



**PERFORMANCE DIESEL, LLC**  
CHEMISTRY-DRIVEN PERFORMANCE

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## Technical Topic

### *Cetane*

Cetane is a term referencing the ignition quality of diesel fuel. In the United States, the minimum cetane is 40 while European cetane is typically 52. Engine manufacturers prefer a Cetane of 45 or higher because it minimizes ignition delay, decreases hard starting, lessens white smoke at start-up, reduces engine knock, lowers fuel consumption, and enhances engine life.

In order to raise motor cetane from 40 to 45 or higher, cetane improver is added to the fuel. Cetane improver is defined as 2-EHN, 2-Ethyl Hexyl Nitrate. Cetane improver is a high energy compound. The auto-ignition temperature of No. 2 diesel is 518 °F. and the auto-ignition temperature of Cetane Improver is 419 °F. When Cetane is added to No. 2 diesel, the fuel will exhibit:

- Decreased engine delay
- Fast cold starts
- More complete combustion
- Increased power
- Reduced black smoke under load

Many Midwest refiners today are processing Western Canadian Select (WCS), commonly known as Tar Sands Crude. Typically, WCS is priced at \$15-\$20/barrel discount to West Texas Intermediate (WTI). WCS is a heavy, low paraffinic, high aromatic crude that has a typical Cetane of 33. As a result, refiners elect to add Cetane Improver at the refinery in order to raise the motor Cetane to a typical 42-43.

This addition of Cetane Improver by refiners significantly reduces the Cetane improvement when additive packages are added by Jobbers, Fleets, or at Retail since the first Cetane bump is usually all a fuel can be boosted. Premium diesel additive packages containing Cetane continue to be important, but since the majority of diesel is fungible, one never really knows if the fuel has already been treated with Cetane at the refinery. The best approach, therefore, is to hope for the Cetane boost and focus on the other important components required such as Detergents, Stabilizers, Lubricity year round and during the winter, Deicers and both Terpolymers, Heavy Wax Modifiers and WASA (Wax Anti-Settling Additives).