential: This product contains free silica, which IARC classifies as a known human carcinogen. The NTP, in its Ninth Annual Report on Carcinogens, classified “silica, crystalline (respirable)” as a known carcinogen.

Section 6: Accidental Release Measures

Use clean-up methods that do not disperse dust into the air. Avoid inhalation of dust and contact with eyes. Use exposure control and personal protection methods as described in Section 12.

Section 7: Physical/Chemical Data

Boiling Point:	4040 ⁰ F
Specific Gravity (H₂O = 1.0):	2.65
Vapor Pressure:	Not applicable
Solubility in Water:	Insoluble
Appearance:	Tan, Brown, Light Brown, Reddish Brown.
Odor:	No Odor
Physical State:	Solid
Vapor Density:	Not applicable

Section 8: Fire and Explosion Hazard Data

Flash Point: None

Lower Explosive Limit: None

Auto ignition Temperature: Not combustible

Upper Explosive Limit: None

Flammable Limits: N/A

Special Fire Fighting Procedures: None

Extinguishing Media: Not Combustible

Unusual Fire and Explosion Hazards: None

Hazardous Combustion Products: 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.

Section 13: Disposal Considerations

All disposal methods must be in accordance with all Federal, State/Provincial and local laws and regulations. Regulations may vary in different locations. Waste characterization and compliance with applicable laws are the responsibility solely of the waste generator.

Section 14: Transportation Data

Arizona Test Dust is not hazardous under U.S. DOT or TDG regulations.

Section 15: Other Regulatory Information

**Status under US OSHA Hazard
Communications Rule 29 CFR 1910.1200:**

Silica sand is considered a hazardous chemical under this regulation and should be included in the employer's hazard communication program.

**Status under CERCLA/Superfund, 40 CFR
117 and 302:**

Not listed

**Hazard Category under SARA (Title III),
Sections 311 and 312:**

Silica sand qualifies as a hazardous substance with delayed health effects.

Status under SARA (Title III), Section 313:

Not subject to reporting requirements under Section 313

**Status under Canadian Environmental
Protection Act:**

Not listed.

Section 16: Other Information

The information and recommendations contained herein are based upon data believed to be correct. However, no guarantee or warranty of any kind, express or implied, is made with respect to the information contained herein. It is the user's obligation to determine the conditions of safe use of this product.