



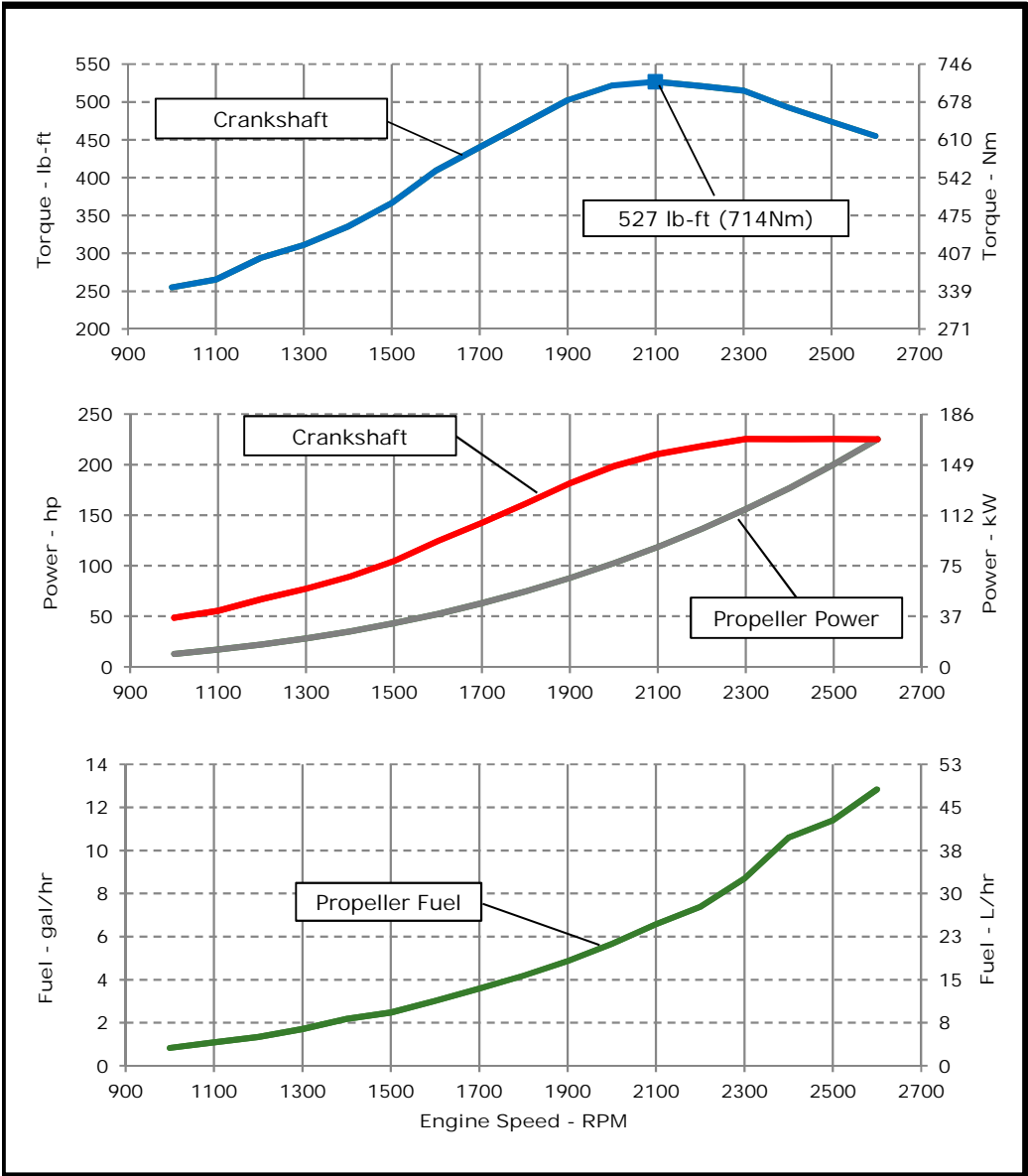
**JOHN DEERE**

**ENGINE PERFORMANCE CURVE**

Rating: M4 - 225hp (168kW) @ 2600 RPM  
 Application: Marine

PowerTech™ 4.5L Engine

Model: 4045AFM85



<u>REFERENCE CONDITIONS</u>	
Air Intake Restriction.....	12 in.H <sub>2</sub> O (3 kPa)
Exhaust Back Pressure.....	30 in.H <sub>2</sub> O (7.5 kPa)
Rated speed and power Gross power guaranteed within ±5% at ISO 8665/SAE J1228 and ISO 3046/SAE J1995	
Test 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.	
All pressures shown in gauge pressure	

**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:
<ul style="list-style-type: none"> <li>EPA Marine Tier 3 Commercial (40 CFR 1042)</li> <li>IMO Tier II Compliant (MARPOL Annex VI)</li> <li>EU Stage IIIa Inland Waterways (NRMM 97/68/EC, as amended)</li> <li>Recreational Craft Directive 2 (2013/53/EU)</li> </ul>	 12-Mar-18
Ref: Engine Emission Label	

Performance Curve: 4045AFM85\_D

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

# Engine Installation Criteria

## General Data

Model	4045AFM85			
Number of Cylinders	4			
Bore	107	mm	4.21	in
Stroke	127	mm	5.00	in
Displacement	4.5	L	275	in <sup>3</sup>
Compression Ratio	16.7:1			
Valves per Cylinder, Intake/Exhaust	2/2			
Combustion System	Direct injection			
Firing Order	1-3-4-2			
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**	172	kW	9790	BTU/min
Max. Pressure Drop Across Keel Cooler	40	kPa	5.8	psi
Coolant Flow	230	L/min	61	gal/min
Min. Coolant Pump Inlet Pressure	30.3	kPa	4.4	psi
Thermostat Start to Open	71	°C	160	°F
Thermostat Fully Open	83	°C	182	°F
Engine Coolant Capacity, HE	17	L	4.4	gal
Engine Coolant Capacity, KC	20	L	5.2	gal
Min. Coolant Fill Rate	12	L/min	3.2	gal/min
Min. Pressure Cap	110.3	kPa	16	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	2	kW	121	BTU/min
Engine Radiated Heat	24	kW	1389	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	752	mm	29.6	in
Length to rear face of flywheel housing (SAE #3)	890	mm	35.0	in
Length maximum	1105	mm	43.5	in
Width maximum	864	mm	34.0	in
Height, crank centerline to top	654	mm	25.7	in
Height, crank centerline to bottom	310	mm	12.2	in
Weight, with oil, no coolant (includes engine, flywheel housing, flywheel, and electronics)	578	kg	1274	lb
Center of Gravity Location, X-axis From Rear Face of Block	273	mm	10.8	in
Center of Gravity Location, Y-axis Right of Crankshaft	4.78	mm	0.2	in
Center of Gravity Location, Z-axis Above Crankshaft	227	mm	8.9	in
Max. Allowable Static Bending Moment At Rear Face of Flywheel Housing (for installations up to 5-G)	814	Nm	600	lb-ft
Thrust Bearing Load Limit, Forward Continuous	2.2	kN	495	lbf
Thrust Bearing Load Limit, Forward Intermittent	4	kN	899	lbf
Thrust Bearing Load Limit, Rearward Continuous	1	kN	225	lbf
Thrust Bearing Load Limit, Rearward Intermittent	2	kN	450	lbf

## Electrical System

Min. Recommended Battery Capacity, 12V @32 °F (0 °C)	625	amps		
Min. Recommended Battery Capacity, 24V @32 °F (0 °C)	500	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	0.002	ohms		
Max. Allowable Start Circuit Resistance, 24V	0.0012	ohms		
Electrical Component Maximum Temperature Limit	125	°C	257	°F
Maximum ECU Temperature	105	°C	221	°F

Performance Curve: 4045AFM85\_D

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

# Engine Installation Criteria

## Fuel System

ECU Description	L14			
Fuel Injection Pump	HPCR			
Governor Type	Electronic			
Volumetric Fuel Consumption	48.6	L/hr	12.8	gal/hr
Mass Fuel Consumption	41.3	kg/hr	91	lb/hr
Total Fuel Volumetric Flow	152	L/hr	40.0	gal/hr
Total Fuel Mass Flow	129	kg/hr	284	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
Normal Operation Fuel Temperature	40	°C	104	°F
Max. Fuel Inlet Temperature	100	°C	212	°F
Min. Recommended Fuel Line Inside Diameter	6.63	mm	0.26	in
Min. Recommended Fuel Line Size	5 (-) AN			
Primary Fuel Filter	10 mic			
Secondary Fuel Filter	2 mic			

## Lubrication System

Oil Pressure at Rated Speed	436	kPa	63	psi
Oil Pressure at Low Idle (800rpm)**	213	kPa	31	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***	35 deg			
Engine Angularity Limits Any Direction, Intermittent***	45 deg			

## Seawater Pump System

Seawater Pump Flow	246	L/min	65	gal/min
Max. Suction Lift	3	m	9.8	ft
Max. Outlet Pressure	140	kPa	20	psi
Max. Inlet Restriction	30	kPa	4	psi

\* With clean filters

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

\*\*\* With 19CZ option

## Air Intake System

Engine Air Flow	15.19	m <sup>3</sup> /min	536.4	ft <sup>3</sup> /min
Intake Manifold Pressure	242.4	kPa	35.2	psi
Manifold Air Temperature	107	°C	225	°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.H2O
Max. Air Intake Restriction, Dirty Air Cleaner	6.25	kPa	25	in.H2O
Min. Ventilation Area	0.093	m <sup>2</sup>	145	in <sup>2</sup>

## Performance Data

Rated Power	168	kW	225	hp
Rated Speed	2600 RPM			
Peak Torque Speed	2100 RPM			
Low Idle Speed	600 RPM			
Rated Torque	714	Nm	527	ft-lb
Peak Torque	681	Nm	502	ft-lb
BMEP, Rated	2003	kPa	290	psi
Rated Pferdestärke (metric hp)	228 ps			
Front Drive Capacity, Intermittent	621	Nm	458	lb-ft
Front Drive Capacity, Continuous	621	Nm	458	lb-ft

## Exhaust System

Exhaust Flow	33.4	m <sup>3</sup> /min	1180	ft <sup>3</sup> /min
Exhaust Flow @ gas STP	15.6	m <sup>3</sup> /min	551	ft <sup>3</sup> /min
Exhaust Temperature	415	°C	779	°F
Max. Allowable Exhaust Restriction	7.5	kPa	30	in.H2O
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	114.3	mm	4.5	in
Min. Exhaust Pipe Diameter, Wet	127	mm	5.0	in

Performance Curve: 4045AFM85\_D

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

## 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	g/kW-hr
2600	168	225	617	455	168	225	49	13	246
2500	168	225	642	474	149	200	43	11	246
2400	168	225	668	493	132	177	40	11	258
2300	168	225	698	515	116	156	33	9	241
2200	163	218	707	521	102	136	28	7	233
2100	157	211	714	527	89	119	25	7	239
2000	148	199	707	522	76	103	21	6	238
1900	135	182	681	502	66	88	18	5	239
1800	120	162	639	471	56	75	16	4	241
1700	106	143	597	440	47	63	14	4	245
1600	93	125	555	409	39	52	11	3	247
1500	78	105	497	367	32	43	9	2	247
1400	67	89	455	336	26	35	8	2	268
1300	57	77	422	311	21	28	6	2	262
1200	50	67	398	294	17	22	5	1	262
1100	41	56	360	266	13	17	4	1	275
1000	36	49	346	255	10	13	3	1	278

\* Theoretical 3.0 exponent propeller curve , measured at flywheel

Performance Curve: 4045AFM85\_D

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