

Technical data TWD1630G Prime & Standby Power

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	16,12 983,9
Firing order		1-5-3-6-2-4
Bore	mm in	144 5,67
Stroke	mm in	165 6,50
Compression ratio		15,0:1

Performance		r/min	1500	1800
Prime Power:	without fan	kW	359	391
		hp	488	532
	with fan	kW	352	379
		hp	479	515
Standby Power:	without fan	kW	398	445
		hp	541	605
	with fan	kW	391	433
		hp	532	589
Torque at:	Prime Power	Nm	2285	2074
		lbft	1686	1530
	Standby Power	Nm	2534	2361
		lbft	1869	1741
Effective mean pressure at Prime Power		MPa	1,78	1,62
		psi	258	235
Max combustion pressure at Prime Power		MPa	13,6	12,5
		psi	1973	1813
Total mass moment of inertia, J (mR ²)		kgm ² lbft ²	4,22 100,1	
Degree of irregularity at Prime Power			1:73	1:177
Residual speed droop at load increase from 0 to 100%		%	<=5	
Friction Power		kW	40	54
		hp	54,4	73,44

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
Measured sound power L _w	No load	dB(A)	-	-
	Prime Power	dB(A)	112,7	115,4
	Standby Power	dB(A)	114,3	116,5
Calculated sound pressure L _p at 1 m	No load	dB(A)	-	-
	Prime Power	dB(A)	100,7	103,4
	Standby Power	dB(A)	102,7	104,5

Unsilenced exhaust noise

Data calculated as sound pressure L_p.

Assumed microphone distance 1 m

		r/min	1500	1800
Prime Power		dB(A)	114	118
Standby Power		dB(A)	114	119

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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
0-20	1,4	1,5	0,5	0,5	20-100				
0-40	2,5	2,9	0,5	0,5	40-100				
0-60	4,5	5,4	0,6	0,9	60-100				
0-70		10,0		1,8	70-100		4,3		2,9
0-78	10,0		1,9						
0-100	>15,0	>15,0	5,6	6,5					
100-0	5,9	6,8	0,5	0,5					

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	1,2	1,4	0,5	0,5	20-100				
0-40	2,2	2,4	0,5	0,5	40-100				
0-60	3,8	5,0	0,7	0,9	60-100				
0-76		10,0		1,9	76-100				
0-86	10,0		1,8						
0-100	>15	>15							
100-0	5,7	5,9	0,5	0,5					

Cold start performance

		r/min	1500	1800	
Time from start to no load speed at ambient temperature:	°C	20	s	4,0	6,0
		0	s	7,0	7,0
			s		
Time from start to stay within 0.8% of no load speed at ambient temperature:	°C	20	s	4,0	6,0
		0	s	7,0	7,0
			s		

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

Derating

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:

	r/min	1500	1800
Altitude derating factor < 3000 m	% / m	4 / 500	
Altitude derating factor > 3000 m	% / m	6 / 500	
Ambient temperature derating factor	% / °C	1,5 / 5°C	
Humidity	%	No derating	

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Lubrication system		r/min	1500	1800
Lubricating oil consumption	Prime Power	liter/h	0,13	0,14
		US gal/h	0,034	0,037
	Standby Power	liter/h	0,15	0,16
		US gal/h	0,040	0,042
Oil system capacity including filters		liter	64	
		US gal	16,9	
Oil sump capacity:	max	liter	57	
		US gal	15,1	
	min	liter	40	
		US gal	10,6	
Oil change intervals/specifications:				
VDS-2*		h	600	
VDS, ACEA, E3*		h	400	
ACEA E2, API CD, CF, CF-4, CG-4*		h	200	
Engine angularity limits:	front up	°	No available	
	front down	°	No available	
	side tilt	°	No available	
Oil pressure at rated speed		kPa	300-500	
Oil pressure shut down switch setting		kPa	70	
Lubrication oil temperature:	normal	°C	105	
		°F	221	
	max	°C	120	
		°F	248	
Oil filter micron size		mm	0,040	

* See also general section in the sales guide

Fuel system		r/min	1500	1800
Prime Power. Specific fuel consumption at:	25%	g/kWh	241	261
		lb/hph	0,391	0,423
	50%	g/kWh	213	220
		lb/hph	0,345	0,357
Standby Power. Specific fuel consumption at:	75%	g/kWh	206	211
		lb/hph	0,334	0,342
	100%	g/kWh	206	112
		lb/hph	0,334	0,182
Standby Power. Specific fuel consumption at:	25%	g/kWh	235	251
		lb/hph	0,381	0,407
	50%	g/kWh	209	216
		lb/hph	0,339	0,350
Standby Power. Specific fuel consumption at:	75%	g/kWh	205	210
		lb/hph	0,332	0,340
	100%	g/kWh	208	218
		lb/hph	0,337	0,353
Recommended fuel to conform to		ASTM-D975-No1 and 2-D JIS KK 2204, EN 590		
Total fuel flow		liter/h	150	170
		US gal/h	40	45
Feed pump pressure		kPa	100-150	
Feed pump max suction head		m	2	
Fuel filter micron size		mm	0,008	
Prefilter / Water separator		mm		
Governor type/make, standard		Mechanical RQ/Bosch		
Injection pump type/make		P7000/Bosch		
Injection timing	std.	°B.T.D.C	21	25
Injection timing		°B.T.D.C		

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Intake and exhaust system		r/min	1500	1800	
Air consumption:	Prime Power at:	27°C 81°F	m ³ /min cfm	27,2 961	32,4 1144
	Standby Power at:	27°C 81°F	m ³ /min cfm	30 1059	36 1271
Air intake restriction, clean filter(s)		kPa in wc	2,4 9,6	3,1 12,4	
Max allowable air intake restriction		kPa in wc	5 20,1	5 20,1	
Air filter type		Single stage paper cartridge			
Air filter cleaning efficiency		%	99,85		
Heat rejection to exhaust at:	Prime Power	kW BTU/min	293 16663	332 18881	
	Standby Power	kW BTU/min	336 19108	407 23146	
Exhaust gas temperature after turbine at:	Prime Power	°C °F	480 896	455 851	
	Standby Power	°C °F	500 932	500 932	
Max allowable back pressure in exhaust line		kPa In wc	5 20,1	7 28,1	
Exhaust gas flow at:	Prime Power	m ³ /min cfm	70,2 2479	79,3 2800	
	Standby Power	m ³ /min cfm	79,2 2797	93,3 3295	

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Cooling system		r/min	1500	1800
Heat rejection radiation from engine at:	Prime Power	kW	22	24
		BTU/min	1251	1365
	Standby Power	kW	24	27
		BTU/min	1365	1535
Heat rejection to coolant at:	Prime Power	kW	209	236
		BTU/min	11886	13421
	Standby Power	kW	234	271
		BTU/min	13307	15411
Recommended coolant	Volvo coolant or Volvo anticorrosion additive together with clean fresh water			
Radiator cooling system type	Closed circuit			
Radiator core area (std. size)	m ²	1,25		
	foot ²	13,45		
Radiator core thickness (std. size)	mm	73		
	in	2,87		
Fan diameter	mm	890		
	in	35,04		
Fan power consumption	kW	7	12	
	hp	10	16	
Fan drive ratio	0,86:1			
Coolant capacity,	engine	liter	38	
		US gal	10,04	
	std radiator with hoses	liter	29	
		US gal	7,66	
Coolant pump	drive/ratio	gear 1,48:1		
Coolant flow with standard system	l/s	9,1	10,9	
	US gal/s	2,40	2,88	
Minimum coolant flow	l/s	8,2	9,8	
	US gal/s	2,17	2,59	
Maximum external coolant system restriction	kPa	62	88	
	in wc	249	353	
Thermostat,	start to open	°C	75	
		°F	167	
	fully open	°C	88	
		°F	190	
Maximum static pressure head	kPa	50		
	in wc	201		
Pressure cap setting on standard radiator	kPa	70		
	in wc	281		
Maximum top tank temperature	°C	103		
	°F	217		
Minimum temperature entering engine	°C	68		
	°F	154		
Shutdown switch setting	°C	103		
	°F	217		
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 103°C TTT and 50% antifreeze (radiator and cooling fan, see optional equipment)

Engine speed rpm	Air on temp °C	110% OF PRIME POWER		STANDBY POWER	
		Air flow m ³ /s	Max additional external restriction Pa	Air flow m ³ /s	Max additional ext. restriction Pa
1500	30	4,20	650	4,20	650
	40	5,30	475	5,30	475
	50	7,10	225	7,10	225
	55	8,50	0	8,50	0
1800	30	5,20	925	5,20	925
	40	6,60	700	6,60	700
	50	8,90	300	8,90	300
	54	10,30	0	10,30	0

Electrical system

		r/min	1500	1800
Voltage and type		24V / insulated from earth		
Alternator:	make/output	Amp	Valeo/60	
	tacho output	Hz/alt. Rev	6	
	drive ratio		4,06:1	
Starter motor	make		Bosch	
	type		KE	
	kW		7,5	
Starter motor solenoid,	pull current	Amp	51	
	hold current	Amp	7	
Number of teeth on:	flywheel		153	
	starter motor		12	
Inrush current at +20°C		Amp	950	
Cranking current at +20°C		Amp	400	
Crank engine speed at 20°C		rpm	200	
Starter motor battery capacity:	max	Ah	2x176	
	min at +5°C	Ah	2x110	
Stop solenoid,	pull current	Amp	35	
	hold current	Amp	0,4	
Inlet manifold heater (at 20 V)		kW	4,0	
Power relay for the manifold heater		Amp	1	

Power take off

		r/min	1500	1800
Timing gear at compressor PTO max:		Nm	130	
Speed ratio direction of rotation viewed from flywheel side			1,12:1/anti-clockwise	
Timing gear at servo pump PTO max:		Nm	55	
Speed ratio direction of rotation viewed from flywheel side			1,68:1/anti-clockwise	