

# Cold Weather Diesel Fuel Characteristics

## Improve your cold weather performance

The information contained herein concerns qualities, performance characteristics, results and benefits of additive purchased from the manufacturers of that additive by Magellan's applicable affiliate providing terminalling services ("Magellan"). That information comes from the manufacturers of the additive and is provided in this additive information memo for the benefit and convenience of Magellan's terminalling customers. Such additive is, for ease of description, referred to herein as "Magellan's CFI additive" and/or "Magellan's X1 additive package."

## Winter Diesel Fuels

All diesel fuels contain wax, which can cause major problems in cold weather. At low temperatures, wax can solidify into crystals and clog a fuel system, leaving the vehicle and driver stranded. The temperature at which wax crystals form is called the cloud point. In biodiesel blends this can be compounded.

The amount of wax – and subsequently the cloud point temperature – in a full tank of diesel can vary greatly within the same specification fuel. If biodiesel is a component of your fuel blend, you can see larger variations.

No. 2 ULSD (X-grade) will always have a higher concentration of wax - and therefore a higher cloud point - than No. 1 ULSD (Y-grade). Fuels with a higher cloud point are more likely to have problems during cold weather. At a temperature lower than the cloud point, diesel fuel becomes so stiff it won't pour ("pour point").

With its lower wax level, lower cloud point and lower pour point, No. 1 ULSD can be used at lower temperatures than No. 2 ULSD.

Biodiesel blending can also cause problems in cold weather due to certain components that precipitate from solution as temperatures drop below the cloud point of the blend. Cloud points can be increased by several degrees in biodiesel blends resulting in unexpected fuel system problems. The components within biodiesel that are most affected by cold temperatures may vary significantly from one biodiesel source to the next.

## No.1 ULSD Benefits

Because of its lower cloud point, No. 1 ULSD has traditionally been a necessity in cold weather months. It is common to mix No. 1 ULSD with No. 2 ULSD to get a lower cloud point. Basically, as the temperature drops, the more No. 1 ULSD will be needed in the blend to lower the cloud and Cold Filter Plugging Point ("CFPP").

CFPP is the minimum temperature at which cooled diesel fuel flows through a filter, which simulates the operation of a diesel fuel system under cold weather conditions.

## Additive Benefits

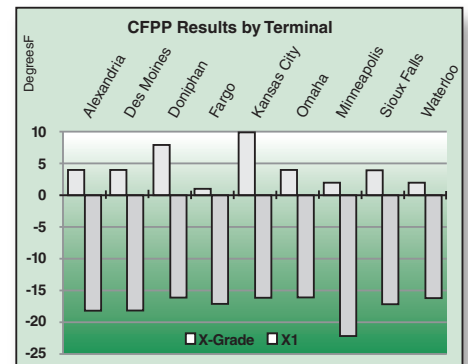
Blending No. 1 ULSD for improved cold weather performance effects the BTU (en-

ergy) content of the fuel. The greater the blend of No. 1 ULSD, the less energy (BTUs) the fuel possesses. No. 2 ULSD with Magellan's Cold Flow Improver ("CFI" or commonly referred to as "X1") additive allows you to operate your diesel engine more efficiently in colder climates. By blending Magellan's X1 additive package in conjunction with your blended fuel, you can help maintain energy content and lower the fuel's operability characteristics.

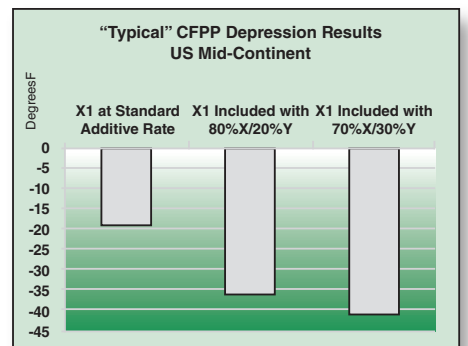
Magellan's X1 additive package can be added to No. 2 ULSD to lower the pour point an average of 25°F, and reduce the CFPP an average of 15°F. When used in blends of biodiesel, Magellan's X1 additive package significantly lowers the pour point and CFPP of biodiesel blends (in general, maintaining a 15°F CFPP reduction in biodiesel blends up to B5).

## Performance Criteria

The graphs below reflect the average CFPP test results from select Magellan Pipeline Company terminals.

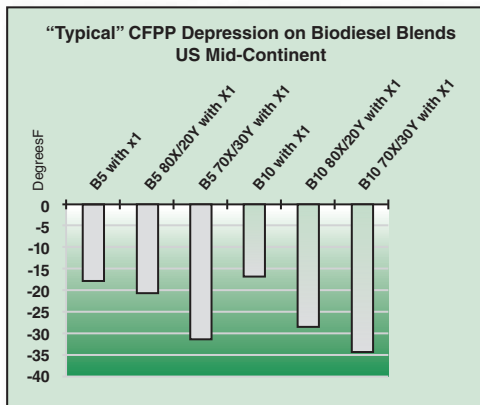


During extreme cold conditions, blending X1 with No. 1 ULSD will yield excellent results. CFPP depression of more than 30 degrees can be achieved by these types of blends.



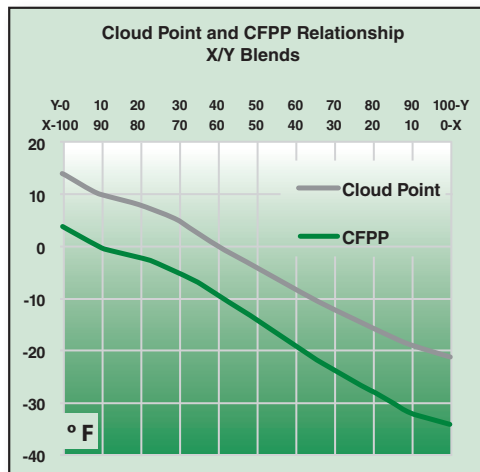
# Cold Weather Diesel Fuel Characteristics

Customers using Biodiesel during the winter months may elect to increase the use of No. 1 ULSD as the temperature drops. Magellan's X1 additive package can be adjusted in these blends to enhance the winter characteristics of the blended diesel to help prevent CFPP issues.



Magellan's CFI additive has treated fuels as low as -40°F with the correct blend amount of No. 1 ULSD. Please contact Magellan's Product Services group to determine the options available at each terminal.

Looking at the table below you will see the typical relationship between cloud point and CFPP when blending No. 1 ULSD and No. 2 ULSD.



Magellan's maximum winter specifications for all diesel fuel (No. 1 ULSD and No. 2 ULSD products) entering the pipeline or terminals are listed below.

**Pour Point Maximum = 0°F Cloud Point Maximum = 14°F**

**For further information on terminal availability on this, other additives offered, and product availability by terminal, please visit our web page at [www.magellanlp.com](http://www.magellanlp.com) or contact Magellan's Product Services group (918) 574-7421 or (918) 574-7365.**

*The blending guidelines in this document assume average cold weather handling characteristics for diesel fuels loaded at our terminals. This data is intended to be informative and under most circumstances will result in satisfactory operation of a vehicle. Always follow your engine manufacturer's recommendations if they differ from those in the table above. When calculating your blend, be sure to include fuel already in your tank.*

[www.magellanlp.com](http://www.magellanlp.com)

