

# 404D-22G

# 400

24.3 kWm @ 1800 rpm (Gross)

## Series

## ElectropaK

### Basic technical data

Number of cylinders	4
Cylinder arrangement	Vertical inline
Cycle	4 stroke
Induction system	Naturally aspirated
Compression ratio	23.3:1
Bore	84 mm
Stroke	100 mm
Cubic capacity	2.216 litres
Direction of rotation when viewed from flywheel	Anticlockwise
Firing order	1, 3, 4, 2

### Weight of ElectropaK

Dry	242 kg
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### Overall dimensions of ElectropaK

Height	841 mm
Length (from rear of air cleaner to front face of radiator)	948 mm
Width (including mounting brackets)	498 mm

### Moments of inertia (mk<sup>2</sup>)

Engine rotational component	TBA kgm <sup>2</sup>
Flywheel	2.55 kgm <sup>2</sup>

### Centre of gravity (engine only)

Forward from rear of block	147 mm
Above centre line of block	79 mm
Offset to RHS of centre line	3 mm

### Performance

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

Speed variation at constant load  $\pm 0.5\%$

### Cyclic irregularity

At 110% standby power TBA

### Test conditions

Air temperature	25°C
Barometric pressure	100 kPa
Relative humidity	31.5%
Air inlet restriction at maximum power (nominal)	3.0 kPa
Exhaust back pressure at maximum power (nominal)	10.2 kPa
Fuel temperature (inlet pump)	40°C
All ratings certified to within	$\pm 5\%$ CRH

### Sound level

Average sound pressure level for bare engine (without inlet and exhaust) at 1 metre 79.0 dB(A)

### Notes:

- 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.
- Emissions Statement: Certified against the requirements of EU2007 (EU97/68/EC Stage II) and EPA Interim Tier 4 (EPA 40 CFR Part 1039 Interim Tier 4) legislation for nonroad mobile machinery, powered by constant speed engines.

## General installation, 404D-22G ElectropaK @ 1800 rpm

Designation	Units	Type of operation and application	
		60 Hz	
		Prime	Standby
Gross engine power	kWb	22.0	24.3
ElectropaK nett engine power	kWm	21.6	23.9
Brake mean effective pressure	kPa	657.9	731.0
Engine coolant flow (coolant pump ratio 1.33:1)	l/min	58.7	
Combustion air flow	m <sup>3</sup> /min	1.74	
Exhaust gas flow (maximum)	m <sup>3</sup> /min	4.34	4.76
Exhaust gas temperature outlet (maximum)	°C	440	510
Overall thermal efficiency (nett)	%	35	
Typical genset electrical output (0.8 pf 25°C)	kWe	19.2	21.3
	kVA	24.0	26.6
Assumed alternator efficiency	%	89	

## Energy balance

Designation	Units	Type of operation and application	
		60 Hz	
		Prime	Standby
Energy in fuel (heat of combustion)	kWt	62.2	69.5
Energy in power output (gross)	kWb	22.0	24.3
Energy to cooling fan	kWm	0.4	
Energy in power output (nett)	kWm	21.6	23.9
Energy to coolant and lubricating oil	kWt	19.9	22.2
Energy to exhaust	kWt	16.6	18.3
Energy to radiation	kWt	3.8	4.6

**Caution:** The airflows shown in this table will provide acceptable cooling for an open power unit operating in ambient temperatures of up to 53°C (46°C with an airflow restriction of up to 80 Pa). If the power unit is to be enclosed totally, a cooling test must be done to check that the engine cooling is acceptable. If there is insufficient cooling, contact your Perkins Distributor or Perkins Technical Service Department.

## Cooling system

### Radiator

Radiator face area	0.167 m <sup>2</sup>
Number of rows and materials	2 rows, Aluminium,
Matrix density and material	14.5 fins/inch, Aluminium
Width of matrix	334.2 mm
Height of matrix	500.0 mm
Pressure cap setting	90 kPa
Estimated cooling air flow reserve	0.125 kPa

### Fan

Diameter	320 mm
Drive ratio	1.33:1
Number of blades	6
Material	Plastic
Type	Puller

### Coolant (total system capacity)

With radiator	7.0 litres
Without radiator	3.6 litres
Maximum top tank temperature	112°C
Temperature rise across engine	7.5°C
Maximum permissible external system resistance	15 kPa
Thermostat operation range	82 - 95°C

**Note:** Recommended coolant: 50% anti freeze/50% water.  
For complete details of recommended coolant specifications, refer to the Operation and Maintenance Manual for this engine model.

## Cold start recommendations

Minimum cranking speed ..... TBA rev/min

Minimum starting temperature	Grade of engine lubricating oil	Battery specifications			
		BS3911 Cold start amps	SAEJ537 Cold cranking amps	Number of batteries required	Commercial reference number
0°C	20 W	540	740	1	647
-15°C	10 W	540	740	1	647
-20°C	5 W	600	780	1	655

## Maximum static bending moment

At rear face of bloc ..... 1400 Nm

## Duct allowance

Maximum additional restriction (duct allowance) to cooling airflow and resultant minimum airflow		
Ambient clearance 50% Glycol	Duct allowance Pa	m <sup>3</sup> /sec
53°C	0	0.78
46°C	80	0.73

### Notes:

- thermal capability needs to be considered as a function of canopy design
- all data assumes 3°C air temperature rise over ambient into radiator

## Electrical system

Alternator	65 amps, 12 volts
Starter motor	2 kW, 12 volts

## Exhaust system

Maximum back pressure for total system	10.2 kPa
Inside diameter of outlet flange	42 mm

## Induction system

### Maximum air intake restriction

Clean filter	3.0 kPa
Dirty filter	6.4 kPa
Air filter type	Dry element type

## Fuel system

Type of injection	Indirect
Fuel injection pump	Cassette type
Fuel atomiser	Pintle nozzle
Nozzle opening pressure	14.7 MPa

## Fuel lift pump

Flow/hour	63 litres/hour
Pressure	10 kPa
Maximum suction head	0.8 metre
Maximum static pressure head	3.0 metre
Governor type	Mechanical

## Fuel specification

USA Fed Off Highway	EPA2D 89.330-96
Europe Off Highway	CEC RF-06-99

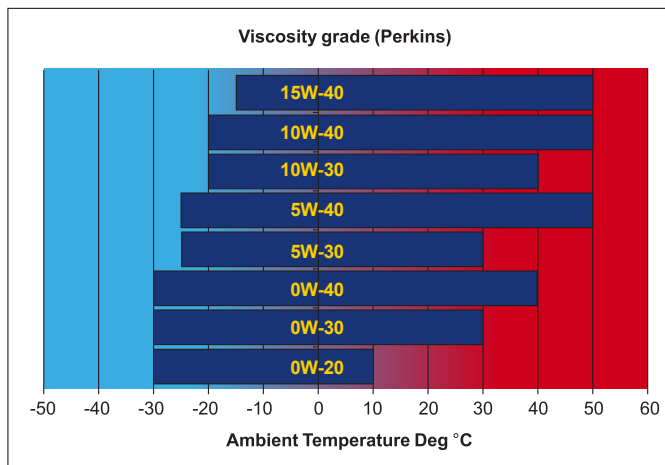
**Note:** For further information on fuel specifications and restrictions, refer to the OMM Fuels section for this engine model.

## Fuel consumption

Power rating	1800 rpm	
	g/kWh	litres/hour
110%	235	6.9
100%	233	6.2
75%	240	4.8
50%	262	3.5

## Recommended SAE viscosity

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



**Note:** For additional notes on lubricating oil specifications, refer to the Operation and Maintenance Manual

## Lubrication system

### Lubricating oil capacity

Maximum	10.6 litres
Minimum	8.9 litres

Maximum engine operating angles  
front up, front down, right side or left side . . . . . 35° continuous

### Lubricating oil pressure

Relief valve opens	352 - 448 kPa
Minimum oil pressure	120 kPa
At maximum no-load speed	TBA
Oil flow at rated speed	109 litres/min
Normal oil temperature	125°C

## Load acceptance

The below complies with the requirements of classification 3 and 4 of ISO 8528-12 and G2 operating limits stated in ISO 8528-5

Initial load application: When engine reaches rated speed (15 seconds maximum after engine starts to crank)		
Descriptor	Units	60 Hz
% of prime power	%	TBA
Load	kWm (kWe)	TBA
Transient frequency deviation	%	TBA
Frequency recovery	Seconds	TBA

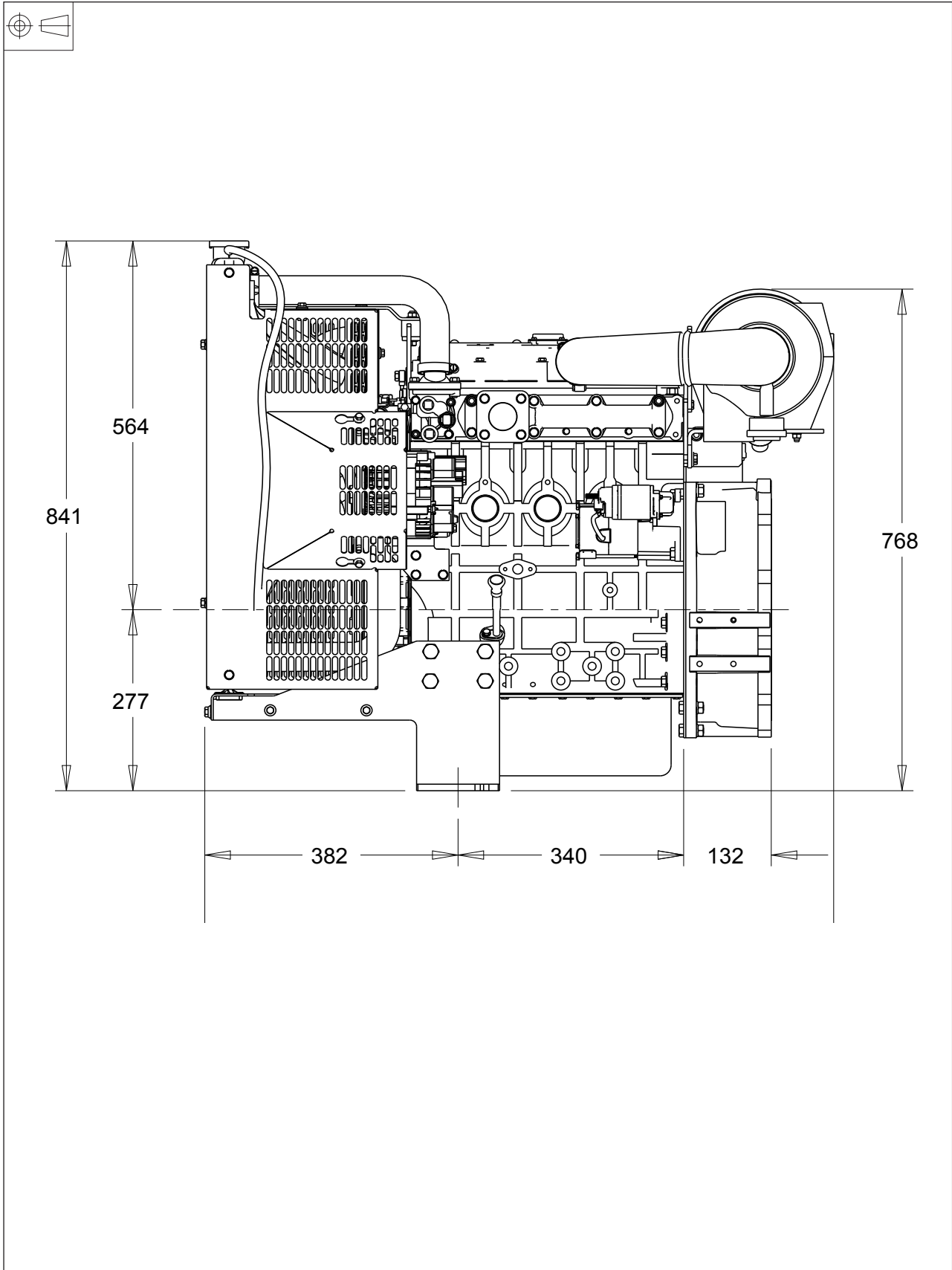
The above figures were obtained under the following test conditions:

Minimum engine block temperature	TBA °C
Alternator efficiency	87%
Ambient temperature	TBA °C
Governing mode	sochronous
Alternator inertia	TBA kgm <sup>2</sup>
Under frequency roll off (UFRO) point set to	1 Hz below rated
UFRO rate set to	2% voltage/1% frequency
LAM on/off	off

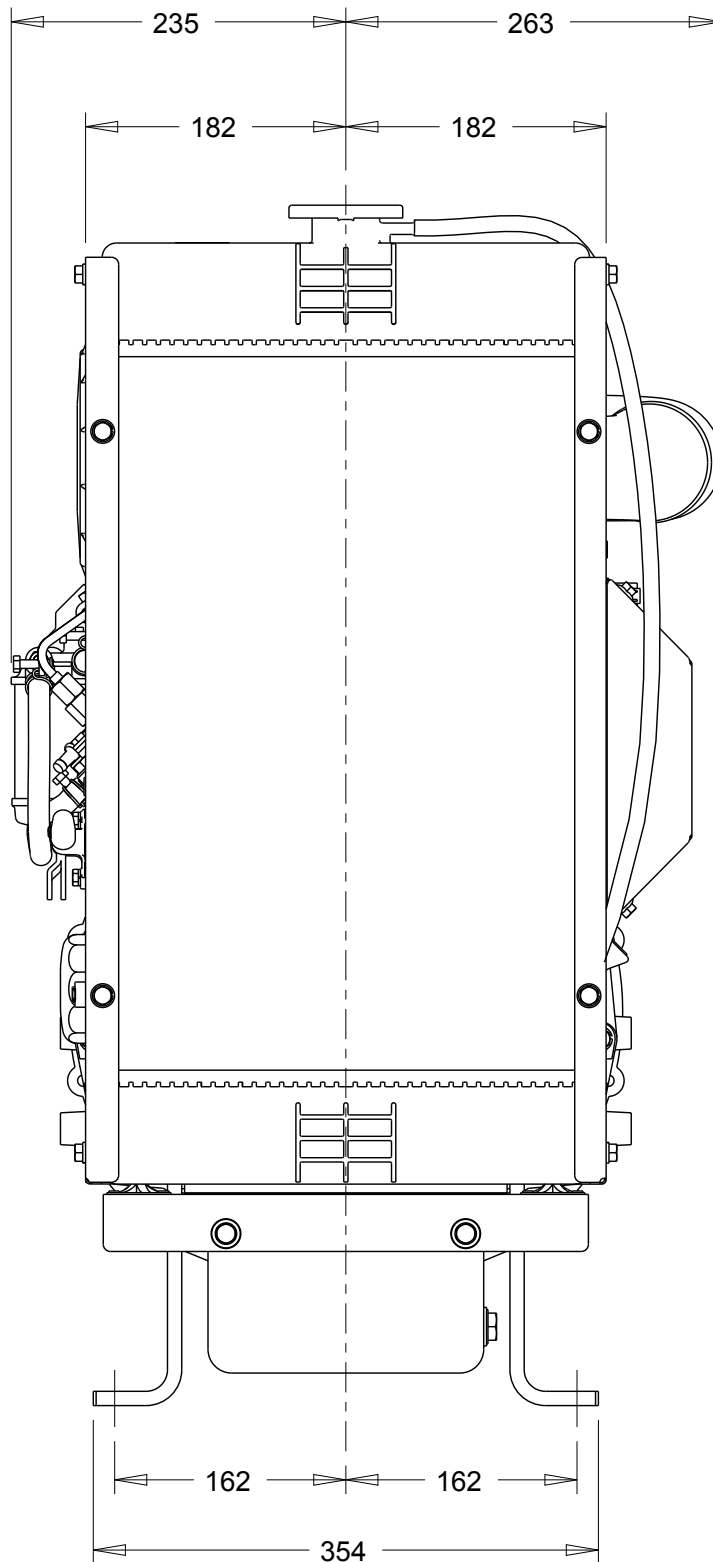
### Notes:

- all tests were conducted using an engine which was installed and serviced to Perkins Engines Company Limited recommendations.
- the general arrangement drawings shown in this data sheet are for guidance only. For installation purposes, latest versions should be requested from the Applications Dept., Perkins Engines Stafford, ST16 3UB United Kingdom.

## 404D-22G Electropak - Left side view



## 404D-22G Electropak - Front view



## 404D-22G ElectropaK - Plan view

