

General

4-stroke direct injected, turbocharged and aftercooled diesel engine

Number of cylinders		5
No of valves		20
Displacement, total	litres in ³	2,40 146,5
Firing order		1-2-4-5-3
Rotational direction, viewed from the front		Clockwise
Bore	mm in	81 3,19
Stroke	mm in	93,2 3,67
Compression ratio		16,5
Max. static forward inclination:	°	0
Max. static backward inclination:	°	10
Max. intermittent forward inclination while running:	°	20
Max. intermittent backward inclination while running:	°	10
Max. intermittent side inclination while running:	°	20
Idling speed	rpm	700 + 50
Rated speed R5	rpm	4000
Propeller selection range R5	rpm	3900-4130
Dry weight engine BT	kg lb	260 573

Performance	Rating	rpm	700	1200	1600	2000	2400	2800	3200	3600	4000	4130
Crankshaft power 1), 5)	5	kW	11	26	48	89	117	136	154	162	162	162
		hp	15	35	65	121	159	185	210	220	220	220
Propeller shaft power 1) (At full load) With drive	5	kW	10	24	46	85	111	129	146	154	154	154
		hp	14	33	62	115	151	175	199	209	209	209
With reverse gear	5	kW	10	25	46	85	112	130	148	156	156	156
		hp	14	33	63	116	152	177	201	212	212	212
Propellershaft power at prop. load x ^{2,5} With drive	5	kW	2	8	16	27	43	63	88	118	154	
		hp	3	10	21	37	58	86	120	161	209	
With reverse gear	5	kW	2	8	16	27	43	64	89	120	156	
		hp	3	10	21	37	59	87	121	163	212	
Torque at crankshaft 2)	5	Nm	147,3	203,7	287,1	424,9	464,7	462,8	460,2	429,7	386,7	374,6
		lbf ft	109	150	212	313	343	341	339	317	285	276
Mean piston speed		m/s	2,2	3,7	5,0	6,2	7,5	8,7	9,9	11,2	12,4	12,8
		ft/s	7,1	12,2	16,3	20,4	24,5	28,5	32,6	36,7	40,8	42,1
Effective mean pressure 2)	5	MPa	0,77	1,07	1,50	2,22	2,43	2,42	2,41	2,25	2,02	1,96
		psi	111,8	154,6	217,9	322,5	352,7	351,3	349,3	326,2	293,5	284,3
Max combustion pressure 2)	5	MPa	9,9	11,6	15,3	16,6	16,3	16,8	17	15,8	16,7	16,8
		psi	1436	1682	2219	2408	2364	2437	2466	2292	2422	2437

1) ISO 3046, fuel temp 40°C.

ISO 8665 (=SAE J 1228=ICOMIA 28-83)

2) At power according to 1).

3) If reverse gear is used, 4% in heat rejection will be added for its oil cooler.

4) Acc. to ISO 3744

5) At installed back pressure

D3-220 Inboard and I/O
21760203
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Lubricating system

Specific lubricating oil consumption.	g/kWh	0,29
Max. oil volume including filters for all allowed installation inclinations:	litres	6,3
	US gal	1,66
Max. oil volume excluding filters for all allowed installation inclinations:	litres	5,8
	US gal	1,53
Min. oil volume excluding filters for all allowed installation inclinations:	litres	4,3
	US gal	1,14

Fuel system

	Rating	rpm	700	1200	1600	2000	2400	2800	3200	3600	4000	4130
Specific fuel consumption 2)	5	g/kWh	362	260	236	224	216	215	225	241	240	243
		lb/hph	0,586	0,421	0,382	0,363	0,35	0,348	0,365	0,39	0,389	0,394
Fuel consumption, Test cycle E5	5	g/kWh	237									
		lb/hph	0,38									
Fuel consumption at prop. load x ^{2.5}	5	l/h	1,0	2,6	4,8	8,2	12,3	18,0	24,6	34,9	46,3	
		US gal/h	0,3	0,7	1,3	2,2	3,2	4,8	6,5	9,2	12,2	
Fuel consumption at full load	5	l/h	4,7	8,0	13,6	23,9	30,2	34,9	41,5	46,7	46,5	47,1
		US gal/h	1,2	2,1	3,6	6,3	8,0	9,2	11,0	12,3	12,3	12,4

Intake and exhaust system

	Rating	rpm	700	1200	1600	2000	2400	2800	3200	3600	4000	4130	
Specific exhaust heating effect in percent of crankshaft power	5	%	64	65	67	68	68	71	81	91	91	93	
	5		64	65	67	68	68	71	81	91	91	93	
Exhaust temperature at the exhaust pipe connecting flange after the turbo charger.	5	°C	370	440	464	553	545	539	583	622	584	574	
		°F	698	824	867	1027	1013	1002	1081	1152	1083	1065	
Permitted back pressure in the exhaust line at rated speed. (Installed back pressure)		kPa								Max	30		
		psi									4,4		
		kPa								Min	5		
		psi									0,7		
Engine air consumption at 25°C / 77°F atmospheric pressure 100kPA and relative humidity 30%.	5	m³/min	0,8	1,7	3	4,7	6,3	7,7	9,2	10,1	11	11,4	
		cu.ft./min	28,25	60,03	105,9	166	222,5	271,9	324,9	356,7	388,5	402,6	
Charge air pressure Inlet manifold	5	kPa	108	135	181	231	254	270	280	276	272	278	
		psi	15,7	19,6	26,3	33,5	36,8	39,2	40,6	40,0	39,5	40,3	
Exhaust gas flow	5	m³/min	1,8	4,4	8	13,8	17,4	20,3	24,1	26,5	26,6	27,1	
		cu.ft./min	63,57	155,4	282,5	487,3	614,5	716,9	851,1	935,8	939,4	957	

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Cooling system	Rating	rpm	700	1200	1600	2000	2400	2800	3200	3600	4000	4130
Radiated heat in percent of crankshaft power.	5	%				9	7	5	4	3	2	2
Heat rejection to charge air cooler in percent of crankshaft power.	5	%	3	7	13	13	14	16	17	17	19	20
Coolant heat rejection to HE in percent of crankshaft power.	5	%	0	90	81	80	74	70	73	77	77	78
Coolant flow with fully open thermostat and std cooling system		l/min	45	70	94	116	140	165	190	211	237	246
		cu.ft./min	1,6	2,5	3,3	4,1	4,9	5,8	6,7	7,5	8,4	8,7
Max. permissible temperature on coolant in engine outlet		°C	98									
		°F	208									
Coolant volume engine, including heat exchanger		litres	8,7									
		US gal.	2,30									
Max. additional coolant for cabin heater etc. with std. Expansion tank		litres	8									
		US gal.	2,11									
Maximum coolant flow to cabin heater etc.		l/min	20									
		cu.ft./min	0,71									
Thermostat, start open at		°C	80									
		°F	176									
Thermostat, fully open at		°C	94									
		°F	201									

Raw water circuit	rpm	700	1200	1600	2000	2400	2800	3200	3600	4000	4130
Nominal raw water design flow	l/min	27	46	61	76	90	103	115	126	136	138
	cu.ft./min	1,0	1,6	2,2	2,7	3,2	3,6	4,1	4,4	4,8	4,9
Nominal raw water pump pressure head at design flow. (measured before and after pump)	kPa	19	26	36	48	62	77	93	109	125	130
	psi	2,8	3,8	5,2	7,0	9,0	11,2	13,5	15,8	18,1	18,9
Maximum raw water pump suction head	kPa	30									
	psi	4,4									
Maximum additional pressure drop excl. reverse gear oil cooler and riser	kPa	0	1	3	5	8	12	17	22	28	30
	psi		0,1	0,4	0,7	1,2	1,7	2,5	3,2	4,1	4,4
Pressure drop over reverse gear oil cooler (optional equipment)	kPa	2	3	4	5	6	7	7	8	9	9
	psi	0,2	0,4	0,6	0,7	0,9	1,0	1,0	1,2	1,3	1,3
Maximum raw water temperature entering charge air cooler	°C	30									
	°F	86									

Emissions	Rating	rpm	700	1200	1600	2000	2400	2800	3200	3600	4000	4130
Smoke at prop. load x ^{2,5}	5	*BSU	0,0	0,0	0,0	0,3	0,2	0,2	0,1	0,2	0,8	
Noise at prop. load x ^{2,5} . 4)	5	dBA	92	95	100	106	111	110	111	111	112	

*NB.! BSU are calculated values. Measured values are acc. to ISO 10054 in FSN units

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