



Tech Tip: Ultra Low Sulfur Diesel Fuel

What is Ultra Low Sulfur Diesel (ULSD)? Simply put, it is diesel fuel that contains a maximum of 15 parts per million (ppm) of sulfur content. The Federal Environmental Protection Agency (EPA) has established a standard that requires 80% of all refinery output be ULSD beginning June 1, 2006. By reducing the sulfur content, and in conjunction with other changes, emissions that contribute to acid rain and other environmental and health concerns will be effectively and positively reduced. This also now brings the quality of North American diesel closer to the quality and chemistry of the diesel fuel presently used in Europe and other parts of the world. For the past several years, low sulfur diesel fuel (LSD - max 500 ppm sulfur) has been sold for over the road use. There also continues to be the availability of non highway use diesel that contains a maximum of 5000 ppm sulfur.

Each of these fuels is often identified by the letter S and the fuel's maximum sulfur content. For example, ULSD is identified as S15, low sulfur diesel as S500 and non highway high sulfur diesel as S5000.

As shown in the table, there is a scheduled roll out for the manufacturing and availability of ULSD S15. It is important to note that the state of California has mandated that all on highway diesel be ULSD by 9/1/06.

While refiners and importers are required to produce a minimum of 80% of fuel for on highway use be ULSD S15, there is no legal requirement for any retail location to offer ULSD S15 until late in 2010.

Dates for On Highway ULSD Fuel			
Source	Action Required	U.S.	California
Refinery & Import	Produce/import a minimum of 80% for on highway use	6/1/06	
	Produce/import all (100%) on highway diesel as ULSD	6/1/10	6/1/06
Terminals	Locations choosing to sell ULSD must meet 15 ppm max	9/1/06	
	All (100%) on highway diesel must meet 15 ppm max	10/1/10	7/15/06
Retail Locations	Locations choosing to sell ULSD must meet 15 ppm max	10/15/06	
	All (100%) on highway diesel sold must meet 15 ppm max	12/1/10	9/1/06

Note:
 Non-highway and construction target for conversion to lower sulfur fuels is 6/1/2007 for S500 and 6/1/2010 for S15.
 Marine and locomotive target for conversion to lower sulfur fuels is 6/1/2007 for S500 and 6/1/2012 for S15.

In order to prevent the incorrect sulfur content fuel from being introduced, the EPA has established specific dispensing pump labeling regulations. The EPA regulations apply to all retail sites and commercial sites. Examples of labels containing the required information as set forth in regulation EPA 40 CFR 80.570 are shown below (provided by the API). In California, the label requirement is not an issue since only S15 diesel will be sold for on highway use.

**ULTRA-LOW SULFUR
HIGHWAY DIESEL FUEL**
(15 ppm Sulfur Maximum)

Required for use in all model year 2007 and later highway diesel vehicles and engines.

Recommended for use in all diesel vehicles and engines.

**LOW SULFUR
HIGHWAY DIESEL FUEL**
(500 ppm Sulfur Maximum)

WARNING

Federal law *prohibits* use in model year 2007 and later highway vehicles and engines.

Its use may damage these vehicles and engines.

**NON-HIGHWAY
DIESEL FUEL**
(May Exceed 500 ppm Sulfur)

WARNING

Federal law *prohibits* use in highway vehicles or engines.

Its use may damage these vehicles and engines.

All 2007 and later on highway diesel engines must use S15. However, 2006 and older on highway engines may use either S15 or S500.

While the chemistry is quite similar, there are some performance properties that are different between ULSD S15 and LSD S500. One of the most talked about differences is the fuel's ability to lubricate the fuel system

components. During the processes used to reduce the sulfur content of the diesel to the 15 ppm or less, other natural lubricity agents are also removed. As a result of this loss of lubricity, the topic of fuel additives has become a much discussed item. As with the fuel, all additives for on highway diesel must comply with the sulfur content and labeling requirements established by the EPA.

Other popular topics associated with ULSD S15 include the energy content of the fuel and other performance / maintenance concerns. ULSD does in fact have a lower energy content (BTU/gal), however, its important to remember 2007 and later engines are very specifically designed to perform with this fuel.

One other by-product of the the shift to S15 may be temporary shortened fuel filter service life. Similar to alternative fuels such as Bio-Diesel, the change to ULSD may affect deposits throughout the chain of fuel distribution, effectively cleaning the systems. Therefore, it would not be unexpected for dispensing pump filters and on vehicle filters to be presented with high levels of contamination due to the "cleansing" effect of the ULSD S15. Of course this shortened service life of the fuel filters would be temporary since once the system is "cleaned up", normal filter service intervals would return. Because of the potential for accelerated fuel filter need, when changing over to ULSD, it would be recommended fleets monitor their vehicular and dispensing pump filtration inventory and usage.