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Gas and engine fluids specification

Gas specifications

A new engine will be set to operate on clean natural gas conforming to the British natural gas specifications having a lower calorific value of 34,71 MJ/Sm³ (930 BTU/Sft³).

The difference between high calorific value (HCV) and low calorific (LCV) is that (HCV) is the total amount of heat given off by the gas during combustion and the (LCV) is the high calorific value less the amount of heat used to vaporize the water content of the gas. Since the amount of heat lost in vaporizing the water is different for different gases, the lower calorific value of the gas is chosen as the basis for fuel consumption data. There must be no liquid hydrocarbon fractions in the gas.

Warning! *If the engine is not set to suit the site gas, uneconomical running, loss of power or damage may occur, which could result in injury.*

Where gases other than British Natural Gas are to be used, such as wellhead gas, digester gas and landfill gas, a detailed analysis of the gas must be submitted to Perkins Engines Company Limited, Stafford as resetting or changing the standard gas equipment may be necessary.

Limiting values for British Gas	4006/8TESI 200 & 140 LC	4006/8TESI 140 & 90 HC
Methane number must exceed	65	80
Combustible constituents must exceed	85%	95%
Calorific value (LCV) to exceed	31,7 MJ/Nm ³ (850 BTU/Sft ³)	34 MJ/Nm ³ (912 BTU/Sft ³)
Ethane	6%	4.5%
Hydrogen content not to exceed	0.2%	0.1%
Propane must not exceed	2.0%	1.0%
Isobutane content not to exceed	0.2%	0.2%
Normal butane not to exceed	0.2%	0.2%
Normal pentane and higher fractions (hexane, heptane, etc). The summation must not exceed	0.02%	0.02%
Minimum gas pressure at inlet to regulators	15 mbar (1.5 kPa)	15 mbar (1.5 kPa)
Gas pressure not to exceed without additional pressure regulators	50 mbar (5 kPa)	50 mbar (5 kPa)
Hydrogen sulphide not to exceed	0.01% or 100 ppm	0.01% or 100 ppm

Note: The rating may be reduced if lower calorific value of the fuel is lower than 34,71 MJ/Nm³ (930 BTU/Sft³). Also pressure must be constant to maintain emissions and stability. If any of the above parameters are not met, Perkins Engines Company Limited, Stafford should be consulted for advice.

Gas safety regulations

There are legal requirements that within the U.K. gas fittings and equipment must be installed only by competent persons and in accordance with the Institution of Gas Engineers Procedures IGE UP3. Outside the U.K. anyone undertaking work on the engine or associated with the engine and its gas equipment in particular should check with local and national regulations to ensure compliance.

Lubricating oil recommendations

Approved lubricating oils

High and low compression engines - ash content < 0.5%

- Mobil 705
- Esso Estor PC 40
- Esso Estor HPC 40
- Texaco Geotec L.A.
- Q8 Mahler MA
- Castrol Duratec L
- Shell Mysella LA 40

Low compression engines - ash content < 1%

- Mobil 710
- Esso Estor P 40
- Castrol Duratec M
- Shell Mysella MA 40

Landfill, Biogas and low compression engines

- Mobil Pegasus 610

Oil and filter change programme

Natural and Biogas engines

Lubricating oil and filter life is governed by engine load, gas quality and the type of oil used. To determine the optimum oil and filter change period after engine commissioning the following programme of oil analysis should be followed.

Initiating an oil analysis programme

Caution: *The oil sample must be taken from the mean level in the engine sump, never from the sump drain plug.*

Note: During the engine’s initial 500 hour running period, oil analysis will show higher levels of iron and copper than the acceptable contamination parameters, marked (*) in the list below. As the engine continues to run the levels will drop within the specified parameters.

Every 250 hours after the first 500 hour oil and filter change the oil should be analysed.

At 750 hours by comparing the oil analysis results a contamination trend can be established, allowing each individual operator to develop an oil and filter change policy for the operating conditions of their engine.

Caution: *Irrespective of condition the lubricating oil and filters MUST be changed at 1500 hours.*

Critical lubricating oil contamination parameters

Viscosity at 100 °C ..	cSt max 20% above original value
Insolubles ..	1.5% wt. max
Total Base Number (TBN)...	60% less than new oil value
Nitration ..	30 abs/cm max
Oxidation ..	30 abs/cm max
Water ..	0.2% volume max
Iron ..	Less than 20 ppm*
Copper ..	Less than 40 ppm*

Coolant specification

50% inhibited ethylene glycol or 50% inhibited propylene glycol and 50% clean fresh water should be used.

For combined heat and power systems and where there is no likelihood of ambient temperature below 10 °C, then clean 'soft' water may be used, treated with 1% by volume of Perkins inhibitor in the cooling system.

The inhibitor is available in under Perkins part number OE 45350.

Maintenance of coolant

Warning! *Always stop the engine and allow the pressurised system to cool before removing the filler cap. Prevent skin contact with the coolant mixture.*

The coolant mixture should be changed at 12,000 hours or 18 months and checked at 3,000 hours or 6 month intervals for the correct alkalinity level. The pH should not be above 7.5.

Note: A hydrometer only shows the proportion of ethylene glycol. This is not a measure of protection against corrosion.

Caution: *Failure to follow the above recommendations may result in engine damage and will invalidate the engine warranty.*