

4012-46TAG1A

973 - 1327 kWm (Gross) @ 1500rpm

4012-46TAG2A

1069 - 1459 kWm (Gross) @ 1500rpm

Electropak

4000

Series

Basic technical data

Number of cylinders	12
Cylinder arrangement	60° Vee
Cycle	4 stroke, compression ignition
Induction system	Turbocharged
Compression ratio	13:1 nominal
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	5949 kg
Wet - fuel cooler	5933 kg

Tropical

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

Overall dimensions of Electropak

Temperate

Length	3916 mm
Width	1775 mm
Height	2255 mm

Tropical

Length	3915 mm
Width	2198 mm
Height	2258 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

4012-46TAG1A	1.582
4012-46TAG2A	1.544

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.

General installation

4012-46TAG1A - Temperate

Designation	Units	Baseload power	Prime power	Standby power
Gross engine power	kWb	973	1212	1327
Fan power	kWm	42		
ElectropaK nett engine power	kWm	931	1170	1285
Gross BMEP	kPa	1694	2110	2309
Combustion air flow	m³/min	92	112	120
Exhaust gas temperature after turbo (maximum)	°C	425		
Exhaust gas flow (maximum) at atmospheric pressure	m³/min	280		
Boost pressure ratio	-	2.6	2.93	3.2
Mechanical efficiency	%	89	91	92
Overall thermal efficiency (nett)	%	42	41.5	41
Friction power and pumping losses	kWm	72		
Mean piston speed	m/s	9.5		
Engine coolant flow (minimum)	litres/s	17		
Typical Genset electrical output 0.8pf 25°C (100 kPa)	kWe	884	1112	1221
	kVA	1106	1389	1526
Assumed alternator efficiency	%	95		

4012-46TAG1A - Tropical

Designation	Units	Baseload power	Prime power	Standby power
Gross engine power	kWb	973	1212	1327
Fan power	kWm	64		
ElectropaK nett engine power	kWm	909	1148	1263
Gross BMEP	kPa	1694	2110	2309
Combustion air flow	m³/min	92	112	120
Exhaust gas temperature after turbo (maximum)	°C	425		
Exhaust gas flow (maximum) at atmospheric pressure	m³/min	280		
Boost pressure ratio	-	2.6	2.93	3.2
Mechanical efficiency	%	89	91	92
Overall thermal efficiency (nett)	%	41	40.8	40.3
Friction power and pumping losses	kWm	72		
Mean piston speed	m/s	9.5		
Engine coolant flow (minimum)	litres/s	17		
Typical Genset electrical output 0.8pf 25°C (100 kPa)	kWe	864	1091	1200
	kVA	1080	1364	1500
Assumed alternator efficiency	%	95		

4012-46TAG2A - Temperate

Designation	Units	Baseload power	Prime power	Standby power
Gross engine power	kWb	1069	1331	1459
Fan power	kWm	42		
ElectropaK nett engine power	kWm	1027	1289	1417
Gross BMEP	kPa	1861	2317	2538
Combustion air flow	m³/min	100	120	128
Exhaust gas temperature after turbo (maximum)	°C	455		
Exhaust gas flow (maximum) at atmospheric pressure	m³/min	320		
Boost pressure ratio	-	2.8	3.1	3.4
Mechanical efficiency	%	89	91	92
Overall thermal efficiency (nett)	%	41.9	40.3	37.8
Friction power and pumping losses	kWm	72		
Mean piston speed	m/s	9.5		
Engine coolant flow (minimum)	litres/s	17		
Typical Genset electrical output 0.8pf 25°C (100 kPa)	kWe	976	1225	1346
	kVA	1220	1531	1683
Assumed alternator efficiency	%	95		

4012-46TAG2A - Tropical

Designation	Units	Baseload power	Prime power	Standby power
Gross engine power	kWb	1069	1331	1459
Fan power	kWm	64		
ElectropaK nett engine power	kWm	1005	1267	1395
Gross BMEP	kPa	1861	2317	2538
Combustion air flow	m³/min	100	120	128
Exhaust gas temperature after turbo (maximum)	°C	455		
Exhaust gas flow (maximum) at atmospheric pressure	m³/min	320		
Boost pressure ratio	-	2.8	3.1	3.4
Mechanical efficiency	%	89	91	92
Overall thermal efficiency (nett)	%	41	39.6	39
Friction power and pumping losses	kWm	72		
Mean piston speed	m/s	9.5		
Engine coolant flow (minimum)	litres/s	17		
Typical Genset electrical output 0.8pf 25°C (100 kPa)	kWe	955	1204	1325
	kVA	1194	1505	1656
Assumed alternator efficiency	%	95		

Note: Not to be used for CHP design purposes (indicative figures only). Consult Perkins Engines Company Limited. Assumes complete combustion.

Rating definitions

Baseload power

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

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 4012-46TAG1A/2A 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

4012-46TAG1A - Temperate

Designation	Units	Baseload power	Prime power	Standby power
Energy in fuel	kWt	2217	2817	3137
Energy in power output (gross)	kWb	973	1212	1327
Energy to cooling fan	kWm	42		
Energy in power output (nett)	kWm	931	1170	1285
Energy to exhaust	kWt	750	900	1010
Energy to coolant and oil	kWt	252	370	406
Energy to radiation	kWt	67	85	94
Energy to charge coolers	kWt	175	250	300

4012-46TAG1A - Tropical

Designation	Units	Baseload power	Prime power	Standby power
Energy in fuel	kWt	2217	2817	3137
Energy in power output (gross)	kWb	973	1212	1327
Energy to cooling fan	kWm	64		
Energy in power output (nett)	kWm	909	1148	1263
Energy to exhaust	kWt	750	900	1010
Energy to coolant and oil	kWt	252	370	406
Energy to radiation	kWt	67	85	94
Energy to charge coolers	kWt	175	250	300

4012-46TAG2A - Temperate

Designation	Units	Baseload power	Prime power	Standby power
Energy in fuel	kWt	2450	3200	3750
Energy in power output (gross)	kWb	1069	1331	1459
Energy to cooling fan	kWm	42		
Energy in power output (nett)	kWm	1027	1289	1417
Energy to exhaust	kWt	805	1015	1080
Energy to coolant and oil	kWt	288	457	501
Energy to radiation	kWt	74	96	107
Energy to charge coolers	kWt	214	301	423

4012-46TAG2A - Tropical

Designation	Units	Baseload power	Prime power	Standby power
Energy in fuel	kWt	2450	3200	3570
Energy in power output (gross)	kWb	1069	1331	1459
Energy to cooling fan	kWm	64		
Energy in power output (nett)	kWm	1005	1267	1395
Energy to exhaust	kWt	805	1015	1080
Energy to coolant and oil	kWt	288	457	501
Energy to radiation	kWt	74	96	107
Energy to charge coolers	kWt	214	301	423

Note: Not to be used for CHP design purposes (indicative figures only). Consult Perkins Engines Company Limited. Assumes complete combustion.

Cooling system

For details of recommended coolant specifications, please refer to the Operation and Maintenance Manual (OMM) for this engine model.

Nominal jacket water pressure in crankcase 170 kPa
Maximum top tank temperature (standby).....98°C
Maximum static pressure head on pump. 70 kPa

Total coolant capacity

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 of). 4 kWe each

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

Radiator (Temperate)

Radiator face area2.57 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 1.608 m
Height of matrix. 1.601 m
Weight of radiator.....1117 kg
Pressure cap setting (minimum) 70 kPa

Radiator (Tropical)

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
Pressure cap setting (minimum) 70 kPa

Water jacket cooling data

Temperate and Tropical

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)..... 1530 mm
Diameter (Tropical)..... 1600 mm
Number of blades..... 12
Material.....Aluminium
Drive ratio 0.93:1

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
4012-46TAG1A - Temperate	35 °C	250	20.2
4012-46TAG1A - Tropical	50 °C	200	32.4
4012-46TAG2A - Temperate	35 °C	250	20.2
4012-46TAG2A - Tropical	50 °C	200	32.4

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

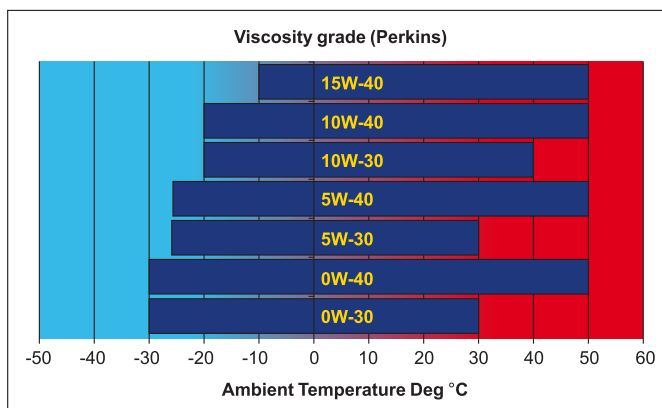
Front and rear 5°
Side tilt 10°

Oil consumption

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

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).

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 (4012-46TAG1A/2A) 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 inlet2.5 m
Maximum static pressure headSee 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

4012-46TAG1A (Temperate and Tropical)		
Rating	g/kWh	litres/hr
Standby power	199	306
Prime power	196	276
Baseload power	196	221
75% prime power	195	209
50% prime power	204	151

4012-46TAG2A (Temperate and Tropical)		
Rating	g/kWh	litres/hr
Standby power	201	340
Prime power	200	309
Baseload power	200	248
75% prime power	201	236
50% prime power	203	164

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
Exhaust outlet flange size 2 x 254 mm Table D
Back pressure for total system at standby power5 kPa

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

Electrical system

Type... .. Insulated return
Alternator24 volts with integral regulator
Alternator output55 amps, 28 volts at 20 °C ambient
Starter motor... ..24 volts
Starter motor type Axial
Starter motor power 8.2 kW
Number of teeth on flywheel190
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⁾ ... 0 amps
Hold in current of starter motor solenoid at -25°C maximum ⁽¹⁾ ... 9 amps
Engine stop solenoid24 volts
Hold-in current of stop solenoid... .. 1.1 amps

⁽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 down to -10°C (14°F)

Oil 15W/40 CH4
Starter... .. 2 x 24 volts
Battery 4 x 12 volts x 286 Ah
Max breakaway current 1600 amps
Cranking current 810 amps
Aids... .. Block heaters
Min 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.

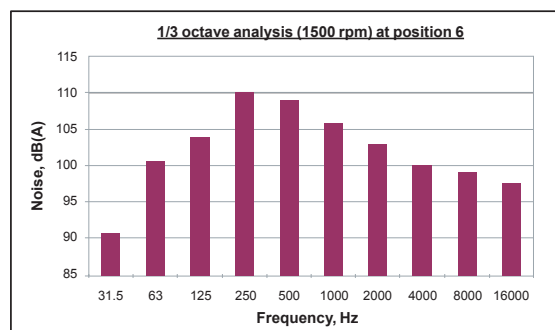
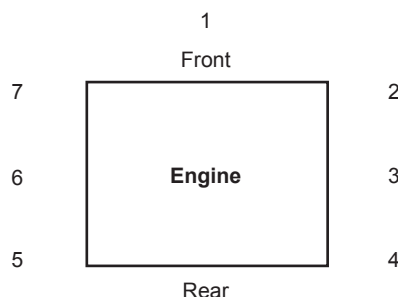
Total noise levels

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

Octave analysis

The following histogram shows an octave band analysis at the position of the maximum noise level.

Position	Noise dB(A)
1	114
2	113
3	111
4	110
5	110
6	111
7	110



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
4012-46TAG1A	73	800	≤ 10	5	27	291	≤ 10	5
4012-46TAG2A	71	860	≤ 10	5	29	344	≤ 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.