VOLVO PENTA GENSET ENGINE

TAD531GE

1500 rpm, 102 kW (139 hp) – 1800 rpm 111 kW (151 hp)

The TAD531GE is a powerful, reliable and economical Generating Set Diesel Engine.

Durability & low noise

Designed for easiest, fastest and most economical installation. Well-balanced to produce smooth and vibration-free operation with low noise level.

To maintain a controlled working temperature in cylinders and combustion chambers, the engine is equipped with piston cooling. The engine is also fitted with replaceable cylinder liners and valve seats/guides to ensure maximum durability and service life of the engine.

Low exhaust emission

The state of the art, high-tech injection and charging system with low internal losses contributes to excellent combustion and low fuel consumption.

The TAD531GE is certified for EU Stage 2 exhaust emission regulations.

Easy service & maintenance

Easily accessible service and maintenance points contribute to the ease of service of the engine.

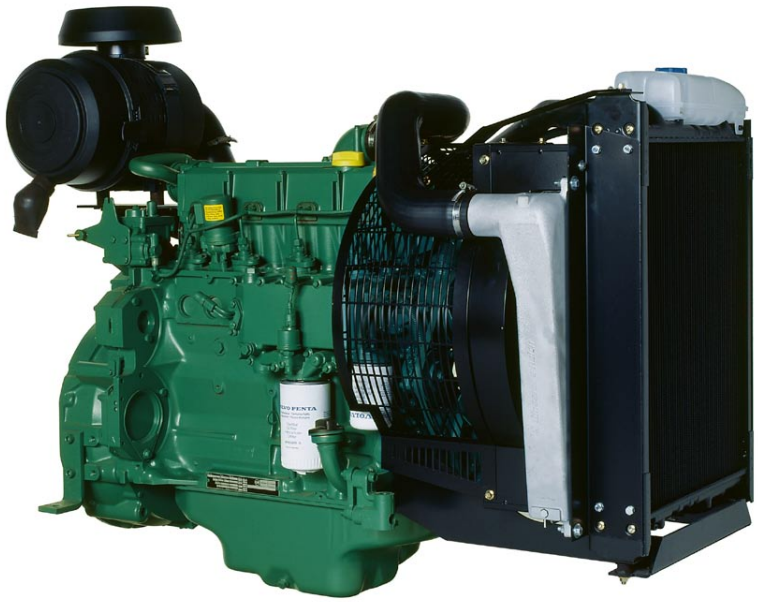
Technical description

Engine and block

- Optimized cast iron cylinder block with optimum distribution of forces
- Piston cooling for low piston temperature and reduced ring temperature
- Drop forged steel connecting rods
- Crankshaft hardened bearing surfaces and fillets for moderate load on main and big-end bearings
- Keystone top compression rings for long service life
- Replaceable valve guides and valve seats
- Three PTO positions at flywheel end
- Lift eyelets
- Flywheel housing with connection acc. to SAE 3
- Flywheel for flexible coupling and friction clutch
- Transport brackets

Lubrication system

- Full flow disposable spin-on oil filter, for extra high filtration
- Rotary displacement oil pump driven by the crankshaft
- Deep centre oil sump, 30° inclination
- Oil filler on top
- Oil dipstick, short in front
- Integrated full flow oil cooler, side-mounted



Features

- Mechanical or electronic governor with CAN-bus communication
- Compact design
- High power to weight ratio
- Emission compliant
- Noise optimized engine design
- A wide selection of optional equipment and power settings

Fuel system

- Six hole fuel injection nozzles
- Electronic governor with smoke limiter function
- Washable fuel prefilter with water separator
- Rotary low-pressure fuel pump
- Fine fuel filter of disposable type

Intake and exhaust system

- Connection flange for exhaust line
- Turbo charger, centre low with exhaust flange
- Closed crankcase ventilation
- Heater flange in charge air inlet (without power relay)

Cooling system

- Belt driven, maintenance-free coolant pump with high degree of efficiency
- Efficient cooling with accurate coolant control through a water distribution duct in the cylinder block
- Reliable thermostat with minimum pressure drop
- Cooling water pipe, inlet and outlet
- Fan hub
- Fan on separate bracket 292mm above crankshaft

Electrical system

- 12 V electrical system
- Alternator 1x55A / 12V, low left
- Starter motor, 3.1kW / 12 V, single pole
- ECU (without high altitude sensor) control and monitoring of oil pressure, coolant temperature, coolant level, charge air pressure, engine rpm and fuel temperature compensation
- Engine wiring

TAD531GE

Technical Data

General

Engine designation	TAD531GE
No. of cylinders and configuration	in-line 4
Method of operation	4-stroke
Bore, mm (in.)	108 (4.25)
Stroke, mm (in.)	130 (5.12)
Displacement, l (in³)	4.76 (290)
Compression ratio	18:1
Dry weight, kg (lb)	575 (1268)
Wet weight, kg (lb)	606 (1336)

Performance	**1500 rpm**	**1800 rpm**
with fan, kW (hp) at:		
Prime Power	88 (119)	93 (126)
Standby Power	98 (133)	104 (141)

Lubrication system	**1500 rpm**	**1800 rpm**
Oil consumption, liter/h (US gal/h) at:		
Prime Power	0.08 (0.021)	0.08 (0.021)
Standby Power	0.08 (0.021)	0.08 (0.021)
Oil system capacity incl filters, liter	13	

Fuel system	**1500 rpm**	**1800 rpm**
Specific fuel consumption at:		
Prime Power, g/kWh (lb/hph)		
25 %	259 (0.419)	277 (0.449)
50 %	225 (0.365)	232 (0.376)
75 %	218 (0.353)	221 (0.358)
100 %	218 (0.353)	218 (0.353)
Standby Power, g/kWh (lb/hph)		
25 %	244 (0.396)	259 (0.420)
50 %	221 (0.358)	226 (0.366)
75 %	217 (0.351)	219 (0.355)
100 %	219 (0.355)	218 (0.353)

Intake and exhaust system	**1500 rpm**	**1800 rpm**
Air consumption at 27°C, m³/min (cfm):		
Prime Power	5.7 (201)	7.24 (256)
Standby Power	6.09 (215)	7.75 (274)
Max allowable air intake restriction, kPa (In wc)	3.5 (14.1)	3.5 (14.1)
Heat rejection to exhaust, kW (BTU/min) at:		
Prime Power	78 (4436)	83 (4720)
Standby Power	88 (5004)	92 (5232)
Exhaust gas temperature after turbine, °C (°F) at:		
Prime Power	544 (1011)	518 (964)
Standby Power	557 (1035)	516 (961)
Max allowable back-pressure in exhaust line, kPa (In wc)	5 (20.1)	7 (28.1)
Exhaust gas flow, m³/min (cfm) at:		
Prime power	16.7 (589)	19.9 (704)
Standby Power	18.4 (650)	22.1 (781)

Cooling system	**1500 rpm**	**1800 rpm**
Heat rejection radiation from engine, kW (BTU/min)		
Prime Power	9 (522)	10 (568)
Standby Power	10 (580)	11 (631)
Heat rejection to coolant kW (BTU/min)		
Prime Power	47.4 (2696)	48.0 (2730)
Standby Power	52.5 (2986)	53.3 (3031)
Fan power consumption, kW (hp)	5.9 (8)	10.2 (14)

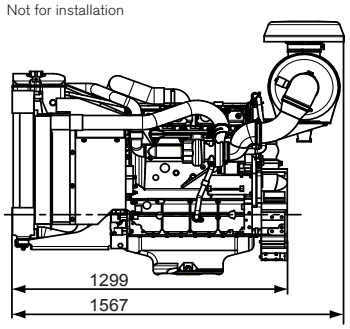
Standard equipment

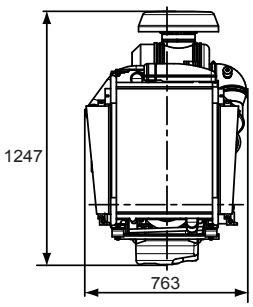
Engine	
Automatic belt tensioner	•
Lift eyelets	•
Flywheel	
Flywheel housing SAE 3	•
Flywheel 11.5” disc	•
Vibration dampers	–
Engine suspension	
Fixed front suspension	•
Lubrication system	
Oil dipstick	•
Full-flow oil filter of spin-on type	•
By-pass oil filter of spin-on type	•
Oil cooler, side mounted	•
Low noise oil sump	•
Fuel system	
Fuel filters of disposable type	•
Pre-filter with water separator	•
Intake and exhaust system	
Air filter with replaceable paper insert	•
Air restriction indicator	•
Air cooled exhaust manifold	•
Connecting flange for exhaust pipe	•
Exhaust flange with v-clamp	•
Turbo charger, low right side	•
Crankcase ventilation	•
Cooling system	
Tropical radiator incl intercooler	–[1]
Gear driven coolant pump	•
Fan hub	•
Pusher fan	–[1]
Fan guard	–[1]
Belt guard	–[1]
Control system	
Engine Diesel Control 4 (EDC4) with CAN-bus interface SAE J1939 and stand alone interface	–
Alternator	
Alternator 55 A / 12 V	•
Starting system	
Starter motor, 3.1kW, 12 V	•
Instruments and senders	
Temp.- and oil pressure for automatic stop/alarm 103°C	•
Engine Packing	
Plastic wrapping	•

[1] must be ordered, se order specification
– optional equipment or not applicable
• included in standard specification

Dimensions TAD531GE

Not for installation





Note! Not all models, standard equipment and accessories are available in all countries.
All specifications are subject to change without notice.
The engine illustrated may not be entirely identical to production standard engines.

Power Standards
The engine performance corresponds to ISO 3046, BS 5514 and DIN 6271. The technical data applies to an engine without cooling fan and operating on a fuel with calorific value of 42.7 MJ /kg (18360 BTU/lb) and a density of 0.84 kg/liter (7.01 lb/US gal), also where this involves a deviation from the standards. Power output guaranteed within 0 to +2% att rated ambient conditions at delivery. Ratings are based on ISO 8528.
Engine speed governing in accordance with ISO 3046/IV, class A1 and ISO 8528-5 class G3

Exhaust emissions
The engine complies with Tier 2 and TA-luft exhaust emission regulations.

Rating Guidelines
PRIME POWER rating corresponds to ISO Standard Power for continuous operation. It is applicable for supplying electrical power at variable load for an unlimited number of hours instead of commercially purchased power. A10 % overload capability for govering purpose is available for this rating.
MAXIMUM STANDBY POWER rating corresponds to ISO Standard Fuel Stop Power. It is applicable for supplying standby electrical power at variable load in areas with well established electrical networks in the event of normal utility power failure. No overload capability is available for this rating. 1 hp = 1 kW x 1.36

Information
For more technical data and information, please look in the Generating Set Engines Sales Guide.

Technical data TAD531GE

General

In-line four stroke diesel engine with direct injection. Rotation direction, anti-clockwise viewed towards flywheel. Turbocharged

Number of cylinders			4
Displacement, total		litre in^3	4,76 290,7
Firing order			1-3-4-2
Bore		mm in	108 4,25
Stroke		mm in	130 5,12
Compression ratio			18:1
Dry weight	Engine and cooling package	kg lb	575 1268
Wet weight	Engine and cooling package	kg lb	606 1336
	SAE2	kg lb	36 79

Performance		**r/min**	**1500**	**1800**
Standby Power	without fan	kW hp	102 139	111 151
	with fan low temp	kW hp	98 133	104 141
Prime Power	without fan	kW hp	92 125	100 136
	with fan low temp	kW hp	88 119	93 126
Torque at:	Standby Power	Nm lbft	649 479	589 434
	Prime Power	Nm lbft	586 432	531 391
Mean piston speed		m/s ft/sec	6,5 21,4	7,8 25,7
Effective mean pressure at:	Standby Power	MPa psi	1,7 248	1,6 225
Max combustion pressure at:	Standby Power	MPa psi	12,9 1871	12,8 1856
Total mass moment of inertia, J (mR2)		kgm^2 $lbft^2$	1,43 33,9	
Residual speed droop at load increase from 0 to 100%		%	≤ 5	
Friction Power		kW hp	6,0 8,16	8,6 11,696

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Engine noise emission

Test Standards: ISO 3744-1981 (E) sound power (without fan, intake and exhaust noise)

Tolerance ± 0.75 dB(A)

		r/min	1500	1800
Measured sound power Lw	No load	dB(A)	87	89.5
	Standby Power	dB(A)	93.5	94.5
		dB(A)		
Calculated sound pressure Lp at 1 m	No load	dB(A)	99	104.5
	Standby Power	dB(A)	108.5	109.5
		dB(A)		

Unsilenced exhaust noise

Data calculated as sound pressure Lp.

Assumed microphone distance 1 m

	r/min	1500	1800
Standby Power	dB(A)	116.7	118.2
	dB(A)		

Test conditions for load acceptance data

Warm engine.	**Generator**	**Model**	**Type of AVR**
	mecc alte spa	ECO 38-2L/4	

Load acceptance performance can vary due to actual alternator inertia, voltage regulator, type of load and local ambient conditions.

Single step load performance at 1500 rpm

Load (%)	Speed diff (%)		Recovery time (s)		Remaining load	Speed diff (%)		Recovery time (s)	
	Prime	Standby	Prime	Standby	(%)	Prime	Standby	Prime	Standby
0-20	2.3	2.6	1.5	1.4	30-100	8.3	-	2.0	-
0-40	4.2	4.7	1.5	1.5	40-100	6.3	6.2	1.5	3.3
0-50	5.1	6.9	1.5	1.7	50-100	4.7	5.3	1.5	3.0
0-60	7.8	10.0	2.0	2.1	60-100	4.0	4.5	1.0	2.5
0-70	11.9	16.9	2.5	3.1	70-100	3.3	3.5	0.5	2.0
0-80	17.7	21.7	3.5	3.6					
0-90	20.7	-	4.0	-					
100-0	7.7	8.3	2.0	2.0					

Single step load performance at 1800 rpm

Load (%)	Speed diff %		Recovery time (s)		Remaining load	Speed diff (%)		Recovery time (s)	
	Prime	Standby	Prime	Standby	(%)	Prime	Standby	Prime	Standby
0-20	1.7	1.8	1.0	1.0	20-100	8.0	8.7	3.1	3.5
0-40	2.8	2.9	1.5	1.3	40-100	4.1	5.2	2.3	3.0
0-50	3.9	4.1	1.4	1.6	60-100	2.9	2.9	1.3	2.0
0-60	4.5	5.3	1.4	1.6	80-100	2.3	2.3	1.0	1.8
0-70	6.3	7.7	1.7	2.0	90-100	0.9	1.0	1.0	1.0
0-80	7.7	9.2	2.0	2.0					
0-90	9.9	13.3	2.3	2.4					
100-0	5.8	6.5	2.0	2.0	0-100	12.1	16.0	2.3	3.9

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Cold start performance		1500/1800
Cold start limit temperature	°C	-15
		-30*

* With manifold heater engaged, lubrication oil 15W/40.

Derating, mechanical governer
The engine may be operated up to 1000 m altitude and 40°C ambient air temperature without derating. For operation at higher altitudes and temperatures the power should be derated according to the following factors:

Altitude derating factor < 3000 m	% / m	4 / 500
Altitude derating factor > 3000 m	% / m	6 / 500
Ambient temperature derating factor	% / °C	3 / 5°C
Humidity	%	No derating

Derating, electronic governer
The engine may be operated up to 1000 m altitude and 40°C ambient air temperature without derating. For applications above 1000 m an ECU with automatic derating must be used. For operations with air ambient temperature over 40°C, see mechanical governor.

Lubrication system		**r/min**	**1500**	**1800**
Lubricating oil consumption	Standby Power	liter/h US gal/h	0,08 0,021	0,08 0,021
Oil system capacity including filters		liter US gal	13 3,4	
Oil sump capacity:	max	liter US gal	11 2,9	
	min	liter US gal	9 2,4	
Oil change intervals/specifications:				
VDS-2. ACEA: E3, E5. API: CG-4, CH-4*		h	500	
Engine angularity limits:	front up	°	30	
	front down	°	30	
	side tilt	°	30	
Oil pressure at rated speed		kPa psi	450 - 480 65 - 70	
Oil pressure shut down switch setting		kPa psi	200 29	
Lubrication oil temperature:	normal	°C °F	110 230	
	max	°C °F	125 257	
Oil filter micron size		mm	0,040	

* See also general section in the sales guide

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Fuel system		r/min	1500	1800
Standby Power Specific fuel consumption at:	25%	g/kWh	244	259
		lb/hph	0,396	0,420
	50%	g/kWh	221	226
		lb/hph	0,358	0,366
	75%	g/kWh	217	219
		lb/hph	0,351	0,355
	100%	g/kWh	219	218
		lb/hph	0,355	0,353
Prime Power Specific fuel consumption at:	25%	g/kWh	259	277
		lb/hph	0,419	0,449
	50%	g/kWh	225	232
		lb/hph	0,365	0,376
	75%	g/kWh	218	221
		lb/hph	0,353	0,358
	100%	g/kWh	218	218
		lb/hph	0,353	0,354

Fuel system	r/min	1500	1800
Recommended fuel to conform to	ASTM-D975-No1 and 2-D JIS KK 2204, EN 590		
Total fuel flow	liter/h	360	450
	US gal/h	95	119
Feed pump pressure	kPa	500 - 550	
	psi	73 - 80	
Feed pump max suction head	m	1,5	
	foot	4,9	
Fuel filter micron size	mm	0,005	
Prefilter / Water separator	mm	0,063	
Governor type/make, standard	Heinzman / EDC4		
Injection pump type/make	PFM 1 P100 S 2005/Bosch		

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Intake and exhaust system			**r/min**	**1500**	**1800**
Air consumption at:	Standby Power	27°C 81°F	m^3/min cfm	6,089 215	7,75 274
	Prime Power	27°C 81°F	m^3/min cfm	5,7 201	7,24 256
Air intake restriction, clean filter(s)			kPa in wc	1 4,0	1 4,0
Max allowable air intake restriction			kPa in wc	3,5 14,1	3,5 14,1
Air filter type			Single stage paper cartridge		
Air filter cleaning efficiency			%	99,85	
Heat rejection to exhaust at:		Standby Power	kW BTU/min	88 5004	92 5232
		Prime Power	kW BTU/min	78 4436	83 4720
Exhaust gas temperature after turbine at:		Standby Power	°C °F	557 1035	516 961
		Prime Power	°C °F	544 1011	518 964
Max allowable back pressure in exhaust line			kPa In wc	5 20,1	7 28,1
Exhaust gas flow at:		Standby Power	m^3/min cfm	18,4 650	22,1 781
		Prime Power	m^3/min cfm	16,7 589	19,9 704
Heat rejection to CAC		Standby Power	kW BTU/min	13,1 745	21 1194
		Prime Power	kW BTU/min	11,8 671	18,9 1075

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Cooling system			**r/min**	**1500**	**1800**
Heat rejection radiation from engine at:	Standby Power		kW BTU/min	10 580	11 631
	Prime Power		kW BTU/min	9 523	10 569
Heat rejection to coolant at:	Standby Power		kW BTU/min	52,5 2986	53,3 3031
	Prime Power		kW BTU/min	47,4 2696	48,0 2730
Recommended coolant	Volvo coolant or Volvo anticorrosion additive together with clean fresh water				
Radiator cooling system type			Closed circuit		
Radiator core area (std. size)			m² foot²	0,29 3,12	
Radiator core thickness (std. size) - low temp cooling package			mm in	62 2,44	
Fan diameter - low temp cooling system			mm in	516 20,31	
Fan power consumption - low temp cooling system			kW hp	4,2 6	7,1 10
Fan power consumption - high temp cooling system			kW hp	5,9 8	10,2 14
Fan drive ratio				1,73:1	
Coolant capacity,	engine		liter US gal	7,2 1,90	
	std radiator with hoses		liter US gal	12,5 3,30	
Coolant pump			drive/ratio	1,73:1	
Coolant flow with low temp system			l/s US gal/s	2,71 0,72	3,42 0,90
Maximum external coolant system restriction			kPa in wc	25 100	35 141
Thermostat,	start to open		°C °F	83 181	
	fully open		°C °F	95 203	
Maximum static pressure head			kPa in wc	100 402	
Pressure cap setting on low temp radiator			kPa in wc	90 361	
Maximum top tank temperature			°C °F	105 221	
Shutdown switch setting			°C °F	113 235	
Recommended draw down capacity	10% of total cooling system capacity				

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Cooling performance

Cooling air flow and maximum additional external restriction at different radiator air temperatures based on 105°C TTT and 50% antifreeze (radiator and cooling fan, see optional equipment)

Engine speed rpm	Air on temp °C	PRIME POWER		STANDBY POWER	
		Air flow m^3/s	External restriction Pa	Air flow m^3/s	External restriction Pa
1500	53	1,5	0		
low temp	44	1,2	150		
	37	1,0	200		
high temp	63	2,0	0		
	57	1,6	150		
	53	1,5	200		
	46	1,2	300		
low temp	50			1,5	0
	40			1,2	150
	32			1,0	200
high temp	60			2,0	0
	54			1,6	150
	50			1,4	200
	42			1,2	300
1800	59	1,9	0		
low temp	51	1,7	150		
	48	1,4	200		
	37	1,1	300		
high temp	67	2,6	0		
	64	2,2	150		
	62	2,1	200		
	59	1,9	300		
	54	1,6	400		
low temp	55			1,9	0
	47			1,7	150
	44			1,4	200
	32			1,1	300
high temp	64			2,6	0
	61			2,2	150
	59			2,1	200
	56			1,9	300
	51			1,6	400

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Electrical system		**r/min**	**1500**	**1800**
Voltage and type		12V / 1 pole system		
Alternator:	make/output	Amp	Iskra/55	
	tacho output	Hz/alt. Rev	6	
	drive ratio		3,01:1	
Starter motor		make	Bosch	
		type	EV	
		kW	3,1	
Starter motor solenoid,	pull current	Amp	60	
	hold current	Amp	12	
Number of teeth on:	flywheel		129	
	cam wheel		96	
	starter motor		9	
Inrush current at +20°C		Amp	1110	
Cranking current at +20°C		Amp	370	
Crank engine speed at 20°C		rpm	160	
Starter motor battery capacity:	max	Ah	176	
	min at +5°C	Ah	110	
Stop solenoid,	max	Amp	3	
Inlet manifold heater (at 12V/24V)		kW	2 / 3,6	
Power relay for the manifold heater (at 12V/24V)		Amp	150 / 120	