

4012-46TAG3A

1260 - 1643 kWm (Gross) @ 1500 rpm

4000

Series

Electropak

Basic technical data

Number of cylinders	12
Cylinder arrangement	60° Vee
Cycle	4 stroke
Induction system	Turbocharged
Combustion system	Direction injection
Compression ratio	13:1
Bore	160 mm
Stroke	190 mm
Cubic capacity	45.842 litres
Direction of rotation	Anticlockwise viewed on flywheel
Firing order	1 ^A , 6 ^B , 5 ^A , 2 ^B , 3 ^A , 4 ^B , 6 ^A , 1 ^B , 2 ^A , 5 ^B , 4 ^A , 3 ^B
Cylinder 1	Furthest from flywheel

Note: Cylinders designated 'A' are on the right hand side of the engine when viewed from the flywheel end.

Weight of Electropak

Temperate

Dry	4400 kg
Wet + fuel cooler	6086 kg
Wet - fuel cooler	6070 kg

Tropical

Dry	4400 kg
Wet + fuel cooler	6450 kg
Wet - fuel cooler	6425 kg

Overall dimensions of Electropak

Temperate

Length	3915 mm
Width	2198 mm
Height	2259 mm

Tropical

Length	3883 mm
Width	2164 mm
Height	2610 mm

Moments of inertia

Engine	9.46 kgm ²
Flywheel	9.55 kgm ²
Total engine inertia	19.01 kgm ²

Cyclic irregularity for engine standby power

4012-46TAG3A	1.499
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Ratings

Steady state speed stability at constant load $\pm 0.25\%$
Electrical rating are based on average alternator efficiency and are for guidance only (0.8 power factor being used).

Operating point

Engine speed	1500 rpm
Static injection timing	See engine number plate
Cooling water exit temperature	< 98°C

Fuel data

To conform to BS2869 class A2 or BS EN590.

Performance

Sound pressure level 1500 rpm	108 / 109 dB(A)
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Note: All data based on operation to ISO 3046/1, BS 5514 and DIN 6271 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	100 kPa
Relative humidity	30%
Air inlet restriction at maximum power (nominal)	2.5 kPa
Exhaust back pressure (nominal)	3 kPa
Fuel temperature (inlet pump)	58°C maximum

Note: For test conditions relevant to data on load acceptance, refer to Perkins Applications Department.

4012-46TAG3A - Temperate

Designation	Units	Baseload power	Prime power	Standby power
Gross engine power	kWm	1260	1500	1643
Fan and battery charging alternator power	kW	64		
ElectropaK nett engine power	kWm	1196	1436	1579
Gross BMEP	kPa	2192	2610	2859
Combustion air flow at ISO conditions	m ³ /min	115	125	135
Exhaust gas temperature after turbo (maximum)	°C	480		
Exhaust gas flow (maximum) at atmospheric pressure	m ³ /min	350		
Boost pressure ratio	-	3.0	3.4	3.7
Mechanical efficiency	%	89	91	92
Overall thermal efficiency (nett)	%	38.1	39.3	38.5
Friction power and pumping losses	kWm	120		
Mean piston speed	m/s	9.5		
Engine coolant flow	litres/min	1020		
Typical Genset electrical output 0.8 pf 25°C (100 kPa)	kWe	1136	1364	1500
	kVA	1420	1705	1875
Assumed alternator efficiency	%	95		

4012-46TAG3A - Tropical

Designation	Units	Baseload power	Prime power	Standby power
Gross engine power	kWm	1260	1500	1643
Fan and battery charging alternator power	kW	60		
ElectropaK nett engine power	kWm	1200	1440	1583
Gross BMEP	kPa	2192	2610	2859
Combustion air flow at ISO conditions	m ³ /min	115	125	135
Exhaust gas temperature after turbo (maximum)	°C	480		
Exhaust gas flow (maximum) at atmospheric pressure	m ³ /min	350		
Boost pressure ratio	-	3.0	3.4	3.7
Mechanical efficiency	%	89	91	92
Overall thermal efficiency (nett)	%	38.3	39.5	38.6
Friction power and pumping losses	kWm	120		
Mean piston speed	m/s	9.5		
Engine coolant flow	litres/min	1020		
Typical Genset electrical output 0.8 pf 25°C (100 kPa)	kWe	1140	1368	1504
	kVA	1425	1710	1880
Assumed alternator efficiency	%	95		

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

Rating definitions

Baseload power

Unlimited hours usage with an average load factor of 100% of the published baseload power rating.

Prime power

Unlimited hours usage with an average load factor of 80% of the published prime power over each 24 hours 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 80% 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.

Emissions capability

All 4012-46TAG ratings are optimised to the 'best fuel consumption' and do not comply to Harmonised International Regulation Emission Limits. More information on these statements can be obtained by contacting the Applications Department at Perkins Engines Company Limited.

Energy balance

4012-46TAG3A - Temperate

Designation	Units	Baseload power	Prime power	Standby power
Energy in fuel	kWt	3137	3650	4100
Energy in power output (gross)	kWb	1260	1500	1643
Energy to cooling fan	kWm		64	
Energy in power output (nett)	kWm	1196	1436	1579
Energy to exhaust	kWt	1010	1102	1219
Energy to coolant and oil	kWt	477	510	625
Energy to radiation	kWt	90	110	123
Energy to charge coolers	kWt	300	429	490

4012-46TAG3A - Tropical

Designation	Units	Baseload power	Prime power	Standby power
Energy in fuel	kWt	3137	3650	4100
Energy in power output (gross)	kWb	1260	1500	1643
Energy to cooling fan	kWm		60	
Energy in power output (nett)	kWm	1200	1440	1583
Energy to exhaust	kWt	1010	1102	1219
Energy to coolant and oil	kWt	477	510	625
Energy to radiation	kWt	90	110	123
Energy to charge coolers	kWt	300	428	490

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

Cooling system

Recommended coolant: 50% inhibited ethylene glycol or 50% inhibited propylene glycol and 50% clean fresh water. For combined heat and power systems (CHP) 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 under part number 21825 735.

Maximum pressure in crankcase water jacket 170 kPa
 Maximum top tank temperature (standby).....98°C
 Maximum static pressure head on pump..... 7 m

Total coolant capacity

Electronit (engine only)..... 73 litres
 ElectropaK - Temperate (engine and radiator) 207 litres
 ElectropaK - Tropical (engine and radiator)..... 210 litres
 Maximum permissible restriction to coolant pump flow 20 kPa
 Thermostat operating range 71 - 85°C
 Temperature rise across the engines (standby power) with inhibited coolant8°C
 Coolant temperature shutdown switch setting..... 101°C rising
 Coolant immersion heater capacity (2 off) 4 kWe each

Note: Ambient cooling clearance (standby power) based on air temperature at fan 6°C above ambient.

Radiator (Temperate)

Radiator face area3.46 m²
 Material and number of rows.. Copper, 4 rows (charge air/water jacket)
 Material and fins per inch Brass, 12 rows (charge air/water jacket)
 Width of matrix..... 2.10 m
 Height of matrix..... 1.65 m
 Weight of radiator..... 1620 kg
 Total coolant capacity including engine and pipes..... 212 litres
 Pressure cap setting (minimum) 70 kPa

Radiator (Tropical)

Radiator face area4.08 m²
 Material and number of rows.. Copper, 4 rows (charge air/water jacket)
 Material and fins per inch Brass, 12 rows (charge air/water jacket)
 Width of matrix..... 1.97 m
 Height of matrix..... 2.07 m
 Weight of radiator..... 1630 kg
 Total coolant capacity including engine and pipes..... 226 litres
 Pressure cap setting (minimum) 70 kPa

Water jacket cooling data

Temperate and Tropical

Coolant flow 1020 litres/min
 Coolant exit temperature (maximum) 98°C
 Coolant inlet temperature (minimum) Thermostatic control
 Coolant inlet temperature (maximum) 90°C

Coolant pump

Speed 1.4 x e rpm
 Method of drive Gear driven

Fan

Type..... Axial flow
 Diameter (Temperate)..... 1600 mm
 Diameter (Tropical)..... 1740 mm
 Number of blades..... 12
 Material..... Aluminium
 Drive ratio (Temperate) 0.93:1
 Drive ratio (Tropical) 0.80:1

Duct Allowance

Maximum additional restriction to cooling airflow and resultant minimum airflow (Standby power applications)			
	Ambient clearance 50% glycol	Duct allowance (Pa)	Min airflow m ³ /sec
Temperate	40°C	250	32
Tropical	50°C	125	37

Recommended SAE viscosity

Multigrade oil conforming to the following must be used: API CH4 15W/40.

Note: For additional notes on lubricating oil specifications, please refer to the Operation and Maintenance Manual (OMM).

Lubrication system

Lubricating oil capacity

Total system capacity 177 litres
 Sump maximum 157.5 litres
 Sump minimum..... 115 litres
 Oil temperature at normal operating conditions to bearings 105°C

Lubricating oil pressure

At rated speed..... 400 kPa
 Minimum at 80°C 340 kPa
 Oil relief valves open 400 kPa
 Oil filter spacing 20 microns
 Sump drain plug tapping size G1
 Oil pump speed..... 2100 rpm
 Method of drive Gear driven
 Shutdown switch pressure setting (where fitted) 193 kPa falling
 Oil pump flow 6 litres/sec

Normal operating angles

Front and rear 5°
 Side tilt 10°

Oil consumption

Prime power	Units	
After running in (typically after 250 hours)	g/kWhr	0.52
Oil flow rate from pump	litres/sec	6

Induction system

Maximum air intake restriction of engine

Clean filter..	..2 kPa
Dirty filter..	..4 kPa
Air filter type	.. Medium duty axial flow

Fuel system

Recommended fuel to conform to:	.. BS2869 Class A2 or BS EN590
Injection system	.. Direct
Fuel injection pump and injector type	.. Combined unit injector
Injector pressure	..140 MPa
Lift pump type	.. Tuthill TCH 1-089
Fuel delivery	.. 1020 litres/hour
Heat retained in fuel to tank.	.. 8 kW
Fuel inlet temperature to be less than	.. 58°C
Delivery pressure	..300 kPa
Maximum suction head at pump inlet	..2.5 m
Maximum static pressure head	..See manual
Fuel filter spacing	.. 10 microns
Governor type	.. Electronic
Governing to	.. ISO 8528-12 Class 3 and 4; ISO 8528-5 Class G2
Tolerance on fuel consumption	.. ± 5%

Fuel consumption

4012-46TAG3A (Temperate and Tropical)		
Rating	g/kWh	litres/hr
Standby power	211	402
Prime power	208	362
Baseload power	207	303
75% prime power	206	272
50% prime power	202	183

Note: All figures in the table above are based on gross mechanical output with assumed fuel density of 0.862. For fuel consumption based on electrical output of the generating set contact your OEM.

Exhaust system

Maximum back pressure for total system

Exhaust outlet size (internal)	.. 2 x 254 mm Table D flanges
Exhaust outlet flange size	.. 2 x 254 mm Table D flanges
Back pressure for total system at standby power	..5 kPa

Note: For recommended pipe sizes, please refer to the Installation Manual.

Electrical system

Type	.. Insulated return
Alternator	..24 volts with integral regulator
Alternator output	..40 amps, 28 volts at 20°C ambient
Starter motor	..24 volts
Starter motor type	.. Axial
Starter motor power	.. 16.4 kW
Number of teeth on flywheel	..156
Number of teeth on starter motor	.. 12
Minimum cranking speed (0°C)	..120 rpm
Pull in current of starter motor solenoid at -25°C maximum ⁽¹⁾	.. 30 amps at 24 volts
Hold in current of starter motor solenoid at -25°C maximum ⁽¹⁾	.. 9 amps at 24 volts
Engine stop solenoid	..24 volts
Hold in current of stop solenoid	.. 1.1 amps at 24 volts

⁽¹⁾All leads rated to 10 amps minimum.

Engine mounting

Maximum static bending moment at rear face of block	.. 1356 Nm
Maximum additional load applied to flywheel due to all rotating components	.. 850 kg

Centre of gravity

Bare engine, dry

Forward of the rear face of the cylinder block	.. 771 mm
Above the crankshaft centre line	.. 32 mm

ElectropaK, dry

Forward of the rear face of the cylinder block	.. 1176 mm
Above the crankshaft centre line	.. 32 mm

Cold start recommendations

Temperature range 5°C down to -10°C (41°F to 14°F)

Oil	.. 15W/40 CH4
Starter	.. 2 x 24 volts
Battery	.. 4 x 12 volts x 286 Ah
Maximum breakaway current	.. 1600 amps
Cranking current	.. 810 amps
Aids	.. Block heaters
Minimum mean cranking speed	..120 rpm

Note: Battery capacity is defined by the 20 hour rate at 0°C.

Note: The oil specification should be for the minimum ambient temperature as the oil will not be warmed by the immersion heater.

Note: Breakaway current is dependant on battery capacity available. Cables should be capable of handling transient current which may be up to double the steady cranking current.

Noise Data

Noise levels

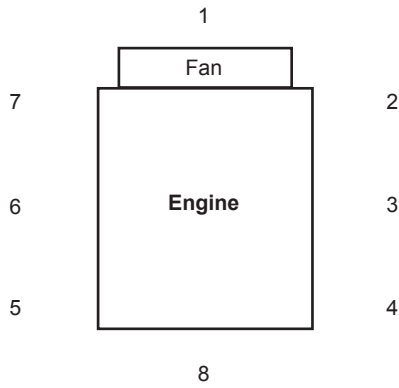
The figures for total noise levels are typical for an engine running at Standby power rating in a semi-reverberant environment and measured at a distance of one metre from the periphery of the engine.

Total noise levels

Sound pressure level re: -20×10^{-6} pa
 Speed 1500 rpm Ambient noise level 79 dB(A)

Octave analysis

Performed at the position of maximum noise.



Position	Noise dB(A)	Hz	dB at position 6
1	114	31.5	90.2
2	113	63	101
3	111	125	104
4	110	250	112
5	110.5	500	109
6	111	1k	107
7	110.5	2k	104
8	107	4k	101
		8k	100

Position	Noise dB(A)	Hz	dB at position 6
1	114	31.5	90.9
2	113	63	101
3	111	125	104
4	110	250	110
5	110	500	109
6	111	1k	106
7	110	2k	103
8	107	4k	100
		8k	99
		16k	98

Position	Noise dB(A)	Hz	dB at position 6
1	114	31.5	91
2	113	63	101
3	111	125	104
4	110	250	110
5	110	500	109
6	111	1k	106
7	110	2k	103
8	107	4k	100
		8k	99
		16k	98

Load acceptance (cold)

Engine Type	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)			
	Prime power %	Load kWm nett / kWe	Transient frequency deviation %	Frequency recovery time seconds	Prime power %	Load kWm nett / kWe	Transient frequency deviation %	Frequency recovery time seconds
4012-46TAG3A	63	860	≤ 10	5	37	505	≤ 10	5

The figures shown in the table above were obtained under the following test conditions:

Engine block temperature ... 40 °C
 Ambient temperature ... 25 °C
 Governing mode ... Isochronous
 Alternator inertia ... 50 kgm²
 Under frequency roll off (UFRO) point set to ... 49.5 Hz
 UFRO rate set to ... 16 V/Hz
 LAM on / off ... On

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

Applied load is a percentage of generator electrical output efficiency as published in the general installation section of this data sheet.

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