

On January 1, 2020 the definition of Premium Diesel Fuel was changed. As per the Uniform Laws and Regulations in the Areas of Legal Metrology and Fuel Quality as adopted by the 104th National Conference on Weights and Measures 2019 is as follows:

2.2.1 Premium Diesel Fuel. All diesel fuels identified on retail dispensers as premium, super, supreme or premier must conform to the following minimum requirements:

(a) **Cetane Number.** A minimum cetane number of 47.0 as determined by the latest version of ASTM D613, "Standard Test Method for Cetane Number of Diesel Fuel Oil."

NOTE: ASTM D613, "Standard Test Method for Cetane Number of Diesel Fuel Oil" is the referee method; however, the following methods can be used to determine cetane number: the latest version of ASTM D6890, "Standard Test Method for Determination of Ignition Delay and Derived Cetane Number" (DCN) of Diesel Fuel Oils by Combustion in a Constant Volume Chamber"; and ASTM D7668, "Standard Test Method for Determination of Derived Cetane Number (DCN) of Diesel Fuel Oils-Ignition Delay and Combustion Delay Using a Constant Volume Combustion Chamber Method."

(Note added 2019)

Comments in red are the perspectives and points-of-view of Primrose Oil Company.

In the United States, the Engine Manufacturers Association requires a Cetane Number (CN) of 43 as the minimum non-premium standard. Our products featuring Xtreme Torque® when used in these fuels help you achieve the above requirement for Premium.

Fuel meeting ASTM D975 only has to have a 40 Cetane Number. Therefore, our fuel enhancement products with Xtreme Torque® insures you are using a fuel that meets minimum warranty requirements of 43 CN.

(b) **Low Temperature Operability.** A cold flow performance measurement which meets the latest version of ASTM D975, "Standard Specification for Diesel Fuel ", tenth percentile minimum ambient air temperature charts and maps by the latest version of either ASTM D2500, "Standard Test Method for Cloud Point of Petroleum Products and Liquid Fuels" or ASTM D4539, "Standard Test Method for Filterability of Diesel Fuels by Low Temperature Flow Test, (LTFT)." The latest version of ASTM D6371, "Standard Test Method for Cold Filter Plugging Point of Diesel and Heating Fuel Oils" may be used when

the test results are a maximum of 6°C below the Cloud Point. Low temperature operability is only applicable October 1 to March 31 of each year.

True winter diesel fuel treatments rely upon wax or paraffin modification and moisture control agents to enhance cold temperature operability. Winter diesel treatments must always be added to the fuel when the fuel is at least 10°F above the Cloud Point so the wax can be affected. If used in a biodiesel blend the treatment must be added to the fuel at least 10°F above the Cloud Point of the stand-alone biodiesel.

Our products with Ice Check contain an aviation grade deicer in addition to state of the art wax modifiers.

(c) **Lubricity.** A maximum wear scar diameter of 460 micrometers as determined by the latest version of ASTM D6079, “Standard Test Method for Evaluating Lubricity of Diesel Fuels by the High-Frequency Reciprocating Rig (HFRR).”

NOTE: The latest version of ASTM D6079, “Standard Test Method for Evaluating Lubricity of Diesel Fuels by the High-Frequency Reciprocating Rig (HFRR)” is the referee method; however, the latest version of ASTM D7688, “Standard Test Method for Evaluating Lubricity of Diesel Fuels by the High-Frequency Reciprocating Rig (HFRR) by Visual Observation can be used.

(Note added 2019)

The Wear Scar Maximum has been reduced to 460μ down from 520μ. This brings the new requirement in line with the EMA.

Products from our 5000 Series, Klenz ID®, Power Klenz ID or Winter Klenz ID, provides unsurpassed lubricity protection compared to any other diesel treatment available!

(d) **Corrosion.** A minimum rating of B+ as determined by the latest version of NACE TM0172, “Determining Corrosive Properties of Cargoes in Petroleum Products Pipelines.”

NOTE: The latest version of NACE TM0172, “Determining Corrosive Properties of Cargoes in Petroleum Product Pipelines” is the referee method. The latest version of ASTM D7548, “Standard Test Method for Determination of Accelerated Iron Corrosion in Petroleum Products” can be used.

(Added 2019)

(e) **Filter Blocking Tendency (FBT).** A maximum of 2.2 by the latest version of ASTM D2068, “Standard Test Method for Determining Filter Blocking Tendency”, following procedure B.

(Added 2019)

The previous requirement for Stability has been replaced by the new requirements for Corrosion and Filter Blocking Tendency. Stability enhancement has always been the cornerstone of all our fuel treatments. The addition of the requirements for Corrosion and Filter Blocking Tendency have been added to this requirement to strengthen the requirement. By-products of corrosion and oxidation from storage and other outside contaminants destabilizes diesel fuel and negatively impacts performance.

(f) **Injector Deposit Control.** Maximum power loss in keep-clean mode of 2% by the latest version of Coordinating European Council, CEC F-98-08, "Direct Injection, Common Rail Diesel Engine Nozzle Coking Test."

(Added 2019)

Selective Catalytic Reduction along with the High Pressure Common Rail Injection Systems were designed and implemented to help meet the government mandated emission standards of the Clean Air Act and Federal fuel economy standards.

These systems have given diesel operators a variety of new performance issues such as Internal Deposits (IDID), excessive condensation formation and wetter fuels which sets the stage for microbial infestation, asphaltene formation (better known as "Black Filter"), particulate trap regenerations, carboxylate gelling and others yet to be identified and/or understood. Primrose Oil Company stays at the forefront of research and development of treatments to maximize reliability, economy and productivity of diesel powered machinery.

Primrose Oil Company

January 6, 2020