

Technical data TAD731GE

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 and cooling package	kg	760
		lb	1676
Wet weight	Engine and cooling package	kg	804
		lb	1773
	SAE3	kg lb	-36 -79

Performance		r/min	1500	1800	2000	
Standby Power	without fan	kW	153	163	163	
		hp	208	222	222	
	with fan high temp cooling	kW	148	154	159	
		hp	201	210	216	
Prime Power	without fan	kW	138	147	147	
		hp	188	200	200	
	with fan high temp cooling	kW	133	138	143	
		hp	181	188	194	
Torque at:	Standby Power	Nm	974	865	778	
		lbft	718	638	574	
	Prime Power	Nm	879	780	702	
		lbft	648	575	518	
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	1.7 248	1.5 221	1.4 199	
		Prime Power	MPa psi	1.5 224	1.4 199	1.2 179
	Max combustion pressure at:		Standby Power	MPa psi	- -	- -
		Prime Power		MPa psi	13.5 1958	13 1885
Total mass moment of inertia, J (mR ²)			kgm ² lbft ²	3.09 73.3		
Residual speed droop at load increase from 0 to 100%		%	≤ 5			
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)	100.5	102.5	-
	Standby Power	dB(A)	102.5	106	-
	Prime Power	dB(A)	103.5	105.5	-
Calculated sound pressure Lp at 1 m	No load	dB(A)	87.5	89.5	-
	Standby Power	dB(A)	89.5	93	-
	Prime Power	dB(A)	90.5	92.5	-

Unsilenced exhaust noise

Data calculated as sound pressure Lp.

Assumed microphone distance 1 m

		r/min	1500	1800	2000
Standby Power		dB(A)	112	113	-
Prime Power		dB(A)	111	112	-

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 - EDC4

Load (%)	Speed diff (%)		Recovery time (s)		Remaining load (%)	Speed diff (%)		Recovery time (s)	
	Prime	Standby	Prime	Standby		Prime	Standby	Prime	Standby
0-40	4.7	5.3	2.2	2.1	40-100	7.1	8.4		8.3
0-50	6.0	6.7	2.1	2.0	50-100	5.8	7.3	3.0	>15
0-60	7.0	7.8	2.3	2.3	60-100	4.5	5.1	3.7	5.5
100-0	9.0	6.4	2.0	1.7					

Single step load performance at 1800 rpm - EDC4

Load (%)	Speed diff %		Recovery time (s)		Remaining load (%)	Speed diff (%)		Recovery time (s)	
	Prime	Standby	Prime	Standby		Prime	Standby	Prime	Standby
0-40	3.1	3.5	1.2	1.2	40-100	3.9	4.0	1.2	3.3
0-60	4.4	4.8	1.1	0.9	60-100	2.5	2.5	1.1	2.5
100-0	5.0	4.3	0.9	1.3					

Single step load performance at 1500 rpm - mech

Load (%)	Speed diff (%)		Recovery time (s)		Remaining load (%)	Speed diff (%)		Recovery time (s)	
	Prime	Standby	Prime	Standby		Prime	Standby	Prime	Standby
0-75	6.2		0.5						
100-0	6.9		1.3						

Single step load performance at 1800 rpm - mech

Load (%)	Speed diff %		Recovery time (s)		Remaining load (%)	Speed diff (%)		Recovery time (s)	
	Prime	Standby	Prime	Standby		Prime	Standby	Prime	Standby
0-75	5.0								
0-100	7.3		1.1						
100-0	5.2								

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, mechanical governor

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	2 / 5°C
Humidity	%	No derating

Derating, electronic governor

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	2000
Lubricating oil consumption	Standby Power	liter/h	0.10		
		US gal/h	0.026		
Oil system capacity including filters		liter	20		
		US gal	5.3		
Oil sump capacity:	max	liter	17		
		US gal	4.5		
	min	liter	14		
		US gal	3.7		
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	420	450	550
		psi	61	65	80
Oil pressure shut down switch setting		kPa	200		
		psi	29		
Lubrication oil temperature:	normal	°C	110		
		°F	230		
	max	°C	125		
		°F	257		
Oil filter micron size		mm	0.040		

* See also general information in Sales Support Tool

Fuel system		r/min	1500	1800	2000	
Standby Power						
Specific fuel consumption at:	25%	g/kWh	244	259	266	
		lb/hph	0.40	0.42	0.43	
		50%	g/kWh	219	224	229
			lb/hph	0.36	0.36	0.37
	75%	g/kWh	215	218	222	
		lb/hph	0.35	0.35	0.36	
	100%	g/kWh	215	217	223	
		lb/hph	0.35	0.35	0.36	
Prime Power						
Specific fuel consumption at:	25%	g/kWh	259	279	280	
		lb/hph	0.42	0.45	0.45	
	50%	g/kWh	224	231	236	
		lb/hph	0.36	0.37	0.38	
	75%	g/kWh	216	220	224	
		lb/hph	0.35	0.36	0.36	
	100%	g/kWh	215	217	223	
		lb/hph	0.35	0.35	0.36	

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Fuel system			r/min	1500	1800	2000
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	70			
		°F	158			
	temporarily	°C	90			
		°F	194			
Feed pump pressure			kPa psi	480 70	550 80	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 manual 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.			°B.T.D.C	2	2	2

Intake and exhaust system			r/min	1500	1800	2000
Air consumption at:	Standby Power	27°C	m ³ /min	10.65	13.33	15.4
		81°F	cfm	376	471	544
	Prime Power	27°C	m ³ /min	9.86	12.26	14
		81°F	cfm	348	433	494
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	131	135	-	
		BTU/min	7450	7677	-	
	Prime Power	kW	117	121	-	
		BTU/min	6654	6881	-	
Exhaust gas temperature after turbine at:	Standby Power	°C	540	480	470	
		°F	1004	896	878	
	Prime Power	°C	520	471	452	
		°F	968	880	846	
Max allowable back pressure in exhaust line			kPa In wc	5 20.1	7 28.1	7 28.1
Exhaust gas flow at:	Standby Power	m ³ /min	30.2	34.2	-	
		cfm	1067	1208	-	
	Prime Power	m ³ /min	27.5	31.3	-	
		cfm	971	1105	-	
Heat rejection to CAC	Standby Power	kW	24	33.7	37.6	
		BTU/min	1365	1916	2138	
	Prime Power	kW	21.6	30.3	34.2	
		BTU/min	1228	1723	1945	

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Intercooler system		r/min	1500	1800	2000
Boost pressure	kPa		139	157	152
	in wc		556	630	610
Charge air temp after turbo compressor	°C		151	161	164
	°F		304	322	327
Max allowable comb. air temp after CAC	°C		50		
	°F		122		
Max pressure droop over intercooler, incl. Piping	kPa		15		
	In wc		60		

Cooling system		r/min	1500	1800	2000
Heat rejection radiation from engine at:	Standby Power	kW	15	16	16
		BTU/min	853	910	910
	Prime Power	kW	14	15	15
		BTU/min	796	853	853
Heat rejection to coolant at:	Standby Power	kW	68	74	77
		BTU/min	3890	4180	4402
	Prime Power	kW	62	66	73
		BTU/min	3509	3770	4151
Recommended coolant	Volvo coolant or Volvo anticorrosion additive together with clean fresh water				
Radiator cooling system type	Closed circuit				
Radiator core area	m ²	0.44			
	foot ²	4.74			
Radiator core thickness	mm	55			
	in	2.17			
Fan diameter - low temp cooling system	mm	546			NA
	in	21.50			
Fan diameter - high temp cooling system & dual speed rating	mm	596			
	in	23.46			
Fan power consumption - low temp cooling system	kW	3.8	6.6	NA	
	hp	5	9	NA	
Fan power consumption - high temp cooling system & dual speed rating	kW	5	8.7	4.1	
	hp	7	12	6	
Fan drive ratio	1.73:1			1.22:1	
Coolant capacity,	engine	liter	9.8		
		US gal	2.59		
	radiator with hoses	liter	14		
		US gal	3.70		
Coolant pump	drive/ratio	1.73:1			1.22:1
Coolant flow	l/s	2.9	3.6	2.8	
	US gal/s	0.77	0.95	0.74	
Maximum external coolant system restriction	kPa	25	35	24	
	in wc	100	141	96	
Thermostat,	start to open	°C	83		
		°F	181		
	fully open	°C	95		
		°F	203		
Maximum static pressure head	kPa	100			
	in wc	402			
Pressure cap setting	kPa	60			
	in wc	241			
Maximum top tank temperature	°C	105			
	°F	221			
Shutdown switch setting	°C	113			
	°F	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	standard	55	2.5	0		
		49	2.1	150		
		47	2.0	200		
		41	1.7	300		
		33	1.5	400		
	tropical	59	2.9	0		
		55	2.5	150		
		54	2.4	200		
		49	2.1	300		
		43	1.8	400		
	standard	52			2.5	0
		45			2.1	150
		43			2.0	200
		37			1.7	300
		28			1.5	400
tropical	56			2.9	0	
	52			2.5	150	
	50			2.4	200	
	45			2.1	300	
	39			1.8	400	
1800	standard	57	3.1	0		
		54	2.8	150		
		52	2.6	200		
		49	2.4	300		
		46	2.2	400		
	tropical	61	3.6	0		
		59	3.3	150		
		58	3.2	200		
		56	2.9	300		
		53	2.7	400		
	standard	54			3.1	0
		50			2.8	150
		49			2.6	200
		45			2.4	300
		42			2.2	400
tropical	58			3.6	0	
	55			3.3	150	
	54			3.2	200	
	52			2.9	300	
	49			2.7	400	

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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
2000 tropical	49	2.7	0		
	42	2.3	150		
	41	2.2	200		
	32	1.8	300		
	15	1.5	400		
tropical	./.			2.7	0
	./.			2.3	150
	./.			2.2	200
	./.			1.8	300
	./.			1.5	400

Electrical system

		r/min	1500	1800	2000
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		3.0		
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	1200		
Cranking current at +20°C		Amp	400		
Crank engine speed at 20°C		rpm	150		
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		