



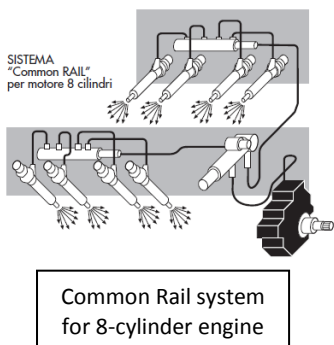
DESCRIPTION

The ever more widespread use of Diesel engines with direct injection and, along with this, the modification of Diesel fuel composition, has changed market scenarios completely. Diesel engines equipped with direct injection and Common Rail systems are by now the most popular choice, compared to engines of previous generations, in that they have better performance, lower fuel consumption and less emissions. According to new European standards issued in the UNI EN590 specification, Diesel fuel must contain no more than 10 ppm of Sulphur and can be additivated with up to 7% by volume of Biodiesel. Today's Diesel fuel composition has contributed to the rise of new problems caused by the difference between the composition of Biodiesel and that of petroleum-derived Diesel fuel. Biodiesel, in particular, proves to be less resistant to oxidation, less volatile, and shows poor performance during cold starts. These factors lead to the formation of deposits in the fuel system with heavy damage to the functioning of sophisticated Common Rail-equipped engines. In addition, a series of field analyses showed that over 60% of the samples taken had a cetane number lower than 51, the minimum value required by UNI EN590 specification. This calls for a new generation of Diesel fuel additives to deal with the recent issues emerging from fast evolving engines and fuels.

PROPERTIES

The new formulation of **SYNECO PLUSDIESEL** is designed to deal with all the problems described above, guaranteeing an excellent performance of modern diesel engine fuel systems under all operating conditions and in all seasons. Regular use of **SYNECO PLUSDIESEL** provides :

- anti-oxidation protection even in the presence of high concentrations of Biodiesel
- counteracts deposit forming tendency on pumps, injectors, valves, and combustion chamber;
- prevents foam formation during refueling operations, reducing the time required for tank fill-up.



- facilitates water separation, protecting the entire fuel system against rust;
- increases cetane number;
- protects pumps and injectors from wear;
- optimizes combustion
- improves behavior of cold Diesel fuel

TESTS PERFORMED

1) OXIDATION RESISTENCE TEST

TEST METHOD

The method used to evaluate oxidation resistance of fuel is the IP 388, equivalent to the ASTM D 2774.

This methodology calls for the insufflation of air at 95°C for 16 hours, considering insoluble hydrocarbons and stabilized ones.

The same Diesel fuel was used in two different configurations, that is additivated and non-additivated.

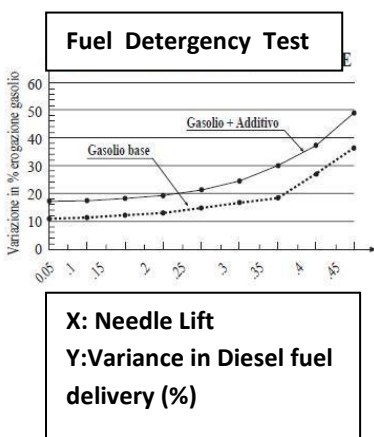
THE RESULTS

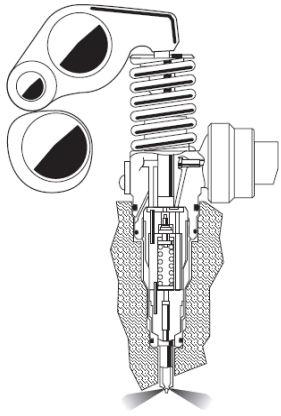
	DIESEL FUEL EN 590	DIESEL FUEL EN 590 + PLUS DIESEL 0,4%
Filterable insolubles	0,47	0,20
Stabilized insolubles	0,38	0,70
Total Insolubles	0,85	0,90

2) INJECTOR APPARATUS CLEANLINESS ASSESSMENT

TEST METHOD

The method generally used for injector testing is the PEUGEOT XUD 9, by which injection system cleanliness (absence of carbon residues) is examined, evaluating the improvement in Diesel fuel nebulization.





3) DEMULSIVITY AND FOAMING TEST

TEST METHOD

The method followed for measuring demulsivity and foaming consists in the evaluation of three Diesel fuel samples and attempts to measure the foaming of fuel under high pressure in recirculation.

As for “foam control”, the values shown refer to foam height over 425 ml of Diesel fuel with a 6-second injection of 2.0 bar of N₂ from a metal tube inside a graded cylinder.

Foam height and the time it takes for it to subside are measured for each of the following:

- Diesel fuel EN 590;
- same Diesel fuel EN 590 treated with 0,4% Syneco Plus Diesel Additive
- same Diesel fuel EN 590 treated with Plus Diesel and 500 ppm of H₂O.

	DIESEL FUEL EN 590	DIESEL FUEL EN 590 + 0,4% PLUS DIESEL	DIESEL FUEL EN 590 + 0,4% PLUS DIESEL + 500ppm di H ₂ O
Foam height	110 mm	49 mm	60 mm
Time for foam to recede	53 s	1 s	7 s

4) SOOT REDUCTION TEST

TEST METHOD

To examine soot reduction a MERCEDES – BENZ OM 364 A test was used.

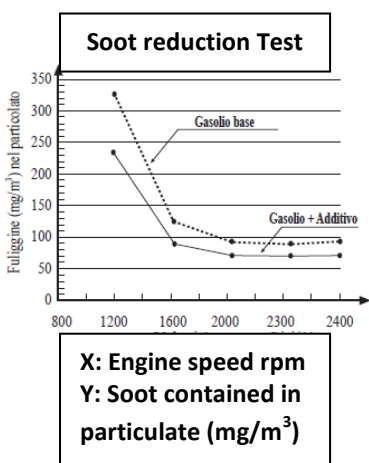
THE RESULTS

The results of the MERCEDES BENZ OM 364 A test showed -power production being equal during testing- both lower soot production and lower fuel consumption.

5) FURTHER TESTING

The performance of **SYNECO PLUSDIESEL** was confirmed through laboratory tests on Diesel fuel containing 0,4% by volume of an additive.

All tests were completed successfully.



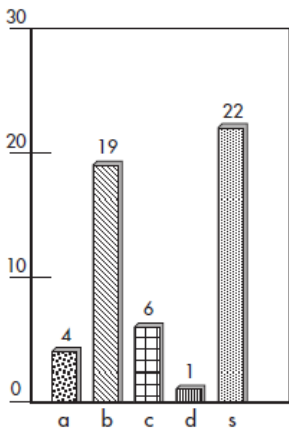
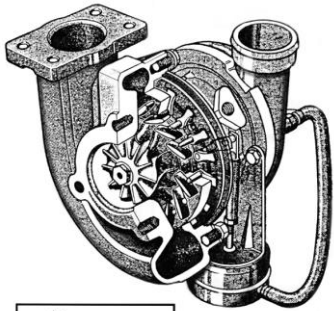


Fig. 6

Effect of injector cleanliness on reduction of Diesel fuel consumption and exhaust gas emission.

- a) saving of Diesel fuel
- b) unburned hydrocarbons
- c) carbon monoxide
- d) nitrogen oxide
- s) particulate

WEAR

Bocle test according to Lubrizol with ASTM D50001

HFRR Test adopted by CEC

Volvo with Bosch VE-R 293 pump

DISPERSAL PROPERTIES

Sund Strand Pump Test

HIGH PRESSURE STABILITY

Diesel fuel Stability Test ASTM D2274

ANTI-RUST

ASTM D 665 B

ANTI-FOAM

ASTM D 892

STORAGE STABILITY

Three-Week Static Rust Test

ANTI-CORROSION PROTECTION

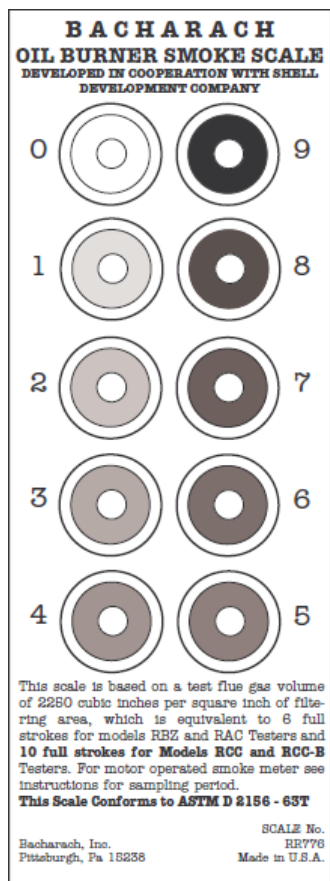
Nace Rust Test

Other tests were carried out on vehicles and fleets. For this specific test, a fleet of vehicles with Diesel Cummins VT- 903 engines, running on different types of road for 18 months, was used.

Fuel consumption per tons carried with commercial Diesel fuel and with Diesel fuel additivated with **SYNECO PLUSDIESEL** was measured.

The results showed:

- cleaner fuel injection system, especially injectors, jet needle and tank surface;
- less maintenance operations required on the injection apparatus, including pumps and filters;
- considerable reduction of smoke in exhaust emissions;
- reduced consumption of additivated Diesel fuel (estimated 0.8 - 1%);
- no signs of corrosion or rust formation;
- easier to purge water from the system;
- reduction of management cost.



A further test was performed on a marine engine. A turbocharged 6-4 V9 Inline 6 cylinder, 580 CV, 3150 rpm engine, was mounted on a dynamometric test bench. Parameters considered were water, oil, and smoke in exhaust gases (measured with Bacharach equipment), using Diesel fuel produced in national oil refineries and Diesel fuel produced in national oil refineries with a 0,4% additivation of SYNECO PLUSDIESEL ADDITIVE.

Fuel consumption being equal, the improvement in combustion allowed for exhaust gas reduction and power enhancement.

- maintains and enhances the performance of the injection system.

GASOLIO SENZA ADDITIVO	CV/RPM	250/2000	350/2500	658/3000
BACHARACH N.		8	>9	>9
GASOLIO CON 0,4% SYNECO PLUSDIESEL ADDITIVE	CV/RPM	270/2000	359/2500	662/3000
BACHARACH N.		6	8	8

USE

SYNECO PLUSDIESEL is part of a new generation of Diesel fuel additives. It is ashless, has multi-function characteristics and can be used even with Diesel fuel additivated with traditional detergent agents.

It finds application in engines with Common Rail, injector pump, and direct injection systems. It facilitates cold starts and prevents filter blockage caused by paraffin formation at low temperatures.

Usage amount: 250cc for approx. 60 l of Diesel fuel or full tank

TECHNICAL CHARACTERISTICS

CHARACTERISTIC	UNIT OF MEASURE	VALUE
Specific weight at 15° C	Kg/l	0,810-0,835
Inflamability	°C	65
Appearance		Liquid
Color		Brown

(The values shown above refer to normal industrial production and do not constitute technical specification.)

November 22, 2013