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POSTER

FISCHER-TROPSCH IPK ASSESSMENTS OF FIT-FOR-USE IN THE ARMY'S TACTICAL GROUND VEHICLES

Patsy A. Muzzell[1], Luis A. Villahermosa[1], Brian J. McKay[1], Eric R. Sattler[1], and Leo L. Stavinoha[2]

[1]USAG-Detroit Arsenal, AMSRD-TAR, 6501 E. 11 Mile Road, Warren, MI 48397-5000 USA
[2]Stavinoha Enterprises, 1730 Westcloud Lane, San Antonio, TX 78227 USA

The U.S. Army's Tank Automotive Research, Development and Engineering Center (TARDEC) has completed several evaluations of Fischer-Tropsch Iso-Paraffinic Kerosene (FT IPK) to assess fit-for-use (i.e., suitability for use) in Army tactical ground vehicles. As this fleet is primarily powered by heavy-duty diesel engines, and these engines must be capable of powering heavy vehicles in extreme environments under severe duty cycles, alternatives to current JP-8 fuel must include consideration of these demanding requirements. In addition, alternatives should be freely interchangeable with JP-8 to accommodate worldwide deployments; unlike JP-8 generally available and widely produced throughout the world, the availability of alternatives would likely be of limited volume for many years yet and not be nearly as globally produced. The FT IPK evaluated is comprised of hydrocarbons in the kerosene range (mostly C9 – C16), is very "clean-burning" in that it contains no aromatics, no sulfur, and is free of various trace compounds typically found in petroleum fuels; the FT IPK has a high cetane number (about 60), and a high temperature viscosity that meets the minimum (1.3 mm^2/s at 40°C) for No. 1 diesel per ASTM D975. On one hand, these attributes define a high performance diesel fuel, while on the other they require that the FT IPK be assessed adequately. The FT IPK has a somewhat lower density then the minimum called out in the JP-8 specification (0.754 kg/L vs. 0.775 kg/L), a slightly lower volumetric energy density than typical JP-8, and less inherent lubricity than petroleum fuels. In addition, the FT IPK has lower solvency than petroleum fuels, resulting in possible sealing concerns in fuel distribution systems, but only for some types of sealing applications and some types of fuel-wetted elastomer materials (primarily nitrile). TARDEC evaluations have focused on two of the most critical areas: elastomer compatibility and fuel lubricity. Assessments show FT IPK fuel lubricity can be significantly improved by current military-specified lubricity improver additives, and that one means to address elastomer compatibility is by the use of blends of FT IPK with JP-8. TARDEC's study of blend properties shows significant quantities of FT IPK can be blended in JP-8 typical of U.S. supply, while still meeting an existing specification precedent for similar blends; namely up to 50% V FT IPK from Sasol's Secunda, South Africa plant with Jet A-1, found acceptable for commercial aviation use.