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# Technical Data 4008TAG 4008TAG1 4008TAG2

## 4000 Series

### Diesel Engine - Electropak

#### 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 kgm<sup>2</sup>  
 ... flywheel 6,02 kgm<sup>2</sup>

#### 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 <sup>3</sup> /min	53	62	68
Exhaust gas temperature (after turbo)	°C	498		
Exhaust gas flow maximum (after turbo)	m <sup>3</sup> /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	m <sup>3</sup> /min	55	66	70
Exhaust gas temperature (after turbo)	°C	460		
Exhaust gas flow maximum (after turbo)	m <sup>3</sup> /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	m <sup>3</sup> /min	59	72	75
Exhaust gas temperature (after turbo)	°C	505		
Exhaust gas flow maximum (after turbo)	m <sup>3</sup> /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 <sub>2</sub> O	Min airflow m <sup>3</sup> /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 <sub>2</sub> O	Min airflow m <sup>3</sup> /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 <sub>2</sub> O	Min airflow m <sup>3</sup> /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 <b>max</b> 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 <b>max</b> 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 <b>max</b> 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 H<sub>2</sub>O  
 - dirty filter ... 380 mm H<sub>2</sub>O  
 - air filter type ... 5001-00-00 MF&T

## Exhaust system

Maximum back pressure for total system.

Designation	Units	1800 rev/min
4008TAG/TAG1	mmH <sub>2</sub> O	1091
4008TAG2	mmH <sub>2</sub> 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

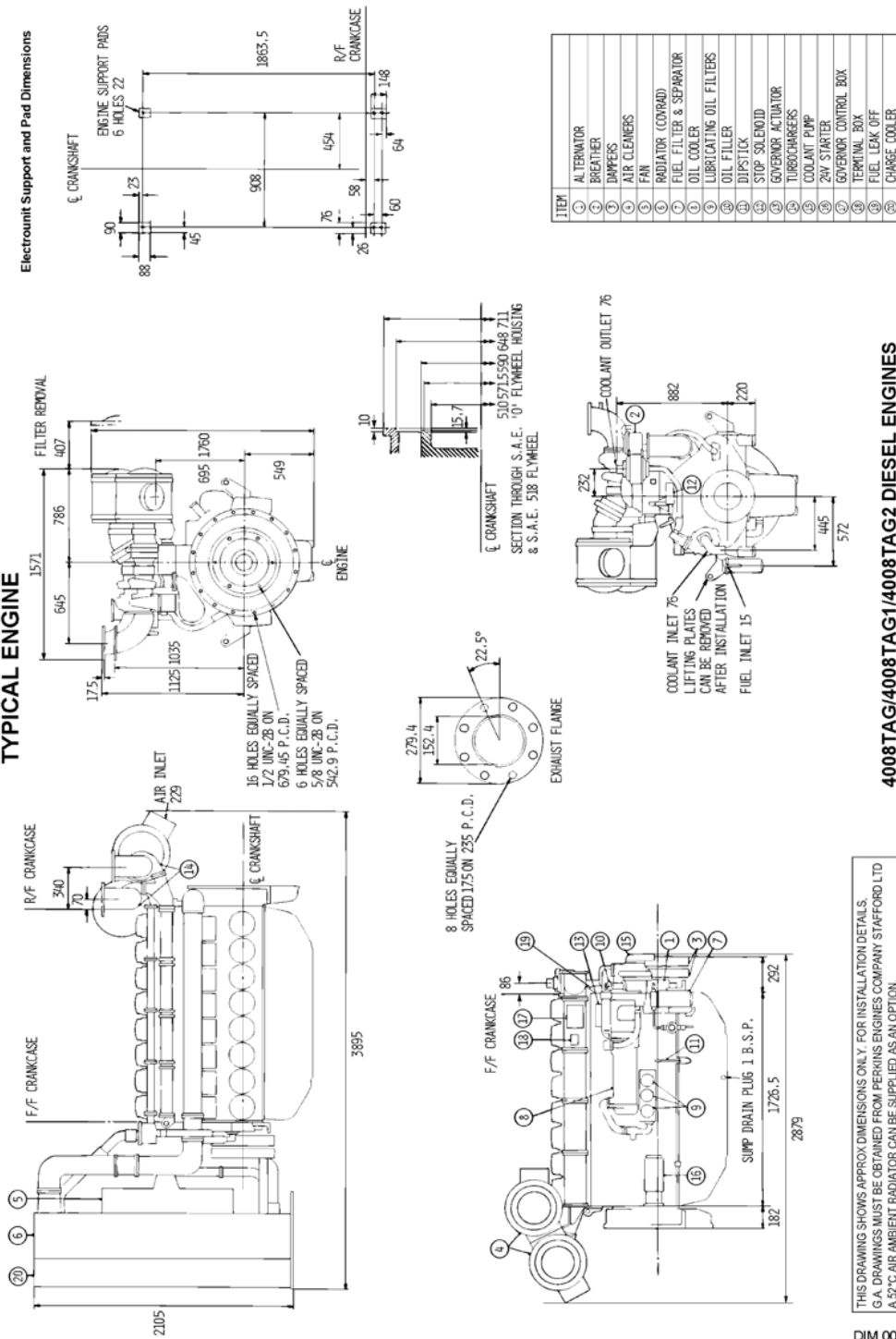
Temperature range	
Range Down to 0 °C (32 °F)	<b>Oil:</b> SAE 30
	<b>Starter:</b> 1 x 24V
	<b>Battery:</b> 2 x 12 volts x Ah 178
	<b>Max breakaway current:</b> 1400 amps
	<b>Cranking current:</b> 750 amps
	<b>Aids:</b> Not necessary
	<b>Starter cable size:</b> 70 mm
<b>Maximum length:</b> 6 m	

### 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

THIS DRAWING SHOWS APPROX DIMENSIONS ONLY. FOR INSTALLATION DETAILS, G.A. DRAWINGS MUST BE OBTAINED FROM PERKINS ENGINES COMPANY STAFFORD LTD A 52°C AIR AMBIENT RADIATOR CAN BE SUPPLIED AS AN OPTION.

## 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:  $20 \times 10^{-6}$  pa

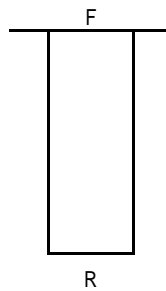
Ambient noise level 77 dBA 4008TAG.

Ambient noise level 79 dBA 4008TAG1/TAG2.

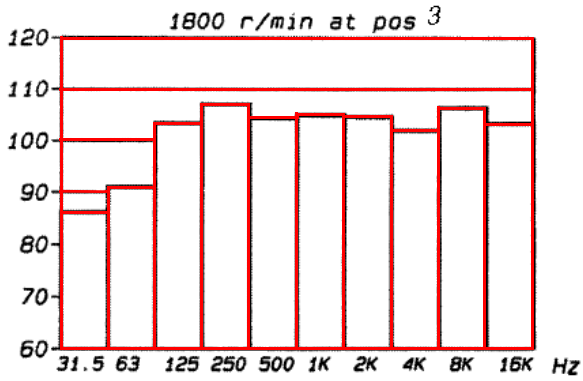
Octave analysis carried out at the position of maximum noise.

## 4008TAG, 4008TAG1, 4008TAG2

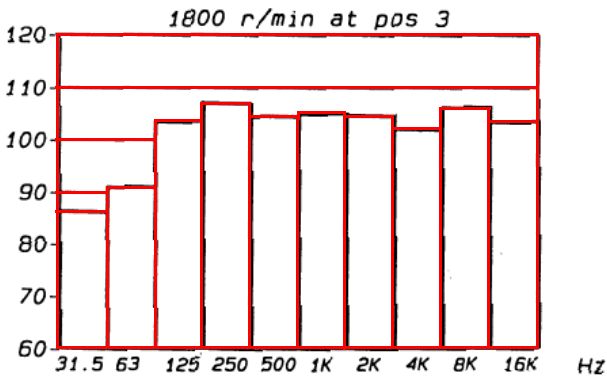
	<b>POSITION 1</b>		
	1800 rev/min 108 - dBA	4008TAG	
	1800 rev/min 104 - dBA	4008TAG1	
	1800 rev/min 105 - dBA	4008TAG2	
<b>POSITION 7</b>		<b>POSITION 2</b>	
1800 rev/min 109 - dBA	4008TAG	1800 rev/min 109 - dBA	4008TAG
1800 rev/min 106 - dBA	4008TAG1	1800 rev/min 107 - dBA	4008TAG1
1800 rev/min 107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



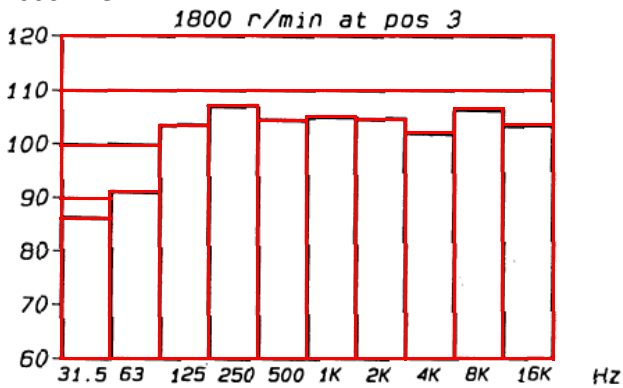
**4008TAG**



**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

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