

This question of what happens to diesel in winter is very hard to answer consistently. There are so many variables and so many different chemicals, crudes and finished fuels it is hard to predict exactly.

One common trend is that the aromatics in fuel are lower and ULSD has a harder time holding wax and others items in suspension.

Some fuels are much harder to treat and require more cold flow improvers. It is very important to fully understand what fuels you are working with. In the extreme temperatures and longer weekends, it really helps to understand how the fuel works and how additives can help or not.

THERE ARE A NUMBER OF WAYS IN WHICH YOU CAN TRY TO MAKE DIESEL FUEL PERFORM BETTER IN COLDER WEATHER. Each of these concepts has limits and benefits.

1. Do nothing. Use ULSD #2 as is.
2. Use an additive package that contains a cold flow improver, deicer and WASA or a combination of these items.
3. Use an all #1 fuel.
4. Use a blend of #1 fuel and additives.

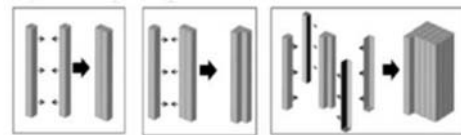
Lets break each of these down .



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Paraffin Crystallization

Reduction of temperatures reduces the solubility on n-paraffins (wax). Wax crystals begin to grow in sheet like formations at or near the Cloud Point.



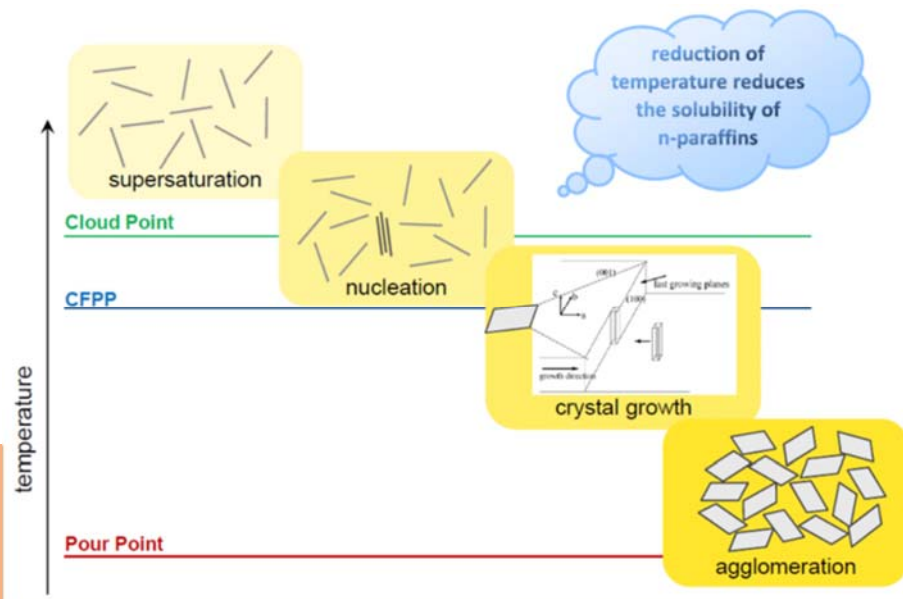
1. If left untreated or as is, the waxes will build up in suspension and “GEL”. This is a thick liquid throughout the fuel and it will no longer flow.

If this happens, it takes a lot of heat and time to recover and typically at a great cost. The upside is that the wax does not separate out of the fuel.

Wax Crystals agglomerate and liquid will gel in suspension. Here is a magnified wax crystal in untreated diesel fuel.



Timeline as fuel cools down due to ambient temperatures.

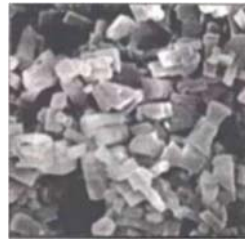


Treated fuel greatly helps filterability of fuel but can lead to wax settling when below the cloud point. WASA can prolong the settling and improve the operability.

2. Use fuel additive package.

- Antigel or cold flow improver. This will help modify wax and help filterability of the fuel.
- WASA
- De-icer Moisture Control
- Cold Flow Improver-Antigel is used for Nucleation or to create subcritical size wax nuclei initiating the formation of numerous crystals at reduced supersaturation (at or above CP)
- Cold Flow Improver modifies the growth of the paraffin by blocking the growth on two sides. This modifies the shape of the wax and helps it filter.
- Cold flow improver will greatly help the filterability of fuel. However, at temperatures below the cloud point the modified wax crystals tend to settle out from liquid due to higher density.

- Wax Anti Settling Agent was introduced to improve cold flow properties by dispersing paraffin crystals precipitated below their sedimentation
- Prevents paraffin precipitation below the cloud point and disperses for longer periods of time.



Magnified wax after being treated with WASA

- De-icer-Moisture control can help suspend moisture and keep it (and possibly other items) in suspension for longer periods of time.
- Moisture control can surround moisture molecule and help pass it through the systems without freezing.

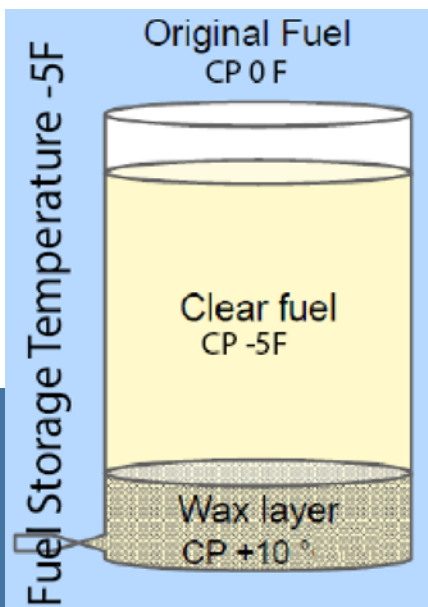
3. Use #1 fuels.

- Number #1 fuel has no wax or very minimal waxes present. This can be good all by itself but does add significant cost to fuel and comes with a lack of power and lubricity.
- In some cases, #1 fuels do not offer the same performance we have become accustomed to.

4. Use a combination of additive and #1 fuel.

- For the best performance, additives and a blend of #1 fuel can offer better filterability, operability and wax control. You can also provide moisture control which helps moisture from freezing in fuel.
- Minimizes wax that additive must nucleate and hold in suspension allowing overall best operability.

Wax Separation



Settled wax may cause issues in storage and equipment tanks .



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