

LUBE

TECHNI-GRAM



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Some Common Questions and Answers on Ultra Low Sulfur Diesel (ULSD)

1. What is ULSD?

ULSD or S15 is defined by the U.S. Environmental Protection Agency (EPA) as U.S. diesel fuel with a sulfur content not to exceed 15 ppm (parts per million). S15, S500, and S5000 are designations for diesel fuels that meet 15 ppm, 500 ppm, and 5,000 ppm maximum sulfur content, respectively as defined in the American Society for Testing and Materials (ASTM) standard D975. In different regions of the world ULSD may refer to different maximum sulfur content values, but ULSD and S15 are often used interchangeable in North America (U.S. and Canada). The S15, S500, and S5000 designations also apply to the Canadian diesel market.

2. When is ULSD required to be produced and sold?

Introduction of the new 15 ppm diesel into different portions of the diesel fuel supply channel will be managed through staggered compliance dates. As we understand it, for North America, there are currently three S15 (ULSD) implementation timelines.

United States (except California)

<i>On-Highway Diesel Fuel</i>	
Refinery	=15ppm by June 1, 2006
Terminal	=15ppm by September 1, 2006
Retail	=15ppm by October 15, 2006
<i>Off-Road / Locomotive & Marine Fuel</i>	
	=500ppm by June 1, 2007

California

<i>On-Highway, Off-Road, & Fixed Equipment Diesel Fuel</i>	
Refinery	=5ppm by June 1, 2006
Terminal	=15ppm by July 15, 2006
Retail	=5ppm by September 1, 2006
<i>Intra-State Locomotive / Marine Harbor Craft Fuel</i>	
	=15ppm by January 1, 2007

Canada

<i>On-Highway Diesel Fuel</i>	
Refinery	=15ppm by June 1, 2006
Retail	=22ppm by September 1, 2006 =15ppm by October 15, 2006
<i>Off-Road / Locomotive & Marine Fuel</i>	
	=500ppm by June 1, 2007



... to keep it running

3. Why is the timeline within California different than the rest of the United States?

The EPA established the federal S15 (ULSD) regulations for the United States. Individual states may adopt more stringent requirements than the federal mandate.

This is the case in California. Specifically, the state is mandating a tighter timeline for the introduction of S15 at the terminal and retail level. They have also chosen to require S15 to be used in all vehicles (e.g. both on-highway and off-road) as opposed to EPA's initial requirement that S15 must be used in only on-highway vehicles.

4. Where is ULSD required?

The U.S. Environmental Protection Agency (EPA) regulations for motor vehicle diesel fuel meeting the S15 (ULSD) requirements are applicable in all 50 states, Puerto Rico, and the U.S. Virgin Islands. Canada's regulations for motor vehicle diesel fuel meeting S15 requirements are applicable to all of Canada.

5. Why is ULSD required?

The EPA states these new regulations will significantly reduce nitrous oxide (NOx) and particulate matter emissions to the atmosphere. To attain these emission reductions the EPA has established a comprehensive program to regulate diesel fuel along with the production of diesel engines.

The regulations require

11. Model Year 2007 diesel engines will be required to use high-efficiency catalytic exhaust emission control devices (or comparably effective technology).
12. On-highway diesel fuel sulfur levels be =15 ppm starting in June 2006.

It is the combination of the Model Year 2007 diesel engines and the lower sulfur diesel fuel that the EPA expects to result in reduced emissions to the atmosphere.

6. What are diesel dispenser pump labeling requirements?

As of June 1, 2006 each diesel dispenser (except those dispensers in California) must have a label that correctly identifies the type of diesel fuel being sold from that dispenser. Initially, for most on-highway diesel dispensers this will be the S500 (LSD) label. If a retail or end-user facility transitions to the new, ultra low sulfur diesel fuel, the S500 (LSD) or S5000 (HSD) label must then be removed from the dispenser and replaced by an S15 (ULSD) label.

In California, the state has mandated that ULSD be the only fuel available. Therefore, the EPA has exempted California from labeling dispenser pumps.

7. Which vehicles are required to use USLD?

All on-highway heavy-duty diesel vehicles manufactured in model year 2007 and later will be required to use S15 (ULSD). These vehicles will be forbidden to use diesel fuel

with sulfur content greater than 15 ppm. Some 2007 light-duty and passenger car vehicles will also require S15 (ULSD).

Vehicles not specifically designed for use with S15 (ULSD) may use either S15 (ULSD) or S500 (500 ppm) diesel.

8. Can ULSD fuel be used in 2006-and-earlier model year engines?

Yes. S15 (ULSD) is compatible with 2006-and-earlier model year diesel engines.

9. How will diesel fuel properties, other than sulfur, change with ULSD?

There are several diesel fuel properties, other than sulfur, that will change as a result of moving to S15 (ULSD).

Lubricity:

11. Lubricity is a measure of the fuel's ability to lubricate and protect the various parts of the engine's fuel injection system from wear. The processing required to reduce sulfur to 15 ppm also removes naturally-occurring lubricity agents in diesel fuel. To manage this change the American Society for Testing and Materials (ASTM) adopted the lubricity specification defined in ASTM D975 for all diesel fuels and this standard went into effect January 1, 2005.

12. The D975 specification is based on the High Frequency Reciprocating Rig (HFRR) test (D 6079) and requires a wear scar no larger than 520 microns.

Energy Content:

11. In general, the processing required to reduce sulfur to 15ppm also reduces the aromatics content and density of diesel fuel, resulting in a reduction in energy content (BTU/gal).

12. The expected reduction in energy content is on the order of 1% and may affect fuel mileage.

Cetane Number:

11. In general, the processing required to reduce sulfur to 15ppm also reduces the aromatics content resulting in an increase to the cetane number. Current ASTM standards requires a minimum cetane number of 40. The Engine Manufacturer's Association (EMA) has asked ASTM to revise the standard to a minimum cetane number of 43.

10. How will the retail customer know which diesel product they are putting in their vehicle?

All dispenser pumps must be labeled to indicate the sulfur level and designation of the fuel. (e.g. S15 diesel or S500 diesel) For example, any dispenser with S500 (500 ppm of sulfur) diesel fuel must declare that the fuel is not suitable for fueling model year 2007 and later vehicles. All diesel dispensers must be appropriately labeled as of June 1, 2006.

***Note** – The above labeling requirements only apply to the United States, Puerto Rico, and US Virgin Islands. Canada does not have dispenser-labeling requirements.*

11. Will (ULSD) have a different color than the current S500 diesel fuel?

The color of a diesel fuel is not related to its performance. As long as the fuel meets specifications, it will perform well in your engine. The natural color of diesel fuels has traditionally varied from colorless to amber. As refinery processing of the diesel fuel increases to remove sulfur the color has tended to get lighter and the diesel can change color. When it changes color the diesel is typically light in tone and can be green, orange, or pink. Sometimes it might show a slight fluorescence when held up to light. Such a change in color does not affect the quality of the diesel.

SWEPCO 501 Premium Diesel Fuel Improver improves the quality and combustion characteristics of any distillate fuel ... including S15 ... and helps customers minimize fuel system maintenance costs, maximize power output, and insure efficient, economical operation of diesel engines. And SWEPCO 501's protective additive chemistry does not put sulfur back into the fuel. While SWEPCO 501's effective detergent and dispersant chemistry helps keep injectors, plungers, filters, screens and other critical diesel engine fuel system components clean, the oxidation inhibitors and storage stabilizers used in the formulation of SWEPCO 501 protect against oxidation and the accumulation of gum, sludge and bacterial growth (Note: SWEPCO 501 prevents infestation of bacterial growth, but fuel must be treated with SWEPCO 501 before healthy colonies of micro-organisms are formed).