

TEST
Evaluation
of
Advance Power Systems International Inc.

Fitch

Fuel Catalyst

Prepared by
Vehicle and Engine Emission Testing Services
15-17 Trade Zone Drive
Ronkonkoma NY 11779

Project Description:

Advanced Power Systems International Inc. (APSI) 558 Lime Rock Rd.
Lakeville, CT. 06039 manufactures the Fitch Fuel Catalyst System (FFC Device)
that may be installed on either gasoline or diesel fueled engines.

The FFC Device is designed to improve energy efficiency while minimizing
impact to the environment.

APSI elected to perform the Environmental Protection Agency (EPA) Federal
Test Procedure (FTP) CVS-75 to evaluate what benefits may be achieved
from installing the FCD System on a Diesel fuel vehicle.

Tailpipe emission gases to be measured:

Hydrocarbons.....(HC)
Carbon Monoxide.....(CO)
Nitric Oxide.....(NOx)
Particulate Matter(PM)
Carbon Dioxide.....(CO₂) Miles per gallon

The vehicle selected:

GMC-2500
Model year 2002
6.6 Diesel engine
Vin # F235320

No EGR, No Exhaust Catalytic Converter, No modifications to EMU software

Fuel used for this test was commercially purchased low sulfur transportation
diesel on board the vehicle at the time of delivery to VEETS. Fuel specifications:

API Gravity at 60F – 36.26	Sulfur – 0.0291
Carbon Weight - 88%	Specific Heat – 18,600
Cetane Index - 47.65	

The schedule of tests performed:

<u>Date</u>	<u>Event</u>
March 30, 2004	Vehicle delivered to VEETS by Fitch
March 31, 2004	One (1) Baseline Test CVS-75 Fitch Device (F750) Installed and 200 mile Accumulation
April 5, 2004	One (1) Retrofit Test-CVS-75
April 6, 2004	Vehicle placed in normal service.
June 1, 2004	Fitch Fuel Catalyst Device removed from vehicle
June 2, 2004	Vehicle placed in normal service.
July 20-21, 2004	Vehicle returns to VEETS laboratory. Three (3) Baseline Test CVS-75 Fitch Device Installed (F750) and idled for three (3) hours
July 22-23, 2004	Three (3) Retrofit Test-CVS-75

These procedures were designed to be an A-B-A-B comparison of the impact of the Fitch Fuel Catalyst. Where A=Baseline test, and B= Retrofit test.

Prior to delivery to VEETS the vehicle had routine oil and oil filter change and OBD scan performed by a GMC dealer. The vehicle was determined to be normal operating condition.

Test Performed at VEETS:

1. CVS-75 were conducted to establish a baseline.
2. Thereafter the vehicle is fitted with the FFC (model F750) system. The vehicle was started and idled for three (3) hours to insure exposure of circulated fuel to catalyst in the In Line unit.
3. Subsequent Retrofit CVS-75 were performed.
4. The baseline and retrofit data are then compared.

Baseline Test CVS-75

Date: 3/31/04

Manufacturer: GMC

Model: Duramax 2500 Diesel HD

Model Year: 2002

Vin: F235320

Odometer: 38078

ALW: 6500 (Adjusted loaded vehicle Wt.)

Dyno Settings:

Fuel: Diesel (Commercially Purchased)

Single Roll: TRLHP-Fo-35.87

F1-2.3804

F2-0.0243

Twin Roll: Inertia Wt.: 6500lbs.

IRLHP: 18.6

Test Results

Hydrocarbons (HC)	Oxides of Nitrogen (NOx)	Carbon Monoxide (CO)	Carbon Dioxide (CO2)	Particulates (PM)	Miles per Gallon
grams/mile	grams/mile	grams/mile	grams/mile	grams/mile	
0.464	2.977	3.868	985.213	0.32	10.25

Retrofit Test-CVS-75

Date 4/5/2004

Fitch Device Installed 200 mile Accumulation

Manufacturer: GMC

Model: Duramax 2500 Diesel HD

Model Year: 2002

Vin: F235320

Odometer: 38288

ALW: 6500 (Adjusted loaded vehicle Wt.)

Dyno Settings:

Fuel: Diesel (Commercially Purchased)

Single Roll: TRLHP-Fo-35.87

F1-2.3804

F2-0.0243

Twin Roll: Inertia Wt.: 6500lbs.

IRLHP: 18.6

Test Results

Hydrocarbons (HC)	Oxides of Nitrogen (NOx)	Carbon Monoxide (CO)	Carbon Dioxide (CO2)	Particulates (PM)	Miles per Gallon
grams/mile	grams/mile	grams/mile	grams/mile	grams/mile	
0.376	3.275	2.972	842.122	0.29	12.0

Baseline Test CVS-75
Date: 7/20/04 – 7/21/04

Manufacturer: GMC
Model Year: 2002
Odometer: 44267
Dyno Settings:

Model: Duramax 2500 Diesel HD
Vin: F235320
ALW: 6500 (Adjusted loaded vehicle Wt.)
Fuel: Diesel (Commercially Purchased)

Single Roll: TRLHP-Fo-35.87
F1-2.3804
F2-0.0243

Twin Roll: Inertia Wt.: 6500lbs.
IRLHP: 18.6

Baseline Test Results CVS-75

Hydrocarbons (HC) grams/mile	Oxides of Nitrogen (NOx) grams/mile	Carbon Monoxide (CO) grams/mile	Carbon Dioxide (CO2) grams/mile	Particulates (PM) grams/mile	Miles/Gal.
0.089	3.595	1.812	942.428	0.376	10.761
0.068	3.647	1.562	948.771	0.316	10.695
0.086	3.972	1.715	977.795	0.414	10.375

Retrofit Test-CVS-75

7/22/04 – 7/23/04

Fitch Device Installed and idled for three (3) hours

Manufacturer: GMC

Model: Duramax 2500 Diesel HD

Model Year: 2002

Vin: F235320

Odometer: 44328

ALW: 6500 (Adjusted loaded vehicle Wt.)

Dyno Settings:

Fuel: Diesel (Commercially Purchased)

Single Roll: TRLHP-Fo-35.87

F₁-2.3804

F₂-0.0243

Twin Roll: Inertia Wt.: 6500lbs.

IRLHP: 18.6

Retrofit Test Results CVS-75

Hydrocarbons (HC) grams/mile	Oxides of Nitrogen (NOx) grams/mile	Carbon Monoxide (CO) grams/mile	Carbon Dioxide (CO ₂) grams/mile	Particulates (PM) grams/mile	Miles/Gal.
0.097	3.291	1.829	850.363	0.238	11.921
0.079	2.547	2.048	838.411	0.238	12.087
0.102	3.203	1.849	833.556	0.246	12.16

Summary of Tests

Date	Event	Hydrocarbons (HC) grams/mile	Oxides of Nitrogen (NOx) grams/mile	Carbon Monoxide (CO) grams/mile	Carbon Dioxide (CO2) grams/mile	Particulates (PM) grams/mile	Miles per Gallon
3/31/04	Baseline 1	0.464	2.977	3.868	985.213	0.32	10.25
4/5/04	Retrofit 1	0.376	3.275	2.972	842.122	0.29	12.0
6/1/04	FFC removed						
7/20/04	Baseline 2-1	0.089	3.595	1.812	942.428	0.376	10.761
thru	Baseline 2-2	0.068	3.647	1.562	948.771	0.316	10.695
7/21/04	Baseline 2-3	0.086	3.972	1.715	977.795	0.414	10.375
7/22/04	Retrofit 2-1	0.097	3.291	1.829	850.363	0.238	11.921
thru	Retrofit 2-2	0.079	2.547	2.048	838.411	0.238	12.087
7/23/04	Retrofit 2-3	0.102	3.203	1.849	833.556	0.246	12.160
	Average of Baselines	0.177	3.548	2.239	963.552	0.357	10.52
	Average of Retrofits	0.164	3.079	2.175	841.113	0.253	12.042
	Difference	-0.013	-0.469	-0.065	-122.439	-0.104	+1.522
	Percent Improvement	-7.5%	-13.21%	-2.89%	-12.71%	-29.03%	+14.46%

Baseline Tests

Vehicle in standard condition

Retrofit Tests

Vehicle with Fitch Fuel Catalyst installed

Conclusions:

Comparison of results of the average of Baseline and Retrofit CVS-75 Fuel Economy and Emissions evaluations show statistically consistent improvement in fuel economy and emissions resulting from the installation of the Fitch Fuel Catalyst device.

Fuel Economy per 78 FTP 40CFR 600.113-88-93