

Technical Data

2500 Series

2506D-E15TAG1

Diesel Engine - ElectropaK

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 |
| Compression ratio | 16:1 |
| Bore | 137 mm |
| Stroke | 171 mm |
| Cubic capacity | 15,2 litres |
| Direction of rotation | anti-clockwise viewed on flywheel |
| Firing order (cylinder 1 furthest from flywheel) | 1, 5, 3, 6, 2, 4 |

Total weight of ElectropaK

| | |
|--------------------|---------|
| -dry (engine only) | 1633 kg |
| -wet | 1714 kg |

Overall dimensions of ElectropaK

| | |
|---------|---------|
| -height | 1718 mm |
| -length | 2657 mm |
| -width | 1120 mm |

Moments of inertia (mk²)

| | |
|----------|--------------------------|
| Engine | 2,3291 kgm ² |
| Flywheel | 1,96355 kgm ² |

Performance

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

Cyclic irregularity

| | |
|----------------------------|------|
| Engine / Flywheel maximum: | 1:60 |
|----------------------------|------|

Ratings

Steady state stability at constant speed $\pm 0.25\%$
 Electrical ratings are based on average alternator efficiency and are for guidance only (0.8 power factor being used)

Operating point

| | |
|--|--------------|
| Engine speed | 1800 rev/min |
| Cooling water maximum exit temperature | < 107 °C |

Fuel data

To conform to BS2869 class A2 or BS EN590

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) | 6,0 kPa |
| -maximum fuel temperature (inlet pump) | 40 °C |

Note: 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. For test conditions relevant to data on load acceptance, refer to the bottom of page 12.

Sound level

| | |
|-------------------------------------|-------------|
| Estimated sound pressure at 1 metre | 105,2 dB(A) |
|-------------------------------------|-------------|

General installation

| Designation | Units | Type of operation and application | |
|--|---------------------|-----------------------------------|---------|
| | | Prime | Standby |
| | | 60 Hz @ 1800 rev/min | |
| Gross engine power | kWb | 458 | 514 |
| Fan power | kWm | 15.5 | |
| Restriction losses | kWm | 8 | 8,9 |
| ElectroPaK nett engine power | kWm | 435 | 490 |
| Gross brake mean effective pressure | kPa | 2036 | 2284 |
| Combustion air flow | m ³ /min | 39.3 | 41,5 |
| Exhaust gas temperature (max) | °C | N/A | 550 |
| Exhaust gas flow | m ³ /min | 104,5 | 112 |
| Boost pressure ratio | - | 3,26 | 3,43 |
| Overall thermal efficiency (nett) | % | 37,4 | 38,1 |
| Friction and pumping power losses | kWm | 51 | |
| Mean piston speed | m/s | 10 | |
| Engine coolant flow | l/sec | 7,2 | |
| Cooling fan air flow (zero duct allowance) | m ³ /min | 866 | |
| Typical Gen Set electrical output (0.8 pf) | kWe | 400 | 450 |
| | kVA | 500 | 563 |
| Assumed alternator efficiency | % | 92 | |

Rating definitions

Prime power

Variable load. Unlimited hours usage with an average load factor of 80% of the published Prime Power rating over each 24 hour period. A 10% overload is available for 1 hour in every 12 hours 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

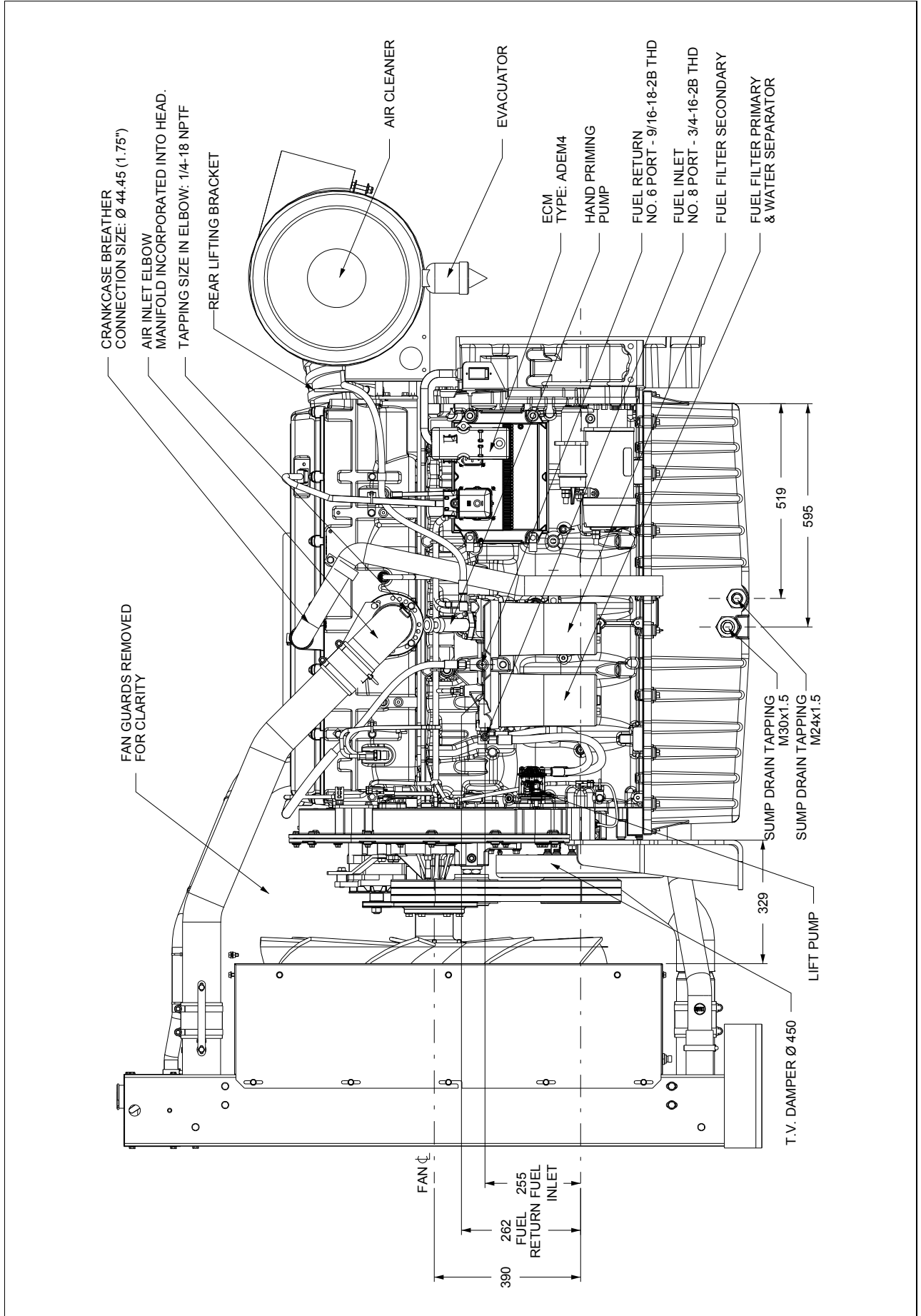
Emissions capability

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).

Energy balance

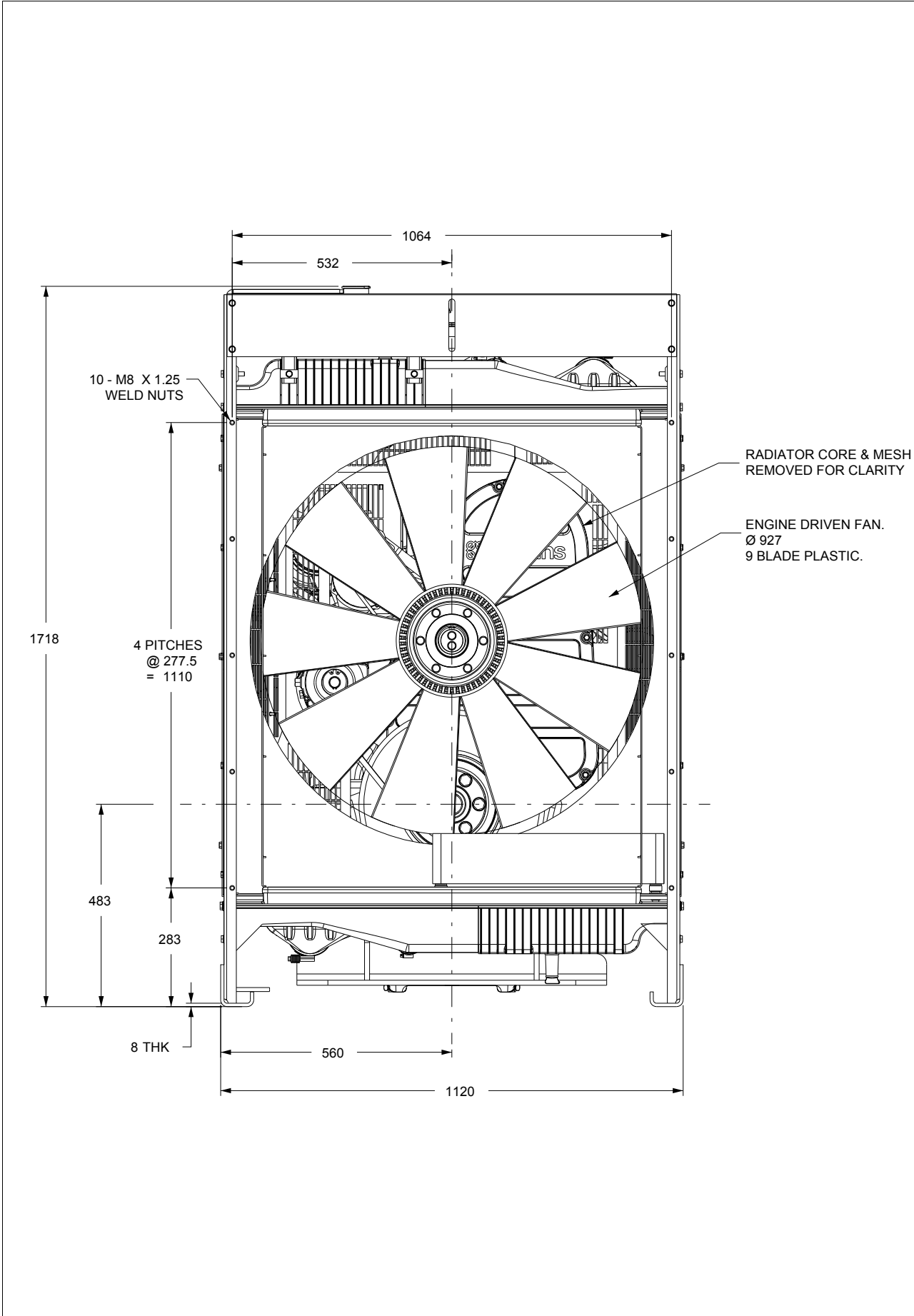
| Designation | Units | Type of operation and application | |
|--|-------|-----------------------------------|---------|
| | | Prime | Standby |
| | | 60 Hz @ 1800 rev/min | |
| Energy in fuel | kWt | 1200 | 1320 |
| Energy in power output (gross) | kWb | 458 | 514 |
| Energy to cooling fan and restrictions | kWm | 23,5 | 24,4 |
| Energy in power output (nett) | kWm | 435 | 490 |
| Energy to exhaust | kWt | 420 | 465 |
| Energy to coolant and oil | kWt | 170 | 178 |
| Energy to radiation | kWt | 38 | 35 |
| Energy to charge cooler | kWt | 114 | 128 |

2506D-E15TAG1 - left side view



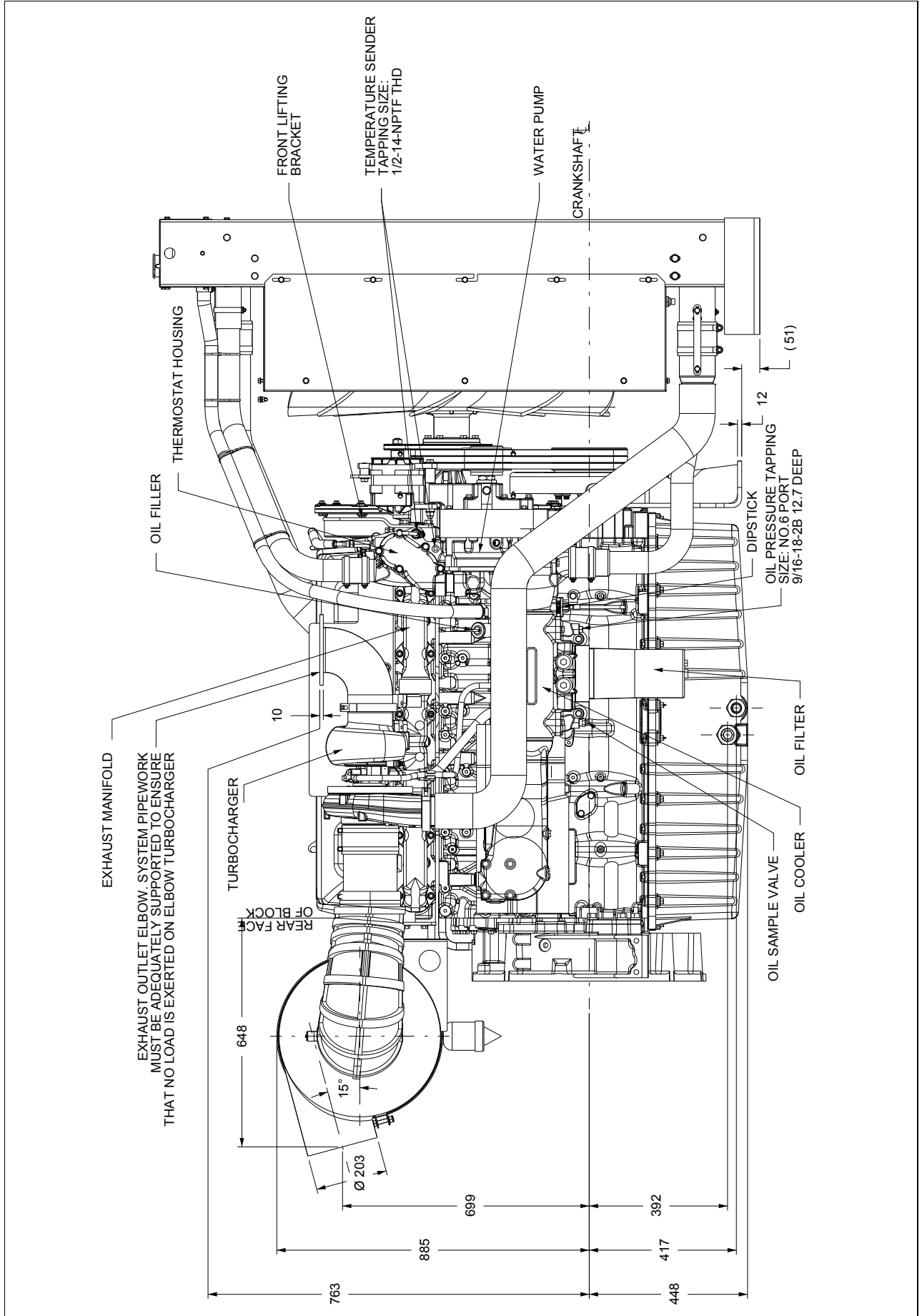
Note: This drawing is for reference only. For installation purposes, please refer to the relevant General Installation drawing (Z13579).

2506D-E15TAG1 - front view



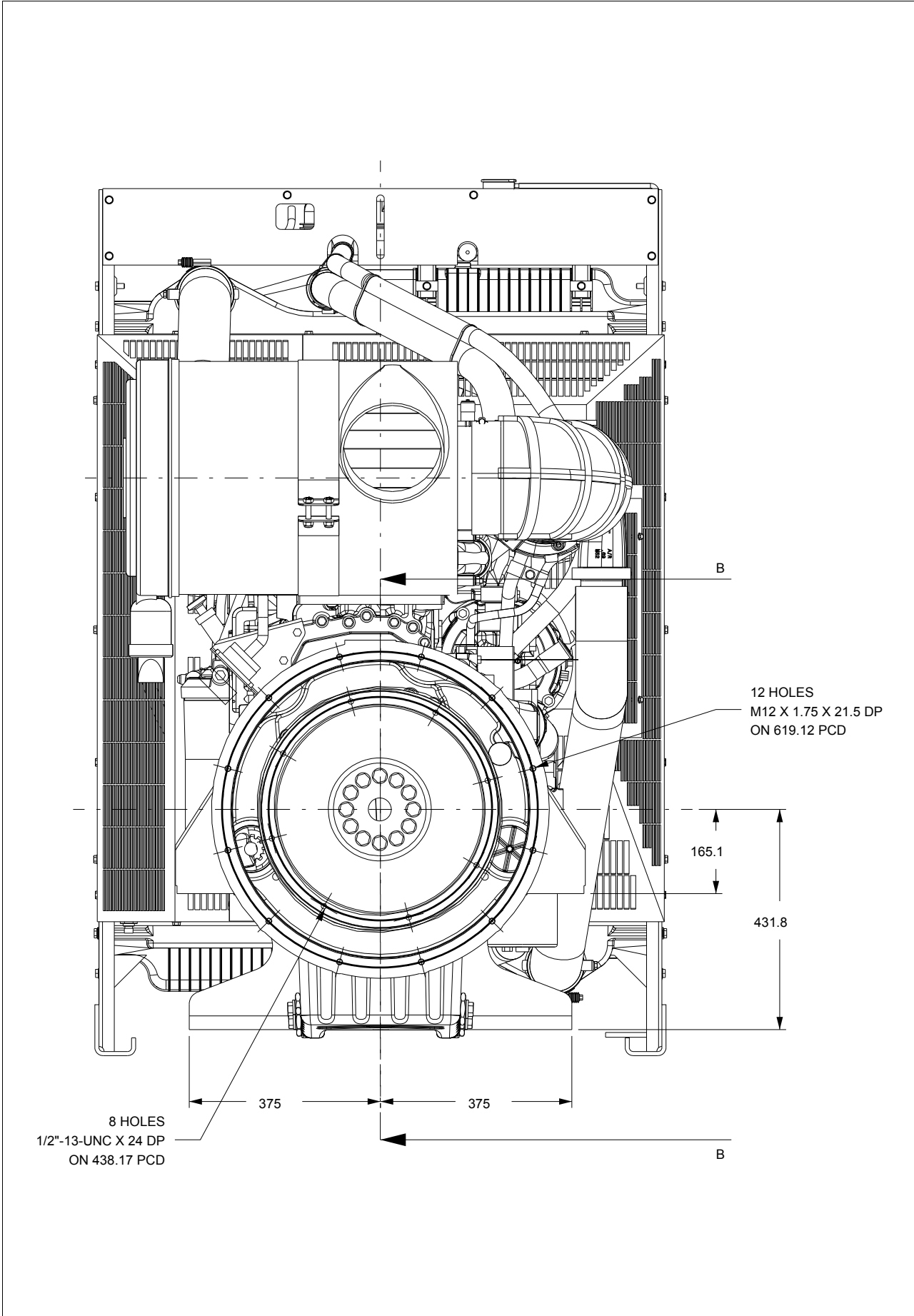
Note: This drawing is for reference only. For installation purposes, please refer to the relevant General Installation drawing (Z13579).

2506D-E15TAG1 - right side view



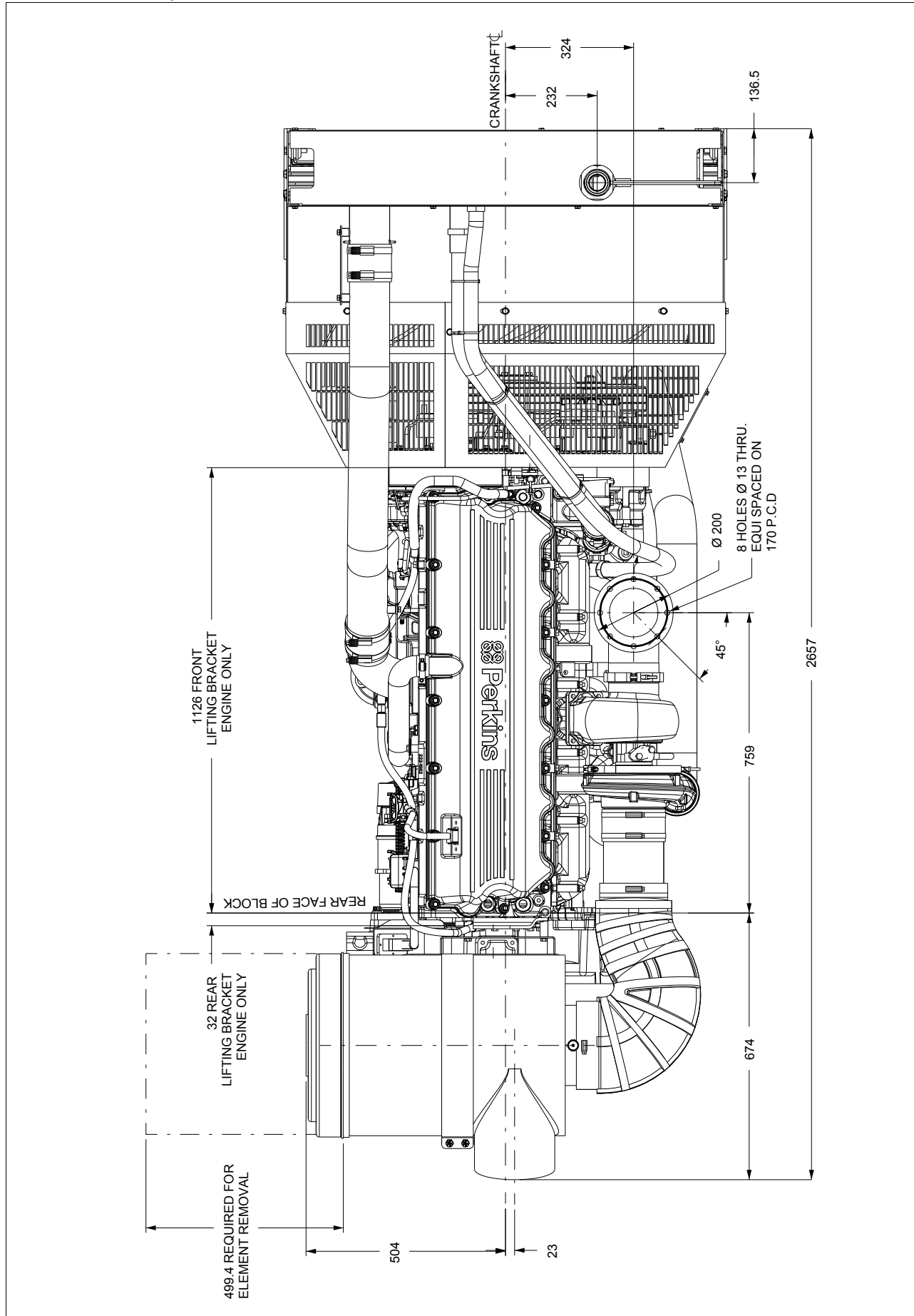
Note: This drawing is for reference only. For installation purposes, please refer to the relevant General Installation drawing (Z13579).

2506D-E15TAG1 - rear view



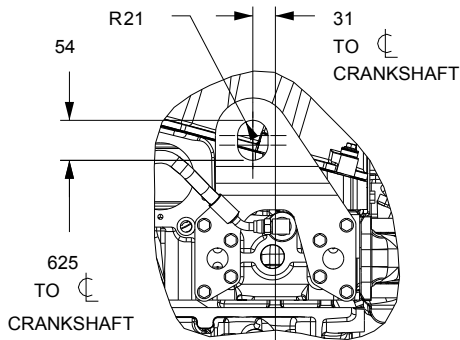
Note: This drawing is for reference only. For installation purposes, please refer to the relevant General Installation drawing (Z13579).

2506D-E15TAG1 - plan view

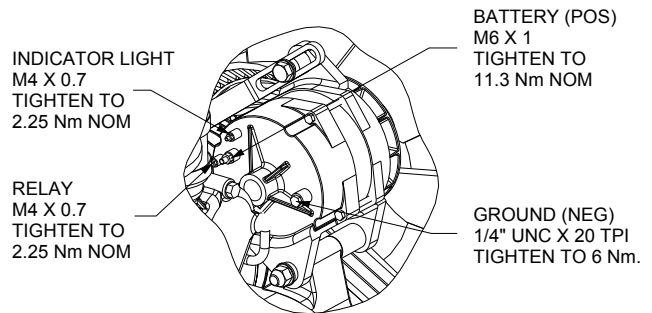


Note: This drawing is for reference only. For installation purposes, please refer to the relevant General Installation drawing (Z13579).

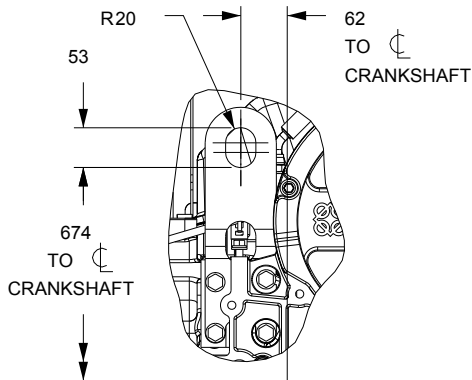
2506D-E15TAG1 - miscellaneous views



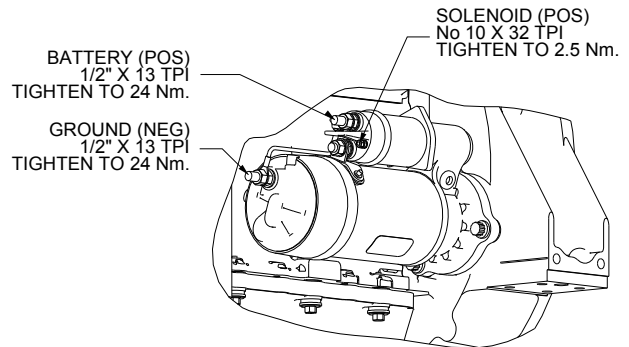
**SCRAP VIEW SHOWING
DETAILS OF REAR LIFTING
EYE**



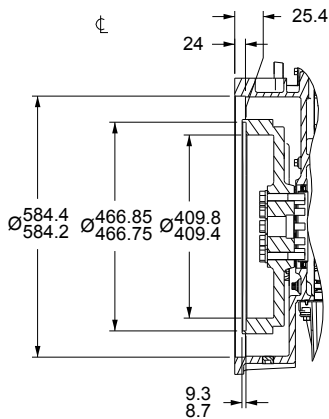
**SCRAP VIEW SHOWING ALTERNATOR CONNECTIONS.
FAN GUARDS & THERMOSTAT REMOVED FOR CLARITY.
SCALE 1:3**



**SCRAP VIEW SHOWING
DETAILS OF FRONT LIFTING
EYE**



**SCRAP VIEW SHOWING
STARTER MOTOR CONNECTIONS
SCALE 1:3**



**SECTION B-B
DETAILS OF SAE 1 / 2 FLYWHEEL HOUSING
AND SAE J620 SIZE 14 FLYWHEEL**

Note: This drawing is for reference only. For installation purposes, please refer to the relevant General Installation drawing (Z13579).

Cooling system

Recommended coolant:

50% inhibited ethylene glycol or 50% inhibited propylene glycol and 50% clean fresh water. Where there is no likelihood of ambient temperatures below 10 °C, clean 'soft' water may be used, treated with 1% by volume of Perkins inhibitor in the cooling system. The inhibitor is available from all Perkins Distributors.

Total system coolant capacity ... 58,0 litres
 Maximum pressure:
 -in crankcase water jacket ... 276 kPa
 Maximum top tank temperature ... 107 °C
 Maximum static pressure on pump ... 170 kPa
 Maximum permissible restriction:
 -to coolant pump flow ... 30 kPa
 Temperature rise across engine with inhibited coolant
 -standby power ... 10 °C
 -prime power ... 9 °C
 Thermostat operation range ... 88 to 98 °C

Radiator

-face area ... 1.238 m²
 -weight (dry) ... 132 kg
 -rows and materials ... 2 rows, Aluminium
 -matrix density and material ... 12 fins per inch, Aluminium
 -width of matrix ... 1048 mm
 -height of matrix ... 1100 mm
 -pressure cap setting (minimum) ... 69 kPa

Charge cooler with integral radiator

-face area ... 1.006 m²
 -number of rows and material ... 1 row, Aluminium
 -matrix density and material ... 12,5 fins per inch, Aluminium
 -width of matrix ... 915 mm
 -height of matrix ... 1100 mm

Coolant pump

Speed: ... 1946 rev/min
 Method of drive ... gear

Fan

-diameter ... 927 mm
 -drive ratio ... 0.92:1
 -number of blades ... 9
 -material ... B3WG6 or PA6GF30 Nylon 6 glass filled 30%
 -type ... ACS 367500

Cooling clearance

Ambient cooling clearance (standby power) based on air temperature at fan of 6 °C above the ambient

| 2506D-E15TAG1 maximum additional restriction (duct allowance) to cooling airflow and resultant minimum airflow | | | |
|--|---------|---------------------|---------|
| Duct allowance with inhibited coolant at 50 °C | | | |
| Description | rev/min | Units | Standby |
| Duct allowance | 1800 | kPa | 0.125 |
| Minimum airflow | 1800 | m ³ /min | 822 |
| Duct allowance with 50% glycol at 43 °C | | | |
| Duct allowance | 1800 | kPa | 0.200 |
| Minimum airflow | 1800 | m ³ /min | 792 |

Electrical system

Type ... 12V negative earth
 Alternator
 -type ... 22SI
 -voltage ... 24 volts
 -output ... 70 amps
 Starter
 -type ... 42MT
 -motor voltage ... 24 volts
 -motor power ... 7,5 kW
 Number of teeth
 -on the flywheel ... 113
 -on starter pinion ... 11
 Minimum cranking speed ... 100 rev/min
 Pull-in current of starter motor solenoid
 @ -25 °C max ⁽¹⁾ ... 57 amps
 Hold-in current of starter motor solenoid
 @ -25 °C max ⁽¹⁾ ... 16 amps

1. All leads to rated at 10 amps minimum

Cold start recommendations

| Temperature Range | |
|------------------------------|---|
| 5 to -10 °C (41 to 14 °F) | Oil: 15W40 Starter: 42MT Battery: 2x 12V 128 Ah Max breakaway current: 1250 amps Cranking current: 676 amps Aids: None Minimum mean cranking speed: 120 rev/min |

| Temperature Range | |
|-----------------------------------|---|
| -11 to -25 °C (12.2 to -13 °F) | Oil: 0W40 Starter: 42MT Battery: 2x 12V 128 Ah Max breakaway current: 1250 amps Cranking current: 880 amps Aids: block heater 1.5 kW Minimum mean cranking speed: 120 rev/min |

- 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 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 6,8 kPa
Exhaust outlet size (internal) 127 mm

Recommended exhaust pipe diameter

| length | mm |
|------------|-----|
| up to 10m | 150 |
| 10m to 20m | 150 |
| 20m to 30m | 200 |

Fuel system

Type of injection MEUI
Injector type MEUI
Injector pressure 200 MPa

Fuel lift pump

type gear driven
Delivery flow 457 litres/hr
Pressure 550 kPa
Maximum suction head at pump inlet 3 m
Maximum static pressure head 4 m
Fuel inlet temperature to be less than 55 °C
Governor type electronic
Governor to ISO 8528-5 class G3 steady state

Fuel filtration level

-primary 10 µm
-secondary 2 µm

Fuel consumption

| Designation | Fuel consumption calculated on nett rated powers | |
|-----------------|--|-----------|
| | g/kWh | litres/hr |
| | 1800 rev/min | |
| Standby | 222 | 126 |
| Prime + 10% | 222 | 126 |
| Prime | 225 | 113 |
| At 75% of Prime | 245 | 93 |
| At 50% of Prime | 267 | 67 |

Induction system

Maximum air intake restriction

- clean filter 3,7 kPa
- dirty filter 6,2 kPa
- air filter type paper element 457 mm diameter

Lubrication system

The recommended SAE viscosity is a multigrade oil (15W40) which adequately meets the specifications of API CI4

- Total system capacity 62,0 litres
- Maximum sump capacity 53,0 litres
- Minimum sump capacity 45,0 litres

Lubricating oil pressure

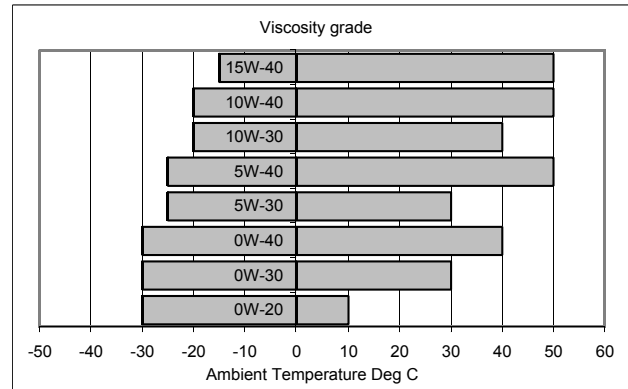
- at rated speed 420 kPa
- Nominal (minimum) 200 kPa
- Oil relief valve opens..... 620 kPa
- Oil filter screen spacing... 30 µm
- Sump drain plug tapping size M24
- Oil pump speed and drive method 1,16 x engine speed, gear
- Oil flow 3,5 litres/sec
- Oil consumption at full load rated speed
(as a percentage of fuel consumption)..... 0,1%
- Oil temperature (in rail)
- maximum continuous operation 114 °C

Normal operating angles

- front and rear 7°
- side tilt..... 7°

Recommended SAE viscosity

A single or multigrade oil must be used which conforms API CI4 or ACEA E5.



Mountings

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

Centre of gravity (bare dry engine)

- forward of rear face of cylinder block 570 mm
- above crankshaft centre line 240 mm

Engine management system

Full electronic engine management system controlling:

- speed governing
- air / fuel ratio
- start / stop sequence
- engine protection and diagnostics

Typical load acceptance

| Model / Engine speed | Initial Load Acceptance When engine reaches rated speed (15 seconds maximum after engine starts to crank) | | | | 2nd Load Application Immediately after engine has recovered to rated speed (5 seconds after initial load application) | | | |
|----------------------|---|---------------------|---------------------------------|---------------------------------|---|---------------------|---------------------------------|---------------------------------|
| | Prime Power % | Load kWm (kWe) Nett | Transient Frequency Deviation % | Frequency recovery time seconds | Prime Power % | Load kWm (kWe) Nett | Transient Frequency Deviation % | Frequency recovery time seconds |
| 1800 rev/min | 65 | 266 | ≤10 | 5 | 60 | 245 | ≤10 | 5 |

The above figures were obtained under test conditions as follows:

- Engine block temperature 45 °C
- Ambient temperature 15 °C
- Governing mode Isochronous
- Alternator inertia. 8 kgm²
- Under frequency roll off (UFRO) point set to 1 Hz below rated frequency
- UFRO rate set to 2 % voltage / 1% frequency
- LAM on / off off

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

The applied load is a percentage of generator electrical output, using alternator efficiencies as published in the general installation section of this Technical Data Sheet.

The information given on this Technical Data Sheet is for standard ratings only. For ratings other than those shown, please contact Perkins Engines Company Limited, Stafford.

The information given in this document is for guidance only.

 **Perkins®**
 Perkins Engines Company Limited
 Peterborough PE1 5NA United Kingdom
 Telephone +44 (0) 1733 583000
 Fax +44 (0) 1733 582240
 www.perkins.com

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