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Customer Assistance

What is Cummins' position on the use of Ethanol Diesel or E-Diesel fuel in Cummins engines?

Background

Alcohol is considered a renewable energy source, and some fuel suppliers blend up to 15% alcohol in diesel fuel to form Oxy-diesel or E diesel. Ethanol blended diesel consists typically of a mixture of #2 diesel (~80%), anhydrous denatured alcohol (7 to 15%), and a blending additive with cetane improver (~5% max). There are two common product names in the market: "E diesel" and "Oxy diesel". There are several companies that are in the business of blending additive packages for use with ethanol diesel fuels. The fuel is being promoted by the corn growers and ethanol producers, additive manufacturers, some state governments, and the RFA (Renewable Fuels Association).

E diesel is likely to remain an experimental fuel until flammability concerns and health effects testing are addressed, and the economic infrastructure developed. Until the safety and other issues outlined in this document are resolved, use of E diesel or other alcohol/diesel blends should not be used in Cummins products.

Fuel Characteristics

The flash point for E diesel is reduced to 50 degrees F vs 126 degrees F for #2 diesel, making it more dangerous to handle and store than #2 diesel. A lower flammability level presents a significant risk of a fuel tank fire or explosion during fueling. Vapors in the fuel tank containing a mixture of ethanol with diesel will readily burn under conditions where diesel vapors alone will not combust.

For Safety reasons, Cummins recommends against the use of alcohol fuel blends. Cummins [Bulletin Fuel for Cummins Engines 3379001](#) provides the following warning.

WARNING: UNDER NO CIRCUMSTANCES SHOULD ALCOHOL BE USED TO DILUTE DIESEL FUEL. THIS PRACTICE CREATES AN EXTREME FIRE HAZARD AND UNDER CERTAIN CIRCUMSTANCES, AN EXPLOSIVE HAZARD.

E diesel has a lower energy content; approximately 92% of #2 diesel fuel, and is therefore a less efficient fuel. Reduced cetane levels of E diesel can be addressed with cetane additives to maintain acceptable combustion characteristics. Without cetane improvement additives, alcohol blended diesel fuel would be expected to have poor ignition quality, poor start-up, and detonation problems. The blending of ethanol and alcohol in diesel fuel also lowers the cloud point and pour point of the fuel.

Alcohol is a reactive chemical and can cause fuel system corrosion. Alcohol also will deteriorate and affect the performance of gasket and/or seal materials. There are confirmed accounts of ISB engine fuel pump failures due to the effects of alcohol induced de-lamination of an internal timing sensor component. Robert Bosch, the fuel pump manufacturer prohibits alcohol blended fuel in the VP44 fuel pump on the ISB/QSB Cummins engine.

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Emissions

Ethanol diesel blended fuel has demonstrated a reduction in particulate emissions, which can be on the order of 20% to 30%. However, emissions of Carbon Monoxide (CO) and Hydrocarbon (HC) can increase, thus requiring an oxidation catalyst. NOx may or may not be affected depending on engine design. Aldehyde emissions are expected to increase with alcohol blended diesel fuel.

A comprehensive health and environmental effects study on this fuel has not been completed to date. This is an EPA requirement for on-road fuels and an exemption is necessary for on-road testing.

Performance and Durability Results

A variety of engines have been tested with E diesel, including a Cummins ISB used in the Dodge Ram pick-up. A dyno endurance test of that engine with a 15% ethanol blend experience fuel system problems. The fuel pump, a Robert Bosch VP44, failed an internal timing sensor (IAT) due to delamination of the foil caused by the presence of alcohol. Bosch has stated that they do not approve the use of ethanol blends in any of their fuel systems, including the VP44 and the new Common Rail equipment. Increased injector wear was also noticed during the above test. Results of tests with a 10% ethanol blend showed an 8% power loss and a 5% increase in fuel consumption.

Fuel System, Vehicle Issues, and Storage

The ethanol in the fuel blend will remove deposits from fuel tanks and lines causing filter plugging during initial testing. The presence of alcohol may also affect the performance of elastomers (seals, gaskets, etc.). With ethanol blended fuel, the fuel filter is not capable of stripping water in the system, leading to an increased risk of fuel pump and system corrosion. Since E diesel is more volatile, it is more likely that the vehicle will experience pump and injector cavitation and hot fuel re-start problems. A typical low pressure system with warm fuel returning to the vehicle tank is likely to require modification for flammability and evaporation. The reduced energy content of E diesel may require an idle governor change to prevent stalling in high temperatures and extreme conditions. Likely fuel handling and storage issues will include: water absorption, fuel stability, flammability and energy loss through evaporation of alcohol.

Warranty and the use of ethanol blended diesel in Cummins Engines

Cummins recommends against the use of ethanol blended diesel fuels due to safety reasons. Cummins is not in a position to evaluate the many variations in fuels or other additives, and their long-term effects on performance, durability or emissions compliance of Cummins products. The use of E diesel or Oxy diesel fuel does not affect Cummins Material and Workmanship warranty. Failures caused by the use of E diesel, Oxy diesel, or other fuel additives are **NOT** defects of workmanship and/or material as supplied by Cummins Inc. and **CANNOT** be compensated under the Cummins' warranty. Robert Bosch prohibits the use of alcohol blended fuel in any of its fuel systems, and will deny warranty coverage on all failures. The Dodge Cummins owner's manual warns against blending alcohol and diesel fuel.

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