

# Perkins based INDUSTRIAL GAS ENGINES

## Technical Data

## CHP NG KVT-E33SI

### Gas Engine

#### Basic technical data

Number of cylinders ..... 3  
 Cylinder arrangement ..... Vertical, In line  
 Cycle ..... 4 stroke, spark ignition  
 Induction system ..... Naturally aspirated  
 Compression ratio ..... 12.1:1  
 Nominal bore..... 105 mm  
 Stroke ..... 127 mm  
 Cubic capacity..... 3.3 Litres  
 Direction of rotation ..... Anti-clockwise viewed on flywheel  
 Firing order ..... 1, 2, 3,  
 Cylinder 1 ..... Furthest from flywheel  
 Total weight of electro unit (engine only)  
 - estimated total weight (dry) ..... 329 kg  
 - estimated total weight (wet) ..... TBA

#### Overall dimensions

-height ..... 915 mm  
 -length ..... 1045 mm  
 -width ..... 631 mm

#### Moment of inertia (GD<sup>2</sup>)

- crank axis ..... 25 kgm<sup>2</sup>  
 - horizontal axis ..... 42 kgm<sup>2</sup>  
 - longitudinal axis ..... 25 kgm<sup>2</sup>

#### Ratings

This is defined in ISO3046 / 1 (BS5514 / 1 - 2002)  
 The tolerance for the specific fuel consumption is +5% at rated output. The tolerance for the usable heat is 7% at rated output.  
 Ratings are based on maximum engine load.

#### Operating point

Engine speed ..... 1500 rev/min  
 Ignition timing ..... 22° BTDC

#### Fuel data

Lower calorific value ..... >30,000 kJ/Sm<sup>3</sup>  
 Methane number..... > 80  
 Density ..... 0,833 kg/Sm<sup>3</sup>

#### Test conditions

-air temperature..... 25 °C (77 °F)  
 -barometric pressure ..... 100 kPa (29.5 in hg)  
 -relative humidity ..... 30%  
 -natural gas LCV ..... 31,65 MJ/Nm<sup>3</sup>

#### Emissions at 100% load (Correlation 5 % O<sub>2</sub>)

-NO<sub>x</sub> ..... mg/Nm<sup>3</sup> < 6000  
 -CO ..... mg/Nm<sup>3</sup> < 5500  
 -Engine surface noise ..... dB (A) 98  
 -Exhaust sound power level..... dB (A) 120

### Energy balance $\lambda = 1$

#### KVT-E33SI - Cogeneration unit

Rating @ 1500 rev/min	Units	Metric		
		100%	75%	50%
Ignition timing	°BTDC	22	25	28
Energy in fuel	kW	97	83	67
Energy in power output (Net)	kW	35	26	18
Energy in exhaust back to 120°C	kW	25	23	19
Energy to coolant	kW	27	26	24
Energy to radiation	kW	10	8	6

### Efficiency

#### KVT-E33SI - Cogeneration unit

Rating @ 1500 rev/min	Units	Metric		
		100%	75%	50%
Mechanical efficiency	%	36	31.5	27
Thermal efficiency	%	51.5	57	64
Total efficiency	%	87.5	88.5	91

### Mass flows

All data is based on measured values. The tolerance for specific fuel consumption is +5% at rated output

#### KVT-E33SI - Cogeneration unit

Rating @ 1500 rev/min	Units	Metric		
		100%	75%	50%
Combustion air	Kg/h	120	94	70
Fuel	Kg/h	9.2	8	6
Exhaust gas mass flow rate wet	Kg/h	122.5	102.3	76.4
Exhaust gas temperature	°C	620	610	605

Note: All data based on a grid coupled CHP set

# Perkins based INDUSTRIAL GAS ENGINES

## Cooling system

Recommended coolant: 50% inhibited ethylene glycol or 50% inhibited propylene glycol and 50% clean fresh water. 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 1 litre bottles from Perkins.

Total coolant capacity (engine only) ... 7 litres  
Maximum jacket water pressure in crankcase ... 1.5 bar

Jacket cooling water data	Units	1500 rev/min
Coolant flow	l/m	125.5
Coolant exit temperature (max)	°C	96
Coolant entry temperature (max)	°C	88

Shutdown switch setting... coolant 112 °C rising  
Recommended operating range... 86 / 90 °C

## Lubrication system

Recommended lubricating oil: Lubricating oil requirements vary with fuel used. Full specifications including oil sampling and recommendations and condemnation limits appear on the fuel, coolant and lubricating oil recommendation sheet for the 1104 Series Gas Engines.

### Lubricating oil capacity

Sump option ... G0002  
Lubricating oil capacity total system ... 8.3 litres  
Maximum sump capacity ... 7.8 litres  
Minimum sump capacity ... 6.2 litres  
Maximum engine operating angles  
-front up, front down, right side or left side ... 30°  
Lube oil consumption... 0.5 g/kWhm

### Lubricating oil temperature

Maximum oil temperature ... 105 °C  
Oil pump ... Gear driven  
Shutdown switch setting... oil 0,80 bar falling

## Exhaust system

Maximum permitted back pressure of the complete exhaust system is 4.0 kPa (40 mBar).

## Fuel system

Recommended fuel: Natural Gas LHV at 31.6 MJ/m<sup>3</sup>. Other fuels may be used, for example landfill or digester gas. Ratings will vary from those shown.

Where fuels other than Natural Gas are being considered it is imperative that a full gas analysis (including details of any solid or liquid components) be obtained. Reference should be made to Kemper en Van Twist Gas B.V. to determine suitability. Gas supplies must be filtered to the same standard as the engine intake air (i.e. Maximum particle size not to exceed 50 microns).

Gas supply pressure ... 1,5 kPa to 5 kPa at full rated flow  
Carburetor type ... Impco with zero pressure regulator

Installation of gas supply and shut off valves to be in accordance with local regulations.

## Ignition system

Primary system ... GECM  
Primary voltage ... 12 volts  
Polarity ... Negative earth  
Spark plug gap ... 0,25 mm  
Ignition timing ... 22° BTDC

## Electrical system

Type ... Insulated return  
Starter motor ... 12 volts  
Starter motor power ... 3 kW  
Number of teeth on flywheel... 126  
Number of teeth on starter motor ... 10  
Minimum cranking speed ... 120 rev/min