



Engine Performance Data

Cummins Inc

Columbus, Indiana 47202-3005
<http://www.cummins.com>

Industrial

QSM11

FR20001

400 BHP (298 kW) @ 2100 RPM
1,400 lb-ft (1,898 N-m) @ 1400 RPM

Configuration
D353020CX03

CPL Code
8471

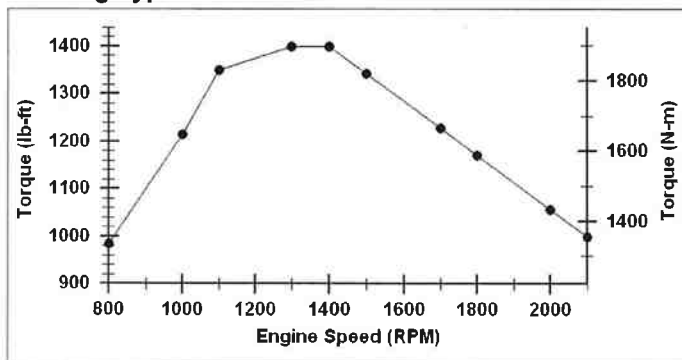
Revision
25-Jan-2006

Compression Ratio: **16.3:1**
Fuel System: **Celect Electronic**
Emission Certification: **U.S. EPA Tier 3, CARB Tier 3, EU Stage IIIA**

Displacement: **660 in3 (10.8 L)**
Aspiration: **Turbocharged and Charge Air Cooled**

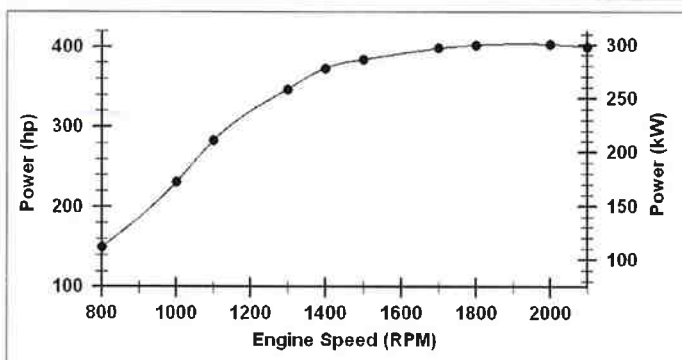
All data is based on the engine operating with fuel system, water pump, and 15 in H₂O (3.733 kPa) inlet air restriction with 6 in (152 mm) inner diameter, and with 3 in Hg (10 kPa) exhaust restriction with 5 in (127 mm) inner diameter; not included are alternator, fan, optional equipment and driven components. 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



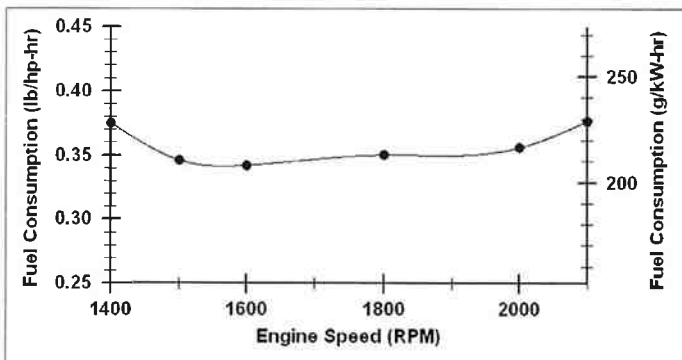
Torque Output

RPM	lb-ft	N-m
800	985	1,335
1,000	1,215	1,647
1,100	1,350	1,830
1,300	1,400	1,898
1,400	1,400	1,898
1,500	1,343	1,821
1,700	1,229	1,666
1,800	1,172	1,589
2,000	1,057	1,433
2,100	1,000	1,356



Power Output

RPM	hp	kW
800	150	112
1,000	231	172
1,100	283	211
1,300	347	259
1,400	373	278
1,500	384	286
1,700	398	297
1,800	402	300
2,000	403	301
2,100	400	298



Fuel Consumption

RPM	lb/hp-hr	g/kW-hr
1,400	0.375	228
1,500	0.346	211
1,600	0.342	208
1,800	0.35	213
2,000	0.356	217
2,100	0.377	229

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. The engine may be operated up to 8,000 ft (2,438 m) altitude before electronic derate is applied.

STATUS FOR CURVES AND DATA: Final
TOLERANCE: Within +/- 5 %

CHIEF ENGINEER:
L K Hwang

Bold entries revised after 29-Aug-2005

Cummins Confidential

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 delta deg F	16.7 delta deg C
--	----------------	------------------

Charge Air Cooling System

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):	3 in-Hg	10 kPa
Maximum Intake Manifold Temperature Differential (Ambient to IMT) (IMTD):	63 delta deg F	35 delta deg C
Intake manifold temperature for Fan-ON	140 deg F	60 deg C
Maximum coolant temperature for engine protection controls	215 deg F	102 deg C
Maximum coolant operating temperature at engine outlet (max. top tank temp):	212 deg F	100 deg C

Exhaust System

Maximum exhaust back pressure:	3 in-Hg	10.1 kPa
Recommended exhaust piping size (inner diameter):	5 in	127 mm

Lubrication System

Nominal operating oil pressure		
@ minimum low idle	15 psi	103 kPa
@ maximum rated speed	35 psi	241 kPa
Minimum engine oil pressure for engine protection devices		
@ minimum low idle	10 psi	69 kPa

Fuel System

Fuel cooling requirements (with diesel fuel)		
Maximum heat rejection to return fuel at max. coolant and inlet fuel temperature:	260 BTU/min	4.57 kW
@ fuel return flow rate of:	587 lb/hr	266 kg/hr
@ fuel return temperature prior to cooler:	212 deg F	100 deg C
Maximum supply fuel flow:	606 lb/hr	275 kg/hr
Maximum return fuel flow:	587 lb/hr	266 kg/hr
Engine fuel compatibility (consult Service Bulletin #3379001 for appropriate use of other fuels)	DF1, DF2	
Maximum fuel inlet pressure:	10 psi	69 kPa

Performance Data

Maximum low idle speed:	1,200 RPM
Minimum low idle speed:	600 RPM
Minimum engine speed for full load sustained operation:	1,600 RPM

	Rated Power		Maximum Power		Torque Peak	
Engine Speed	2,100 RPM		1,800 RPM		1,400 RPM	
Output Power	400 hp	298 kW	402 hp	300 kW	373 hp	278 kW
Torque	1,000 lb-ft	1,356 N-m	1,173 lb-ft	1,590 N-m	1,400 lb-ft	1,898 N-m
Friction Horsepower	61 hp	46 kW	45 hp	33 kW	28 hp	21 kW
Intake Manifold Pressure	62 in-Hg	208 kPa	61 in-Hg	206 kPa	64 in-Hg	216 kPa
Turbo Comp. Outlet Pressure	65 in-Hg	219 kPa	64 in-Hg	216 kPa	66 in-Hg	223 kPa
Turbo Comp. Outlet Temperature	374 deg F	190 deg C	364 deg F	184 deg C	396 deg F	202 deg C
Inlet Air Flow	1,039 ft ³ /min	490 L/s	915 ft ³ /min	432 L/s	774 ft ³ /min	365 L/s
Charge Air Flow	75 lb/min	34 kg/min	67 lb/min	30 kg/min	56 lb/min	25 kg/min
Exhaust Gas Flow	2,579 ft ³ /min	1,217 L/s	2,294 ft ³ /min	1,083 L/s	2,179 ft ³ /min	1,028 L/s
Exhaust Gas Temperature	915 deg F	491 deg C	905 deg F	485 deg C	1,081 deg F	583 deg C
Maximum Fuel Flow to Pump	423 lb/hr	192 kg/hr	365 lb/hr	166 kg/hr	257 lb/hr	117 kg/hr
Heat Rejection to Coolant	6,663 BTU/min	117.16 kW	6,035 BTU/min	106.12 kW	6,022 BTU/min	105.89 kW
Heat Rejection to Fuel	238 BTU/min	4.19 kW	235 BTU/min	4.13 kW	234 BTU/min	4.11 kW
Heat Rejection to Ambient	1,650 BTU/min	29.01 kW	1,525 BTU/min	26.82 kW	1,494 BTU/min	26.27 kW
Heat Rejection to Exhaust	17,050 BTU/min	299.81 kW	14,960 BTU/min	263.06 kW	15,400 BTU/min	270.8 kW
**Steady State Smoke	1.23 Bosch		0.79 Bosch		0.46 Bosch	

**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.

Bold entries revised after 29-Aug-2005

Cummins Confidential

Cranking System (Cold Starting Capability)

Unaided Cold Start:

Minimum cranking speed:	110 RPM	
Minimum ambient temperature for unaided cold start	10 deg F	-12.2 deg C
Cranking torque at minimum unaided cold start temperature:	215 lb-ft	292 N-m

Aided Cold Start:

Minimum ambient temperature with Grid Heater only	-10 deg F	-23 deg C
Minimum ambient temperature with Ether only:	-10 deg F	-23 deg C
Minimum ambient temperature with coolant and lube heater only:	0 deg F	-18 deg C

Cold starting aids available

Ether, Intake Manifold Heater, Block Heater, Oil Pan Heater

Noise Emissions

Top	101.4 dBA
Right Side	104.1 dBA
Left Side	104.2 dBA
Front	104.6 dBA
Exhaust noise emissions	121 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

Bold entries revised after 29-Aug-2005

Cummins Confidential

