TEST
Evaluation
of
Advance Power Systems International Inc.

Fitch Fuel Catalyst

Prepared by

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Vehicle and Engine Emission Testing Services, (VETS) test results are recognized by the EPA, & CARB. Over two decades of experienc.

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Project Description:

Advanced Power Systems International Inc. (APSI) manufactures the Fitch Fuel Catalyst System (FCD) that may be installed on either gasoline or diesel fueled engines.

The Fitch Fuel Catalyst is designed to improve energy efficiency and reduce emissions.

APSI selected VETS to perform the Environmental Protection Agency (EPA) Federal Test Procedure (FTP) CVS-75 to evaluate the benefit that may be achieved by installing the Fuel Catalyst Device 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

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

Test Performed at VETS:

1. Three (3) CVS-75 were conducted to establish a baseline.

2. Thereafter the vehicle is fitted with the Fuel Catalyst Device (F750). The vehicle was started and idled for three (3) hours to insure exposure of circulated fuel to catalyst in the In Line unit. The vehicle was cold soak conditioned.

3. Subsequently three (3) Retrofit CVS-75 were performed.

4. The baseline and retrofit data are then compared.

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 (Supplied by Fitch Commercially purchased Premium Mobil diesel fuel)

Single Roll: TRLHP-Fo-35.87
F_1-2.3804
F_2-0.0243

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

Baseline Test Results CVS-75

	Hydrocarbons (HC) plus Oxides of Nitrogen (NOx)	Carbon Monoxide (CO)	Carbon Dioxide (CO2)	Particulates (PM)	Miles/Gal.
	grams/mile	grams/mile	grams/mile	grams/mile	
	3.684	1.812	942.428	0.376	10.761
	3.715	1.562	948.771	0.316	10.695
	4.058	1.715	977.795	0.414	10.375
Average	3.819	1.696	956.331	0.369	10.610

Retrofit Test-CVS-75
7/22/04 – 7/23/04
Fitch Device Installed

Manufacturer: GMC
Model Year: 2002
Odometer: 44328
Dyno Settings:

Model: Duramax 2500 Diesel HD
Vin: F235320
ALW: 6500 (Adjusted loaded vehicle Wt.)
Fuel: Diesel (Supplied by Fitch – Same tank used in baseline)

Single Roll: TRLHP-Fo-35.87
F_1-2.3804
F_2-0.0243

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

Retrofit Test Results CVS-75

	Hydrocarbons (HC) plus Oxides of Nitrogen (NOx)	Carbon Monoxide (CO)	Carbon Dioxide (CO2)	Particulates (PM)	Miles/Gal.
	grams/mile	grams/mile	grams/mile	grams/mile	
	2.626	2.048	838.411	0.238	12.087
	3.388	1.829	850.363	0.238	11.921
	3.305	1.849	833.556	0.245	12.16
Average	3.106	1.909	840.777	0.240	12.056

Summary of Test Results

	Hydrocarbons (HC) plus Oxides of Nitrogen (NOx)	Carbon Monoxide (CO)	Carbon Dioxide (CO2)	Particulates (PM)	Miles/Gal.
	grams/mile	grams/mile	grams/mile	grams/mile	
Baseline Avg.	3.819	1.696	956.331	0.369	10.610
Retrofit Avg.	3.106	1.909	840.777	0.240	12.056
Difference	-0.713	0.212	-115.555	-0.128	1.446
% Change	-18.66%	12.52%	-12.08%	-34.81%	13.63%

Conclusions:

Comparison of results of the (3) three Baseline and (3) three 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

MPG = 2778 / [(0.866 x HC grams/mile) + (0.429 x CO grams/mile) + (0.273 x CO2 grams / mile)]

Fuel used for this test was commercially purchased low sulfur on road diesel from a Mobil station. Baseline and retrofit tests were performed on the same tank of fuel to insure introduction of the Fitch unit was the only changed condition. Fuel specifications were obtained for the fuel used in the baseline and the first retro-fit CVS75 and are as follows:

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

Code of Federal Regulations

Title 40: Protection of Environment
PART 600—FUEL ECONOMY OF MOTOR VEHICLES
Subpart B—Fuel Economy Regulations for 1978 and Later Model Year Automobiles—Test Procedures

§ 600.113-88 Fuel economy calculations.

The Administrator will use the calculation procedure set forth in this paragraph for all official EPA tests. For the 1988 model year, manufacturers may choose to use this procedure or use the calculation procedure described in §600.113–78. However, once a manufacturer uses this procedure, it must be used for all subsequent tests. This procedure must be used by manufacturers for 1989 and later model years. The calculations of the weighted fuel economy values require input of the weighted grams/mile values for HC, CO and CO_2 for both the city fuel economy test and the highway fuel economy test. Additionally, for tests of gasoline-fueled vehicles, the specific gravity, carbon weight fraction and net heating value of the test fuel must be determined. The city and highway fuel economy values shall be calculated as specified in this section. A sample appears in appendix II to this part.

(a) Calculate the weighted grams/mile values for the city fuel economy test for HC, CO, and CO_2 as specified in §86.144 of this chapter. For tests of gasoline-fueled vehicles, measure and record the test fuel's properties as specified in paragraph (c) of this section.

(b)(1) Calculate the mass values for the highway fuel economy test for HC, CO, and CO_2 as specified in paragraph (b) of §86.144 of this chapter. For tests of gasoline-fueled vehicles, measure and record the test fuel's properties as specified in paragraph (c) of this section.

(2) Calculate the grams/mile values for the highway fuel economy test for HC, CO, and CO_2 by dividing the mass values obtained in paragraph (b)(1) of this section, by the actual distance traveled, measured in miles, as specified in paragraph (h) of §86.135 of this chapter.

(f) For diesel vehicle, calculate the fuel economy in miles per gallon of diesel fuel:

by dividing 2778 by the sum of three terms:

(1) 0.866 multiplied by HC (in grams/miles as obtained in paragraph (d) of this section),

(2) 0.429 multiplied by CO (in grams/mile as obtained in paragraph (d) of this section), and

(3) 0.273 multiplied by CO_2 (in grams/mile as obtained in paragraph (d) of this section).

MPG = 2778 / [(0.866 x HC grams/mile) + (0.429 x CO grams/mile) + (0.273 x CO2 grams / mile)]

Round the quotient to the nearest 0.1 mile per gallon. [51 FR 37851, Oct. 24, 1986]