

L.H. COOK PLUMBING & HEATING LTD FACTSHEET LHC-FS039

Changes to the properties of standard Kerosene

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The properties of Standard Kerosene have changed considerably over the last couple of decades for many reasons. When supplied they **should** be within the parameters of British Standard 2869. Not all kerosene is refined from Crude Oil, some is cracked from “heavier” products or even waste products left over from the refinery process. These heavier products are re-cracked breaking down their longer chain lengths into shorter ones which are within the parameters of kerosene. Although afterwards the products are legally classed as kerosene, they are less stable and can “crack” again much easier than kerosene refined in the original or correct manner.

BS 2869 which governs the various parameters of kerosene and other fuels was altered in 2010, because of this it has allowed an overlap between Kerosene and Gas Oil. The Specific Gravity (Relative Density) of Kerosene was variable between 0.775 and 0.82 kg per cubic meter, it is now acceptable to be as high as 0.84 kg per cubic meter, but Gas Oil (Diesel) starts from 0.825 meaning that heavier grades of Kerosene can now include thinner grades of Gas Oil ! This in itself could lead to higher carbon formation and poor combustion in vaporising appliances, and increased temperatures of flames and appliance output, which could be the cause of baffle distortion and damage of burner seals in boilers. A lot of fuel that has been tested is towards the higher Specific Gravity range. **Oil Delivery Companies generally do not know what they are supplying you with; only that the fuel is supposedly “within specification”.**

According to Julia Mansfield a chemist working for Fuel Additive Science Technology (FAST Additives) “44% of our kerosene is now imported from the Middle East, Asia, Russia and South America and quality is variable”.

What does concern Julia is the fact that the UK is now buying ships full of kerosene that may have been floating around the world for some time. “With less control over its quality and its source, are we importing problematic fuel?” she asks. “As the fuel ages en-route, it could lead to larger molecules resulting in poor char values.

“When tested, char values of imported fuel were as high as 25.2mg/kg,” said Julia. “On the other hand, a fresh sample manufactured at a UK refinery had a char value of 1mg/kg.” Typical char values taken from kerosene samples at fuel distributors’ premises were an acceptable 6.5mg/kg.

Other aspects of the fuel that have changed:

Viscosity

The viscosity of the fuel has a wider spec now than it did in the 70’s and early 80’s which can cause combustion issues depending where in the spec the fuel is, as it may require more or less air for combustion than the previous delivery of fuel. As the burner cannot self-regulate the air supply, the combustion can change leaving the burner with a “lean” over aired flame which is inefficient, or a dirty flame which will produce soot which then becomes inefficient and can lead to the boiler breaking down or billowing black smoke from the flue terminal. With a vaporising appliance such as an AGA, a heavier distillate of fuel may travel through the metering stem of the oil control slower meaning the cooker will lose heat, whereas a lighter distillate may travel through faster either increasing the temperature of the cooker or causing the flame to “over fire” which will then lead to high soot formation. The viscosity of the fuel is now measured in Centistokes and is variable between 1.0 and 2.0 with a UK typical of 1.25 and because of these low numbers it does not appear to have much variance. Kerosene used to be measured under the Redwood scale and in the early 80’s became variable between 25 and 32 seconds with the average or ideal being 28 second; hence kerosene being known as 28 second fuel, Gas Oil or Red Diesel was known as 35 second fuel as it was variable between 33 and 38 seconds with the ideal being 35 which means you can get a heavy distillate of kerosene that is very nearly classed as Gas Oil or a lighter distillate of Gas Oil that is very nearly Kerosene. Using the wrong fuel will obviously cause problems but when the correct fuel is bordering on being the wrong fuel what can you do?!

Char value

The maximum permissible char value for kerosene is supposed to be 20 mg/kg; 25 years ago the UK typical was between 4 and 6mg/kg. An AGA type cooker will have difficulty coping with anything above 10-12mg/kg. Currently the UK average Char value is 16mg/kg.

Sulphur Content

EU directives have regularly called for reductions in sulphur within kerosene. The lack of sulphur in fuel has added to failures of oil pumps as they rely on sulphur to provide lubrication. Increased temperatures within the oil pump can lead to damage of seals, seizing of the pump and damage to the motor turning it due to increased resistance from friction.

The process to reduce sulphur content can be so severe that it is apparently changing the chemical structure of kerosene further and depending where in the world the Crude Oil comes from the levels of sulphur may be extremely high, meaning the fuel has to be treated even more aggressively to remove it which can cause even more changes.