

General Engine Data

Type	V-Type, 4 cycle, water cooled, 12 Cylinder		
Aspiration	Turbocharged & Intercooled		
Cylinder Type	Replaceable dry liner		
Bore x Stroke	mm (inch)	128 x 142 (5.04 x 5.59)	
Displacement	litre (in. ³)	21.927 (1338.1)	
Compression Ratio	14.2 : 1		
Valves per Cylinder	- Intake	2	
	- Exhaust	2	
Valves lashes at cold	- Intake	mm (inch)	0.35 (0.0138)
	- Exhaust	mm (inch)	0.40 (0.0177)
Valve Timing	- Intake	Opening: 24° BTDC Close: 30° ABDC	
	- Exhaust	Opening: 59° BBDC Close: 21° ATDC	
Combustion Type	Direct Injection		
Firing Order	1-12-5-8-3-10-6-7-2-11-4-9		
Injection Timing	12° BTDC		
Rotation	Counter Clockwise, viewed from flywheel		
Dimension (L x W x H)	Approx. mm	1,909 x 1,306 x 1,913	
Dry Weight	Approx. kg (lb.)	1,850 (4,079)	

Approved Ratings		1,470 rpm	1,760 rpm
DF22TiH-N Output	<i>kW (hp)</i>	623 (834)	724 (970)

*To determine the maximum allowable pump load, a deduction of 10% must be made.

Fuel System

Injection Pump	Bosch in-line “P” type
Governor	RSV type (all speed control)
Feed Pump	Mechanical type
Injection Nozzle	Multi hole type
Opening Pressure <i>kPa (psi)</i>	27,949 (4,053.7)
Fuel Filter	Full flow, cartridge type
Used Fuel	Diesel fuel type 2-D Only
Fuel consumption	See table no. 03.100.06FCEN.XX
Minimum Supply line Size <i>mm (inch)</i>	12 (0.47)
Minimum Return line Size <i>mm (inch)</i>	12 (0.47)

Electrical System

		24 Volts (Nominal)	
Starter motor	<i>kW</i>	1 x 7	
Recommended Battery Capacity	<i>Ah</i>	200	
Quantity per battery bank		2	
Cold Cranking Amperes	<i>@ -18°C (0°F)</i>	1,000	
Charging Alternator Output	<i>Amps</i>	45	

Air Induction System

Air Cleaner Type	Drip proof		
Engine Air Flow	<i>m³/min.</i>	45.3 @ 1,470 rpm	52.5 @ 1,800 rpm
Air Inlet Restriction Dirty	<i>kPa (mmH₂O)</i>	6.2 (635)	
Air Inlet Restriction Clean	<i>kPa (mmH₂O)</i>	2.2 (220)	

Lubrication System

Lub. Method		Fully Forced pressure feed type
Oil Pump		Gear type driven by crankshaft
Oil Filter		Full Flow Cartridge type
Oil pressure Range, normal	<i>kPa (psi)</i>	100 (14.5) at idle 300-600 (43.5-87.0) at maximum speed
Max. Oil Sump Temperature	<i>°C (°F)</i>	108 (226)
Oil Sump Capacity - High	<i>litre (gal.)</i>	40 (10.6)
- Low	<i>litre (gal.)</i>	33 (8.7)
Total Engine Oil Capacity	<i>litre (gal.)</i>	40 (10.6)
Minimum Oil Pressure	<i>kPa (psi)</i>	75 (10.9)

Cooling system

Heat Exchanger Minimum Raw Water Flow		1 litre / minute per kW installed
Engine Water Pump		Centrifugal type driven by belt
Water Pump Capacity	<i>litre/min. (gal./min.)</i>	415 (109.6) @ 1,470 rpm 508 (134.2) @ 1,800 rpm
Heat Exchanger Raw water Inlet		
Maximum Pressure	<i>kPa (psi)</i>	1,500 (217.6)
Flow	<i>litre/min. (gal./min.)</i>	555 (146)
Maximum Temperature	<i>°C (°F)</i>	37.8 (100)
Thermostat Start to Open	<i>°C (°F)</i>	71 (160)
Fully Opened	<i>°C (°F)</i>	85 (185)
Coolant Capacity	<i>litre (gal.)</i>	35 (9.4)
Coolant Pressure Cap	<i>kPa (psi)</i>	95 (13.8)
Maximum Raw Water Supply pipe		
Connection to Heat Exchanger	<i>inch</i>	2½" BSP
Maximum Raw Water Discharge pipe		
Connection from Heat Exchanger	<i>inch</i>	3" BSP
Max. Engine Coolant Temperature	<i>°C (°F)</i>	96 (204.8)
Pressure loss Engine Cooling Circuit	<i>kPa (psi)</i>	80 (11.6)

Exhaust System

Exhaust Gas Flow	<i>m³/min.</i>	119.3 @ 1,470 rpm	138.4 @ 1,800 rpm
Exhaust Gas Temperature	<i>°C (°F)</i>	590 (1,094) @ 1,470 rpm	561 (1,042) @ 1,800 rpm
Max. Allowable Back Pressure	<i>kPa (mmH2O)</i>	6.2 (630)	
Minimum Exhaust Pipe Diameter	<i>mm(inch)*</i>	2x 138.4 (5")	

* Based on Nominal System. Flow analysis must be done to assure adherence to system limitations!

(Minimum exhaust pipe diameter is based on 15 feet of pipe, one elbow, and a silencer. Pressure drop no greater than one half the max. allowable back pressure)

Heater System

Wattage (Nominal)	<i>W</i>	3,000
Voltage – AC	<i>V</i>	230

Engine Performance Data

All data is based on the engine operating with fuel system, lubricating oil pump, air cleaner, and alternator; not included are compressor, fan, optional equipment, and driven components. Data is based on operation at SAE standard J1394 conditions of 300ft (91.4m) altitude, 29.61 in.(752mm) Hg dry barometer, and 77°F (25°C) intake air temperature, using No.2 diesel or a fuel corresponding to ASTM-D2.

Altitude above which output should be Limited	<i>m(ft.)</i>	91.4 (300)
Correction Factor per 305m.(1000ft.) above Altitude Limit		3 %
Temperature above which output should be Limited	<i>°C(°F)</i>	25 (77)
Correction Factor per 11°C (10°F) above Temperature Limit		2% (1%)