

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 |
|-----|--------|

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 (mk²)

| | |
|-----------------------------|-----------------------|
| Engine rotational component | TBA kgm ² |
| Flywheel | 2.55 kgm ² |

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 ³ /min | 1.74 | |
| Exhaust gas flow (maximum) | m ³ /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 ² |
| 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 ³ /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 |

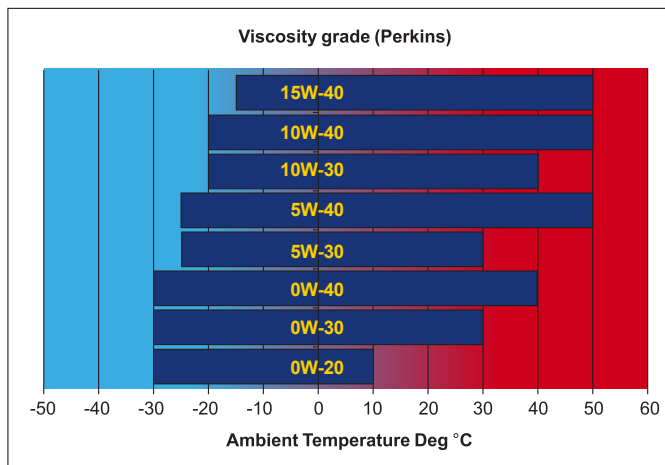
Note: For further information on fuel specifications and restrictions, refer to the OMM Fuels section for this engine model.

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 |

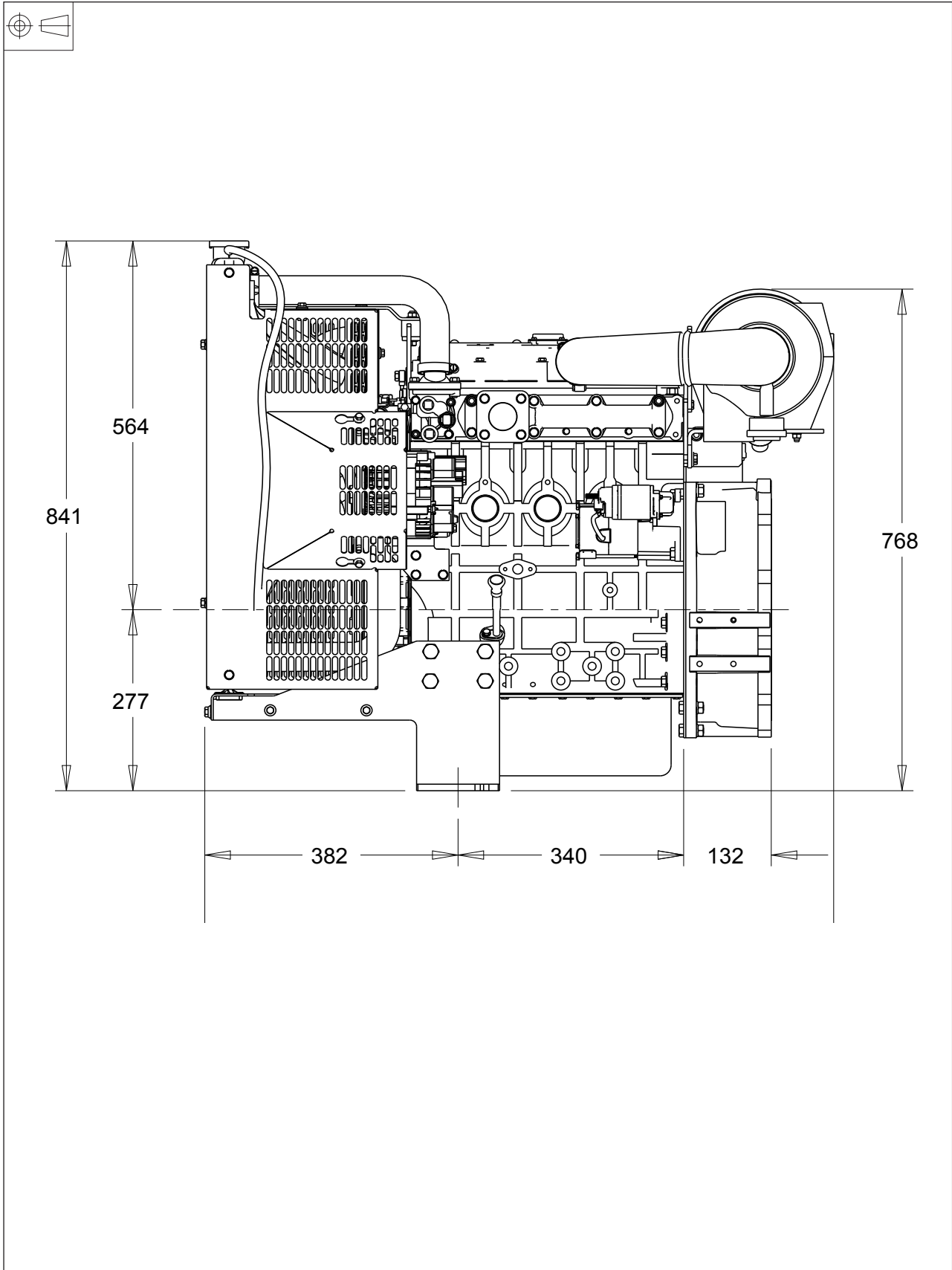
The above figures were obtained under the following test conditions:

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

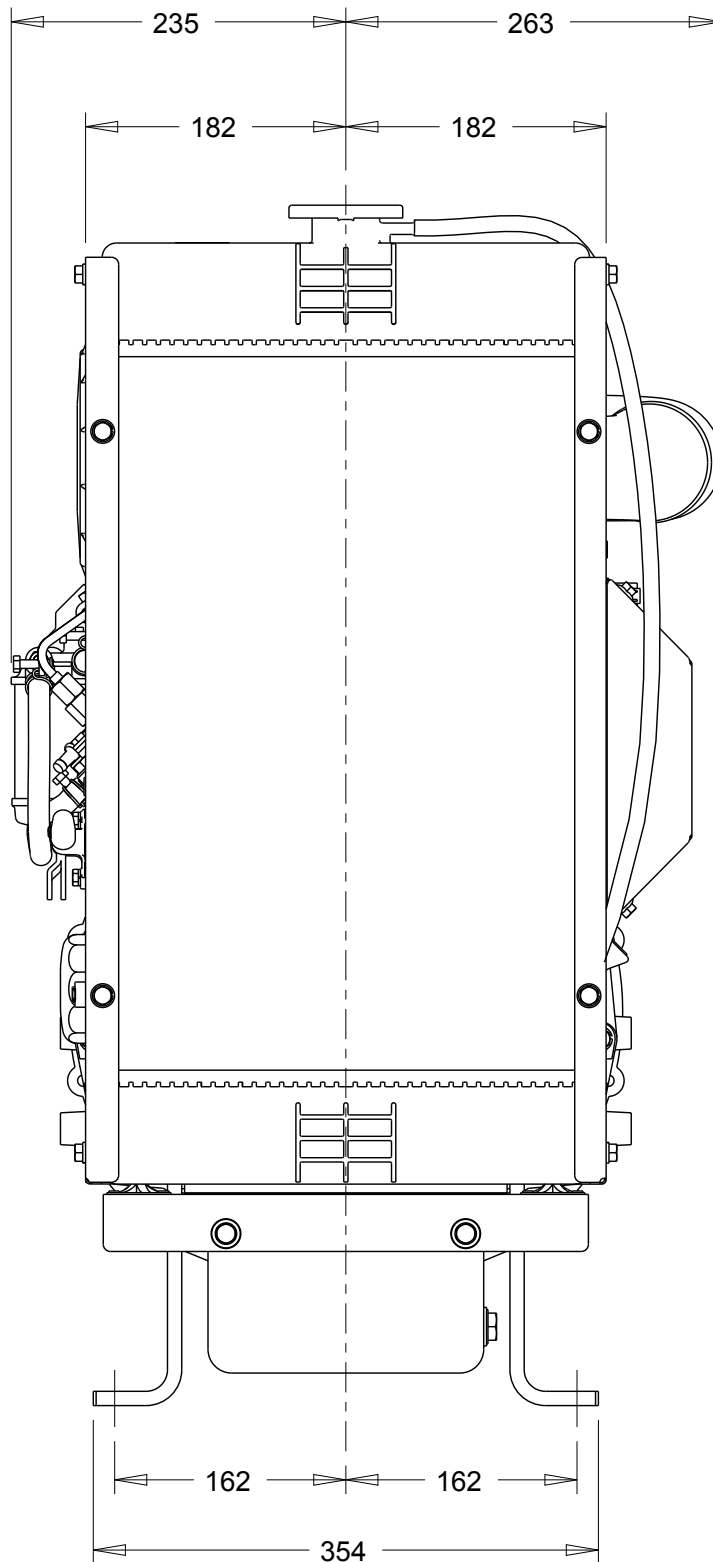
Notes:

- 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

