

Technical Data

4000 Series EGi

4016-E61TRS

Spark Ignited Gas Engine

Basic technical data

Number of cylinders 16
 Cylinder arrangement 60° Vee
 Cycle 4 stroke, spark ignition
 Induction system Turbocharged
 Compression ratio 12:1
 Bore 160 mm
 Stroke 190 mm
 Cubic capacity 61,123 litres
 Direction of rotation Anti-clockwise viewed on flywheel
 Firing order 1^A,1^B,3^A,3^B,7^A,7^B,5^A,5^B,8^A,8^B,6^A,6^B,2^A,2^B,4^A,4^B
 Total weight (dry) 5600 kg

Ratings

Electrical ratings are based on average alternator efficiency and are for guidance only

Operating point

Engine speed 1500 rev/min
 Ignition timing 25° BTDC
 Mixture cooler water temp. 40 °C
 Cooling water exit temp. <98 °C
 Exhaust emissions ¹/₂TA-Luft (NOx)
 TA-Luft (NOx)

Fuel data

Fuel type Natural Gas (UK)
 Lower calorific value 34,710 kJ/Sm³ (45,671 kJ/kg)
 Density 0,76 kg/Sm³
 Stoich, air requirement 16 kg/kg
 Minimum methane number 75

Performance

Note: All data based on operation to ISO 3046/1, BS 5514 DIN 6271 standard reference conditions

Test conditions

Air temperature 25 °C
 Barometric pressure 100 kPa
 Relative humidity 30%

General installation

Designation	Units	Continuous baseload rating	
		50 Hz; 1500 rev/min	
		¹ / ₂ TA-Luft (NOx)	TA-Luft (NOx)
Gross engine power	kW	1042	1042
BMEP gross	Bar	13,6	13,6
Combustion air flow	m ³ /min	82,7	79,8
Exhaust gas temperature max (after turbo)	°C	498	497
Exhaust gas flow (max)	m ³ /min	220	212
Overall electrical efficiency	%	38.2	39.2
Mean piston speed	m/s	9,5	9,5
Charge coolant flow	l/s	10	10
Nominal excess air factor (Lambda)	λ	1.80	1.75
Typical Gen Set 25 °C (100 kPa) Electrical Output	kW	1008	1008
Assumed alternator efficiency (1.0 power factor)	%	96.7	96.7

Energy balance

Continuous baseload rating	Units	1500 rev/min ¹ / ₂ TA-Luft NOx	%	1500 rev/min TA-Luft NOx	%
Energy in fuel (Fuel heat of combustion)	kW	2638	100	2574	100
Energy in power output (Net) (Engine shaft power)	kW	1042	39,5	1042	40,5
Energy to exhaust cooled to 120 °C	kW	688	26,1	673	26,1
Energy to coolant (jacket, oil and 1st circuit of c/c)	kW	554	21,0	548	21,3
Energy to radiation (surface radiation and other losses)	kW	79	3,0	49	1,9
Energy to charge cooler 2nd circuit	kW	98	3,7	93	3,6
Waste energy from exhaust gas	kW	177	6,7	171	6,6

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 temperatures 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 bottles under Perkins Part No. OE 45350 (1 litre).

Maximum jacket water pressure in crankcase 2,0 bar

Jacket water data	Units	1500 rev/min
Coolant flow	kg/s	15
Coolant exit temperature (max)	°C	98
Coolant entry temperature	°C	84

Charge cooling water data (2nd circuit)	Units	1500 rev/min
Coolant flow	kg/s	10
Coolant entry temperature (max)	°C	40

Charge cooler Bar and plate on engine
Coolant pump not fitted
Coolant immersion heater capacity 4 kW (2 off)

Lubrication system

Recommended lubricating oil:

For Natural Gas fuel applications... .. ESSO HPC 40

Lubricating oil capacity:

Total system... .. 286 litres

Sump maximum 257 litres

Sump minimum 147 litres

Lubricating oil temperature maximum to bearings 105 °C

Lubricating oil pressure:

at 85 °C temperature to bearing gallery 4,5 bar

Oil consumption	Units	1500 rev/min
After RUNNING-IN *	g/kW,hr	0,25
Oil flow rate from pump	l/s	7,8

* Typical after 500 hours

Sump drain plug tapping size. G1

Oil pump. Positive displacement gear pump

Normal operating angles:

Fore and aft 5°

Side tilt 10°

Fuel system

Recommended fuel Natural Gas LHV at 34,71 MJ/m³

Gas supplies must be filtered to the same standard as the engine intake air, i.e. Maximum particle size not to exceed 5 microns.

Gas supply pressure ... 6 kPa to 10 kPa at full rated flow conditions

Carburettor type. Woodward Tecjet 50

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

Fuel consumption gross	kJ/kWs	
	¹ / ₂ TA-Luft	TA-Luft
Designation	1500 rev/min	1500 rev/min
Continuous baseload rating	2,53	2,47

Designation	Units	¹ / ₂ TA-Luft	TA-Luft
Mass flow data		1500 rev/min	1500 rev/min
Fuel	kg/h	201	198

Designation		¹ / ₂ TA-Luft	TA-Luft
Volume flow data (100kPa)	Units	1500 rev/min	1500 rev/min
Fuel (15 °C)	m ³ /h	265	261

Induction system

Emissions data with combustion air temperature of 25 °C at continuous baseload rating.

Designation		¹ / ₂ TA-Luft (NOx)	TA-Luft (NOx)
Speed		1500 rev/min	1500 rev/min
Oxygen (O ₂)	%	9.4	9.3
* Oxides of nitrogen (NOx)	mg/Nm ³	250	500
* Carbon monoxide (CO)	mg/Nm ³	1100	850
Total Hydrocarbon (THC)	mg/Nm ³	1411	1372

* Typical figures corrected to 5% O₂ in the exhaust stream

Designation		¹ / ₂ TA-Luft	TA-Luft
Mass flow data	Units	1500 rev/min	1500 rev/min
Combustion air	kg/h	5760	5544
Maximum inlet depression	kPa	4,8	5,9

Exhaust system

Exhaust outlet size 210 mm (Internal)

Designation		¹ / ₂ TA-Luft	TA-Luft
Exhaust data	Units	1500 rev/min	1500 rev/min
Exhaust gas flow (wet)	kg/h	5961	5742
Exhaust gas temperature	°C	498	497
Lambda	λ	1.80	1.75
Maximum Allowable Exhaust Back Pressure	kPa	6,5	7,0

Electrical system

Starter motor 24 volts

Starter motor power. 16,4 kW

Number of teeth on flywheel 156

Number of teeth on starter motor 12

Minimum cranking speed 120 rev/min

Pull in current of starter motor solenoid... .. 26,8 amps at 24 volts

Hold in current of starter motor solenoid 9 amps at 24 volts

Engine management system

Full electronic Engine Management System controlling:

Speed governing

Air/Fuel ratio

Start/Stop sequence

Anti-knock

Engine protection and diagnostics

Ignition system

Primary voltage 24 volts

Polarity Negative earth

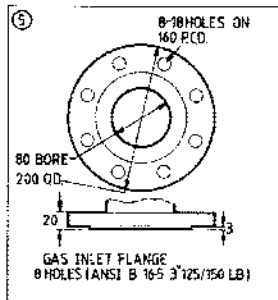
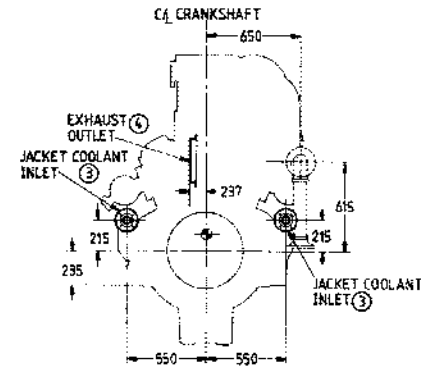
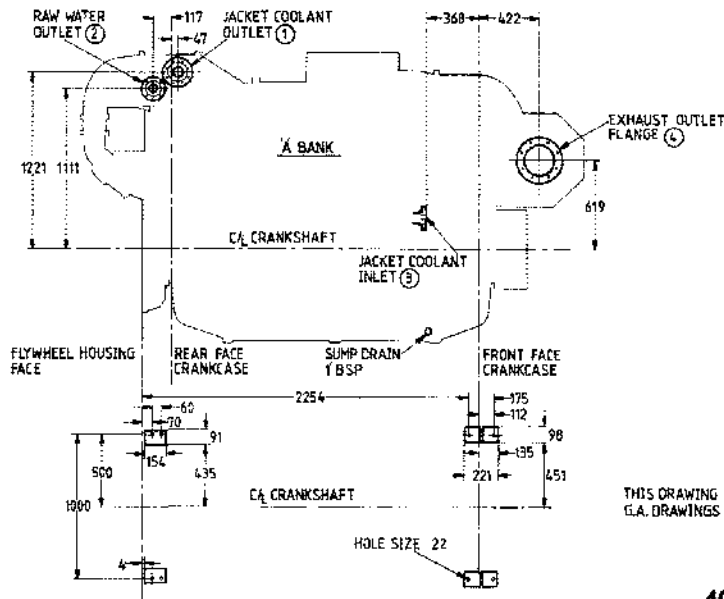
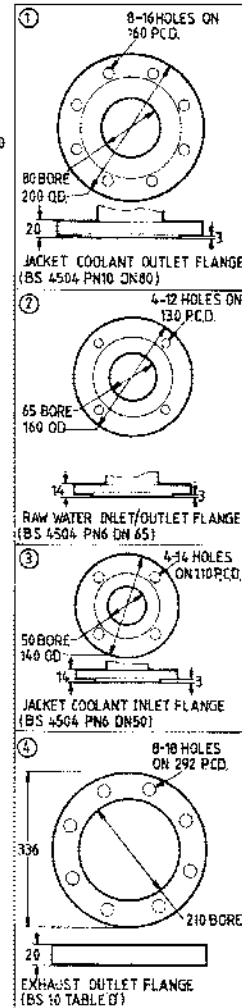
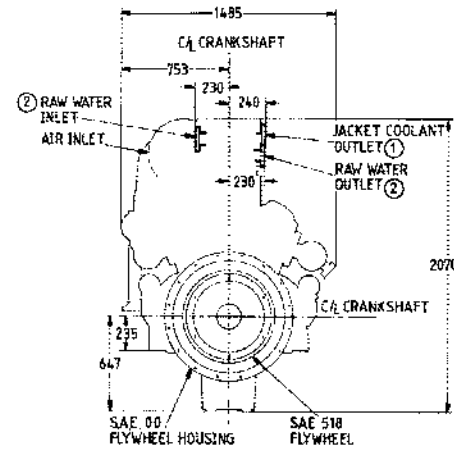
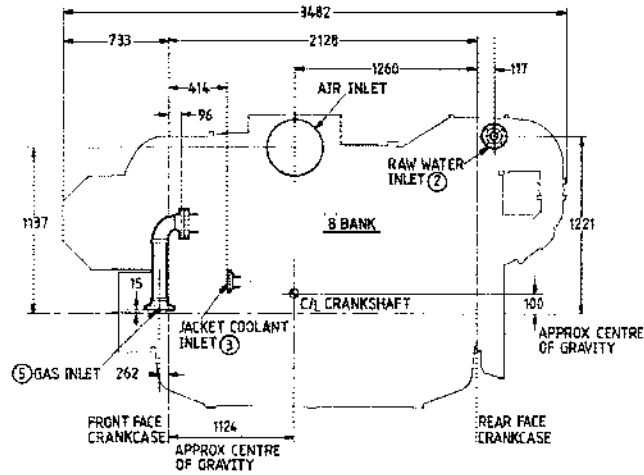
Ignition coils. 1 per cylinder

Spark plug type 18 mm

Spark plug gap 0,25 mm

Ignition timing 25° BTDC

TYPICAL ENGINE



THIS DRAWING COVERS GENERAL DIMENSIONS ONLY. FOR INSTALLATION DETAILS G.A. DRAWINGS MUST BE OBTAINED FROM PERKINS ENGINES (STAFFORD) LTD.

4016-E61TRS GAS ENGINE

Noise levels

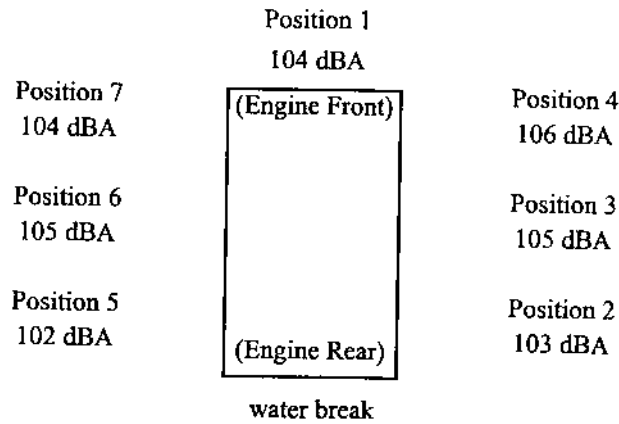
The figures for total noise levels are typical for an engine running in a semi-reverberant environment and measured at a distance of one metre from the periphery of the engine.

Octave analysis

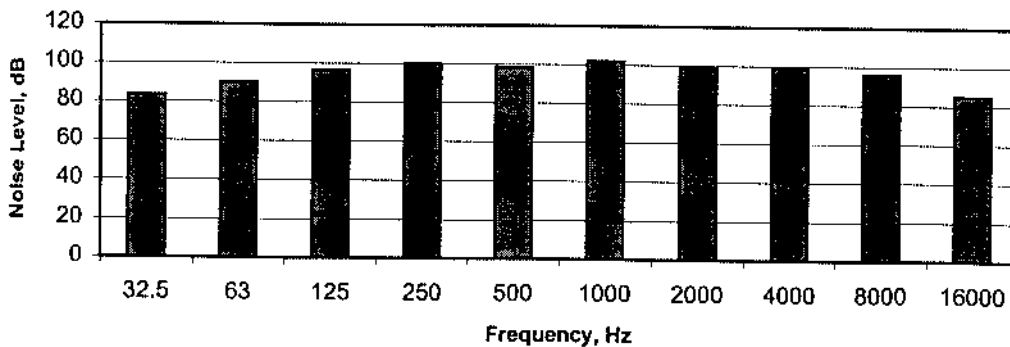
The following histograms show an octave band analysis at the position of the maximum noise level.

Total noise level

Speed 1500 rev/min Ambient noise level 79 dBA



Octave analysis taken at the position of maximum noise (position 4):



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