



ISO/TC 28 Petroleum products and lubricants

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To: P-members
O-members
L-members

Copy to: ISO/CS

Octane booster ferrocene

The attached letter entitled "Detrimental effects of the octane booster Ferrocene" was received from ISO/TC 22. Although ISO/TC 28 and specifically ISO/TC 28/SC 4 have not developed a gasoline specification, we are circulating the ISO/TC 22 information to our membership and liaisons for review and comment. CEN/TC 19 may elect to take actions as appropriated with respect to specification EN 228.

A query to our colleagues in ASTM International Committee D02 has provided the following insight. "It was reported that the US fuels industry is well aware of the issues surrounding the use of ferrocene in gasoline and diesel. The ASTM gasoline specification D 4814 addresses additives and clearly states the need for EPA registration. D 4814 states in section 6.3 that the finished fuel shall also be free of any adulterant or contaminant that may render the fuel unacceptable for its commonly used applications. Further, the US EPA has not approved ferrocene as a motor fuel additive in the US, hence they have not recognized it with a formal registration as an allowable additive in motor fuels. Aftermarket fuel additives are exempt from this EPA-registration ban, so many metal-containing fuel additives are indeed available in the market."

The ISO/TC 28 membership and its liaisons such as CEN/TC 19 are requested to provide feedback to the ISO/TC 22 Secretariat on this issue.

Yours sincerely

Paula Watkins

Paula Watkins
Secretary to ISO/TC 28



ISO/TC22 ROAD VEHICLES

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Dr. W. James Bover
through
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Detrimental effects of the octane booster Ferrocene Statement of Chairman/Secretary of ISO/TC22/SC1

Ladies and Gentlemen,

According to investigations carried out by Japanese experts an additive called Ferrocene is mixed to gasoline mainly in Russia and China as an octane booster. This additive causes deposits on spark-plugs that extremely deteriorate the insulation resistance which leads interalia to misfiring. Attachment 1 and 2 and the Explanation Sheet give technical details and show the development of the deposits by various photographs.

Engine malfunctions caused by these deposits occur as soon as after 5000 km driving distance and include jerking or hesitation in the engine function, bad acceleration and misfiring. If vehicles are equipped with OBD, engine check lamps are actuated. Chemical reactions of unburned gas in the catalytic converter due to frequent misfiring cause abnormal overheating of the catalyst up to a melting of it. The after-treatment system is thus inevitably destroyed causing economic damage for the driver and negative ecologic effects for the environment.

ISO/TC22/SC1 concluded from the evidence presented by the Japanese experts that the use of Ferrocene in road vehicles cannot be tolerated and shall be banned. If standards in your responsibility allow the use of Ferrocene or at least do not forbid it, we ask you to take appropriate action to expressly exclude the use of Ferrocene from these standards.

As the item seems to be urgent we appreciate very much your co-operation.

Sincerely YOURS

Jean-Pierre Cheynet
ISO/TC22 Chairman

Copy to
Dr. Fritz Ackermann
Chairman of ISO TC22/SC1

Egbert Fritzsche
Secretariat of ISO/TC 22/SC 1

Mr. Abram ISO CS

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Explanation of the Attached Data

Attached data 1

Spark plug appearance:

Black or Brown deposit accumulated on the insulator surface of the replaced spark plugs due to engine malfunction in Russian market.

Analysis of component:

Deposit consists mainly of Iron, oxygen, and carbon. Detection of a large quantity of iron implies that ferrocene was contained in the gasoline used.

Test result on actual engine:

Insulation resistance and discharge waveform were observed during engine operation with a returned plug installed in. Insulation resistance was kept infinity and engine showed good operation when the spark plug temperature was not more than 400 degree C. However, insulation resistance was dropped rapidly down to less than 10 mega-ohms under higher temperature driving condition. Discharge waveform showed misfire occurrence due to the fact that high voltage leaked through accumulated deposit.

Attached data 2

Durability test result on actual vehicle with ferrocene-contained gasoline:

Deposit accumulation on spark plug was observed at 10, 30, and 50 hours under 90km/h drive with a gasoline containing 40mg/l of ferrocene, which is the maximum mixed quantity in Russian market. Driveability and insulation resistance were also checked and monitored. The more drive mileage increased, the more deposit accumulated. We confirmed that misfire occurs with increasing frequency as insulation resistance drops.

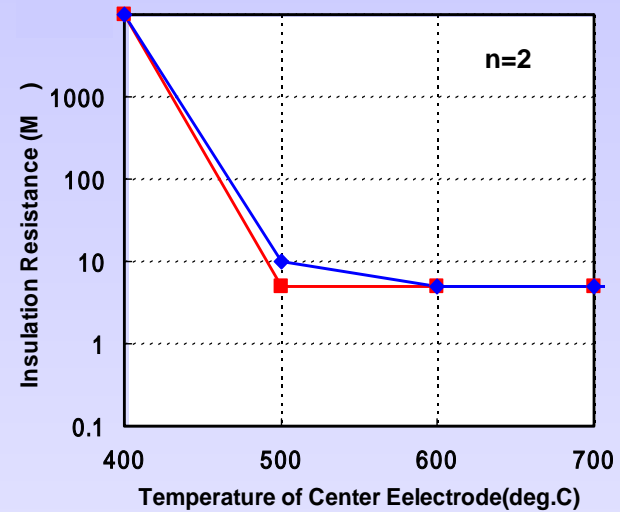
Attachment 1 :

Influence of Ferrocene on Spark Plugs ~ Insulation resistance ~

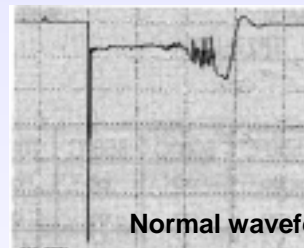
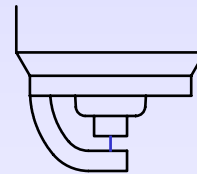
Engine :1800cc, 4cyl. 4cycles
 Spark plug :M14Hex16 Standard type
 (After 15000km drive in Russia)



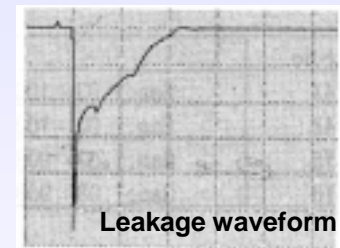
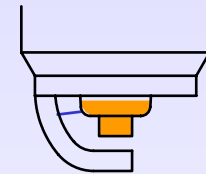
MATERIAL	wt %
Fe	52.2
O	30.8
C	10.3
P	2.6
Al	1.8
Ca	0.5
S	0.2
Zn	1.6



Normal discharge















Leakage



Insulation resistance dropped sharply at 500 degree C
Misfiring may be caused by spark leakage in street use

Attachment 2: Durability test on Actual Vehicle

Engine: 1.8L 4cyl. MPI Test fuel: Unleaded gasoline +Ferrocene (40mg/l)
Condition: R/L 90km/h Constant speed, 3rd, 4500r p.m –64kPa

	900km	2,700km	4,500km
#1cyl.			
#2cyl.			
#3cyl.			
#4cyl.			
Performance Test Result	<p>-Good performance -Insulation resistance : more than 400 mega-ohms under high temperature driving condition</p>	<p>-Good under normal temperature driving condition -Deterioration of driveability found under high temperature condition and on acceleration. -Insulation resistance: more than 100 mega-ohms under high temperature driving condition</p>	<p>-Deterioration of driveability found under normal/high temperature driving condition and on acceleration. -Insulation resistance: less than 20 mega-ohms under high temperature driving condition</p>