

Technical Data

2200 Series

Electropak

2206A-E13TAG5

2206A-E13TAG6

Basic technical data

Number of cylinders... 6
 Cylinder arrangement... vertical in-line
 Cycle... 4 stroke
 Induction system... turbocharged, air-to-air charge cooling
 Combustion system... direct injection diesel
 Compression ratio... 16,3:1
 Bore... 130 mm
 Stroke... 157 mm
 Cubic capacity... 12,5 litres
 Direction of rotation... anticlockwise when viewed from flywheel
 Firing order (number 1 cylinder furthest from flywheel) 1-5-3-6-2-4
 Estimated total weight of Electropak (dry)... 1478 kg
 Estimated total weight of Electropak (wet)... 1582 kg

Overall dimensions - Electropak

-height... 1725 mm
 -length (air cleaner fitted)... 2410 mm
 -width... 1120 mm

Moments of inertia (mk²)

Engine (1500 & 1800 rev/min)... 1,36 kgm²
 Flywheel (1500 & 1800 rev/min)... 1.41 kgm²

Centre of gravity

Forward of rear face of cylinder block... 650 mm
 Above crankshaft centre line... 250 mm

Cyclic irregularity

-1500 rev/min... 1,54
 -1800 rev/min... 1,82

Performance

Note: All data based on operation to ISO 3046-1, BS5514 and DIN 6271 standard reference conditions.

All data based on 42584 MJ/kg calorific value for diesel conforming to specification BS2869 ClassA2

All ratings certified to within $\pm 3\%$

All ratings are based on average alternator efficiency and are for guidance only.

Steady state speed capability at constant load - G2... $\pm 0,25\%$

Test conditions

-air temperature... 25 °C
 -barometric pressure... 100 kPa
 -relative humidity... 30 %
 -air inlet restriction at maximum power (nominal)... 2,5 kPa
 -exhaust back pressure at maximum power (nominal)... 6,8 kPa
 -fuel temperature (inlet pump)... 40 °C

Sound level

Estimated sound pressure level of electropak (exhaust piped away, cooling pack and air cleaner fitted)

-1500 rev/min... 102,5 dB(A)

-1800 rev/min... 104,6 dB(A)

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: All 2206A ratings are to 'best fuel consumption' and do not comply to Harmonised International regulation Emission Limits.

General installation - 2206A-E13TAG5

Designation	Units	Prime	Standby	Prime	Standby
		60Hz @ 1800 rev/min		50 Hz @ 1500 rev/min	
Gross engine power	kWb	373,4	406,5	324,2	368,4
Brake mean effective pressure	kPa	1995	2182	2063	2357
Combustion air flow (at rated speed)	m ³ /min	23,8	25,7	19,8	22,0
Exhaust gas flow (Max.)	m ³ /min	67,5	74,5	58,7	66,9
Exhaust gas mass flow	kg/min	27,8	30,2	48,4	51,9
Exhaust gas temperature (turbocharger outlet)	°C	680	680	630	630
Boost pressure ratio	:1	2,6	2,9	2,5	2,8
Overall thermal efficiency (nett)	%	40,0	39,6	39,0	40,5
Typical genset electrical output (0.8pf 25 °C)	kWe	320,0	350,0	280,0	320,0
	kVA	400,0	438,0	350,0	400,0
Assumed alternator efficiency	%	92		92	

General installation - 2206A-E13TAG6

Designation	Units	Prime	Standby	Prime	Standby
		60Hz @ 1800 rev/min		50 Hz @ 1500 rev/min	
Gross engine power	kWb	406,5	461,7	324,2	368,4
Brake mean effective pressure	kPa	2212	2430	2063	2357
Combustion air flow (at rated speed)	m³/min	26,9	29,0	19,8	22,0
Exhaust gas flow (Max.)	m³/min	75,5	84,3	58,7	66,9
Exhaust gas mass flow	kg/min	33,0	34,4	48,4	51,9
Exhaust gas temperature (turbocharger outlet)	°C	680	680	630	630
Boost pressure ratio	:1	3,0	3,3	2,5	2,8
Overall thermal efficiency (nett)	%	39,5	39,4	39,0	40,4
Typical genset electrical output (0.8pf 25 °C)	kWe	350	400	280	320
	kVA	438	500	350	400
Assumed alternator efficiency	%	92		92	

Energy balance - 2206A-E13TAG5

Designation	Units	Prime	Standby	Prime	Standby
		60Hz @ 1800 rev/min		50 Hz @ 1500 rev/min	
Energy in fuel	kWt	872,1	962,4	782,3	862,2
Energy in power output (gross)	kWb	372,4	405,5	323,2	367,3
Energy to additional losses	kWb	5,6	6,1	4,9	5,5
Energy to cooling fan	kWm	19,0		14,0	
Energy in power output (nett)	kWt	348,8	381,4	305,3	348,9
Energy to exhaust	kWt	271,7	306,5	219,2	248,2
Energy to coolant and lubricating oil	kWt	137,5	148,9	126,0	136,7
Energy to charge cooler	kWt	44,9	53,2	79,7	88,8
Energy to radiation	kWt	44,6	47,3	33,3	20,1

Energy balance - 2206A-E13TAG6

Designation	Units	Prime	Standby	Prime	Standby
		60Hz @ 1800 rev/min		50 Hz @ 1500 rev/min	
Energy in fuel	kWt	962,6	1102,4	781,1	860,8
Energy in power output (gross)	kWb	405,5	460,7	323,2	367,3
Energy to additional losses	kWb	6,1	6,9	4,9	5,5
Energy to cooling fan	kWm	19,0		14,0	
Energy in power output (nett)	kWt	381,4	435,1	305,3	348,9
Energy to exhaust	kWt	302,6	338,3	219,2	248,2
Energy to coolant and lubricating oil	kWt	146,4	162,2	126,0	136,7
Energy to charge cooler	kWt	60,4	75,4	79,7	88,8
Energy to radiation	kWt	47,7	65,8	33,3	20,1

Rating definitions

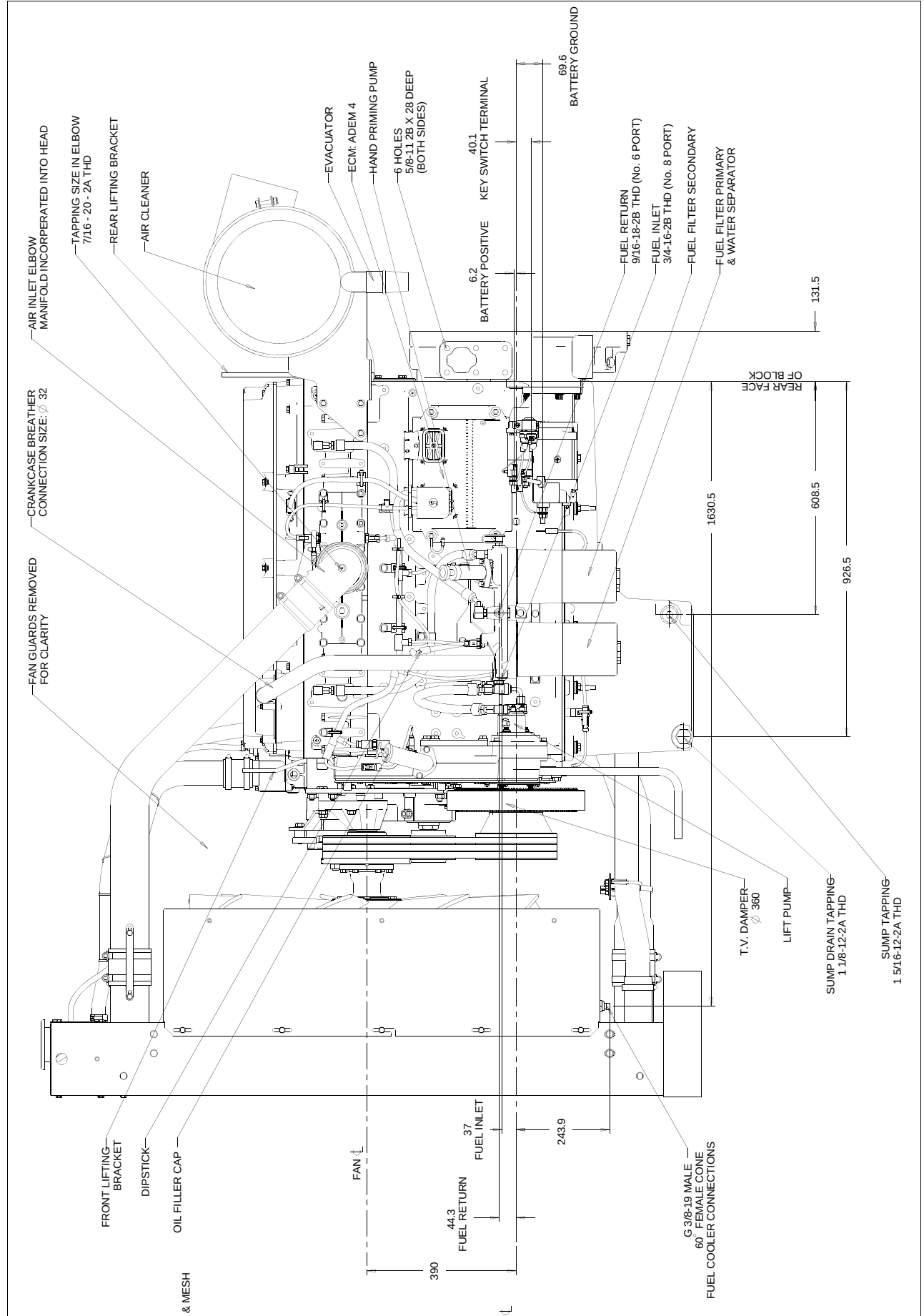
Prime power

Variable load. Unlimited hours usage with an average load factor of 70% of the published Prime Power rating over each 24 hour period. A 10% overload is available for 1 hour in every 12 hours of operation.

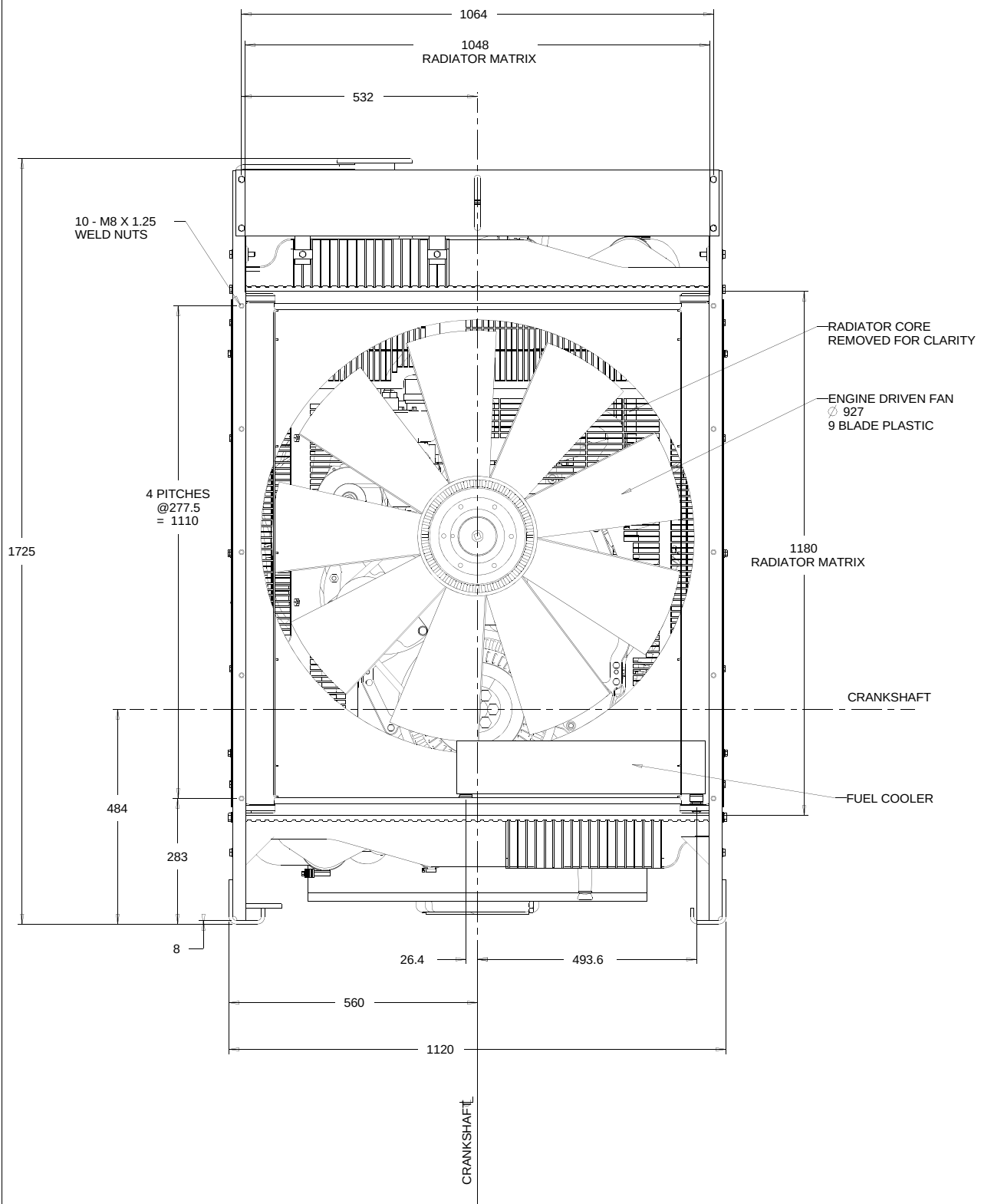
Standby power

Variable load. Limited to 500 hours annual usage up to 300 hours of which may be continuous running, No overload is permitted

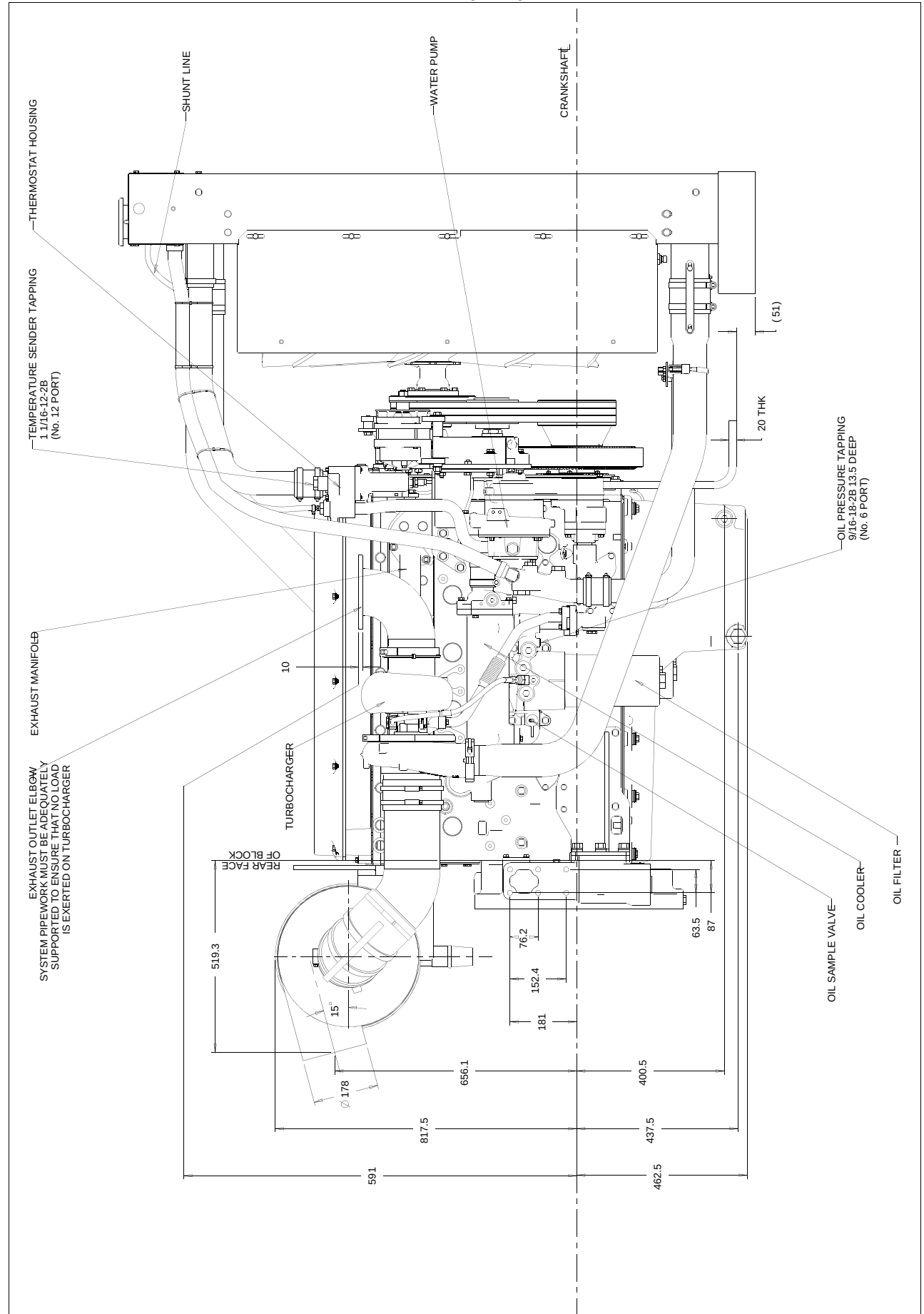
2206A-E13TAG5 and 2206A-E13TAG6 - GA Z13620 (60Hz)



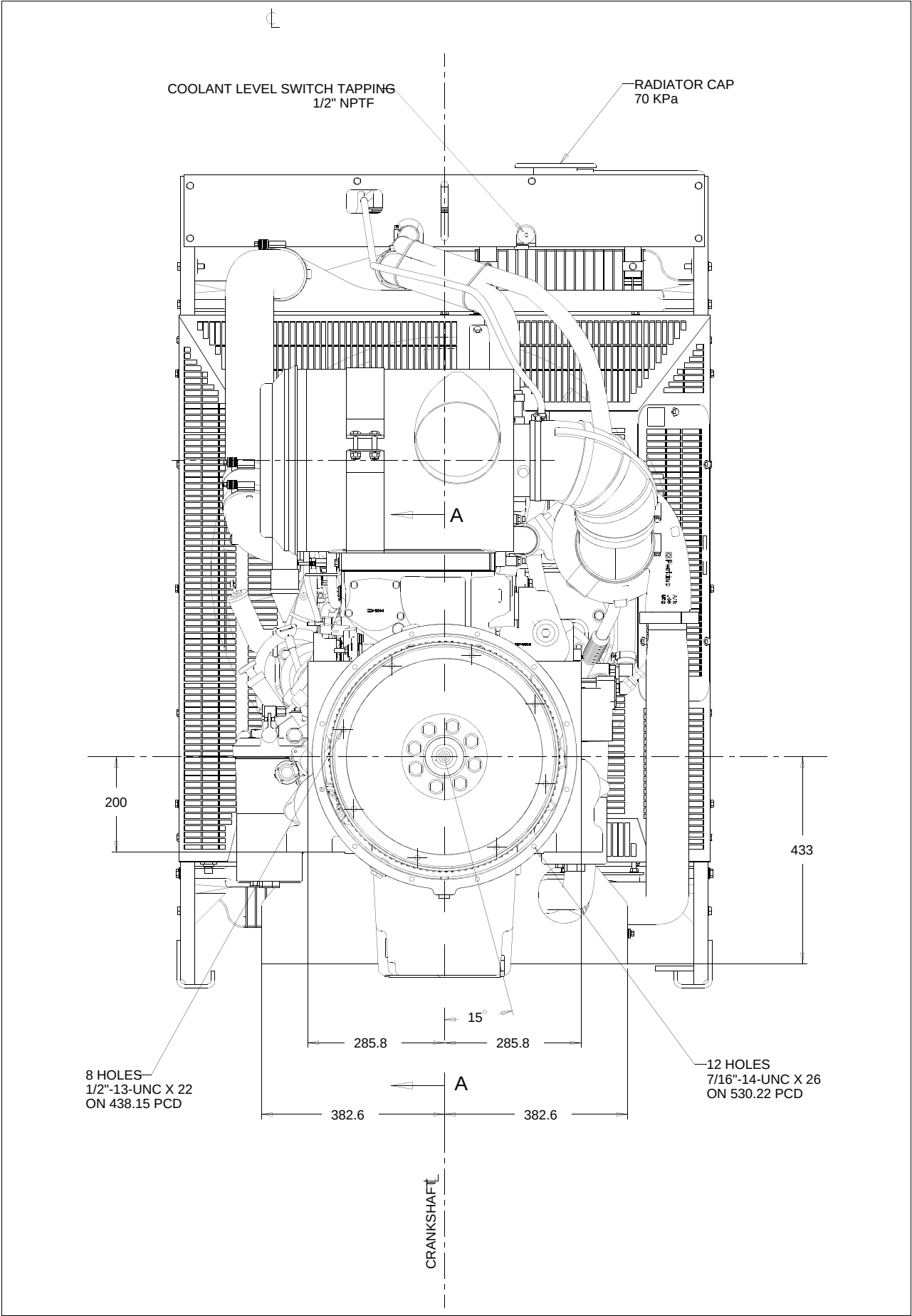
2206A-E13TAG5 and 2206A-E13TAG6 - GA Z13620 (60Hz)



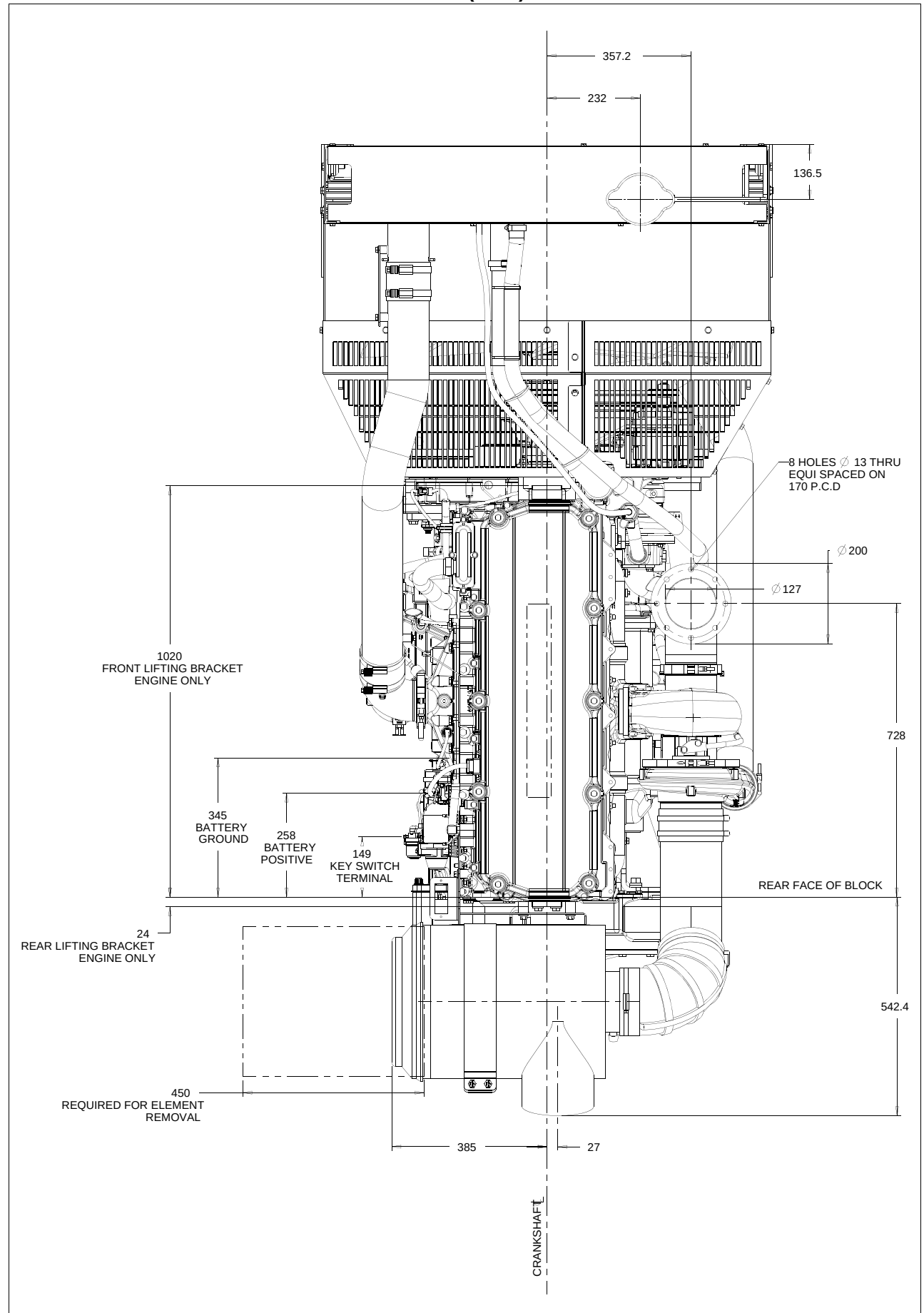
2206A-E13TAG5 and 2206A-E13TAG6 - GA Z13620 (60Hz)



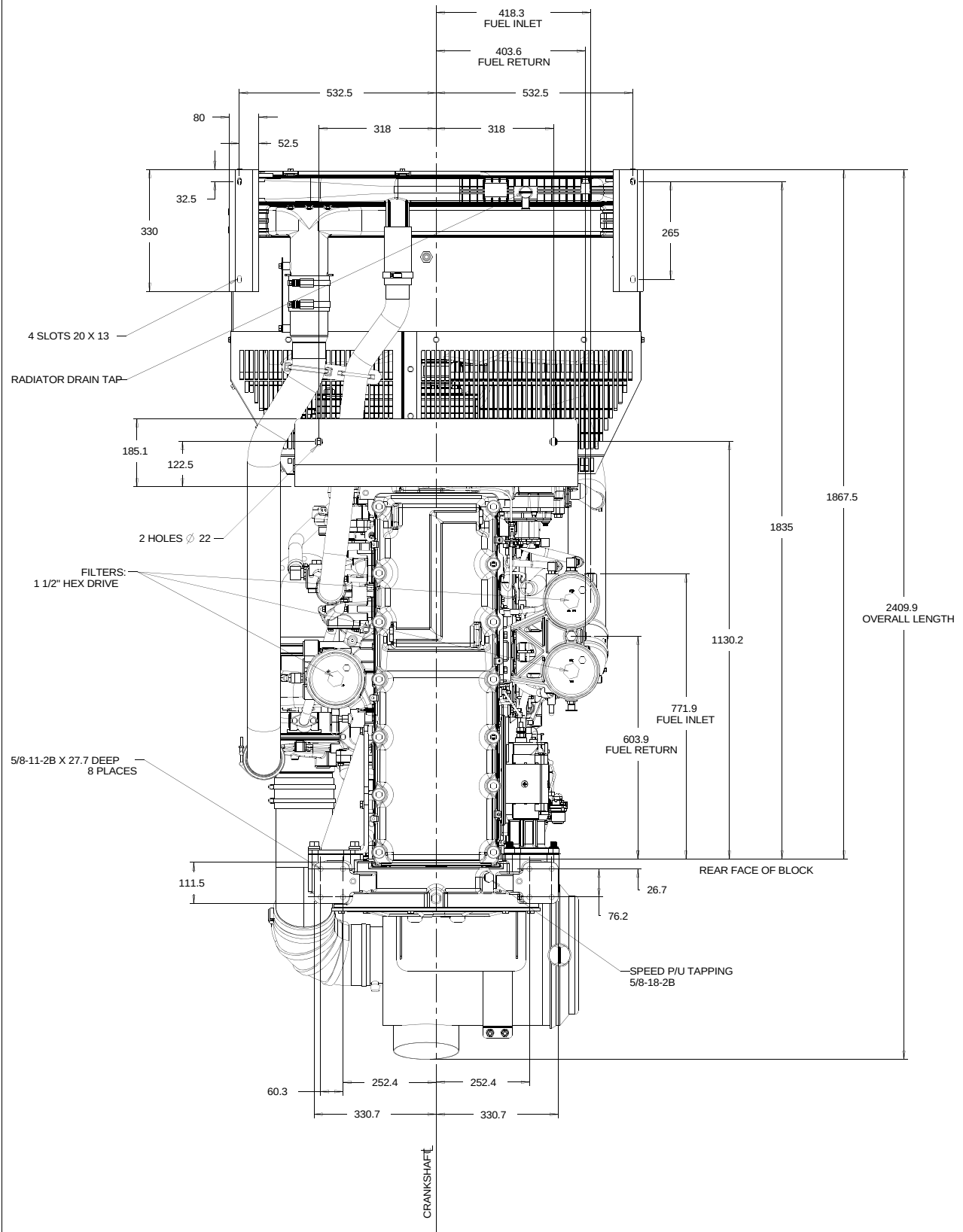
2206A-E13TAG52206A-E13TAG5 and 2206A-E13TAG6 - GA Z13620 (60Hz)



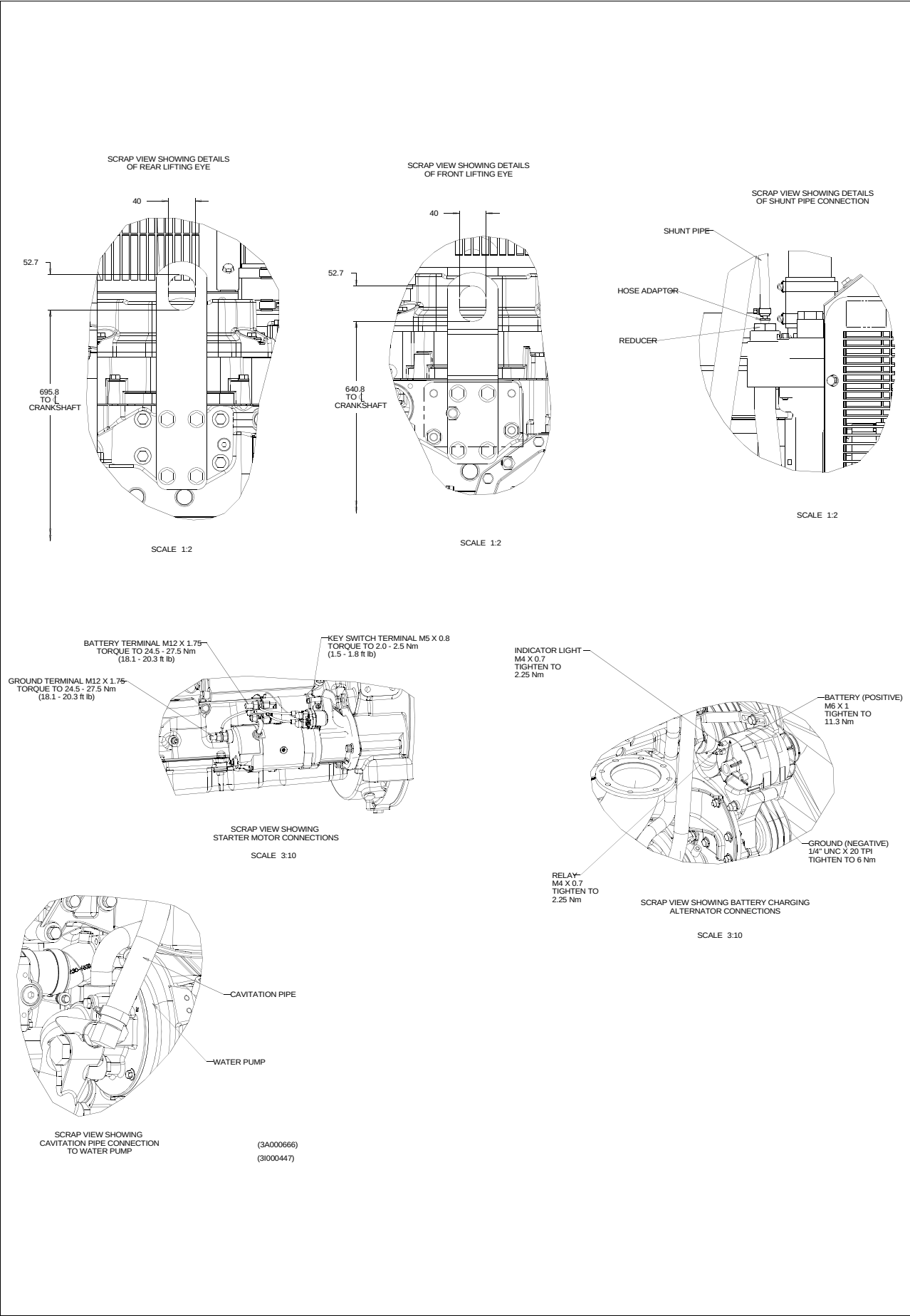
2206A-E13TAG5 and 2206A-E13TAG6 - GA Z13620 (60Hz)



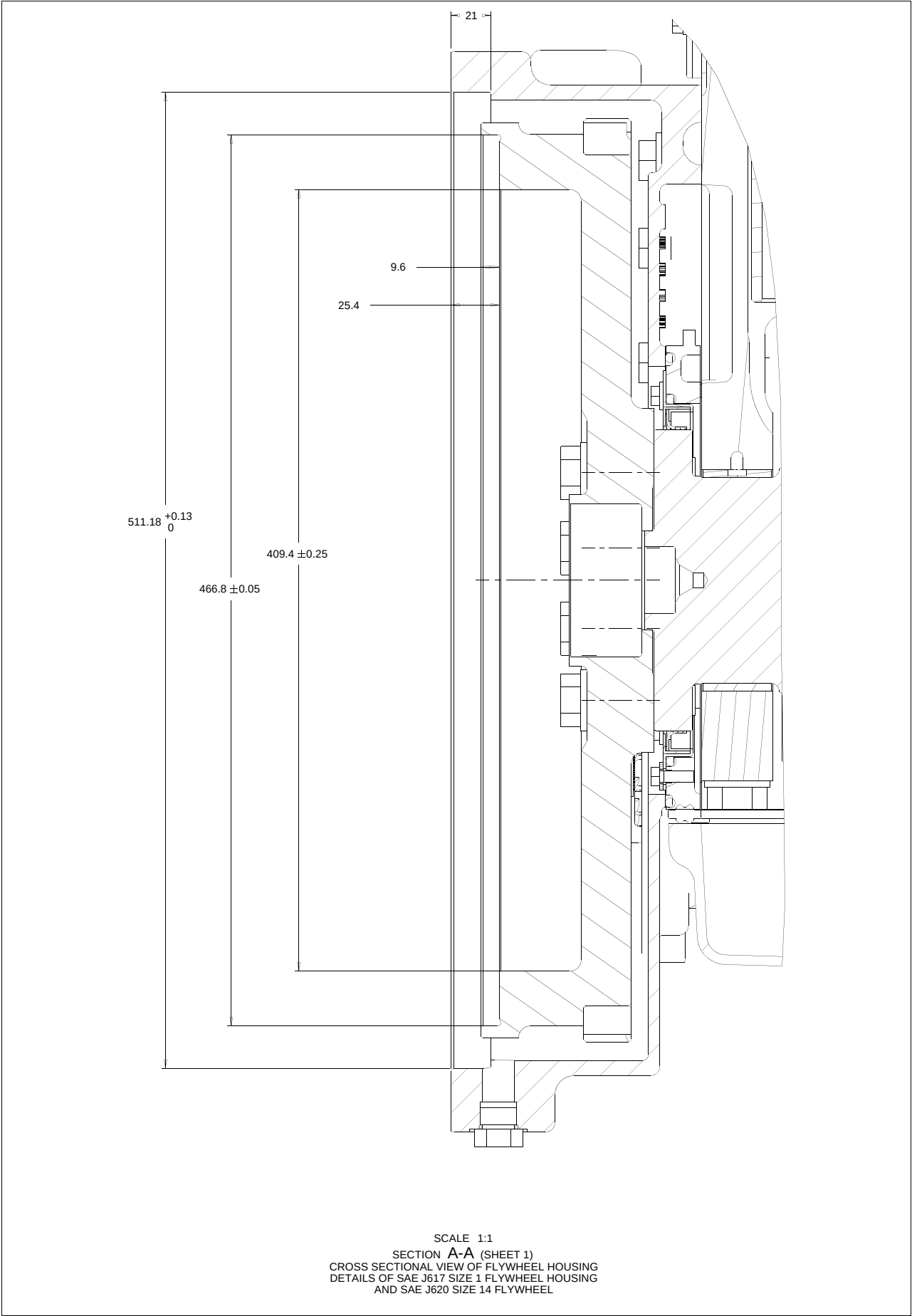
2206A-E13TAG5 and 2206A-E13TAG6 - GA Z13620 (60Hz)



2206A-E13TAG5 and 2206A-E13TAG6 - GA Z13620 (60Hz)



2206A-E13TAG5 and 2206A-E13TAG6 - GA Z13620 (60Hz)



Cooling system

Radiator

Face area 1,238 m²
Number of rows and materials 1rows, aluminium
Matrix density and material 12 fins per inch, aluminium
Width of matrix 1048 mm
Height of matrix 1100 mm
Weight of radiator (dry) 132 kg
Pressure cap setting (min) 70 kPa

Charge cooler

Face area.. . . . 1,006 m²
Number of rows and materials 1rows, aluminium
Matrix density and material 12 fins per inch, aluminium
Width of matrix 915 mm
Height of matrix 1100 mm

Coolant pump

Speed:

- 1500 rev/min 2056 rev/min
- 1800 rev/min 2468 rev/min

Drive method. Gear

Fan

Diameter 927 mm
Drive ratio.. . . . 0,92:1
Number of blades.. . . . 9
Material composite
Type pusher
Cooling fan air flow
- 1500 rev/min 654 m³/min
- 1800 rev/min 788 m³/min

Coolant

Total system capacity 51,4 litres
Max. top tank temperature 104 °C
Temperature rise across engine 10 °C
Max. pressure in engine cooling circuit. 70 kPa
Max. permissible external system resistance 30 kPa
Max. static pressure head on pump.. . . . 30 kPa
Coolant flow (min) against 30 kPa restriction
- 1500 rev/min 5,3 litres/sec
- 1800 rev/min 6,7 litres/sec
Thermostat operation range.. . . . 87 to 98°C
For details of recommended coolant specifications, refer to the
Operation and Maintenance Manual for this engine model

Duct allowance

Duct allowance 2206A-E13TAG5 - standby			
Maximum additional restriction (duct allowance) to cooling airflow and resultant minimum airflow			
Engine speed rev/min	Ambient clearance inhibited coolant °C	Duct allowance Pa	m ³ /min
1500	55	200	563
1800	59	200	716

Duct allowance 2206A-E13TAG6 - standby			
Maximum additional restriction (duct allowance) to cooling airflow and resultant minimum airflow			
Engine speed rev/min	Ambient clearance inhibited coolant °C	Duct allowance Pa	m ³ /min
1500	55	200	563
1800	59	200	716

Electrical system

-type ... 24 Volt negative earth
Alternator type ... 22SI
-alternator voltage ... 24V
-alternator output ... 70A
Starter motor type ... 39MT
-starter motor voltage ... 24V
-starter motor power ... 7,8 kW
Number of teeth on flywheel ... 113
Number of teeth on starter pinion ... 11
Minimum cranking speed ... 106 rev/min
Starter solenoid maximum
-pull-in current @ 0°C ... 200A
-hold-in current @ 0°C ... 25A

Cold start recommendations

-5°C to -10°C

oil ... SAE grade 15W40
Starter ... 42MT
Battery ... 24 volts
Max. breakaway current ... 1311 amps
Cranking current ... 588 amps
Starting aids (ECM controlled) ... none
Min. mean cranking speed ... 106 rev/min

-11°C to -25°C

oil ... SAE grade 5W40
Starter ... 42MT
Battery ... 24 volts
Max. breakaway current ... 1585 amps
Cranking current ... 828 amps
Starting aids (ECM controlled) ... block heater 1,5kW (110V/240V)
Min. mean cranking speed ... 106 rev/min

Notes:

- Battery capacity is defined by the 20 hour rate
- The oil specification should be for the minimum ambient temperature as the oil will not be warmed by the immersion heater
- Breakaway current is dependent on the battery capacity available. Cables should be capable of handling transient current twice that of cranking current.

Fuel system

Injection system ... MEUI
Injector type ... MEUI
Governor type ... electronic
Governing conforms to ... ISO 8528-5 Class G2
Injector pressure ... 207 MPa

Fuel lift pump

-lift pump type ... gear driven
-lift pump delivery @1500 rev/min ... 480 litres/hour
-lift pump delivery @1800 rev/min ... 600 litres/hour
-lift pump delivery pressure ... 621 kPa
-max. suction head at pump inlet ... 3 m
-max. static pressure head ... 4 m
-max. fuel inlet temperature ... 55 °C
-fuel filter spacing primary ... 10 microns
-fuel filter spacing secondary ... 2 microns

Fuel specification

BS2869 Class A2 or BSEN590

ASTM D975 Class 1D and class 2D

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

Fuel consumption

Note: All fuel consumption figures are based on Nett power

2206A-E13TAG5 - 1800 rev/min

Load	g/kWhr	l/hr
Standby	197	89
110% Prime power	200	91
100% Prime power	201	83
75% of Prime power	204	63
50% of Prime power	209	44

2206A-E13TAG6 - 1800 rev/min

Load	g/kWhr	l/hr
Standby	199	102
110% Prime power	202	100
100% Prime power	202	91
75% of Prime power	204	69
50% of Prime power	208	48

2206A-E13TAG5 - 1500 rev/min

Load	g/kWhr	l/hr
Standby	203	83
110% Prime power	206	82
100% Prime power	207	75
75% of Prime power	211	57
50% of Prime power	219	40

2206A-E13TAG6 - 1500 rev/min

Load	g/kWhr	l/hr
Standby	203	83
110% Prime power	206	82
100% Prime power	207	75
75% of Prime power	211	57
50% of Prime power	219	40

Note: All fuel consumption figures are based on Nett power

Induction system

Maximum air intake restriction

-clean filter. 2,5 kPa
-dirty filter 6,4 kPa
-air filter type paper element - 15 inch diameter

Exhaust system

Maximum back pressure

-1500 rev/min ... 10,0 kPa
-1800 rev/min ... 10,0 kPa
Exhaust outlet, internal diameter... 123 mm

Lubrication system

Maximum total system oil capacity. 40 litres
Minimum oil capacity in sump ... 32,5 litres
Maximum oil capacity in sump ... 38 litres
Maximum engine operating angles -
front up, front down, right side, left side 7 °

Lubricating oil

-oil flow @ 1500 rev/min. 140 litres/min
-oil flow @ 1800 rev/min. 172 litres/min
-oil pressure at bearings @ 1500 rev/min 310 kPa
-oil pressure at bearings @ 1800 rev/min 358 kPa
-oil pressure at bearings (min) ... 270 kPa
-oil temperature (continuous operation) 113 °C
-oil consumption at full load as a % of fuel consumption ... 0.1%
Oil filter screen spacing.. ... 30 microns
Oil consumption as % of fuel consumption ... 0,1
Sump drain plug tapping ... 1 1/8 UNF
Lubricating oil specification ... API-CH4 - SAE15W-40

Recommended SAE viscosity

Engine Oil Viscosity		
EMA LRG-1 API CH-4 Viscosity Grade	Ambient Temperature	
	Minimum	Maximum
SAE 0W20	-40 °C	10 °C
SAE 0W30	-40 °C	30 °C
SAE 0W40	-40 °C	40 °C
SAE 5W30	-30 °C	30 °C
SAE 5W40	-30 °C	40 °C
SAE 10W30	-20 °C	40 °C
SAE 15W40	-10 °C	50 °C

Mountings

Maximum static bending moment at rear face of block... 1356 Nm

2200 Series

2206A-E13TAG5
2206A-E13TAG6

Load acceptance

TAG5 (cold)

Initial load application: When engine reaches rated speed (15 seconds maximum after engine starts to crank)			
Descriptor	Units	60Hz	50Hz
% of prime power	%	68	60
168	kWe	217,6	168
Transient frequency deviation	%	<10	<10
Frequency recovery	Seconds	5	5

Second load application: When engine reaches rated speed (5 seconds after initial load application)			
Descriptor	Units	60Hz	50Hz
% of prime power	%	85	65
Load (nett)	kWe	272	208
Transient frequency deviation	%	<10	<10
Frequency recovery	Seconds	5	5

TAG6 (cold)

Initial load application: When engine reaches rated speed (15 seconds maximum after engine starts to crank)			
Descriptor	Units	60Hz	50Hz
% of prime power	%	65	60
Load (nett)	kWe	227,5	168
Transient frequency deviation	%	<10	<10
Frequency recovery	Seconds	5	5

Second load application: When engine reaches rated speed (5 seconds after initial load application)			
Descriptor	Units	60Hz	50Hz
% of prime power	%	85	65
Load (nett)	kWe	272	208
Transient frequency deviation	%	<10	<10
Frequency recovery	Seconds	5	5

The information shown above complies with the requirements of classification 3 and 4 of ISO 8528-12 and G2 operating limits stated in ISO 8528-5

The above figures were obtained under the following test conditions:

- minimum engine block temperature... 45 °C
- ambient temperature... 15 °C
- governing mode ... isochronous
- alternator efficiency... 92%
- alternator inertia ... 6,9 kgm²
- 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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