Technical Data

403D-11

IOPU

Basic technical data

Number of cylinders ... 3
Cylinder arrangement ... Vertical in-line
Cycle ... 4 stroke
Induction system ... NA
Compression ratio ... 22.7:1
Bore ... 77 mm (3 in)
Stroke ... 81.0 mm (3.2 in)
Cubic capacity ... 1.131 litres (69 in³)
Direction of rotation ... Anti-clockwise
Firing order ... 1, 2, 3
Estimated total weight (dry) ... 129.2kg (284.8 lb)
Estimated total weight (wet) ... 138.7 kg (305.8 lb)

Overall dimensions

-length (from x-x) ... 777.0 mm (30.6 in)
-width (widest point) ... 438.0 mm (17.2 in)
-height ... 729.5 mm (28.7 in)

Moments of inertia

-engine Includes fan pulleys, fan and flywheel:
-flywheel ... 1.51 kgm² (0.31 lbft²)
-rotational components ... 0.119459 kgcm²

Centre of gravity (dry)

-above block centre line ... 83.0 mm
-forward from rear of block ... 148 mm

Performance

Notes:

- All data based on operation to ISO/TR14396, ISO3046/1 standard reference conditions
- 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.
- All ratings certified to within 5 ± %.

Test conditions

-air temperature ... 25°C (°F)
-barometric pressure ... 100 kPa (14.50 lb/in²)
-relative humidity ... 30.0%

Sound level

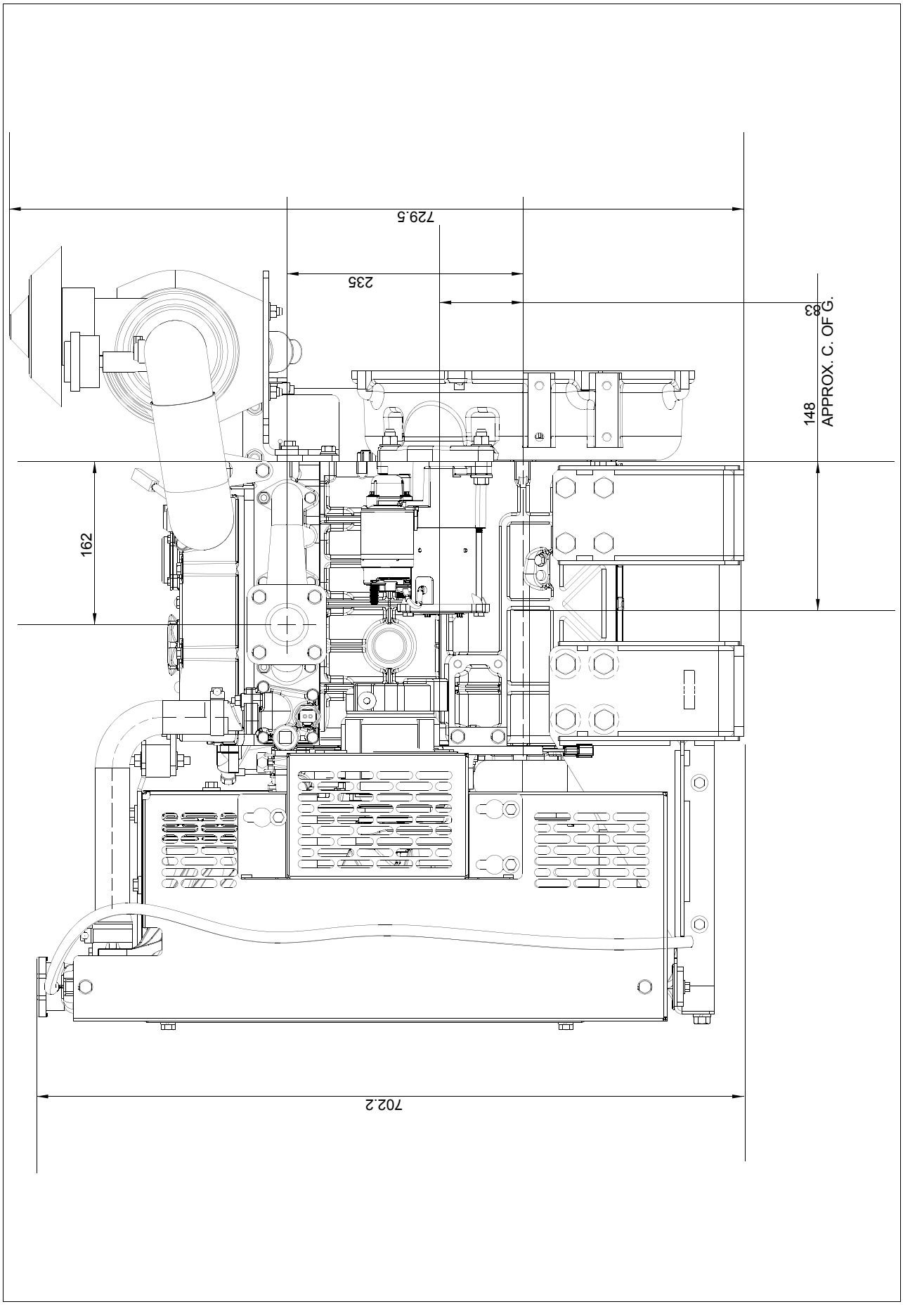
Average sound pressure level for bare engine (without inlet and exhaust) at 1 metre ... 79.0 dB(A)

General installation

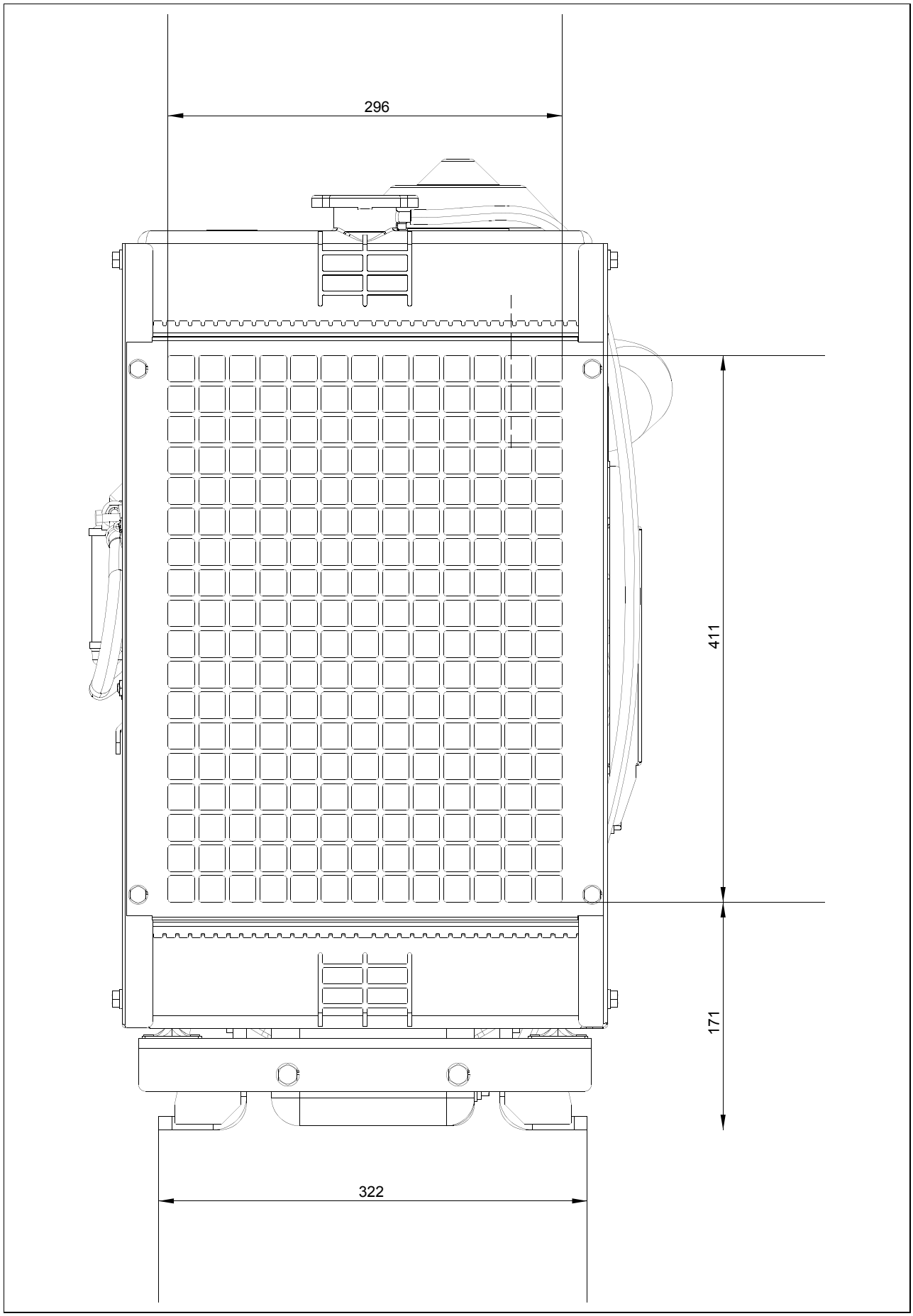
Designation	Units	Type of operation and application				
		Engine speed rev/min				
		2200	2400	2600	2800	3000
Gross engine power	kW	14.7	16.1	17.3	18.4	19.7
Brake mean effective pressure	kPa	709.2	712.0	706.2	697.4	696.9
Mean Piston speed	m/s	5.9	6.5	7.0	7.6	8.1
IOPU net engine power	kW	14.30	15.60	16.50	17.50	18.60
Engine coolant flow 35 kPa restriction	l/min	39.6	43.9	47.1	50.4	54.1
Combustion air flow	m³/min	1.10	1.20	1.30	1.40	1.50
Exhaust gas flow Max.	m³/min	3.1	3.4	3.7	3.9	4.5
Exhaust gas temperatureMax.	°C	580	600	580	630	650
Cooling fan air flow (Pusher)	m³/min	1.2	1.4	1.6	1.9	1.3
Energy balance						
Energy in fuel (Fuel heat of combustion)	KW	45.9	50.6	55.4	60.6	65.6
Gross heat to power	KW	14.7	16.1	17.3	18.4	19.7
Energy to coolant and lubricating oil	KW	14.3	16.0	17.6	19.5	21.0
Energy to exhaust	KW	13.0	14.0	15.7	17.7	19.5
Heat to radiation	KW	3.9	4.5	4.8	5.0	5.4

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 if a canopy fitted). If the power unit is to be enclosed totally, a cooling test should be done to check that the engine cooling is acceptable. If there is insufficient cooling, contact Perkins Technical Service Department.*

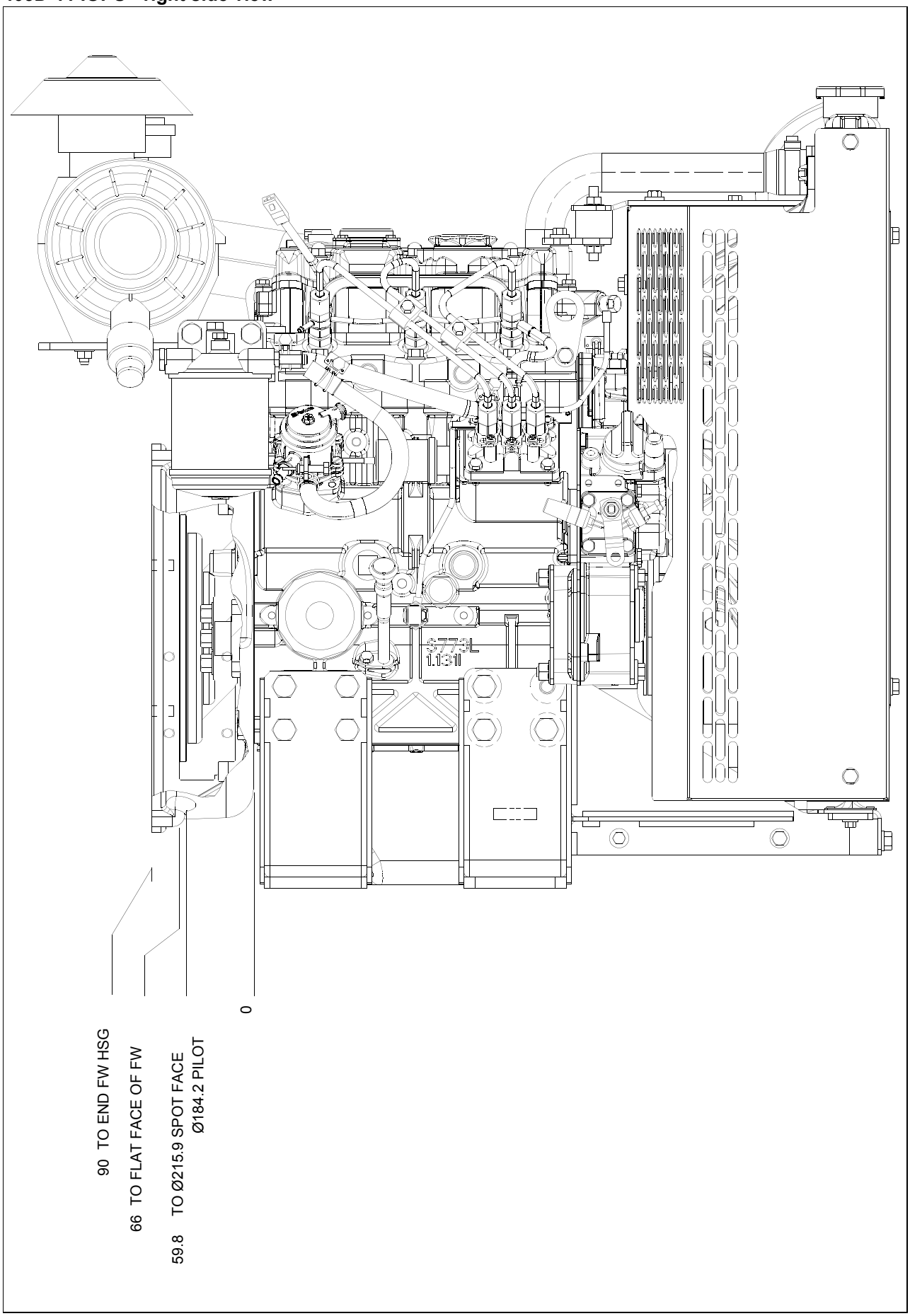
403D-11 IOPU - left side view



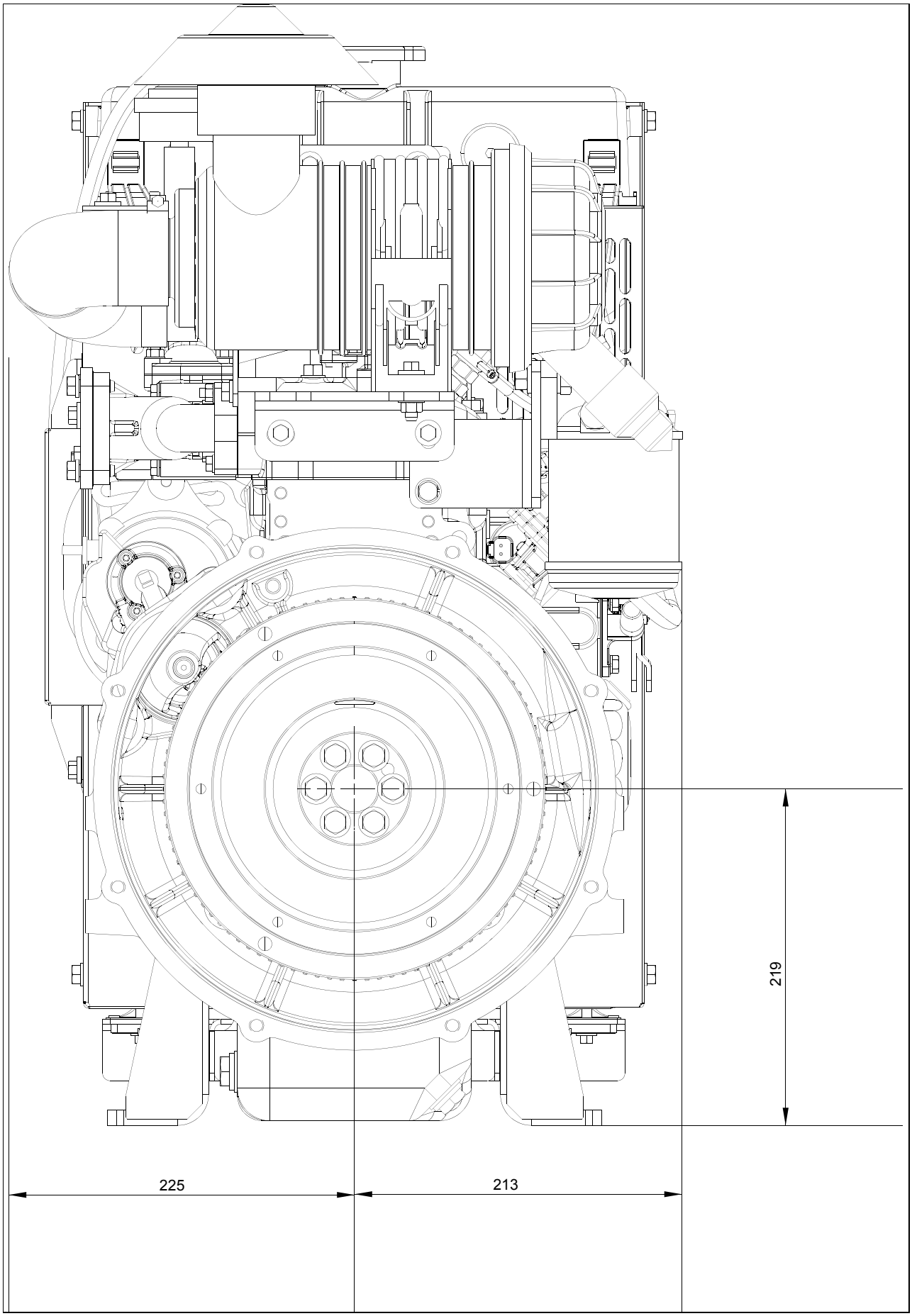
403D-11 IOPU - front view



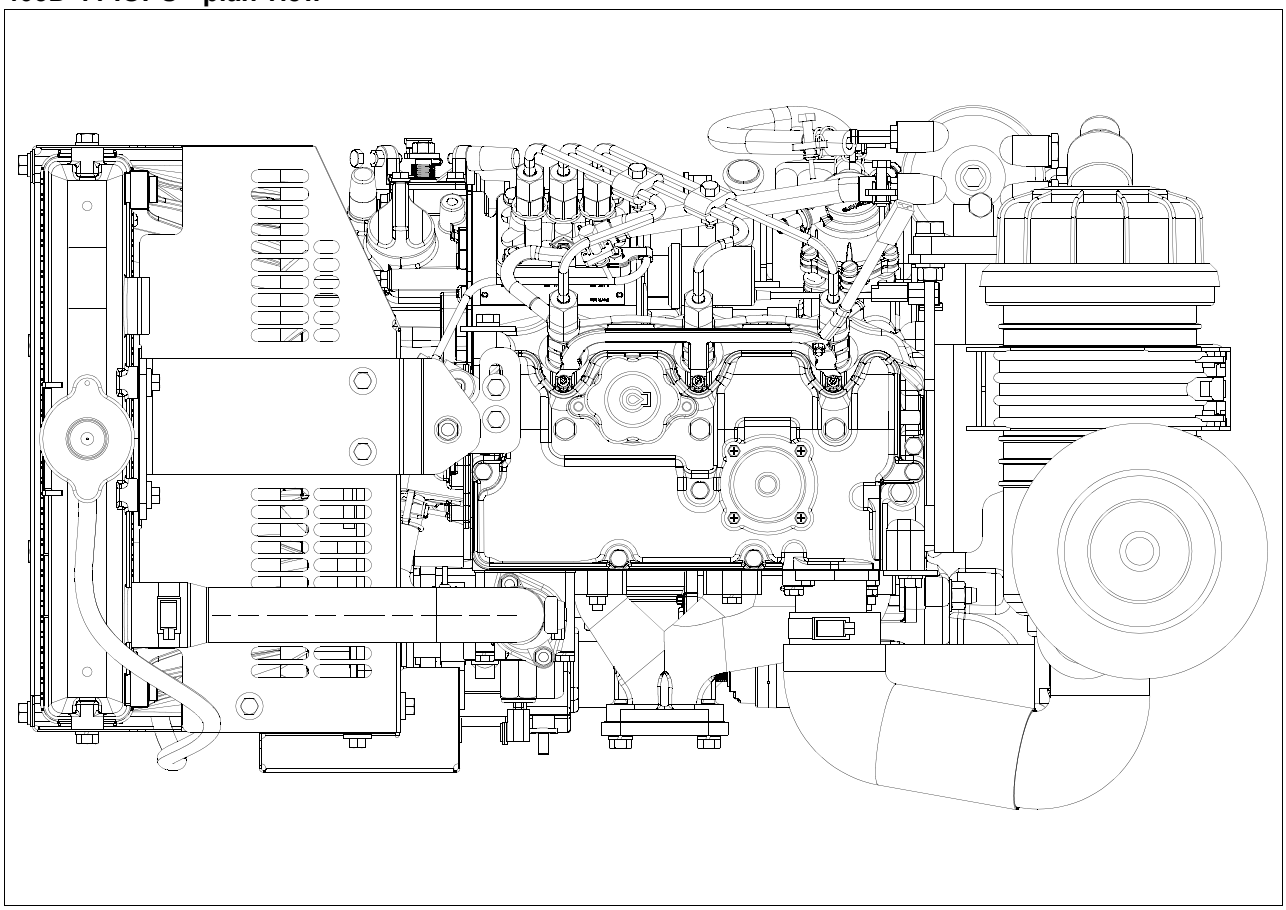
403D-11 IOPU - right side view



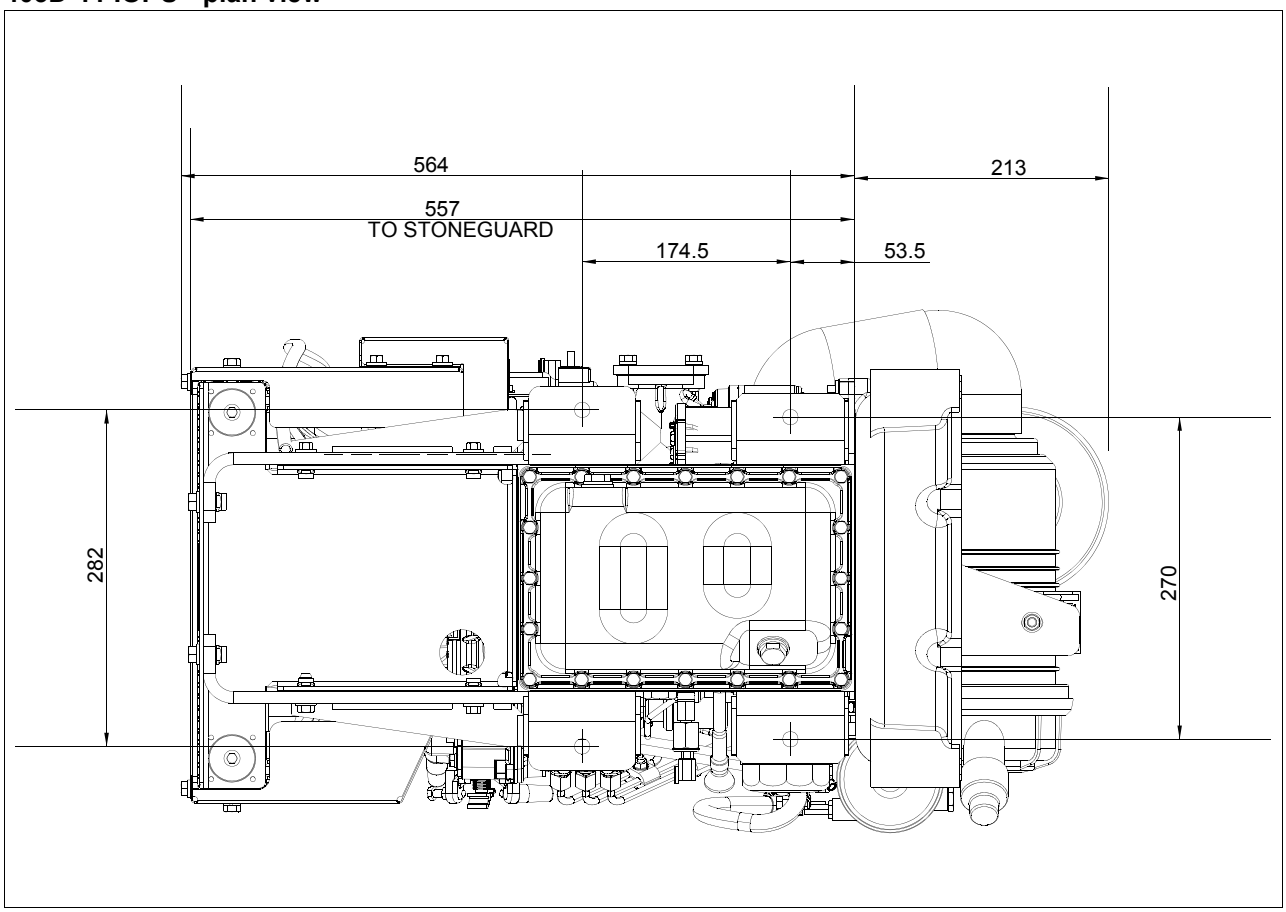
403D-11 IOPU - rear view



403D-11 IOPU - plan view



403D-11 IOPU - plan view



Cooling system

Radiator

-face area .. .. 0.145 m² (1.56 m²)
-rows and materials... ... ...2 row Aluminium
-gills/inch and material .. .. 14.5 Aluminium fins per inch
-width of matrix.. ... ... 330.0 mm (13.0 in)
-height of matrix ... ... 440.0 mm (17.3 in)
-pressure cap setting. ... ... 95.0 kPa (13.8 lb/in²)

Fan

-diameter... ... ... 320mm (12.6 in)
-drive ratio 1.285:1
-number of blades 7
-material ... ...Plastic
-type .. .. Puller

Coolant

Recommended coolant: 50% ethylene glycol with a corrosion inhibitor (BS 658 :1992 or MOD AL39) and 50% clean fresh water.
Total system capacity
-with radiator . ... 5.2 l (9.16 pt)
-without radiator ... ... 1.9 l (3.34 pt)
Maximum top tank temperature ... ... 110°C (230°F)
Thermostat operation range.. ... ... 75 - 87°C (167 - 188 °F)

Electrical system

-alternator.. ... ... 12V
-starter motor. 12V

Cold start recommendations

Minimum cranking speed .. .. 180 rev/min

Battery type

Minimum starting temperature	Grade of engine lubricating oil	Battery specifications			
		BS3911 cold start amps	SAEJ537 cold cranking amps	Number of batteries required	Commercial reference
0°C	20W	340	540	1	069
- 15°C	10W	340	540	1	069
- 20°C	5W	300	540	1	069

Exhaust system

Maximum back pressure for total system... ... 10.2 kPa (1.5 lb/in²)
Inside diameter of outlet flange .. .. 34mm (1.3 in)

Fuel system

Type of injection . ... Pintle nozzle
Fuel injection pump ... ... Casette
Nozzle opening pressure ... ... 13.93 MPa (0.54 lb/in²)

Fuel lift pump

-flow/hour ... ... 63.0 l/hr (13.8 g/hr)
-pressure ... ... 10.0 kPa
Maximum suction head .. .. 0.8 m using 6 mm bore pipe
Maximum pressure head ... ... 3.0 m using 6 mm bore pipe
Governor type. ... ... Mechanical

Fuel specification

USA FED Off Highway
Density ... ... 0.840 - 0.865 (kg/l @ 15°C)
Viscosity . ... 2.0 - 3.2 (mm²/s @ 40°C)
Sulphur content .. .. 0.0007 - 0 0.0015 (% mass)
Cetane No .. .. .40 - 50
Europe Off Highway EU 2004/26/EC Stage 3B/4
Density ... ... 0.833 - 0.837 (kg/l @ 15°C)
Viscosity . ... 2.3 - 3.3 (mm²/s @ 40°C)
Sulphur content .. ..0.001 Max. (% mass)
Cetane No .. ..54 Max.

Fuel consumption

Fuel consumption given 100% power rating @ rev/min					
rev/min	2200	2400	2600	2800	3000
sfc g/kWh	267	266	253	264	265
litres/ hour	4.7	5.2	5.3	5.9	6.3

Induction system

Maximum permissible air intake restriction

-clean filter.. ... ... 3.0 kPa
-dirty filter ... ... 6.4 kPa
-air filter type... ... ... Dry Element Type

Lubrication system

Lubricating oil capacity

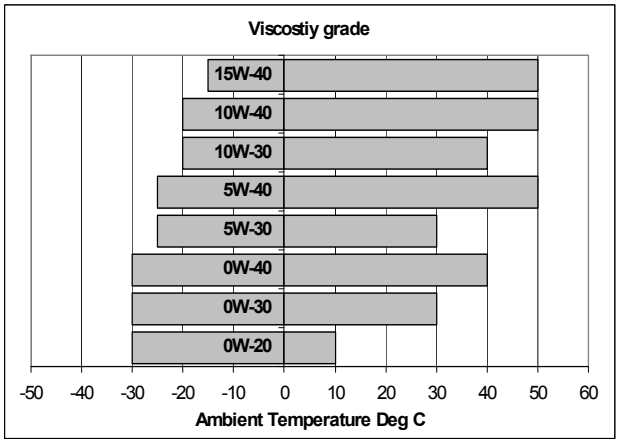
-total system... ... ... 4.9 l (8.62 pt) Unbalanced
-minimum .. .. 3.4 l (5.98pt) Unbalanced
Maximum engine operating angles ... ... 35° Unbalanced

Lubricating oil pressure

-relief valve opens.. ... ... 304 - 500 kPa (44 - 73 lb/in²)
-at maximum no-load speed .. .. 196 - 392 kPa (28 - 68 lb/in²)
Max continuous oil temperature. ... 125°C Max, 135°C intermittent

Recommended SAE viscosity

A single or multi grade lubricating oil which conforms to API CG4 / CH4 or ACEA E3 / E5 must be used, see illustration below:



Mountings

Maximum bending moment at
rear face of block .. .. TBA Nm (lbf ft)

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