

Klenz ID® and MP8

The solutions to today's diesel fuel issues.

February 2020

Primrose Oil Company, Inc. – Since 1916
11444 Denton Dr., Dallas, TX 75229
1-800-275-2772

Today's Diesel Fuel Issues:

- Internal Diesel Injector Deposits (IDID)
- Hard Starting and Lack of Power
- Premature Filter Plugging
- Excessive Diesel Particulate Filter (DPF) Regenerations
- Excessive Water in Fuel
- Wax
- Carboxylates
- Asphaltenes
- Low Lubricity
- Fuel Storage Stability and Recovery
- Excessive Monoglycerides in Fuel
- Bacteria and Fungal Contamination



Internal Diesel Injector Deposits



Injector nozzle coking is not the only concern faced by modern high pressure common rail (HPCR) engines.

Internal diesel injector deposits (IDID) are causing substandard performing injectors that lead to decreased power, decreased fuel economy, and increased regulated emissions.

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Hard Starting and Lack of Power

Hard starting and lack of enough power can be caused by a low cetane number, or cetane points, diesel fuel.

Low temperature weather can cause these symptoms as well.

Finally, a plugged filter can lead to a lack of power and/or hard starting.

Left unchecked, extreme damage can occur to a diesel engine, and lead to large sums of money being lost in repairs.

Premature Filter Plugging

Premature filter plugging can be caused by many different things, and can lead to many detriments, including:

- Premature engine, injector or fuel pump failure due to fuel “starvation”
- High filter replacement costs
- Undesired downtime
- Going over maintenance budgets



EXCESSIVE DIESEL PARTICULATE FILTER (DPF) REGENERATIONS

DPF Regenerations can lead to:

- Safety hazards (busses parked on the side of the road in a “regen”)
- Premature DPF clogging
- Excessive downtime
- Premature “7th” Injector replacement
- “Busting” a maintenance budget

Excessive Water in Fuel

Excessive water can come from diesel transports of fuel, ingress from the air (tank “breathing”) or other sources. This can lead to:

- An environment rich for bacteria and/or fungi life
- Icing of fuel filters in below “zero” weather
- Premature filter life
- Excessive replacement filter costs
- Over spending on a maintenance budget



Wax



Paraffin wax, even though at a very low concentration, is naturally present in diesel fuel. When the diesel fuel is below the “cloud point,” left unchecked, the diesel fuel can form a paraffin waxy substance that will clog filters and make a vehicle unusable. This can cause:

- Premature filter clogging
- High maintenance costs
- Undesired downtime
- Excessive filter costs

Carboxylates

It is still not fully clear how carboxylates are formed. The most common theory is that they come from salts of corrosion inhibitors used in pipelines, refineries, additive packages, or aftermarket products. This in combination with sodium or calcium "contamination" in refinery salt dryers, storage tank water bottoms, or residual biodiesel as a catalyst can form sodium or calcium carboxylate salts. Carboxylates unchecked can cause:

- Clogged injectors
- Premature plugged filters
- Excessive maintenance costs
- Extra filter costs
- Unnecessary downtime



Pictured is pink tinted carboxylates / sticky IDID.

Asphaltenes

Asphaltenes are molecular substances commonly found in crude oil and in the form of asphalt, but are now being found in Ultra Low Sulfur Diesel (ULSD) fuel. There are many theories on where they come from including the removal of aromatics from diesel fuel (tied to sulfur), high pressures found in the High Pressure Common Rail (HPCR) engine, high temperatures in today's diesel vehicles (Some internal temperatures of injectors have been documented at 300° Celcius.) . In reality, to some extent, these theories can be combined. With diesel fuel left untreated, asphaltenes can cause:

- Premature clogged filters
- Injector deposits and/or failure
- High maintenance costs
- High replacement filter costs
- Undesired downtime

Low Lubricity



Over the years in diesel fuel, sulfur has been refined out. Years ago, sulfur was at a concentration greater than 3,000 ppm in diesel fuel; today it is found at a concentration less than 15 ppm. Higher levels of sulfur in diesel fuel provided inherent levels of lubricity, where a lubricity additive was not needed; however, today, without a proper lubricity additive, diesel fuel can cause:

- Premature fuel pump or injector wear
- Excessive down time
- Catastrophic injector and/or fuel pump failure
- Blown maintenance budgets

Fuel Storage Stability and Recovery

Untreated diesel fuel, over time, can oxidize at an unchecked pace, and lead to unusable diesel fuel that has to be disposed of and replaced. This unnecessary phenomenon can lead to:

- Premature clogged filters
- High maintenance costs
- Unneeded downtime
- Fuel Disposal Costs



Excessive Monoglycerides in Fuel

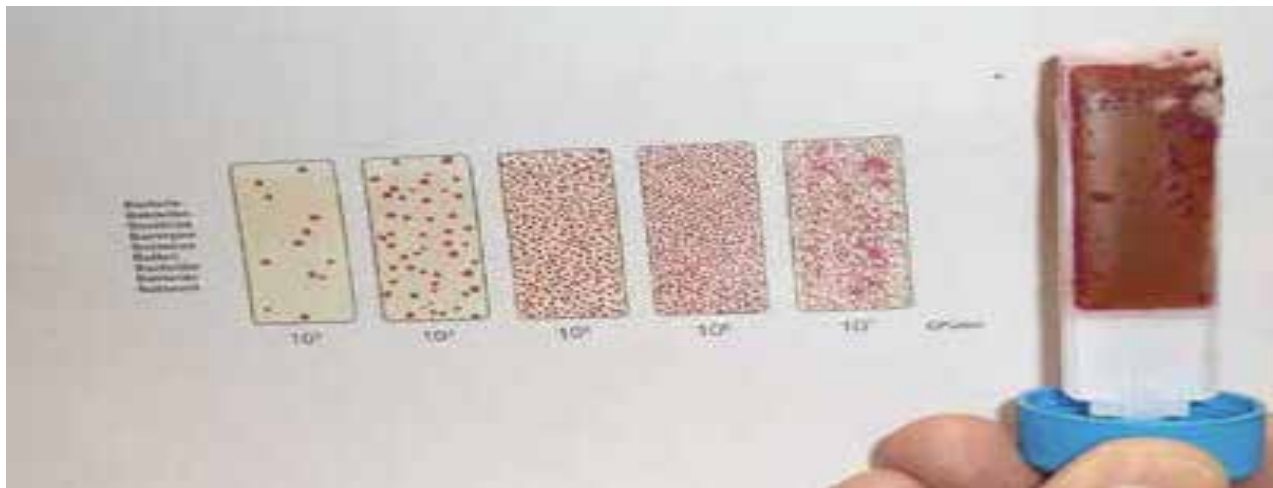
Biodiesel, in most states, can be used up to 5 percent in diesel fuel, without being disclosed at the pump. Biodiesel can be made of different feedstocks, and canola is a more common feedstock used. Typically, biodiesel made from canola contains around one half percent of Monoglycerides. Monoglycerides are not exclusive to canola, and can be found in tallow, and palm biodiesel feedstocks. The Monoglycerides, in these different feedstocks, have something in common, they can lead to a waxy thick coating that appear on filters. This can cause:

- Premature clogged filters
- Blown maintenance budgets
- Overspending on new filters
- Excessive downtime

Bacteria and Fungal Contamination

Unchecked, bacteria and fungal contamination can wreak havoc on a diesel engine. Some symptoms of contamination are a black, brown, or green slime on filters, or even a rotten egg smell coming from the filter, vent, or filling tube. Water can provide an environment rich in bacteria or fungi. Left unchecked, this can lead to:

- Premature clogged filters
- Having to replace the entire fuel system
- Excessive maintenance costs
- High filter replacement costs



WHAT IS THE "FIX?"



February 2020

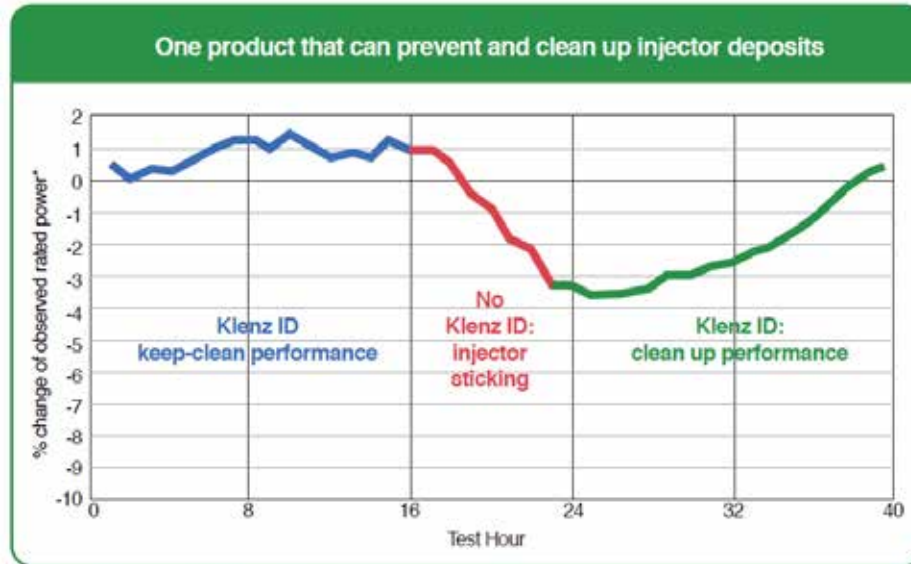
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Any Klenz ID[®] 5000 Series Product

When used at the proper treat rate, see Technical Data Sheet (TDS) for more details, any 5000 Series product can prevent the following phenomenon:

- Internal Diesel Injector Deposits (IDID)
- Hard Starting and Lack of Power
- Premature Filter Plugging
- Excessive Diesel Particulate Filter (DPF) Regenerations
- Excessive Water in Fuel
- Wax
- Carboxylates
- Asphaltenes
- Low Lubricity
- Fuel Storage Stability and Recovery
- Excessive Monoglycerides in Fuel

Internal Diesel Injector Deposits



* Loss of power is a symptom of sticky injectors

Graph above shows how Klenz ID[®] can clean up IDID in injectors.

- Any Klenz ID[®] product, when diesel fuel is treated at the "quick clean" (1:250)/ "keep clean" (1:500) dosage, can prevent IDID from occurring.

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Hard Starting And Lack Of Power

Klenz ID[®] contains Xtreme Torque[®], Primrose's exclusive cetane booster, that when used at the recommended "maintenance" dosage (1:1000) will boost cetane by up to 40 points or 4 numbers. This will help decrease hard starting, and return power back to the engine.



Premature Filter Plugging

Klenz ID® has been documented to extend the fuel filter life of one fleet by 3 times their normal life. This can lead to vast savings and contribute to the bottom line.

- This was achieved at the Klenz ID® “maintenance,” 1:1000, treatment ratio.



Excessive Diesel Particulate Filter (DPF) Regenerations

When used at the recommended treatment ratio (1:1000) or higher, Klenz ID® will help to reduce passive and active DPF “regens.”



Excessive Water in Fuel

Klenz ID® disperses moisture, the more moisture one desires to be dispersed, the higher recommended dose that the product should be used at.

If even more moisture is needed to be dispersed, use a Winter Klenz ID product, as Winter Klenz ID contains Ice Check to disperse higher concentrations of water.

Highest dose of Winter Klenz ID is 1:500; highest dose of Power Klenz ID or Klenz ID® is 1:250.



Wax

Winter Klenz ID contains anti-waxing additives that will keep wax from coagulating together, dispersed throughout the diesel fuel, thus lowering the operating temperature of diesel fuel.

Use Winter Klenz ID at least at the recommended dosage for best results in most fuels.

Carboxylates

Klenz ID® will dissolve and disperse carboxylates. The higher concentration of carboxylates or the more desired to be dealt with, use Klenz ID® at a higher dose.

It is recommended to use Klenz ID® at least at the "maintenance" dose, 1:1000, all the way up to the "quick clean," 1:250 dose for Power Klenz ID or Klenz ID®, or up to 1:500 in the Winter Klenz ID Product Line.



Asphaltenes



To prevent the harmful effects that asphaltenes cause, use Klenz ID® at least at the recommended "maintenance" (1:1000) treatment ratio; it can be used at higher treatment level, if higher dissolution and dispersion of asphaltenes is desired.

Highest dose for Winter Klenz ID is 1:500; highest dose for Power Klenz ID or Klenz ID® is 1:250.

Low Lubricity

Testing on the wear scar has been conducted on baseline diesel fuel without lubricity additives and Klenz ID® products. At the "maintenance" dose (1:1000) the wear scar went from a baseline of 610 μm to a range between 200 μm and 340 μm in fuel treated with Klenz ID®.

The less of a wear scar, more protection on fuel pumps and injectors – that is desired, the more Klenz ID® should be used.

Highest dose of Winter Klenz ID is 1:500; highest dose of Power Klenz ID or Klenz ID® is 1:250.

Type	HFRR Wear Scar	% Better Than Baseline	% Better Than "Regular" Diesel Fuel Additive
Baseline Diesel Fuel with No Additives	610		
"Regular" Diesel Fuel Additive	460	24.6%	
Klenz ID® Series of Products	200 mm - 340 mm	44.3% - 67.2%	26.1% - 56.5%

Fuel Storage Stability and Recovery

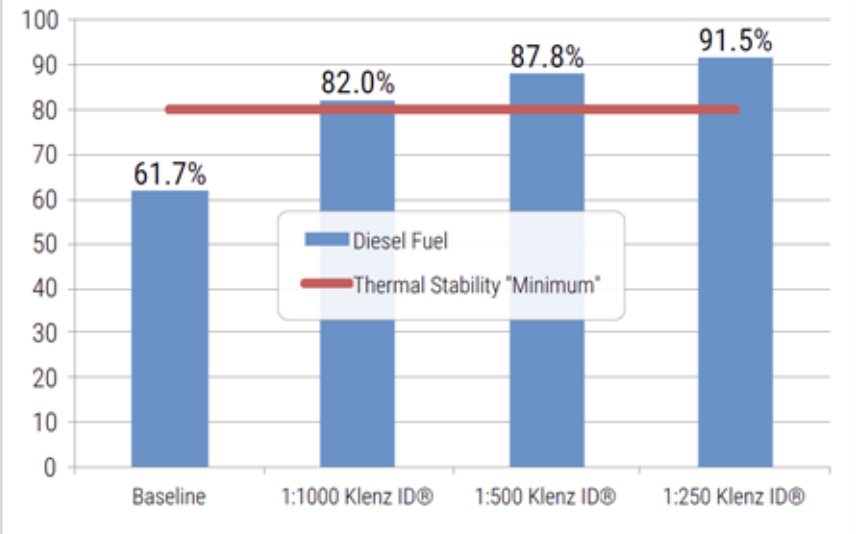
Klenz ID can be used to prevent pre-mature oxidation of diesel fuel, and to recover diesel fuel that has oxidized and turned black.

It is recommended to treat diesel fuel at least at the "maintenance" dose (1:1000), treating at higher recommended dosage for more stability protection.

To rejuvenate diesel fuel back into a usable state, it is recommended to at least treat at the "maintenance" dose (1:1000), and increase the treatment rate for less responsive fuel.

Highest dose of Winter Klenz ID is 1:500; highest dose of Power Klenz ID or Klenz ID® is 1:250.

**Thermal Stability Testing with Primrose® Klenz ID®
Fuel Recoverable with Treatment**



Excessive Monoglycerides in Fuel

For prevention of Monoglycerides pre-mature clogging of diesel fuel, treat at least at the Klenz ID® “maintenance” dose (1:1000), increasing the dosage for more dissolution and dispersion of Monoglycerides.

Highest dose of Winter Klenz ID is 1:500; highest dose of Power Klenz ID or Klenz ID® is 1:250.



Monoglyceride Filter Clogging

They will appear on the filter as a waxy, thick coating. If you suspect this has occurred with your fuel filter in the past, is occurring with your fuel filter or you just want to prevent this from happening, use one of Primrose's exclusive Klenz ID additives.

Klenz ID[®] and MP8

Any Klenz ID[®] product will disperse water, thus removing the potential for a bacteria or yeast environment.

MP8, when used at the “Kill Dosage” will kill off unnecessary bacteria and/or fungi from fuel. Note: fuel tanks must be filled to the “top,” for proper bacterial and yeast “killing.”

So, Klenz ID[®] and MP8, sometimes, are needed in combination to combat:

- Bacteria and Fungal Contamination





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