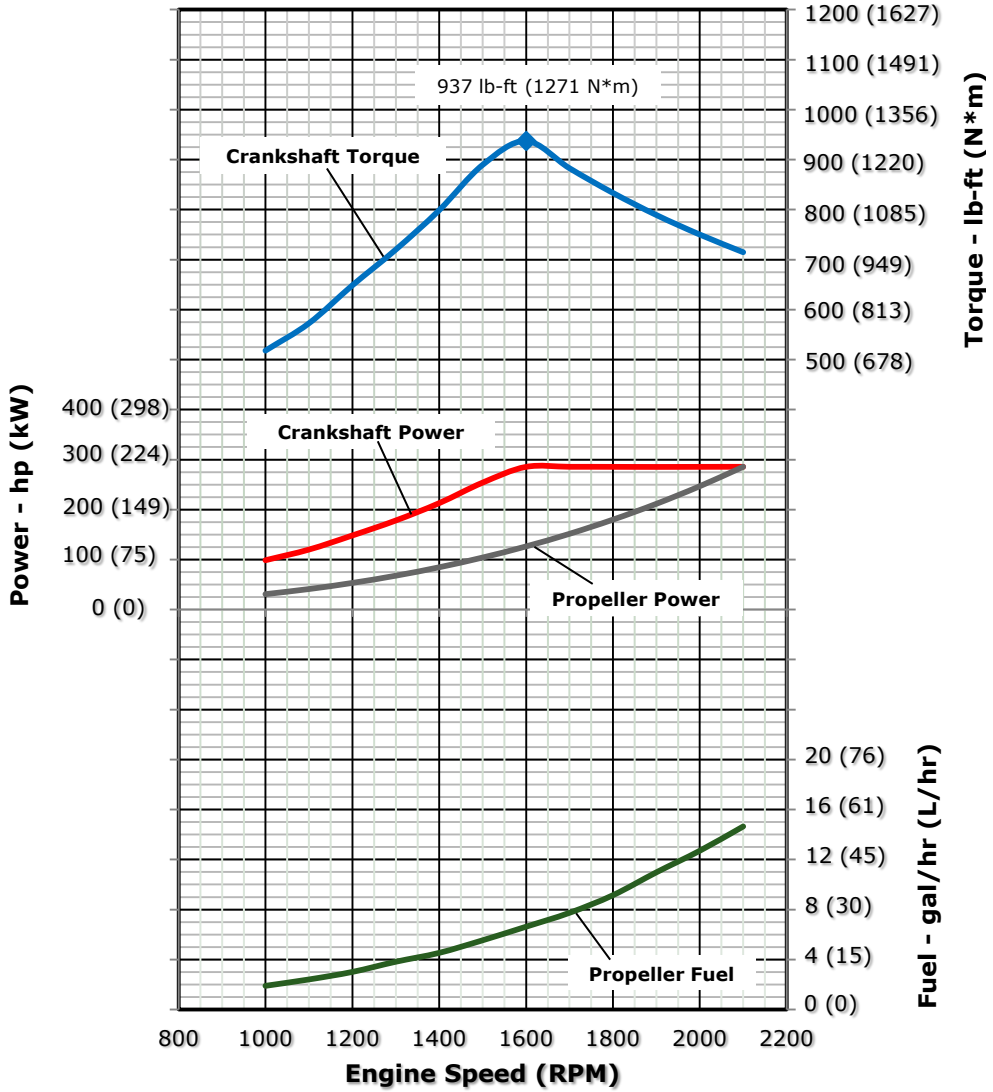
ENGINE PERFORMANCE CURVE

JOHN DEERE

Rating: M1 - 285 (213 kW) @ 2100 RPM
Application: Marine

PowerTech™ 9.0L Engine
Model: 6090AFM75
285 hp @ 2100 RPM
213 kW @ 2100 RPM
See Option Code Table



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:

M1: The M1 rating is for marine propulsion applications that may operate up to 24 hours per day uninterrupted full power. These applications typically operate over 3,000 hours per year and have load factors over 65%. The M1 rating is the ISO 8665 standard power rating and the SAE J1228 crankshaft power rating. Both are defined as the power level at which an engine can run continuously between recommended service intervals.

Possible applications: Line haul tugs and towboats, fish and shrimp trawlers/draggers, and displacement hull fishing boats over 18 m (60 ft).

Designed/Calibrated to meet:	Certified by:
• EPA Commercial Marine Tier 2 • IMO MARPOL Annex VI Compliant • IWT (2004/26/EC) Ref: Engine Emission Label	

Performance Curve: 6090AFM75_A

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

Engine Installation Criteria

General Data

Model	6090AFM75	
Number of Cylinders	6	
Bore	118 mm	4.6 in
Stroke	127 mm	5.0 in
Displacement	9.0 L	549 in^3
Compression Ratio	16.0:1	
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**	191.5 kW	10900 BTU/min
Max. Pressure Drop Across Keel Cooler	40 kPa	5.8 psi
Coolant Flow	329.7 L/min	87.1 gal/min
Thermostat Start to Open	82 °C	180 °F
Thermostat Fully Open	94 °C	202 °F
Engine Coolant Capacity, HE	47.5 L	12.5 gal
Engine Coolant Capacity, KC	43.5 L	11.5 gal
Min. Coolant Fill Rate	12 L/min	3 gal/min
Min. Pressure Cap	110 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	TBD kW	TBD BTU/min

Physical Data

Length	1682 mm	66.2 in
Width	938 mm	36.9 in
Height, centerline to top	665 mm	26.2 in
Height, centerline to bottom	319 mm	12.6 in
Weight, with oil, no coolant (includes engine, flywheel housing, flywheel, and electronics)	1011 kg	2229 lb
Center of Gravity Location, X-axis From Rear Face of Block	434 mm	17.8 in
Center of Gravity Location, Y-axis Right of Crankshaft	4.5 mm	0.18 in
Center of Gravity Location, Z-axis Above Crankshaft	106 mm	4.2 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	900 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

* 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

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Engine Installation Criteria

Fuel System

ECU Description	L14	
Fuel Injection Pump	Denso HP4	
Governor Type	Electronic	
Volumetric Fuel Consumption	55.6 L/hr	14.7 gal/hr
Mass Fuel Consumption	47.3 kg/hr	104.3 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*	30 kPa	120 in.H_2O
Max. Fuel Inlet Pressure	20 kPa	80 in.H_2O
Max. Fuel Height Above Transfer Pump	2.41 m	7.9 ft
Max Fuel Return Pressure	20 kPa	80 in.H2O
Max. Leak-off Return Height	2.41 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	8.3 mm	0.33 in
Min. Recommended Fuel Line Size	-6	
Primary Fuel Filter	10 mic	
Secondary Fuel Filter	2 mic	

Lubrication System

Oil Pressure at Rated Speed	300 kPa	43.5 psi
Oil Pressure at Low Idle **	130 kPa	18.85 psi
Max. Crankcase Pressure	2 kPa	8 in.H_2O
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.

Air Intake System

Engine Air Flow	17.1 m^3/min	603.8 ft^3/min
Intake Manifold Pressure	135.0 kPa	19.6 psi
Manifold Air Temperature	95 °C	203 °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	0.105 m^2	163 in^2

Performance Data

Rated Power	213 kW	285 hp
Rated Speed	2100 RPM	
Peak Torque Speed	1600 RPM	
Low Idle Speed	650 RPM	
Rated Torque	969 Nm	715 ft-lb
Peak Torque	1271 Nm	937 ft-lb
BMEP, Rated	1353 kPa	196 psi
Rated Pferdestärke	290 ps	
Front Drive Capacity, Intermittent	550 Nm	406 lb-ft
Front Drive Capacity, Continuous	468 Nm	348 lb-ft

Exhaust System

Exhaust Flow	39.1 m^3/min	1380.6 ft^3/min
Exhaust Flow @ gas STP	18.1 m^3/min	640.6 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 lb
Max. Bending Moment on Turbocharger Exhaust Outlet	7 Nm	5.2 lb-ft
Min. Exhaust Pipe Diameter, Dry	101.6 mm	4.0 in
Min. Exhaust Pipe Diameter, Wet	114.3 mm	4.5 in

Performance Curve: 6090AFM75_A

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
2100	213	286	969	715	213	285	56	15	221
2000	213	285	1017	750	184	246	48	13	222
1900	213	285	1070	789	158	211	42	11	224
1800	213	285	1130	833	134	180	35	9	220
1700	213	286	1197	883	113	151	29	8	221
1600	213	285	1271	937	94	126	25	7	227
1500	189	254	1206	889	78	104	21	6	230
1400	159	213	1083	799	63	85	17	5	232
1300	133	178	976	720	51	68	15	4	244
1200	110	148	879	648	40	53	11	3	245
1100	89	120	776	572	31	41	9	2	254
1000	74	99	702	518	23	31	7	2	267

*** Theoretical 3.0 exponent propeller curve, measured at flywheel**

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