GELLING

Effects of cold on fuel

Diesel applications operating in cold or extremely cold environments face some unique challenges, especially when it comes to the wax crystals in the fuel. Diesel fuel contains wax which is considered an important diesel component because of its high cetane value. Normally the wax is liquid in the fuel, however, when diesel fuel gets cold enough the wax starts to crystallize (i.e. solidify). If the temperature is sufficiently low, enough crystals will form to clog the fuel filter and injectors, starving the engine of fuel, preventing it from starting or even stalling out a running engine. Wax crystals can be visible as yellow/white deposits or as cloudiness in the fuel.

As the temperatures drops, the state of the fuel changes to different states/points:
State 1: Cloud Point
State 2: Cold Filer Plug Point
State 3: Pour Point

Cloud Point

Cloud point refers to the temperature below which wax in diesel or biowax in biodiesels form a cloudy appearance. Cloudiness, when fuel is treated, is not necessarily a bad thing. For instance, Xp3 additive will keep the wax crystals and water suspended avoiding masses of wax crystals from forming.

Cold Filter Plug Point

Cold filter plugging point (CFPP) is the lowest temperature, expressed in degrees Celsius (°C), at which a given volume of diesel fuel still passes through a standardized filtration device in a specified time when cooled under certain conditions. This test gives an estimate for the lowest temperature that a fuel will give trouble free flow in certain fuel systems.

Pour Point – "Gelling"

The pour point of a liquid is the temperature at which it becomes semi solid and loses its flow characteristics and can no longer flow by gravity or be pumped through fuel lines. In crude oil a high pour point is generally associated with a high paraffin content, typically found in crude deriving from a larger proportion of plant material. That type of crude oil is mainly derived from a kerogen Type II.

Cold Flow Improvers/fuel additives

Anti-gel additives (Cold Flow Improvers) are therefore commonly added to diesel or biodiesels where cold temperature is expected. They act to reduce the formation of wax crystals in the fuel, thereby lowering the pour point and the gel point of the fuel. Anti-gel additives may not necessarily affect the cloud point.

Not all cold flow improvers are made the same though. Be sure to check what added degrees of flow improver the additive provides and with what ratio of additive to fuel.

Xp Lab has two winter specific fuel additives designed to reduce the fuel Pour Point and Cloud Point (CFPP); 1) the **Xp³D-W** and 2) the **Xp³W-XT**.

Xp³D-W – Flow Improver for Diesel Fuels

- Xp³D-W was designed to reduce the fuel Pour Point and Cloud Point (CFPP). Its exclusive formula reduces the fuel Pour Point from –10°C up to –50° C. Xp³D-W has all the additional advantages that Xp³D (Xp3 Diesel).

Xp³W-XT – Extreme Flow Improver for Diesel Fuels

- Xp³D-W was designed to reduce the fuel Pour Point and Cloud Point (CFPP) in extreme cold weather. Its exclusive formula reduces the fuel Pour Point from –16°C up to –60° C. Xp³W-XT has all the additional advantages that Xp³D (Xp3 Diesel) provides. **The fuel additive itself has a pour point of more than -60° F.**