

Technical Data

400 Series

403D-15G

Electropak

Basic technical data

Number of cylinders	3
Cylinder arrangement	Vertical in-line
Cycle	four stroke
Induction system	Naturally aspirated
Compression ratio	22,5:1
Bore	84 mm
Stroke	90 mm
Cubic capacity	1.496 litres
Direction of rotation	anti-clockwise when viewed from flywheel
Firing order	1, 2, 3
Estimated total weight (dry)	197 kg

Overall dimensions

-height	791 mm
-length	820 mm
-width	476 mm

Moments of inertia (mk²)

-engine rotational components	0,45 kg m ²
-flywheel	2,01 kg m ²

Centre of gravity

-forward from rear of block	tba mm
-above centre line of block	tba mm
-offset to RHS of centre line	tba mm

Performance

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

Steady state speed stability at constant load

G2 ± 0,75%

Cyclic irregularity

-at 110% stand-by power tba

Test conditions

-air temperature 25 °C

-barometric pressure 100 kPa

-relative humidity 31.5%

-air inlet restriction at maximum power (nominal) 3 kPa

-exhaust back pressure at maximum power (nominal) 10,2 kPa

-fuel temperature (inlet pump) 40 °C

Sound level

Average sound pressure level for bare engine (without inlet and exhaust) at 1 metre 76,7 dB(A)

-all ratings certified to within ± 5%

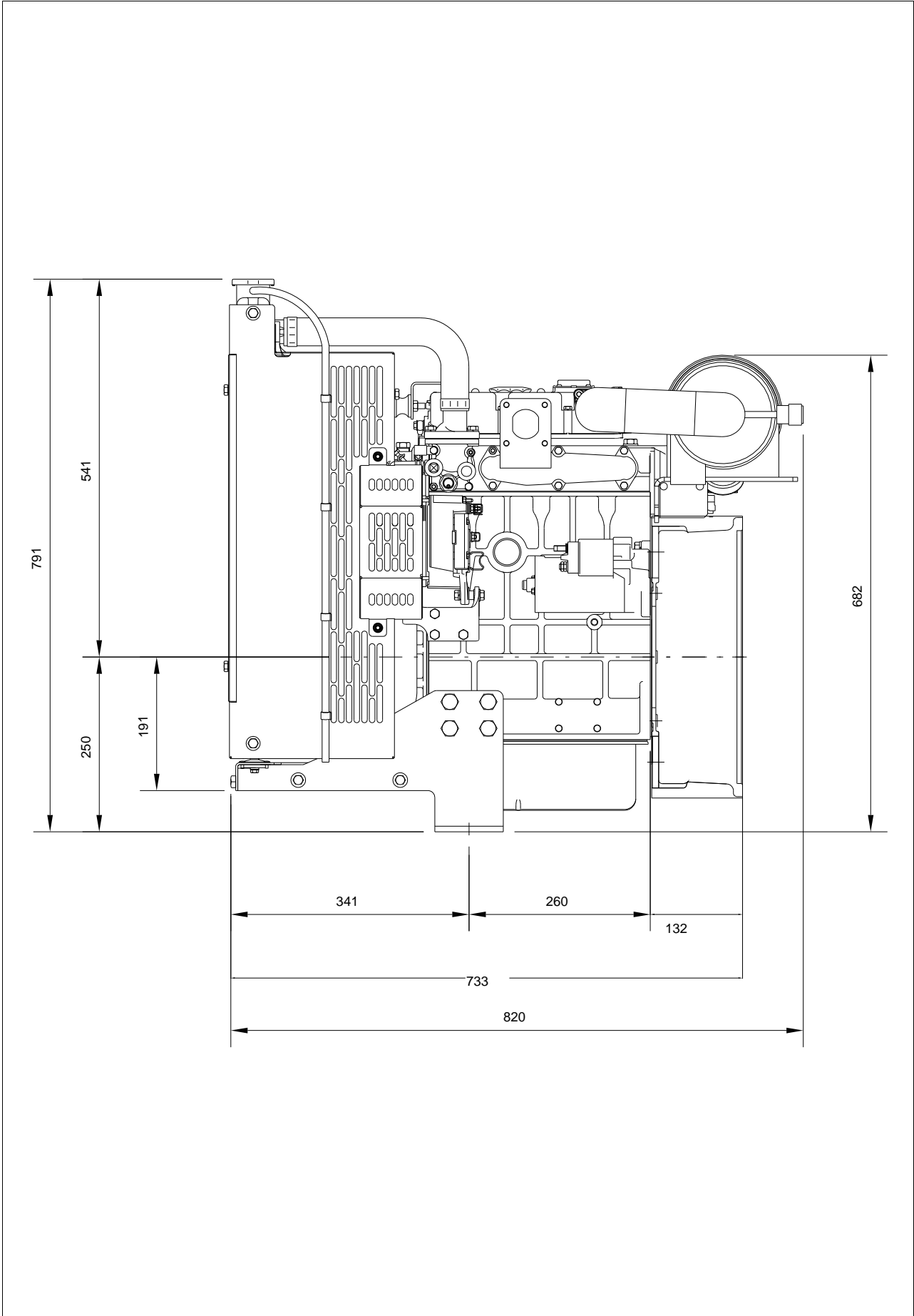
If the engine is to operate in ambient conditions other than those of the test conditions, suitable adjustments must be made for these changes. For full details, contact Perkins Technical Service Department.

Emissions Statement: Certified against the requirements of EU2007 (EU 97/68/EC Stage II) legislation for non-road mobile machinery, powered by constant speed engines.

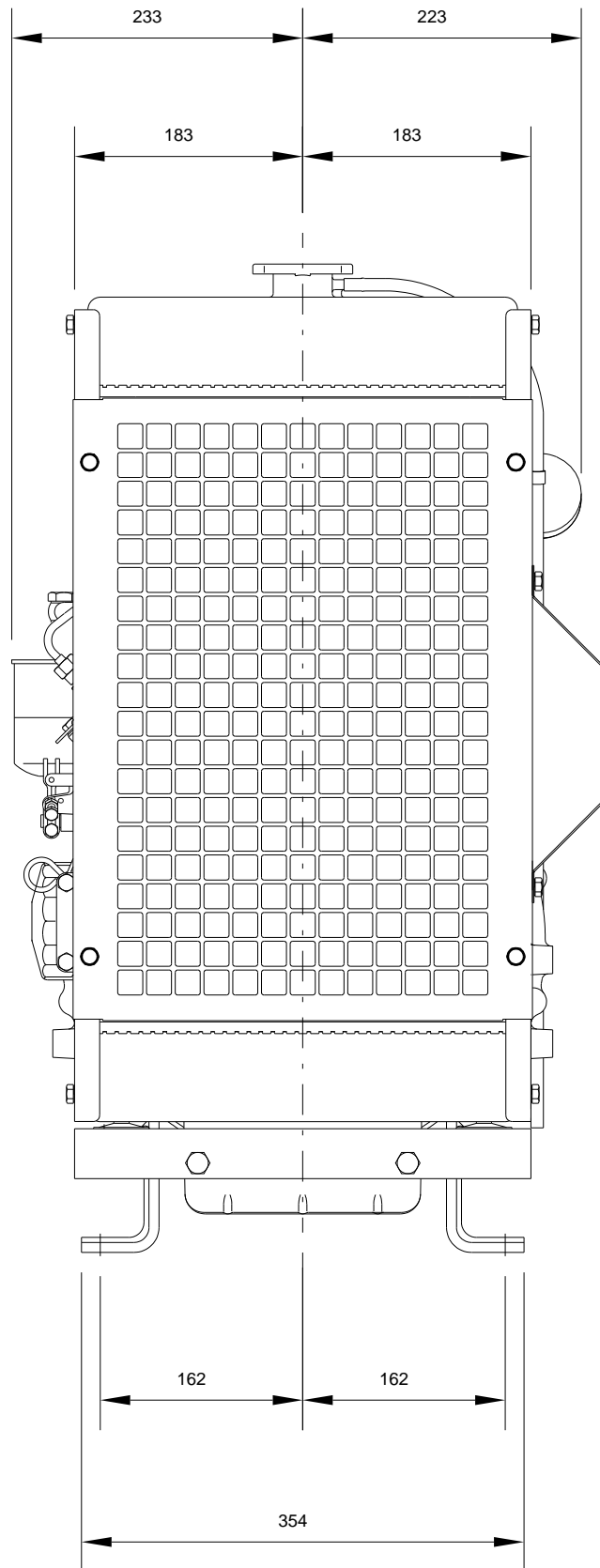
General installation

Designation	Units	Type of operation and application	
		Prime	Stand-by
		50Hz	50Hz
Gross engine power	kWb	12,2	13,5
Brake mean effective pressure	kPa	650	722
Mean Piston speed	m/s	4,5	
Electropak net engine power	kW	12,0	13,3
Engine coolant flow (coolant pump ratio 1-15:1)	l/min	37,7	
Combustion air flow	m ³ /min	1,1	
Exhaust gas flow (max)	m ³ /min	2,7	2,9
Exhaust gas temperature (max)	°C	445	490
Overall thermal efficiency	%	33,0	33,0
Typical genset electrical output (0,8 pf 25°C)	kWe	10,4	11,6
	kVA	13,1	14,5
Assumed alternator efficiency	%	87	
Energy balance			
Energy in fuel (heat of combustion)	kW	36,3	40,2
Energy in power output (gross)	kW	12,2	13,5
Energy to cooling fan	kWt	0,2	
Energy in power output (nett)	kWm	12,0	13,3
Energy to coolant and lubricating oil	kW	11,6	12,9
Energy to exhaust	kW	9,3	10,3
Energy to radiation	kW	3,2	3,5

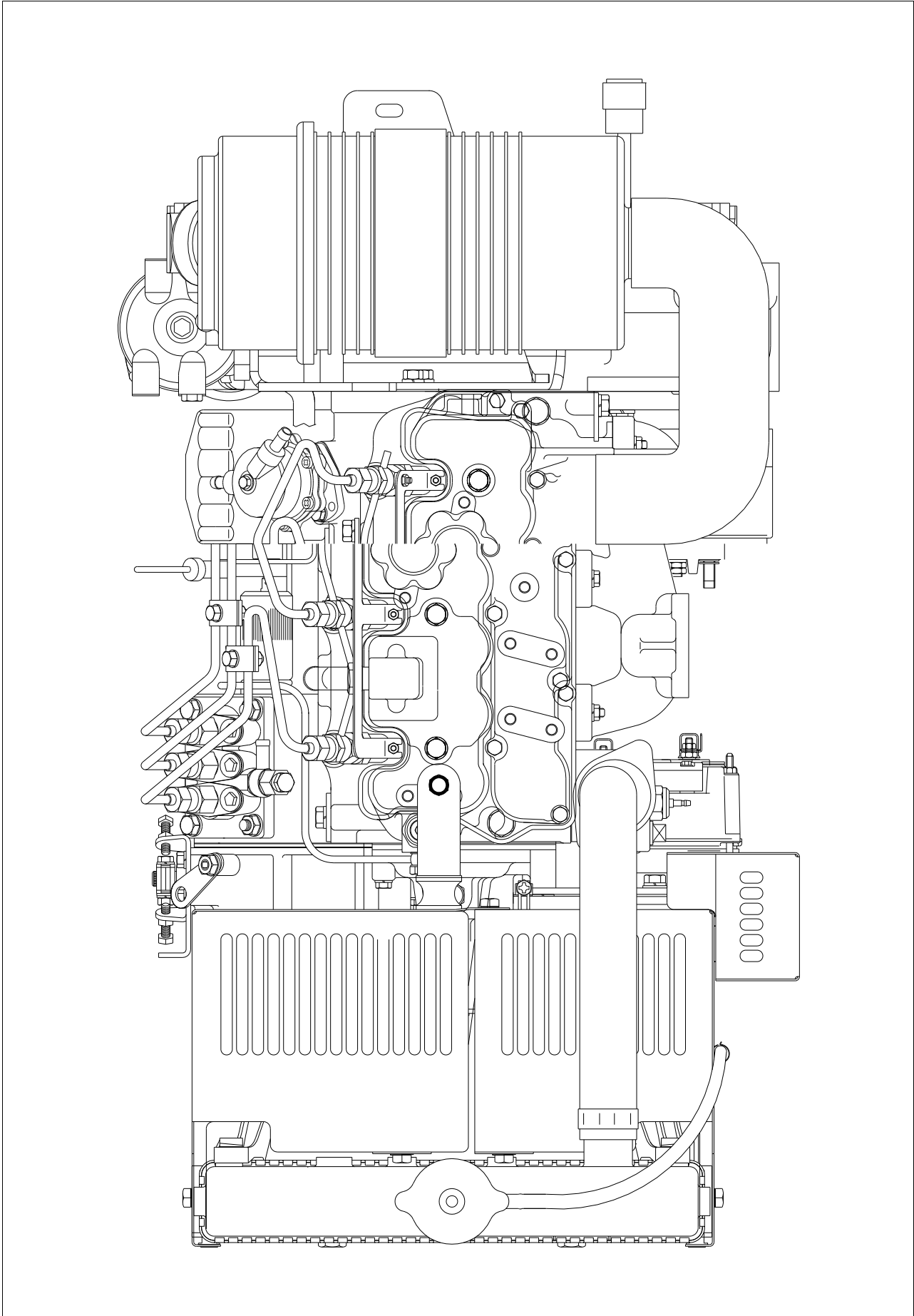
403D-15G ElectropaK, left side view



403D-15G ElectropaK, front view



403D-15G ElectropaK, plan view



Cooling system

Radiator

-face area 0,167 m²
 -rows and materials..... 2 rows, Aluminium
 -matrix density and material 4,5 fins per 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 1,15:1
 -number of blades 7
 -material Plastic
 -type Pusher

Coolant

Total system capacity
 -with radiator 6,0 litres
 -without radiator..... 2,6 litres
 Maximum top tank temperature 112 °C
 Max static pressure head on pump 30,4 kPa
 Temperature rise across engine 5,1 °C
 Max permissible external system resistance..... tba kPa
 Thermostat operation range. 82 - 95 °C
 Recommended coolant:
 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

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	0,61
46°C	125	0,42

Electrical System

-alternator 65 amps, 12 V
 -starter motor..... Bosch 2 kW, 12 V

Cold start recommendations

Minimum cranking speed 150 rev/min

Minimum starting temperature	Grade of engine lubricating oil	Battery specifications			
		BS3911 Cold start amps	SAEJ537 Cold cranking amps	Number of batteries needed	Commercial ref number
0	20W	420	590	1	072
-15	10W	420	590	1	072
-20	5W	540	740	1	647

Note: Additional information for battery and cable limits can be found in section 6 (Electrics) of 400D Engine Sales Manual.

Exhaust system

Maximum back pressure 10,2 kPa
 Exhaust outlet size..... 42 mm

Fuel system

Type of injection Indirect injection
 Fuel injection pump..... Cassette type
 Fuel injector Pintle nozzle
 Nozzle opening pressure 14,7 MPa
 Max particle size 25 microns

Fuel lift pump

-type.....mechanical (camshaft driven)
 -flow/hour..... 63 litres/hr
 -pressure 10 kPa
 Maximum suction head 0,8 m
 Maximum static pressure head 3,0 m
 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 %				
g/kWh (litres/hr)				
110	100	75	50	25
251 (4.08)	248 (3.67)	252 (2.79)	277 (2.04)	360 (1.32)

Induction system

Maximum air intake restriction

- clean filter 3,0 kPa
- dirty filter 6,4 kPa
- air filter type. dry element type

Lubrication system

Lubricating oil capacity

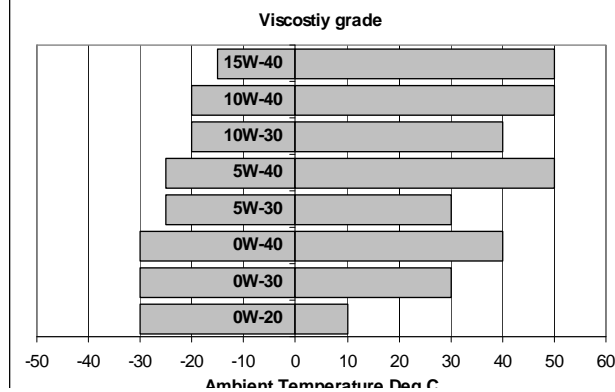
- Maximum sump capacity6,0 litres
- Minimum4,5 litres
- Maximum engine operating angles
- front up, front down, right side or left side. 35° continuous

Lubricating oil pressure

- relief valve opens.262 - 359 kPa
- Minimum oil pressure. 120 kPa
- at maximum no-load speed tba
- Normal oil temperature 125 °C
- Oil flow at rated speed 10,9 litres /min

Recommended SAE viscosity

A single or multigrade oil must be used which conforms API-CH-4 or ACEA E5..



Maximum static bending moment

at rear face of block 990 Nm

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	50 Hz
% of prime power	%	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
 - ambient temperature 25 °C
 - governing mode 5 %
 - alternator inertia tba kgm²
 - under frequency roll off (UFRO) point set to 2% Volt / 1% frequency
 - UFRO rate set to 1 Hz below rated speed
 - LAM on/off off
- All tests were conducted using an engine which was installed and serviced to Perkins Engines Company Limited recommendations.

Derate Curves

Derate curves for altitude and humidity can be found in section six (Ratings) of the 400D Engine Sales Manual.

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.



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