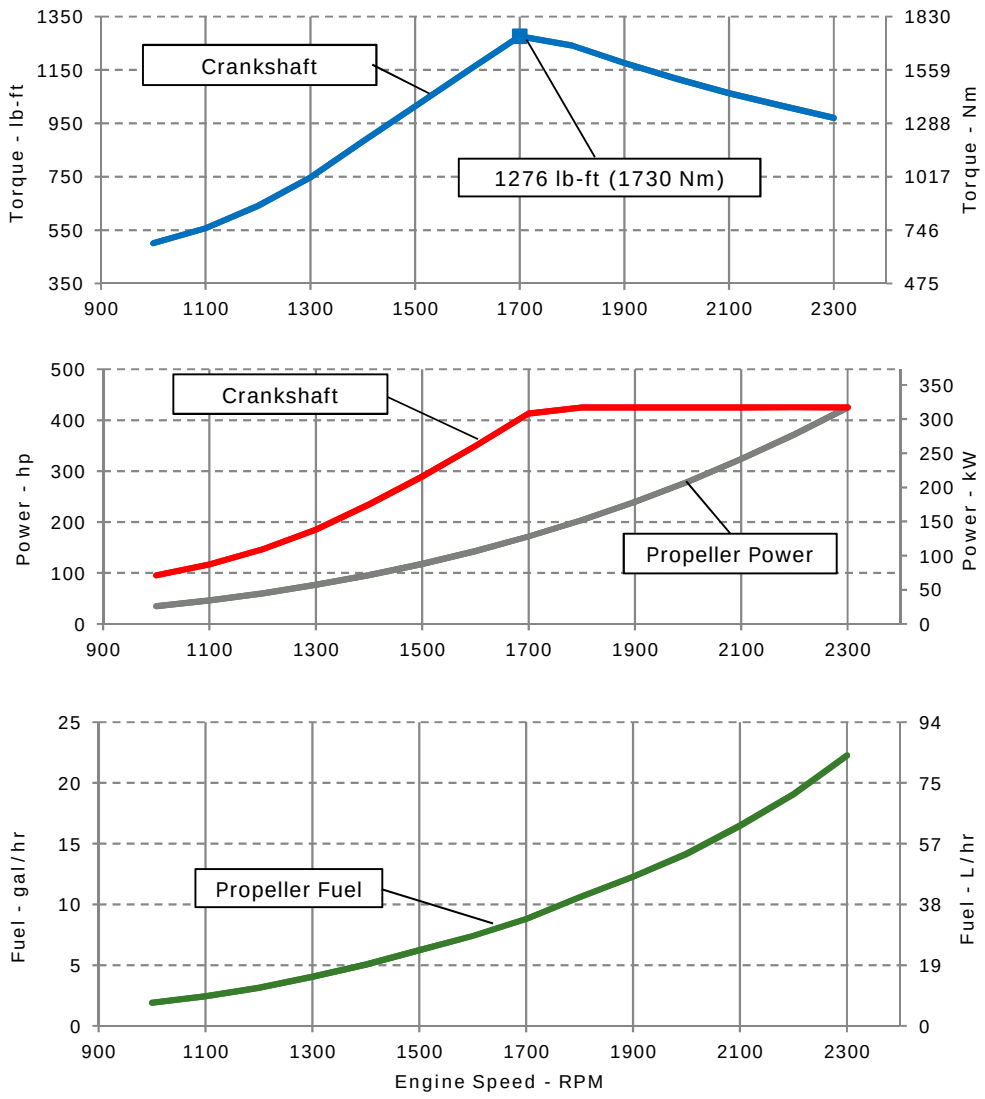
# ENGINE PERFORMANCE CURVE

Rating: M3 - 425hp (317kW) @ 2300 RPM
Application: Marine

PowerTech™ 9.0L Engine
Model: 6090SFM85




## 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 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:*

*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 Marine Tier 3 Commercial (40 CFR 1042)<br>• IMO Tier II Compliant (MARPOL Annex VI)<br>• EU Stage IIIa Inland Waterways (NRMM 97/68/EC, as amended)<br>• Recreational Craft Directive 2 (2013/53/EU) | |
| Ref: Engine Emission Label | 30-Oct-18 |

Performance Curve: 6090SFM85_C

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

# Engine Installation Criteria

## General Data

| | | | | |
|---|---|---|---|---|
| Model | 6090SFM85 | | | |
| Number of Cylinders | 6 | | | |
| Bore | 118.4 | mm | 4.66 | 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 | Seawater cooled | | | |
| Engine Crankcase Vent System | Closed | | | |

## Cooling System*

| | | | | |
|---|---|---|---|---|
| Jacket Water Heat Rejection** | 248 | kW | 14116 | BTU/min |
| Aftercooler Heat Rejection | 90 | kW | 5123 | BTU/min |
| Coolant Flow | 329 | L/min | 87 | gal/min |
| Min. Coolant Pump Inlet Pressure | 30.3 | kPa | 4.4 | psi |
| Thermostat Start to Open | 82 | °C | 180 | °F |
| Thermostat Fully Open | 94 | °C | 202 | °F |
| Engine Coolant Capacity, HE | 38 | L | 10 | 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 | 3.4 | kW | 196 | BTU/min |
| Engine Radiated Heat | 42 | kW | 2403 | BTU/min |

## Physical Data

| | | | | |
|---|---|---|---|---|
| Length to rear face of block | 1297 | mm | 51.1 | in |
| Length to rear face of flywheel housing (SAE #2) | 1415 | mm | 55.7 | in |
| Length maximum | 1712 | mm | 67.4 | in |
| Width maximum | 974 | mm | 38.3 | in |
| Height, crank centerline to top | 664 | mm | 26.1 | in |
| Height, crank centerline to bottom | 319 | mm | 12.6 | in |
| Weight, with oil, no coolant (includes engine, flywheel housing, flywheel, and electronics) | 1056 | kg | 2327 | 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 (for installations up to 5-G) | 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) | 500 | amps | | |
| Starter Rolling Current, 24V @32 °F (0 °C) | 300 | 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 |

* 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

Performance Curve: 6090SFM85_C

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# Engine Installation Criteria

## Fuel System

| | | | | |
|---|---|---|---|---|
| ECU Description | | | L14 | |
| Fuel Injection Pump | | | HPCR | |
| Governor Type | | | Electronic | |
| Volumetric Fuel Consumption | 84.1 | L/hr | 22.2 | gal/hr |
| Mass Fuel Consumption | 71.5 | kg/hr | 158 | lb/hr |
| Total Fuel Volumetric Flow | 251 | L/hr | 66.3 | gal/hr |
| Total Fuel Mass Flow | 213 | kg/hr | 470 | 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 | 8.53 | mm | 0.34 | 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 | 270 | kPa | 39 | psi |
| Oil Pressure at Low Idle (650rpm)** | 145 | kPa | 21 | 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 | |

## Seawater Pump System

| | | | | |
|---|---|---|---|---|
| Seawater Pump Flow | 375 | L/min | 99 | gal/min |
| Max. Suction Lift | 3 | m | 9.8 | ft |
| Max. Outlet Pressure | 140 | kPa | 20 | psi |
| Max. Inlet Restriction | 30 | kPa | 4 | psi |

## Air Intake System

| | | | | |
|---|---|---|---|---|
| Engine Air Flow | 29.24 | $m^3$/min | ### | $ft^3$/min |
| Intake Manifold Pressure | 212.9 | kPa | 30.9 | psi |
| Manifold Air Temperature | 42 | °C | 108 | °F |
| Maximum Manifold Air Temperature | 67 | °C | 153 | °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 | 0.18 | $m^2$ | 279 | $in^2$ |
| Max. CAC Delta Pressure | 12.9 | kPa | 51.8 | in.H2O |

## Performance Data

| | | | | |
|---|---|---|---|---|
| Rated Power | 317 | kW | 425 | hp |
| Rated Speed | | 2300 | RPM | |
| Peak Torque Speed | | 1700 | RPM | |
| Low Idle Speed | | 650 | RPM | |
| Rated Torque | 1316 | Nm | 971 | ft-lb |
| Peak Torque | 1730 | Nm | 1276 | ft-lb |
| BMEP, Rated | 1838 | kPa | 266 | 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 | 61 | $m^3$/min | 2154 | $ft^3$/min |
| Exhaust Flow @ gas STP | 27.9 | $m^3$/min | 985 | $ft^3$/min |
| Exhaust Temperature | 382 | °C | 720 | °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 |

* With clean filters

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

*** With 1932 option

Performance Curve: 6090SFM85_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 | 317 | 425 | 1316 | 971 | 317 | 425 | 84 | 22 | 225 |
| 2200 | 317 | 425 | 1377 | 1015 | 277 | 372 | 72 | 19 | 221 |
| 2100 | 317 | 425 | 1441 | 1063 | 241 | 324 | 62 | 16 | 219 |
| 2000 | 317 | 425 | 1514 | 1117 | 208 | 280 | 54 | 14 | 218 |
| 1900 | 317 | 425 | 1593 | 1175 | 179 | 240 | 46 | 12 | 221 |
| 1800 | 317 | 425 | 1682 | 1241 | 152 | 204 | 40 | 11 | 224 |
| 1700 | 308 | 413 | 1730 | 1276 | 128 | 172 | 33 | 9 | 221 |
| 1600 | 260 | 349 | 1553 | 1146 | 107 | 143 | 28 | 7 | 223 |
| 1500 | 216 | 290 | 1375 | 1014 | 88 | 118 | 24 | 6 | 228 |
| 1400 | 175 | 235 | 1195 | 881 | 72 | 96 | 19 | 5 | 227 |
| 1300 | 138 | 185 | 1013 | 747 | 57 | 77 | 15 | 4 | 227 |
| 1200 | 109 | 147 | 870 | 641 | 45 | 60 | 12 | 3 | 224 |
| 1100 | 87 | 117 | 755 | 557 | 35 | 47 | 9 | 2 | 227 |
| 1000 | 71 | 95 | 679 | 501 | 26 | 35 | 7 | 2 | 235 |

* Theoretical 3.0 exponent propeller curve , measured at flywheel

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