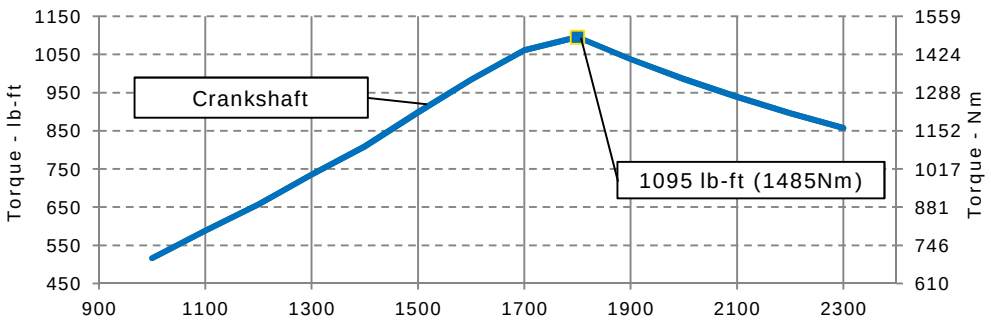
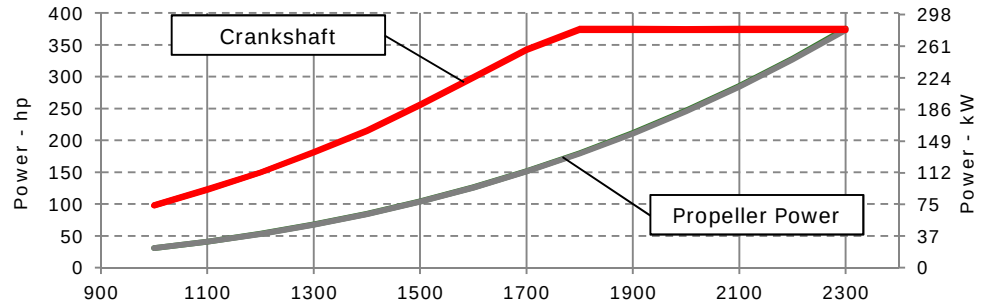
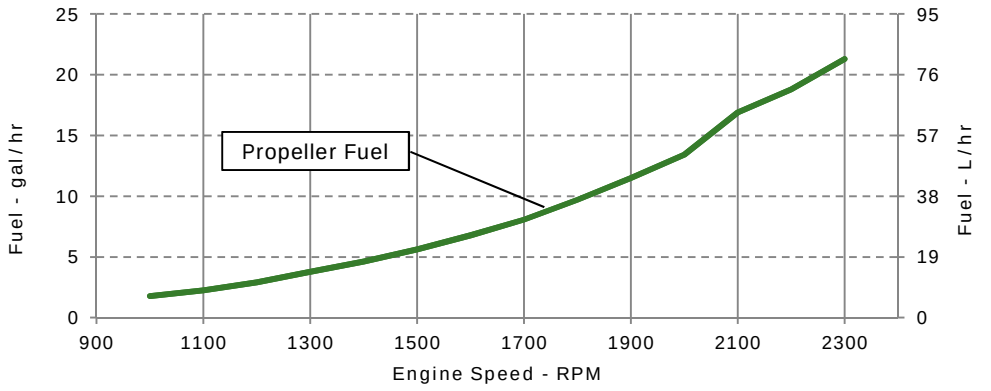
ENGINE PERFORMANCE CURVE

Rating: M3 - 375hp (280kW) @ 2300 RPM
Application: Marine

PowerTech™ 9.0L Engine
Model: 6090AFM85







REFERENCE CONDITIONS

Air Intake Restriction.....12 in.H_2O (3 kPa)
Exhaust Back Pressure..... 30 in.H_2O (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:

M3: The M3 rating is for marine propulsion applications that typically operate between 2,000-4,000 hours per year and have load factors up to 50 percent. This rating is for applications that use full power for no more than 4 hours out of each 12 hours of operation. The remaining time of operation is at or below cruising speed.

Possible applications: Coastal fishing boats offshore crew boats, research boats. Short range ferryboats and dinner cruise 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_C

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**	298	kW	16962	BTU/min
Max. Pressure Drop Across Keel Cooler	40	kPa	5.8	psi
Coolant Flow	345	L/min	91	gal/min
Seawater Flow (heat exchanged)	416	L/min	110	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	12	kW	675	BTU/min
Engine Radiated Heat	40	kW	2304	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

Performance Curve: 6090AFM85_C

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Engine Installation Criteria

Fuel System

ECU Description		L14		
Fuel Injection Pump		Denso HP4		
Governor Type		Electronic		
Volumetric Fuel Consumption	80.6	L/hr	21.3	gal/hr
Mass Fuel Consumption	68.5	kg/hr	151	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	27	m^3/min	957	ft^3/min
Intake Manifold Pressure	242	kPa	35.1	psi
Manifold Air Temperature	96	°C	205	°F
Maximum Manifold Air Temperature	130	°C	266	°F
Max. Allowable Temperature Rise, Ambient Air to Engine Inlet	17	°C	30	°F
Max. Air Intake Restriction, Clean Air Cleaner	3	kPa	12	$in.H_2O$
Max. Air Intake Restriction, Dirty Air Cleaner	6.25	kPa	25	$in.H_2O$
Min. Ventilation Area	0.167	m^2	258	in^2

Performance Data

Rated Power	280	kW	375	hp
Rated Speed		2300	RPM	
Peak Torque Speed		1800	RPM	
Low Idle Speed		650	RPM	
Rated Torque	1163	Nm	857	ft-lb
Peak Torque	1485	Nm	1095	ft-lb
BMEP, Rated	1623	kPa	235	psi
Rated Pferdestärke (metric hp)		381	ps	
Front Drive Capacity, Intermittent	955	Nm	704	lb-ft
Front Drive Capacity, Continuous	955	Nm	704	lb-ft

Exhaust System

Exhaust Flow	59	m^3/min	2094	ft^3/min
Exhaust Flow @ gas STP	25.9	m^3/min	915	ft^3/min
Exhaust Temperature	416	°C	781	°F
Max. Allowable Exhaust Restriction	7.5	kPa	30	$in.H_2O$
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_C

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

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	g/kW-hr
2300	280	375	1162	857	280	375	81	21	245
2200	280	375	1215	896	245	328	71	19	247
2100	280	375	1273	939	213	286	64	17	255
2000	280	375	1336	985	184	247	51	13	234
1900	280	375	1407	1038	158	212	43	11	234
1800	280	375	1485	1095	134	180	37	10	233
1700	256	343	1439	1061	113	152	31	8	229
1600	224	300	1334	984	94	126	26	7	232
1500	191	257	1218	898	78	104	21	6	233
1400	161	216	1097	809	63	85	17	5	235
1300	136	182	996	735	51	68	14	4	240
1200	112	150	890	657	40	53	11	3	235
1100	92	123	797	588	31	41	9	2	237
1000	73	98	700	516	23	31	7	2	249

* Theoretical 3.0 exponent propeller curve , measured at flywheel

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