

# PALM DIESEL WITH LOW POUR POINT FOR COLD CLIMATE COUNTRIES

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**T**he fluidity of a fuel in an engine or machine is very important under all circumstances. When starting up an engine from cold, it is vital that fuel can be pumped into the engine and mechanical parts are able to move freely. Failure to do so will lead to excessive wear and the engine may become inefficient and inoperable.

Crude and distilled palm oil methyl esters (palm diesel) have been successfully evaluated as a diesel substitute. However, due to the presence of saturated methyl esters contributed mainly by 45% of methyl palmitate (C16 methyl esters), palm diesel has a pour point of +15°C. This property limits its usage as biofuel in countries with cold climate. The present technology is able to produce palm diesel with low pour point, which enables the biofuel to be used in cold climate countries.

## PRODUCTION TECHNOLOGY

The pour point of palm diesel can be lowered by the following routes:

- addition of additives to the palm diesel;
- esterification of palm fatty acids with certain carbon chain length; and
- fractionation of palm oil methyl esters.

Palm diesel with the desired pour point (from -20°C to 0°C) can be produced by controlling:

- dosage of additives; and
- the composition of fatty acids methyl esters or alkyl esters of certain carbon chain length.

## FUEL CHARACTERISTICS

The fuel characteristics of the palm diesel with low pour point are as shown in *Table 1*. It exhibits similar fuel properties as compared to petroleum diesel and normal palm diesel.

## ADVANTAGES

The low pour point palm diesel exhibits the following characteristics:

- reduction of black smoke, CO, CO<sub>2</sub>, SO<sub>2</sub> and hydrocarbon in the exhaust gas emission;
- offers enhanced safety characteristics with higher flash point when compared to that of petroleum diesel; and



**TABLE 1. FUEL CHARACTERISTICS OF NORMAL PALM DIESEL, PALM DIESEL WITH LOW POUR POINT AND PETROLEUM DIESEL**

Test	Method	Normal palm diesel	Palm diesel with low pour point	Petroleum diesel
Specific gravity	ASTM D1290	0.8700 @ 74.5°F	0.8803 @ 60°F	0.8330 @ 60°F
Sulphur content (% wt)	IP 242	0.04	0.04	0.10
Viscosity @40°C (cSt)	ASTM D445	4.5	4.5	4.0
Pour point (°C)	ASTM D97	+15	-15	+12
CFPP (°C)	EN 116	+15	-15	+12
Cloud point (°C)	ASTM D2500	+17.4	-15.4	+15.4
Flash point (°C)	ASTM D93	174	153	98
Gross heat of combustion (kJ kg <sup>-1</sup> )	ASTM D2332	40 335	39 160	45 800
Conradson carbon residue (% wt)	ASTM D198	0.02	0.01	0.14
Distillation	ASTM D86			
Initial boiling point (°C)		324.0	282.2	228.0
50% (°C)		334.0	336.8	298.0
Final boiling point (°C)		363.0	357.1	400.0
Final recovery (ml)		98	99	-



*Normal palm diesel (crude and distilled palm oil methyl esters).*



- renewable

### **PATENT**

The palm diesel with low pour point and its production technology were filed under Malaysian patent PI 20021157.

### **CONCLUSION**

By overcoming the pour point problem, palm diesel will have a worldwide market.

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