

EFFECT OF BIODIESEL AND MONOOILIEN ON KEY FUEL PROPERTIES AND THEIR IMPACT ON WATER SEPARATION EFFICIENCY OF STANDARD FUEL-WATER SEPARATING FILTERS

Umer Farooq¹, Swarna Agarwal¹ Hamidreza Arouni², Stephen Russell³

¹Parker Hannifin Manufacturing (UK) Ltd, ²Nonwoven Innovation and Research Institute, UK.,
³University of Leeds, UK

Water is a fuel contaminant and can alter the physical properties of the fuel, as it changes the filterability and also accelerates fatigue wear in highly stressed mechanical parts (White, 1988) by promoting corrosion of steel components and microbiological growth which can be fatal in modern high precision diesel engine injectors. Injector manufacturers are continuously reducing the limits of maximum dissolved water content (some are currently capping it to 200ppm) and free water content (current trend is towards zero tolerance) in the fuel. The diesel engines are fitted with Fuel Filters and Water Separators (FFWS) to remove the contaminants before the diesel enters the injector compartment. Ever tightening emission regulations and the strong drive towards greener technologies has resulted in changing the chemistry of diesel fuel blends over the last decade or so. Today's diesel fuels are predominantly ULSD, have a number of additives with increasing percentage of bio-diesels. This change in Chemistry of diesel fuels have an adverse effect on the performance of the traditional fuel filters – particularly on their ability to separate emulsified water. Standard methods for testing water separation efficiency of fuel filters, like SAE J1488 and ISO 16332 recommends the use of surfactant Mono-olien to adjust the Interfacial Tension (IFT) of the test fuel (CEC Reference grade diesel) to simulate the challenging diesel fuels in the market, including bio-diesel blends.

This paper provides a comparative analysis of how the physical properties of diesel fuels blends are affected with different proportions of bio-diesel blends vs Mono-olien-Reference grade diesel blends; including, the effect on resulting water droplet size distribution challenge in a typical water separation efficiency measurement stand. The paper also discusses the effect of changing bio-diesel blends on the water separation efficiency of a typical 4 Mic Fuel Water Separating element and subsequently addresses the challenges faced by the current standards for analysing water separation efficiency of the diesel water separators.

Bibliography

White, R. (1988). Water Removal from Hydraulic Oil. Proceedings of the International Conference on Filtration and Separation, AFS, (p. 279).