

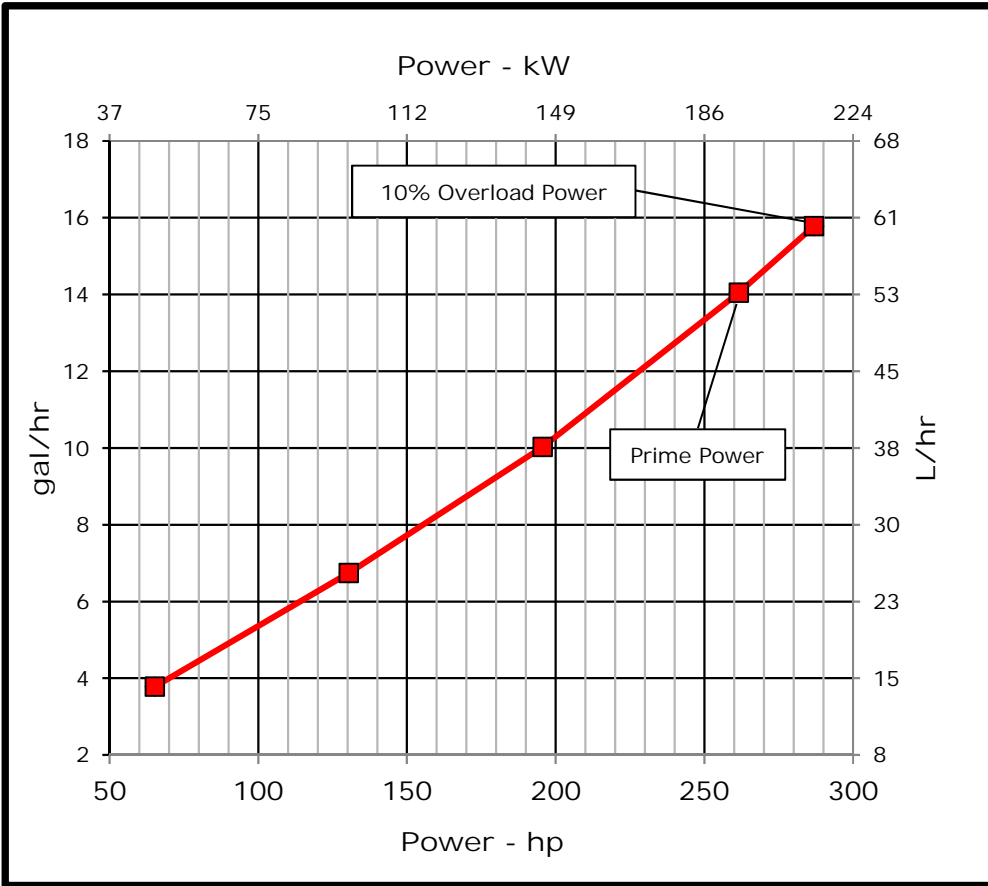


**ENGINE PERFORMANCE CURVE**

Rating: 50 Hz - 261hp (195kW) @ 1500 RPM  
 Application: Marine

PowerTech™ 9.0L Engine  
 Model: 6090AFM85

| Generator Efficiency (%) | Power Factor | Calculated Gen-Set Rating |         | Prime Power | 10% Overload Power |
|--------------------------|--------------|---------------------------|---------|-------------|--------------------|
|                          |              | kWe                       | kVA     | hp (kW)     | hp (kW)            |
| 88-92                    | 0.8          | 171-179                   | 214-224 | 261 (195)   | 287 (214)          |



**REFERENCE CONDITIONS**

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:**  
**Marine Generator:** The Marine generator engine rating is the power available under normal varying electrical load factors for an unlimited number of hours per year in commercial applications. This rating incorporates a 10% overload capability, and conforms to ISO 8528 prime power. Average load over a 24-hour period shall not exceed 67% of the prime rating, of which no more than 2 hours are between 100% and 110% of the prime rating.

Constant speed engines are not certified for constant speed propulsion applications (i.e. variable pitch propeller, hybrid propulsion system).

Possible applications: This rating is used for applications that require constant speed operation in power generation or auxiliary applications such as generators and hydraulic pumps.

Designed/Calibrated to meet:

- IMO Tier II Compliant (MARPOL Annex VI)

Ref: Engine Emission Label

Certified by:

30-Oct-18

Performance Curve: 6090AFM85\_F

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 L                          | 549 in <sup>3</sup> |  |
| 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**                   | 220 kW     | 12522 BTU/min |  |
| Max. Pressure Drop Across Keel Cooler             | 40 kPa     | 6 psi         |  |
| Coolant Flow                                      | 268 L/min  | 70.8 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                       | 42 L       | 11.1 gal      |  |
| Engine Coolant Capacity, KC                       | 40 L       | 10.6 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                           | 4 kW       | 220 BTU/min   |  |
| Engine Radiated Heat                              | 27 kW      | 1518 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  | 1297 mm | 51.1 in   |
| Length to rear face of flywheel housing (SAE #2)  | 1415 mm | 55.7 in   |
| Length maximum  | 1685 mm | 66.3 in   |
| Width maximum   | 1027 mm | 40.4 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)         | 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  | 7.87 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)           | 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    |
| Electrical Component Maximum Temperature Limit       | 125 °C 257 °F |
| Maximum ECU Temperature                              | 105 °C 221 °F |

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# Engine Installation Criteria

## Fuel System

|  |            |             |  |
|--|------------|-------------|--|
| ECU Description                            | L14        |             |  |
| Fuel Injection Pump                        | Denso HP4  |             |  |
| Governor Type                              | Electronic |             |  |
| Volumetric Fuel Consumption, Prime         | 53.1 L/hr  | 14.0 gal/hr |  |
| Mass Fuel Consumption, Prime               | 45.2 kg/hr | 100 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   |  |
| 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 1500 RPM**                              | 250 kPa | 41 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     | 299 L/min | 79 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 1932 option

## Air Intake System

|  |                          |                          |  |
|--|--------------------------|--------------------------|--|
| Engine Air Flow  | 17.0 m <sup>3</sup> /min | 600 ft <sup>3</sup> /min |  |
| Intake Manifold Pressure                                     | 206 kPa                  | 29.8 psi                 |  |
| Manifold Air Temperature                                     | 89 °C                    | 192 °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.H2O                |  |
| Max. Air Intake Restriction, Dirty Air Cleaner               | 6.25 kPa                 | 25 in.H2O                |  |
| Min. Ventilation Area  | 0.105 m <sup>2</sup>     | 162 in <sup>2</sup>      |  |

## Performance Data

|  |          |           |  |
|--|----------|-----------|--|
| Prime Power                              | 195 kW   | 261 hp    |  |
| 10% Overload Power                       | 214 kW   | 287 hp    |  |
| Rated Speed                              | 1500 RPM |           |  |
| Low Idle Speed                           | 1000 RPM |           |  |
| Prime Torque                             | 1239 Nm  | 913 lb-ft |  |
| BMEP, Prime                              | 1729 kPa | 251 psi   |  |
| Rated Pferdestärke, Prime (metric hp)    | 265 ps   |           |  |
| Front Drive Capacity, Intermittent       | 955 Nm   | 704 lb-ft |  |
| Front Drive Capacity, Continuous         | 955 Nm   | 704 lb-ft |  |
| Software and Label Convertible to 50 Hz? | NO       |           |  |
| Friction Power @ Rated Speed             | 16.9 kW  | 22.6 hp   |  |

## Exhaust System

|  |                          |                           |  |
|--|--------------------------|---------------------------|--|
| Exhaust Flow                                       | 40 m <sup>3</sup> /min   | 1409 ft <sup>3</sup> /min |  |
| Exhaust Flow @ gas STP                             | 16.3 m <sup>3</sup> /min | 574 ft <sup>3</sup> /min  |  |
| Exhaust Temperature                                | 453 °C                   | 847.4 °F                  |  |
| Max. Allowable Exhaust Restriction <sup>+</sup>    | 7.5 kPa                  | 60 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                    | 101.6 mm                 | 4.0 in                    |  |
| Min. Exhaust Pipe Diameter, Wet                    | 114.3 mm                 | 127.0 in                  |  |

<sup>+</sup> Exhaust system restriction should be limited to 7.5 kPa. When an exhaust aftertreatment system is installed, the maximum design restriction is 15 kPa. Restriction over 7.5 kPa will result in diminished performance. Restriction over 15 kPa may cause engine damage

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## Engine Installation Criteria

Engine Performance Data Table

| Engine Power | Crank Power |     | Crank Torque |       | Fuel Consumption |        | BSFC |
|--------------|-------------|-----|--------------|-------|------------------|--------|------|
|              | kW          | hp  | Nm           | lb-ft | L/hr             | gal/hr |      |
| 25%          | 49          | 65  | 310          | 228   | 14.3             | 3.8    | 250  |
| 50%          | 97          | 130 | 619          | 457   | 25.5             | 6.7    | 223  |
| 75%          | 146         | 196 | 929          | 685   | 38.0             | 10.0   | 221  |
| 100%         | 195         | 261 | 1238         | 913   | 53.1             | 14.0   | 232  |
| 110%         | 214         | 287 | 1362         | 1004  | 59.7             | 15.8   | 237  |

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