



# Engine Performance Data

Industrial  
**QSF3.8**  
 FR94590

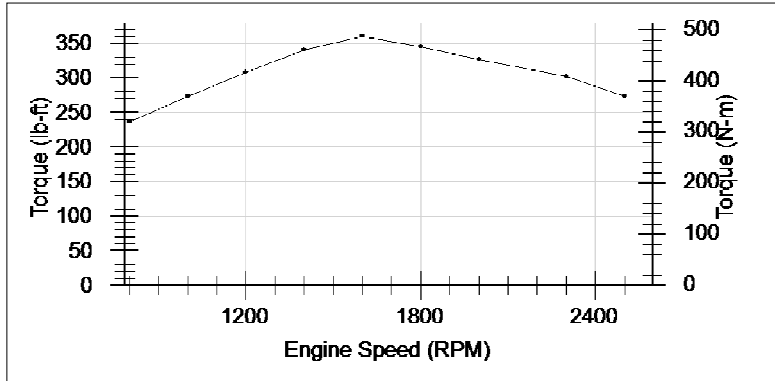
**130 BHP (97 kW) @ 2500 RPM**  
**360 lb-ft (488 N-m) @ 1600 RPM**

Configuration D0F3009CX03	CPL Code 4480	Revision 28-Mar-2016
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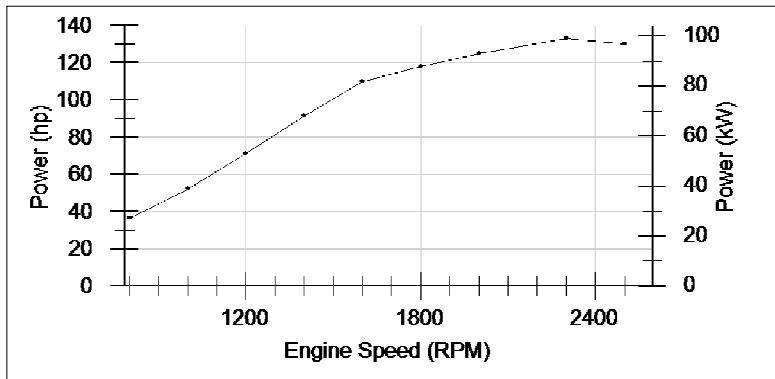
Compression Ratio: **17.2:1** Displacement: **232 in3 (3.8 L)**  
 Fuel System: **Bosch HPCR** Aspiration: **Turbocharged and Charge Air Cooled**  
 Emission Certification: **Pending EU Stage IIIA, US EPA Loco Tier 3 Linehaul**

All data is based on the engine operating with fuel system, water pump, and 15 in H2O (3.73 kPa) inlet air restriction with 4 in (102 mm) inner diameter, and with 3.00 in Hg (10 kPa) exhaust restriction with 3 in (76 mm) inner diameter; not included are alternator, fan, optional equipment and driven components. Coolant flows and heat rejection data based on coolants as 50% ethylene glycol/50% water. All data is subject to change without notice.

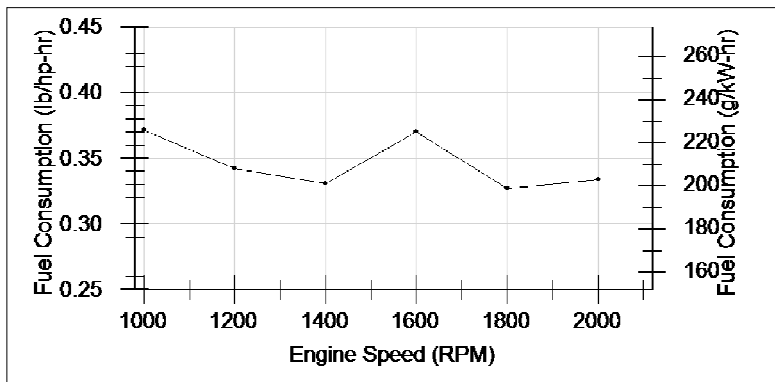
## Rating Type: Intermittent



RPM	lb-ft	N-m
800	237	321
1,000	274	371
1,200	308	418
1,400	340	461
1,600	360	488
1,800	345	468
2,000	327	443
2,300	302	409
2,500	274	371



RPM	hp	kW
800	36	27
1,000	52	39
1,200	71	53
1,400	91	68
1,600	110	82
1,800	118	88
2,000	125	93
2,300	133	99
2,500	130	97



RPM	lb/hp-hr	g/kW-hr
1,000	0.372	226
1,200	0.342	208
1,400	0.330	201
1,600	0.370	225
1,800	0.327	199
2,000	0.334	203

Curves shown above represent gross engine performance capabilities obtained and corrected in accordance with SAE J1995 conditions of 29.61 in Hg (100 kPa) barometric pressure [300ft (91m) altitude] 77 deg F (25 deg C) inlet air temperature, and 0.30 in Hg (1kPa) water vapor pressure with No. 2 diesel fuel. At speeds above 800 RPM the engine may be operated at altitudes up to 5,249 ft (1,600 m) before electronic derate is applied. At engine speeds below 800 RPM the engine may be operated at altitudes up to 4,265 ft (1,300 m) before electronic derate is applied.

**STATUS FOR CURVES AND DATA: Alpha-(Measured data)**  
 Tolerance: N/A for Alpha/Beta/Preliminary Engines.

**CHIEF ENGINEER:**

## Intake Air System

Maximum allowable air temperature rise over ambient at Intake Manifold (Naturally Aspirated Engines) or Turbo Compressor inlet (Turbo-charged Engines): (This parameter impacts emissions, LAT and/or altitude capability) 30.6 delta deg F 17.0 delta deg C

## Cooling System

Maximum charge air cooler outlet to ambient at 25 deg C [77 deg F] (CAC dT) 63 delta deg F 35.0 delta deg C  
 Maximum CAC outlet temperature at <=25 °C (77 °F) ambient 140 deg F 60 deg C  
 Maximum intake manifold temperature at 25 deg C (77 F) ambient 140 deg F 60 deg C  
 Maximum allowable pressure drop across charge air cooler and OEM CAC piping (IMPD): 4 in-Hg 13.5 kPa  
 Maximum Intake Manifold Temperature Differential (Ambient to IMT) (IMTD): 63 delta deg F 35.0 delta deg C  
 Charge air cooler outlet temperature for full Fan-On 140 deg F 60 deg C  
 Maximum coolant temperature for engine protection controls 225 deg F 107 deg C  
 Maximum coolant operating temperature at engine outlet (max. top tank temp): 225 deg F 107 deg C

## Exhaust System

Maximum exhaust back pressure: 3.00 in-Hg 10 kPa  
 Recommended exhaust piping size (inner diameter): 3 in 76 mm

## Lubrication System

Nominal operating oil pressure  
 @ minimum low idle 20.0 psi 138 kPa  
 @ maximum rated speed 330 psi 2,275 kPa  
 Minimum engine oil pressure for engine protection devices  
 @ minimum low idle 10.0 psi 69 kPa

## Fuel System

Fuel cooling requirements (with diesel fuel)  
 Maximum heat rejection to return fuel at max. coolant and inlet fuel temperature: 85 BTU/min 1.50 kW  
 @ fuel return flow rate of: 220 lb/hr 100 kg/hr  
 @ fuel return temperature prior to cooler: 149 deg F 65 deg C  
 Maximum supply fuel flow: 276 lb/hr 125 kg/hr  
 Maximum return fuel flow: 254 lb/hr 115 kg/hr  
 Engine fuel compatibility (consult Service Bulletin #3379001 for appropriate use of other fuels)  
 Maximum fuel inlet pressure: 0 in H2O 0 kPa

## Performance Data

Maximum low idle speed: 1,200 RPM  
 Minimum low idle speed: 700 RPM  
 Minimum engine speed for full load sustained operation: 1,700 RPM

	Rated Power		Maximum Power		Torque Peak	
Engine Speed	2,500 RPM				1,600 RPM	
Output Power	130 hp	97 kW			110 hp	82 kW
Torque	274 lb-ft	371 N-m			360 lb-ft	488 N-m
Friction Horsepower	33 hp	25 kW			16 hp	12 kW
Intake Manifold Pressure	42 in-Hg	143 kPa			47 in-Hg	159 kPa
Turbo Comp. Outlet Pressure	46 in-Hg	156 kPa			49 in-Hg	164 kPa
Turbo Comp. Outlet Temperature	316 deg F	158 deg C			336 deg F	169 deg C
Inlet Air Flow	307 ft <sup>3</sup> /min	145 L/s			225 ft <sup>3</sup> /min	106 L/s
Charge Air Flow	22.5 lb/min	10.2 kg/min			16 lb/min	7 kg/min
Exhaust Gas Flow	780 ft <sup>3</sup> /min	368 L/s			570 ft <sup>3</sup> /min	269 L/s
Exhaust Gas Temperature	975 deg F	524 deg C			923 deg F	495 deg C
Maximum Fuel Flow to Pump						
Heat Rejection to Coolant	2,821 BTU/min	50 kW			2,303 BTU/min	41 kW
Heat Rejection to Fuel	85 BTU/min	1.5 kW			74 BTU/min	1.3 kW
Heat Rejection to Ambient						
Heat Rejection to Exhaust						

\*\*When operating Naturally Aspirated engines above SAE J1995 conditions, it should be noted that smoke levels will increase due to combustion inefficiencies associated with a reduction in the air to fuel mixture.

**Cranking System (Cold Starting Capability)**

## Unaided Cold Start:

Minimum cranking speed

Minimum ambient temperature for unaided cold start

10.4 deg F

-12.0 deg C

## Aided Cold Start:

Minimum ambient temperature with Grid Heater only

-4 deg F

-20 deg C

Cold starting aids available

Maximum parasitic load at 10 deg F @ 800

115 lb-ft

156 N-m

**Noise Emissions**

Top

90.4 dBa

Right Side

94.7 dBa

Left Side

94.8 dBa

Front

94.7 dBa

Estimated Free Field Sound Pressure Level at 3.28ft (1m) and Full-Load Governed Speed  
(Excludes Noise from Intake, Exhaust, Cooling System and Driven Components)

**End of Report**