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SUBJECT: Lubricants for Compressed Natural Gas Engines

Lubricants for Compressed Natural Gas Engines

Decreasing natural gas prices, incentive programs and technological changes have made fleet operators consider moving more truck and bus fleets from diesel fuel to compressed natural gas (CNG) and liquefied natural gas (LNG) engine technologies. However, there are misconceptions about the lubrication of these engines in the marketplace. Differences in fuel and combustion processes between diesel fuel and CNG/LNG result in very different stresses on engine oil.

Diesel Fuel

Emissions control technologies have forced engine oil formulators to change their approach to heavy-duty diesel engine oils. Technologies such as diesel oxidation catalysts (DOCs) and diesel particulate filters (DPFs) have come with limitations on additives available for acid neutralization and wear reduction. Exhaust gas recirculation (EGR) has increased soot-loading in the oil, putting higher demands on engine oil dispersants to effectively prevent the agglomeration of abrasive soot particles and thickening of the oil caused by soot. Increased use of biodiesel and biodiesel blends, and new injection timing technologies have added a new challenge for heavy-duty engine oils. Diesel engine oils are uniquely designed for these new and changing conditions.

Compressed and Liquefied Natural Gas

Unlike diesel fueled engines, engines run on gaseous fuel tend to run much hotter and produce much more complete combustion. While having virtually no soot as a by-product of combustion, high temperatures and high nitrogen oxides production rates creates a new set of problems for these engines. These engines place much less demand on dispersants and detergents, but also require much higher anti-oxidant concentrations to maintain and even extend drain intervals over their diesel-fueled counterparts.

CNG and LNG engines also require a carefully balanced sulfated ash level, which is typically lower than that found in diesel engine oils. Because the gaseous fuels are 'dry' and provide absolutely no lubricant value, engine oils must provide a soft ash deposit on the exhaust valves as a lubricant to prevent valve recession. Excess ash content can cause piston deposits, especially on the piston crown area, which can harm engine efficiency and cause irregular combustion. Eventually, these piston deposits can result in extreme knock and engine failure. In CNG and LNG engines, both the quantity and the type of ash-producing chemicals must be balanced to prevent high-temperature deposits and provide adequate valve lubrication.

Conclusion

Diesel-fueled engines and CNG/LNG engines place very different demands on engine oils. Diesel-fueled engines require oils with total base number (TBN) or alkaline reserve, and require much more dispersant for increased soot-handling capabilities. CNG and LNG engines require carefully balanced sulfated ash levels for valve lubrication, and require much higher anti-oxidant concentrations to prevent harmful effects of oxidation and nitration. In order to get the best performance out of your engines, you must select the appropriate oil. Using the correct oil for your heavy-duty engines will result in longer drain intervals and better engine protection.