

Technical Data

4000 Series

Diesel Engine - Electropak

4008TAG

4008TAG1

4008TAG2

Basic technical data

Number of cylinders... 8
 Cylinder arrangement... in line
 Cycle... 4 stroke, compression ignition
 Induction system... turbocharged
 Compression ratio... 13-6:1 nominal
 Bore... 160 mm
 Stroke... 190 mm
 Cubic capacity... 30,561 litres
 Direction of rotation... anti-clockwise viewed on flywheel
 Firing order... 1,4,7,6,8,5,2,3
 Cylinders 1 furthest from flywheel

Total weight Electrounit (engine only)

4008TAG (dry)... 3120 kg
 4008TAG1/TAG2 (dry)... 3250 kg
 4008TAG (wet)... 3310 kg
 4008TAG1/TAG2 (wet)... 3428 kg

Overall dimensions

... height 1760 mm
 ... length 2879 mm
 ... width 1571 mm

Moment of inertia

...engine 9,60 kgm²
 ... flywheel 6,02 kgm²

Cyclic irregularity for engine/flywheel (prime power):

4008TAG... 1,314
 4008TAG1... 1,300
 4008TAG2... 1,278

Ratings

Steady state speed stability at constant load... ± 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
 Static injection timing... see engine number plate
 Cooling water exit temperature... <98 °C

Fuel data

To conform to BS2869 class A1, A2.

Performance

Sound pressure level... 110 dB(A)
Note: All data based on operation to ISO 3046/1, BS 5514 and DIN 6271 standard reference conditions.

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 (nominal)... 3,0 kPa
 For load acceptance figures, please contact the Applications Department.

General installation 4008TAG

| Designation | Units | 60 Hz 1800 rev/min | | |
|--------------------------------------------------------|---------------------|---------------------|-------------|---------------|
| | | Continuous baseload | Prime power | Standby power |
| Gross engine power | kWb | 594 | 742 | 814 |
| Fan power | kWm | 30 | | |
| Net engine power | kWm | 564 | 712 | 784 |
| BMEP gross | bar | 12,7 | 16,0 | 17,5 |
| Combustion air flow | m ³ /min | 53 | 62 | 68 |
| Exhaust gas temperature (after turbo) | °C | 498 | | |
| Exhaust gas flow maximum (after turbo) | m ³ /min | 182,7 | | |
| Boost pressure ratio | - | 2,20 | 2,65 | 2,80 |
| Mechanical efficiency | % | 89 | | |
| Overall thermal efficiency | % | 41 | 40 | 40 |
| Friction power and pumping losses | kWm | 96 | | |
| Mean piston speed | m/s | 11,4 | | |
| Engine coolant flow (minimum) | l/s | 10,6 | | |
| Typical Genset electrical output 0,8pf 25 °C (100 kPa) | kVA | 670 | 846 | 931 |
| | kWe | 536 | 676 | 745 |
| Assumed alternator efficiency | % | 95 | | |

General installation 4008TAG1

| Designation | Units | 60 Hz 1800 rev/min | | |
|--------------------------------------------------------|--------|---------------------|-------------|---------------|
| | | Continuous baseload | Prime power | Standby power |
| Gross engine power | kWb | 640 | 800 | 877 |
| Fan power | kWm | 56 | | |
| Net engine power | kWm | 584 | 744 | 821 |
| BMEP gross | bar | 13,7 | 17,2 | 18,9 |
| Combustion air flow | m³/min | 55 | 66 | 70 |
| Exhaust gas temperature (after turbo) | °C | 460 | | |
| Exhaust gas flow maximum (after turbo) | m³/min | 172,9 | | |
| Boost pressure ratio | - | 2,5 | 2,9 | 3,1 |
| Mechanical efficiency | % | 87 | 89 | 90 |
| Overall thermal efficiency | % | 41 | 40 | 40 |
| Friction power and pumping losses | kWm | 96 | | |
| Mean piston speed | m/s | 11,4 | | |
| Engine coolant flow (minimum) | l/s | 12 | | |
| Typical Genset electrical output 0,8pf 25 °C (100 kPa) | kVA | 694 | 884 | 975 |
| | kWe | 555 | 707 | 780 |
| Assumed alternator efficiency | % | 95 | | |

General installation 4008TAG2

| Designation | Units | 60 Hz 1800 rev/min | | |
|--------------------------------------------------------|--------|---------------------|-------------|---------------|
| | | Continuous baseload | Prime power | Standby power |
| Gross engine power | kWb | 715 | 894 | 980 |
| Fan power | kWm | 56 | | |
| Net engine power | kWm | 659 | 838 | 924 |
| BMEP gross | bar | 15,3 | 19,2 | 21,1 |
| Combustion air flow | m³/min | 59 | 72 | 75 |
| Exhaust gas temperature (after turbo) | °C | 505 | | |
| Exhaust gas flow maximum (after turbo) | m³/min | 202 | | |
| Boost pressure ratio | - | 2,80 | 3,15 | 3,40 |
| Mechanical efficiency | % | 88 | 90 | 91 |
| Overall thermal efficiency | % | 41 | 40 | 39 |
| Friction power and pumping losses | kWm | 96 | | |
| Mean piston speed | m/s | 11,4 | | |
| Engine coolant flow (minimum) | l/s | 12 | | |
| Typical Genset electrical output 0,8pf 25 °C (100 kPa) | kVA | 783 | 995 | 1097 |
| | kWe | 626 | 796 | 878 |
| Assumed alternator efficiency | % | 95 | | |

Note: Not to be used for CHP design purposes. (Indicative figures only.) Consult Perkins Engines Company Limited. Assumes complete combustion.

Continuous Baseload rating: Power available for continuous full load operation.

Prime Power rating: is available for unlimited hours per year with a variable load of which the average engine load factor is 80% of the published power rating, incorporation of a 10% overload for 1 hour in every 12 hours of operation which is permitted.

Standby Power rating: is for the supply of emergency power at variable load for the duration of the non-availability of the mains power supply. **NO OVERLOAD** capacity is available at this rating. Engines must not be allowed to have facilities for parallel operation with the mains supply. This rating should be applied only when reliable mains power is available. Should this not be the case then refer to Prime Power rating. A Standby rated engine should be sized for an average load factor of 80% based on published standby rating for 500 operating hours per year. Standby ratings should never be applied except in true emergency power failure conditions.

Energy balance

Notes:

- Not to be used for CHP design purposes. (Indicative figures only). Consult Perkins Engines Company Limited. Assumes complete combustion.

4008TAG

| Designation | Units | Continuous baseload | Prime power | Standby power |
|--------------------------------|-------|---------------------|-------------|---------------|
| Energy in fuel | kWt | 1439 | 1858 | 2053 |
| Energy in power output (gross) | kWb | 594 | 742 | 814 |
| Energy to cooling fan | kWm | 30 | | |
| Energy in power output (net) | kWm | 564 | 712 | 784 |
| Energy to exhaust | kWt | 455 | 619 | 678 |
| Energy to coolant and oil | kWt | 235 | 277 | 307 |
| Energy to radiation | kWt | 40 | 60 | 76 |
| Energy to charge coolers | kWt | 115 | 160 | 178 |

4008TAG1

| Designation | Units | Continuous baseload | Prime power | Standby power |
|--------------------------------|-------|---------------------|-------------|---------------|
| Energy in fuel | kWt | 1557 | 1994 | 2202 |
| Energy in power output (gross) | kWb | 640 | 800 | 877 |
| Energy to cooling fan | kWm | 56 | | |
| Energy in power output (net) | kWm | 584 | 744 | 821 |
| Energy to exhaust | kWt | 474 | 620 | 702 |
| Energy to coolant and oil | kWt | 247 | 308 | 317 |
| Energy to radiation | kWt | 58 | 81 | 101 |
| Energy to charge coolers | kWt | 138 | 185 | 205 |

4008TAG2

| Designation | Units | Continuous baseload | Prime power | Standby power |
|--------------------------------|-------|---------------------|-------------|---------------|
| Energy in fuel | kWt | 1738 | 2250 | 2516 |
| Energy in power output (gross) | kWb | 715 | 894 | 980 |
| Energy to cooling fan | kWm | 56 | | |
| Energy in power output (net) | kWm | 659 | 838 | 924 |
| Energy to exhaust | kWt | 550 | 725 | 811 |
| Energy to coolant and oil | kWt | 255 | 336 | 366 |
| Energy to radiation | kWt | 59 | 85 | 100 |
| Energy to charge coolers | kWt | 160 | 210 | 259 |

Cooling system

Recommended coolant: 50% inhibited ethylene glycol or 50% inhibited propylene glycol and 50% clean fresh water. For combined heat and power systems and where there is no likelihood of ambient temperature below 10 °C then clean 'soft' water may be used, treated with 1% by volume of Perkins inhibitor in the cooling system. The inhibitor is available in 1 litre bottles.
Nominal jacket water pressure in crankcase. 1,7 bar

The following is a guide based on ambient air conditions of 52 °C on a Perkins supplied radiator

Total coolant capacity:

Electronit (engine only) 48 litres
Electropak (engine/radiator)..... 162 litres
Pressure cap setting 0,69 bar
Fan incorporated in radiator
Diameter 4008TAG 1016 mm (pusher)
Diameter 4008TAG1/TAG2 1219 mm (pusher)
Ambient cooling clearance (open **Electropak** prime power) based on air temperature at fan 3 °C above ambient.

4008TAG

| Maximum additional restriction (duct allowance) to cooling airflow (prime power applications) and resultant minimum airflow | | |
|-----------------------------------------------------------------------------------------------------------------------------|------------------------------------|---------------------------------|
| Ambient clearance 50% glycol | Duct allowance mm H ₂ O | Min airflow m ³ /min |
| 52 °C | 15 | 989 |

4008TAG1

| Maximum additional restriction (duct allowance) to cooling airflow (prime power applications) and resultant minimum airflow | | |
|-----------------------------------------------------------------------------------------------------------------------------|------------------------------------|---------------------------------|
| Ambient clearance 50% glycol | Duct allowance mm H ₂ O | Min airflow m ³ /min |
| 52 °C | 30 | 1188 |

4008TAG2

| Maximum additional restriction (duct allowance) to cooling airflow (prime power applications) and resultant minimum airflow | | |
|-----------------------------------------------------------------------------------------------------------------------------|------------------------------------|---------------------------------|
| Ambient clearance 50% glycol | Duct allowance mm H ₂ O | Min airflow m ³ /min |
| 52 °C | 13 | 1290 |

Coolant pump speed and method of drive 1,4 x e rev/min gear driven
Maximum static pressure head on pump above engine crank centre line 7 m
Maximum external permissible restriction to coolant pump flow 20 kPa
Thermostat operating range.. 71-85 °C
Shutdown switch setting 101 °C rising
Coolant immersion heater capacity.... 4 kW x 1

| Jacket cooling water data | Units |
|----------------------------------|----------|
| Coolant flow 4008TAG | 10.6 l/s |
| Coolant flow 4008TAG1 & 4008TAG2 | 12 l/s |
| Coolant exit temperature max. | 93 °C |
| Coolant entry temperature min. | 70 °C |
| Coolant entry temperature max. | 86 °C |

Lubrication system

Recommended lubricating oil to conform with the specification of APICD or MIL - L - 2104C

Lubricating oil capacity:

- sump maximum 153 litres
- sump minimum. 127 litres
Lubricating oil temperature maximum to bearings 105 °C

Lubricating oil pressure:

- at 80 °C temperature to bearing gallery (minimum) 0,34 MPa

4008TAG, TAG1 & TAG2

| Oil consumption Prime power | Units | 1800 rev/min |
|-----------------------------|--------|--------------|
| After running-in* | g/kWhr | 0,53 |
| Oil flow rate from pump | l/s | 4,40 |

*Typical after 250 hours

Sump drain plug tapping size G1
Oil pump speed and method of drive . 1,4 x e rev/min, gear driven
Oil pump flow..... 4,4 litres/sec
Shutdown switch setting. 1,93 bar falling

Normal operating angles

Front and rear. 5°
Side tilt 10°

Fuel system

Recommended fuel ...to conform to BS2869 1998 Class A1, A2
 Type of injection system ... direct injection
 Fuel injection pump ... combined unit injector
 Fuel injector ... combined unit injector
 Fuel injector opening pressure... 234 bar
 Fuel lift pump ... Tuthill TCH 1-054
 Delivery/hour... 810 litres
 Heat retained in fuel to tank 4008TAG... 4,0 kW
 Heat retained in fuel to tank 4008TAG1/2... 4,5 kW
 Temperature of fuel at lift pump to be less than... 58 °C
 Fuel lift pump pressure ... 3,0 bar
 Fuel lift pump maximum suction head ... 2,5 m
 Fuel lift pump maximum pressure head (see Installation Manual)
 Fuel filter spacing... 10 microns
 Governor type ... electronic
 Torque at the governor output shaft... 0,917 kgm
 Static injection timing ... see engine number plate
 Tolerance on fuel consumption... +5%

4008TAG

| Fuel consumption (gross) | | |
|------------------------------------|-------|-----------|
| Designation | g/kWh | Litres/hr |
| At standby max power rating | 213 | 204 |
| At prime power rating | 212 | 185 |
| At continuous baseload rating | 205 | 143 |
| At 75% of prime power rating | 203 | 133 |
| At 50% of prime power rating | 210 | 92 |
| At 25% of prime power rating | 220 | 48 |

4008TAG1

| Fuel consumption (gross) | | |
|------------------------------------|-------|-----------|
| Designation | g/kWh | Litres/hr |
| At standby max power rating | 212 | 219 |
| At prime power rating | 211 | 199 |
| At continuous baseload rating | 206 | 155 |
| At 75% of prime power rating | 208 | 147 |
| At 50% of prime power rating | 210 | 99 |
| At 25% of prime power rating | 207 | 49 |

4008TAG2

| Fuel consumption (gross) | | |
|------------------------------------|-------|-----------|
| Designation | g/kWh | Litres/hr |
| At standby max power rating | 216 | 249 |
| At prime power rating | 213 | 224 |
| At continuous baseload rating | 206 | 173 |
| At 75% of prime power rating | 206 | 162 |
| At 50% of prime power rating | 205 | 108 |
| At 25% of prime power rating | 210 | 55 |

Induction system

Emissions data with combustion air temperature of 25 °C at continuous base load.

Maximum air intake restriction of engine:

- clean filter ... 127 mm H₂O
 - dirty filter ... 380 mm H₂O
 - air filter type ... 5001-00-00 MF&T

Exhaust system

Maximum back pressure for total system.

| Designation | Units | 1800 rev/min |
|--------------|--------------------|--------------|
| 4008TAG/TAG1 | mmH ₂ O | 1091 |
| 4008TAG2 | mmH ₂ O | 683 |

Exhaust outlet flange size ... 2 x 152 mm (table 'D')
 For recommended pipe sizes, refer to the Installation Manual.

Electrical system

Type ... insulated return
 Alternator ... 24 volts with integral regulator
 Alternator output... 40 amps
 ... at a stabilised output 28 volts, at 20 °C ambient
 Starter motor ... 24 volts
 Starter motor power... 8,2 kW
 Number of teeth on flywheel ... 190
 Number of teeth on starter motoer ... 12
 Minimum cranking speed ... 120 rev/min
 Pull-in current of starter motor solenoid ... 30 amps at 24 volts
 Hold-in current of starter motor solenoid ... 9 amps at 24 volts
 Engine stop solenoid ... 24 volts
 Pull-in current of stop solenoid ... 60 amps at 24 volts
 Hold-in current of stop solenoid... 1,1 amps at 24 volts

Engine mounting

Position of centre of gravity (wet engine) forward
 from rear face of crankcase ... 900 mm
 Engine vertical centre line above crankshaft centre line ... 140 mm
 Maximum additional load applied to flywheel
 due to all rotating components ... 650 Kg

Starting requirements

| Temperature range | |
|-------------------------------|-----------------------------------------|
| Range Down to 0 °C (32 °F) | Oil: SAE 30 |
| | Starter: 1 x 24V |
| | Battery: 2 x 12 volts x Ah 178 |
| | Max breakaway current: 1400 amps |
| | Cranking current: 750 amps |
| | Aids: Not necessary |
| | Starter cable size: 70 mm |
| Maximum length: 6 m | |

Notes:

- Battery capacity is defined by the 20 hour rate at 0 °C.
- The oil specification should be for the minimum ambient temperature as the oil will not be warmed by the immersion heater.
- Breakaway current is dependant on battery capacity available. Cables should be capable of handling transient current which may be up to double the steady cranking current.

Noise levels

The figures for total noise levels are typical for an engine running at Prime Power Rating in a semi-reverberant environment and measured at a distance of one metre from the periphery of the engine.

Octave analysis

The following histograms show an octave band analysis at the position of the maximum noise level.

Total noise level

Sound pressure level re: 20×10^{-6} pa

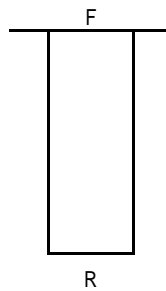
Ambient noise level 77 dBA 4008TAG.

Ambient noise level 79 dBA 4008TAG1/TAG2.

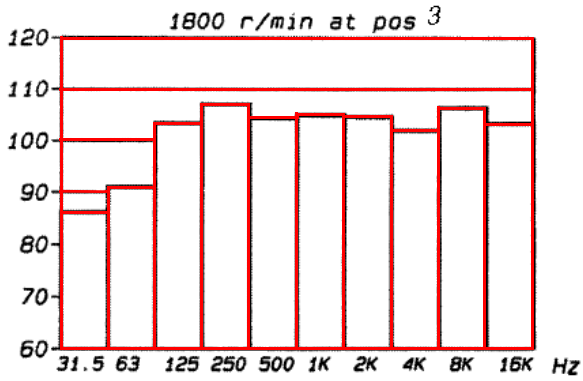
Octave analysis carried out at the position of maximum noise.

4008TAG, 4008TAG1, 4008TAG2

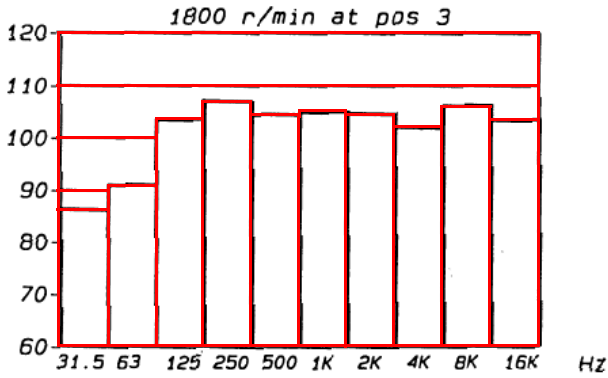
| | | | |
|------------------------|------------------------|------------------------|----------|
| | POSITION 1 | | |
| | 1800 rev/min 108 - dBA | 4008TAG | |
| | 1800 rev/min 104 - dBA | 4008TAG1 | |
| | 1800 rev/min 105 - dBA | 4008TAG2 | |
| POSITION 7 | | POSITION 2 | |
| 1800 rev/min 109 - dBA | 4008TAG | 1800 rev/min 109 - dBA | 4008TAG |
| 1800 rev/min 106 - dBA | 4008TAG1 | 1800 rev/min 107 - dBA | 4008TAG1 |
| 1800 rev/min 107 - dBA | 4008TAG2 | 1800 rev/min 108 - dBA | 4008TAG2 |
| POSITION 6 | | POSITION 3 | |
| 1800 rev/min 111 - dBA | 4008TAG | 1800 rev/min 111 - dBA | 4008TAG |
| 1800 rev/min 109 - dBA | 4008TAG1 | 1800 rev/min 111 - dBA | 4008TAG1 |
| 1800 rev/min 110 - dBA | 4008TAG2 | 1800 rev/min 111 - dBA | 4008TAG2 |
| POSITION 5 | | POSITION 4 | |
| 1800 rev/min 111 - dBA | 4008TAG | 1800 rev/min 110 - dBA | 4008TAG |
| 1800 rev/min 108 - dBA | 4008TAG1 | 1800 rev/min 108 - dBA | 4008TAG1 |
| 1800 rev/min 109 - dBA | 4008TAG2 | 1800 rev/min 109 - dBA | 4008TAG2 |



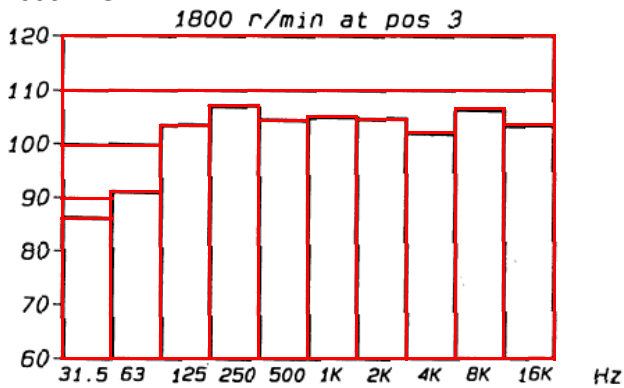
4008TAG



4008TAG1



4008TAG2



The information given on Technical Data Sheets are for standard ratings only. For ratings other than shown, please contact Perkins Engines Company Limited.

@ Perkins®

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

All information in the document is substantially correct at the time of printing but may be subsequently altered by the company.

Distributed by