

BIO-DIESEL Test Results

Automotive Test and Development Services, INC. is please to report the results of testing conducted with ECO-FUEL SAVER fuel additive which was tested for fuel economy benefits in a Diesel Medium Duty Truck application.

Testing was conducted in two phases; first in an on-road environment, using public highways, and based upon the Society of Automotive Engineers (SAE) J1321* test protocol; second, in ATDS emissions laboratory on a chassis dynamometer using a protocol derived from the EPA "511" test sequence. Two medium-duty Isuzu cab over stake bed trucks were provided for test by the client. Both trucks were powered by six-cylinder intercooled turbo diesels. Prior to the start of the first phase, over-the-road testing, ATDS mechanics disconnected the original fuel system and installed a stand-alone fuel tank in the bed of each truck. The stand-alone fuel tank had quick disconnects fitting on the fuel and return lines so that the tanks could be easily removed from the truck for weighing after each test run. In this manner it was possible to determine the fuel usage of each truck precisely.

During the first test sequence. ATDS driver drove both truck over a real-world road route in the Ontario, CA. area of approximately 100 miles in length. The length of the route was determined by the range of the trucks on one tank full of fuel. The trucks were fueled with a mixture of 80% commercial diesel and 20% BioDiesel (B20). The commercial diesel was bought all at one time from one truck stop while the BioDiesel was provided by the customer. During the Baseline sequence of tests both trucks used the B20 Biodiesel mixture. Once Baseline testing was completed the B20 BioDiesel for one truck was treated with ECO-FUEL SAVER per the customer's instructions. Then the over the road testing was restarted. Neither driver was informed of the whether their truck was using the original B20 BioDiesel or the ECO-FUEL SAVER treated B20 Bio-Diesel fuel.

Both trucks were driven in their 'as received' condition for baseline runs. Multiple identical 150 mile laps were driven on both trucks using a route developed by ATDS to replicate the normal driving patterns of everyday drivers. After addition of the product to the fuel for the test truck, additional 150 mile laps were driven in both trucks. In all cases, the trucks were driven together to minimize the effects of varying traffic and weather conditions, that is, as they were driving together, the traffic and weather seen by one truck was similar to the conditions seen by the other. Furthermore, in evaluating the effects of the products, only the ratio of test truck fuel consumption to control truck fuel consumption was considered. The absolute value of fuel economy for the test truck with product is not compared directly to the economy in the baseline condition. Instead the ratio of test vs. control truck is computed and then compared from run to run. This ratio comparison minimized the effect of differing traffic and weather conditions form one day to the next.

Prior to beginning driving the fuel tanks were removed from the truck beds and weighed on a scale with a resolution of 0.02 Kg. The weight of the B20 BioDiesel fuel had been previously established by weighing a 5 gallon “Prover” bucket of fuel on the same scale; the weight of the B20 BioDiesel was 3.24Kg/gallon. The tanks were then filled to the full mark on the tank and weighted again. This is the starting weight for each run. At the end of the run the trucks were stopped in the parking area and the tanks removed and weighed again to provide the ending weight for each run. The process was then repeated for the additional runs.

The test plan was for the trucks to run until 3 runs had been completed where the difference in the ratio in fuel usage between the trucks for those runs was less than 2%. Due to the erratic fuel usage of truck #2 it was not possible to achieve the 2% target and it was decided to accept two runs with a difference of 3% as providing an acceptable Baseline test. The fuel for truck #2 was treated with the ECO-FUEL SAVER as directed by customer. To ensure that there were not an effect caused by the drivers, neither driver was informed which truck had the ECO-FUEL SAVER additive in it fuel; only the mechanic who mixed the fuel and weighed the tanks knew which truck was using the additive. Approximately 264 miles were run on both trucks after the additive had been added to the fuel for Truck #2 to allow the additive to completely work its way through the fuel system and engine. Then additional test runs were made with the two trucks over same route as used for the Baseline testing. As before, the fuel was weighed before and after each test run and the ratio of the fuel used between the trucks compared. During this testing two runs wer completed with a difference in ratios of less than 1% so the test was stopped at this point.

The test results show that the test truck, with the ECO-FUEL SAVER additive improved its’ fuel economy approximately 0.5 MPG over baseline while the fuel economy of the control vehicle which continued to run unmodified B20 BioDiesel actually declined slightly. The result is that when operation on B20 BioDiesel blended with ECO-FUEL SAVER the test truck has 6.15% improvement in Fuel Economy when compared to the control vehicle. The power of a comparative test protocol like the SAE J1321 is that it removes the effects of changes in weather and traffic from the Fuel Economy equation since both vehicles are operating under exactly the same conditions.

Between the completion of the Over-the-Road Baseline driving and the start of the ‘with additive’ mileage both vehicles were driven approximately 264 miles. The control vehicle was driven on the basic B20 BioDiesel while the test truck was driven on B20 mixed with ECO-FUEL SAVER. During this mileage accumulation the actual fuel usage of the test vehicle was measured at 12.78 MPG compared to only 11.60 MPG during the Baseline testing, a 10.3% increase in Fuel Economy. These results, though not a part of the formal report however, demonstrate an engineering evaluation of the possible fuel savings benefit of ECO-FUEL SAVER in the real world.

The results of this test are summarized in the following table. An approximate 6.2% fuel savings over normal B20 BioDiesel was demonstrated with B20 BioDiesel treated with ECO-FUEL SAVER additive; therefore it appears possible that there is a beneficial fuel economy effect in the application.

SAEJ1321 Type Test of Eco-Fuel Saver
on Gasoline Fueled Vehicles

	TRUCK 1		BASELINE
	FUEL USED	MILES DRIVEN	FUEL ECONOMY
RUN 1	8.00	104	13.00
RUN 2	7.93	105	13.24
AVERAGE			13.12

	TRUCK 2		BASELINE	
	FUEL USED	MILES DRIVEN	FUEL ECONOMY	RATIO
RUN 1	8.90	104	11.68	89.88%
RUN 2	9.04	104	11.51	86.94%
AVERAGE			11.60	88.41%

With Eco-Fuel Saver

	TRUCK 1		WITH ECO-FUEL SAVER
	FUEL USED	MILES DRIVEN	FUEL ECONOMY
RUN 1	7.68	103	13.41
RUN 2	8.45	104	12.31
AVERAGE			12.86

	TRUCK 2		WITH ECO-FUEL SAVER	
	FUEL USED	MILES DRIVEN	FUEL ECONOMY	RATIO
RUN 1	8.16	104	12.75	95.02%
RUN 2	8.98	104	11.58	94.10%
AVERAGE			12.16	94.56%

Improvement **6.15%**