

Technical Data

1100 Series

1104A-44G

Electropak

45,7 kW @ 1500 rev/min

50,4 kW @ 1800 rev/min

Basic technical data

Number of cylinders 4
 Cylinder arrangement vertical in-line
 Cycle four stroke
 Induction system naturally aspirated
 Compression ratio 19.25:1
 Bore 105 mm (4.13 in)
 Stroke 127 mm (4.99 in)
 Cubic capacity 4,4 litres (in³)
 Direction of rotation clockwise when viewed from front
 Firing order 1,3,4,2
 Estimated total weight (dry) 445 kg (981 lb)
 Estimated total weight (wet) 465 kg (1025 lb)

Overall dimensions

-height 915 mm (36.02 in)
 -length 1162 mm (45.75 in)
 -width 652 mm (25.67 in)

Moments of inertia (mk²)

-engine flywheel 1,14 kgm²

Centre of gravity

	Unit	Wet	Dry
Forward from rear of block	mm (in)	258 (10.16)	251 (9.88)
Above centre line of block	mm (in)	157 (6.18)	146 (5.75)
Offset to Rhs of centre line	mm (in)	23 (0.91)	21 (0.83)

Performance

All data based on operation to ISO 14396, ISO 3046/1 standard reference conditions.

Speed variation at constant load ISO 8528 G2 (Mech) ± 5 %

Cyclic irregularity

at 110% stand-by power 0,2 %

Test conditions

-air temperature 25 °C (77 °F)
 -barometric pressure 100 kPa (29.5 in hg)
 -relative humidity 30%

Sound level

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

1500 rev/min 90,8 dB(A)

1800 rev/min 92,7 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.

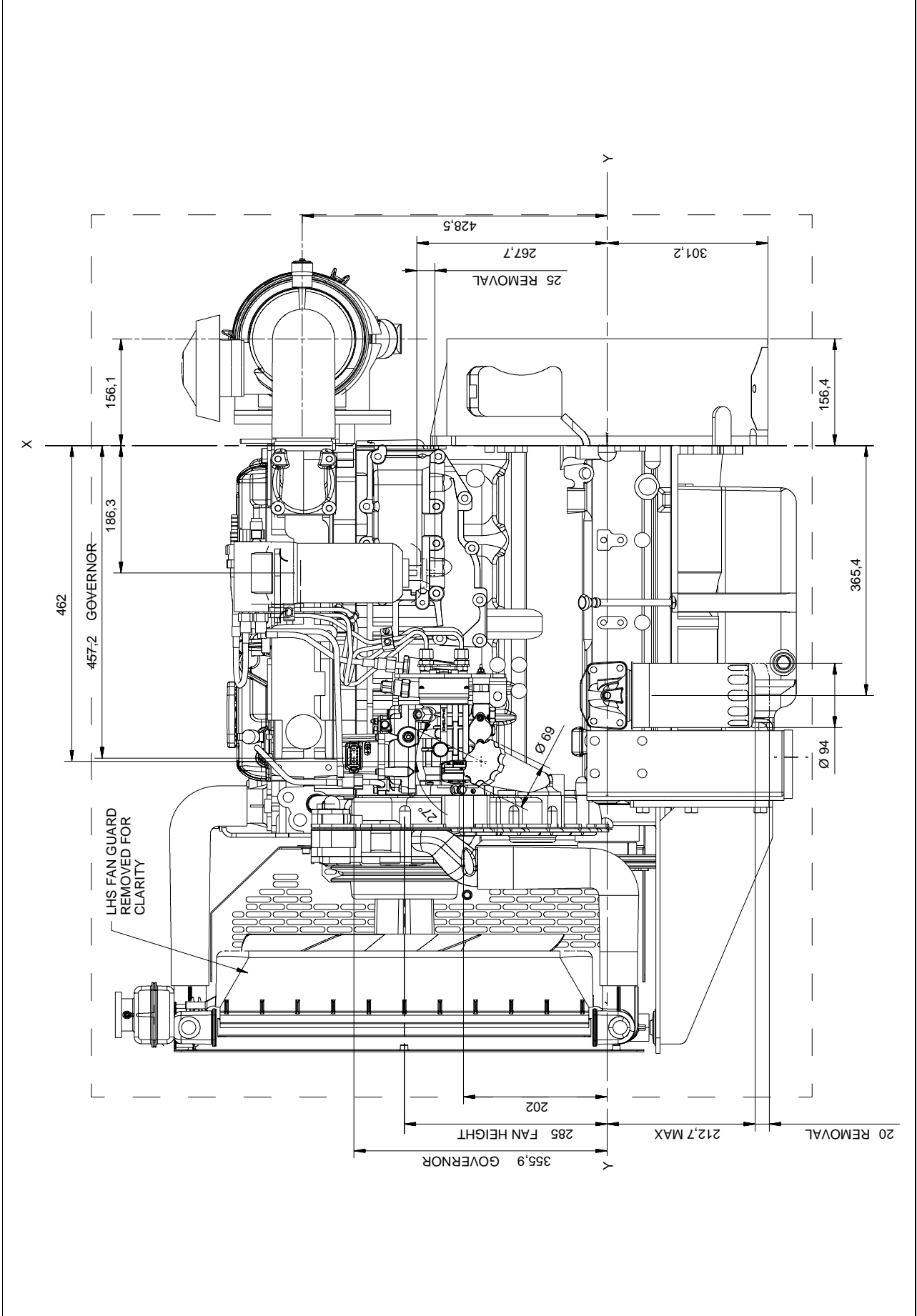
Caution: The airflows shown in this table will provide acceptable cooling for an open power unit operating in ambient temperatures of up to 53 °C (127 °F) or 46 °C (115 °F) if a canopy is fitted with an air flow restriction of up to 0,125 kPa. If the power unit is to be enclosed totally, a cooling test should be done to check that the engine cooling is acceptable. If there is insufficient cooling, contact Perkins Technical Service Department.

General installation

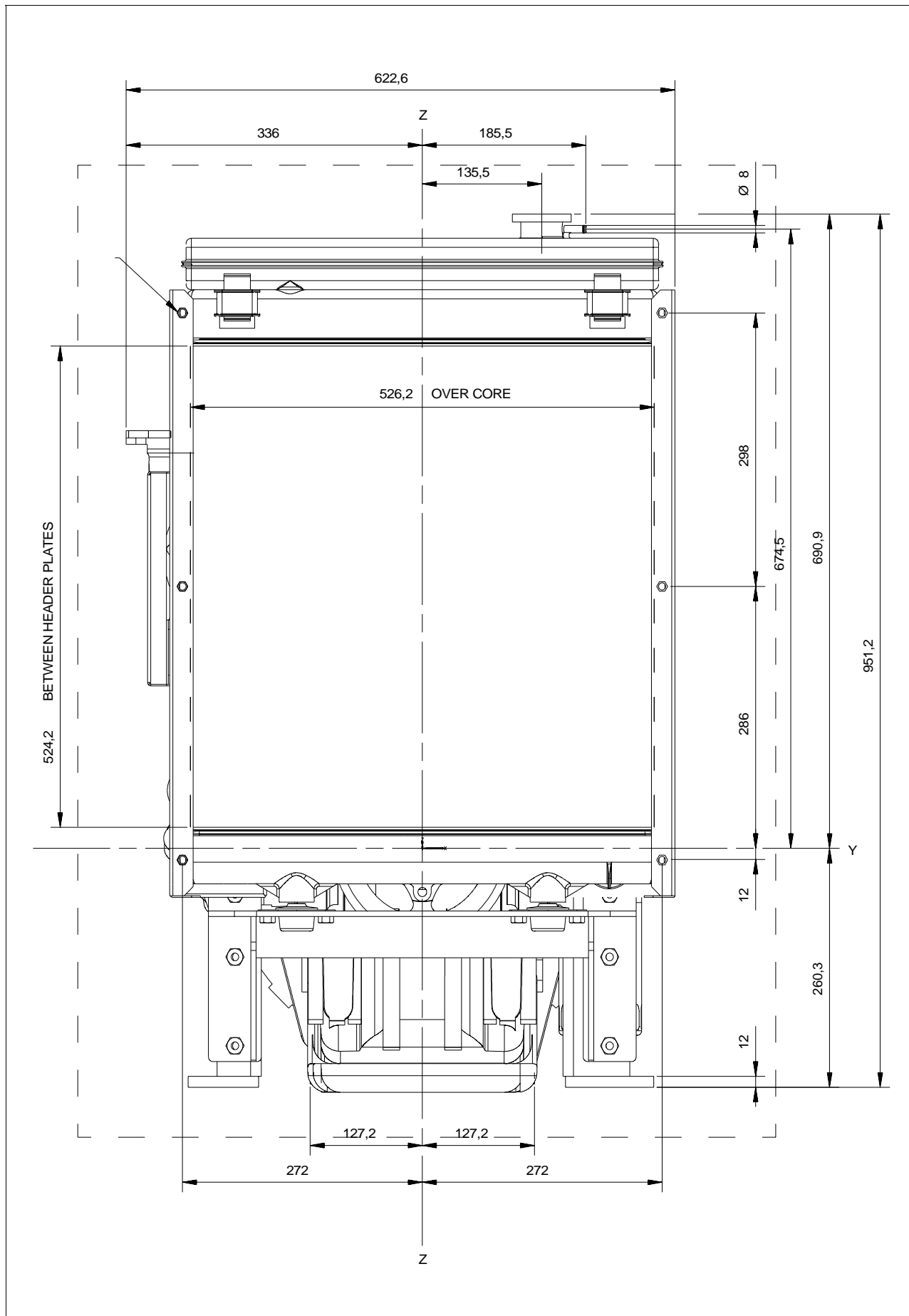
Designation	Units	Type of operation and application			
		Prime	Stand-by	Prime	Stand-by
		50 Hz	50 Hz	60 Hz	60 Hz
Gross engine power	kW (bhp)	42,4 (56.9)	46,6 (62.5)	47,3 (63.4)	52,0 (69.7)
Brake mean effective pressure	kPa (lbf/in ²)	772,0 (112.0)	849,0 (123.1)	720,4 (104.5)	795,0 (115.3)
Mean piston speed	m/s (ft/s)	6,35 (20.8)	6,35 (20.8)	7,62 (25)	7,62 (25)
Electropak net engine power	kW (bhp)	41,5 (55.7)	45,7 (61.3)	45,7 (61.3)	50,4 (67.6)
Engine coolant flow (coolant pump ratio 1.25:1)	l/min (UK gal/min)	142 (31.2)	142 (31.2)	170 (37.4)	170 (37.4)
Combustion air flow	m ³ /min (ft ³ /min)	2,8 (98.9)	2,8 (98.9)	3,4 (120.1)	3,4 (120.1)
Exhaust gas flow (max)	m ³ /min (ft ³ /min)	6,9 (243.7)	7,7 (271.9)	9,5 (335.5)	9,4 (332.0)
Exhaust gas temperature (max)	°C (°F)	520 (968)	580 (1076)	535 (995)	600 (1112)
Cooling fan air flow (zero duct allowance)	m ³ /min (ft ³ /min)	58,2 (2055.3)	58,2 (2055.3)	81,6 (2881.7)	81,6 (2881.7)
Typical Genset Electrical output (0.8pf 25 °C)	kWe	36,0	39,6	39,9	43,9
	kVA	45,0	49,5	49,9	54,9
Assumed alternator efficiency	%	87			
Energy balance					
Power in fuel (fuel heat of combustion)	kW (Btu/min)	109,0 (6204.2)	121,0 (6887.3)	125,0 (7115.0)	139,0 (7911.8)
Power output (gross)	kW (Btu/min)	42,4 (2413.4)	46,6 (2652.5)	47,3 (2692.3)	52,0 (2959.8)
Power to cooling fan	kW (Btu/min)	0,9 (51.2)	0,9 (52.1)	1,6 (91.1)	1,6 (91.1)
Power to coolant and lubricating oil	kW (Btu/min)	24,6 (1400.2)	27,4 (1559.6)	30,7 (1747.4)	31,0 (1764.5)
Power to exhaust	kW (Btu/min)	34,0 (1935.3)	38,0 (2162.9)	43,0 (2447.5)	48,0 (2732.1)
Power to radiation	kW (Btu/min)	8,0 (455.4)	9,0 (512.3)	7,0 (398.4)	8,0 (455.4)

Note: Cooling fan air flow (zero duct allowance) at 60 Hz Stand-by assumes 1.25:1 fan ratio and 120 kPa restriction

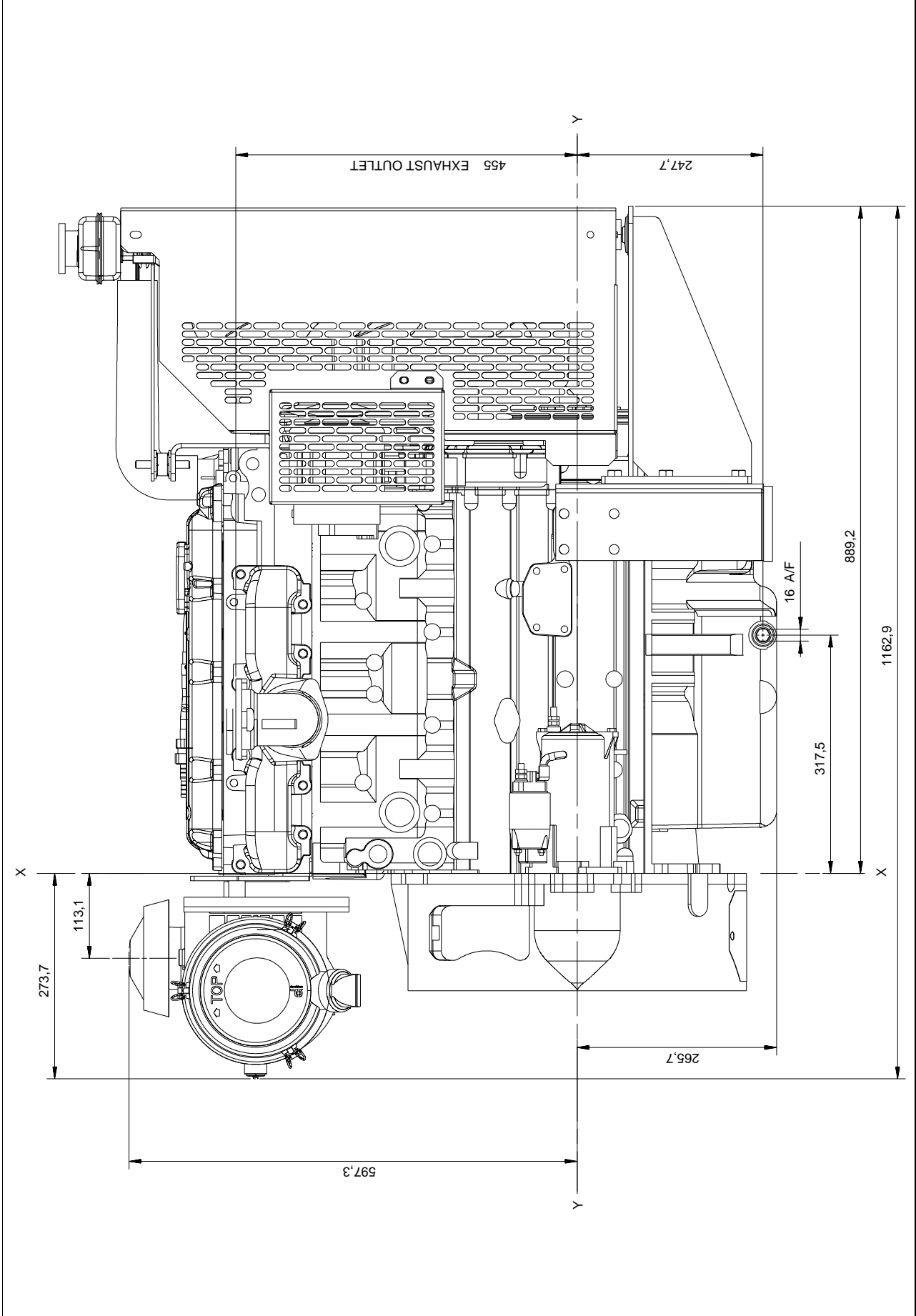
1104A-44G - left side view



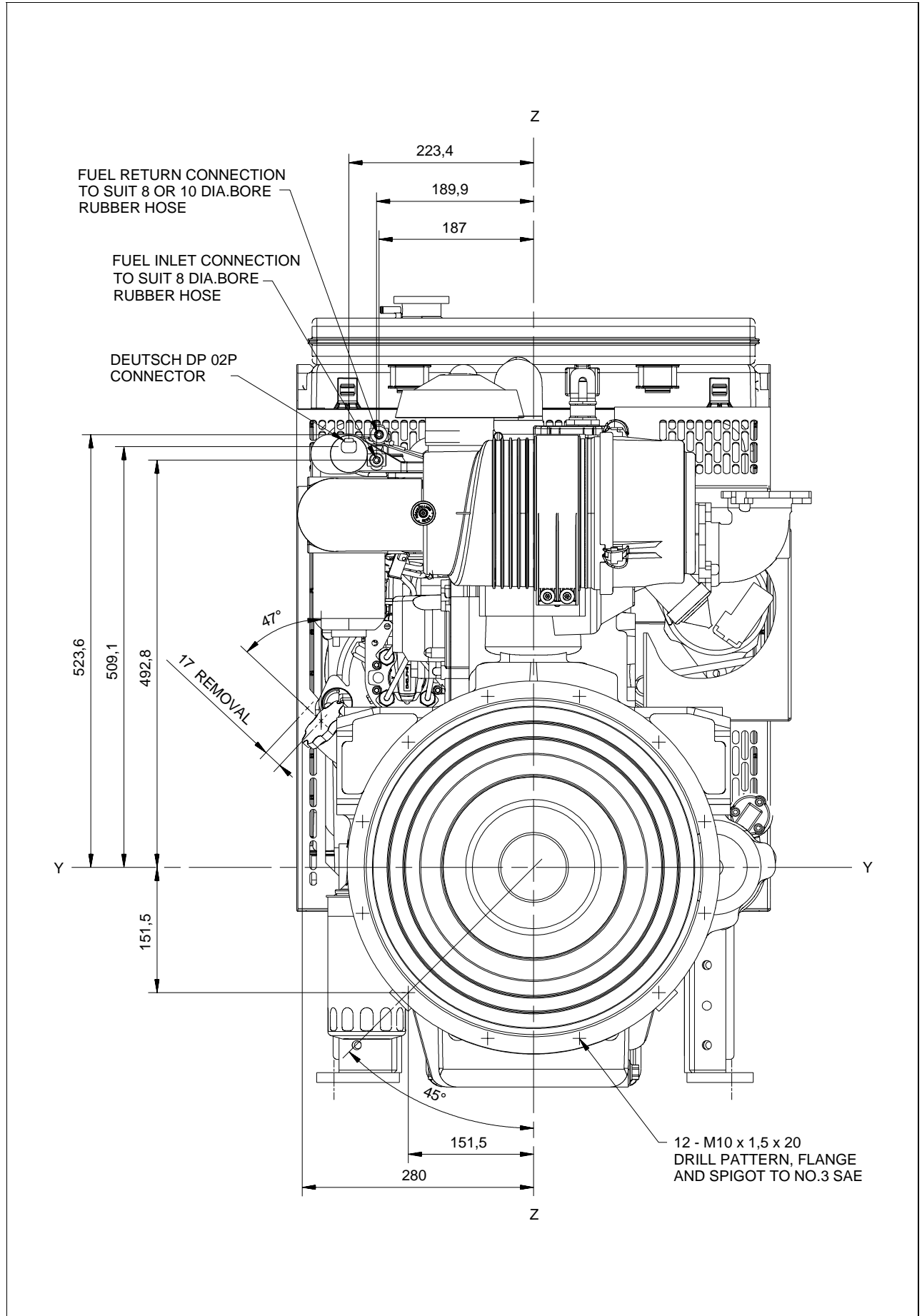
1104A-44G - front view



1104A-44G - right side view



1104A-44G - rear view



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Cooling system

Radiator
 -weight (dry) ... 10 Kg
 -face area ... 0,28 m² (2.97 ft²)
 -rows and materials ... single row aluminium
 -matrix density and material ... aluminium 12,7 fins/inch
 -width of matrix ... 526 mm (20.7 in)
 -height of matrix ... 524 mm (20.6 in)
 -pressure cap setting ... 107 kPa (15.5 lb/in²)

Fan

-diameter ... 457 mm (18 in)
 -drive ratio ... 01:01
 -number of blades ... 7
 -material ... composite
 -type ... pusher
 -power @ 1500 rev/min ... 0,9

Coolant

Total system capacity
 -with radiator ... 12,8 litres (23.2 UK pints)
 -without radiator ... 7,0 litres (12.3 UK pints)
 Maximum top tank temperature ... 110 °C (230 °F)
 Maximum permissible external system resistance ... 35 kPa
 Thermostat operation range ... 82 - 93 °C (180 - 199 °F)
 Coolant pump ratio and method of drive ... gear driven 2:1
 Recommended coolant immersion heater rating ... TBA kW
 Recommended coolant:
 50% ethylene glycol with a corrosion inhibitor (BS 658 :1992 or MOD AL39) and 50% clean fresh water.

Electrical System

-type ... negative ground
 -alternator ... 12 V
 -alternator output ... 65 amps
 -starter motor ... 12 V
 -starter motor power ... 3 kW
 -number of teeth on the flywheel ... 126
 -pull-in current of starter motor solenoid ... 60 amps
 -hold-in current of starter motor solenoid ... 15 amps
 -engine stop solenoid ... 12 V
 Pull-in current of stop solenoid and hold-in current of stop solenoid:
 All leads to be rated at 10 amps minimum

Cold start recommendations

Minimum cranking speed ... 105 rev/min

Temperature Range	
5 to -7 °C	Oil: 15W40 Starter: Denso P95 12V Battery: F Max breakaway current: 900 CCA Cranking current: TBA Aids: None

Temperature Range	
-7 to -20 °C	Oil: 5W Starter: Denso P95 12V Battery: F Max breakaway current: 900 CCA Cranking current: TBA Aids: Glowplugs (15 seconds per-heat)

- Battery capacity is defined by 20 hour rate
- If a change to a low viscosity oil is made, the cranking torque necessary at low ambient temperatures is much reduced. The starting equipment has been selected to take advantage of this. It is important to change to the appropriate multigrade oil in anticipation of operating in low ambient temperatures
- Breakaway current is dependent on battery capacity available. Cables should be capable of handling the transient current which may be up to double the steady cranking current.

Exhaust system

Maximum back pressure:
 1500 rev/min ... 12 kPa (3.54 in Hg)
 1800 rev/min ... 15 kPa (4.43 in Hg)
 Exhaust outlet size ... 64 mm (2.5 in)

Fuel system

Type of injection ... direct
 Fuel injection pump ... rotary
 Fuel atomiser ... multi-hole
 Nozzle opening pressure ... 29,0 MPa (290 bar)
 Static injection timing No.1 cylinder ... Locked at TDC

Fuel lift pump

-type ... electric
 -flow/hour through EFPM ... 120 - 150 litres/hr (211 - 264 pt/m)
 -pressure ... 30 - 75 kPa (4.4 - 10.9 psi)
 Maximum suction head on EFPM:
 17 kPa @ 1,7 m using 8 mm dia bore pipe
 Maximum static pressure head:
 30 kPa @ 2,0 m using 8 mm dia bore pipe
 -delivery/hr @ 1500 rev/min ... 120 - 150 liters/hr
 -delivery/hr @ 1800 rev/min ... 120 - 150 liters/hr
 -fuel temperature at the lift pump to be less than ... 70 °C (158 °F)
 -fuel filter spacing ... 10 microns
 -tolerance on fuel consumption ... tested to ISO

Governor

-type ... Mechanical or L Series Electrical Governor
 Speed control for diesel fuel to conform to:
 Mechanical ... governor speed control to ISO 8528, G2

Fuel specification

Fuel specification	USA Fed Off Highway EPA2D 89.330-96
Density (kg/l @ 15 °C)	0.835 / 0.845
Viscosity (mm ² /s @ 40 °C)	2.0 / 3.5
Sulphur Content	0.2% maximum
Cetane Number	45 - 50

Fuel consumption

Load		Type of Operation and Application	
		1500 rev/min	1800 rev/min
110%	g/kWhr (l/hr)	223 (11.9)	222 (13.9)
100%	g/kWhr (l/hr)	214 (10.7)	219 (12.4)
75%	g/kWhr (l/hr)	215 (8.1)	218 (9.1)
50%	g/kWhr (l/hr)	232 (5.8)	243 (7.1)
25%	g/kWhr (l/hr)	297 (3.7)	320 (4.7)

Induction system

Maximum air intake restriction

-clean filter ... 3,0 kPa
 -dirty filter ... 6,6 kPa
 -air filter type ... 2 stage cyclonic / paper element

Lubrication system

Lubricating oil capacity

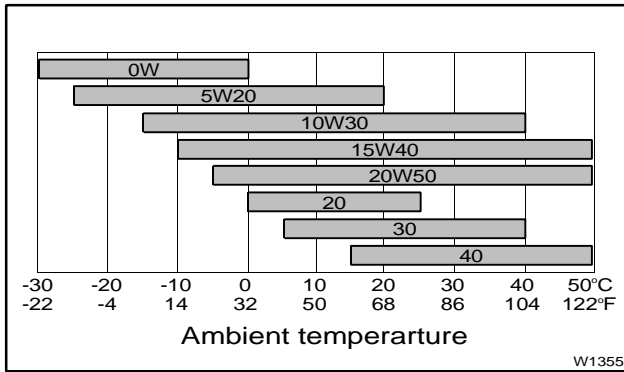
Total system... 8,0 litres (14.1 UK pints)
 Minimum ... 5,5 litres (9.7 UK pints)
 Maximum ... 7,0 litres (12.3 UK pints)
 Maximum engine operating angles
 -front up, front down, right side or left side. ... 25° continuous
 Sump drain plug tapping size. ... ¼ in x 16 UNF
 Shutdown switch setting (where fitted) ... 60 - 90 kPa
 Oil pump speed and
 method of drive ... gear driven @ 2 x engine speed
 Oil pump flow:
 1500 rev/min ... 42 litres/min
 1800 rev/min ... 51 litres/min

Lubricating oil pressure

-relief valve opens... 415 - 470 kPa (60 - 68 lbf/in²)
 -at maximum no-load speed ... 276 - 414 kPa (40 - 60 lbf/in²)
 Maximum continuous oil temperature (in rail) ... 125 °C (257 °F)
 Oil consumption at full load as a % of fuel consumption: ... 0,15%

Recommended SAE viscosity

A single or multigrade oil must be used which conforms to API-CG4/CH4.



Mountings

Maximum static bending moment at rear face of block ... 791 Nm (583.4 lb ft)

Load Acceptance

Initial load application when engine reaches rated speed (15 seconds maximum after engine starts to crank)				
rev/min	Prime Power %	Load kWm/ kWe	Transient frequency deviation %	Frequency recovery time seconds
1500	85	35,6 / 31	0,1 / -2,7	0,5
1800	110	52,0 / 45	0,2 / -3,5	0,7

Notes:

- The above complies with the requirements of classifications 3 and 4 of ISO 8528-12 and G2 operating limits stated in ISO 8528-5
- The above figures were obtained under test conditions as follows:

1500 rev/min and 1800 rev/min	
Engine block temperature	82 - 93 °C
Alternator efficiency	87%
Maximum ambient temperature	30 °C
Isochronous governing	0%
Mechanical governing	4% ± 1%
Under frequency roll off (UFRO)	N/A
Flywheel inertia	1.14 kgm²
Alternator	LSA 43.2.53

All tests were conducted using an engine which was installed and serviced to Perkins Engines Company Limited recommendations.



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