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	12.78 779.7
Firing order			1-5-3-6-2-4
Bore		mm in	131 5.16
Stroke		mm in	158 6.22
Compression ratio			18.1:1
Wet weight	Engine only	kg lb	1325 2921
	Engine incl. cooling system and air filtration system	kg lb	1596 3519
	Engine incl. cooling system, air filtration system, and frame	kg lb	1790 3946

Performance		**rpm**	**1500**	**1800**
Standby Power	without fan	kW hp	313 426	335 456
	with fan	kW hp	306 416	323 439
Prime Power	without fan	kW hp	286 389	306 416
	with fan	kW hp	279 379	294 400
Torque at:	Standby Power	Nm lbft	1993 1470	1777 1311
	Prime Power	Nm lbft	1821 1343	1623 1197
Mean piston speed		m/s ft/sec	7.9 26.0	9.5 31.2
Effective mean pressure at:	Standby Power	MPa psi	2.0 284	1.7 254
Effective mean pressure at:	Prime Power	MPa psi	1.8 260	1.6 232
Max combustion pressure at:	Standby Power	MPa psi	14.1 2045	13.5 1958
Max combustion pressure at:	Prime Power	MPa psi	13.6 1973	12.5 1813
Total mass moment of inertia, J (mR^2)		kgm^2 $lbft^2$	3.43 81.4	
Friction Power		kW hp	31 42.16	44 59.84
Derating see Technical Diagrams				

Engine noise emission

Test Standards: ISO 3744-1981 (E) sound power

Tolerance ± 0.75 dB(A)		rpm	1500	1800
Measured sound power Lw	No load	dB(A)	113.2	111.5
	Standby Power	dB(A)	118.1	114.3
	Prime Power	dB(A)	118.1	113.9
Calculated sound pressure Lp at 1 m	No load	dB(A)	102.2	100.5
	Standby Power	dB(A)	107.1	103.3
	Prime Power	dB(A)	107.1	102.9

Unsilenced exhaust noise

Data calculated as sound pressure Lp.

Assumed microphone distance 1 m	rpm	1500	1800
Standby Power	dB(A)	113	117
Prime Power	dB(A)	112	117

Test conditions for load acceptance data

Warm engine.	**Generator**	**Model**	**Type of AVR**
	Stamford	HCI 434 F1	MX 341
AVR Settings	Frequency:50/60HZ, Voltage:400/440V, UFRO:47/57Hz, STAB:50/70%, DIP:50/50%		

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	1.7	1.1	1.0	20-100	10.6	11.7	2.6	3.4
0-40	2.7	2.8	1.4	1.3	40-100	5.0	5.4	1.5	2.4
0-60	5.9	7.0	1.6	1.4	60-100	2.3	2.8	1.4	1.4
0-66	7.0		1.9		66-100	2.0		1.2	
0-71,5		10.0		1.8	71,5-100		1.7		1.2
0-79	10.0		1.7		79-100	1.2		1.0	
0-80	10.2	12.3	1.8	2.1	80-100	1.0	1.2	1.0	0.9
0-100	14.0	19.7	2.9	4.0					
100-0	-4.7	-5.3	1.4	1.3					

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	1.0	1.1	0.5	0.6	20-100	5.7	6.4	1.5	3.8
0-40	2.2	2.4	0.9	1.0	40-100	4.0	4.8	1.3	3.4
0-60	3.4	4.1	1.0	1.0	60-100	2.7	4.1	1.0	2.7
0-80	5.6	6.6	1.2	1.4	80-100	1.0	1.2	0.6	0.9
0-82,5		7.0		1.5	82,5-100		1.2		0.8
0-90,5	7.0		1.5		90,5-100	0.5		0.0	
0-97		10.0		2.4	97-100		0.2		0.0
0-100	9.0	10.1	2.1	2.7					
100-0	-3.2	-3.5	1.2	1.3					

Cold start performance			rpm	1500	1800
Time from start to stay within 0.5% of no load speed at ambient temperature:	°C	20	s	5.2	5.7
		5	s	6.0	6.4
		-15*	s	6.2	7.0
		-30**	s	7.3	9.1

* With manifold heater 4 kW egaged, lubrication oil 15W/40 and block heater.

** With manifold heater 4 kW egaged, lubrication oil 5W/30 and block heater, Fuel MK-1.

Block heater type	Make	Power kW	Engaged hours	Cooling water temp engine block
	Volvo	2	12	10°C 50°F

Lubrication system			rpm	1500	1800
Lubricating oil consumption	Standby Power		litre/h	0.04	0.04
			US gal/h	0.011	0.011
	Prime Power		litre/h	0.04	0.04
			US gal/h	0.011	0.011
Oil system capacity including filters			litre	36	
			US gal	9.5	
Oil sump capacity:		max	litre	30	
			US gal	7.9	
		min	litre	19	
			US gal	5.0	
Oil change intervals/specifications:	VDS 3		h	600	
	VDS 2		h	400	
			h		
Engine angularity limits:		front up	°	11	
		front down	°	11	
		side tilt	°	11	
Oil pressure at rated speed			kPa	370 - 520	
			psi	54 - 75	
Lubrication oil temperature in oil sump:		max	°C	130	
			°F	266	
Oil filter micron size			µ	40.000	

* See also general section in the sales guide

Fuel system		rpm	1500	1800
Standby Power	25%	g/kWh	244	253
Specific fuel consumption at:		lb/hph	0.396	0.410
	50%	g/kWh	221	221
		lb/hph	0.358	0.358
	75%	g/kWh	207	212
		lb/hph	0.336	0.344
	100%	g/kWh	202	210
		lb/hph	0.327	0.340
Prime Power	25%	g/kWh	250	262
Specific fuel consumption at:		lb/hph	0.405	0.425
	50%	g/kWh	222	226
		lb/hph	0.360	0.366
	75%	g/kWh	204	214
		lb/hph	0.331	0.347
	100%	g/kWh	200	211
		lb/hph	0.324	0.342

Fuel system	rpm	1500	1800
Fuel to conform to	ASTM-D975-No1 and 2D JIS KK 2204, EN 590		
System supply flow at:	litre/h	94.0	102.0
	US gal/h	24.8	26.9
Fuel supply line max restriction	kPa	30.0	30.0
(Measured at fuel inlet connection)	psi	4.4	4.4
Fuel supply line max pressure, engine stopped	kPa	0.0	0.0
	psi		
System return flow	litre/h	18.0	18.0
	US gal/h	4.8	4.8
Fuel return line max restriction	kPa	20.0	20.0
(Measured at fuel return connection)	psi	2.9	2.9
Maximum allowable inlet fuel temp	°C	60	60
(Measured at fuel inlet connection)	°F	140	140
Prefilter / Water separator micron size	µ	10.000	
Fuel filter micron size	µ	5.000	
Governor type/make, standard	Volvo / EMS 2.2		
Injection pump type/make	Delphi E3.18		

Intake and exhaust system			rpm	1500	1800
Air consumption at: (+25°C and 100kPa)	Standby Power		m^3/min	21.2	25.7
			cfm	749	908
	Prime Power		m^3/min	19.7	24.5
			cfm	696	865
Max allowable air intake restriction including piping			kPa	5	5
			psi	0.7	0.7
Air filter restriction clean Volvo Penta filter			kPa		
			psi		
Heat rejection to exhaust at:		Standby Power	kW	221	247
			BTU/min	12568	14047
		Prime Power	kW	202	225
			BTU/min	11488	12796
Exhaust gas temperature after turbine at:		Standby Power	°C	480	465
			°F	896	869
		Prime Power	°C	467	445
			°F	873	833
Max allowable back pressure in exhaust line		Standby Power	kPa	10	10
			psi	1.5	1.5
		Prime Power	kPa	8	8
			psi	1.2	1.2
Exhaust gas flow at: (temp and pressure after turbine at the corresponding power setting)		Standby Power	m^3/min	52.6	60.3
			cfm	1858	2129
		Prime Power	m^3/min	48.9	56.6
			cfm	1727	1999

Cooling system			rpm	1500	1800
Heat rejection radiation from engine at:	Standby Power		kW	10	9
			BTU/min	569	512
	Prime Power		kW	10	8
			BTU/min	569	455
Heat rejection to coolant at:	Standby Power		kW	130	156
			BTU/min	7393	8872
	Prime Power		kW	127	143
			BTU/min	7222	8132
Coolant	Volvo Penta coolant "ready mix" or Volvo Penta coolant mixed with clean fresh water 40 / 60				
Radiator cooling system type			Closed circuit		
Standard radiator core area			m²	0.8	
			foot²	8.61	
Fan diameter			mm	890	
			in	35.04	
Fan power consumption			kW	7	12
			hp	10	16
Fan drive ratio				0.84:1	
Coolant capacity,	engine		litre	20	
			US gal	5.28	
	engine with std radiator and hoses		litre	24	
			US gal	6.34	
Coolant pump			drive/ratio	Belt / 1.43:1	
Coolant flow with standard system			l/s	5	5.5
			US gal/s	1.32	1.45
Minimum coolant flow			l/s	4.1	5.0
			US gal/s	1.08	1.32
Maximum outer circuit restriction, including piping			kPa	40	40
			psi	5.8	5.8
Thermostat	start to open		°C	82	
			°F	180	
	fully open		°C	92	
			°F	198	
Maximum static pressure head (expansion tank height + pressure cap setting)			kPa	100	
			psi	14.5	
Minimum static pressure head (expansion tank height + pressure cap setting)			kPa	70	
			psi	10.2	
Standard pressure cap setting			kPa	75	
			psi	10.9	
Maximum top tank temperature			°C	107	
			°F	225	
Draw down capacity. The difference between min coolant level in the expansion tank and the lowest level where the engine's coolant system still is functioning			litre	1.8	
			US gal	0.48	

Charge air cooler system		rpm	1500	1800
Heat rejection to charge air cooler	Standby Power	kW	64	82
		BTU/min	3640	4663
	Prime Power	kW	53	73
		BTU/min	3014	4151
Charge air mass flow	Standby Power	kg/s	0.42	0.49
	Prime Power	kg/s	0.41	0.47
Charge air inlet temp. (Charge air temp after turbo compressor)	Standby Power	°C	190	210
		°F	374	410
	Prime Power	°C	175	196
		°F	347	385
Charge air outlet temp. (Charge air temp after intercooler)	Standby Power	°C	47	45
		°F	117	113
	Prime Power	°C	45	43
		°F	113	109
Maximum pressure drop over charge air cooler incl. piping		kPa	8	
		psi	1.16	
Charge air pressure (After charge air cooler)		kPa	264	
		psi	38.29	
Standard charge air cooler core area		m²	0.89	
		foot²	9.58	

Cooling performance

Cooling air flow and external restriction at different radiator air temperatures based on 107°C TTT and 40% coolant. Valid at 1 atm. (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	45				
	55			4.6	245
	58	4.7	220	5.0	135
	61	5.2	95	5.5	0
	63	5.5	0		
1800	45	3.9	900	4.4	775
	50	4.4	775	4.9	610
	55	4.9	575	5.5	360
	60	5.7	295	6.4	0
	64	6.4	0		

Note! External restrictions are calculated for values >0 Pa

Engine management system

Functionality	Alternatives	Default setting
Governor mode	Isochronus / Droop	Isochronus
Governor droop	0-8 %	4.0
Governor response	Adjustable PID-constants (VODIA)	Standard
Dual speed	1500 / 1800 rpm	According to customer
Idle speed	600-1200 rpm	900 rpm
Fine speed adjustment	± 120 rpm	0.0
Stop function	Energized to Run / Stop	Energized to Stop
Preheating function	On / Off	On
Lamp test	On / Off	On

Engine sensor and switch settings

			Alarm level		Engine protection	
Parameter		**Unit**	**Setting range**	**Default setting**	**Level**	**Action. Default/Alternative**
Oil temp		°C	120 - 130	125	Setting +5	Shut down.
Oil pressure	Low idle	kPa	-	150.0	120.0	Shut down
	1500 rpm	kPa	-	250.0	220.0	Shut down
	1800 rpm	kPa	-	300.0	270.0	Shut down
Oil level			-	Min level	-	-
Piston cooling pressure >1000 rpm		kPa	-	150	150.0	Shut down
Coolant temp		°C	95 - 103	102	Setting +5	Shut down.
Coolant level			-	On	Low level	Shut down.
Fuel feed pressure	Low idle	kPa	-	150	-	-
	>1400 rpm		-	300	-	-
Water in fuel			-	High level	-	-
Crank case pressure		kPa	-	Increased Pressure	Increased Pressure	Shut down
Air filter pressure droop		kPa	-	5	-	-
		0.0	Alarm level		Engine protection	
Altitude, above sea		m	-	-	-	Automatic derating, see section derating
Charge air temp		°C	-	80	85.0	
Charge air pressure		kPa	-	310	320.0	
Engine speed		rpm	100 - 120% of rated speed	120%	Alarm level	Shut down.
Engine protection can be disabled. For consequences please see VP International Limited Warranty Policy						

Electrical system

Voltage and type		24 V / insulated from earth	
Alternator:	make/output	A	Bosch / 80
	tacho output	Hz/alt. Rev	6
	drive ratio		5.3 : 1
Starter motor		make	Melco
		type	105 P70
		kW	7.0
Number of teeth on:	flywheel		153
	starter motor		12
Max wiring resistance main circuit		mΩ	2
Cranking current at +20°C		A	280
Crank engine speed at 20°C		rpm	155
Starter motor battery capacity:	max	Ah/A	2x225
	min at +5°C	Ah/A	-
Inlet manifold heater (at 20 V)		kW	4.0
Power relay for the manifold heater		A	1

Power take off		**rpm**	**1500**	**1800**
Front end in line with crank shaft max:		Nm lbft	-	
Front end belt pulley load. Direction of load viewed from flywheel side:	max left	kW hp	-	-
	max down	kW hp	-	-
	max right	kW hp	-	-
Timing gear at compressor PTO max:		Nm lbft	160 118	
Speed ratio direction of rotation viewed from flywheel side		0.91:1/clockwise		
Timing gear at servo pump PTO max:		Nm lbft	100 74	
Speed ratio direction of rotation viewed from flywheel side		1.58:1/clockwise		
Timing gear at hydraulic pump PTO max:		Nm lbft	-	
Speed ratio direction of rotation viewed from flywheel side				
Max allowed bending moment in flywheel housing		Nm lbft	15000 11063	
Max. rear main bearing load		N lbf	4000 899.2	

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	12.78 779.7
Firing order			1-5-3-6-2-4
Bore		mm in	131 5.16
Stroke		mm in	158 6.22
Compression ratio			18.1:1
Wet weight	Engine only	kg lb	1325 2921
	Engine incl. cooling system and air filtration system	kg lb	1596 3519
	Engine incl. cooling system, air filtration system, and frame	kg lb	1790 3946

Performance		**rpm**	**1500**	**1800**
Standby Power	without fan	kW hp	356 484	395 537
	with fan	kW hp	345 469	376 511
Prime Power	without fan	kW hp	325 442	363 494
	with fan	kW hp	314 427	344 468
Torque at:	Standby Power	Nm lbft	2266 1671	2096 1545
	Prime Power	Nm lbft	2069 1526	1926 1420
Mean piston speed		m/s ft/sec	7.9 26.0	9.5 31.2
Effective mean pressure at:	Standby Power	MPa psi	2.2 323	2.1 299
Effective mean pressure at:	Prime Power	MPa psi	2.0 295	1.9 275
Max combustion pressure at:	Standby Power	MPa psi	16 2321	15.8 2292
Max combustion pressure at:	Prime Power	MPa psi	14.8 2147	15.1 2190
Total mass moment of inertia, J (mR^2)		kgm^2 $lbft^2$	3.43 81.4	
Friction Power		kW hp	31 42.16	44 59.84
Derating see Technical Diagrams				

Engine noise emission

Test Standards: ISO 3744-1981 (E) sound power

Tolerance ± 0.75 dB(A)			rpm	1500	1800
Measured sound power Lw	No load	dB(A)		114	111.3
	Standby Power	dB(A)		115.1	114.4
	Prime Power	dB(A)		114.9	114
Calculated sound pressure Lp at 1 m	No load	dB(A)		103	100.3
	Standby Power	dB(A)		104.1	103.4
	Prime Power	dB(A)		103.9	103

Unsilenced exhaust noise

Data calculated as sound pressure Lp.

Assumed microphone distance 1 m	rpm	1500	1800
Standby Power	dB(A)	114	118
Prime Power	dB(A)	113	118

Test conditions for load acceptance data

Warm engine.	**Generator**	**Model**	**Type of AVR**
	Stamford	HCI 434 F1	MX 341
AVR Settings	Frequency:50/60HZ, Voltage:400/440V, UFRO:47/57Hz, STAB:50/70%, DIP:50/50%		

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	1.6	1.7	1.0	1.2	20-100	12.1	14.0	2.6	3.7
0-40	2.9	3.4	1.3	1.4	40-100	5.4	6.1	1.6	2.3
0-54		7.0		1.9	54-100		4.0		1.9
0-59,5	7.0		1.8		59,5-100	2.3		1.5	
0-60	7.2	8.7	1.8	2.1	60-100	2.3	2.7	1.4	1.4
0-65		10.0		2.4	65-100		2.5		1.4
0-72	10.0		2.4		72-100	1.6		1.2	
0-80	11.9	16.9	2.4	2.5	80-100	1.2	1.3	1.0	1.1
0-100	17.8	22.4	3.0	4.2					
100-0	-5.0	-5.6	1.5	1.6					

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	1.6	1.8	0.9	0.9	20-100	7.4	7.5	1.7	2.2
0-40	3.0	3.1	1.1	1.2	40-100	4.1	4.9	1.2	2.1
0-60	4.7	5.5	1.0	1.0	60-100	2.9	3.7	1.0	1.5
0-70		7.0		1.3	70-100		2.1		1.0
0-77,5	7.0		1.3		77,5-100	1.4		0.8	
0-80	7.8	9.4	1.3	1.7	80-100	1.1	1.2	0.7	0.7
0-82		10.0		1.8	82-100		1.2		0.6
0-90,5	10.0		1.7		90,5-100	0.6		0.0	
0-100	11.7	13.5	2.2	2.7					
100-0	-3.7	-3.8	1.5	1.5					

Cold start performance			rpm	1500	1800
Time from start to stay within 0.5% of no load speed at ambient temperature:	°C	20	s	5.2	5.7
		5	s	6.0	6.4
		-15*	s	6.2	7.0
		-30**	s	7.3	9.1

* With manifold heater 4 kW egaged, lubrication oil 15W/40 and block heater.

** With manifold heater 4 kW egaged, lubrication oil 5W/30 and block heater, Fuel MK-1.

Block heater type	Make	Power kW	Engaged hours	Cooling water temp engine block
	Volvo	2	12	10°C 50°F

Lubrication system			rpm	1500	1800
Lubricating oil consumption	Standby Power		litre/h	0.04	0.05
			US gal/h	0.011	0.013
	Prime Power		litre/h	0.04	0.05
			US gal/h	0.011	0.013
Oil system capacity including filters			litre	36	
			US gal	9.5	
Oil sump capacity:		max	litre	30	
			US gal	7.9	
		min	litre	19	
			US gal	5.0	
Oil change intervals/specifications:	VDS 3		h	600	
	VDS 2		h	400	
			h		
Engine angularity limits:		front up	°	11	
		front down	°	11	
		side tilt	°	11	
Oil pressure at rated speed			kPa	370 - 520	
			psi	54 - 75	
Lubrication oil temperature in oil sump:		max	°C	130	
			°F	266	
Oil filter micron size			µ	40.000	

* See also general section in the sales guide

Fuel system		rpm	1500	1800
Standby Power	25%	g/kWh	237	253
Specific fuel consumption at:		lb/hph	0.384	0.410
	50%	g/kWh	216	214
		lb/hph	0.350	0.347
	75%	g/kWh	206	210
		lb/hph	0.334	0.340
	100%	g/kWh	200	208
		lb/hph	0.324	0.337
Prime Power	25%	g/kWh	241	252
Specific fuel consumption at:		lb/hph	0.391	0.408
	50%	g/kWh	217	218
		lb/hph	0.352	0.353
	75%	g/kWh	206	209
		lb/hph	0.334	0.339
	100%	g/kWh	197	205
		lb/hph	0.319	0.332

Fuel system	rpm	1500	1800
Fuel to conform to	ASTM-D975-No1 and 2D JIS KK 2204, EN 590		
System supply flow at:	litre/h	105.0	116.0
	US gal/h	27.7	30.6
Fuel supply line max restriction	kPa	30.0	30.0
(Measured at fuel inlet connection)	psi	4.4	4.4
Fuel supply line max pressure, engine stopped	kPa	0.0	0.0
	psi		
System return flow	litre/h	18.0	18.0
	US gal/h	4.8	4.8
Fuel return line max restriction	kPa	20.0	20.0
(Measured at fuel return connection)	psi	2.9	2.9
Maximum allowable inlet fuel temp	°C	60	60
(Measured at fuel inlet connection)	°F	140	140
Prefilter / Water separator micron size	µ	10.000	
Fuel filter micron size	µ	5.000	
Governor type/make, standard	Volvo / EMS 2.2		
Injection pump type/make	Delphi E3.18		

Intake and exhaust system			rpm	1500	1800
Air consumption at: (+25°C and 100kPa)	Standby Power		m^3/min	23	26
			cfm	812	918
	Prime Power		m^3/min	22	26
			cfm	777	918
Max allowable air intake restriction including piping			kPa	5	5
			psi	0.7	0.7
Air filter restriction clean Volvo Penta filter			kPa		
			psi		
Heat rejection to exhaust at:		Standby Power	kW	250	300
			BTU/min	14217	17061
		Prime Power	kW	225	269
			BTU/min	12796	15298
Exhaust gas temperature after turbine at:		Standby Power	°C	495	535
			°F	923	995
		Prime Power	°C	470	470
			°F	878	878
Max allowable back pressure in exhaust line		Standby Power	kPa	10	10
			psi	1.5	1.5
		Prime Power	kPa	8	8
			psi	1.2	1.2
Exhaust gas flow at: (temp and pressure after turbine at the corresponding power setting)		Standby Power	m^3/min	58.1	67.7
			cfm	2052	2391
		Prime Power	m^3/min	53.7	62.7
			cfm	1896	2214

Cooling system			rpm	1500	1800
Heat rejection radiation from engine at:	Standby Power		kW	12	9
			BTU/min	682	512
	Prime Power		kW	11	8
			BTU/min	626	455
Heat rejection to coolant at:	Standby Power		kW	149	177
			BTU/min	8473	10066
	Prime Power		kW	143	164
			BTU/min	8132	9327
Coolant	Volvo Penta coolant "ready mix" or Volvo Penta coolant mixed with clean fresh water 40 / 60				
Radiator cooling system type			Closed circuit		
Standard radiator core area			m²	0.8	
			foot²	8.61	
Fan diameter			mm	890	
			in	35.04	
Fan power consumption			kW	11	19
			hp	15	26
Fan drive ratio				0.99:1	
Coolant capacity,	engine		litre	20	
			US gal	5.28	
	engine with std radiator and hoses		litre	24	
			US gal	6.34	
Coolant pump			drive/ratio	Belt / 1.43:1	
Coolant flow with standard system			l/s	5	5.5
			US gal/s	1.32	1.45
Minimum coolant flow			l/s	4.5	5.0
			US gal/s	1.19	1.32
Maximum outer circuit restriction, including piping			kPa	30	40
			psi	4.4	5.8
Thermostat	start to open		°C	82	
			°F	180	
	fully open		°C	92	
			°F	198	
Maximum static pressure head (expansion tank height + pressure cap setting)			kPa	100	
			psi	14.5	
Minimum static pressure head (expansion tank height + pressure cap setting)			kPa	70	
			psi	10.2	
Standard pressure cap setting			kPa	75	
			psi	10.9	
Maximum top tank temperature			°C	107	
			°F	225	
Draw down capacity. The difference between min coolant level in the expansion tank and the lowest level where the engine's coolant system still is functioning			litre	1.8	
			US gal	0.48	

Charge air cooler system		rpm	1500	1800
Heat rejection to charge air cooler	Standby Power	kW	76	87
		BTU/min	4322	4948
	Prime Power	kW	65	83
		BTU/min	3696	4720
Charge air mass flow	Standby Power	kg/s	0.46	0.5
	Prime Power	kg/s	0.44	0.49
Charge air inlet temp. (Charge air temp after turbo compressor)	Standby Power	°C	209	215
		°F	408	419
	Prime Power	°C	191	208
		°F	376	406
Charge air outlet temp. (Charge air temp after intercooler)	Standby Power	°C	50	45
		°F	122	113
	Prime Power	°C	48	43
		°F	118	109
Maximum pressure drop over charge air cooler incl. piping		kPa	8	
		psi	1.16	
Charge air pressure (After charge air cooler)		kPa	264	
		psi	38.29	
Standard charge air cooler core area		m²	0.89	
		foot²	9.58	

Cooling performance

Cooling air flow and external restriction at different radiator air temperatures based on 107°C TTT and 40% coolant. Valid at 1 atm. (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	40				
	55			5.7	265
	57	5.5	350	6.1	135
	59	5.9	220	6.2	0
	62	6.6	0		
1800	40	4.5	1350	5.0	1140
	50	4.9	1170	5.5	975
	55	5.6	940	6.2	685
	60	6.6	510	7.1	250
	61			7.7	0
	65	7.7	0		

Note! External restrictions are calculated for values >0 Pa

Engine management system

Functionality	Alternatives	Default setting
Governor mode	Isochronus / Droop	Isochronus
Governor droop	0-8 %	4.0
Governor response	Adjustable PID-constants (VODIA)	Standard
Dual speed	1500 / 1800 rpm	According to customer
Idle speed	600-1200 rpm	900 rpm
Fine speed adjustment	± 120 rpm	0.0
Stop function	Energized to Run / Stop	Energized to Stop
Preheating function	On / Off	On
Lamp test	On / Off	On

Engine sensor and switch settings

			Alarm level		Engine protection	
Parameter		**Unit**	**Setting range**	**Default setting**	**Level**	**Action. Default/Alternative**
Oil temp		°C	120 - 130	125	Setting +5	Shut down.
Oil pressure	Low idle	kPa	-	150.0	120.0	Shut down
	1500 rpm	kPa	-	250.0	220.0	Shut down
	1800 rpm	kPa	-	300.0	270.0	Shut down
Oil level			-	Min level	-	-
Piston cooling pressure >1000 rpm		kPa	-	150	150.0	Shut down
Coolant temp		°C	95 - 103	102	Setting +5	Shut down.
Coolant level			-	On	Low level	Shut down.
Fuel feed pressure	Low idle	kPa	-	150	-	-
	>1400 rpm		-	300	-	-
Water in fuel			-	High level	-	-
Crank case pressure		kPa	-	Increased Pressure	Increased Pressure	Shut down
Air filter pressure droop		kPa	-	5	-	-
		0.0	Alarm level		Engine protection	
Altitude, above sea		m	-	-	-	Automatic derating, see section derating
Charge air temp		°C	-	80	85.0	
Charge air pressure		kPa	-	310	320.0	
Engine speed		rpm	100 - 120% of rated speed	120%	Alarm level	Shut down.
Engine protection can be disabled. For consequences please see VP International Limited Warranty Policy						

Electrical system

Voltage and type		24 V / insulated from earth	
Alternator:	make/output	A	Bosch / 80
	tacho output	Hz/alt. Rev	6
	drive ratio		5.3 : 1
Starter motor		make	Melco
		type	105 P70
		kW	7.0
Number of teeth on:	flywheel		153
	starter motor		12
Max wiring resistance main circuit		mΩ	2
Cranking current at +20°C		A	280
Crank engine speed at 20°C		rpm	155
Starter motor battery capacity:	max	Ah/A	2x225
	min at +5°C	Ah/A	-
Inlet manifold heater (at 20 V)		kW	4.0
Power relay for the manifold heater		A	1

Power take off		**rpm**	**1500**	**1800**
Front end in line with crank shaft max:		Nm lbft	-	
Front end belt pulley load. Direction of load viewed from flywheel side:	max left	kW hp	-	-
	max down	kW hp	-	-
	max right	kW hp	-	-
Timing gear at compressor PTO max:		Nm lbft	160 118	
Speed ratio direction of rotation viewed from flywheel side		0.91:1/clockwise		
Timing gear at servo pump PTO max:		Nm lbft	100 74	
Speed ratio direction of rotation viewed from flywheel side		1.58:1/clockwise		
Timing gear at hydraulic pump PTO max:		Nm lbft	-	
Speed ratio direction of rotation viewed from flywheel side				
Max allowed bending moment in flywheel housing		Nm lbft	15000 11063	
Max. rear main bearing load		N lbf	4000 899.2	

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	12.78 779.7
Firing order			1-5-3-6-2-4
Bore		mm in	131 5.16
Stroke		mm in	158 6.22
Compression ratio			18.1:1
Wet weight	Engine only	kg lb	1325 2921
	Engine incl. cooling system and air filtration system	kg lb	1596 3519
	Engine incl. cooling system, air filtration system, and frame	kg lb	1790 3946

Performance		**rpm**	**1500**	**1800**
Standby Power	without fan	kW hp	404 549	400 544
	with fan	kW hp	390 530	376 511
Prime Power	without fan	kW hp	369 502	368 500
	with fan	kW hp	355 483	344 468
Torque at:	Standby Power	Nm lbft	2572 1897	2122 1565
	Prime Power	Nm lbft	2349 1732	1952 1440
Mean piston speed		m/s ft/sec	7.9 26.0	9.5 31.2
Effective mean pressure at:	Standby Power	MPa psi	2.5 367	2.1 303
Effective mean pressure at:	Prime Power	MPa psi	2.3 335	1.9 278
Max combustion pressure at:	Standby Power	MPa psi	19.8 2872	17.8 2582
Max combustion pressure at:	Prime Power	MPa psi	19.3 2799	16.1 2335
Total mass moment of inertia, J (mR^2)		kgm^2 $lbft^2$	3.43 81.4	
Friction Power		kW hp	31 42.16	44 59.84
Derating see Technical Diagrams				

Engine noise emission

Test Standards: ISO 3744-1981 (E) sound power

Tolerance ± 0.75 dB(A)		**rpm**	**1500**	**1800**
Measured sound power Lw	No load	dB(A)	113.5	111.3
	Standby Power	dB(A)	115.6	114.5
	Prime Power	dB(A)	115.6	114.1
Calculated sound pressure Lp at 1 m	No load	dB(A)	102.5	100.3
	Standby Power	dB(A)	104.6	103.5
	Prime Power	dB(A)	104.6	103.1

Unsilenced exhaust noise

Data calculated as sound pressure Lp.

Assumed microphone distance 1 m	**rpm**	**1500**	**1800**
Standby Power	dB(A)	114	118
Prime Power	dB(A)	114	118

Test conditions for load acceptance data

Warm engine.	**Generator**	**Model**	**Type of AVR**
	Stamford	HCI 434 F1	MX 341
AVR Settings	Frequency:50/60HZ, Voltage:400/440V, UFRO:47/57Hz, STAB:50/70%, DIP:50/50%		

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	1.7	1.9	1.2	1.2	20-100	13.6	14.9	2.4	3.2
0-40	3.5	4.2	1.3	1.3	40-100	4.9	5.5	1.5	2.1
0-50,5		7.0		2.2	50,5-100		3.5		1.5
0-55,5	7.0		2.2		55,5-100	3.0		1.4	
0-60	8.0		2.2		60-100	2.5		1.4	
0-60,5		10.0		2.4	60,5-100		2.8		1.3
0-66,5	10.0		2.3		66,5-100	2.2		1.3	
0-80	14.6	18.3	2.3	2.6	80-100	1.2	1.1	1.0	1.1
0-100	22.1	29.4	3.2	5.0					
100-0	-5.8	-6.3	1.5	1.6					

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	1.6	1.8	0.9	0.9	20-100	7.4	7.5	1.7	2.2
0-40	3.0	3.1	1.1	1.2	40-100	4.1	4.9	1.2	2.1
0-60	4.7	5.5	1.0	1.0	60-100	2.9	3.7	1.0	1.5
0-70		7.0		1.3	70-100		2.1		1.0
0-77,5	7.0		1.3		77,5-100	1.4		0.8	
0-80	7.8	9.4	1.3	1.7	80-100	1.1	1.2	0.7	0.7
0-82		10.0		1.8	82-100		1.2		0.6
0-90,5	10.0		1.7		90,5-100	0.6		0.0	
0-100	11.7	13.5	2.2	2.7					
100-0	-3.7	-3.8	1.5	1.5					

Cold start performance			rpm	1500	1800
Time from start to stay within 0.5% of no load speed at ambient temperature:	°C	20	s	5.2	5.7
		5	s	6.0	6.4
		-15*	s	6.2	7.0
		-30**	s	7.3	9.1

* With manifold heater 4 kW egaged, lubrication oil 15W/40 and block heater.

** With manifold heater 4 kW egaged, lubrication oil 5W/30 and block heater, Fuel MK-1.

Block heater type	Make	Power kW	Engaged hours	Cooling water temp engine block
	Volvo	2	12	10°C 50°F

Lubrication system			rpm	1500	1800
Lubricating oil consumption	Standby Power		litre/h US gal/h	0.04 0.011	0.05 0.013
	Prime Power		litre/h US gal/h	0.04 0.011	0.05 0.013
Oil system capacity including filters			litre US gal	36 9.5	
Oil sump capacity:		max	litre US gal	30 7.9	
		min	litre US gal	19 5.0	
Oil change intervals/specifications:	VDS 3		h	600	
	VDS 2		h	400	
			h		
Engine angularity limits:		front up	°	11	
		front down	°	11	
		side tilt	°	11	
Oil pressure at rated speed			kPa psi	370 - 520 54 - 75	
Lubrication oil temperature in oil sump:		max	°C °F	130 266	
Oil filter micron size			µ	40.000	

* See also general section in the sales guide

Fuel system		rpm	1500	1800
Standby Power	25%	g/kWh	238	253
Specific fuel consumption at:		lb/hph	0.386	0.410
	50%	g/kWh	221	214
		lb/hph	0.358	0.347
	75%	g/kWh	206	209
		lb/hph	0.334	0.339
	100%	g/kWh	195	200
		lb/hph	0.316	0.324
Prime Power	25%	g/kWh	242	258
Specific fuel consumption at:		lb/hph	0.392	0.418
	50%	g/kWh	222	217
		lb/hph	0.360	0.352
	75%	g/kWh	205	208
		lb/hph	0.332	0.337
	100%	g/kWh	192	199
		lb/hph	0.311	0.323

Fuel system	rpm	1500	1800
Fuel to conform to	ASTM-D975-No1 and 2D JIS KK 2204, EN 590		
System supply flow at:	litre/h	112.0	113.0
	US gal/h	29.6	29.9
Fuel supply line max restriction	kPa	30.0	30.0
(Measured at fuel inlet connection)	psi	4.4	4.4
Fuel supply line max pressure, engine stopped	kPa	0.0	0.0
	psi		
System return flow	litre/h	18.0	18.0
	US gal/h	4.8	4.8
Fuel return line max restriction	kPa	20.0	20.0
(Measured at fuel return connection)	psi	2.9	2.9
Maximum allowable inlet fuel temp	°C	60	60
(Measured at fuel inlet connection)	°F	140	140
Prefilter / Water separator micron size	µ	10.000	
Fuel filter micron size	µ	5.000	
Governor type/make, standard	Volvo / EMS 2.2		
Injection pump type/make	Delphi E3.18		

Intake and exhaust system			rpm	1500	1800
Air consumption at: (+25°C and 100kPa)	Standby Power		m^3/min	24	26
			cfm	848	918
	Prime Power		m^3/min	23	26
			cfm	812	918
Max allowable air intake restriction including piping			kPa	5	5
			psi	0.7	0.7
Air filter restriction clean Volvo Penta filter			kPa		
			psi		
Heat rejection to exhaust at:		Standby Power	kW	260	280
			BTU/min	14786	15923
		Prime Power	kW	236	252
			BTU/min	13421	14331
Exhaust gas temperature after turbine at:		Standby Power	°C	501	502
			°F	934	936
		Prime Power	°C	476	457
			°F	889	855
Max allowable back pressure in exhaust line		Standby Power	kPa	10	10
			psi	1.5	1.5
		Prime Power	kPa	8	8
			psi	1.2	1.2
Exhaust gas flow at: (temp and pressure after turbine at the corresponding power setting)		Standby Power	m^3/min	61.0	65.0
			cfm	2154	2295
		Prime Power	m^3/min	58.0	61.0
			cfm	2048	2154

Cooling system			rpm	1500	1800
Heat rejection radiation from engine at:	Standby Power		kW	13	9
			BTU/min	739	512
	Prime Power		kW	12	8
			BTU/min	682	455
Heat rejection to coolant at:	Standby Power		kW	162	177
			BTU/min	9213	10066
	Prime Power		kW	156	164
			BTU/min	8872	9327
Coolant	Volvo Penta coolant "ready mix" or Volvo Penta coolant mixed with clean fresh water 40 / 60				
Radiator cooling system type			Closed circuit		
Standard radiator core area			m^2	0.8	
			$foot^2$	8.61	
Fan diameter			mm	890	
			in	35.04	
Fan power consumption			kW	14	24
			hp	19	33
Fan drive ratio				1.07:1	
Coolant capacity,	engine		litre	20	
			US gal	5.28	
	engine with std radiator and hoses		litre	24	
			US gal	6.34	
Coolant pump			drive/ratio	Belt / 1.43:1	
Coolant flow with standard system			l/s	5	5.5
			US gal/s	1.32	1.45
Minimum coolant flow			l/s	5.0	5.0
			US gal/s	1.32	1.32
Maximum outer circuit restriction, including piping			kPa	39	40
			psi	5.7	5.8
Thermostat	start to open		°C	82	
			°F	180	
	fully open		°C	92	
			°F	198	
Maximum static pressure head (expansion tank height + pressure cap setting)			kPa	100	
			psi	14.5	
Minimum static pressure head (expansion tank height + pressure cap setting)			kPa	70	
			psi	10.2	
Standard pressure cap setting			kPa	75	
			psi	10.9	
Maximum top tank temperature			°C	107	
			°F	225	
Draw down capacity. The difference between min coolant level in the expansion tank and the lowest level where the engine's coolant system still is functioning			litre	1.8	
			US gal	0.48	

Charge air cooler system		rpm	1500	1800
Heat rejection to charge air cooler	Standby Power	kW	82	84
		BTU/min	4663	4777
	Prime Power	kW	72	81
		BTU/min	4095	4606
Charge air mass flow	Standby Power	kg/s	0.49	0.53
	Prime Power	kg/s	0.47	0.52
Charge air inlet temp. (Charge air temp after turbo compressor)	Standby Power	°C	220	210
		°F	428	410
	Prime Power	°C	201	204
		°F	394	399
Charge air outlet temp. (Charge air temp after intercooler)	Standby Power	°C	52	45
		°F	126	113
	Prime Power	°C	51	43
		°F	124	109
Maximum pressure drop over charge air cooler incl. piping		kPa	8	
		psi	1.16	
Charge air pressure (After charge air cooler)		kPa	264	
		psi	38.29	
Standard charge air cooler core area		m²	0.89	
		foot²	9.58	

Cooling performance

Cooling air flow and external restriction at different radiator air temperatures based on 107°C TTT and 40% coolant. Valid at 1 atm. (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	40				
	53			6.3	290
	55	6.0	370	6.7	160
	57	6.5	225	7.1	0
	60	7.1	0		
1800	40	4.5	1350	5.0	1140
	50	4.9	1170	5.5	975
	55	5.6	940	6.2	685
	60	6.6	510	7.1	250
	61			7.7	0
	65	7.7	0		

Note! External restrictions are calculated for values >0 Pa

Engine management system

Functionality	Alternatives	Default setting
Governor mode	Isochronus / Droop	Isochronus
Governor droop	0-8 %	4.0
Governor response	Adjustable PID-constants (VODIA)	Standard
Dual speed	1500 / 1800 rpm	According to customer
Idle speed	600-1200 rpm	900 rpm
Fine speed adjustment	± 120 rpm	0.0
Stop function	Energized to Run / Stop	Energized to Stop
Preheating function	On / Off	On
Lamp test	On / Off	On

Engine sensor and switch settings

			Alarm level		Engine protection	
Parameter		**Unit**	**Setting range**	**Default setting**	**Level**	**Action. Default/Alternative**
Oil temp		°C	120 - 130	125	Setting +5	Shut down.
Oil pressure	Low idle	kPa	-	150.0	120.0	Shut down
	1500 rpm	kPa	-	250.0	220.0	Shut down
	1800 rpm	kPa	-	300.0	270.0	Shut down
Oil level			-	Min level	-	-
Piston cooling pressure >1000 rpm		kPa	-	150	150.0	Shut down
Coolant temp		°C	95 - 103	102	Setting +5	Shut down.
Coolant level			-	On	Low level	Shut down.
Fuel feed pressure	Low idle	kPa	-	150	-	-
	>1400 rpm		-	300	-	-
Water in fuel			-	High level	-	-
Crank case pressure		kPa	-	Increased Pressure	Increased Pressure	Shut down
Air filter pressure droop		kPa	-	5	-	-
		0.0	Alarm level		Engine protection	
Altitude, above sea		m	-	-	-	Automatic derating, see section derating
Charge air temp		°C	-	80	85.0	
Charge air pressure		kPa	-	310	320.0	
Engine speed		rpm	100 - 120% of rated speed	120%	Alarm level	Shut down.
Engine protection can be disabled. For consequences please see VP International Limited Warranty Policy						

Electrical system

Voltage and type		24 V / insulated from earth	
Alternator:	make/output	A	Bosch / 80
	tacho output	Hz/alt. Rev	6
	drive ratio		5.3 : 1
Starter motor		make	Melco
		type	105 P70
		kW	7.0
Number of teeth on:	flywheel		153
	starter motor		12
Max wiring resistance main circuit		mΩ	2
Cranking current at +20°C		A	280
Crank engine speed at 20°C		rpm	155
Starter motor battery capacity:	max	Ah/A	2x225
	min at +5°C	Ah/A	-
Inlet manifold heater (at 20 V)		kW	4.0
Power relay for the manifold heater		A	1

Power take off		**rpm**	**1500**	**1800**
Front end in line with crank shaft max:		Nm lbft	-	
Front end belt pulley load. Direction of load viewed from flywheel side:	max left	kW hp	-	-
	max down	kW hp	-	-
	max right	kW hp	-	-
Timing gear at compressor PTO max:		Nm lbft	160 118	
Speed ratio direction of rotation viewed from flywheel side		0.91:1/clockwise		
Timing gear at servo pump PTO max:		Nm lbft	100 74	
Speed ratio direction of rotation viewed from flywheel side		1.58:1/clockwise		
Timing gear at hydraulic pump PTO max:		Nm lbft	-	
Speed ratio direction of rotation viewed from flywheel side				
Max allowed bending moment in flywheel housing		Nm lbft	15000 11063	
Max. rear main bearing load		N lbf	4000 899.2	

VOLVO PENTA GENSET ENGINE

TAD1651GE

484 kW (658 hp) at 1500 rpm, 565kW (768 hp) at 1800 rpm

A powerful, reliable and economical Generating Set Diesel Engine built on the dependable Volvo in-line six concept.

Energy efficiency and Economy

Through careful management of the combustion process, involving precise control of air movement and injection spray Volvo Penta has been able to achieve higher levels of efficiency than ever before. This has resulted in improved fuel economy and reduced exhaust emission levels that comply with current requirements and which will enable the engines to satisfy future legislation.
Volvo Penta engines offer the highest kWh/Liter fuel, resulting in superior economy and performance.

Durability & low noise

Designed for easy, fast and economical installation. Field tested to ensure highest standard of durability and long life. 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 highly efficient charge air system with low internal losses contributes to excellent combustion and low fuel consumption. The engine is EPA/CARB Tier 3 & EU Stage 3A emission certified. These regulations are met by using V-ACT™ (Volvo Advanced Combustion technology). V-ACT includes a flexible high pressure fuel injection system, an air management system including an internal exhaust gas recirculation device and an enhanced electronic controller.

Easy service & maintenance

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

Features

- Volvo Penta Electronic management system
- Certified for US/EPA Tier 3 and EU Stage 3A at 1500 rpm
- Certified for US/EPA Tier 2 at 1800 rpm
- High efficient cooling system
- Compact design
- Base engines as well as Gen Pac configurations
- Switchable between 1500/1800 rpm
- Excellent step load performance acc. to ISO 8528-5 G3 governing class
- Low operating cost

50 Hz/1500 rpm

Prime power			Standby			Generator efficiency
kWm	kWe	kVa	kWm	kWe	kVa	(%)
430	404	505	473	445	556	94%

60 Hz/1800 rpm

Prime power			Standby			Generator efficiency
kWm	kWe	kVa	kWm	kWe	kVa	(%)
496	466	583	546	513	641	94%

VOLVO PENTA

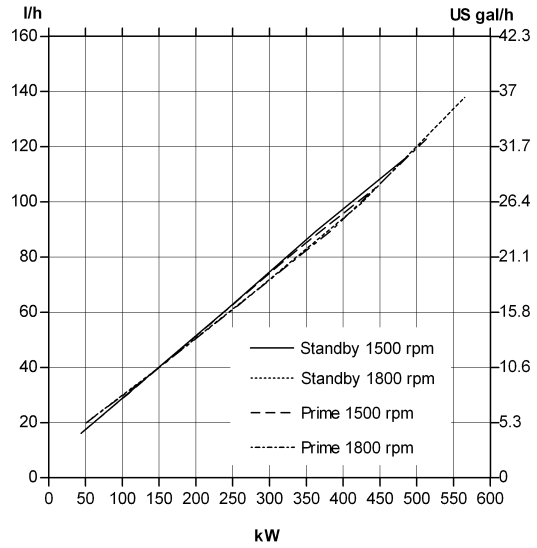
TAD1651GE

Technical Data

General

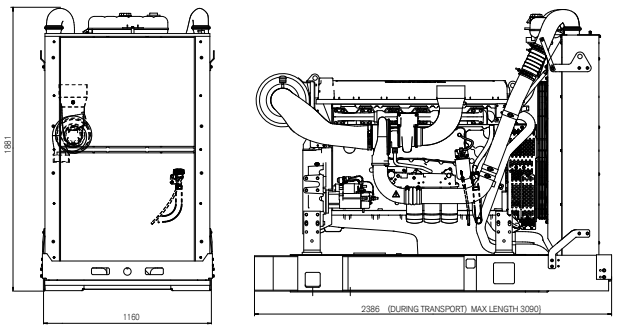
Engine designation	TAD1651GE
No. of cylinders and configuration	in-line 6
Method of operation	4-stroke
Bore, mm (in.)	144 (5.67)
Stroke, mm (in.)	165 (6.50)
Displacement, l (in³)	16.12 (983.9)
Compression ratio	16.5:1
Dry weight, engine only, kg (lb)	1480 (3263)
Dry weight with Gen Pac, kg (lb)	1910 (4211)

Performance	**1500 rpm**	**1800 rpm**
with fan, kW (hp) at:		
Prime Power	430 (585)	496 (675)
Max Standby Power	473 (643)	546 (743)
Fan power consumption, kW (hp)	11 (15)	19 (26)



Dimensions TAD1651GE

Not for installation



Technical description

Engine and block

- Cast iron cylinder block with optimum distribution of forces without the block being unnessarily heavy.
- Wet, replaceable cylinder liners
- Piston cooling for low piston temperature and reduced ring temperature
- Tapered connecting rods for increased piston lifetime
- Crankshaft induction hardened bearing surfaces and fillets with seven bearings for moderate load on main and high-end bearings
- Case hardened and Nitrocarburized transmission gears for heavy duty operation
- Keystone top compression rings for long service life
- Viscous type crankshaft vibration dampers to withstand single bearing alternator torsional vibrations
- Replaceable valve guides and valve seats
- Over head camshaft and 4 valves per cylinder

Lubrication system

- Full flow oil cooler
- Full flow disposable spin-on oil filter, for extra high filtration
- The lubricating oil level can be measured at start-up
- Gear type lubricating oil pump, gear driven by the transmission

Fuel system

- Electronic high pressure unit injectors
- Fuel prefilter with water separator and water-in-fuel indicator / alarm
- Gear driven low-pressure fuel pump
- Fine fuel filter with manual feed pump and fuel pressure switch

Cooling system

- Efficient cooling with accurate coolant control through a water distribution duct in the cylinder block. Reliable sleeve thermostat with minimum pressure drop
- Belt driven coolant pump with high degree of efficiency

Turbo charger

- Efficient and reliable turbo charger
- Electronically controlled Waste-gate
- Extra oil filter for the turbo charger

Electrical system

- Engine Management System 2 (EMS 2), an electronically controlled processing system which optimizes engine performance. It also includes advanced facilities for diagnostics and fault tracing
- The instruments and controls connect to the engine via the CAN SAE J1939 interface, either through the Control Interface Unit (CIU) or the Digital Control Unit (DCU). The CIU converts the digital CAN bus signal to an anolog signal, making it possible to connect a variety of instruments. The DCU is a control panel with display, engine control, monitoring, alarm, parameter setting and diagnostic functions. The DCU also presents error codes in clear text.
- Sensors for oil pressure, oil temp, boost pressure, boost temp, coolant temp, fuel temp, water in fuel, fuel pressure and two speed sensors.

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 US/EPA Tier 3 and EU stage 3 A emission legislation according to the Non Road Directive EU 97/68/EEC. The engine also complies with TA-luft -50% 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.

AB Volvo Penta
SE-405 08 Göteborg, Sweden
www.volvopenta.com

TWD1652GE

522 kW (710 hp) at 1500 rpm, acc. to ISO 3046

NEW!

The TWD1652GE 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.

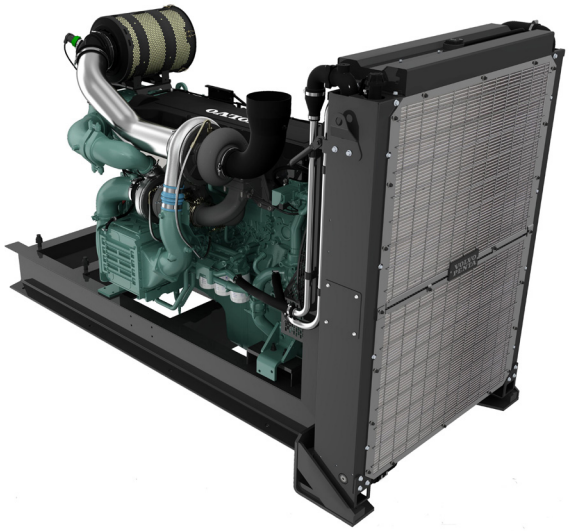
Low exhaust emission

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

The TWD1652GE complies with Indian emission legislation CPCB Stage II (Similar to EU Stage IIIA).

Easy service & maintenance

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



Features

- Volvo Penta Electronic management system
- Certified for CPCB Stage II at 1500 rpm
- High efficient cooling system
- Compact design
- Base engines as well as Gen Pac configurations
- Excellent step load performance acc. to ISO 8528-5 G3 governing class
- Low operating cost

50 Hz/1500 rpm

Prime power			Standby			Generator efficiency
kWm	kWe	kVa	kWm	kWe	kVa	(%)
505	480	600	557	529	661	95%

VOLVO PENTA

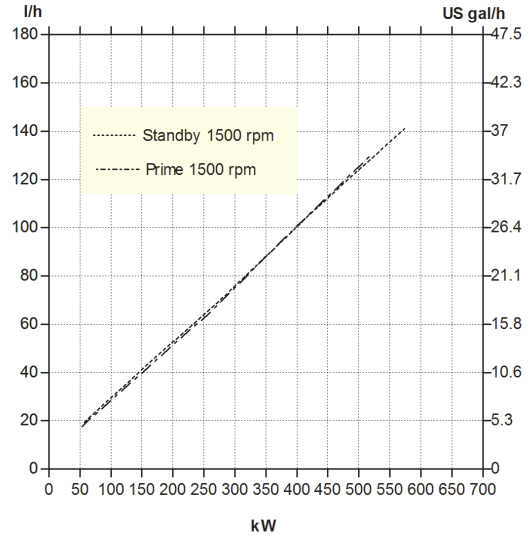
TWD1652GE

Technical Data

General

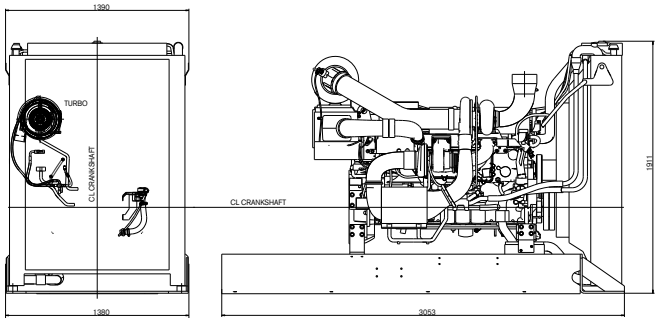
Engine designation	TWD1652GE
No. of cylinders and configuration	in-line 6
Method of operation	4-stroke
Bore, mm (in.)	144 (5.67)
Stroke, mm (in.)	165 (6.50)
Displacement, l (in³)	16.12 (983.9)
Compression ratio	16.5:1
Wet weight, engine only, kg (lb)	1780 (3924)
Wet weight with Gen Pac, kg (lb)	2650 (5842)

Performance	**1500 rpm**
with fan, kW (hp) at:	
Prime Power	505 (687)
Max Standby Power	557 (747)
Fan power consumption, kW (hp)	17 (23)



Dimensions TWD1652GE

Not for installation



Technical description

Engine and block

- Optimized cast iron cylinder block with optimum distribution of forces without the block being unnessarily heavy.
- Wet, replaceable cylinder liners
- Piston cooling for low piston temperature and reduced ring temperature
- Tapered connecting rods for reduce risk of piston cracking
- Crankshaft induction hardened bearing surfaces and fillets with seven bearings for moderate load on main and high-end bearings
- Case hardened and Nitrocarburized transmission gears for heavy duty operation
- Keystone top compression rings for long service life
- Viscous type crankshaft vibration dampers to withstand single bearing alternator torsional vibrations
- Replaceable valve guides and valve seats
- Over head camshaft and four valves per cylinder

Lubrication system

- Full flow oil cooler
- Full flow disposable spin-on oil filter, for extra high filtration
- The lubricating oil level can be measured during operation
- Gear type lubricating oil pump, gear driven by the transmission

Fuel system

- Non-return fuel valve
- Electronic unit injectors
- Fuel prefilter with water separator and water-in-fuel indicator / alarm
- Gear driven low-pressure fuel pump
- Fine fuel filter with manual feed pump and fuel pressure switch
- Fuel shut-off valve (option)

Cooling system

- Two water cooled charge air coolers
- Efficient cooling with accurate coolant control through a water distribution duct in the cylinder block. Reliable sleeve thermostat with minimum pressure drop
- Belt driven, maintenance-free coolant pump with high degree of efficiency

Turbocharger

- Efficient and reliable dual stage turbo chargers
- Intermediate charge air coolers for both turbo chargers
- Waste gate system for the high pressure turbo charger

Electrical system

- Engine Management System 2 (EMS 2), an electronically controlled processing system which optimizes engine performance. It also includes advanced facilities for diagnostics and fault tracing
- The instruments and controls connect to the engine via the CAN SAE J1939 interface, either through the Control Interface Unit (CIU) or the Display Control Unit (DCU). The CIU converts the digital CAN bus signal to an anolog signal, making it possible to connect a variety of instruments. The DCU is a control panel with display, engine control, monitoring, alarm, parameter setting and diagnostic functions. The DCU also presents error codes.
- Sensors for oil pressure, oil temp, boost pressure, boost temp, exhaust temp, coolant temp, water in fuel, fuel pressure and two speed sensors.

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 The engine complies with Indian emission legislation CPCB Stage II
(Similar to EU Stage IIIA).

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.
1 kW = 1.36 hp

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

VOLVO PENTA

AB Volvo Penta
SE-405 08 Göteborg, Sweden
www.volvopenta.com

TWD1653GE

564kW (767 hp) at 1500 rpm, acc. to ISO 3046

NEW!

The TWD1653GE 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.

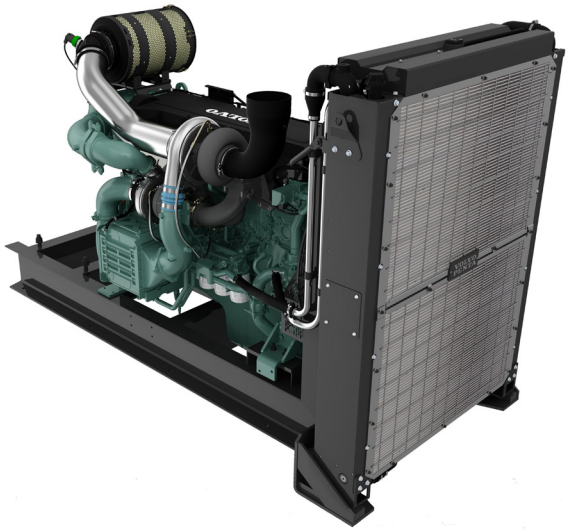
Low exhaust emission

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

The TWD1653GE complies with Indian emission legislation CPCB Stage II (Similar to EU Stage IIIA).

Easy service & maintenance

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



Features

- Volvo Penta Electronic management system
- Complies with CPCB Stage II at 1500 rpm
- High efficient cooling system
- Compact design
- Base engines as well as Gen Pac configurations
- Excellent step load performance acc. to ISO 8528-5 G3 governing class
- Low operating cost

50 Hz/1500 rpm

Prime power			Standby			Generator efficiency
kWm	kWe	kVa	kWm	kWe	kVa	(%)
547	520	650	603	573	716	95%

VOLVO PENTA

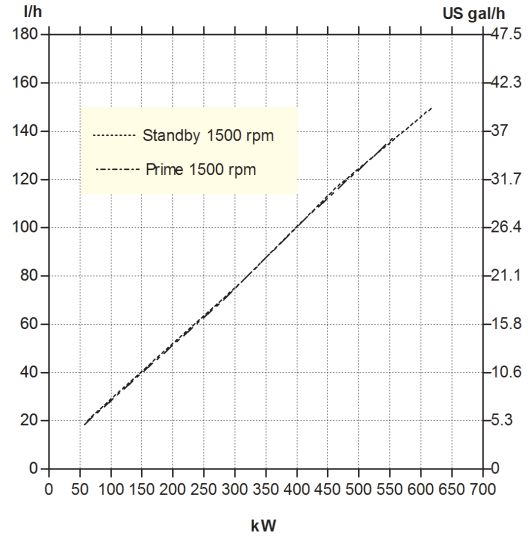
TWD1653GE

Technical Data

General

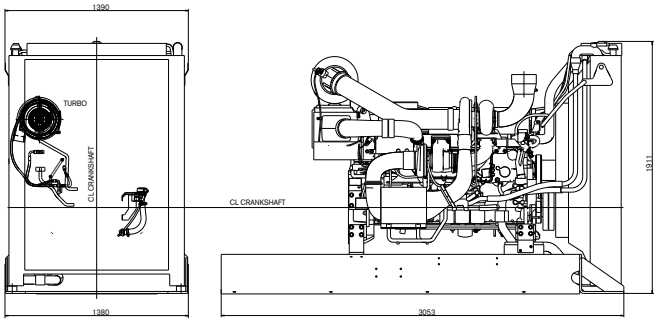
Engine designation	TWD1653GE
No. of cylinders and configuration	in-line 6
Method of operation	4-stroke
Bore, mm (in.)	144 (5.67)
Stroke, mm (in.)	165 (6.50)
Displacement, l (in³)	16.12 (983.9)
Compression ratio	16.5:1
Wet weight, engine only, kg (lb)	1780(3924)
Wet weight with Gen Pac, kg (lb)	2650 (5842)

Performance	**1500 rpm**
with fan, kW (hp) at:	
Prime Power	547 (744)
Max Standby Power	603 (808
Fan power consumption, kW (hp)	17 (23)



Dimensions TWD1653GE

Not for installation



Technical description

Engine and block

- Optimized cast iron cylinder block with optimum distribution of forces without the block being unnessarily heavy.
- Wet, replaceable cylinder liners
- Piston cooling for low piston temperature and reduced ring temperature
- Tapered connecting rods for reduce risk of piston cracking
- Crankshaft induction hardened bearing surfaces and fillets with seven bearings for moderate load on main and high-end bearings
- Case hardened and Nitrocarburized transmission gears for heavy duty operation
- Keystone top compression rings for long service life
- Viscous type crankshaft vibration dampers to withstand single bearing alternator torsional vibrations
- Replaceable valve guides and valve seats
- Over head camshaft and four valves per cylinder

Lubrication system

- Full flow oil cooler
- Full flow disposable spin-on oil filter, for extra high filtration
- The lubricating oil level can be measured during operation
- Gear type lubricating oil pump, gear driven by the transmission

Fuel system

- Non-return fuel valve
- Electronic unit injectors
- Fuel prefilter with water separator and water-in-fuel indicator / alarm
- Gear driven low-pressure fuel pump
- Fine fuel filter with manual feed pump and fuel pressure switch
- Fuel shut-off valve (option)

Cooling system

- Two water cooled charge air coolers
- Efficient cooling with accurate coolant control through a water distribution duct in the cylinder block. Reliable sleeve thermostat with minimum pressure drop
- Belt driven, maintenance-free coolant pump with high degree of efficiency

Turbocharger

- Efficient and reliable dual stage turbo chargers
- Intermediate charge air coolers for both turbo chargers
- Waste gate system for the high pressure turbo charger

Electrical system

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Exhaust emissions
The engine complies with Indian emission legislation CPCB Stage II (Similar to EU Stage IIIA).

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.
1 kW = 1.36 hp

Information
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VOLVO PENTA

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