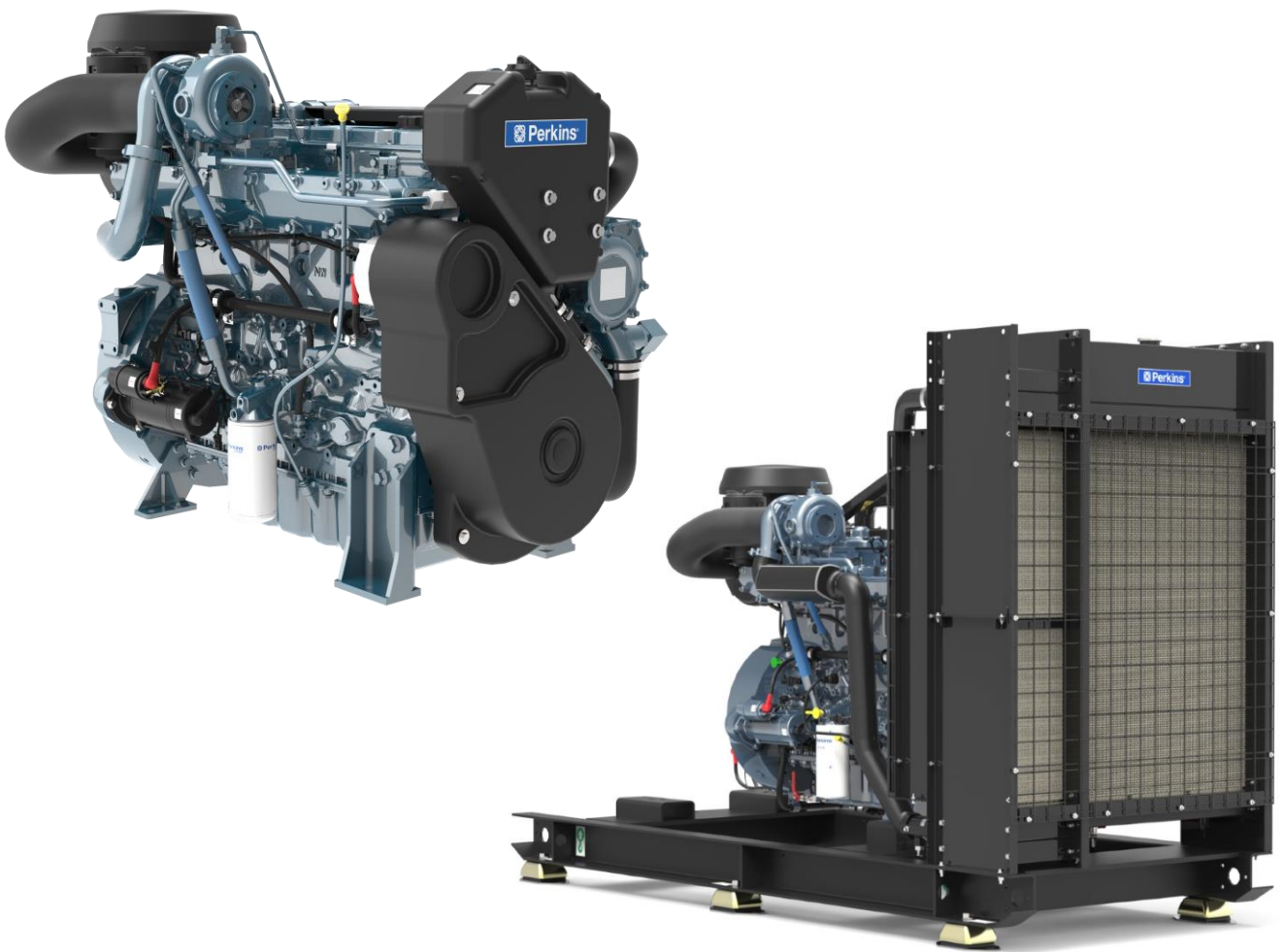




Customer Information Pack



E70B Marine Auxiliary Engine

Perkins E70B

- Technical / Installation Data
- Performance Data
- Fuel Consumption
- Jacket Water Pump Data
- Auxiliary Water Pump Data
- Fan Curves
- Fuel Systems
- Cooling Systems
- Reference Material

Marine Power



Perkins E70B Auxiliary

Basic Technical Data

Number of Cylinders	6
Cylinder Arrangement	Vertical in-line
Cycle	4 stroke
Induction System	Turbo after cooled
Combustion System	Direct injection
Bore	105 mm
Stroke	135 mm
Compression Ratio	16.5:1
Cubic Capacity	7.01 litres
Direction of Rotation	Anti-clockwise view from flywheel
Firing Order	1, 5, 3, 6, 2, 4,
Total Weight (Wet)	759 kg (HEX/K.C.) – 1192kg (RAD)
Overall Dimensions HEX/K.C.	Height = 1132 mm Length = 1368 mm Width = 836 mm
RAD Cooled	Height = 1583 mm Length = 2659 mm Width = 993 mm

Performance

Typical Average Sound Pressure Level at 1 Metre

HEX/K.C	
1500 rev/min = 86.6 dBA	(Complete with a Typical Alternator)
1800 rev/min = 88.9 dBA	(Complete with a Typical Alternator)
RAD	
1500 rev/min = 105.7 dBA	(Complete with a Typical Alternator)
1800 rev/min = 109.0 dBA	(Complete with a Typical Alternator)

Note

All data based on operation under ISO/TR14396, ISO 3046/1 standard reference conditions

Test Conditions

Air temperature 25°C (77°F) barometric pressure 100 kPa (29.5 in Hg), relative humidity 30%, all ratings certified within ± 5%

If the engine is to operate in ambient conditions other than the test conditions then suitable adjustments must be made for any change in inlet air temperature, barometric pressure or humidity.

Diesel Fuel

ISO-F-DMX/ISO-F-DMA/ISO 8217:1986 (E) Class F, EN590, D975, JIS class 1,2,3

Alternative fuel

EN15940 BTL,GTL,HVO (R100%),
EN16709 Biodiesel (B20%)

Lubricating Oil

A multigrade lubricating oil must be used which conforms to specification API-CJ4


Start/Load Delay

90% of prime power can be applied 10 seconds after the starter motor is energized. The remaining 10% can be applied 30 seconds after start if the ambient temperature is not less than 15°C. If the ambient temperature is less than 15°C, an immersion heater is recommended

General Installation Data - Typical Installation Conditions

E70B 1500 RPM HEX & K.C.

Item	Units	Type of Operation and Application					
		Prime Power			110%		
		109 bkW	129 bkW	164 bkW	120 bkW	142 bkW	180 bkW
Engine Speed	rev/min	1500					
Net Engine Power	BHP	147	173	220	161	190	242
Brake Mean Effective Pressure	bar	12.47	14.68	18.68	13.72	16.20	20.54
Piston Speed	m/s	6.8	6.8	6.8	6.8	6.8	6.8
Engine Coolant Flow (FW) Max	litre/min	284	284	284	284	284	284
Raw Water Flow Max	litre/min	138	138	138	138	138	138
Combustion Air Flow	m³/min	8.5	9.2	10.4	8.9	9.5	10.9
Exhaust Gas Flow	m³/min	19.7	21.6	24	20.8	22.6	25.4
Exhaust Gas Temperature	°C	499.6	509	505.4	515.7	524	522.8
Total Heat From Fuel	kW	319	361	430	346	392	473
Gross Heat to Power	kW	109.3	129.0	163.9	120.2	141.9	180.3
Het Heat to Power	kW	109.3	129.0	163.9	120.2	141.9	180.3
Heat to Water and Lubricating Oil	kW	119.9	130.4	140.9	128.3	138.9	154.6
Heat to Exhaust	kW	84.8	108	131	104	119	145
Heat to Radiation	kW	8.2	8.1	8.3	8.2	8.2	8.3
Heat From Aftercooler	kW	10.5	12.9	18	11.8	14.3	20.6

Marine Power	
Perkins E70B Auxiliary	

E70B 1800 RPM HEX & K.C.

Item	Units	Type of Operation and Application							
		Prime Power kW				110%			
		129	164	191.3	218.6	142	180	210	240
Engine Speed	rev/min	1800							
Net Engine Power	BHP	173	220	257	293	190	242	282	322
Brake Mean Effective Pressure	bar	12.27	15.58	18.2	20.75	13.51	17.16	20.0	22.82
Piston Speed	m/s	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1
Engine Coolant Flow (FW) Max	litre/min	340	340	340	340	340	340	340	340
Raw Water Flow Max	litre/min	165	165	165	165	165	165	165	165
Combustion Air Flow	m ³ /min	11.7	14.1	15.5	16.5	12.2	14.6	16.2	17.4
Exhaust Gas Flow	m ³ /min	23.5	28	30.8	33.5	24.7	29.1	32.8	36.2
Exhaust Gas Temperature	°C	404.6	403.3	405.6	413.2	415.6	412.6	422.5	438.4
Total Heat From Fuel	kW	356	435	498	565	386	469	548	633
Gross Heat to Power	kW	129.0	164.0	191.3	218.6	141.6	180.4	210.4	240.5
Net Heat to Power	kW	129.0	164.0	191.3	218.6	141.6	180.4	210.4	240.5
Heat to Water and Lubricating Oil	kW	118.9	126.3	141	164.1	127.3	135.7	154.7	185.1
Heat to Exhaust	kW	109	140	159	174	118	148	175	199
Heat to Radiation	kW	8.7	8.7	8.8	8.8	8.8	8.7	8.9	8.8
Heat From Aftercooler	kW	17.5	28.4	35.6	41.7	19.4	30.8	40.0	47.6

E70B 2400 RPM

Item	Units	Type of Operation and Application		
		Prime Power (100%)		
		129 kW	149 kW	186 kW
Engine Speed	rev/min	2,400		
Net Engine Power	BHP	173	200	249
Brake Mean Effective Pressure	bar	9.71	10.61	13.23
Piston Speed	m/s	10.8	10.8	10.8
Engine Coolant Flow (FW) Max	litre/min	440	440	440
Raw Water Flow Max	litre/min	195	195	195
Combustion Air Flow	m ³ /min	18.9	20.0	20.4
Exhaust Gas Flow	m ³ /min	33.3	35.6	38.3
Exhaust Gas Temperature	°C	326.2	339.9	365.0
Total Heat From Fuel	kW	429	477	557
Gross Heat to Power	kW	129	149	186
Net Heat to Power	kW	129	149	186
Heat to Water and Lubricating Oil	kW	139.9	149.1	165.1
Heat to Exhaust	kW	145	160	188
Heat to Radiation	kW	8.7	8.8	8.7
Heat From Aftercooler	kW	38.8	46.1	51.1

Marine Power



Perkins E70B Auxiliary

E70B 1500rpm Radiator Cooled

Item	Units	Type of Operation and Application					
		Prime Power bkW			110%		
		101	122	157	111	134	172
Engine Speed	rev/min	1500					
Net Engine Power	BHP	135	163	210	148	179	231
Brake Mean Effective Pressure	bar	12.0	16.1	18.6	13.3	17.9	20.4
Piston Speed	m/s	6.8	6.8	6.8	6.8	6.8	6.8
Engine Coolant Flow (FW) Max	litre/min	284	284	284	284	284	284
Combustion Air Flow	m3/min	9.5	9.6	10.2	10.6	10.7	10.4
Exhaust Gas Flow	m3/min	20.7	22.7	25.7	22.7	24.9	28.2
Exhaust Gas Temperature	°C	462	501.4	521.3	513.3	557.1	520.5
Total Heat From Fuel	kW	302	358	423	335.6	397.8	465.3
Gross Heat to Power	kW	101	122	157	111	134	172.7
Net Heat to Power	kW	101	122	157	111	134	172.7
Heat to Water and Lubricating Oil	kW	84.3	104.3	122	93.7	115.9	134.2
Heat to Exhaust	kW	90.2	102	116	100.2	113.3	118
Heat to Radiation	kW	4.9	6.7	7	5.4	7.4	8.4
Heat From Aftercooler	kW	14.5	17.3	22.7	16.1	19.2	23.3

E70B 1800rpm Radiator Cooled

Item	Units	Type of Operation and Application					
		Prime Power bkW			110%		
		116	151	178	128	167	197
Engine Speed	rev/min	1800					
Net Engine Power	BHP	155.5	202.4	238.7	172.8	224.9	265.2
Brake Mean Effective Pressure	bar	11.7	15.0	17.5	13.0	16.7	19.4
Piston Speed	m/s	8.4	8.4	8.4	8.4	8.4	8.4
Engine Coolant Flow (FW) Max	litre/min	340.0	340.0	340.0	340.0	340.0	340.0
Combustion Air Flow	m3/min	13.6	14.5	16.3	15.1	16.1	18.1
Exhaust Gas Flow	m3/min	25.3	29.9	33.4	27.8	32.8	36.7
Exhaust Gas Temperature	°C	371.7	394.7	404.0	413.0	438.6	448.9
Total Heat From Fuel	kW	352.0	421.0	496.0	391.1	467.8	551.1
Gross Heat to Power	kW	116.0	151.0	178.0	128.9	167.8	197.8
Net Heat to Power	kW	116.0	151.0	178.0	128.9	167.8	197.8
Heat to Water and Lubricating Oil	kW	84.2	109.4	128.4	93.6	121.6	142.7
Heat to Exhaust	kW	99.8	116.0	135.0	110.9	128.9	150.0
Heat to Radiation	kW	10.6	10.8	11	11.6	11.8	12.7
Heat From Aftercooler	kW	26	34.3	42.6	28.6	37.7	46.8

Marine Power



Perkins E70B Auxiliary

Cooling System Hex

Minimum seacock diameter (full flow)	39mm
Maximum lift of seawater pump	2m
Maximum seawater inlet temperature	38 °C
Pressure cap setting	50kPa
Maximum Engine Air intake Temperature	50 °C

Coolant

Extended Life Coolant 50% Mix (Heat Exchanger)	
Extended Life Coolant 20% Mix (Keel Cooled, normal conditions)	
Maximum raw water pump inlet pressure 50/60 Hz	15Kpa

Radiator Capacity

Total system coolant capacity	35.5 litres
Drain down capacity	36 litres
Maximum temperature to engine	70 °C

Thermostat

Operating range	83-94 °C
-----------------	----------

Electrical System

Battery Charging System:

Type:	Insulated return
Alternator:	100 amp- 12 volt 55 amp- 24 volt
Starter	4.2 kW 12 volt 4.0 kW 24 volt

Cold start recommendations

Minimum cranking speed	100 rpm
------------------------	---------

Batteries for Temperatures down to - 5 Deg.C (23 Deg. F)

12 Volt	24 Volt
One battery - 520 Amps BS3911 or 800 Amps SAE J537 (CCA)	Two 12 Volt batteries in series - each 315 Amps BS3911 or 535 Amps SAE J537 (CCA)

Batteries for Temperatures down to - 15 Deg.C (5 Deg. F)

Two 12 Volt batteries in parallel, each 520 Amps BS3911 or 800 Amps SAE J537 (CCA)	Two 12 Volt batteries in parallel, each 520 Amps BS3911 or 800 Amps SAE J537 (CCA)
--	--

Exhaust system

Max allowable back pressure	15 kPa
Exhaust connection	68 bore 6x9.8 holes on 145mm PCD

Induction system

Maximum air intake restriction

Clean filter	5 kPa
Dirty filter	8 kPa
Air filter type	2 stage cyclonic/paper element

Lubrication system

Lubricating oil capacity

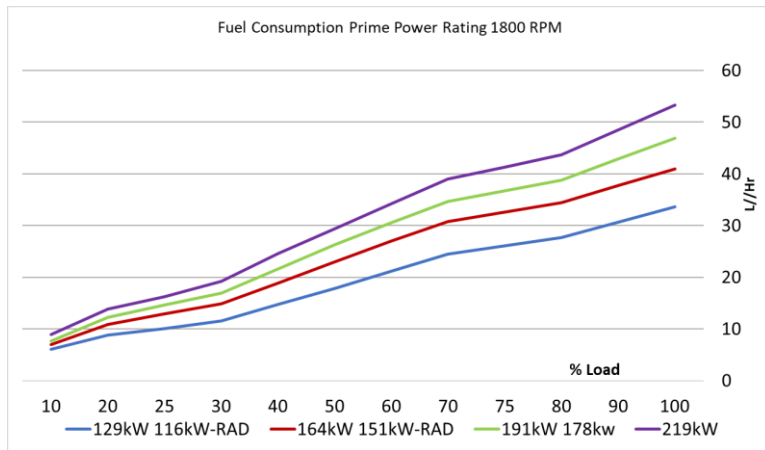
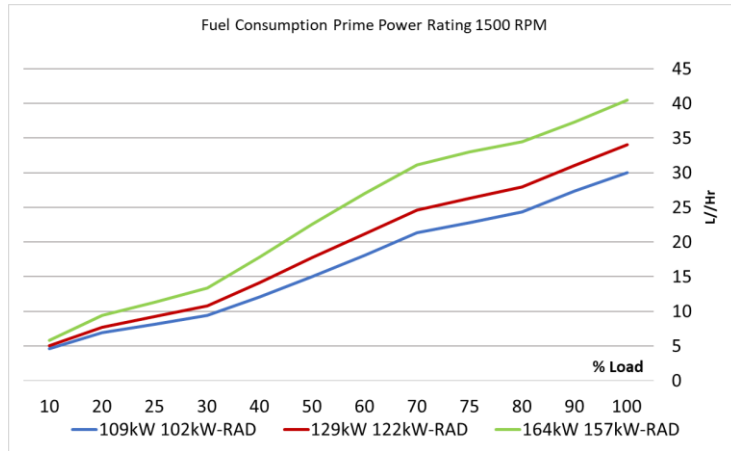
Total system	21 litres
Minimum	17.5 litres
Maximum engine operating angle intermittent	30°C

Marine Power

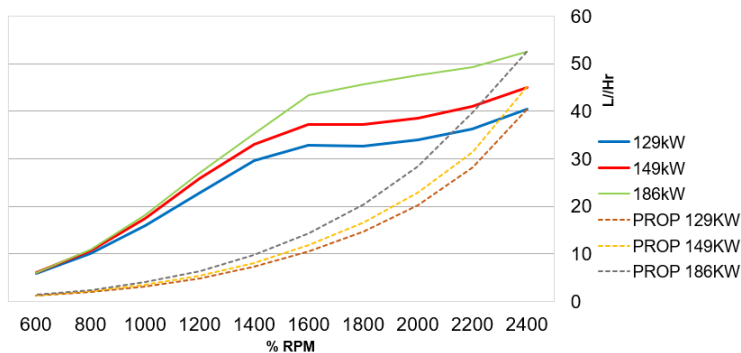
Perkins E70B Auxiliary



Fuel consumption



Fuel Consumption Prime Power Rating 2400 RPM

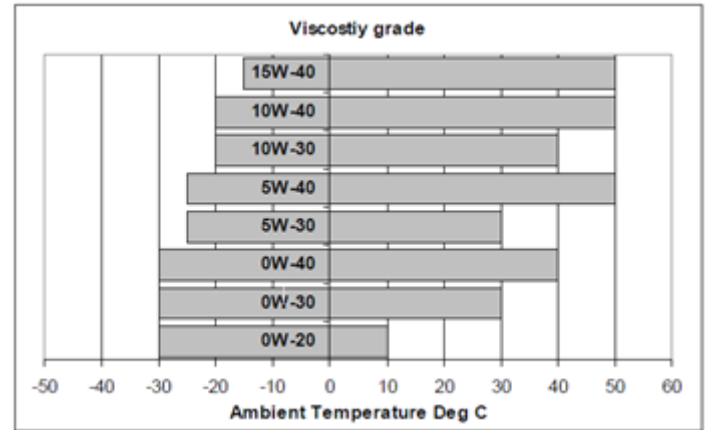


Lubricating oil pressure

Relief valve opens 415-470 kPa
 At maximum rated speed 500+/-100 kPa
 Normal oil temperature 110°C
 Max continuous oil temperature 125°C
 Oil consumption at full load as a % of fuel consumption 0.01 %

Recommended SAE viscosity

Multigrade oil must be used which conforms to API-CJ4.
 See illustration below:



Fuel Lift Pump

Flow/hour 4 Ltr/min(240 Ltrs/Hr)

Maximum suction head 2m
 Maximum supply line restriction 30 kPa
 Maximum returnline restriction 20 kPa

Governor Type

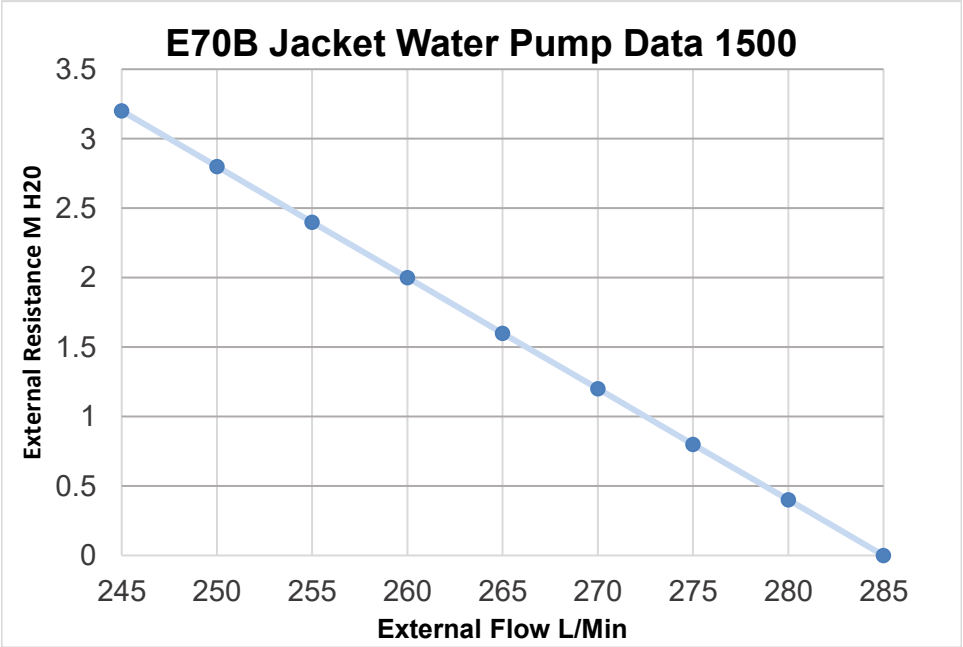
Speed control to ECM
 ISO 8528, G2

Jacket Water Pump Data

Engine Speed RPM: 1,500

Pump Speed RPM: 3,000

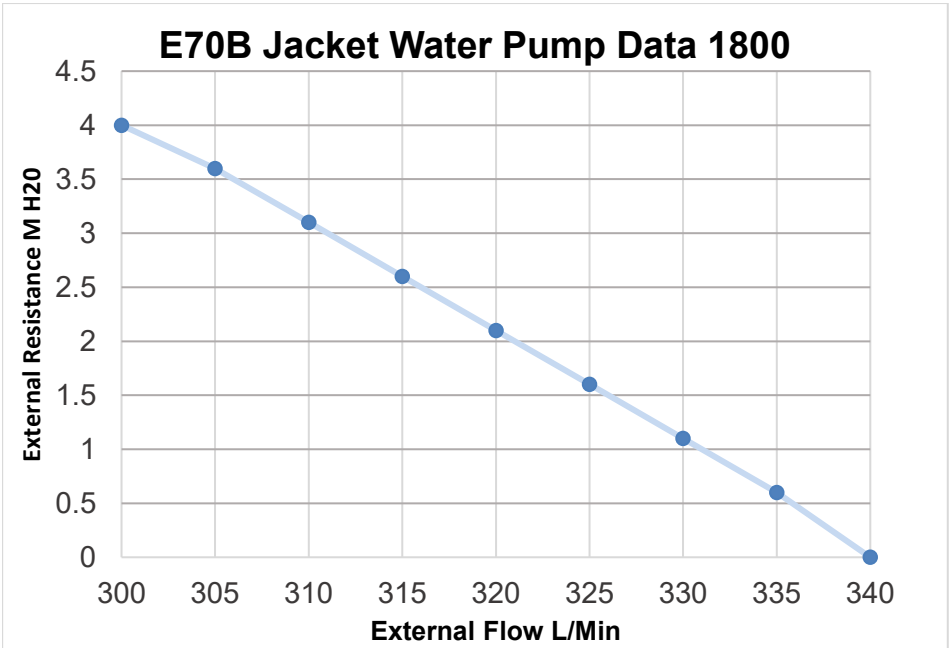
EXT RESIST M H2O	EXT FLOW L/MIN
3.2	245
2.8	250
2.4	255
2	260
1.6	265
1.2	270
0.8	275
0.4	280
0	285



Engine Speed RPM: 1,800

Pump Speed RPM: 3,600

EXT RESIST M H2O	EXT FLOW L/MIN
4	300
3.6	305
3.1	310
2.6	315
2.1	320
1.6	325
1.1	330
0.6	335
0	340

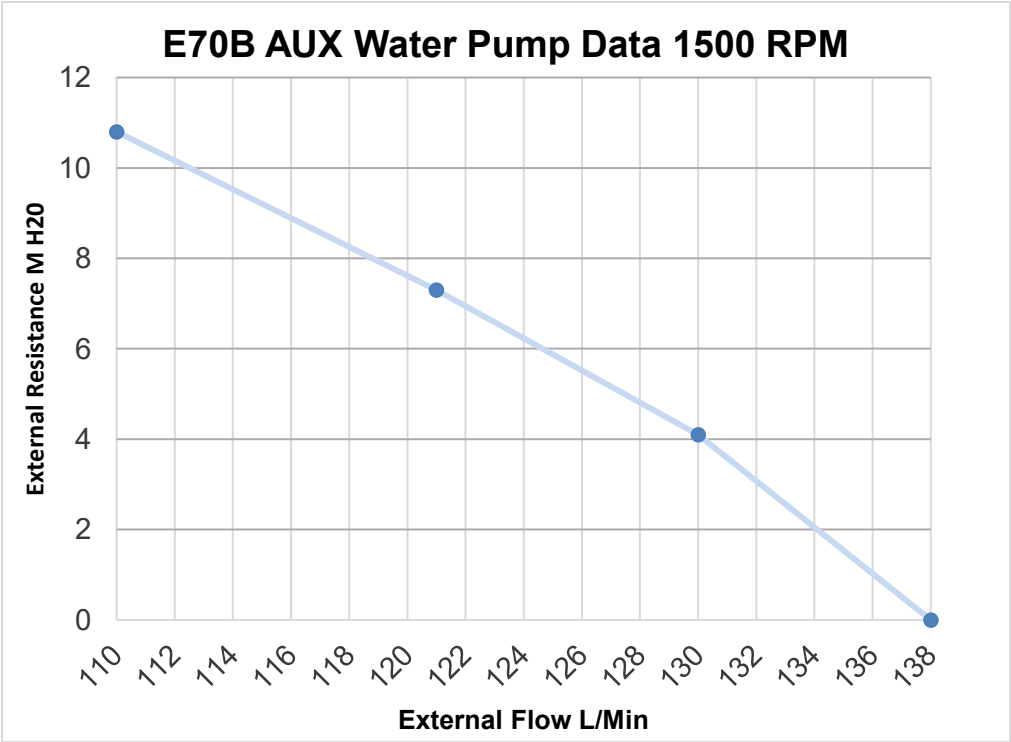


Auxiliary Water Pump Data

Engine Speed RPM: 1,500

Pump Speed RPM: 1,125

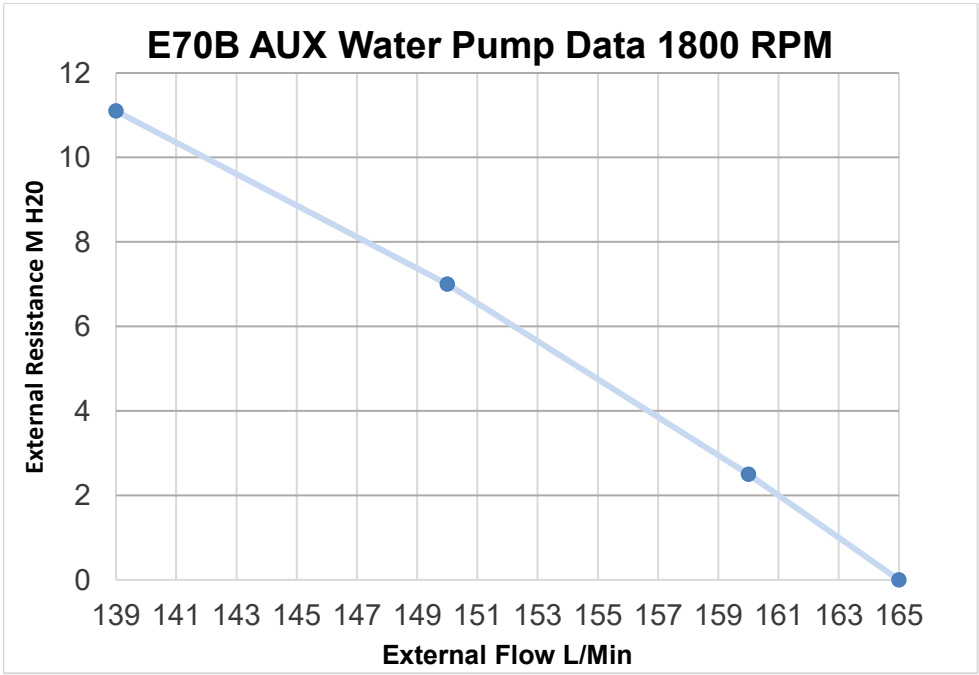
EXT RESIST M H2O	EXT FLOW L/MIN
11.1	139
7	150
2.5	160
0	165



Engine Speed RPM: 1,800

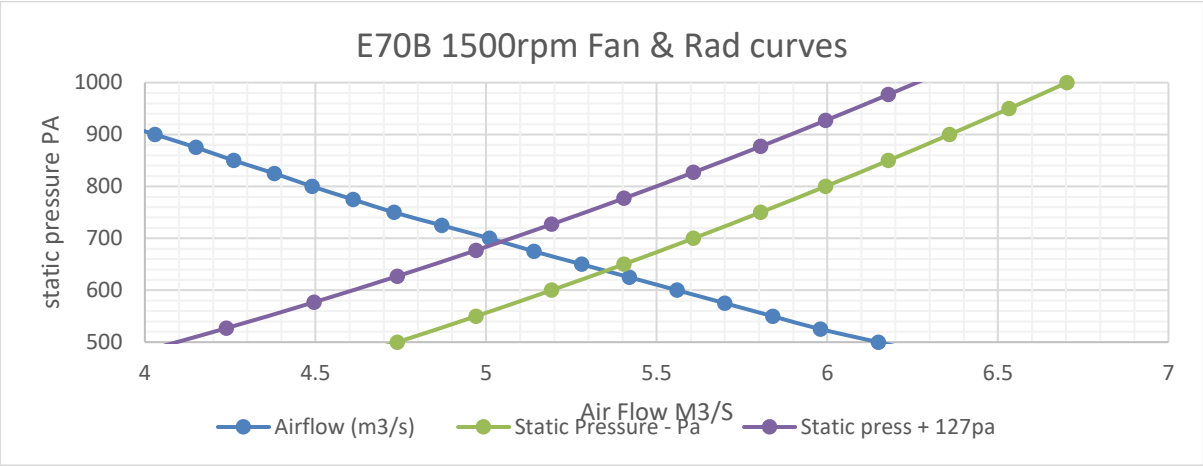
Pump Speed RPM: 1,350

EXT RESIST M H2O	EXT FLOW L/MIN
10.8	110
7.3	121
4.1	130
0	138



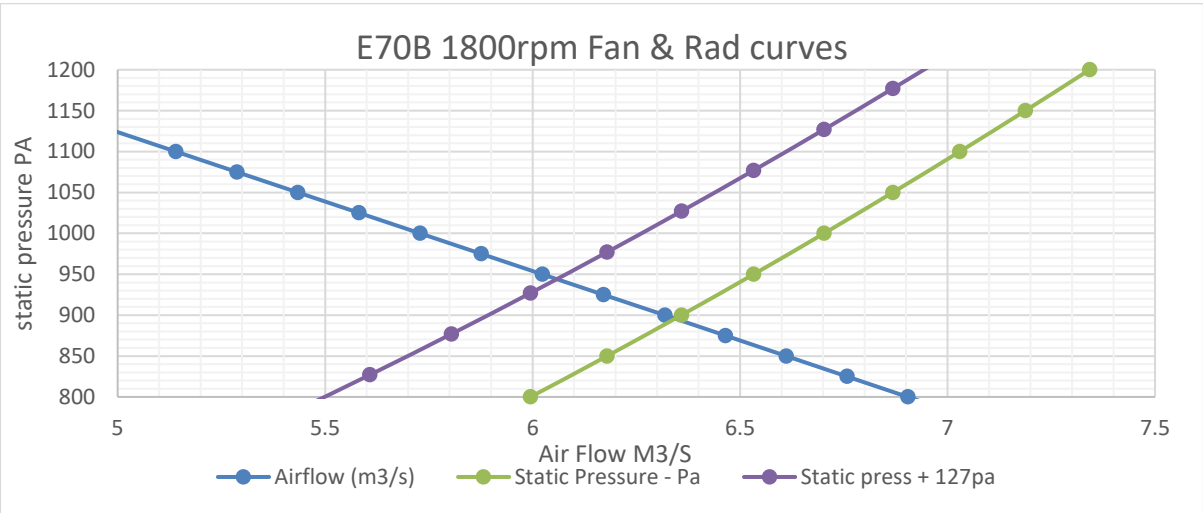
Radiator Fan Data

1500rpm Ratings



- | | |
|---|---|
| Total radiator airflow (unrestricted). 5.4 m3/sec | Maximum allowable total duct restriction 127 Pa |
| Total radiator airflow (unrestricted) 11,440 cfm | Maximum allowable total duct restriction 0.5 in H2O |
| Total radiator airflow (125Pa restriction) 4.7 m3/sec | Maximum allowable ambient temperature. 50 °C |
| Total radiator airflow (125Pa restriction) 995 cfm | Maximum allowable ambient temperature 122 °F |

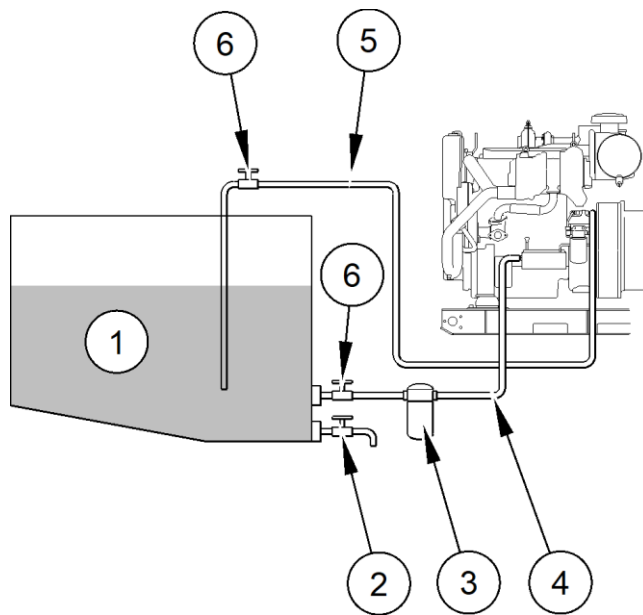
1800rpm Ratings



- | | |
|---|---|
| Total radiator airflow (unrestricted) 6.4 m3/sec | Maximum allowable total duct restriction 127 Pa |
| Total radiator airflow (unrestricted) 13,560 cfm | Maximum allowable total duct restriction 0.5 in H2O |
| Total radiator airflow (125Pa restriction) 5.8 m3/sec | Maximum allowable ambient temperature. 50 °C |
| Total radiator airflow (125Pa restriction). 1228 cfm | Maximum allowable ambient temperature 122 °F |

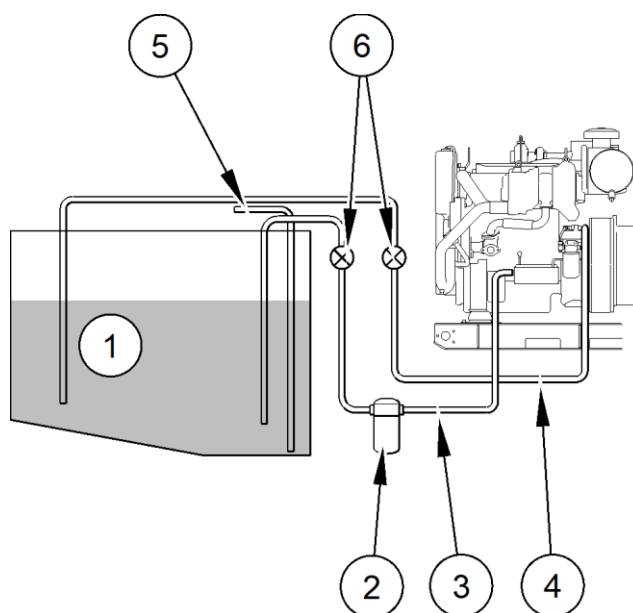
Typical Vessel Fuel Systems

Main Fuel Tank with Bottom Pickup Installation



- 1 Fuel tank
- 2 Drain point
- 3 Water separator/pre filter
- 4 Main fuel feed
- 5 Fuel return
- 6 Stop cock

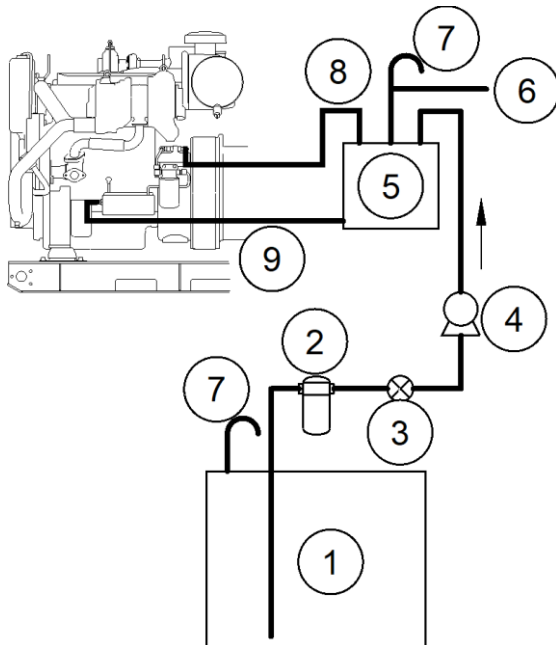
Main Fuel Tank with Standpipe Installation



- 1 Fuel tank
- 2 Water separator/pre filter
- 3 Main fuel feed
- 4 Fuel return
- 5 Drain tube
- 6 Stop cocks

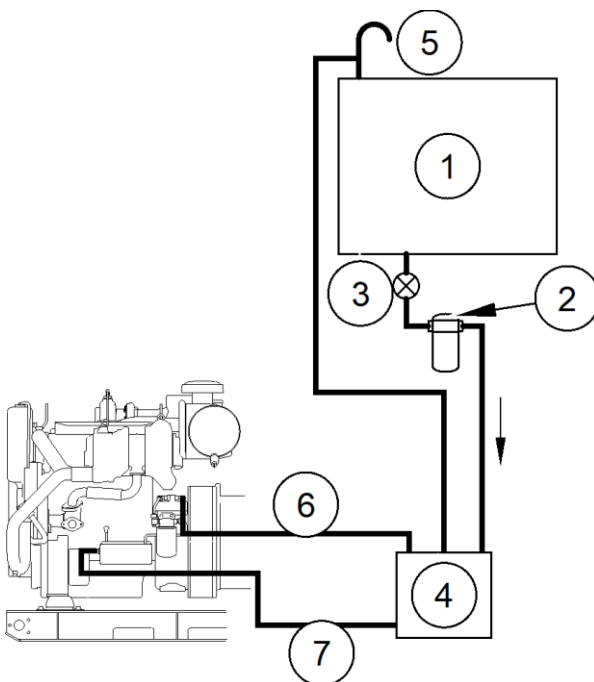
Typical Vessel Fuel System

Fuel Day Tank with Transfer Pump Installation



- 1 Main fuel tank
- 2 Water separator/pre-filter return
- 3 Valve.
- 4 Pump.
- 5 Day tank.
- 6 Overflow
- 7 Vent
- 8 Fuel
- 9 Fuel feed

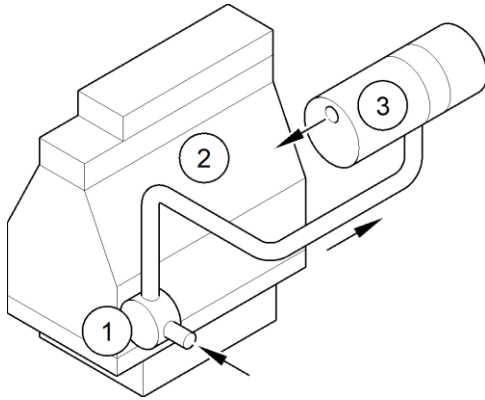
Gravity Fed Day Tank Installation



- 1 Main fuel tank.
- 2 Water separator/pre-filter (recommended option).
- 3 Valve.
- 4 Day tank.
- 5 Vent.
- 6 Fuel return.
- 7 Fuel feed

Engine Cooling System

Raw Water

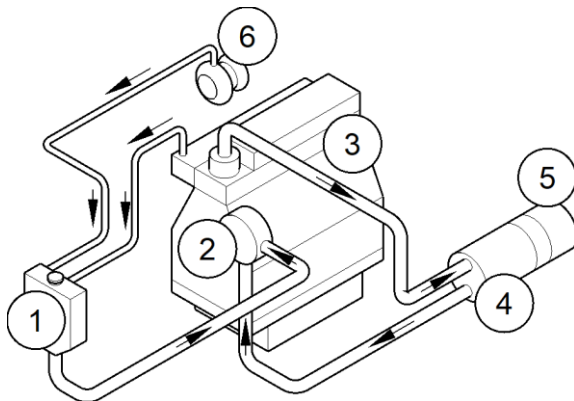


1 Auxiliary water pump

2 Engine.

3 Heat exchanger.

Fresh Water



1 Header tank.

2 Fresh water pump.

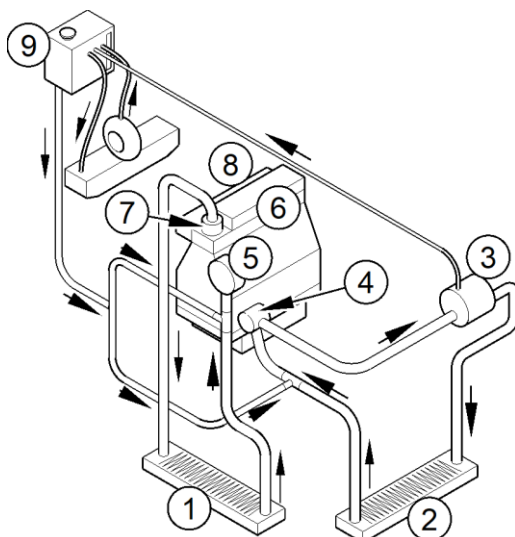
3 Engine

4 Heat exchanger.

5 Aftercooler.

6 Turbocharger.

Keel Cooling



1 Jacket grid cooler

2 Aftercooler grid cooler

3 Aftercooler.

4 Auxiliary water pump

5 Fresh water pump

6 Engine

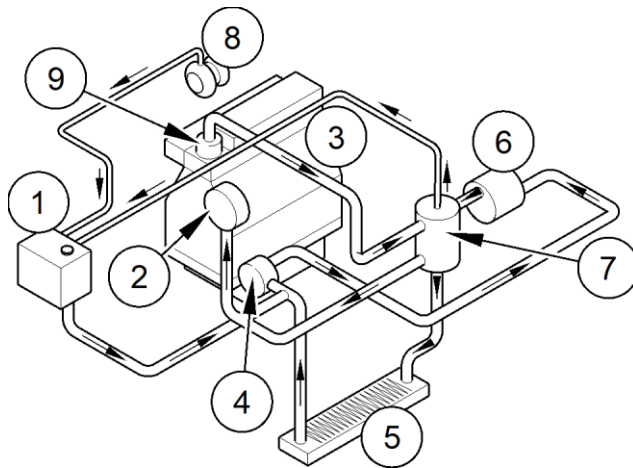
7 Thermostat.

8 Exhaust manifold.

9 Remote tank

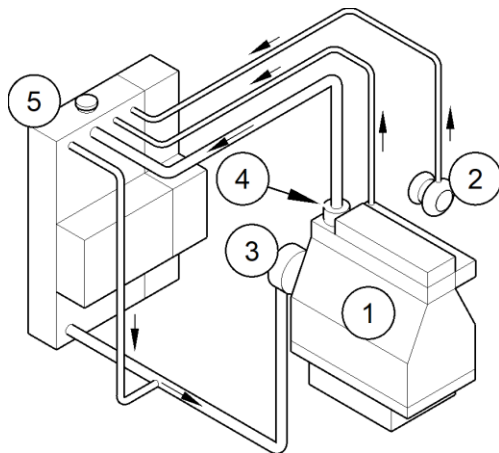
Engine Cooling System

Single Grid, Keel Cooling



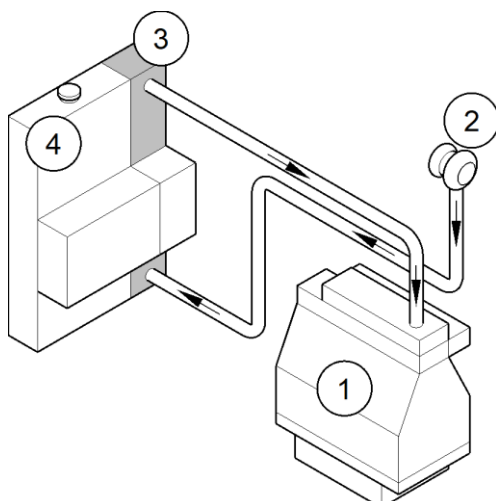
- | | |
|-------------------------|----------------|
| 1 Remote tank | 6 Aftercooler |
| 2 Fresh water pump tank | 7 Mixing |
| 3 Engine | 8 Turbocharger |
| 4 Auxiliary water pump | 9 Thermostat |
| 5 Grid cooler | |

Radiator



- | |
|--------------------|
| 1 Engine. |
| 2 Turbocharger |
| 3 Fresh water pump |
| 4 Thermostat |
| 5 Radiator |

Air Flow, Radiator



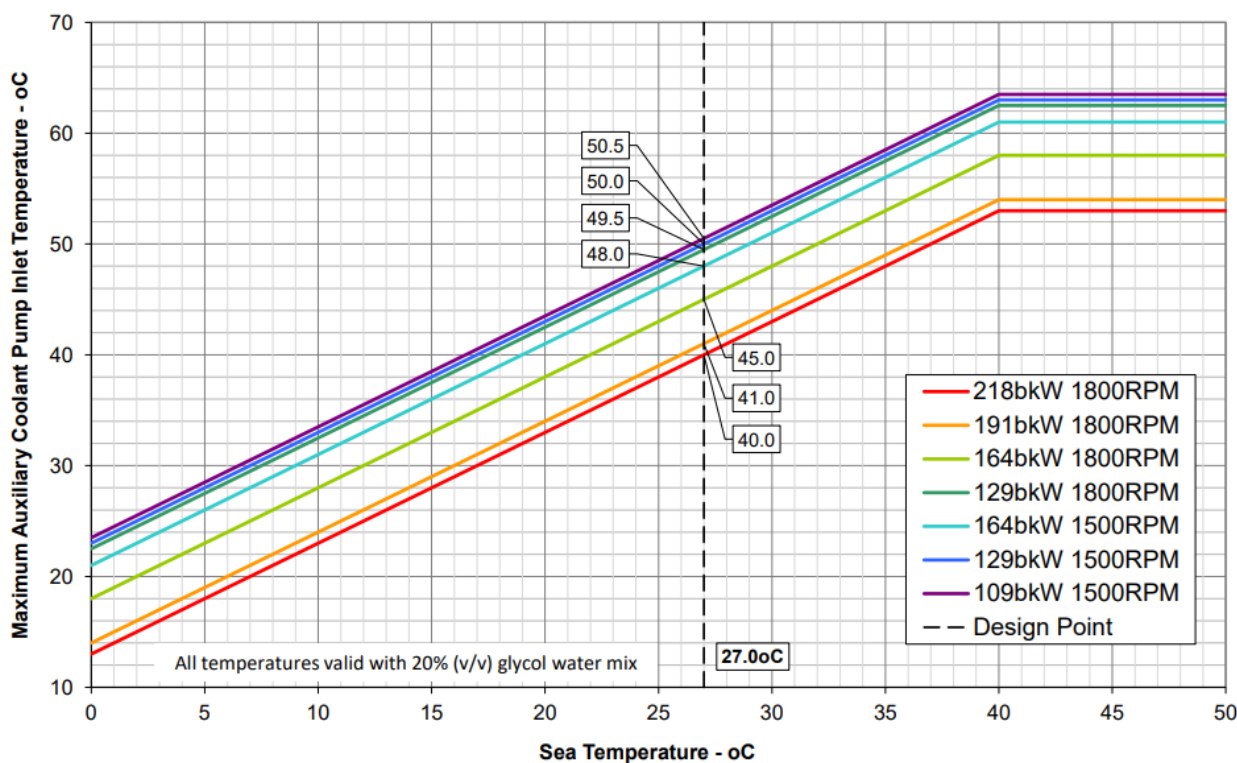
- | |
|---------------------|
| 1 Engine. |
| 2 Turbocharger |
| 3 Charge air cooler |
| 4 Radiator |

Engine Cooling System

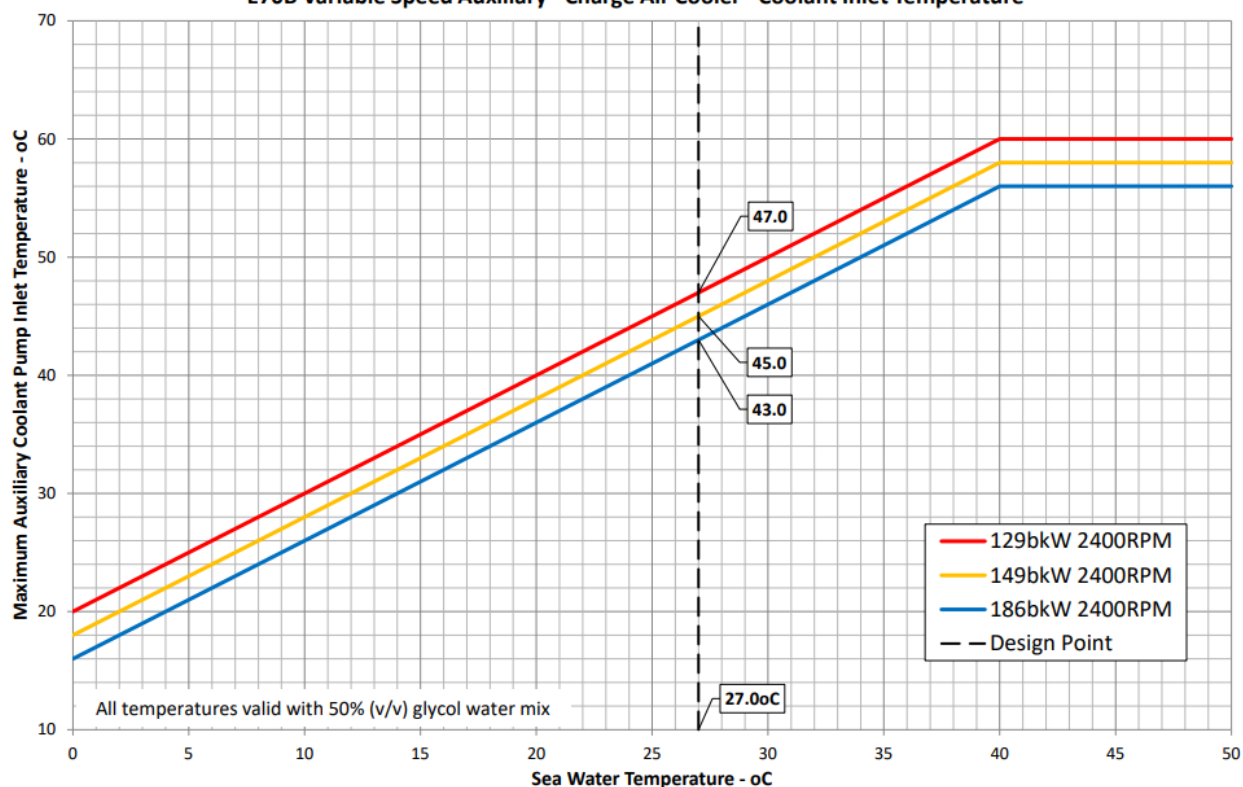
Single Grid Keel Cooling

A combined cooling system provides both jacket water and charge air cooling from a single external cooling circuit. This eliminates the need for two external keel or grid coolers. The external cooling circuit is driven by the auxiliary coolant pump.

E70B Constant Speed Auxiliary - Charge Air Cooler - Coolant Inlet Temperature



E70B Variable Speed Auxiliary - Charge Air Cooler - Coolant Inlet Temperature



Reference Material

All information in this document is
substantially correct at time of printing
and may be altered subsequently.
Doc No 7684-1-15
Produced in England ©2023 by
Wimborne Marine Power Centre



Email: Marine@Perkins.com

Web: www.Perkins.com/Marine