

1706A-E93TAG1

303.9 kWb (Gross) @ 1500 rpm
358.4 kWb (Gross) @ 1800 rpm

1700

Series

Diesel Engine - Electropak

Basic technical data

Number of cylinders 6
Cylinder arrangement In-Line
Cycle Four Stroke
Induction system Turbocharged, Aftercooled
Compression ratio 16.5:1
Bore 115 mm
Stroke 149 mm
Displacement 9.29 litres
Direction of rotation (Viewed from flywheel face) Anticlockwise
Firing order (Cylinder 1 1, 5, 3, 6, 2, 4
furthest from flywheel)

Weight of Electropak

Dry (estimated) 1070 kg
Wet (estimated) 1126 kg

Overall dimensions of Electropak

Height 1311 mm
Length 2083 mm
Width 1091 mm

Centre of gravity

Forward from rear of block 551 mm
Above centre line of block 290 mm

Moments of inertia

Engine rotational components (excluding flywheel) 1.067 kgm²
Flywheel 1.664 kgm²
Total engine (flywheel & engine) 2.731 kgm²

Electrical output

Electrical output frequency Switchable 50/60 Hz

Ratings

Steady state speed stability at constant load ± 0.25 %

Cyclic irregularity for engine standby power

At 110% 0.483

Performance

Average sound pressure level for Electropak 113 dB(A)
including raw exhaust noise at 1 metre

Note: All data based on operation to ISO 3046/1:2002 standard reference conditions.

Note: For engines operating in ambient conditions other than the standard reference conditions stated below, a suitable derate must be applied.

Note: Derate tables for increased ambient temperature and/or altitude are available, please contact Perkins Applications Department.

Test conditions

Air temperature 25 °C
Barometric pressure 101.3 kPa
Relative humidity 30 %
Air inlet restriction at maximum power (nominal) 6.2 kPa
Exhaust back pressure at maximum power (nominal) 10.0 kPa
Fuel temperature (inlet pump) 40 °C
All ratings certified to within 3 %

Note: For engine servicing information, refer to the Engine Operation and Maintenance manual.

Conditions of use

This document is only to be used as a reference guide for installation purposes through Perkins' applications engineering team.

Invalid if printed.

For business tender purposes, user must obtain the latest controlled copy through Perkins applications engineering team.

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General installation

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Designation	Units	Type of application					
		50 Hz @ 1500 rpm			60 Hz @ 1800 rpm		
		Baseload power	Prime power	Standby power	Baseload power	Prime power	Standby power
Gross engine power output	kWb	TBC	276.30	303.93	TBC	325.80	358.38
Gross BMEP	kPa	TBC	2380	2618	TBC	2339	2573
Mean piston speed	m/s	7.5			8.9		
ElectropaK nett engine power	kW	TBC	267.30	294.93	TBC	310.80	343.38
Engine coolant flow against 35 kPa restriction	l/min	265.00			330.00		
Intake air flow	m³/min	TBC	15.52	16.50	TBC	21.44	22.44
Exhaust gas flow (maximum) at atmospheric pressure	m³/min	TBC	41.74	44.46	TBC	52.31	55.49
Exhaust gas temperature (maximum)	°C	TBC	538.1	548.8	TBC	481.0	497.9
Overall thermal efficiency	%	TBC	40.2	40.4	TBC	39.7	39.7
Typical generator set electrical output (0.8 pf)	kWe	TBC	245.92	271.34	TBC	285.94	315.91
	kVA	TBC	307.40	339.17	TBC	357.42	394.89
Assumed alternator efficiency	%	TBC	92.00	92.00	TBC	92.00	92.00

Rating definitions

Baseload power

Unlimited hours usage with an average load factor of 100% of the published Baseload power rating. No overload is permitted on Baseload power.

Prime power

Unlimited hours usage with an average load factor of 70% of the published prime power over each 24 hour period. A 10% overload is available for 1 hour in every 12 hours operation.

Standby power

Limited to 500 hours annual usage with an average load factor of 70% of the published standby power rating over each 24 hour period. Up to 300 hours of annual usage may be run continuously. No overload is permitted on standby power.

Energy balance

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Designation	Units	50 Hz @ 1500 rpm			60 Hz @ 1800 rpm		
		Baseload power	Prime power	Standby power	Baseload power	Prime power	Standby power
Power input from fuel	kWt	TBC	686.36	752.23	TBC	821.30	901.67
Gross engine power output	kWb	TBC	276.30	303.93	TBC	325.80	358.38
Cooling fan parasitic loss	kWm	9.00			15.00		
Nett power output	kWm	TBC	267.30	294.93	TBC	310.80	343.38
Energy flow through exhaust	kWt	TBC	229.42	252.36	TBC	264.84	291.33
Energy flow through coolant and oil	kWt	TBC	118.32	127.64	TBC	132.07	142.13
Radiative power loss	kWt	TBC	17.85	19.64	TBC	29.23	32.15
Energy to aftercooler	kWt	TBC	41.03	48.00	TBC	67.87	77.25

Note: Not to be used for combined heat and power (CHP) purposes (indicative figures only). If necessary, consult Perkins Engines Company Limited.

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Cooling system

Recommended coolant

Note: Perkins Extended Life Coolant, 50% antifreeze/50% water.
For details of recommended coolant specifications, please refer to the Operation and Maintenance Manual (OMM) for this engine model.

Total coolant capacity

ElectropaK (with radiator)	35.8 litres
ElectropaK (without radiator)	20.3 litres
Maximum top tank temperature	107 °C
Maximum static pressure head on pump	170 kPa
Coolant temperature rise across engine	Not available
Maximum permissible external system resistance	35 kPa
Thermostat operation range (closed to fully open)	87-98 °C

Radiator

Radiator face area	0.62 m ²
Core material	Aluminium
Number of rows	4
Fins per inch	10
Width of matrix	1071 mm
Height of matrix	1318 mm
Pressure cap setting	110 kPa

Fan

Fan type	Mechanical, fixed
Configuration	Pusher
Diameter (tip to tip)	813 mm
Number of blades	9
Material	Plastic
Drive ratio	1.05:1

Duct allowance

Duct allowance	Unit	50 Hz @ 1500 rpm	60 Hz @ 1800 rpm
Ambient clearance	°C	69	70
Duct allowance (maximum additional cooling airflow restriction)	Pa	125	125
Resultant minimum airflow	m ³ /sec	370	482

Fuel system

System specification

Type of injection	Electronic
Fuel injection pump	Common Rail
Fuel injector	Electronic
Nozzle opening pressure	20 MPa
Filtration media size	4 µm
Fuel lift pump type	N/A
Fuel flowrate	480 l/h
Pressure	800 kPa
Maximum suction head	2 m
Maximum static pressure head	3 m
Maximum fuel temperature at lift pump inlet	80 °C
Governor type	Electronic
Speed control conformity	ISO 8528-5 Class G3

Fuel specification

Recommended fuel conformity BS 2869:1998, Class A2/ BS EN590

Note: For further information on fuel specifications and restrictions, refer to the OMM fuels section for this engine model.

Fuel consumption data

	50 Hz @ 1500 rpm	60 Hz @ 1800 rpm
Prime power (kW):	276.3	325.8
Load condition	g/kWh	g/kWh
Standby (110% Prime)	189	193
Prime	190	194
75% Prime	194	197
50% Prime	205	206
25% Prime	236	240

Note: For conversion to l/h use the following formula with the correct fuel density: (SFC [kg/kWh] ÷ Fuel density [kg/l]) × Power [kW] = SFC [l/h]

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Lubrication system

Total system capacity

Maximum sump capacity (maximum dipstick mark)	30.0 litres
Minimum sump capacity (minimum dipstick mark)	26.0 litres
Maximum oil temperature (continuous operation)	110 °C
Maximum oil temperature (intermittent operation)	115 °C

Lubricating oil

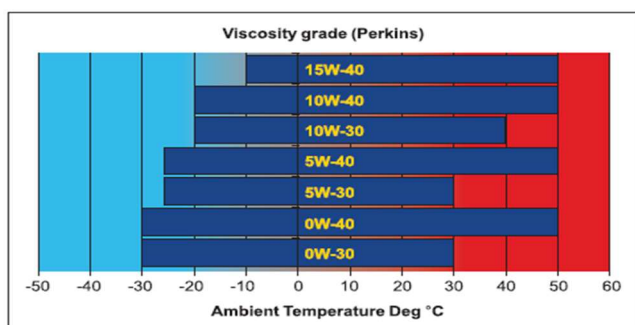
Relief valve opening pressure	662 kPa
Minimum oil pressure	38 kPa
Oil pressure at maximum no-load speed	350 kPa
Oil flow at rated speed	130 l/min

Maximum engine operating angles

Front up, front down	35 °
Right side up, right side down	20 °

Note: A single or multigrade oil conforming to API-CH-4 or ACEA E5 must be used.

Recommended SAE viscosity



Cold Start Recommendations

Minimum starting temperature	Engine oil grade	Battery specifications with glowplugs		Battery specifications without glowplugs	
		Cold start Amps (A)	Cold cranking Amps (A)	Cold start Amps (A)	Cold cranking Amps (A)
10°C	15W-40 API CH-4	N/A	N/A	N/A	1000
0°C	15W-40 API CH-4	N/A	N/A	N/A	1000
-5°C	15W-40 API CH-4	N/A	N/A	N/A	1000
-10°C	15W-40 API CH-4	N/A	N/A	N/A	1000
-15°C	0W-30 API CH-4	N/A	N/A	N/A	1125
-20°C	0W-30 API CH-4	N/A	N/A	N/A	1125
-25°C	0W-30 API CH-4	N/A	N/A	N/A	1125

Note: Cold start Amps as per BS3911 and cold cranking Amps as per SAEJ537.

Induction system

Max. air intake restriction (clean filter)	4 kPa
Max. air intake restriction (dirty filter)	6 kPa
Air filter type	Dry
Number of air filters	1

Exhaust system

Number of exhaust outlets	1
Exhaust outlet diameter	127 mm
Minimum back pressure	2 kPa
Maximum back pressure	10 kPa

Electrical system

Alternator output voltage	24 V
Alternator output current	45 A
Starter motor input voltage	24 V
Starter motor power draw	8 kW
Number of teeth on flywheel	113
Number of teeth on starter pinion	11
Engine stop method	Electronic

Engine mounting

Maximum static bending moment at rear face of block 1920.0 Nm

Maximum static bending moment for exhaust outlet (for muffler design) 0.4 Nm

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Noise data

Noise levels

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

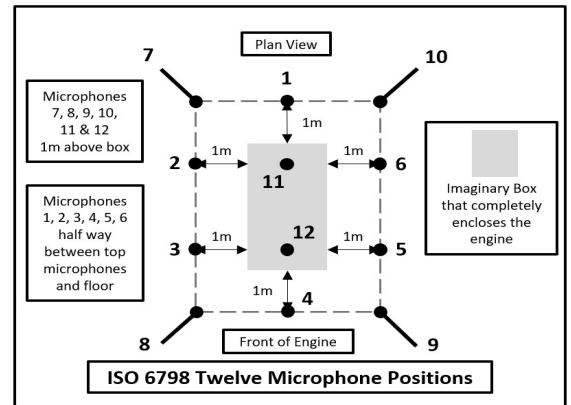
Total noise levels

Total noise levels	50 Hz @1500 rpm dB(A)	60 Hz @1800 rpm dB(A)
Ambient noise level	11.0	38.9

Noise data

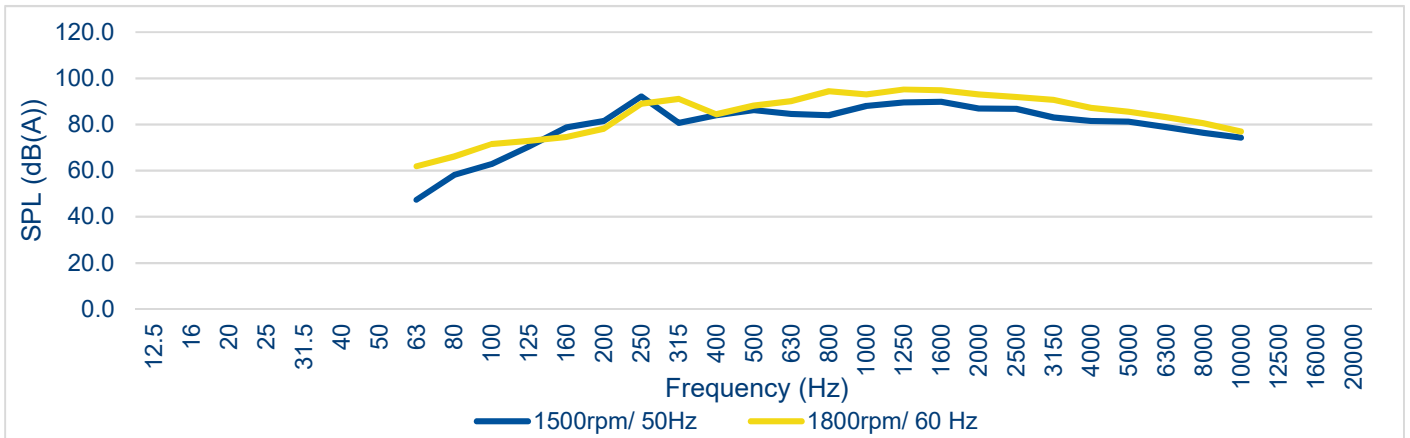
Average sound pressure level for engine	50 Hz @1500 rpm dB(A)	60 Hz @1800 rpm dB(A)
Without inlet and exhaust (Pusher fan)	96.0	100.0
With inlet and exhaust (Pusher fan)	113.0	115.0

Position (ref. diagram)	Noise level measurement			
	50 Hz @1500 rpm		60 Hz @1800 rpm	
	SPL, dB(A)	SWL, dB(A)	SPL, dB(A)	SWL, dB(A)
1	93.8	111.9	97.0	115.1
2	97.7	115.8	100.7	118.8
3	97.5	115.6	101.0	119.1
4	98.5	116.6	103.4	121.5
5	98.6	116.7	102.3	120.4
6	96.9	115.0	100.3	118.4
7	93.2	111.3	96.4	114.5
8	94.2	112.3	98.6	116.7
9	94.2	112.3	97.7	115.8
10	93.1	111.2	95.1	113.2
11	96.2	114.3	98.8	116.9
12	96.2	114.3	99.3	117.4
Avg.	96.3	114.3	99.8	117.9



Octave analysis

The following figure shows third octave band analyses at the position of the maximum noise level:



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.

Note: Sound pressure reference level: 20 μ Pa.

Note: One third octave analysis performed at the position where the highest noise levels were measured.

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