

Technical Data

1100D Series

1104D-E44TG1

Electropak

Basic technical data

Number of cylinders	4
Cylinder arrangement	in-line
Cycle4 stroke
Induction system	turbocharged
Combustion system	direct injection diesel
Compression ratio	16,2:1
Bore	105 mm
Stroke	127 mm
Cubic capacity	4,4 litres
Direction of rotation.....	anticlockwise when viewed from flywheel
Firing order (number 1 cylinder furthest from flywheel)	1 3 4 2
Estimated total weight of Electropak (dry)	483 kg

Overall dimensions - Electropak

-height	940 mm
-length (air cleaner fitted)	1281 mm
-width	708 mm

Moments of rotational inertia (mk²)

Engine rotational components	0.14 kgm ²
Flywheel	1.2 kgm ²

Centre of gravity (fan face to flywheel housing)

Forward of rear face of cylinder block.....	289 mm
Above crankshaft centre line	138 mm
Offset to RHS of crankshaft centre line	-3 mm

Performance

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

All ratings certified to within

Speed variation at constant load	± 3%
Cyclic irregularity with 1,2kg.m ² (@ 1800 rev/min)	± 0,25%
	0,0143

Test conditions

-air temperature	25 °C
-barometric pressure	100 kPa
-relative humidity	31.5%
-air inlet restriction at maximum power (nominal)	5 kPa
-exhaust back pressure at maximum power (nominal)	15 kPa
-fuel temperature (inlet pump)	40 °C

Sound level

Sound power level (exhaust piped away, cooling pack and air cleaner fitted)

	103,3 dB(A)
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Note: Note: Sound power level calculated from the mean of 4 microphones sited, in front, right, left and above the engine (1m away)

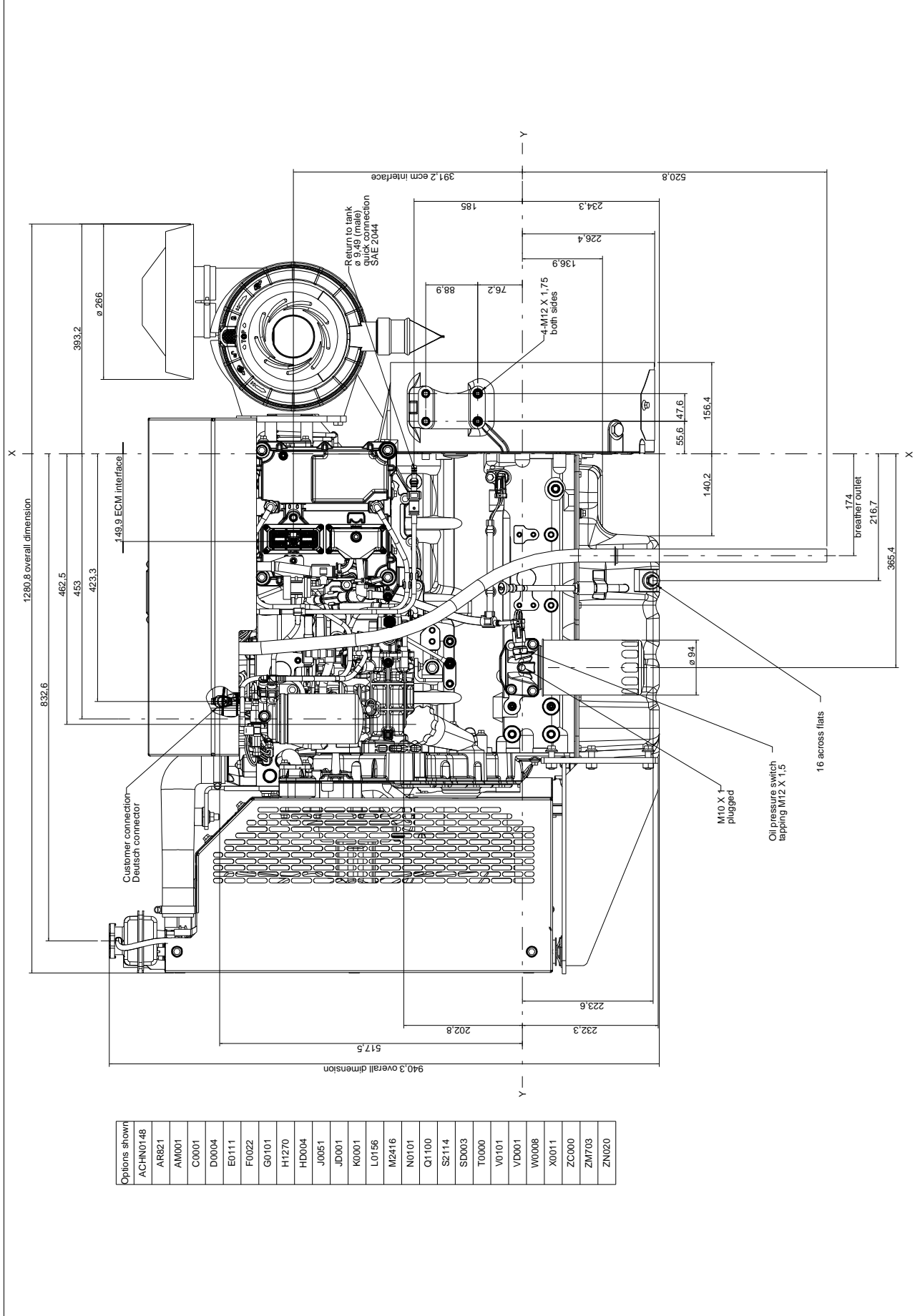
If the engine is to operate in ambient conditions other than those of the test conditions, suitable adjustments must be made for these changes. For full details, contact Perkins Technical Service Department.

Emissions capability: Certified against the requirements of Tier 3 legislation for non-road mobile machinery, powered by constant speed engines (EPA 40 CFR Part 89 Tier 3).

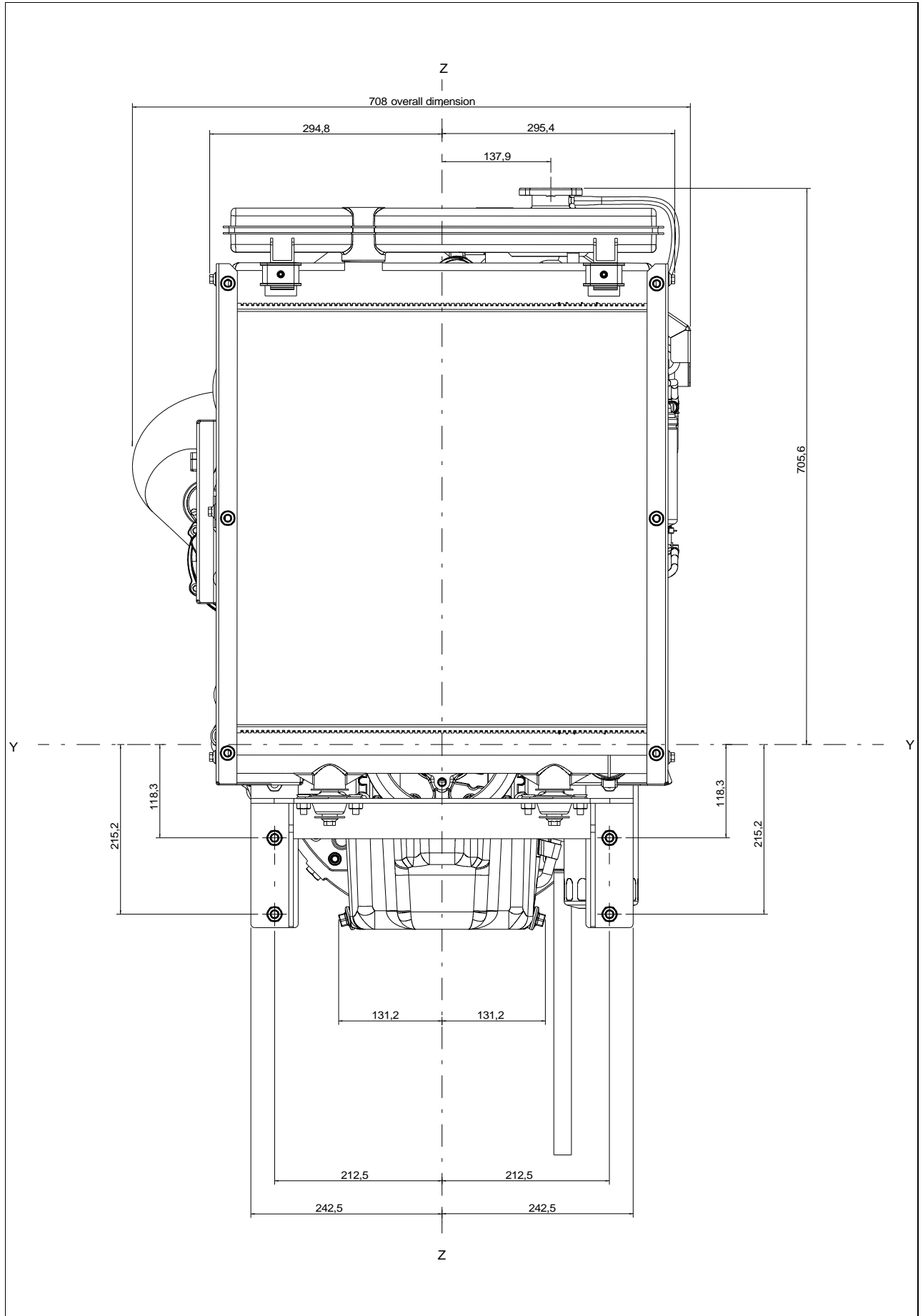
General installation

Designation	Units	Prime	Standby
Gross engine power	kWb	66,2	72,8
Electropak nett engine power	kWm	65,2	71,8
Brake mean effective pressure	kPa	1002	1102
Engine coolant flow (against 35 kPa restriction)	l/min	169	
Combustion air flow (at rated speed)	m ³ /min	5,9	5,9
Exhaust gas flow (Max.)	m ³ /min	14,4	14,7
Exhaust gas mass flow	kg/min	7,1	7,2
Exhaust gas temperature (turbocharger outlet)	°C	525	547
Boost pressure ratio		2,18	2,2
Overall thermal efficiency (nett)	%	34	35
Typical genset electrical output (0.8pf 25 °C)	kWe	58,7	64,6
	kVA	73,4	80,8
Assumed alternator efficiency	%	90	
Energy balance			
Energy in fuel	kWt	189,5	203,3
Energy in power output (gross)	kWb	66,2	72,8
Energy to cooling fan	kWm	1,0	
Energy in power output (net)	kWt	65,2	71,8
Energy to exhaust	kWt	65,8	66,0
Energy to coolant and lubricating oil	kWt	46,7	49,6
Energy to radiation	kWt	10,8	14,9

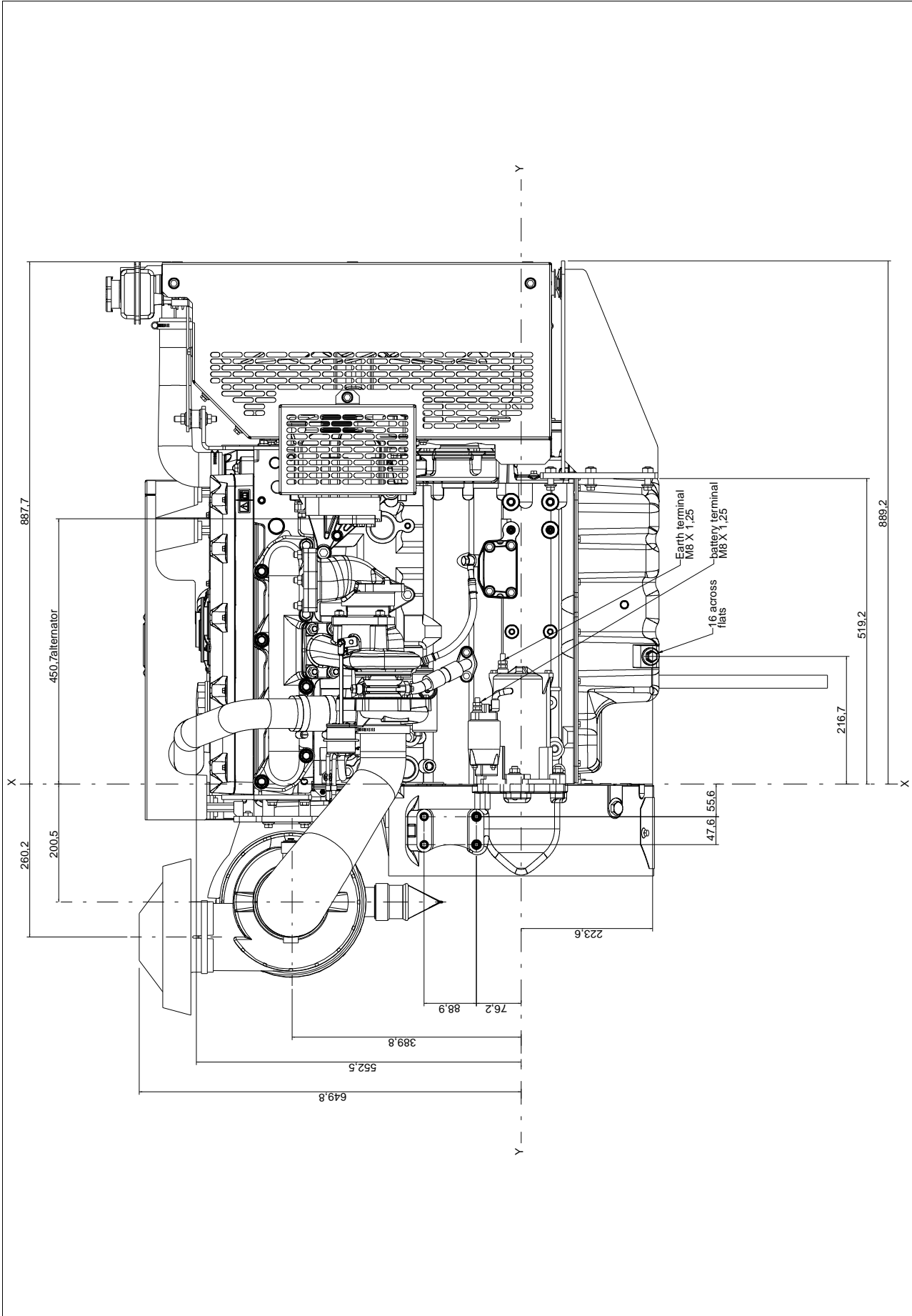
1104D-E44TG1 - Left side view GAA0761



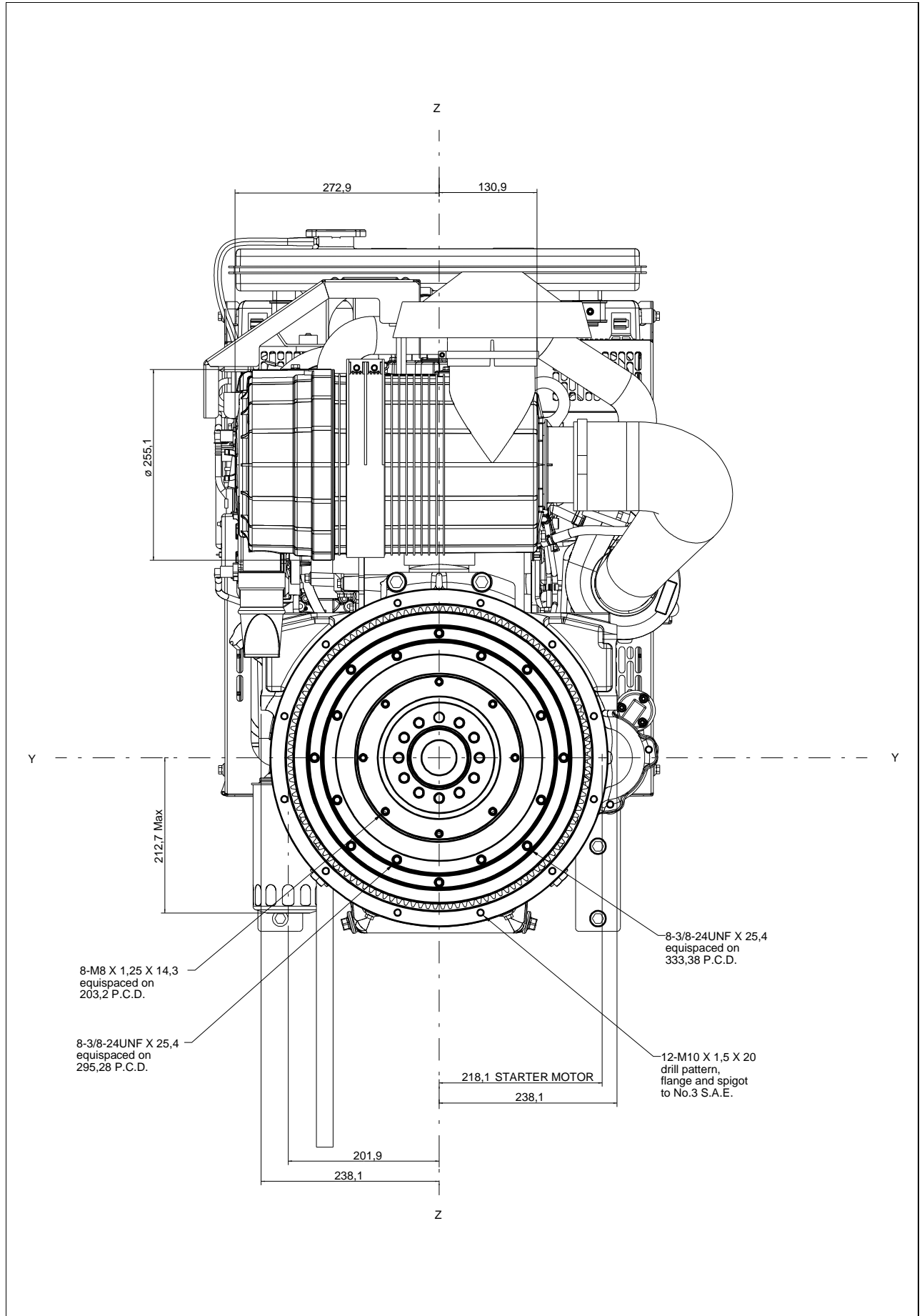
1104D-E44TG1 - Front view GAA0761



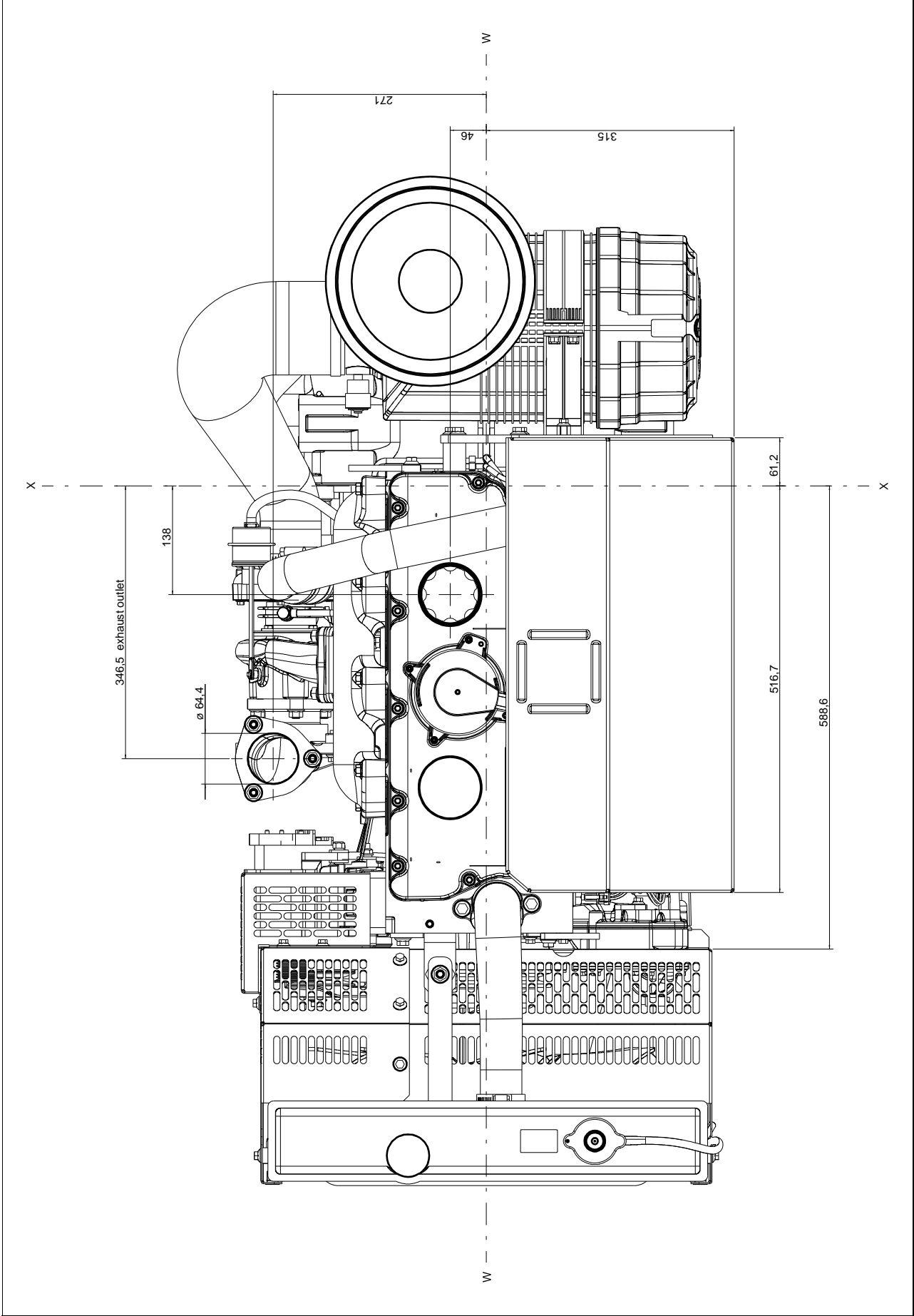
1104D-E44TG1 - Right side view GAA0761



1104D-E44TG1 - Rear view GAA0761



1104D-E44TG1 - Plan view GAA0761



Cooling system

Cooling pack

-overall weight (wet)	71 kg
-overall face area	275834 mm ²
-width	550 mm
-height	762 mm

Radiator

Face area	275834 mm ²
Number of rows and materials	2 rows, aluminium
Matrix density and material	12 fins per inch, aluminium
Width of matrix	526 mm
Height of matrix	524 mm
Pressure cap setting (min)	100 kPa

Fan

Diameter	457,2 mm
Drive ratio	1.25:1
Number of blades	7
Material	composite
Type	pusher

Coolant

Total system capacity	16,5 litres
Engine capacity	7,0 litres
Maximum top tank temperature	112 °C
Temperature rise across engine	6,6 - 7,0 °C
Max. permissible external system resistance	35 kPa
Thermostat operation range	82 to 95 °C
Coolant pump drive type	Gear driven
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 /min
46 °C	200	60
tba	tba	tba

Electrical system

-type	12 Volt negative earth
Alternator type	Denso A115i
-alternator voltage	12V
-alternator output	65 - 175A
Starter motor type	Iskra
-starter motor voltage	12V
-starter motor power AZE	3,2 kW
-starter motor power AZF	4,0 kW
Number of teeth on flywheel	126
Number of teeth on starter pinion	10
Minimum cranking speed	100 rev/min
Starter solenoid maximum	
-pull-in current @ 0 °C	62A
-hold-in current @ 0 °C	14A

Cold start recommendations

Minimum required cranking speed over TDC. 100 rev/min

Cold start recommendation

Starter model	At Temp. °C	Oil viscosity limit	Minimum Battery CCA (cold cranking amps)	
			With glow plugs (SAE)	Without glow plugs
AZE ⁽¹⁾	-5	15W40	750	750
AZE ⁽¹⁾	-10	15W40	850	950
AZF ⁽²⁾	-15	15W40	1125	(3)
AZF ⁽²⁾	-20	10W40	1300	(3)
AZF ⁽²⁾	-25	5W30	1300	(3)

1. AZE starter - Battery must not exceed 950 CCA.
2. AZF starter - Battery must not exceed 2400 CCA.
3. Glow plugs must be used.

The table above shows the recommended battery sizes against starter model, temperature and oil viscosity and is based on the test results from starting a 'bare' engine with batteries at a 75% state of charge and with a cable resistance of 0,0017 Ohms.

Induction system

Maximum air intake restriction

-clean filter	5 kPa
-dirty filter	8 kPa
-air filter type	paper element

Exhaust system

Maximum back pressure

-1800 rev/min	15,0 kPa
Exhaust outlet, internal diameter	64 mm

Fuel system

Type of injection	direct
Fuel injection pump	common rail
Fuel atomiser	unit injector / multi-hole
Nozzle opening pressure	18,5 MPa
Fuel filter particle size (maximum)	2 microns

Fuel lift pump

-max flow through customer filter	2,2 litres/min
-max fuel supply restriction at lift pump	40 kPa
-max fuel return restriction @ low idle	50 kPa
-max fuel return flow	0,8 m ³ /min
Maximum suction head	17 kPa (1.7 m)
Maximum static pressure head	10 kPa (1.0 m)
Governor type	control by ECM
Speed control to	ISO 8528, G3

Fuel specification

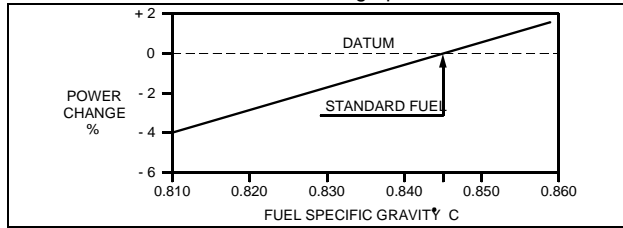
Perkins recommend the use of the following fuel specifications:

- EN590 DERV Grade A, B, C, E, F, Class 0, 1, 2, 3 & 4
- BS2869 Class A2 Off-highway Gas Oil Red Diesel
- ASTM D975, Class 1D and Class 2D
- JIS K2204 Grades 1, 2 & 3 & Special Grade 3

Note: For further information on fuel specifications and restrictions, refer to P.5 of the OMM Fuels section for this engine model

Fuel specific gravity

Engine power is affected by changes of the specific gravity of the fuel oil. The results are shown in the graph below:



Note: It is important to maintain extreme cleanliness when working on the fuel system. Even tiny particles can cause damage to the fuel system with possible engine damage. For further information on fuel system cleanliness, please refer to the Systems Operation Testing and Adjusting manual for the engine model.

Fuel consumption

Load	rev/min g/kWhr	rev/min l/hr
Standby	230,8	20,1
Prime power	236,4	18,7
75% of Prime power	249,4	16,5
50% of Prime power	257,7	12,2
25% of Prime power	293,1	6,5

Note: Based on gross rated power.

Mountings

Flywheel housing ... SAE3 156,4mm
Maximum static bending moment at rear face of block... 1130 Nm

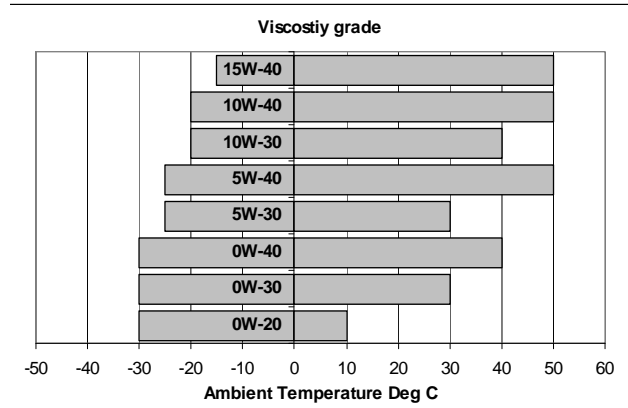
Lubrication system

Maximum total system oil capacity ... 8,4 litres
Minimum oil capacity in sump ... 5,6 litres
Maximum oil capacity in sump ... 6,9 litres
Maximum engine operating angles -
front up, front down, right side, left side ... 24 °

Lubricating oil

-relief valve opens... 450 kPa
-at maximum no-load speed ... 280 - 340 kPa
Oil temperature
-continuous operation ... 125 °C
-maximum intermittent operation ... 135 °C
-oil consumption at full load as a % of fuel consumption ... 0.15%

Recommended SAE viscosity



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	%	80
Load	kWm (kWe)	52,2 (47,0)
Transient frequency deviation	%	6,2
Frequency recovery	Seconds	1,1

The above figures were obtained under the following test conditions:

- minimum engine block temperature ... 45 °C
 - ambient temperature ... 15 °C
 - governing mode ... isochronous
 - alternator inertia ... 8kgm²
 - under frequency roll off (UFRO) point set to ... 1 Hz below rated
 - UFRO rate set to ... 2% voltage / 1% frequency
 - LAM on/off ... off
- All tests were conducted using an engine which was installed and serviced to Perkins Engines Company Limited recommendations.

Note: 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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