VOLVO PENTA INDUSTRIAL DIESEL

TAD733GE

195 kW (265 hp) at 1500 rpm, 214 kW (292 hp) at 1800 rpm

The TAD733GE is a powerful, reliable and economical Generating Set Diesel Engine built on the dependable in-line six design.

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 TAD733GE complies with EU Stage 2 and TA-Luft exhaust emission regulations.

Easy service & maintenance

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

Features

- Electronic governing, EDC 4
- 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

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 2
- 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

Fuel system

- Six hole fuel injection nozzles
- Direct injection unit pumps
- 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
- Two stage air filter
- 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
- Belt driven coolant pump, ratio 1.0:1
- Fan hub
- Fan on separate bracket 292mm above crankshaft
- Pusher fan Ø 600 mm

Electrical system

- 24V electrical system
- Alternator 1x35A / 24V, low left
- Starter motor, Melco, 5.5kW / 24V, 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

TAD733GE

Technical Data

General

Engine designation	TAD733GE
No. of cylinders and configuration	in-line 6
Method of operation	4-stroke
Bore, mm (in.)	108 (4.25)
Stroke, mm (in.)	130 (5.12)
Displacement, l (in³)	7.15 (436.3)
Compression ratio	18.1:1
Dry weight, with cooling package, kg (lb)	900 (1984)
Wet weight, with cooling package, kg (lb)	968 (2134)

Performance	**1500 rpm**	**1800 rpm**
with fan, kW (hp) at:		
Prime Power	175 (238)	192 (260)
Standby Power	195 (265)	214 (292)

Lubrication system	**1500 rpm**	**1800 rpm**
Oil consumption, liter/h (US gal/h) at:		
Prime Power	0.08 (0.021)	0.09 (0.024)
Standby Power	0.09 (0.024)	0.11 (0.029)
Oil system capacity incl filters, liter (US gal)	34 (9.0)	

Fuel system	**1500 rpm**	**1800 rpm**
Specific fuel consumption at:		
Prime Power, g/kWh (lb/hph)		
25 %	228 (0.369)	245 (0.397)
50 %	217 (0.352)	222 (0.361)
75 %	214 (0.347)	220 (0.357)
100 %	216 (0.351)	222 (0.361)
Standby Power, g/kWh (lb/hph)		
25 %	228 (0.370)	238 (0.386)
50 %	216 (0.350)	221 (0.359)
75 %	215 (0.348)	220 (0.357)
100 %	219 (0.355)	228 (0.369)

Intake and exhaust system	**1500 rpm**	**1800 rpm**
Air consumption at 27°C, m³/min (cfm):		
Prime Power	11.5 (406)	14.2 (501)
Standby Power	12.4 (439)	15.8 (557)
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	142 (8075)	168 (9554)
Standby Power	165 (9383)	202 (11488)
Exhaust gas temperature after turbine, °C (°F) at:		
Prime Power	510 (950)	509 (948)
Standby Power	530 (986)	530 (986)
Max allowable back-pressure in exhaust line, kPa (In wc)		
Prime Power	5 (20.1)	7.5 (30.1)
Standby Power	3 (12.0)	5 (20.1)
Exhaust gas flow, m³/min (cfm) at:		
Prime power	31.8 (1123)	40.4 (1428)
Standby Power	37.2 (1314)	44.4 (1569)

Cooling system	**1500 rpm**	**1800 rpm**
Heat rejection radiation from engine, kW (BTU/min)		
Prime Power	19 (1081)	22 (1251)
Standby Power	20 (1137)	23 (1308)
Heat rejection to coolant kW (BTU/min)		
Prime Power	87 (4919)	99 (5607)
Standby Power	96 (5465)	110 (6244)
Fan power consumption, kW (hp)	6.1 (8)	10.5 (14)

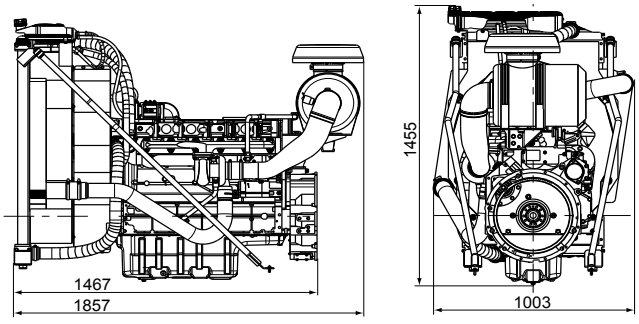
Standard equipment

Engine	
Automatic belt tensioner	•
Lift eyelets	•
Flywheel	
Flywheel housing with conn. acc. to SAE 2	•
Flywheel 10” and 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	•
Electronic unit injectors	•
Pre-filter with water separator	•
Intake and exhaust system	
Two stage 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, open	•
Cooling system	
Radiator incl intercooler	–[1]
Gear driven coolant pump	•
Fan hub	•
Pusher fan	–[1]
Fan guard	–[1]
Belt guard	–[1]
Control system	
Engine Management System (EMS) with CAN-bus interface SAE J1939 and stand alone interface	•
Alternator	
Alternator 35 A / 24 V	•
Starting system	
Starter motor, 5.5 kW, 24 V	•
Instruments and senders	
Temp.- and oil pressure for automatic stop/alarm	•
Engine Packing	
Plastic wrapping	•

[1] must be ordered, se order specification
– optional equipment
• included in standard specification

Dimensions TAD733GE

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 EU stage 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.
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.

LOTUS® POWER GENERATOR SETS

VOLVO PENTA

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General

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

Number of cylinders			6
Displacement, total		litre in^3	7.15 436.0
Firing order			1-5-3-6-2-4
Bore		mm in	108 4.25
Stroke		mm in	130 5.12
Compression ratio			18:1
Dry weight	Engine only	kg lb	710 1565
	Engine and cooling package	kg lb	900 1984
Wet weight	Engine only	kg lb	751 1656
	Engine and cooling package	kg lb	968 2134

Performance		**r/min**	**1500**	**1800**	**2000**
Standby Power	without fan	kW hp	201 273	224.9 306	206 280
	with fan	kW hp	195 265	214 292	192 261
Prime Power	without fan	kW hp	181 246	202 275	185 252
	with fan	kW hp	175 238	192 260	171 232
Torque at:	Standby Power	Nm lbft	1280 944	1193 880	984 725
	Prime Power	Nm lbft	1152 850	1072 790	883 651
Mean piston speed		m/s ft/sec	6.5 21.4	7.8 25.7	8.7 28.5
Effective mean pressure at:	Standby Power	MPa psi	2.3 326	2.1 304	1.7 251
	Prime Power	MPa psi	2.0 294	1.9 273	1.6 225
Max combustion pressure at:	Standby Power	MPa psi	14.9 2161	19.1 2770	15.2 2205
	Prime Power	MPa psi	14 2031	15.1 2190	14 2031
Total mass moment of inertia, J (mR2)		kgm^2 $lbft^2$	3.09 73.3		
Degree of irregularity at:	Standby Power		1:37	1:48	
	Prime Power		1:41	1:52	
Residual speed droop at load increase from 0 to 100%		%	adjustable		
Friction Power		kW hp	8.5 11.56	12.3 16.728	

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Engine noise emission

Test Standards: ISO 3744-1981 (E)
sound power (without fan, intake and exhaust noise)
Tolerans ± 0.75 dB(A)

		r/min	1500	1800	2000
Measured sound power Lw	No load	dB(A)	103	104	
	Standby Power	dB(A)	106	109	
	Prime Power	dB(A)	106	108	
Calculated sound pressure Lp at 1 m	No load	dB(A)	90	91	
	Standby Power	dB(A)	93	95	
	Prime Power	dB(A)	92	95	

Unsilenced exhaust noise

Data calculated as sound pressure Lp.
Assumed microphone distance 1 m

r/min	1500	1800	2000
Standby Power	dB(A)	117	118	
Prime Power	dB(A)	116	117	

Load acceptance

Test condition: Warm engine. 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
0-40	6.0	6.3	1.8	2.0	40-100	11.2	13.1	4.5	9.9
0-50	7.2	8.2	2.1	2.9	50-100	8.5	9.6	3.8	7.8
0-60	8.7	10.2	3.0	4.3	60-100	6.8	7.8	3.5	5.0
0-75	13.7	17.5	3.8	4.5	75-100	4.0	4.6	3.2	3.6
0-51	7.0		2.8		0-46		7.0		2.8
0-100									
100-0									

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
0-40	3.8	4.1	1.2	1.4	40-100	5.4	6.7	2.1	7.0
0-50	4.5	5.1	1.6	1.7	50-100	4.8	5.8	1.9	6.8
0-60	5.6	6.2	1.8	2.2	60-100	3.6	4.4	1.8	4.1
0-75	7.3	7.5	2.1	2.5	75-100	2.4	3.5	1.7	3.6
0-73	7.0		1.9		0-66		7.0		1.9
0-100	14.3	18.3	3.5	9.1					
100-0	5.8	5.8	2.0	2.0					

Cold start performance

		1500/1800/2000
Cold start limit temperature	°C	-15
		-30*

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

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Derating

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, 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	2 / 5°C
Humidity	%	No derating

Lubrication system		**r/min**	**1500**	**1800**	**2000**
Lubricating oil consumption	Standby Power	liter/h US gal/h	0.09 0.024	0.11 0.029	0.10 0.026
	Prime Power	liter/h US gal/h	0.08 0.021	0.09 0.024	0.09 0.024
Oil system capacity including filters		liter US gal	34 9.0		
Oil sump capacity:	max	liter US gal	31 8.2		
	min	liter US gal	24 6.3		
Oil change intervals/specifications:					
Closed crankcase ventilation	ACEA: E4. API: CH-4, CI-4* full synthetic	h	500		
Open crankcase ventilation	VDS-2. ACEA: E3, E5. API: CG-4, CH-4*	h	500		
Open crankcase ventilation	VDS. ACEA: E2. API: CF, CF-4*	h	250		
Engine angularity limits:	front up	°	10		
	front down	°	10		
	side tilt	°	10		
Oil pressure at rated speed		kPa psi	480 70	520 75	550 80
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	0.012		

* See also general section in the sales guide

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Fuel system		r/min	1500	1800	2000
Standby Power Specific fuel consumption at:	25%	g/kWh lb/hph	228 0.37	238 0.39	249 0.40
	50%	g/kWh lb/hph	216 0.35	221 0.36	223 0.36
	75%	g/kWh lb/hph	215 0.35	220 0.36	221 0.36
	100%	g/kWh lb/hph	219 0.35	228 0.37	226 0.37
Prime Power Specific fuel consumption at:	25%	g/kWh lb/hph	228 0.37	245 0.40	265 0.43
	50%	g/kWh lb/hph	217 0.35	222 0.36	227 0.37
	75%	g/kWh lb/hph	214 0.35	220 0.36	221 0.36
	100%	g/kWh lb/hph	216 0.35	222 0.36	223 0.36
Recommended fuel to conform to		ASTM-D975-No1 and 2-D JIS KK 2204, EN 590			
Total fuel flow		liter/h US gal/h	360 95	450 119	480 127
Max allowed inlet fuel temperature	continuous	°C °F	70 158		
	temporarily	°C °F	90 194		
Feed pump pressure		kPa psi	500 73		
Fuel supply line max. restriction (before fuel feed pump)		kPa psi	35 5.1		
Fuel supply line max. restriction (before fuel prefilter and manuel feed pump)		kPa psi	15 2.2		
Fuel supply line max. pressure, (before fuel feed pump)		kPa psi	20 2.9		
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			
Injection timing std.		ºB.T.D.C	2.5		

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Intake and exhaust system			r/min	1500	1800	2000
Air consumption at:	Standby Power	27°C 81°F	m^3/min cfm	12.4 439	15.8 557	14.4 509
	Prime Power	27°C 81°F	m^3/min cfm	11.5 406	14.2 501	13.1 463
Air intake restriction, clean filter(s)			kPa in wc	1.5 6.0		
Max allowable air intake restriction			kPa in wc	3.5 14.1		
Air filter type			Two stage paper cartridge			
Air filter cleaning efficiency			%	99.9		
Heat rejection to exhaust at:	Standby Power		kW BTU/min	165 9383	202 11488	
	Prime Power		kW BTU/min	142 8075	168 9554	
Exhaust gas temperature after turbine at:	Standby Power		°C °F	530 986	530 986	501 934
	Prime Power		°C °F	510 950	509 948	479 894
Max allowable back pressure in exhaust line	Standby Power		kPa In wc	3 12.0	5 20.1	5 20.1
	Prime Power		kPa In wc	5 20.1	7.5 30.1	7.5 30.1
Exhaust gas flow at:	Standby Power		m^3/min cfm	37.2 1314	44.4 1568	48.0 1695
	Prime Power		m^3/min cfm	31.8 1123	40.4 1427	43.0 1519
Heat rejection to CAC	Standby Power		kW BTU/min	42 2388	51 2895	43 2462
	Prime Power		kW BTU/min	38 2150	46 2605	39 2235

Intercooler system	r/min	1500	1800	2000
Boost pressure	kPa in wc	183 733	205 823	186 747
Charge air temp after turbo compressor	°C °F	196 385	201 394	194 381
Max allowable comb. air temp after CAC	°C °F	50 122		
Max pressure droop over intercooler, incl. Piping	kPa In wc	15 60		

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Cooling system		r/min	1500	1800	2000
Heat rejection radiation from engine at:	Standby Power	kW BTU/min	20 1137	23 1308	21 1194
	Prime Power	kW BTU/min	19 1081	22 1251	20 1137
Heat rejection to coolant at:	Standby Power	kW BTU/min	96 5465	110 6244	101 5738
	Prime Power	kW BTU/min	87 4919	99 5607	92 5215
Recommended coolant	Volvo coolant or Volvo anticorrosion additive together with clean fresh water				
Radiator cooling system type		Closed circuit			
Radiator core area		m² foot²	0.65 7.00		
Radiator core thickness		mm in	55 2.17		
Intercooler core area		m² foot²	0.41 4.46		
Intercooler core thickness		mm in	50 1.97		
Fan diameter		mm in	870 34.25		
Fan power consumption		kW hp	6.1 8	10.5 14	14.3 19
Fan drive ratio			1:0,8		
Coolant capacity,	engine	liter US gal	9.8 2.59		
	radiator with hoses	liter US gal	28.6 7.56		
Coolant pump		drive/ratio	1,73:1		1,36:1
Coolant flow with standard cooling system		l/s US gal/s	3.0 0.79	3.6 0.95	3.2 0.85
Maximum external coolant system restriction		kPa in wc	25 100	35 141	28 112
Thermostat,	start to open	°C °F	87 189		
	fully open	°C °F	102 216		
Maximum static pressure head		kPa in wc	100 402		
Pressure cap setting on standard cooling system		kPa in wc	90 361		
Maximum top tank temperature		°C °F	105 221		
Max. permissible cooling down of engine coolant by radiator		°C °F	8 46		
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	63	3.9	0		
	57	3.3	150		
	55	3.1	200		
	50	2.7	300		
	43	2.4	400		
	66			3.9	0
	61			3.3	150
	59			3.1	200
	54			2.7	300
	48			2.4	400
1800	65	4.9	0		
	61	4.3	150		
	60	4.1	200		
	56	3.7	300		
	53	3.4	400		
	68			4.9	0
	64			4.3	150
	63			4.1	200
	60			3.7	300
	57			3.4	400
2000	71	5.7	0		
	69	5.1	150		
	68	5.0	200		
	67	4.6	300		
	64	4.3	400		
	73			5.7	0
	72			5.1	150
	71			5.0	200
	70			4.6	300
	67			4.3	400

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Electrical system		r/min	1500	1800	2000
Voltage and type		24V / 1 pole system			
Alternator:	make/output	Amp	Iskra/35		
	tacho output	Hz/alt. Rev	6		
	drive ratio		4,07:1		
Starter motor		make	Melco		
		type	M008T62471		
		kW	5.0		
Starter motor solenoid,	pull current	Amp	2		
	hold current	Amp	2		
Number of teeth on:	flywheel		129		
	cam wheel		96		
	starter motor		10		
Inrush current at +20°C		Amp	1200		
Cranking current at +20°C		Amp	400		
Crank engine speed at 20°C		rpm	200		
Starter motor battery capacity:	max	Ah	135		
	min at +5°C	Ah	110		
Inlet manifold heater (at 12V/24V)		kW	2 / 3,6		
Power relay for the manifold heater (at 12V/24V)		Amp	150 / 120		