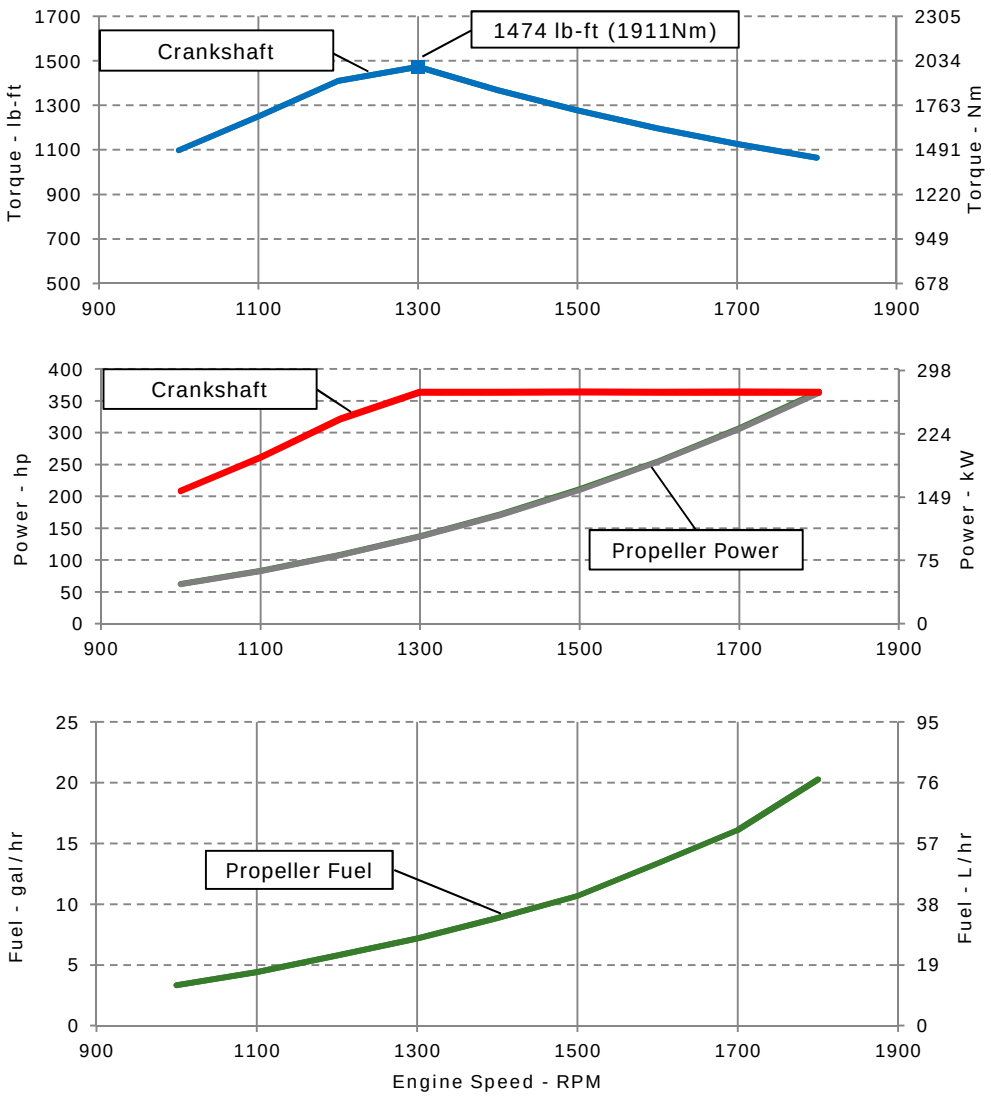
ENGINE PERFORMANCE CURVE

Rating: M1 - 365hp (272kW) @1800 RPM
Application: Marine

PowerTech™ 13.5L Engine
Model: 6135AFM85



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 at uninterrupted full power and have load factors greater than 65 percent.

Possible applications: Line hauls tugs and towboats, fish and shrimp trawlers/draggers, and displacement hull fishing boats.

Designed/Calibrated to meet:	Certified by:
• EPA Commercial Marine Tier 3 • IMO MARPOL Annex VI Compliant • NRMM (97/68/EC), as amended	Adam Powell
Ref: Engine Emission Label	12-Mar-14

Performance Curve: 6135AFM85_A

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

Engine Installation Criteria

General Data

Model	6135AFM85			
Number of Cylinders	6			
Bore	132	mm	5.20	in
Stroke	165	mm	6.50	in
Displacement	13.5	L	824	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**	278	kW	15824	BTU/min
Max. Pressure Drop Across Keel Cooler	40	kPa	5.8	psi
Coolant Flow	219	L/min	58	gal/min
Seawater Flow (heat exchanged)	401	L/min	106	gal/min
Thermostat Start to Open	72	°C	161	°F
Thermostat Fully Open	82	°C	179	°F
Engine Coolant Capacity, HE	43	L	11.4	gal
Engine Coolant Capacity, KC	38	L	10.0	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	100-105	°C	212-230	°F
Absolute Max Top Tank Temperature	105	°C	221	°F
Recommended Fuel Cooler	25	kW	1441	BTU/min
Engine Radiated Heat	38	kW	2191	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	1337	mm	52.6	in
Length maximum	1725	mm	67.9	in
Width maximum	1075	mm	42.3	in
Height, crank centerline to top	806	mm	31.7	in
Height, crank centerline to bottom	360	mm	360	in
Weight, with oil, no coolant (includes engine, flywheel housing, flywheel, and electronics)	1410	kg	3108	lb
Center of Gravity Location, X-axis From Rear Face of Block	516	mm	20.3	in
Center of Gravity Location, Y-axis Right of Crankshaft	5	mm	0.2	in
Center of Gravity Location, Z-axis Above Crankshaft	239	mm	9.4	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	5.4	kN	1214	lbf
Thrust Bearing Load Limit, Forward Intermittent	8.1	kN	1821	lbf
Thrust Bearing Load Limit, Rearward Continuous	2.5	kN	562	lbf
Thrust Bearing Load Limit, Rearward Intermittent	4	kN	899	lbf

Electrical System

Min. Recommended Battery Capacity, 12V @32 °F (0 °C)	1900	amps		
Min. Recommended Battery Capacity, 24V @32 °F (0 °C)	925	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"	#000			
Recommended Starter Cable, 24V 100"	#1			
Recommended Starter Cable, 12V 200"	2#000			
Recommended Starter Cable, 24V 200"	#000			
Electrical Component Maximum Temperature Limit	125	°C	257	°F

Performance Curve: 6135AFM85_A

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

Engine Installation Criteria

Fuel System

ECU Description			L15	
Fuel Injection Pump			Unit Injection	
Governor Type			Electronic	
Volumetric Fuel Consumption	76.7	L/hr	20.3	gal/hr
Mass Fuel Consumption	65.2	kg/hr	144	lb/hr
Total Fuel Volumetric Flow	417	L/hr	110.2	gal/hr
Total Fuel Mass Flow	354	kg/hr	781	lb/hr
Max. Fuel Inlet Restriction*	30	kPa	120	in.H2O
Max. Fuel Inlet Pressure	24	kPa	96	in.H2O
Max Fuel Return Pressure	35	kPa	141	in.H2O
Max. Fuel Height Above Transfer Pump	2.88	m	9.4	ft
Max. Leak-off Return Height	2.88	m	9.4	ft
Max. Fuel Inlet Height Above Fuel Tank Supply	3.6	m	11.8	ft
Normal Operation Fuel Temperature	40	°C	104	°F
Max. Fuel Inlet Temperature	80	°C	176	°F
Min. Recommended Fuel Line Inside Diameter	11	mm	0.43	in
Min. Recommended Fuel Line Size			7 (-) AN	
Primary Fuel Filter			10 mic	
Secondary Fuel Filter			2 mic	

Lubrication System

Oil Pressure at Rated Speed	317	kPa	46	psi
Oil Pressure at Low Idle (600rpm)**	157	kPa	23	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 1904 option

Air Intake System

Engine Air Flow	29.9	m^3/min	1055	ft^3/min
Intake Manifold Pressure	199	kPa	28.9	psi
Manifold Air Temperature	86	°C	187	°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	0.184	m^2	285	in^2

Performance Data

Rated Power	272	kW	365	hp
Rated Speed		1800	RPM	
Peak Torque Speed		1300	RPM	
Low Idle Speed		600	RPM	
Rated Torque	1443	Nm	1064	ft-lb
Peak Torque	1998	Nm	1474	ft-lb
BMEP, Rated	1343	kPa	195	psi
Rated Pferdestärke (metric hp)		370	ps	
Front Drive Capacity, Intermittent	542	Nm	400	lb-ft
Front Drive Capacity, Continuous	542	Nm	400	lb-ft

Exhaust System

Exhaust Flow	63	m^3/min	2211	ft^3/min
Exhaust Flow @ gas STP	28.52	m^3/min	1007	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

Performance Curve: 6135AFM85_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
1800	272	365	1528	1064	272	365	76.7	20.3	240
1700	272	365	1623	1127	229	307	61.0	16.1	226
1600	272	365	1732	1197	191	256	50.6	13.4	225
1500	272	365	1855	1278	157	211	40.4	10.7	218
1400	272	365	1998	1368	128	172	33.6	8.9	223
1300	272	365	1911	1474	102	137	27.2	7.2	225
1200	240	322	1695	1410	81	108	21.9	5.8	231
1100	195	262	1489	1250	62	83	16.7	4.4	229
1000	156	209	0	1098	47	63	12.6	3.3	229

* Theoretical 3.0 exponent propeller curve , measured at flywheel

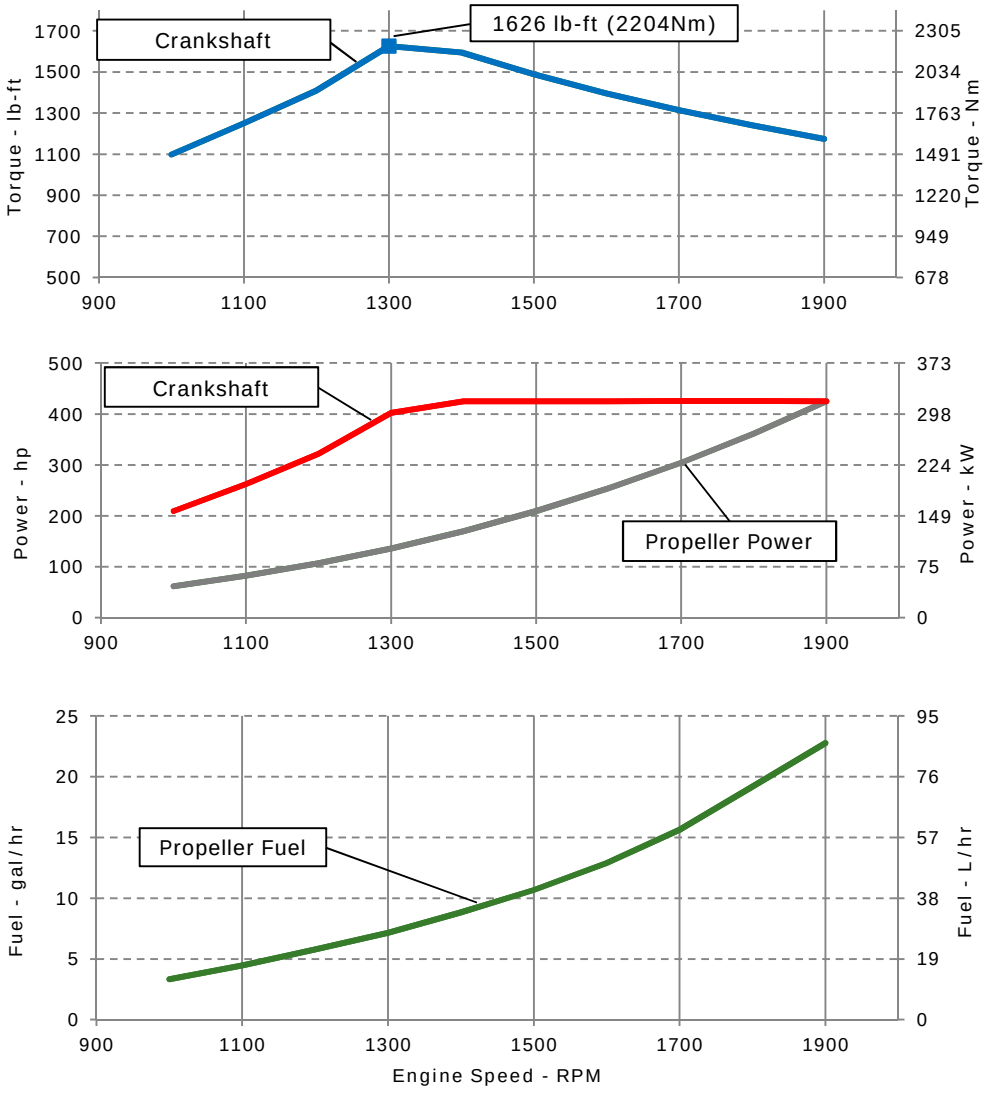
Performance Curve: 6135AFM85_A

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

ENGINE PERFORMANCE CURVE

Rating: M2 - 425hp (317kW) @ 1900 RPM
Application: Marine

PowerTech™ 13.5L Engine
Model: 6135AFM85



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:

M2: The M2 rating is for marine propulsion applications that typically operate between 3,000-5,000 hours per year and have load factors up to 65 percent. This rating is for applications that are in continuous use and use full power for no more than 16 hours of each 24 hours of operation. The remaining time of operation is at or below cruising speed.

Possible applications: Short-range tugs and towboats long-range ferryboats, large passenger vessels and offshore displacement hull fishing boats

Designed/Calibrated to meet:	Certified by:
• EPA Commercial Marine Tier 3 • IMO MARPOL Annex VI Compliant • NRMM (97/68/EC), as amended	Adam Powell
Ref: Engine Emission Label	12-Mar-14

Performance Curve: 6135AFM85_B

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

Engine Installation Criteria

General Data

Model	6135AFM85			
Number of Cylinders	6			
Bore	132	mm	5.20	in
Stroke	165	mm	6.50	in
Displacement	13.5	L	824	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**	312	kW	17759	BTU/min
Max. Pressure Drop Across Keel Cooler	40	kPa	5.8	psi
Coolant Flow	228	L/min	60	gal/min
Seawater Flow (heat exchanged)	394	L/min	104	gal/min
Thermostat Start to Open	72	°C	161	°F
Thermostat Fully Open	82	°C	179	°F
Engine Coolant Capacity, HE	43	L	11.4	gal
Engine Coolant Capacity, KC	38	L	10.0	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	100-105	°C	212-230	°F
Absolute Max Top Tank Temperature	105	°C	221	°F
Recommended Fuel Cooler	25	kW	1400	BTU/min
Engine Radiated Heat	43	kW	2464	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	1337	mm	52.6	in
Length maximum	1725	mm	67.9	in
Width maximum	1075	mm	42.3	in
Height, crank centerline to top	806	mm	31.7	in
Height, crank centerline to bottom	360	mm	360	in
Weight, with oil, no coolant (includes engine, flywheel housing, flywheel, and electronics)	1410	kg	3108	lb
Center of Gravity Location, X-axis From Rear Face of Block	516	mm	20.3	in
Center of Gravity Location, Y-axis Right of Crankshaft	5	mm	0.2	in
Center of Gravity Location, Z-axis Above Crankshaft	239	mm	9.4	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	5.4	kN	1214	lbf
Thrust Bearing Load Limit, Forward Intermittent	8.1	kN	1821	lbf
Thrust Bearing Load Limit, Rearward Continuous	2.5	kN	562	lbf
Thrust Bearing Load Limit, Rearward Intermittent	4	kN	899	lbf

Electrical System

Min. Recommended Battery Capacity, 12V @32 °F (0 °C)	1900	amps		
Min. Recommended Battery Capacity, 24V @32 °F (0 °C)	925	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"	#000			
Recommended Starter Cable, 24V 100"	#1			
Recommended Starter Cable, 12V 200"	2#000			
Recommended Starter Cable, 24V 200"	#000			
Electrical Component Maximum Temperature Limit	125	°C	257	°F

Performance Curve: 6135AFM85_B

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

Engine Installation Criteria

Fuel System

ECU Description			L15	
Fuel Injection Pump			Unit Injection	
Governor Type			Electronic	
Volumetric Fuel Consumption	86.2	L/hr	22.8	gal/hr
Mass Fuel Consumption	73.3	kg/hr	162	lb/hr
Total Fuel Volumetric Flow	417	L/hr	110.2	gal/hr
Total Fuel Mass Flow	354	kg/hr	781	lb/hr
Max. Fuel Inlet Restriction*	30	kPa	120	in.H2O
Max. Fuel Inlet Pressure	24	kPa	96	in.H2O
Max Fuel Return Pressure	35	kPa	141	in.H2O
Max. Fuel Height Above Transfer Pump	2.88	m	9.4	ft
Max. Leak-off Return Height	2.88	m	9.4	ft
Max. Fuel Inlet Height Above Fuel Tank Supply	2.88	m	9.4	ft
Normal Operation Fuel Temperature	40	°C	104	°F
Max. Fuel Inlet Temperature	80	°C	176	°F
Min. Recommended Fuel Line Inside Diameter	11	mm	0.43	in
Min. Recommended Fuel Line Size			7 (-) AN	
Primary Fuel Filter			10 mic	
Secondary Fuel Filter			2 mic	

Lubrication System

Oil Pressure at Rated Speed	317	kPa	46	psi
Oil Pressure at Low Idle (600rpm)**	157	kPa	23	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 1904 option

Air Intake System

Engine Air Flow	32.9	m^3/min	1163	ft^3/min
Intake Manifold Pressure	219	kPa	31.8	psi
Manifold Air Temperature	86	°C	194	°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	0.203	m^2	314	in^2

Performance Data

Rated Power	317	kW	425	hp
Rated Speed		1900	RPM	
Peak Torque Speed		1300	RPM	
Low Idle Speed		600	RPM	
Rated Torque	1593	Nm	1175	ft-lb
Peak Torque	2204	Nm	1626	ft-lb
BMEP, Rated	1483	kPa	215	psi
Rated Pferdestärke (metric hp)		431	ps	
Front Drive Capacity, Intermittent	542	Nm	400	lb-ft
Front Drive Capacity, Continuous	542	Nm	400	lb-ft

Exhaust System

Exhaust Flow	68.2	m^3/min	2408	ft^3/min
Exhaust Flow @ gas STP	31.2	m^3/min	1101	ft^3/min
Exhaust Temperature	380	°C	716	°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: 6135AFM85_B

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
1900	317	425	1593	1175	317	425	86	23	231
1800	317	425	1682	1241	269	361	73	19	229
1700	317	425	1781	1314	227	304	59	16	221
1600	317	425	1891	1395	189	254	49	13	219
1500	317	425	2018	1488	156	209	40	11	221
1400	317	425	2162	1595	127	170	33	9	224
1300	300	402	2204	1626	102	136	27	7	226
1200	240	322	1911	1409	80	107	22	6	233
1100	195	262	1695	1250	61	82	17	4	233
1000	156	209	1489	1098	46	62	13	3	232

* Theoretical 3.0 exponent propeller curve , measured at flywheel

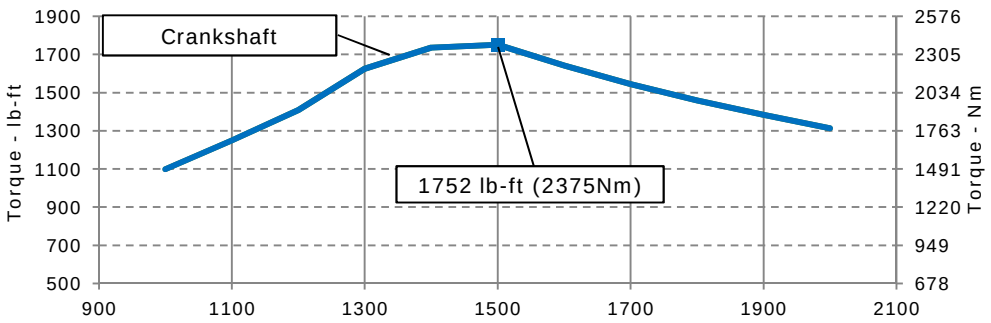
Performance Curve: 6135AFM85_B

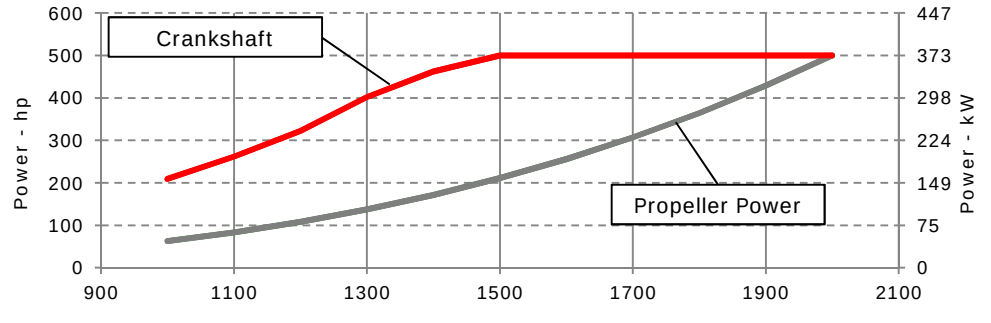
All values at rated speed, power, and standard conditions, per SAE J1995 unless otherwise noted.

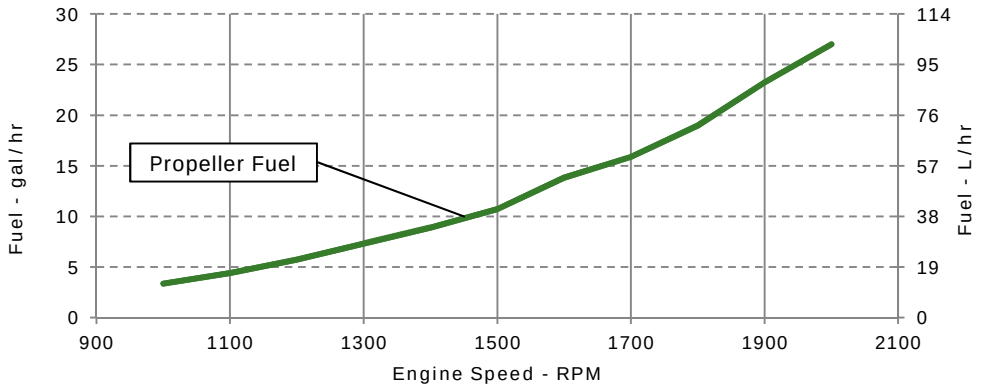
ENGINE PERFORMANCE CURVE

Rating: M3 - 500hp (373kW) @ 2000 RPM
Application: Marine

PowerTech™ 13.5L Engine
Model: 6135AFM85







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	Adam Powell
Ref: Engine Emission Label	12-Mar-14

Performance Curve: 6135AFM85_C

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

Engine Installation Criteria

General Data

Model	6135AFM85			
Number of Cylinders	6			
Bore	132	mm	5.20	in
Stroke	165	mm	6.50	in
Displacement	13.5	L	824	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**	361	kW	20548	BTU/min
Max. Pressure Drop Across Keel Cooler	40	kPa	5.8	psi
Coolant Flow	240	L/min	63	gal/min
Seawater Flow (heat exchanged)	386	L/min	102	gal/min
Thermostat Start to Open	72	°C	161	°F
Thermostat Fully Open	82	°C	179	°F
Engine Coolant Capacity, HE	43	L	11.4	gal
Engine Coolant Capacity, KC	38	L	10.0	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	100-105	°C	212-230	°F
Absolute Max Top Tank Temperature	105	°C	221	°F
Recommended Fuel Cooler	23	kW	1333	BTU/min
Engine Radiated Heat	51	kW	2920	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	1337	mm	52.6	in
Length maximum	1725	mm	67.9	in
Width maximum	1075	mm	42.3	in
Height, crank centerline to top	806	mm	31.7	in
Height, crank centerline to bottom	360	mm	360	in
Weight, with oil, no coolant (includes engine, flywheel housing, flywheel, and electronics)	1410	kg	3108	lb
Center of Gravity Location, X-axis From Rear Face of Block	516	mm	20.3	in
Center of Gravity Location, Y-axis Right of Crankshaft	5	mm	0.2	in
Center of Gravity Location, Z-axis Above Crankshaft	239	mm	9.4	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	5.4	kN	1214	lbf
Thrust Bearing Load Limit, Forward Intermittent	8.1	kN	1821	lbf
Thrust Bearing Load Limit, Rearward Continuous	2.5	kN	562	lbf
Thrust Bearing Load Limit, Rearward Intermittent	4	kN	899	lbf

Electrical System

Min. Recommended Battery Capacity, 12V @32 °F (0 °C)	1900	amps		
Min. Recommended Battery Capacity, 24V @32 °F (0 °C)	925	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"	#000			
Recommended Starter Cable, 24V 100"	#1			
Recommended Starter Cable, 12V 200"	2#000			
Recommended Starter Cable, 24V 200"	#000			
Electrical Component Maximum Temperature Limit	125	°C	257	°F

Performance Curve: 6135AFM85_C

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

Engine Installation Criteria

Fuel System

ECU Description		L15		
Fuel Injection Pump		Unit Injection		
Governor Type		Electronic		
Volumetric Fuel Consumption	102	L/hr	27.0	gal/hr
Mass Fuel Consumption	86.9	kg/hr	192	lb/hr
Total Fuel Volumetric Flow	417	L/hr	110.2	gal/hr
Total Fuel Mass Flow	354	kg/hr	781	lb/hr
Max. Fuel Inlet Restriction*	30	kPa	120	in.H2O
Max. Fuel Inlet Pressure	24	kPa	96	in.H2O
Max Fuel Return Pressure	35	kPa	141	in.H2O
Max. Fuel Height Above Transfer Pump	2.88	m	9.4	ft
Max. Leak-off Return Height	2.88	m	9.4	ft
Max. Fuel Inlet Height Above Fuel Tank Supply	2.88	m	9.4	ft
Normal Operation Fuel Temperature	40	°C	104	°F
Max. Fuel Inlet Temperature	80	°C	176	°F
Min. Recommended Fuel Line Inside Diameter	11	mm	0.43	in
Min. Recommended Fuel Line Size		7	(-) AN	
Primary Fuel Filter		10	mic	
Secondary Fuel Filter		2	mic	

Lubrication System

Oil Pressure at Rated Speed	317	kPa	46	psi
Oil Pressure at Low Idle (600rpm)**	157	kPa	23	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 1904 option

Air Intake System

Engine Air Flow	37	m^3/min	1307	ft^3/min
Intake Manifold Pressure	253	kPa	36.7	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	0.228	m^2	353	in^2

Performance Data

Rated Power	373	kW	500	hp
Rated Speed		2000	RPM	
Peak Torque Speed		1500	RPM	
Low Idle Speed		600	RPM	
Rated Torque	1781	Nm	1314	ft-lb
Peak Torque	2375	Nm	1752	ft-lb
BMEP, Rated	1658	kPa	240	psi
Rated Pferdestärke (metric hp)		507	ps	
Front Drive Capacity, Intermittent	542	Nm	400	lb-ft
Front Drive Capacity, Continuous	542	Nm	400	lb-ft

Exhaust System

Exhaust Flow	77	m^3/min	2712	ft^3/min
Exhaust Flow @ gas STP	35.0	m^3/min	1236	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	139.7	mm	5.5	in
Min. Exhaust Pipe Diameter, Wet	152.4	mm	6.0	in

Performance Curve: 6135AFM85_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
2000	373	500	1781	1314	373	500	102	27	233
1900	373	500	1875	1383	320	429	88	23	234
1800	373	500	1979	1460	272	365	72	19	224
1700	373	500	2095	1545	229	307	60	16	223
1600	373	500	2226	1642	191	256	52	14	233
1500	373	500	2375	1752	157	211	41	11	219
1400	345	463	2353	1735	128	172	34	9	224
1300	300	402	2204	1626	102	137	28	7	229
1200	240	322	1911	1409	81	108	22	6	230
1100	195	262	1695	1250	62	83	17	4	228
1000	156	209	1489	1098	47	63	13	3	232

* Theoretical 3.0 exponent propeller curve , measured at flywheel

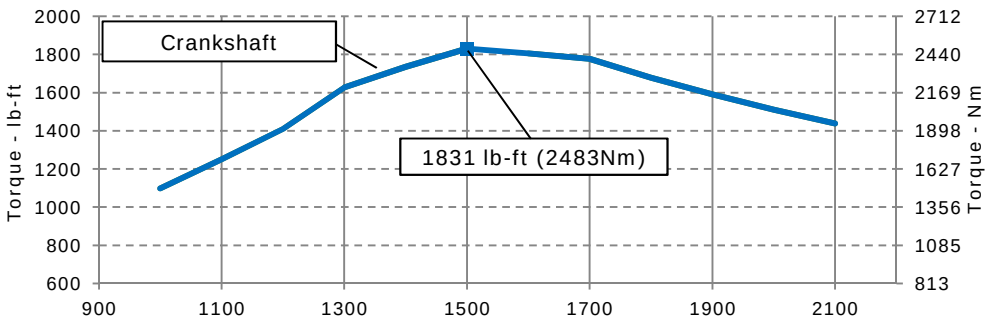
Performance Curve: 6135AFM85_C

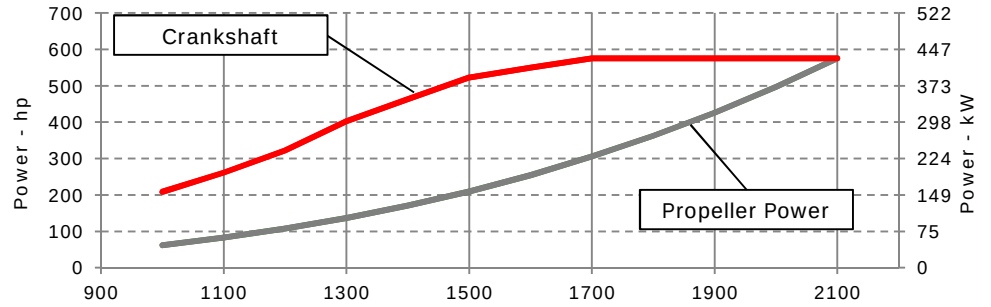
All values at rated speed, power, and standard conditions, per SAE J1995 unless otherwise noted.

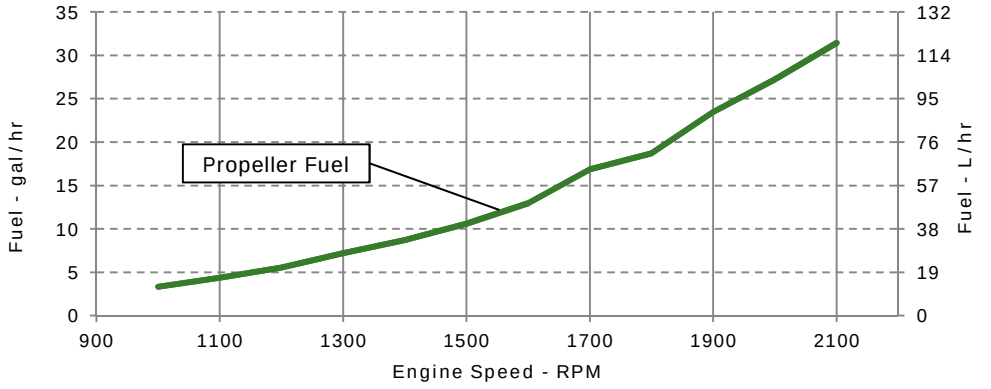
ENGINE PERFORMANCE CURVE

Rating: M4 - 575hp (429kW) @ 2100 RPM
Application: Marine

PowerTech™ 13.5L Engine
Model: 6135AFM85







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:

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:
• EPA Commercial Marine Tier 3 • IMO MARPOL Annex VI Compliant • NRMM (97/68/EC), as amended Ref: Engine Emission Label	Adam Paull 12-Mar-14

Performance Curve: 6135AFM85_D

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

Engine Installation Criteria

General Data

Model	6135AFM85			
Number of Cylinders	6			
Bore	132	mm	5.20	in
Stroke	165	mm	6.50	in
Displacement	13.5	L	824	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**	436	kW	24834	BTU/min
Max. Pressure Drop Across Keel Cooler	40	kPa	5.8	psi
Coolant Flow	252	L/min	67	gal/min
Seawater Flow (heat exchanged)	382	L/min	101	gal/min
Thermostat Start to Open	72	°C	161	°F
Thermostat Fully Open	82	°C	179	°F
Engine Coolant Capacity, HE	43	L	11.4	gal
Engine Coolant Capacity, KC	38	L	10.0	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	100-105	°C	212-230	°F
Absolute Max Top Tank Temperature	105	°C	221	°F
Recommended Fuel Cooler	22	kW	1261	BTU/min
Engine Radiated Heat	60	kW	3401	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	1337	mm	52.6	in
Length maximum	1725	mm	67.9	in
Width maximum	1075	mm	42.3	in
Height, crank centerline to top	806	mm	31.7	in
Height, crank centerline to bottom	360	mm	360	in
Weight, with oil, no coolant (includes engine, flywheel housing, flywheel, and electronics)	1410	kg	3108	lb
Center of Gravity Location, X-axis From Rear Face of Block	516	mm	20.3	in
Center of Gravity Location, Y-axis Right of Crankshaft	5	mm	0.2	in
Center of Gravity Location, Z-axis Above Crankshaft	239	mm	9.4	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	5.4	kN	1214	lbf
Thrust Bearing Load Limit, Forward Intermittent	8.1	kN	1821	lbf
Thrust Bearing Load Limit, Rearward Continuous	2.5	kN	562	lbf
Thrust Bearing Load Limit, Rearward Intermittent	4	kN	899	lbf

Electrical System

Min. Recommended Battery Capacity, 12V @32 °F (0 °C)	1900	amps		
Min. Recommended Battery Capacity, 24V @32 °F (0 °C)	925	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"	#000			
Recommended Starter Cable, 24V 100"	#1			
Recommended Starter Cable, 12V 200"	2#000			
Recommended Starter Cable, 24V 200"	#000			
Electrical Component Maximum Temperature Limit	125	°C	257	°F

Performance Curve: 6135AFM85_D

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

Engine Installation Criteria

Fuel System

ECU Description			L15	
Fuel Injection Pump			Unit Injection	
Governor Type			Electronic	
Volumetric Fuel Consumption	119	L/hr	31.4	gal/hr
Mass Fuel Consumption	101	kg/hr	223	lb/hr
Total Fuel Volumetric Flow	417	L/hr	110.2	gal/hr
Total Fuel Mass Flow	354	kg/hr	781	lb/hr
Max. Fuel Inlet Restriction*	30	kPa	120	in.H2O
Max. Fuel Inlet Pressure	24	kPa	96	in.H2O
Max Fuel Return Pressure	35	kPa	141	in.H2O
Max. Fuel Height Above Transfer Pump	2.88	m	9.4	ft
Max. Leak-off Return Height	2.88	m	9.4	ft
Max. Fuel Inlet Height Above Fuel Tank Supply	2.88	m	9.4	ft
Normal Operation Fuel Temperature	40	°C	104	°F
Max. Fuel Inlet Temperature	80	°C	176	°F
Min. Recommended Fuel Line Inside Diameter	11	mm	0.43	in
Min. Recommended Fuel Line Size			7 (-) AN	
Primary Fuel Filter			10 mic	
Secondary Fuel Filter			2 mic	

Lubrication System

Oil Pressure at Rated Speed	317	kPa	46	psi
Oil Pressure at Low Idle (600rpm)**	157	kPa	23	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 1904 option

Air Intake System

Engine Air Flow	40.3	m^3/min	1423	ft^3/min
Intake Manifold Pressure	275	kPa	39.9	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	0.248	m^2	384	in^2

Performance Data

Rated Power	429	kW	575	hp
Rated Speed		2100	RPM	
Peak Torque Speed		1500	RPM	
Low Idle Speed		600	RPM	
Rated Torque	1951	Nm	1439	ft-lb
Peak Torque	2483	Nm	1831	ft-lb
BMEP, Rated	1816	kPa	263	psi
Rated Pferdestärke (metric hp)		583	ps	
Front Drive Capacity, Intermittent	542	Nm	400	lb-ft
Front Drive Capacity, Continuous	542	Nm	400	lb-ft

Exhaust System

Exhaust Flow	92.3	m^3/min	3260	ft^3/min
Exhaust Flow @ gas STP	38.1	m^3/min	1345	ft^3/min
Exhaust Temperature	418	°C	784	°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	152.4	mm	6.0	in
Min. Exhaust Pipe Diameter, Wet	165.1	mm	6.5	in

Performance Curve: 6135AFM85_D

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	429	575	1951	1439	429	575	119	31	236
2000	429	575	2048	1510	371	497	103	27	236
1900	429	575	2156	1590	318	426	89	23	238
1800	429	575	2276	1679	270	362	71	19	223
1700	429	575	2410	1777	228	305	64	17	238
1600	410	550	2447	1805	190	254	49	13	220
1500	390	523	2483	1831	156	210	40	11	218
1400	345	463	2353	1735	127	170	33	9	221
1300	300	402	2204	1626	102	136	27	7	228
1200	240	322	1911	1410	80	107	21	6	223
1100	195	262	1695	1250	62	83	17	4	227
1000	156	209	1489	1098	46	62	13	3	231

* Theoretical 3.0 exponent propeller curve , measured at flywheel

Performance Curve: 6135AFM85_D

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