

# **REPORT**

**on the results of the test and application of  
additives**

**MPG-Cap<sup>TM</sup> and MPG-BOOST<sup>TM</sup> performed  
by the 10<sup>th</sup> Chemmotological Centre  
of the Ministry of Defence of Ukraine**



2007

## **MULTIFUNCTIONAL ADDITIVES MPG-Cap<sup>TM</sup> (in tablets), MPG-BOOST<sup>TM</sup> (liquid)**

### **Product description**

Multifunctional additives MPG-Cap<sup>TM</sup> and MPG-BOOST<sup>TM</sup> are 100% organic compounds for combustion engines, which ensure real fuel economy, increase engine power and at reduce the amount of harmful exhaust gas at the same time. These additives create 0.01  $\mu$  catalytic micro coating on the surface of the combustion chamber, on the valves, the piston and the spark-plugs, clean the engine of carbon and reduce formation of soot on spark-plugs, piston, rings and valves.

### **Application of MPG-Cap<sup>TM</sup> and MPG-BOOST<sup>TM</sup> additives**

MPG-Cap<sup>TM</sup> additive is used with all type of combustion engines, including those using organic fuel, installed on passenger cars and trucks, aircrafts and helicopters using motor gasoline, motor boats, river and marine vessels, railway locomotives, off-road vehicles, generators, motor pumps, motorcycles, snowmobiles, motor bicycles, mowers etc. Optimal concentration for motor gasoline is 0.5 g per 50 litres or 0.010 g/l (one tablet per 50 l of gasoline or diesel fuel).

MPG-BOOST<sup>TM</sup> is used with gasoline and diesel combustion engines with optimal concentration of 0.295 ml per 1 l, which is a standard package of 236 ml per 800 l of fuel.

Dosage recommended by the manufacturer should be strictly followed. (Dosage can be indicated in ounces and gallons).

*1 ounce corresponds to 28.4 ml*

*1 gallon corresponds to 3.785 l*

### **Features of MPG-Cap<sup>TM</sup> and MPG-BOOST<sup>TM</sup> additives**

MPG-Cap<sup>TM</sup> and MPG-BOOST<sup>TM</sup> additives according to the official data ensure:

- biological increase of fuel octane rating up to 1.0 octane units, increase of fuel cetane rating up to 1.5 units;
- acceleration of fuel combustion in the beginning of the compression stroke and increase of engine power;
- removal of unburned fuel residues from the combustion chamber owing to combustion efficiency;
- improvement and extension of lifespan of spark-plugs and nozzles;
- extension of life of engine exhaust system and catalyst;
- reduction of engine detonation;
- reduction of different mechanical noises and facilitation of improvement of driving quality;

- improvement of operation of ignition system at extreme temperatures in winter and in summer, as well as raise of engine power at high speed and sharp climbs;
- real fuel economy by 7 – 14 %;
- extension of engine lifetime;
- reduction of harmful CO exhaust gas emissions up to 75%.

### **Methods of application of fuel additives**

1 tablet of MPG-Cap<sup>TM</sup> (0.50 g) is used for 50 litres of any fuel. MPG-BOOST<sup>TM</sup> additive is used for 40-75 litres of motor gasoline and diesel fuel. In case of 4—75 litre fuel tank capacity a fuel tank capacity the additive should be added in the amount of 12-22 ml accordingly.

The additives are introduced into the fuel tank just before its filling and are used at each filling. After approximately 150 litres of fuel are used, a catalytic coating in the combustion chamber is formed.

MPG-Cap<sup>TM</sup> and MPG-BOOST<sup>TM</sup> additives have an effect both on new and old vehicles; however, sometimes three to seven full fuel tank fillings may be required for passenger cars and trucks before fuel economy can be stated. If the use of the product is terminated, the coating will disappear eventually, but it will be renewed again, when MPG-Cap<sup>TM</sup> or MPG-BOOST<sup>TM</sup> correspondingly are added.

Tablets are absolutely dissolved in motor fuel within 2.5-3 hours. To speed up the process of dissolution it is advisable to previously pulverize or dissolve tablets in a small amount of fuel.

### **The results of the test of MPG-Cap<sup>TM</sup> and MPG-BOOST<sup>TM</sup> additives used for all kinds of fuels: motor gasoline, diesel, biodiesel and ethanol fuel**

The 10<sup>th</sup> Chemmotological Centre during the period from March 3, 2007 till May 4, 2007 has developed and performed the schedule of the test of the above mentioned additives for the provision of a catalytic effect:

- increase of octane rating of gasoline types A-80, A-92 and A-95 produced in accordance with ДСТУ (State Standard of Ukraine) 4063-2001 for automotive engines up to 1.6 octane units;
- increase of cetane rating of diesel fuel ДІ-0,2-62 produced in accordance with ДСТУ 3868-99 up to 2.0 cetane units;
- increase of engine power owing to combustion efficiency;
- improvement of combustion chamber cleaning of unburned fuel residues;
- improvement of operation of spark-plugs and nozzles;
- extension of lifespan of engine exhaust system and catalyst;
- reduction of detonation and rough running of engine;
- real fuel economy;
- extension of lifespan of engine ;
- reduction of harmful exhaust gas emitted into atmosphere.

The tests for the above characteristics have been performed on УИТ-85 equipment for the determination of octane rating in accordance with the standard

ГОСТ 511-82 and on ИДТ-69 for the determination of cetane rating in accordance with the standard ГОСТ 3122-67, as well as the tests on actual vehicles – passenger car Opel Astra, year of manufacture – 2005, engine displacement 1.4 litres; Honda Accord, year of manufacture – 1997, engine displacement 2.0 litres; Mercedes E220, year of manufacture – 1999, engine displacement 2.2 litres.

Total mileage of Opel Astra and Honda Accord with a gasoline engines for the period of the experiment was 6,552 km. Total mileage of Mercedes E220 with a diesel engine was 4,500 km.

The additives should be used on new cars after over than 2,500 km of mileage.

УИТ-85 equipment was used for the tests to determine motor octane rating of a 70:30 reference mix of isooctane and heptane with no additives and with various additions of MPG-Cap<sup>TM</sup> additive in m/l; total of 4 samples. Octane rating of the above reference fuel was increased by 4.7 units.

There were also performed 6 tests with the samples of commercial motor gasoline A-80, A-92 and 95 produced by Lukoil oil refinery. Motor octane rating determination was performed on 3 samples with no additives and 3 samples with MPG-Cap<sup>TM</sup> additive in the amount of 0.125 g/l.

ИДТ-69 equipment was used to perform two tests of diesel fuel to determine the influence of MPG-BOOST<sup>TM</sup> additive on the increase of cetane number. Diesel fuel Л-0,2-62 produced by Lukoil oil refinery.

The data are indicated in Table 1 of the test record dated April 21, 2007.

УИТ-85 equipment was operated for total of 60 motor hours: 30 hours using A-80, A-92 and A-95 gasoline types with no MPG-Cap<sup>TM</sup> and 30 hours using the same gasoline types with MPG-Cap<sup>TM</sup> additives. Monitoring of the fuel combustion process with no additive was performed using the detonation sensor and the spark-plug of the equipment, which are located directly in the combustion chamber of the engine. Monitoring of sooting on the sensor and the spark-plug was performed every 10 hours of operation of the engine.

As a result of monitoring using spark-plugs and detonation sensors it was determined that on new (cleaned) spark-plugs and sensors glossy yellow micro coatings are formed, while on spark-plugs and sensors after 10 hours of operation with no additives a dark soot is formed.

After 10 hours operation on sensors and spark-plugs with a dark soot gradual removal of soot is observed along with the formation of a glossy yellow micro coating.

**The described results are illustrated on the photos:**

- Photo 1 – detonation sensor of УИТ-85 equipment and a spark-plug cleaned of soot;

- Photo 2 – detonation sensor of УИТ-85 equipment and a spark-plug after ten motor hours using A-95 gasoline with no MPG-Cap<sup>TM</sup> additive;

- Photo 3 – the detonation sensor of УИТ-85 equipment and the spark-plug, previously cleaned of sooth, after ten motor hours with А-95 gasoline with MPG-Cap<sup>TM</sup> additive in the amount of 0.5 g per 50 litres;

- Photo 4 - the detonation sensor of УИТ-85 equipment and the spark-plug, not previously cleaned of sooth, after ten motor hours with А-95 gasoline with MPG-Cap<sup>TM</sup> additive in the amount of 0.5 g per 50 litres.

- Photo 5 – comparative analysis of sensors:

- 5<sup>th</sup> on the left – previously cleaned sensor;
- 1<sup>st</sup> on the left – cleaned sensor after 10 motor hours with no additive applied;
- 2<sup>nd</sup> on the left – not previously cleaned sensor after 5 motor hours with the additive;
- 3<sup>rd</sup> on the left – not previously cleaned sensor after 10 motor hours with the additive;
- 4<sup>th</sup> on the left – not previously cleaned sensor after 20 motor hours with the additive.

ИДТ-69 equipment was operated for total of 20 motor hours using diesel fuel Л-0,2-62, among them: 10 hours with no MPG-BOOST<sup>TM</sup> additive and 10 hours with the additive. Monitoring of sooting was performed using the piston for changing the level of the compression of the equipment engine.

As a result of monitoring of the piston it was determined that on a cleaned bottom of the piston in operation with no additive dark soot is formed. After 10 hour operation of the piston with dark soot gradual removal of sooting from the centre of the piston is observed with the formation of a glossy yellow micro coating.

When the engine is operated using diesel fuel with the additive on the piston, which has been previously cleaned, a glossy yellow micro coating is formed. Owing to the effect of the additive improving fuel combustion cetane rating is increased and roughness of engine running is reduced.

On Opel Astra and Honda Accord cars upon the beginning of application of the additive separation of soot on the combustion chamber and piston occurred, which basically is possible on some cars due to previous use of low quality fuel. This resulted in contamination of fuel system and, correspondingly, in engine operation disturbances, which is the evidence of the effect of the additive.

To solve the situation it is necessary to continue application of the additive and, if necessary, to clean the fuel system of the car.

In the course of application of MPG-Cap<sup>TM</sup> additive reduction of harmful exhaust gas emitted into atmosphere from 0.5 to 0.2 % took place and idle engine speed increased when measured with the help of a digital tachometer. When the combustion chamber was checked with the help of the device for adjustment of fuel supply to the combustion chamber the change of flame colour from light red to light blue was detected, which evidences of the acceleration of fuel combustion in the beginning of the compression stroke, as well as of the increase of engine power.

On Mercedes E220 upon the beginning of application of MPG-BOOST™ additive combustion efficiency was improved and fuel consumption was reduced by 0.5 l per 100 km.

According to the owners of the cars that took part in the experiment, there is an impression of increase of engine power and smoother running of diesel engine in case of a cold start.

### **Conclusions:**

MPG-Cap™ and MPG-BOOST™ additives ensure:

- chemical increase of fuel octane rating up to 4.7 octane units and increase of fuel cetane rating up to 2.0 units;
- acceleration of fuel combustion in the beginning of the compression stroke and increase of engine power;
- improvement of removal of unburned fuel residues from the combustion chamber;
- improvement of operation of spark-plugs and nozzles;
- extension of lifespan of engine exhaust system and catalyst;
- reduction of engine detonation;
- reduction of different mechanical noises, which facilitates the improvement of driving quality;
- improvement of operation of the ignition system at extreme temperatures in winter and in summer, as well as increase of engine power at high speed and sharp climbs;
- real fuel economy of 6-23 % and more: see the log;
- expansion of lifespan of the engine;
- reduction by more than 60% of CO harmful exhaust gases emitted into atmosphere.

The tests have been performed by senior researcher  
of the 10<sup>th</sup> Chemmotological Centre

P.I. Zvyagin

## LOG

of characteristics of the cars, which took part in the experiment on application of MPG-Cap<sup>TM</sup> additive during the period from March 23 till May 4, 2007

No.	Engine make	Year of manufacture	Engine displacement, l	Total mileage, km	Average fuel consumption before the experiment l/100 km	CO emission before the experiment	Characteristics in the course of the experiment					
							Amount of fuel filled, l	Mileage, km	Average fuel consumption l/100 km	Real fuel economy, %	CO rate	Notes
	Opel Astra	2005	1.4	39800	8.5	0.5	234	3120	7.5	12	0,2	-
	Honda Accord	1997	2.0	235140	11.0	-	292,03	3432	8.5	23	-	-
	Mercedes E220	1999	2.2	199315	8.6	-	365	4500	8.1	6	-	-



"APPROVED"

Начальник  
10<sup>th</sup> CHEMMOTOLOGICAL CENTRE  
Manager  
V.P.Pivovar  
April 25, 2007

## TEST RECORD

April 25, 2007

The Accredited Test Centre "THE 10<sup>th</sup> CHEMMOTOLOGICAL CENTRE" (registration number in the Register 2H389 from September 17, 2004 till September 16, 2007) has conducted tests of isooctane and n-heptane mixes in the ratio of 70:30 % adding MPG-Cap<sup>TM</sup> additive in the amount of 0.0125 g/l, 0.025 g/l and 0.0375 g/l and motor gasoline types A-80, A-92 and A-95 adding MPG-Cap<sup>TM</sup> additive in the amount of 0.0125 g/l and diesel fuel JI-0,2-62 adding MPG-BOOST<sup>TM</sup> additive in the amount of 0.295 ml/l.

The tests ordered by "Fuel Freedom International" (USA).

The test have been conducted on the basis of the Agreement No. 30 dated 23.03.2007.

### 1. CHARACTERISTICS OF THE TESTED SAMPLES

1.1. The name and the type of samples: reference isooctane in accordance with the standard ГОСТ 12433-83 and reference n-heptane in accordance with the standard ГОСТ 25828-83.

Samples of motor gasoline types: A-80, A-92 and A-95 in accordance with the standard ДСТУ 4063-2001 and diesel fuel JI-0,2-62 in accordance with the standard ДСТУ 3868-99 in the amount of 20 l each, gasoline additive MPG-Cap<sup>TM</sup> and diesel additive MPG-BOOST<sup>TM</sup> have been delivered to the 10<sup>th</sup> Chemmotological Centre by the representative of "Fuel Freedom International" (USA).

### 3. TEST CHARACTERISTICS

3.1. The tests have been conducted during the period from March 23 till April 25, 2007.

3.2. The tests have been conducted with the samples received with the addition of MPG-Cap<sup>TM</sup> additive in the amount of 0.0125 g/l, 0.025 g/l and 0.0375 g/l to the isooctane and n-heptane mix in the ratio of 70:30 %, motor gasoline types A-80, A-92 and A-95 with the addition of MPG-Cap<sup>TM</sup> additive in the amount of 0.0125 g/l, diesel fuel JI-0,2-62 with the addition of MPG-BOOST<sup>TM</sup> additive in the amount of 0.295 ml/l.

In the course of the tests octane rating in accordance with the standard ГОСТ 511-82 "Fuel for engines. Motor method for determination of octane number" and cetane rating in accordance with the standard ГОСТ 3122-67 "Diesel fuels". Method for determination of cetane number" in the received samples to determine the influence of the additives on octane and cetane rating.

3.3. Preparation of the samples has been performed by volumetric method.

3.4. The tests have been conducted using УИТ-85 equipment, factory No.329 (measuring equipment test certificate No.36-1/1863 valid till 05.10.2007) ИДТ-69 equipment for determination of cetane number (measuring equipment test certificate No.36-1/2009 valid till 05.10.2007).

Annex: Summary statistical table of test results.

Summary statistical table of test results for base gasoline types, diesel fuel Л-0,2-62 and influence of additives on the improvement of antide-tonant features and cetane rating

Table 1

Results for base gasoline types and influence of additives on the improvement of their antide-tonant features								
Test method in accordance with the standard ГОСТ 511-82								
Sample No.	Denomination of samples	MPG-Cap™ additives for gasoline and isooctane and n-heptane mix			Results of sample tests			
		0.5 g/40 l or 0.0125 g/l	1.0 g/40 l or 0.025 g/l	1.5 g/40 l или 0.0375 g/l	Motor method octane rating of the sample – base gasoline with no additive	Motor method octane rating of the sample – base gasoline with additive	Increase of motor method octane rating	Notes
1.	Isooctane and n-heptane 70 %:30 %	-	-	-	70.0	-	-	
2.	Isooctane and n-heptane 70 %:30 %	0.0125	-	-	70.0	74.7	+4.7	
3.	Isooctane and n-heptane 70 %:30 %	-	0.025	-	70.0	75.1	+5.1	
4.	Isooctane and n-heptane 70 %:30 %	-	-	0.0375	70.0	76.0	+6.0	
5.	A-80 ННЗ Lukoil	-	-	-	77.0	-	-	
6.	A-80 ННЗ Lukoil	0.0125	-	-	77.0	78.6	+1.6	
7.	A-92 ННЗ Lukoil	-	-	-	82.6	-	-	
8.	A-92 ННЗ Lukoil	0.0125	-	-	82.6	83.8	+1.2	
9.	A-95 ННЗ Lukoil	-	-	-	85.0	-	-	
10.	A-95 ННЗ Lukoil	0.0125	-	-	85.0	86.2	+1.2	
Results for diesel fuel Л-0,2-62 and influence of diesel fuel additives on the improvement of cetane rating								
Test method ГОСТ 3122-67								
№ Образца	Denomination of samples	Diesel fuel additive MPG-BOOST™		Results of sample tests				
		0.295 ml/l		Cetane rating with no additive	Cetane rating with additive	Increase of cetane rating	Notes	
11	Л-0,2-62 ННЗ Lukoil	-		48	-			
12	Л-0,2-62 ННЗ Lukoil	0.295		48	50	+2		

REPORT on the results of the test and application of additives MPG-Cap™ and MPG-BOOST™

performed by the 10th Chemmotological Centre of the Ministry of Defence of Ukraine dated May 4, 2007

Test was performed on 12 (twelve) samples  
Preparation of mixes and tests performed by  
senior researcher of the 10th Chemmotological Centre

P.I.Zvyagin



