



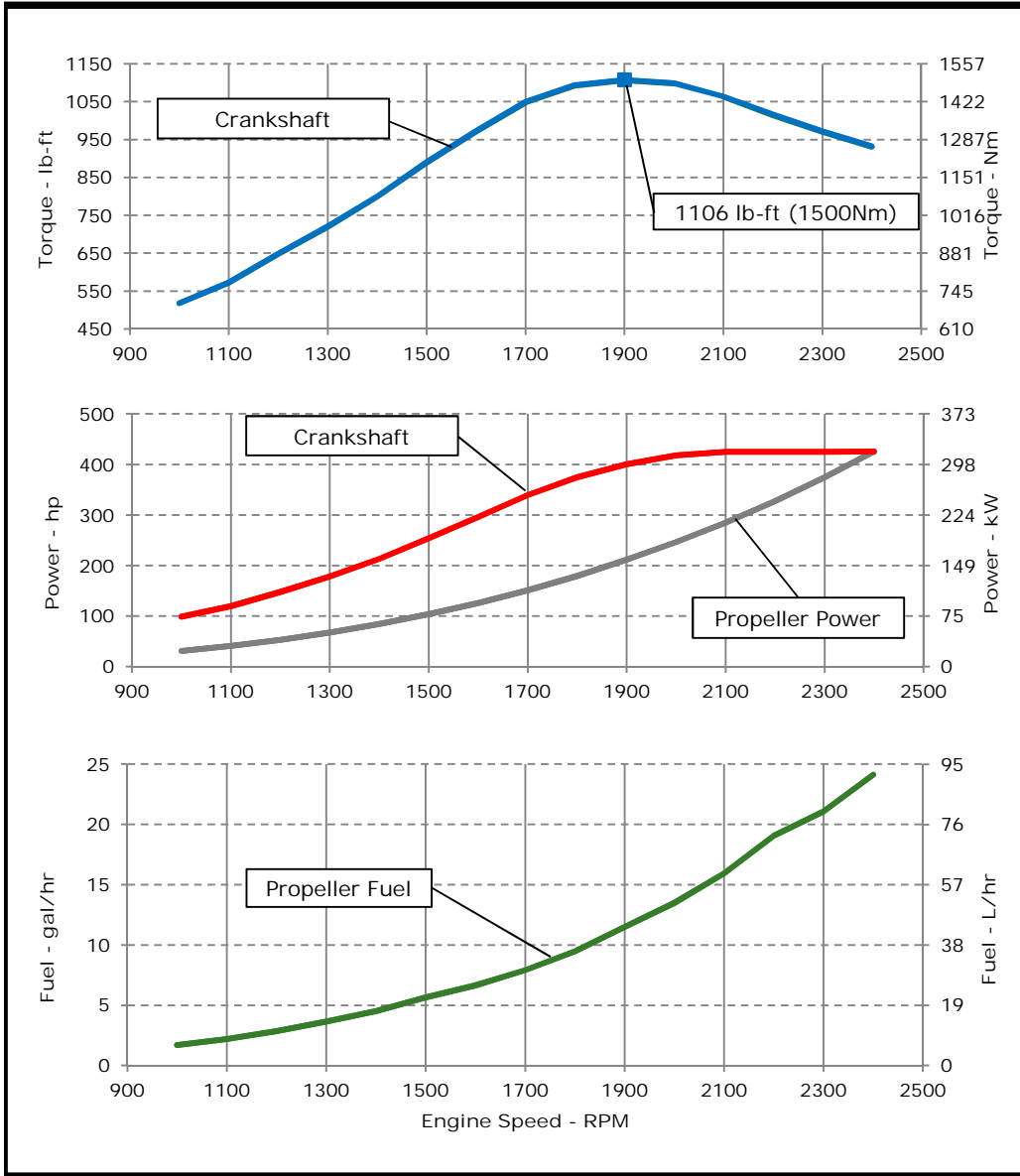
JOHN DEERE

ENGINE PERFORMANCE CURVE

Rating: M4 - 425hp (317kW) @ 2400 RPM
 Application: Marine

PowerTech™ 9.0L Engine

Model: 6090AFM85



REFERENCE CONDITIONS

Air Intake Restriction..... 12 in.H₂O (3 kPa)
 Exhaust Back Pressure..... 30 in.H₂O (7.5 kPa)

Rated speed and power
 Gross power guaranteed within ±5% at SAE J1995 and ISO 3046
 J1995 and ISO 3046 conditions:

- 77 °F (25 °C) air inlet temperature
- 29.31 in.Hg (99 kPa) barometric pressure
- 104 °F (40 °C) fuel inlet temperature
- 0.853 fuel specific gravity @ 60 °F (15.5 °C)

Ambient air temperature is defined to be the temperature of ambient air close to operating vessel that is not influenced in any manner by operating characteristics of the vessel (free field temp).

Conversion factors:

- Power: kW = hp x 0.746
- Fuel: 1 gal = 7.1 lb, 1 L = 0.85 kg
- Torque: N-m = lb-ft x 1.356

All values from currently available data. Subject to manufacturing and measurement variations and to change without notice.
 Actual performance is subject to application and operation conditions outside of John Deere control.

Notes:

M4: The M4 rating is for marine propulsion applications that typically operate between 1,000-3,000 hours per year and have load factors below 40 percent. This rating is for applications that use full power no more than 1 hour out of each 12 hours of operation. The remaining time of operation is at or below cruising speed.

Possible applications: Inshore crew boats, charter fishing boats, pilot boats, dive boats, and planning hull commercial fishing boats.

Designed/Calibrated to meet: Certified by:

- EPA Commercial Marine Tier 3
- IMO MARPOL Annex VI Compliant
- NRMM (97/68/EC), as amended

Ref: Engine Emission Label

Preliminary

Performance Curve: 6090AFM85_D

All values at rated speed, power, and standard conditions, per SAE J1995 unless otherwise noted.

Engine Installation Criteria

General Data

Model	6090AFM85		
Number of Cylinders	6		
Bore	118 mm	4.65 in	
Stroke	136 mm	5.35 in	
Displacement	9.0 L	549 in ³	
Compression Ratio	16.3:1		
Valves per Cylinder, Intake/Exhaust	2/2		
Combustion System	Direct injection		
Firing Order	1-5-3-6-2-4		
Engine Type	In line, 4 Cycle		
Aspiration	Turbocharged and Aftercooled		
Aftercooling System	Engine coolant		
Engine Crankcase Vent System	Closed		

Cooling System*

Engine Coolant Heat Rejection**	335 kW	19068 BTU/min
Max. Pressure Drop Across Keel Cooler	40 kPa	5.8 psi
Coolant Flow	360 L/min	95 gal/min
Seawater Flow (heat exchanged)	405 L/min	107 gal/min
Thermostat Start to Open	71 °C	178 °F
Thermostat Fully Open	84 °C	203 °F
Engine Coolant Capacity, HE	30 L	7.9 gal
Engine Coolant Capacity, KC	26 L	6.9 gal
Min. Coolant Fill Rate	12 L/min	3.2 gal/min
Min. Pressure Cap	110.3 kPa	16 psi
Min. Pump Inlet Pressure	30 kPa	4.4 psi
Max. External Coolant Restriction	40 kPa	5.8 psi
Normal Operation Max Top Tank Temperature	100 °C	212 °F
≤ 5% of Total Operating Time Top Tank Temperature	100-110 °C	212-230 °F
Absolute Max Top Tank Temperature	110 °C	230 °F
Recommended Fuel Cooler	11 kW	629 BTU/min
Engine Radiated Heat	46 kW	2610 BTU/min

* The cooling system should be capable of typical at ambient up to the maximum conditions in which the vessel will operate.

Typical operation is defined as the average load sustainable in the vessel over 10 min.

** Reference 32 °C Sea Water Temperature

Physical Data

Length to rear face of block	1293 mm	50.9 in
Length maximum	1714 mm	67.5 in
Width maximum	938 mm	36.9 in
Height, crank centerline to top	665 mm	26.2 in
Height, crank centerline to bottom	319 mm	319 in
Weight, with oil, no coolant (includes engine, flywheel housing, flywheel, and electronics)	1055 kg	2325 lb
Center of Gravity Location, X-axis From Rear Face of Block	408 mm	16.1 in
Center of Gravity Location, Y-axis Right of Crankshaft	38 mm	1.5 in
Center of Gravity Location, Z-axis Above Crankshaft	200 mm	7.9 in
Max. Allowable Static Bending Moment At Rear Face of Flywheel Housing with 5-G Load	814 Nm	600 lb-ft
Thrust Bearing Load Limit, Forward Continuous	8.6 kN	1933 lbf
Thrust Bearing Load Limit, Forward Intermittent	13 kN	2923 lbf
Thrust Bearing Load Limit, Rearward Continuous	4 kN	899 lbf
Thrust Bearing Load Limit, Rearward Intermittent	6 kN	1349 lbf

Electrical System

Min. Recommended Battery Capacity, 12V @32 °F (0 °C)	1100 amps
Min. Recommended Battery Capacity, 24V @32 °F (0 °C)	750 amps
Starter Rolling Current, 12V @32 °F (0 °C)	920 amps
Starter Rolling Current, 24V @32 °F (0 °C)	600 amps
Min. Voltage at ECU during Cranking, 12V	6 volts
Min. Voltage at ECU during Cranking, 24V	10 volts
Max. Allowable Start Circuit Resistance, 12V	0.0012 ohms
Max. Allowable Start Circuit Resistance, 24V	0.002 ohms
Recommended Starter Cable, 12V 100"	#00
Recommended Starter Cable, 24V 100"	#2
Recommended Starter Cable, 12V 200"	#0000 or #2#00
Recommended Starter Cable, 24V 200"	#0
Electrical Component Maximum Temperature Limit	125 °C 257 °F

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Engine Installation Criteria

Fuel System

ECU Description	L14			
Fuel Injection Pump	Denso HP4			
Governor Type	Electronic			
Volumetric Fuel Consumption	91.4	L/hr	24.1	gal/hr
Mass Fuel Consumption	77.7	kg/hr	171	lb/hr
Total Fuel Volumetric Flow	240	L/hr	63.4	gal/hr
Total Fuel Mass Flow	204	kg/hr	450	lb/hr
Max. Fuel Inlet Restriction*	20	kPa	80	in.H2O
Max. Fuel Inlet Pressure	20	kPa	80	in.H2O
Max Fuel Return Pressure	20	kPa	80	in.H2O
Max. Fuel Height Above Transfer Pump	2.4	m	7.9	ft
Max. Leak-off Return Height	2.4	m	7.9	ft
Max. Fuel Inlet Height Above Fuel Tank Supply	2.4	m	7.9	ft
Normal Operation Fuel Temperature	40	°C	104	°F
Max. Fuel Inlet Temperature	100	°C	212	°F
Min. Recommended Fuel Line Inside Diameter	8.34	mm	0.33	in
Min. Recommended Fuel Line Size	6 (-) AN			
Primary Fuel Filter	10 mic			
Secondary Fuel Filter	2 mic			

Lubrication System

Oil Pressure at Rated Speed	274	kPa	40	psi
Oil Pressure at Low Idle (650rpm)**	115	kPa	17	psi
Max. Crankcase Pressure	2	kPa	8	in.H2O
Maximum Installed Angle, Front Down	0 deg			
Maximum Installed Angle, Front Up	12 deg			
Engine Angularity Limits Any Direction, Continuous***	20 deg			
Engine Angularity Limits Any Direction, Intermittent***	30 deg			

* With clean filters

** With John Deere Plus-50 II™ 15w-40, not applicable with break in oil.

*** With 19BP option

Air Intake System

Engine Air Flow	28.3	m ³ /min	999	ft ³ /min
Intake Manifold Pressure	255	kPa	37.0	psi
Manifold Air Temperature	97	°C	207	°F
Maximum Manifold Air Temperature	130	°C	266	°F
Max. Allowable Temperature Rise, Ambient	17	°C	30	°F
Air to Engine Inlet				
Max. Air Intake Restriction, Clean Air Cleaner	3	kPa	12	in.H ₂ O
Max. Air Intake Restriction, Dirty Air Cleaner	6.25	kPa	25	in.H ₂ O
Min. Ventilation Area	0.174	m ²	270	in ²

Performance Data

Rated Power	317	kW	425	hp
Rated Speed	2400 RPM			
Peak Torque Speed	1900 RPM			
Low Idle Speed	650 RPM			
Rated Torque	1260	Nm	929	ft-lb
Peak Torque	1500	Nm	1106	ft-lb
BMEP, Rated	1759	kPa	255	psi
Rated Pferdestärke (metric hp)	431 ps			
Front Drive Capacity, Intermittent	955	Nm	704	lb-ft
Front Drive Capacity, Continuous	955	Nm	704	lb-ft

Exhaust System

Exhaust Flow	64.4	m ³ /min	2274	ft ³ /min
Exhaust Flow @ gas STP	27.3	m ³ /min	964	ft ³ /min
Exhaust Temperature	427	°C	801	°F
Max. Allowable Exhaust Restriction	7.5	kPa	30	in.H ₂ O
Max. Shear on Turbocharger Exhaust Outlet	11	kg	24.3	lb
Max. Bending Moment on Turbocharger Exhaust Outlet	7	Nm	15.4	lb-ft
Min. Exhaust Pipe Diameter, Dry	127	mm	5.0	in
Min. Exhaust Pipe Diameter, Wet	139.7	mm	5.5	in

Performance Curve: 6090AFM85_D

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Engine Installation Criteria

Engine Performance Data Table

Engine Speed	Crank Power		Crank Torque		* Prop Power		* Prop Fuel		* Prop BSFC
	RPM	kW	hp	Nm	lb-ft	kW	hp	L/hr	gal/hr
2400	317	425	1262	931	317	425	91	24	245
2300	317	425	1316	970	279	374	80	21	243
2200	317	425	1376	1015	244	328	72	19	251
2100	317	425	1441	1063	213	285	60	16	241
2000	312	418	1489	1098	184	246	51	13	236
1900	298	400	1500	1106	157	211	44	12	235
1800	279	374	1481	1093	134	179	36	9	227
1700	253	339	1421	1048	113	151	30	8	226
1600	221	296	1317	972	94	126	25	7	228
1500	189	254	1206	890	77	104	21	6	234
1400	159	213	1083	799	63	84	17	5	230
1300	133	178	976	720	50	68	14	4	233
1200	110	148	879	648	40	53	11	3	232
1100	89	120	776	572	31	41	8	2	231
1000	73	99	702	518	23	31	6	2	239

* Theoretical 3.0 exponent propeller curve , measured at flywheel

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