

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... $\pm 0.25\%$
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
Static injection timing... see engine number plate
Cooling water exit temperature... $<98^{\circ}\text{C}$

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)	$^{\circ}\text{C}$	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 $^{\circ}\text{C}$ (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:

Electrounit (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

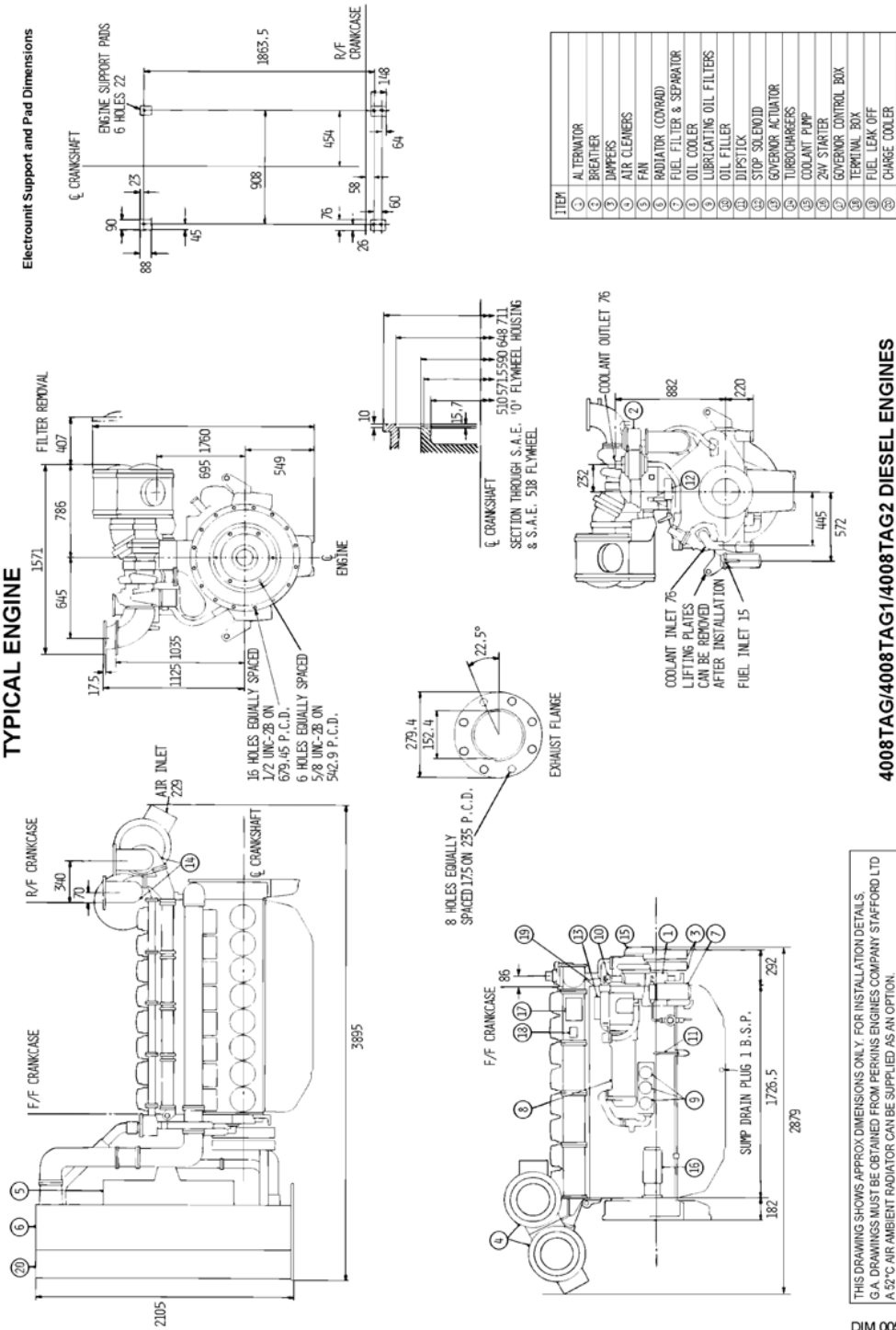
Temperature range	
Range Down to 0 °C (32 °F)	Oil: SAE 30 Starter: 1 x 24V Battery: 2 x 12 volts x Ah 178 Max breakaway current: 1400 amps Cranking current: 750 amps Aids: Not necessary Starter cable size: 70 mm Maximum length: 6 m

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.

4008TAG1 and 4008TAG2

TYPICAL ENGINE



4008TAG/4008TAG1/4008TAG2 DIESEL ENGINES

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.

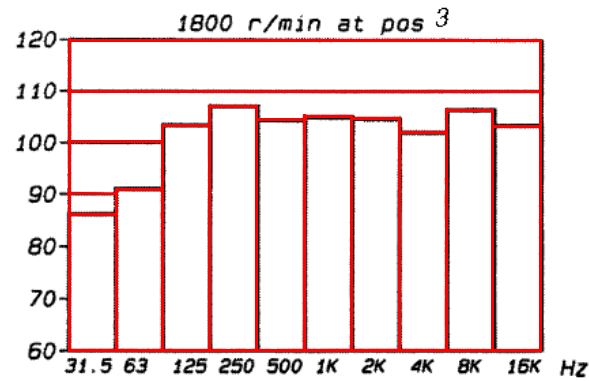
4008TAG, 4008TAG1, 4008TAG2

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

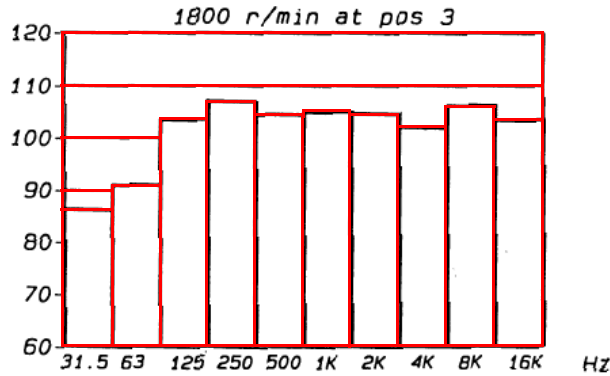
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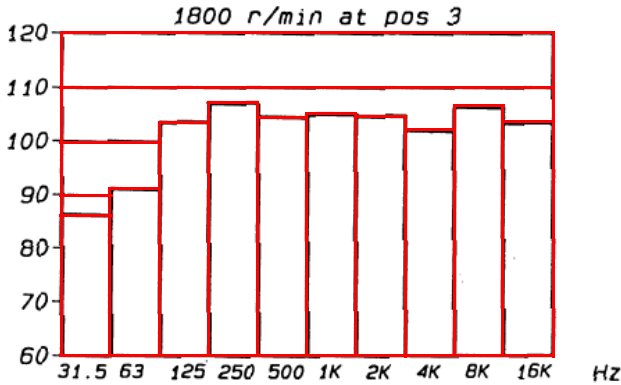
4008TAG



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.

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