



ENERGOCET 76

Additive for diesel fuels




Cetane-detergent package for refining environmentally friendly diesel fuels

INTRODUCTION

Energocet® 76 is a multi-functional supplement to the Diesel fuel used to improve fuel efficiency and vehicle dynamics. This additive meets the following requirements:

- standard EN 590+A1:2011 "Fuels for automotive vehicles - Diesel fuels – requirements and testing methods"
- World Fuels Card fifth edition from September 2013 for category 4 and 5 diesel fuels with the cetane number above 55 accepted by ACEA, Auto ALLIANCE, EMA and JAMA
- Global manufacturers of injection systems for self-ignition engines DELPHI, BOSCH, DENSO, STANADYNE, CONTINENTAL presented in a common position from 2012 concerning quality requirements for PREMIUM type diesel fuels.





**Fuel Requirements for Diesel Fuel Injection Systems
Diesel Fuel Injection Equipment Manufacturers
Common Position Statement 2009**

Please note that this statement supersedes all previous joint statements

Background

The continuous world-wide tendency to increase engine performance and reduce emissions has necessitated the development of new generations of enhanced diesel fuel injection equipment, supporting the achievement of stringent legislation targets. Rising injection pressures and multiple injections result in higher operating temperatures, increased contact pressures and reduced clearances. Minimum standards of fuel quality are essential to maintain durability and emission compliance over a longer duration.

International standards have been established defining fuel quality and continue to be revised on an as needed basis. Alterations to fuel quality, e.g. by increasingly severe refinery hydro-processing being introduced to remove sulphur also reduce the content of aromatics and destroy surface active compounds and antioxidants. Removal of these beneficial compounds effects boundary lubrication, commonly known as lubricity, and inherent oxidation stability and must be compensated for. Fuel parameters such as cetane number, viscosity, density, lubricity, oxidation stability, sulphur and aromatic content together with the absence of free water and dirt contamination are key parameters required to ensure performance of equipment in the field.

Biofuels are becoming increasingly available to end-users. In Europe (EU) and in the United States of America (USA), as well as in other countries, fuel sources such as rapeseed methyl ester (RME), soybean methyl ester (SME), palm oil methyl ester (PME) and others, collectively known as fatty acid methyl esters (FAME), are being used as alternatives and extenders for mineral oil derived fuels. Furthermore, the EU Biofuels Directive 2003/30/EC requires member states to ensure that a minimum proportion of biofuels are placed on the market. It must be recognized that the physical and chemical characteristics of bio components are significantly different to conventional fuels and that care must be taken in their specification and use.

Diesel fuel injection equipment (FIE) manufacturers fully support the development of alternative sources of fuel. Where possible, compatible components were provided and validated. However, many vehicles, engines and equipment are not designed to run on them. It is recommended to refer to the vehicle and engine manufacturers 'Limitations of Use' documents for guidance. Prior to use, users should also check whether appropriate biofuel quality is guaranteed.

General Diesel Fuel Quality

Standards: The European fuel standard EN 590:2009 embodies the latest fuel quality requirements. Fuel injection equipment manufacturers' products might not meet the expected lifetime performance and emissions targets if EN 590:2009 fuel or fuel with similar properties to the EN 590:2009 specification is not used. The responsibility therefore must fall to the equipment user and/or the fuel supplier to ensure that the fuels used are compatible with the fuel system and objectives of the emissions legislation.

Fuel Requirements for Diesel Fuel Injection Systems – Joint FIE Manufacturers Statement, issued in Sept. 2009

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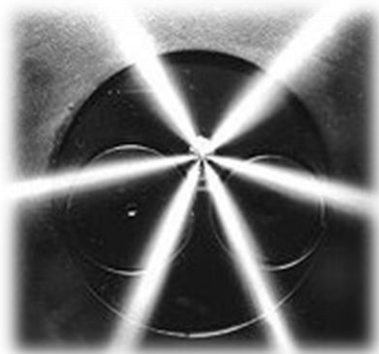
ENERGOCET 76 PACKAGE COMPOSITION

ENERGOCET[®] 76	Cetane additive	<ul style="list-style-type: none"> • Decreases fuel consumption • Increases motor power • Improves fuel ignition properties • Improves engine startup in low temperatures • Improves engine operation efficiency in low temperatures • Reduces emission of harmful substances in exhaust gases
	Detergent-dispersing additive	<ul style="list-style-type: none"> • Decreases contamination of injectors • Decreases fuel consumption • Reduces emission of harmful substances in exhaust gases • Improves fuel combustion in engine
	Lubrication modifier	<ul style="list-style-type: none"> • Decreases fuel pump wear • Decreases injector wear
	Corrosion inhibitor	<ul style="list-style-type: none"> • Limits corrosion in fuel tank • Decreases deposits in fuel tank • Prolongs fuel filter life • Decreases fuel pump wear • Decreases injector wear
	Foaming inhibitor	<ul style="list-style-type: none"> • Prevents foaming while refuelling
	Oxidation inhibitor	<ul style="list-style-type: none"> • Prevents fuel oxidation process during fuel storage, transport and use • Prevents fuel hydrolysis in contact with water and moisture during storage and transport
	Polymerization stabilizer	<ul style="list-style-type: none"> • Improves fuel stability • Decreases contamination of injectors • Decreases deposits in fuel pump • Secures fuel filter against blocking in low temperatures • Reduces emission of harmful substances in exhaust gases
	Demulsifier	<ul style="list-style-type: none"> • Decreases deposits in fuel tank • Prolongs fuel filter life • Decreases fuel pump wear • Decreases injector wear • Introduces fuel separation from water

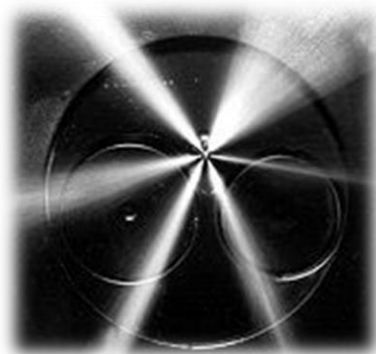
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DETERGENT - DISPERSING PACKAGE

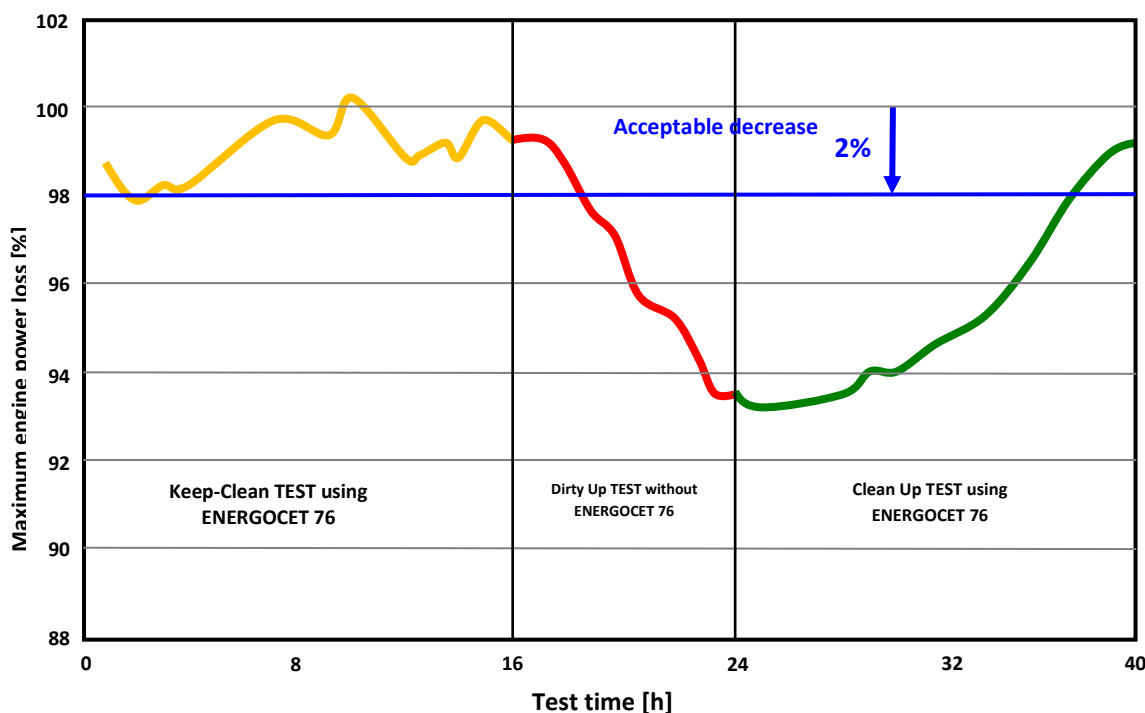
A modern detergent – dispersing package used in **ENERGOCET® 76** keeps elements of the engine injection system in due cleanliness, preventing formation of deposits at injector tips during fuel combustion in the engine combustion chamber, what extends engine life and reduces fuel consumption.



Clean fuel injector
regular fuel stream shape
using Energocet® 76



Contaminated fuel injector
irregular fuel stream shape



The chart shows testing on a Peugeot DW10 engine in a test according to the standard CEC F-98-08 to present benefits from the application of Energocet® 76 additive containing detergent - dispersing package.

In the conducted test the engine was fed for the period of 36 hours with fuel without the addition of **Energocet® 76** ("Dirty Up" test) and fuel with the supplement of **Energocet® 76** with detergent-dispersing package ("Clean Up" test).

In the "Dirty Up" test substantial loss of engine power can be noted during engine operation, while in "Clean Up" test, fuel with the supplement of **Energocet® 76** containing detergent - dispersing package causes restoration of engine efficiency to the original level and any power loss is invisible.

Cetane-detergent package for refining environmentally friendly diesel fuels

CETANE SUPPLEMENT

The cetane additive used in ENERGO CET[®] 76 significantly increases cetane number which has a substantial effect on:

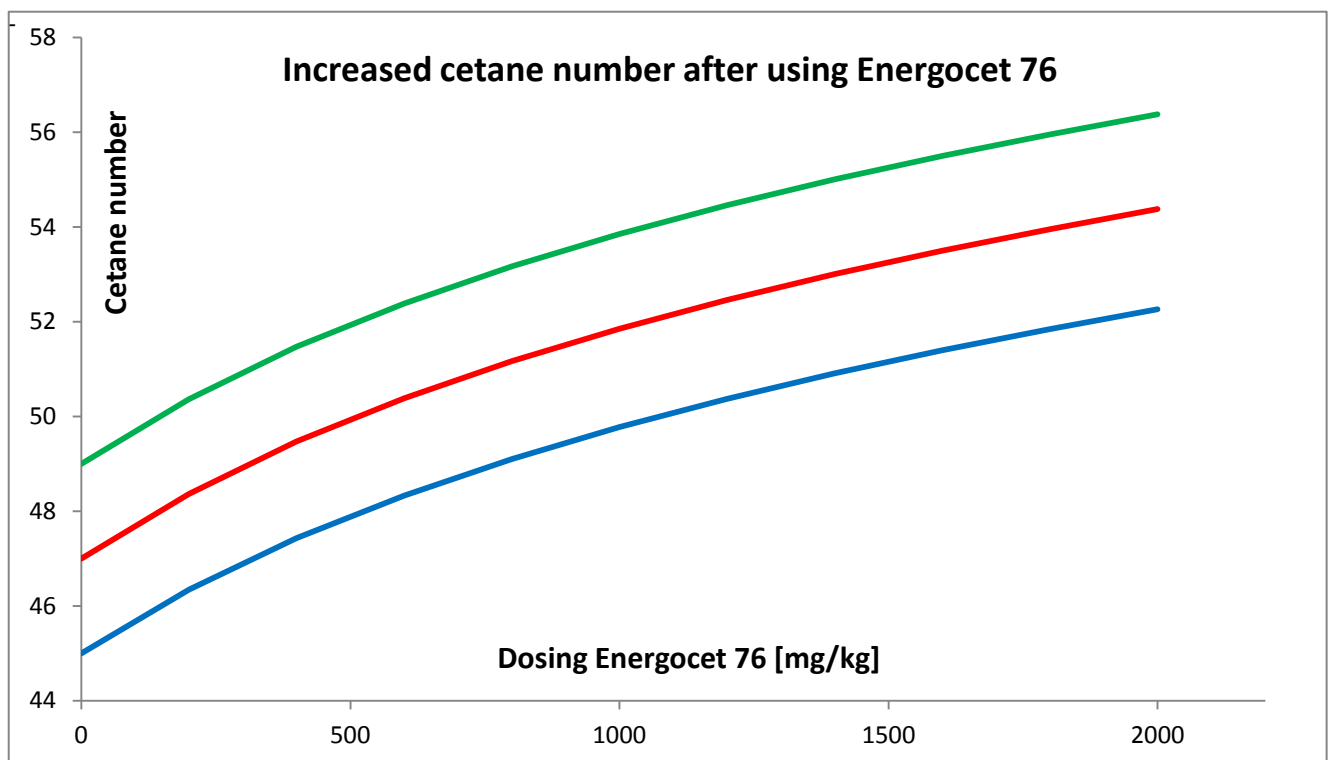
- reduced fuel consumption;
 - increased engine power;
 - improved ignition properties (easier cold startup);
 - reduced flue gas smoke;
 - reduced emissions of NO_x, CO, HC and solid particles in exhaust gases;
 - reduced engine noise.
- engine durability and smaller wear of its elements.



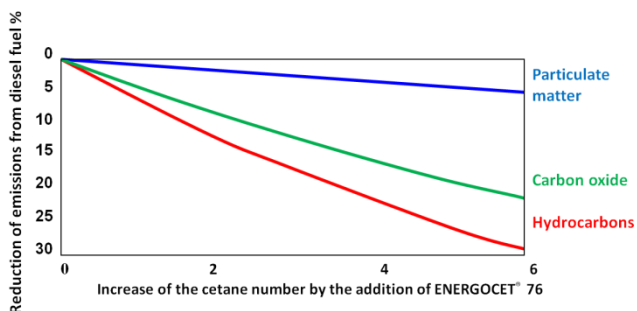
Clean fuel injector using Energocet[®] 76



Contaminated fuel injector



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REDUCTION IN EMISSION OF SELECTED PARAMETERS WHEN USING **ENERGO CET® 76** CETANE - DETERGENT PACKAGE

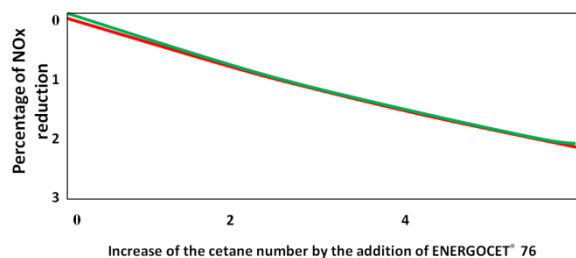


CHART SHOWING REDUCTION IN NOX NITROGEN OXIDES RESULTING FROM INCREASED DIESEL FUEL CETANE NUMBER BY THE APPLICATION OF **ENERGO CET® 76** CETANE – DETERGENT PACKAGE

ENERGO CET 76 ADVANTAGES

ENERGO CET® 76 cetane - detergent package:

- Decreases unit fuel consumption by about 2 - 3 %
- Increases diesel fuel cetane number by approx. 4 - 5 units, resulting in a substantial increase in engine power (very important parameter for passenger cars, overloaded trucks and vehicles working in difficult field conditions)
- Improves ignition properties, start-up properties and engine operation in low temperatures
- Prevents fuel filter blocking in low temperatures
- Decreases engine noisiness
- Reduces emission of harmful substances in exhaust gases (NO_x, CO, solid particles and non-incinerated hydrocarbons)
- Effectively protects elements of the fuel system against contamination and corrosion
- Prolongs life of the fuel pump, fuel filter, injectors
- Prevents hydrolysis and fuel oxidation process in the course of fuel storage, transport and use

ENERGO CET 76 PROPERTIES

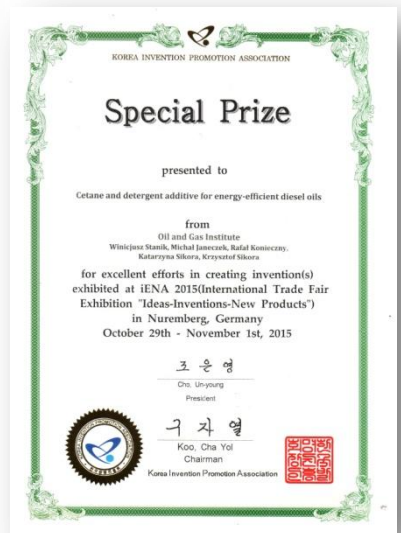
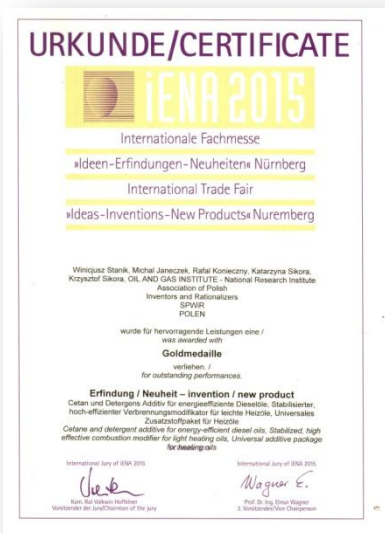
Density in 15 °C, kg/m ³	920 – 960
Flash point, °C	min. 62
Flow temperature °C	max. -30

DOSAGE

Recommended ENERGO CET® 76 dispensing level
0.88 litre per 1000 litres of diesel fuel
 (880 litres per 1 million litres of diesel fuel)

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ENERGOCET 76 PRIZES AND DISTINCTIONS





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