

General Engine Data			
Type	V-Type, 4 cycle, water cooled, 12 Cylinder		
Aspiration	Turbocharged & Intercooled		
Cylinder Type	Replaceable dry liner		
Bore x Stroke	<i>mm (inch)</i>	128 x 142 (5.04 x 5.59)	
Displacement	<i>litre (inch³)</i>	21.927 (1,338.1)	
Compression Ratio	14.2 : 1		
Valves per Cylinder	Intake	<i>mm (inch)</i>	2
	Exhaust	<i>mm (inch)</i>	2
Valves lashes at cold	Intake	<i>mm (inch)</i>	0.35 (0.0138)
	Exhaust	<i>mm (inch)</i>	0.45 (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)	<i>Approx. mm</i>	2,030 x 1,306 x 1,900 (L= Construction length)	
Dry Weight	<i>Approx. kg (lb.)</i>	1,850 (4,079)	

Approved Ratings		1,470 rpm	1,800 rpm
DF224TiH-F Output	<i>kW (hp)</i>	562 (764)	652 (887)

Although our FM ratings are shown at specific speeds, De Maas FFE engines can be applied at any intermediate speed. To determine the intermediate speed power; make a linear interpolation from the applicable De Maas power curves.

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. 3.100.06FCEN.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			
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>	1000	
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	<i>kPa</i>	3.4	

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>	1,000 (145.1)	
Flow	<i>litre/min. (gal./min.)</i>	652 (143.4)	
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>	2" BSP	
Maximum Raw Water Discharge pipe			
Connection from Heat Exchanger	<i>inch</i>	2½" BSP Vertical up!	
Maximum Engine Coolant Temperature	<i>°C (°F)</i>	96 (204.8)	
Pressure loss Engine Cooling Circuit	<i>kPa (psi)</i>	80 (11.6)	

Lubrication System			
Lubricating 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 300-400 (43.5-58.0) at maximum speed	
Max. Oil Sump Temperature	<i>°C (°F)</i>	118 (244)	
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)	

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 (1094) @ 1,470 rpm	561 (1,042) @ 1,800 rpm
Max. Allowable Back Pressure	<i>kPa</i>	5.7	
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 4.5 meters (15 feet) of pipe, one elbow, and a silencer.

Allowable pressure drop of silencer shall be 5 kPa based on 6.2 kPa max. allowable back pressure as per engine data sheet and 10" X 1 point connection from engine!

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.(1,000ft.) 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%)	