

Technical data TAD943VE

279kW / 1800rpm

General

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

Number of cylinders			6
Displacement, total		liters	9,36
		in ³	571
Firing order			1-5-3-6-2-4
Bore		mm	120
		in	4,72
Stroke		mm	138
		in	5,43
Compression ratio			20,2
Dry weight	Engine only, excluding cooling system	kg	1015
		lb	2238
	Power pac	kg	1354
		lb	2985
Wet weight	Engine only, excluding cooling system	kg	1065
		lb	2348
	Power pac	kg	1404
		lb	3095

Performance			r/min	1500	1800	2000	2100
ICFN Power	280 kW	without fan	kW	269	279	270	255
			hp	366	379	367	347
		with fan ratio 0,9 890 mm	kW	262	267	254	236
			hp	356	363	345	321
280 kW		without fan	kW	269	279	270	255
			hp	366	379	367	347
		with fan ratio 0,9 750 mm	kW	265	272	260	243
			hp	360	370	354	330
Torque at:	ICFN Power 280 kW	Nm	1713	1480	1289	1160	
		lbf ft	1263	1092	951	855	
Mean piston speed		m/s	6,9	8,3	9,2	9,7	
		ft/sec	22,6	27,2	30,2	31,7	

Performance			r/min	1500	1800	2000	2100
Effective mean pressure at:	ICFN Power 280 kW	Mpa		2,30	1,99	1,73	1,56
		psi		333	288	251	226
Max combustion pressure at:	ICFN Power 280 kW	Mpa		18,5	18,5	18,4	18
		psi		2683	2683	2668	2610
Total mass moment of inertia , J		kgm ²		2,6			
Std fly wheel included		lbft ²		61,6			
Degree of irregularity at:	ICFN Power 280 kW			1:44	1:80	1:127	1:164
Friction Power		kW		28	39	48	51
		hp		38	53	65	69
Time from start to idle speed at ambient temperature:	°C		15	1			
			0	2			
			-20*	5			

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

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Cold start performance

*Cold start ambient temperature limit.	without starting aid	°C	0	2*170 Amp
		°F	32	
	with manifold heater 4 kW	°C	-5	
	°F	23		
	with manifold heater 4 kW and blockheater	°C	-35	2*225 Amp
		°F	-31	
*Specify oil and fuel quality	<-15°C Lubrication oil 15/40w Fuel VSD >-15°C Lubrication oil 0/30w Fuel MK1			

Block heater type	Make	Power kW	Engaged hours	Cooling water temp engine block
Plug in type	Calix	1,5	48	7,5 °C

* See also general section in the sales guide

Derating

The engine may be operated up to 1000 m altitude and 40 °C ambient air

Altitude derating factor at rated power < 3000 m	% / m	See graph
Altitude derating factor at rated power > 3000 m	% / m	See graph
Ambient temperature derating factor	% / °C	No derating
Humidity		No derating

Lubrication system

		r/min	1500	1800	2000	2100
Lubricating oil consumption at max rpm at:	ICFN Power 280 kW	liter/h			0,068	
		US gal/h			0,0180	
Oil system capacity including filters		liter			40	
		US gal			10,57	
Oil sump capacity:	Max	liter			35	
		US gal			9,25	
	Min	liter			28	
		US gal			7,40	
Oil change intervals/specifications	VDS-2	h			600	
	VDS, ACEA, E3	h			400	
	ACEA E2, API CF, CF-4, CG-4	h			250	
Engine angularity limits:	front up	°			30	
	front down	°			30	
	side tilt	°			30	
Oil pressure at rated speed		kPa			350 - 600	
		psi			51 - 87	
Oil pressure shut down switch setting		kPa			250	
		psi			36	
Lubrication oil temperature in sump:	max	°C			125	
		°F			257	
Oil filter micron size		mm			0,040	

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Fuel system

		r/min	1500	1800	2000	2100
ICFN Power 280 kW Specific fuel consumption at:	25%	g/kWh lb/hph	230 0,373	249 0,404	270 0,438	216 0,350
	50%	g/kWh lb/hph	205 0,332	213 0,345	222 0,360	236 0,383
	75%	g/kWh lb/hph	195 0,316	201 0,326	212 0,344	219 0,355
	100%	g/kWh lb/hph	196 0,318	203 0,329	214 0,347	218 0,353
Recommended fuel to conform to			ASTM-D975-No2, DIN 51601, EN 590			
System return flow		l/h US gal/h	36 9,5			
System supply flow at rated speed		l/h US gal/h	108 28,5			
Fuel supply line restriction, maximum allowable		kPa psi	10 1,5			
Fuel return line restriction, maximum allowable		kPa psi	20 2,9			
Fuel supply line max. pressure, engine stopped		kPa psi	0			
Maximum allowable inlet fuel temp		°C	50			
Prefilter / Waterseparator micron size		mm	0,005			

Intake and exhaust system

		r/min	1500	1800	2000	2100
Air consumption at:	ICFN Power 280 kW	kg/s	0,37	0,44	0,46	0,46
Air intake restriction, clean filter(s)		kPa In wc	2 8,0			
Max allowable air intake restriction		kPa In wc	5 20,1			
Heat rejection to exhaust at:	ICFN Power 280 kW	kW BTU/min	198 11260	215 12227	215 12227	207 11772
Exhaust gas temperature after turbine at:	ICFN Power 280 kW	°C °F	457 855	425 797	410 770	396 745
Max allowable back pressure in exhaust line		kPa In wc	10,0 40,2	13,0 52,2	15,0 60,2	15,0 60,2
Exhaust gas flow at:	ICFN Power 280 kW	m ³ /min cfm	42,5 1501	47,2 1667	48 1695	46,8 1653
Exhaust gas smoke	ICFN Power 280 kW	Bosch Units	0,12	0,26	0,34	0,44

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Cooling system

		r/min	1500	1800	2000	2100
Heat rejection radiation from engine at:	ICFN Power 280 kW	kW	18	18	19,7	19,8
		BTU/min	1007	1001	1120	1126
Heat rejection to coolant at:	ICFN Power 280 kW	kW	116	118	118	115
		BTU/min	6568	6682	6682	6540
Recommended coolant		Volvo coolant or Volvo anticorrosion additive together with clean fresh water				
Radiator cooling system type		Closed circuit				
Charge air temp after CAC at referens ambient conditions 25°C / 1000mbar		°C	41	45	45	45
		°F	106	113	113	113
Charge air temp after turbo compressor at referens ambient conditions 25°C / 1000mbar		°C	177	185	186	181
		°F	351	365	367	358
Boost pressure		kPa	177	189	191	187
		In wc	710,7	758,8	766,9	750,8
Max allowable pressure drop (Turbo outlet to manifold)		kPa	15	15	15	15
		In wc	60,2	60,2	60,2	60,2
Heat rejection to CAC		kW	47	55	59	57
		BTU/min	2673	3128	3355	3242
Radiator core area	(std. Size)	m²	0,8			
		sq.ft.	8,61			
Radiator core thickness	(std. Size)	mm	52			
		in	2,05			
Intercooler core area	(std. Size)	m²	0,89			
		foot²	9,58			
Intercooler core thickness	(std. Size)	mm	68			
		in	2,68			
Fan diameter	890 mm	mm	890			
		in	35,04			
	750 mm	mm	750			
		in	29,53			
Fan power consumption	890 mm	kW	7,0	12,0	16,0	19,0
		hp	10	16	22	26
	750 mm	kW	4,0	7,0	10,0	12,0
		hp	5	10	14	16
Fan drive ratio	fan Ø890	0,9				
	fan Ø750	0,9				
Coolant capacity:	engine	liter	17			
		US gal	4,5			
	std. 0,8m² radiator with hoses	liter	24			
		US gal	6,3			
Coolant pump		drive/ratio	belt/1,50:1			
Coolant flow including radiator restriction		l/s	4,7	5,6	6,3	6,6
		cu ft/min	9,9	11,9	13,2	13,9
Maximum external coolant system restriction incl. piping		kPa	55,0			
		psi	8,0			
Thermostat:	start to open	°C	82			
		°F	180			
	fully open	°C	92			
		°F	198			
Maximum static pressure head		kPa	100			
		psi	14,5			
Maximum pressure cap setting		kPa	70			
		psi	10,2			
Maximum top tank temperature		°C	103			
		°F	217			
Minimum temperature entering engine		°C	68			
		°F	154			
Shutdown switch setting		°C	98			
		°F	208			
Recommended drawdown capacity		10% of total cooling system capacity				

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Cooling performance: 0,8 m² radiator and 890mm fan. Fan ratio 0,9

Cooling air flow and maximum additional external restriction at different radiator air temperatures based on 103°C TTT and 50% antifreeze

Engine speed rpm	Engine power hp	Air on temp		Air flow kg/s	Max additional external restriction	
		°C	°F		Pa	psi
2100	255	65	149	7,7	690	0,100
	347	55	131	5,7	1380	0,200
		45	113	4,5	1800	0,261
1800	279	65	149	7,9	160	0,023
	379	55	131	5,8	780	0,113
		45	113	4,5	1150	0,167

Engine management system Versatile

Functionality	Alternatives	Default setting
Governor mode	Isochronous/droop Switchable during operation	Isochronous
Governor droop	0 - 5%	
Governor response	Adjustable PID-constants	
Idle speed	600 - 1200 rpm	600 rpm
Stop function	Energized to run / stop	Energized to stop
Preheating function		
Lamp test	ON/OFF	ON

Engine protection		Alarm level		Engine protection		
Parameter	Unit	Setting range	Default setting	Level	Action. Default/Alternative	
Oil temp	°C	120 - 130	125	Setting +3	Torque reduction	
Oil pressure	Low idle	kPa	NA	160,0	130,000	Torque reduction
	Rated speed	kPa	NA	225	195,000	Torque reduction
Oil level		NA	Low level	NA	NA	
Piston cooling pressure >1000 rpm	kPa	NA	NA	NA	NA	
Coolant temp	°C	95 - 101	98	Setting +7	Torque reduction	
Coolant level		See coling system	On	Low level	Torque reduction	
Fuel feed pressure	Low idle	kPa	NA	100	NA	NA
Water in fuel		Water Present	NA	NA	NA	
Crank case pressure	kPa	Rapid Increase of Press			Torque reduction	
Air filter pressure drop		NA	NA	NA	NA	
Altitude, above sea	m	NA	NA	1200	Automatic derating, see section derating	
Charge air temp	°C	NA	80	91,000	Torque reduction	
Charge air pressurer	kPa	NA	325	350,000	Torque reduction	
Engine speed	rpm	100 - 120% of rated speed	115% of rated speed	Alarm level	NA	

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Engine management system Power pac

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Governor response	Adjustable PID-constants	
Idle speed	600 - 1200 rpm	600 rpm
Stop function	Energized to run / stop	Energized to stop
Preheating function		
Lamp test	ON/OFF	ON

Engine protection		Alarm level		Engine protection		
Parameter	Unit	Setting range	Default setting	Level	Action. Default/Alternative	
Oil temp	°C	120 - 130	125	Setting +3	Shut down	
Oil pressure	Low idle	kPa	NA	160,0	130,000	Shut down
	Rated speed	kPa	NA	225	195,000	Shut down
Oil level		NA	Low level	NA	NA	
Piston cooling pressure >1000 rpm	kPa	NA	NA	NA	NA	
Coolant temp	°C	95 - 101	98	Setting +7	Shut down	
Coolant level		See coling system	On	Low level	Shut down	
Fuel feed pressure	Low idle	kPa	NA	100	NA	NA
Water in fuel		Water Present	NA	NA	NA	
Crank case pressure	kPa	Rapid Increase of Press			Shut down	
Air filter pressure drop		NA	NA	NA	NA	
Altitude, above sea	m	NA	NA	1200	Automatic derating, see section derating	
Charge air temp	°C	NA	80	91,000	Shut down	
Charge air pressurer	kPa	NA	325	350,000	Shut down	
Engine speed	rpm	100 - 120% of rated speed	115% of rated speed	Alarm level	NA	

Electrical system

Voltage and type			24V / Insulated from earth	
Alternator:	make		Bosch	
	output	Amp	80	
	tacho output	Hz/alternator rev.	6	
	drive ratio		4,5	
Starter motor:	make		Melco	
	type		90P55	
	output	kW hp	5,5 7,5	
Starter motor solenoid:	pull current	Amp	N/A	
	hold current	Amp	2	
Number of teeth on:	flywheel		153	
	starter motor		11	
Inrush current at +20°C		Amp	1000	
Cranking current at +20°C		Amp	428	
Crank engine speed at 20°C		rpm	75	
Starter motor battery capacity	max	Ah	2x143 570A DIN	
	min at +5°C	Ah	2x88 400A DIN	
Inlet manifold heater (at 20 V)		kW	4	
Power relay for the manifold heater		Amp	1	

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Power take off

		r/min	1500	1800	2000	2100
Front end in line with crank shaft max:		Nm lbf ft	TVC calculation necessary Available torque depends on inertia			
Front end belt pulley load. Direction of load viewed from flywheel side:	max left	kW	61	63	59	43
		hp	83	86	80	58
	max down	kW	229	298	335	302
		hp	311	405	456	411
	max right	kW	38	61	62	53
		hp	52	83	84	72
Timing gear at compressor PTO max continuous:		Nm lbf ft	150 111			
Speed ratio direction of rotation viewed from flywheel side			1,29:1/anti-clockwise			
Max allowed bending moment in flywheel housing		Nm lbf ft	7000 5163			
Max. rear main bearing load		N lbf	3000 674,4			