FDK ENERGY
SHENZHEN FUDIANKANG ENERGY CO., LTD
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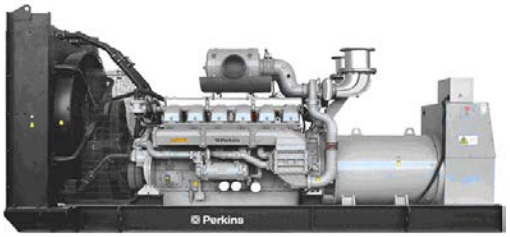
DATA SHEET

DIESEL GENERATOR 440KW
MODEL#FDK-P440/H1
50HZ/1500RPM
PERKINS MODEL: 2506C-E15TAG2



General Features:

- All qualified generator sets are subjected to a comprehensive performance test which includes 50% load, 70% load, 100% load, 110% load and to check, verify that all control systems, alarm and shut-down protection.
- Equipped with battery charger and 24V high performance maintenance-free lead-acid starting batteries and connecting cables.
- Stainless galvanized zinc plates with strong corrosion-proof.
- Vibration isolators between the engine/alternator and base frame.
- Equipped with industrial silencer and flexible exhaust hose.
- Designed to comply with ISO8528/GB2820.
- Powered by Perkins engine and coupled with Stamford alternator.
- Water jacket preheater, oil heater and double air cleaner, etc. are available.

FDK Diesel Generator Set Data

Genset Model	FDK-P440/H1	Engine Make	Perkins UK
Prime Power	400KW/500KVA	Engine Model	2506C-E15TAG2
Standby Power	440KW/550KVA	Alternator model	Stamford HCI544C
Output Frequency / Rated speed	50Hz/1500rpm	Control System	DSE7320
Rated Voltage	230V/400V	Phase	Three

(1) **Prime power**: The rating is available for an unlimited of annual operating hours in variable load applications, in accordance with ISO8528-1.A 10% overload is available for a period of 1 hour within 12-hour period of operation, in accordance with ISO 3046-1.

(2) **Standby power**: The rating is applicable for supplying emergency power in variable load applications for up to 200 hours per year in accordance with ISO8528-1. Overload is not allowed.

(3) **Rated voltage**: available with customer requirement.

Engine Specifications (DETAILED in APPENDIX)

Engine Model	2506C-E15TAG1	Bore x Stroke (mm x mm)	137×171
Engine Manufacturer	Perkins UK	Displacement	15 L
Cylinder quantity	6	Compression Ratio	16:1
Cylinder Arrangement	In-line	Prime power / Speed (KW/RPM)	451kw/1500
Cycle	4	Standby power/ Speed (KW/RPM)	495kw/1500
Aspiration	Turbo charged	Governor type	Electric

CE ISO9001:2008 FDK reserves the right to change the specifications and designs without noice.

Piston Speed	N.A.
Typical genset electrical output	400 kw
Total Lubrication System Capacity (L)	62
Total Coolant Capacity (L)	58

Fuel Consumption at 100% load (L/HOUR)	106 at rated speed
Starter motor	24V
Alternator	24V
Minimum cranking speed.	120 rpm

Alternator Specifications

Alternator model	HCI544C
Alternator manufacturer	STAMFORD
Exciter type	Single bearing, Brushless, Self-excited
Rated output prime power	500KVA
Rated speed	1500 rpm
Rated frequency	50Hz

Number of phase	3
Rated voltage	400V (Available with custom requirements)
Power factor	0.8
Voltage regulation NL-FL	≤±1%
Insulation grade	H
Protection grade	IP23

Alternator option: Leroy Somer, MECC, Marathon, Engga, Faraday

Control System DSE7320 (DETAILED in INSTRUCTION)

DSE7320 is an advanced control module based on micro-processor, containing all necessary functions for protection of the genset and the breaker control. It can monitor the mains supply, breaker control and automatically start the engine when the mains are abnormal. Accurately measure various operational parameters and display all values and alarms information on the LCD. In addition, the control module can automatically shut down the engine and indicate the engine failure.

FEATURES

- Microprocessor control, with high stability and credibility.
- Monitoring and measuring operational parameters of the mains supply and genset.
- Indicating operation status, fault conditions, all parameters and alarms.
- Multiple protections; multiple parameters display, like pressure, temp. etc.
- Manual, automatic and remote work mode selectable.
- Real time clock for time and date display, overall runtime display, 250 log entries.
- Overall power output display.
- Integral speed/frequency detecting, telling status of start, rated operation, overspeed etc.
- Communication with PC via RS485 OR RS232 interface, using MODBUS protocol.

Soundproof Enclosure Specification

FDK silent generator is designed by professional acoustic engineers based on years of experience. Now we can make the noise of the generator less than 80-85dB(A) at 1m, or 70-75dB(A) at 7m, 60-65dB(A) at 15m.

FEATURES

- Multi-way air intake and exhaust guarantee the power performance of the generator.
- Large-scale impedance combined type silencer effectively reduce noise of the generator.
- Internal high performance rubber damper and flexible materials reduce vibration.
- Base mounted fuel tank supports the generator running for 8 hours.

CE ISO9001:2008

Optional

Generator set	Alternator	Low environment Temp	ATS
☐ Open generator set	☐ Stamford	☐ Water heater	☐ CHINT
☐ Silent generator set	☐ Marathon	☐ Oil heater	☐ SCHNEIDER
☐ Trailer generator set	☐ Mecc Alte	☐ Battery heater	☐ ABB
☐ ABB MCCB circuit breaker	☐ Leroy Somer		
	☐ Farady		
	☐ Engga		
Fuel system	**Control system**	**Voltage**	**Synchronized system**
☐ 12hrs base tank	☐ AMF function	☐ 415/240V	☐ CHINT Cabinet
☐ 24hrs base tank	☐ ATS control cabinet	☐ 400/230V	☐ SCHNEIDER Cabinet
☐ Dual wall base fuel tank	☐ DSE7320	☐ 380/220V	☐ DSE8610 Module
☐ Outside fuel tank	☐ DSE7510	☐ 220/127V	☐ COMAQ Module
	☐ GU620A	☐ 200/115V	☐ DEIF Module

Dimension & Weight

Open

Overall Size: L×W×H (mm)	4500×1800×2500
Weight (kg)	3500

Soundproof Version

Overall Size: L×W×H (mm)	5250×2600×3500
Weight (kg)	5200

Sales Promises

- FDK provides a full line of brand new and high quality products. Each and every unit is strictly factory tested before shipment.
- Quality warranty is according to our standard conditions: 12 months from BL date or 1000 running hours, whichever comes first.
- Service and parts are available from FDK or distributors in your location.
- FDK guarantee use **BRAND NEW & GENUINE MACHINE.**

Technical Data

2500 Series

2506C-E15TAG1
2506C-E15TAG2

Diesel Engine - ElectropaK

Basic technical data

Number of cylinders 6
Cylinder arrangement . . . . . Vertical, In-line
Cycle . . . . . 4 stroke
Induction system . . . . . turbocharged, air to air charge cooling
Combustion system . . . . . direct injection
Compression ratio 16:1
Bore . . . . . 137 mm
Stroke . . . . . 171 mm
Cubic capacity . . . . . 15 litres
Direction of rotation . . . . . anti-clockwise viewed on flywheel
Firing order (cylinder 1 furthest from flywheel) 1, 5, 3, 6, 2, 4

Total weight of ElectropaK

-dry (engine only) . . . . . 1633 kg
-wet . . . . . 1714 kg

Overall dimensions

-height . . . . . 1718 mm
-length . . . . . 2657 mm
-width . . . . . 1120 mm

Moments of inertia (mk²)

Engine
-1500 rev/min . . . . . 2·3291 kgm²
-1800 rev/min . . . . . 2·3291 kgm²
Flywheel
-1500 rev/min . . . . . 1·96355 kgm²
-1800 rev/min . . . . . 1·96355 kgm²

Performance

Note: All data based on operation to ISO 3046/1, BS5514 and DIN 6271 standard reference conditions.

Cyclic irregularity

Engine / Flywheel maximum:
-1500 rev/min 1:44
-1800 rev/min 1:60

Ratings

Steady state stability at constant speed . . . . . ± 0·25 %
Electrical ratings are based on average alternator efficiency and are for guidance only (0.8 power factor being used)

Operating point

Engine speed . . . . . 1500 & 1800 rev/min
Cooling water maximum exit temperature . . . . . < 107 °C

Fuel data

To conform to . . . . . BS2869 class A2 or BS EN590

Test conditions

-air temperature . . . . . 25 °C
-barometric pressure . . . . . 100 kPa
-relative humidity 30%
-air inlet restriction at maximum power (nominal) . . . . . 2,5 kPa
-exhaust back pressure at maximum power (nominal) . . . . . 6,0 kPa
-maximum fuel temperature (inlet pump) . . . . . 40 °C
Note: If the engine is to operate in ambient conditions other than those of the test conditions, suitable adjustments must be made for these changes. For full details, contact Perkins Technical Service Department. For test conditions relevant to data on load acceptance, refer to the bottom of page 14.

Sound level

Estimated sound pressure level at 1 metre:
-1500 rev/min . . . . . 103,1 dB(A)
-1800 rev/min . . . . . 105,2 dB(A)

General installation

2506C-E15TAG1

Designation	Units	Type of operation and application			
		Prime	Standby	Prime	Standby
		50 Hz @ 1500 rev/min		60 Hz @ 1800 rev/min	
Gross engine power	kWb	412	451	458	514
Fan power	kWm	8,8		15,5	
Restriction losses	kWm	7,2	7,8	8,0	8,8
ElectropaK nett engine power	kWm	396	435	435	490
Gross brake mean effective pressure	kPa	2197	2405	2036	2284
Combustion air flow	m³/min	33,0	35,8	34,3	38,0
Exhaust gas temperature (max)	°C	N/A	550	N/A	550
Exhaust gas flow	m³/min	85,0	94,0	96,0	105,3
Boost pressure ratio	-	3,20	3,40	3,00	3,25
Overall thermal efficiency (nett)	%	39,9	39,7	44,0	43,4
Friction and pumping power losses	kWm	45		51	
Mean piston speed	m/s	8		10	
Engine coolant flow	l/min	6,1		7,2	
Cooling fan air flow (zero duct allowance)	m³/min	722		866	
Typical Gen Set electrical output (0.8 pf)	kWe	364	400	400	450
	kVA	455	500	500	563
Assumed alternator efficiency	%	92		92	

2506C-E15TAG2

Designation	Units	Type of operation and application			
		Prime	Standby	Prime	Standby
		50 Hz @ 1500 rev/min		60 Hz @ 1800 rev/min	
Gross engine power	kWb	451	495	458	514
Fan power	kWm	8,8		15,5	
Restriction losses	kWm	7,8	8,4	8,0	8,8
ElectropaK nett engine power	kWm	435	478	435	490
Gross brake mean effective pressure	kPa	2405	2640	2036	2284
Combustion air flow	m³/min	35,8	36,6	34,3	38,0
Exhaust gas temperature (max)	°C	N/A	550	N/A	550
Exhaust gas flow	m³/min	94	98	96	105,3
Boost pressure ratio	-	3,40	3,60	3,00	3,25
Overall thermal efficiency (nett)	%	39,7	39,6	44,0	43,4
Friction and pumping power losses	kWm	49		51	
Mean piston speed	m/s	8		10	
Engine coolant flow	l/min	6,1		7,2	
Cooling fan air flow (zero duct allowance)	m³/min	722		866	
Typical Gen Set electrical output (0.8 pf)	kWe	400	440	400	450
	kVA	500	550	500	563
Assumed alternator efficiency	%	92		92	

Rating definitions

Prime power

Variable load. Unlimited hours usage with an average load factor of 80% of the published Prime Power rating over each 24 hour period. A 10% overload is available for 1 hour in every 12 hours operation.

Standby power

Variable load. Limited to 500 hours annual usage up to 300 hours of which may be continuous running. No overload is permitted.

Emissions capability

Certified against the requirements of EU2007 legislation for non-road mobile machinery, powered by constant speed engines (EU 97/68/EC Stage II). These engines also comply with the 1/2 TA Luft (1986) NOx limits of 2000 mg/nm³

Cooling system

Recommended coolant:
50% inhibited ethylene glycol or 50% inhibited propylene glycol and 50% clean fresh water. Where there is no likelihood of ambient temperatures below 10 °C, clean 'soft' water may be used, treated with 1% by volume of Perkins inhibitor in the cooling system. The inhibitor is available from all Perkins Distributors.
Total system coolant capacity ... 58,0 litres
Maximum pressure:
-in crankcase water jacket. ... 276 kPa
Maximum top tank temperature ... 107 °C
Maximum static pressure on pump ... 170 kPa
Maximum permissible restriction:
-to coolant pump flow ... 30 kPa
Temperature rise across engine with inhibited coolant:
-standby power @ 1500 and 1800 rev/min ... 10 °C
-prime power @ 1500 and 1800 rev/min ... 9 °C
Thermostat operation range ... 88 to 98 °C

Radiator

-face area ... 1·238 m²
-weight (dry) ... 132 kg
-rows and materials ... 2 rows, Aluminium
-matrix density and material ... 12 fins per inch, Aluminium
-width of matrix ... 1048 mm
-height of matrix ... 1100 mm
-pressure cap setting (minimum) ... 69 kPa

Charge cooler with integral radiator

-face area ... 1·006 m²
-number of rows and material ... 1 row, Aluminium
-matrix density and material ... 12,5 fins per inch, Aluminium
-width of matrix ... 915 mm
-height of matrix ... 1100 mm

Coolant pump

Speed:
-1500 rev/min ... 1622 rev/min
-1800 rev/min ... 1946 rev/min
Method of drive ... gear

Fan

-diameter ... 927 mm
-drive ratio ... 0·92:1
-number of blades ... 9
-material ... B3WG6 or PA6GF30 Nylon 6 glass filled 30%
-type ... ACS 367500

Cooling clearance

Ambient cooling clearance (standby power) based on air temperature at fan of 6 °C above the ambient

2506C-E15TAG1 maximum additional restriction (duct allowance) to cooling airflow and resultant minimum airflow			
Duct allowance with inhibited coolant at 50 °C			
Description	**rev/min**	**Units**	**Standby**
Duct allowance	1500	kPa	0·125
	1800	kPa	0·125
Minimum airflow	1500	m³/min	660
	1800	m³/min	822
Duct allowance with 50% glycol at 43 °C			
Duct allowance	1500	kPa	0·200
	1800	kPa	0·200
Minimum airflow	1500	m³/min	576
	1800	m³/min	792

2506C-E15TAG2 maximum additional restriction (duct allowance) to cooling airflow and resultant minimum airflow			
Duct allowance with inhibited coolant at 50 °C			
Description	**rev/min**	**Units**	**Standby**
Duct allowance	1500	kPa	0·125
	1800	kPa	0·125
Minimum airflow	1500	m³/min	660
	1800	m³/min	822
Duct allowance with 50% glycol at 43 °C			
Duct allowance	1500	kPa	0·200
	1800	kPa	0·200
Minimum airflow	1500	m³/min	576
	1800	m³/min	822

Electrical system

Type ... 12V negative earth
Alternator
-type ... 22SI
-voltage ... 24 volts
-output ... 70 amps
Starter
-type ... 42MT
-motor voltage ... 24 volts
-motor power ... 7,5 kW
Number of teeth
-on the flywheel ... 113
-on starter pinion ... 11
Minimum cranking speed ... 100 rev/min
Pull-in current of starter motor solenoid
@ -25 °C max (1) ... 57 amps
Hold-in current of starter motor solenoid
@ -25 °C max (1) ... 16 amps

1. All leads to rated at 10 amps minimum

Cold start recommendations

Temperature Range	
5 to -10 °C (41 to 14 °F)	Oil: 15W40 Starter: 42MT Battery: 2x 12V 128 Ah Max breakaway current: 1250 amps Cranking current: 676 amps Aids: None Minimum mean cranking speed: 120 rev/min

Temperature Range	
-11 to -25 °C (12.2 to -13 °F)	Oil: 0W40 Starter: 42MT Battery: 2x 12V 128 Ah Max breakaway current: 1250 amps Cranking current: 880 amps Aids: block heater 1.5 kW Minimum mean cranking speed: 120 rev/min

- Battery capacity is defined by the 20 hour rate
- The oil specification should be for the minimum ambient temperature as the oil will not be warmed by the immersion heater
- Breakaway current is dependent on battery capacity available. Cables should be capable of handling the transient current which may be up to double the steady cranking current.

Exhaust system

Maximum back pressure ... ... 6,8 kPa
Exhaust outlet size (internal).. ... ... 127 mm

Recommended exhaust pipe diameter

length	1500 rev/min	1800 rev/min
	mm	mm
up to 10m	125	150
10m to 20m	150	150
20m to 30m	150	200

Fuel system

Type of injection .. .. MEUI
Injector type. ... ... MEUI
Injector pressure.. ... ... 200 MPa

Fuel lift pump

type.. ... ... gear driven
Delivery flow:
-1500 rev/min .. .. 413 litres/hr
-1800 rev/min .. .. 457 litres/hr
Pressure .. ..550 kPa
Maximum suction head at pump inlet.. ... ... 3 m
Maximum static pressure head ... ... 4 m
Fuel inlet temperature to be less than. ... ...55 °C
Governor type.. ... ... electronic
Governing to ... ... ISO 8528-5 class G3 steady state

Fuel filtration level

-primary ... ... 10 µm
-secondary... ... ... 2 µm

Fuel consumption

2506C-E15TAG1

Designation	Fuel consumption calculated on nett rated powers			
	g/kWh		litres/hr	
	1500 rev/min	1800 rev/min	1500 rev/min	1800 rev/min
Standby	217	201	109	114
Prime + 10%	217	201	109	114
Prime	216	199	99	100
At 75% of Prime	212	204	73	77
At 50% of Prime	222	217	51	57

2506C-E15TAG2

Designation	Fuel consumption calculated on nett rated powers			
	g/kWh		litres/hr	
	1500 rev/min	1800 rev/min	1500 rev/min	1800 rev/min
Standby	207	201	114	114
Prime + 10%	207	201	114	114
Prime	211	199	106	100
At 75% of Prime	215	204	81	77
At 50% of Prime	220	217	55	55

Induction system

Maximum air intake restriction

-clean filter. ... ... .3,7 kPa
-dirty filter .. .. .6,2 kPa
-air filter type . ... paper element 457 mm diameter

Lubrication system

The recommended SAE viscosity is a multigrade oil (15W40) which adequately meets the specifications of API CI4
Total system capacity ... ... 62,0 litres
Maximum sump capacity... ... ... 53,0 litres
Minimum sump capacity ... ... 45,0 litres

Lubricating oil pressure

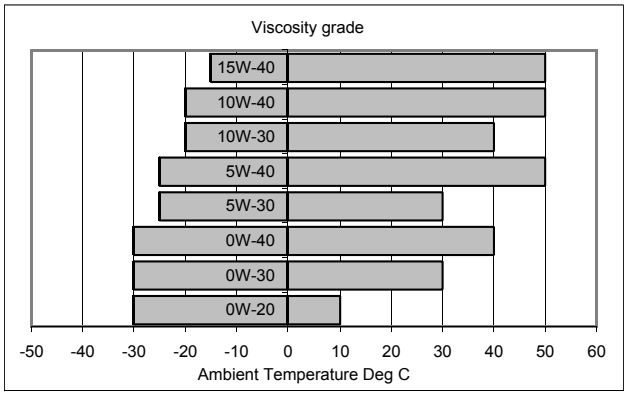
-at rated speed.. ... ... 420 kPa
Nominal (minimum)... ... ... 200 kPa
Oil relief valve opens. ... ... 620 kPa
Oil filter screen spacing. ... ... 30 µm
Sump drain plug tapping size M24
Oil pump speed and drive method ... ... 1,16 x engine speed, gear
Oil flow:
-1500 rev/min ... ... 2,9 litres/sec
-1800 rev/min ... ... 3,5 litres/sec
Oil consumption at full load rated speed
(as a percentage of fuel consumption).. ... ... 0,1%
Oil temperature (in rail)
-maximum continuous operation... ... ... 114 °C

Normal operating angles

-front and rear ... ... 7°
-side tilt.. ... ...7°

Recommended SAE viscosity

A single or multigrade oil must be used which conforms API CI4 or ACEA E5.



Mountings

Maximum static bending moment at
rear face of block ... ... 1356 Nm

Centre of gravity (bare dry engine)

-forward of rear face of cylinder block ... ... 570 mm
-above crankshaft centre line . ... 240 mm

Engine management system

Full electronic engine management system controlling:

- speed governing
- air / fuel ratio
- start / stop sequence
- engine protection and diagnostics

Typical load acceptance

2506C-E15TAG1

	Initial Load Acceptance When engine reaches rated speed (15 seconds maximum after engine starts to crank)				2nd Load Application Immediately after engine has recovered to rated speed (5 seconds after initial load application)			
Engine speed	**Prime Power %**	**Load kWm (kWe) Nett**	**Transient Frequency Deviation %**	**Frequency recovery time seconds**	**Prime Power %**	**Load kWm (kWe) Nett**	**Transient Frequency Deviation %**	**Frequency recovery time seconds**
1500 rev/min	65	236	≤ 10	5	60	218	≤ 10	5
1800 rev/min	65	266	≤ 10	5	60	300	≤ 10	5

2506C-E15TAG2

	Initial Load Acceptance When engine reaches rated speed (15 seconds maximum after engine starts to crank)				2nd Load Application Immediately after engine has recovered to rated speed (5 seconds after initial load application)			
Engine speed	**Prime Power %**	**Load kWm (kWe) Nett**	**Transient Frequency Deviation %**	**Frequency recovery time seconds**	**Prime Power %**	**Load kWm (kWe) Nett**	**Transient Frequency Deviation %**	**Frequency recovery time seconds**
1500 rev/min	60	240	≤ 10	5	55	220	≤ 10	5
1800 rev/min	65	266	≤ 10	5	60	300	≤ 10	5

The above figures were obtained under test conditions as follows:

Engine block temperature . . . . . 45 °C
Ambient temperature . . . . . 15 °C
Governing mode . . . . . Isochronous
Alternator inertia. . . . . 8 kgm²
Under frequency roll off (UFRO) point set to . . . . . 1 Hz below rated frequency
UFRO rate set to . . . . . 2 % voltage / 1% frequency
LAM on / off . . . . . off

All tests were conducted using an engine installed and serviced to Perkins Engines Company Limited recommendations.

The applied load is a percentage of generator electrical output, using alternator efficiencies as published in the general installation section of this Technical Data Sheet.

The information given on this Technical Data Sheet is for standard ratings only. For ratings other than those shown, please contact Perkins Engines Company Limited, Stafford.

The information given in this document is for guidance only.