California Environmental Engineering

ENVIRONMENTAL TESTING LABORATORY
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May 2, 1991

Mr. Don Means
Sonic Dry Clean
12255 Kirkman Rd. Suite 200
Poway, CA 92064

RE: Air filter test

Dear Mr. Means,

On April 25, 1991, California Environmental Engineering was hired to observe a test on four air filters and the Sonic Dry Clean System. California Environmental Engineering's manager Larry Swiencki was present for the tests performed by Sonic Dry Clean. Sonic Dry Clean personnel Mr. Don Means, Mr. Joel Champion and Mr. John Dollman were conducting the tests. A vein type blower was used to draw air through the test filters with a Dwyer Monometer measuring 0 to 18" of water. The blower itself pulled 2.8" of water when unobstructed. We then placed a plexiglass cover measuring 1' x 1' x 2' over the blower inlet and measured 1.6" of water.

The filters chosen for this test were a new Duralife (A), a new Baldwin (B), a new K&N (C), and a Fleetgard (D), which had been cleaned with the Sonic Dry Clean System. All filters were weighed prior to testing. The weights were for filter A, 9.181 lbs, for filter B, 7.611 lbs., filter C, 7.980 lbs., and filter D, 7.893 lbs. After weighing, all the filters were flow checked using the blower and manometer. The baseline flows were the following measured in inches of water, with the plexiglass cover over each filter to simulate in use conditions as though the air filter was in its own air box as on large trucks and off-road equipment. Filter A measured 2.5", filter B, 2.5", filter C, 2.3" and filter D, 2.7".

To simulate clogged air filters we used dry paint in four different colors. The paint was weighed prior to use on each filter. The red paint used on filter A weighed 2.117 lbs., yellow paint used on filter B weighed 2.075 lbs., green paint used on filter C weighed 1.936 lbs., and orange paint used on filter D weighed 2.048 lbs.

Each filter was then wrapped in a plastic bag placed on the blower inlet. The paint was then poured down the side of the filter as the filter was turned to completely coat the filter surface. The filters were then flow checked. Filter A had 4.0" of water, filter B, 4.7" of water, filter C, 2.4" of water and filter D had 5.0" of water.

CALIFORNIA ENVIRONMENTAL ENGINEERING'S ENVIRONMENTAL TESTING LABORATORY
Results of an Independent Test Conducted for Sonic Dry Clean, Inc.

TEST FILTER WEIGHTS AND PERCENTAGES

FILTER NAME & TEST NUMBER	Clean Filter Weight	Weight of Paint Added	Filter Weight with Paint	Amount of Paint Trapped by Filter	Percent of Paint Trapped by Filter	Filter Weight after Sonic Dry Clean	Percent of Original Weight
DURALIFE (New) Filter "A"	9.181 lbs.	2.117 lbs.	11.298 lbs.	2.108 lbs.	99.6%	9.412 lbs.	102.5%
BALDWIN (New) Filter "B"	7.611 lbs.	2.075 lbs.	9.686 lbs.	2.049 lbs.	98.7%	7.780 lbs.	102.2%
K&N (New) Filter "C"	7.980 lbs.	1.936 lbs.	9.916 lbs.	1.623 lbs.	83.8%	9.264 lbs.	116.1%
FLEETGARD (Used) Filter "D" (Sonic Dry Cleaned)	7.893 lbs.	2.048 lbs.	9.941 lbs.	2.047 lbs.	99.95%	7.958 lbs.	100.8%

MANOMETER READINGS (Inches of Water)

FILTER NAME & TEST NUMBER	Baseline Filter Readings	After Test Injection of Paint	After Sonic Dry Clean
DURALIFE (New) [Filter "A"]	2.5 inches	4.0 inches	2.6 inches*
BALDWIN (New) [Filter "B"]	2.5 inches	4.7 inches	2.6 inches*
K&N (New) [Filter "C"]	2.3 inches	2.4 inches	2.3 inches*
FLEETGARD (Used) [Filter "D"]	2.7 inches	5.0 inches	2.7 inches*

* Post-tested

After the flow check, each filter was again weighed to compare how much paint each filter trapped. Filter A weighed 11.289 lbs., filter B weighed 9.660 lbs., filter C weighed 9.603 lbs., and filter D weighed 9.940 lbs.

The next step was to clean all the filters using the Sonic Dry Clean System. When the cleaning was complete all the filters were reweighed. Filter A weighed 9.412 lbs., filter B weighed 7.780 lbs., filter C, 9.264 lbs., and filter D weighed 7.958 lbs.

The conclusions for this test are interesting for many reasons. If you take the weight of each filter and add the weight of the paint, you will see that the Duralife (A), Baldwin (B), and the Sonic cleaned Fleetgard (D) trapped over 98.7% of the paint as opposed to the K&N filter which trapped only 83.8% of the paint. When you look at the monometer readings, the K&N filter showed very little change after the paint was put in the filter, only 1/10 of an inch difference from the base reading. Also of note, is that after all the filters were Sonic Dry Cleaned, the Duralife (A), Baldwin (B), and the Fleetgard (D) filters were returned to within 2.5% of their original weight where as the K&N filter (C) weighed 16.1% more than the original weight.

California Environmental Engineering concludes that the Sonic Dry Clean method is an efficient, fast and cost effective way to clean air filters when a good quality air filter is used. It is evident that this process will extend the life of air filters while at the same time lower maintenance costs.

If there are any questions please call (714) 630-8555. Thank you.

Sincerely,

Larry Swiencki

Larry Swiencki
Lab Manager
C.E.E.