

Technical data TAD 660 VE

With Valve Lift Management (VLM)

General

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

Number of cylinders			6
Displacement, total		liters	5.70
		in ³	348
Firing order			1-5-3-6-2-4
Bore		mm	98
		in	3.86
Stroke		mm	126
		in	4.96
Compression ratio			18.4
Dry weight	Engine only, excluding cooling system	kg	565
		lb	1246
Wet weight	Engine only, excluding cooling system	kg	585
		lb	1290

Performance			r/min	1000	1600	1700	1900	2100	2300
IFN Power	147 kW	without fan	kW	70	134	138	143	146	147
			hp	95	182	187	195	199	200
Torque at:		IFN Power 147 kW	Nm	670	800	773	719	664	610
			lbf ft	494	590	570	530	490	450
Max torque at engine speed		1600 rpm	Nm	800					
			lbf ft	590					
Mean piston speed			m/s	4.2	6.7	7.1	8.0	8.8	9.7
			ft/sec	13.8	22.0	23.4	26.2	28.9	31.7
Effective mean pressure at:		IFN Power 147 kW	Mpa	1.48	1.76	1.70	1.58	1.46	1.34
			psi	214	256	247	230	212	195
Max combustion pressure at:		IFN Power 147 kW	Mpa	15	13.9	13.8	13.5	13.5	13.5
			psi	2175	2016	2001	1958	1958	1958
Total mass moment of inertia, J (mR ²) (without flywheel)			kgm ²	0.3534					
			lbft ²	8.4					
Friction Power			kW	8	17	19	23	27	32
			hp	11	23	25	31	36	43

Cold start performance

*Coldstart ambient temperature limit	without starting aid	°C	-15
		°F	5
	with 24V glow plugs	°C	-30
		°F	-22
	with 24V glow plugs and coolant block heater	°C	-30
		°F	-22

* With lubrication oil 15W/40.

Block heater type	Make	Power W	Engaged hours	Cooling water temp engine block
230 V	Defa	600	not tested	not tested

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Lubrication system			r/min	1000	1600	1700	1900	2100	2300	
Lubricating oil consumption at : (0,2% of fuel consumption)		IFN Power 147 kW	liter/h US gal/h	0.04 0.011	0.07 0.018	0.07 0.019	0.08 0.020	0.08 0.021	0.08 0.022	
Oil system capacity incl. filter and cooler (initial filling)	with std. oil sump (sump central)		liter US gal	16 4.23						
	with opt. oil sump (sump on fan side)		liter US gal	21 5.42						
Oil change with filter	with std. oil sump (sump central)		liter US gal	15.5 4.09						
	with opt. oil sump (sump on fan side)		liter US gal	19.5 5.15						
Oil sump capacity:	with std. oil sump (sump central)	Max	liter US gal	14 3.70						
		Min	liter US gal	12 3.17						
	with opt. oil sump (sump on fan side)	Max	liter US gal	19 4.89						
		Min	liter US gal	17 4.36						
	Oil change intervals/specifications with open CVS	ACEA E3-96 / E5-05		h	500					
		API CG-4 / CH-4		h	500					
VDS-2		h	500							
ACEA E4-99		h	500							
ACEA E4-99 (fulsynthetic)		h	500							
with closed CVS	ACEA E4-99		h	500						
	ACEA E4-99 (fulsynthetic)		h	500						
Engine angularity limits:	with std. oil sump (sump central)	front up	°	30						
		front down	°	30						
		side tilt	°	30						
	with opt. oil sump (sump on fan side)	front up	°	30						
		front down	°	30						
		side tilt	°	30						
Oil pressure at rated speed			kPa psi	450 65						
Oil pressure shut down switch setting			kPa psi	50 7						
Lubrication oil temperature in sump:		max	°C °F	130 266						
Oil filter micron size			mm	0.012						

* See also general information in Sales Support Tool

Fuel system			r/min	1000	1600	1700	1900	2100	2300
IFN Power 147 kW									
Specific fuel consumption at:	25%		g/kWh lb/hph	240 0.389	249 0.404	251 0.407	270 0.438	292 0.473	320 0.519
	50%		g/kWh lb/hph	213 0.345	236 0.383	242 0.392	248 0.402	251 0.407	268 0.434
			g/kWh lb/hph	219 0.355	229 0.371	234 0.379	231 0.374	233 0.378	245 0.397
	100%		g/kWh lb/hph	250 0.405	215 0.349	216 0.350	220 0.357	223 0.361	232 0.376
Fuel to conform to				ASTM-D975-No2, DIN 51601, EN 590					
System return flow at max. power / speed			liter/h US gal/h	259 68.4					
System supply flow at max. speed			liter/h US gal/h	300 79.3					
Fuel supply line max. restriction at max. speed			kPa psi	55 8.0					
Fuel return line max. restriction			kPa psi	50 7.3					
Max. allowable inlet fuel temp (under operating conditions)			°C °F	70 158					
Prefilter / Waterseparator micron size			mm	0.010					
Governor type/make, standard				EMS 2					
Injection pump type/make				B412 010 558 / BOSCH					
Injection timing			°B.T.D.C	variable					

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Intake and exhaust system		r/min	1000	1600	1700	1900	2100	2300
Air consumption at:	IFN Power 147 kW	m ³ /min cfm	3.5 125	8.1 285	8.6 303	9.6 339	10.1 357	11.1 392
Max allowable air intake restriction		kPa In wc	6.5 26.1					
Heat rejection to exhaust at:	IFN Power 147 kW	kW BTU/min	86 4891	101 5744	104 5914	115 6540	120 6824	133 7564
Exhaust gas temperature after turbine at:	IFN Power 147 kW	°C °F	560 1040	570 1058	560 1040	550 1022	540 1004	540 1004
Max allowable back pressure in exhaust line		kPa In wc	10.0 40.2					
Exhaust gas flow at:	IFN Power 147 kW	m ³ /min cfm	10.8 380	24.6 869	26.3 928	28.0 987	29.6 1044	31.5 1112
Exhaust gas smoke	IFN Power 147 kW	*Bosch Units	1.7	0.7	0.4	0.4	0.4	0.4

*N.B! Bosch units are calculated values. Measured values are acc. to ISO 10054 in FSN units

Cooling system		r/min	1000	1600	1700	1900	2100	2300
Heat rejection radiation from engine at:	IFN Power 147 kW	kW BTU/min	7 398	13 739	14 796	14 796	15 853	15 853
Heat rejection to coolant at:	IFN Power 147 kW	kW BTU/min	40 2275	68 3884	72 4078	75 4242	78 4424	81 4618
Coolant			Volvo coolant or Volvo anticorrosion additive together with clean fresh water					
Radiator cooling system type			Closed circuit					
Fan drive ratio	standard (on sep. bracket)		1 : 1					
	optional (on sep. bracket)		1 : 1.12					
	optional (on sep. bracket)		1 : 0.9					
	optional (on crankshaft)		1 : 1					
Coolant capacity:	engine	liter	6					
		US gal	1.6					
Coolant pump		drive/ratio	1 : 1.36					
Minimum Coolant flow		l/s	1.3	2.0	2.2	2.4	2.67	2.92
		US gal/s	0.3	0.5	0.6	0.6	0.7	0.8
Maximum external coolant system restriction incl. piping		kPa	6	17	18	23	27	33
		In wc	24	66	72	90	108	132
Thermostat:	start to open	°C	83					
		°F	181					
	fully open	°C	95					
		°F	203					
Maximum static pressure head (expansion tank height + pressure cap setting)		kPa	100					
		in wc	402					
Pressure cap setting		kPa	90					
		In wc	361					
Maximum top tank temperature		°C	106					
		°F	223					
Max. permissible cooling down of engine coolant by radiator		°C	8					
		°F	46					
Expansion tank capacity			30% of total cooling system capacity					

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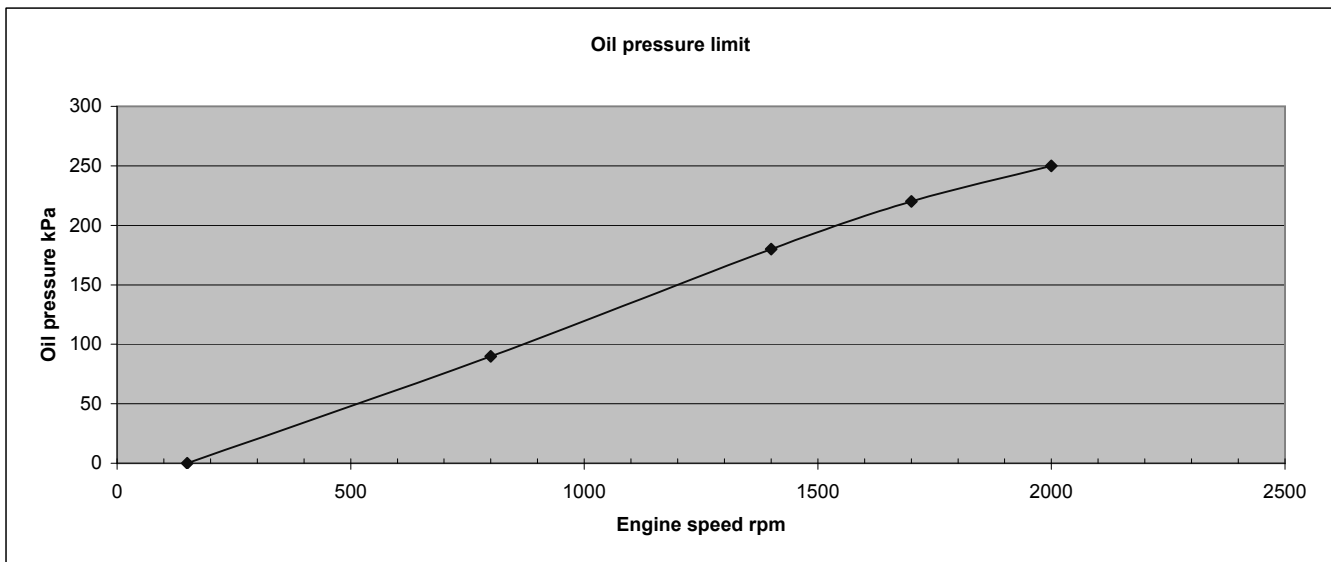
Intercooler system		r/min	1000	1600	1700	1900	2100	2300
Cooling power	IFN Power 147 kW	kW	6	26	27	28	29	31
		BTU/min	341	1479	1535	1592	1649	1763
Combustion air mass flow	IFN Power 147 kW	kg/s	0.07	0.160	0.170	0.190	0.200	0.220
Combustion air inlet temp. (Charge air temp after turbo compressor)	IFN Power 147 kW	°C	95	175	180	182	184	188
		°F	203	347	356	360	363	370
Combustion air outlet temp. (Charge air temp after intercooler)	IFN Power 147 kW	°C	50	50	50	50	50	50
		°F	122	122	122	122	122	122
Maximum pressure droop over intercooler, incl. piping		kPa	15					
		psi	2.18					
Charge air pressure		kPa	205					
		psi	29.73					

Engine management system

Functionality	Alternatives	Default setting
Governor mode	Isochronous/droop switchable during operation	Isochronous
Governor droop	1rpm/10Nm - 1rpm/127Nm	1rpm/25Nm
Governor response	NA	NA
Idle speed	550-800 rpm	600 rpm
Stop function	Energized to run / stop	Energized to stop
Preheating on ignition	ON/OFF (option)	OFF (option)
Lamp test	ON/OFF	ON

Engine protection settings

Parameter	"Yellow lamp"	"Red lamp"	Derate 0 % to engine protection map	Derate 100% to engine protection	Forced idle after 5sec	Forced shut down after 15sec
Coolant temperature	103°C	106°C	106°C	113°C	>113°C	>113°C
Oil temperature	125°C	128°C	128°C	135°C		
High boost temp	90°C	95°C	95°C	105°C	>110°C	>110°C
Parameter	"Yellow lamp"	"Red lamp"	Derate 50 % to engine protection map		Forced idle after 5sec	Forced shut down after 15sec
High boost pressure	340kpa	350kpa	350kpa		>355kpa	>355kpa
Parameter	"Yellow lamp"	"Red lamp"	Derate 70 % to engine protection map		Forced idle after 5sec	Forced shut down after 15sec
Low oil pressure	Limit	20kpa < limit	20kpa < limit		25kpa < limit	25kpa < limit



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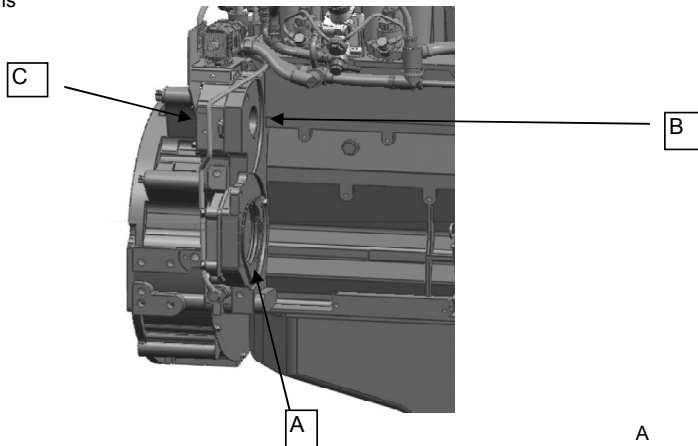
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Electrical system

Voltage and type			24V / Body grounded
Alternator:	make		Iskra
	output	Amp	80
	tacho output	Hz/alternator rev.	6
	drive ratio		1 : 3.3
Starter motor:	make		Melco
	type		90P55
	output	kW	5.5
		hp	7.5
Starter motor solenoid:	pull current	Amp	3
	hold current	Amp	3
Number of teeth on:	flywheel		129
	starter motor		12
Inrush current at +20°C		Amp	1800
Cranking current at +20°C		Amp	400
Crank engine speed at 20°C		rpm	200
Starter motor battery capacity	max	Ah	180
	min at +5°C	Ah	110
24 V glow plugs (starting current / operating current)		Amp	30 / 15
Power relay for the manifold heater		Amp	0.8

Power take off

Transmission positions



Parameters		A	B	C
Gear ratio 660		1.023:1	1.189:1	1.189:1
Direction of rotation when facing the engine		anti-clockwise		clockwise
PTO connection				
Max. output	kW	50	20	20
	hp	68	27	27
Mdmax	Nm	187.5	64.5	64.5
	lbf ft	138.3	47.6	47.6

Note:

Maximale output valid only for single drive.

In case of other driven engaged, it applies as follows:

Parameters		B+C	A+B+C	A without B+C
Max. output	kW	20	50	
	hp	27	68	
Mdmax	kW	64.5	187.5	
	hp	47.6	138.3	
Bosch flange and serrated shaft	kW			30
	hp			41
SAE - 9 T 16/32 DP	kW			30
	hp			41
SAE - 13 T 16/32 DP	kW			50
	hp			68
Bosch flange and cone	kW			20
	hp			27