



Cummins Inc.
 Columbus, Indiana 47201
ENGINE PERFORMANCE CURVE
 www.cumminspowerunits.com

Basic Engine Model:
KTA50-P2220

Curve Number:
FR-6244 (1P / 2L)
FR-6295 (2P / 2L)

Page
 No.

Engine Critical Parts List:
CPL: 2527 (1 Pump / 2 Loop)
CPL: 2533 (2 Pump / 2 Loop)

Date:
26Nov01

Displacement : **50.3 litre (3067 in³)**

Bore : **159 mm (6.25 in.)** Stroke : **159 mm (6.25 in.)**

No. of Cylinders : **16**

Aspiration : **Turbocharged and Low Temperature Aftercooled**

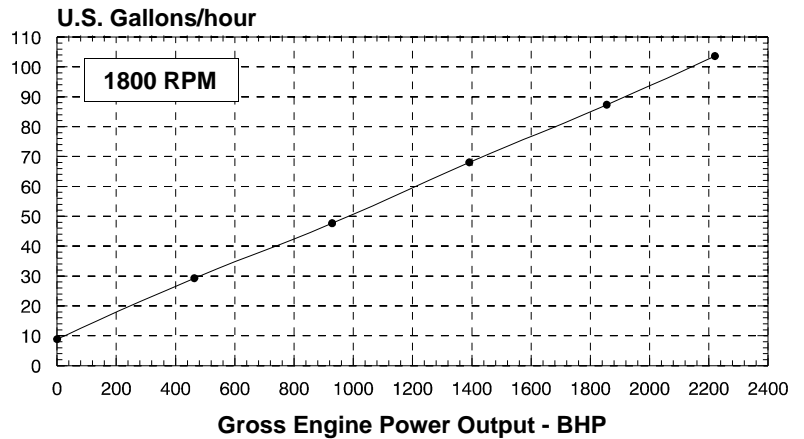
| Engine Speed RPM | Standby Power | | Prime Power | | Continuous Power | |
|---------------------|---------------|-------------|-------------|-------------|------------------|-------------|
| | kWm | BHP | kWm | BHP | kWm | BHP |
| 1800 | 1656 | 2220 | 1384 | 1855 | 1224 | 1640 |

Emissions Certification

This engine complies with certain emissions requirements established by US EPA/CARB.
 See Exhaust Emissions Data Sheet for conformance specifics.

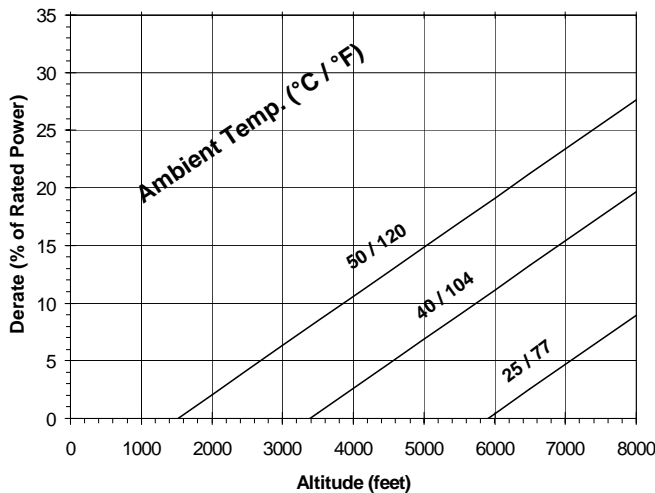
Engine Performance Data @ 1800 RPM

| OUTPUT POWER | | | FUEL CONSUMPTION | | | |
|-------------------------|------|------|------------------|--------------|----------------|-------------------|
| % | kWm | BHP | kg/ kWm-h | lb/ BHP-h | liter/ hour | U.S. Gal/ hour |
| STANDBY POWER | | | | | | |
| 100 | 1656 | 2220 | 0.201 | 0.331 | 392 | 103.6 |
| PRIME POWER | | | | | | |
| 100 | 1384 | 1855 | 0.203 | 0.334 | 330 | 87.3 |
| 75 | 1038 | 1391 | 0.211 | 0.347 | 257 | 68.0 |
| 50 | 692 | 928 | 0.221 | 0.364 | 180 | 47.6 |
| 25 | 346 | 463 | 0.273 | 0.449 | 111 | 29.2 |
| CONTINUOUS POWER | | | | | | |
| 100 | 1224 | 1640 | 0.208 | 0.342 | 299 | 79.0 |

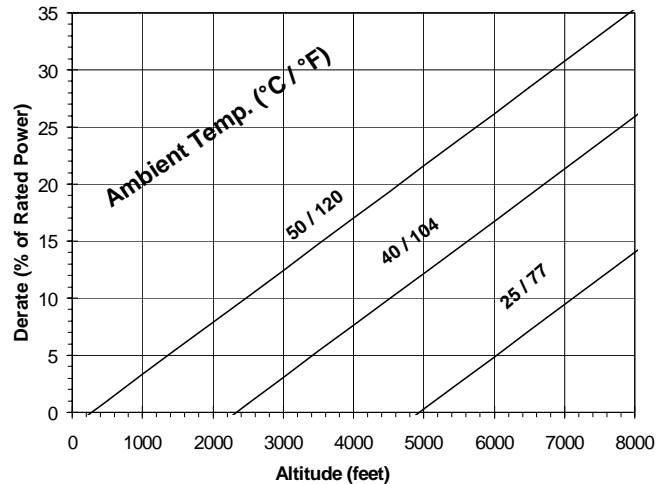


Power Derate Curves:

Standby / Prime Power



Continuous Power



Operation At Elevated Temperature And Altitude:

For sustained operation above these conditions, derate by an additional 4.5% per 300 m (1000 ft), and 10% per 10° C (18° F).

CONVERSIONS:(Liters = U.S. Gal x 3.785) (U.S.Gal = Liters x 0.2642)

Data Subject to Change Without Notice

These guidelines have been formulated to ensure proper application of generator drive engines in A.C. generator set installations. **STANDBY POWER RATING:** Applicable for supplying emergency power for the duration of the utility power outage. No overload capability is available for this rating. Under no condition is an engine allowed to operate in parallel with the public utility at the Standby Power rating. This rating should be applied where reliable utility power is available. A Standby rated engine should be sized for a maximum of an 80% average load factor and 200 hours of operation per year. This includes less than 25 hours per year at the Standby Power rating. Standby ratings should never be applied except in true emergency power outages. Negotiated power outages contracted with a utility company are not considered an exception. **PRIME POWER RATING:** Applicable for supplying emergency power in lieu of commercially purchased power. Prime Power applications must be in the form of one of the following two categories: **UNLIMITED TIME RUNNING PRIME POWER:** Prime Power is available for an unlimited number of hours per year in a variable load application. Variable load should not exceed a 70% average of the Prime Power rating during any operating period of 250 hours. The total operating time at 100% Prime Power shall not exceed 500 hours per year. A 10% overload capability is available for a period of 1 hour within a 12-hour period of operation. Total operating time at the 10% overload power shall not exceed 25 hours per year. **LIMITED TIME RUNNING PRIME POWER:** Limited Time Prime Power is available for a limited number of hours in a non-variable load application. It is intended for use in situations where power outages are contracted, such as in utility power curtailment. Engines may be operated in parallel to the public utility up to 750 hours per year at power levels never to exceed the Prime Power rating. The customer should be aware, however, that the life of any engine will be reduced by this constant high load operation. Any operation exceeding 750 hours per year at the Prime Power rating should use the Continuous Power rating. **CONTINUOUS POWER RATING:** Applicable for supplying utility power at a constant 100% load for an unlimited number of hours per year. No overload capability is available for this rating.

Reference AEB 10.47 for determining Electrical Output.
 Data shown above represent gross engine performance capabilities obtained and corrected in accordance with ISO-3046 conditions of 100 kPa (29.53 in Hg) barometric pressure [110 m (361 ft) altitude], 25 °C (77 °F) air inlet temperature, and relative humidity of 30% with No. 2 diesel or a fuel corresponding to ASTM D2.
 Derates shown are based on 15 in H₂O air intake restriction and 2 in Hg exhaust back pressure.
 The fuel consumption data is based on No. 2 diesel fuel weight at 0.85 kg/liter (7.1 lbs/U.S. gal). Power output curves are based on the engine operating with fuel system, water pump and lubricating oil pump; not included are battery charging alternator, fan, optional equipment and driven components.

Data Status: Limited Production
 Data Tolerance: ± 5%
 Chief Engineer:
D.K. Trueblood

Cummins Engine Company, Inc.

Engine Data Sheet

ENGINE MODEL : KTA50-P2220 **CONFIGURATION NUMBER :** D283022DX02

DATA SHEET : DS-6244

DATE : 26Nov01

PERFORMANCE CURVE : FR-6244 (1P / 2L)
FR-6295 (2P / 2L)

PERFORMANCE CURVE :

INSTALLATION DIAGRAM

- Fan to Flywheel (1P / 2L): 3170289
- Fan to Flywheel (2P / 2L): 3626419

CPL NUMBER

- Engine Critical Parts List : 2527 (1 Pump / 2 Loop)
- Engine Critical Parts List : 2533 (2 Pump / 2 Loop)

GENERAL ENGINE DATA

| | | |
|---|--------------------------------------|--------|
| Type..... | 4-Cycle; 60° Vee; 16-Cylinder Diesel | |
| Aspiration..... | Turbocharged & Low Temp. Aftercooled | |
| Bore x Stroke | 6.25 x 6.25 (159 x 159) | |
| Displacement | 3067 (50.3) | |
| Compression Ratio | 13.9 : 1 | |
| Dry Weight | | |
| Fan to Flywheel Engine | 11820 | (5360) |
| Wet Weight | | |
| Fan to Flywheel Engine | 12485 | (5662) |
| Moment of Inertia of Rotating Components | | |
| • with FW 6009 Flywheel | 301 | (12.7) |
| • with FW 6017 Flywheel..... | 515 | (21.7) |
| Center of Gravity from Rear Face of Flywheel Housing (FH 6024)..... | 47.5 | (1206) |
| Center of Gravity above Crankshaft Centerline | 11.0 | (279) |
| Maximum Static Loading at Rear Main Bearing | 2000 | (908) |

ENGINE MOUNTING

| | | |
|---|------|--------|
| Maximum Bending Moment at Rear Face of Block..... | 4500 | (6100) |
|---|------|--------|

EXHAUST SYSTEM

| | | |
|--|---|------|
| Maximum Back Pressure @ Standby Power Rating | 2 | (51) |
|--|---|------|

AIR INDUCTION SYSTEM

| | | |
|---|----|-------|
| Maximum Intake Air Restriction | | |
| • with Dirty Filter Element @ Standby Power Rating..... | 25 | (635) |
| • with Clean Filter Element @ Standby Power Rating..... | 15 | (381) |

COOLING SYSTEM (Low Temperature Aftercooling Required; 1 Pump / 2 Loop or 2 Pump / 2 Loop)

| | | |
|---|-----------|-------------|
| Coolant Capacity — Engine Only..... | 37 | (140) |
| — Aftercoolers | 9 | (34) |
| Maximum Static Head of Coolant Above Engine Crank Centerline | 60 | (18.3) |
| Thermostat Modulating Range — High Flow (Jacket) | 180 - 200 | (82 - 93) |
| Maximum Top Tank Temperature for Standby Power / Prime Power | 220 / 212 | (104 / 100) |
| Target Coolant Inlet Temperature to Aftercoolers @ 77 °F (25 °C) Ambient— | 130 | (55) |
| Maximum Coolant Temperature to Aftercoolers; Standby Power / Prime Power | 160 / 150 | (71 / 66) |

Additional 2 Pump / 2 Loop Requirements

| | | |
|---|------|--------|
| Maximum Coolant Friction Head External to Engine— High Flow (Jacket)..... | 10 | (67) |
| — Low Flow (Aftercooler)..... | 7 | (48) |
| Thermostat Modulating Range — Low Flow (Aftercooler) (2P / 2L) w/ HX ____ | N.A. | (N.A.) |
| Minimum Pressure Cap (for Cooling Systems with less than 2 m [6 ft.] Static Head)... .. | 14 | (96) |

Additional 1 Pump / 2 Loop Requirements

| | | |
|---|-----------|-----------|
| Maximum Coolant Friction Head External to Engine— High Flow (Jacket) | 15 | (103) |
| — Low Flow (Aftercooler)..... | 5 | (35) |
| Thermostat Modulating Range — Low Flow (Aftercooler)..... | 150 - 175 | (66 - 79) |
| Minimum Pressure Cap (for Cooling Systems with less than 2 m [6 ft.] Static Head)... .. | 14 | (96) |

LUBRICATION SYSTEM

| | | |
|---|---------|-------------|
| Oil Pressure @ Idle Speed..... | 20 | (138) |
| @ Governed Speed..... | 50 - 70 | (345 - 483) |
| Maximum Oil Temperature | 250 | (121) |
| Oil Capacity with OP 6027 Oil Pan : High - Low..... | 47 - 39 | (178 - 148) |
| Total System Capacity (Including Bypass Filter) | 54 | (204) |

FUEL SYSTEM

| | | |
|---|-----------------------------|-------|
| Type Injection System | Direct Injection Cummins PT | |
| Maximum Restriction at PT Fuel Injection Pump — with Clean Fuel Filter..... | 4.0 | (102) |
| — with Dirty Fuel Filter..... | 8.0 | (203) |
| Maximum Allowable Head on Injector Return Line (Consisting of Friction Head and Static Head)..... | 6.5 | (165) |
| Maximum Fuel Flow to Injection Pump | 183 | (693) |

ELECTRICAL SYSTEM

| | | |
|---|----------|-------|
| Cranking Motor (Heavy Duty, Positive Engagement)..... | — volt | 24 |
| Battery Charging System, Negative Ground..... | — ampere | 35 |
| Maximum Allowable Resistance of Cranking Circuit..... | — ohm | 0.002 |
| Minimum Recommended Battery Capacity | | |
| • Cold Soak @ 50 °F (10 °C) and Above..... | — °F CCA | 1280 |
| • Cold Soak @ 32 °F to 50 °F (0 °C to 10 °C)..... | — °F CCA | 1800 |
| • Cold Soak @ 0 °F to 32 °F (-18 °C to 0 °C)..... | — °F CCA | 1800 |

COLD START CAPABILITY

| | | | |
|---|-----------|----|------|
| Minimum Ambient Temperature for Aided (with Coolant Heater) Cold Start within 10 seconds..... | — °F (°C) | 50 | (10) |
| Minimum Ambient Temperature for Unaided Cold Start..... | — °F (°C) | 45 | (7) |

PERFORMANCE DATA

- All data is based on:
- Engine operating with fuel system, water pump, lubricating oil pump, air cleaner and exhaust silencer; not included are battery charging alternator, fan, and optional driven components.
 - Engine operating with fuel corresponding to grade No. 2-D per ASTM D975.
 - ISO 3046, Part 1, Standard Reference Conditions of:

| | | | |
|---------------------|-------------------------|-------------------|-----------------|
| Barometric Pressure | : 100 kPa (29.53 in Hg) | Air Temperature | : 25 °C (77 °F) |
| Altitude | : 110 m (361 ft) | Relative Humidity | : 30% |

| | | |
|--|-------|----------|
| Steady State Stability Band at any Constant Load | — % | +/- 0.25 |
| Estimated Free Field Sound Pressure Level of a Typical Generator Set; | | |
| Excludes Exhaust Noise; at Rated Load and 7.5 m (24.6 ft); 1800 rpm..... | — dBA | 94.6 |
| Exhaust Noise at 1 m Horizontally from Centerline of Exhaust Pipe Outlet Upwards at 45°..... | — dBA | 130 |

| | | |
|------------------------------------|--------------------------|-------------|
| Governed Engine Speed..... | — rpm | 1800 |
| Engine Idle Speed..... | — rpm | 725 - 775 |
| Gross Engine Power Output..... | — BHP (kW _m) | 2220 (1656) |
| Brake Mean Effective Pressure..... | — psi (kPa) | 318 (2221) |
| Piston Speed..... | — ft / min (m / s) | 1875 (9.5) |
| Friction Horsepower..... | — HP (kW _m) | 225 (168) |

Engine Data with Dry Type Exhaust Manifold

| | | |
|--------------------------------|--------------------------------|--------------|
| Intake Air Flow..... | — cfm (liter / s) | 4400 (2075) |
| Exhaust Gas Temperature..... | — °F (°C) | 960 (515) |
| Exhaust Gas Flow..... | — cfm (liter / s) | 10650 (5025) |
| Air to Fuel Ratio..... | — air : fuel | 25.2 : 1 |
| Radiated Heat to Ambient..... | — BTU / min (kW _m) | 11220 (200) |
| Heat Rejection to Exhaust..... | — BTU / min (kW _m) | 58925 (1040) |

Additional Engine Aftercooler Data (2 Pump / 2 Loop)

Engine Jacket Coolant Flow at Stated Friction Head External to Engine:

| | | |
|--|--------------------------------|-------------|
| • 4 psi Friction Head..... | — US gpm (liter / s) | 430 (27.1) |
| • Maximum Friction Head..... | — US gpm (liter / s) | 376 (23.7) |
| Heat Rejection to Coolant (Aftercooler)..... | — BTU / min (kW _m) | 19500 (345) |
| Heat Rejection to Coolant (Engine)..... | — BTU / min (kW _m) | 40600 (715) |
| Aftercooler Coolant Flow at Stated Friction Head External to Engine: . | | |
| • 2 psi Friction Head..... | — US gpm (liter / s) | 112 (7.1) |
| • Maximum Friction Head..... | — US gpm (liter / s) | 100 (6.3) |

Additional Engine Aftercooler Data (1 Pump / 2 Loop)

Engine Jacket Coolant Flow at Stated Friction Head External to Engine:

| | | |
|--|--------------------------------|-------------|
| • 4 psi Friction Head..... | — US gpm (liter / s) | 430 (27.1) |
| • Maximum Friction Head..... | — US gpm (liter / s) | 376 (23.7) |
| Heat to be Rejected by Low Temperature Radiator*..... | — BTU / min (kW _m) | 35720 (630) |
| Heat to be Rejected by Jacket Coolant Radiator*..... | — BTU / min (kW _m) | 26110 (460) |
| Aftercooler Coolant Flow at Stated Friction Head External to Engine: . | | |
| • 2 psi Friction Head..... | — US gpm (liter / s) | 97 (6.1) |
| • Maximum Friction Head..... | — US gpm (liter / s) | 94 (5.9) |

| STANDBY POWER | | PRIME POWER UNLIMITED TIME | |
|----------------------|--|-----------------------------------|--|
| 60 hz | 50 hz | 60 hz | 50 hz |
| 1800 | | 1800 | |
| 725 - 775 | | 725 - 775 | |
| 2220 (1656) | | 1855 (1384) | |
| 318 (2221) | | 266 (1835) | |
| 1875 (9.5) | | 1875 (9.5) | |
| 225 (168) | | 225 (168) | |
| 4400 (2075) | | 4100 (1930) | |
| 960 (515) | | 880 (470) | |
| 10650 (5025) | | 9600 (4530) | |
| 25.2 : 1 | | 27.6 : 1 | |
| 11220 (200) | | 9610 (170) | |
| 58925 (1040) | Not Applicable for 1500 RPM Operation | 51690 (910) | Not Applicable for 1500 RPM Operation |
| 430 (27.1) | | 430 (27.1) | |
| 376 (23.7) | | 376 (23.7) | |
| 19500 (345) | | 15200 (270) | |
| 40600 (715) | | 35100 (620) | |
| 112 (7.1) | | 112 (7.1) | |
| 100 (6.3) | | 100 (6.3) | |
| 430 (27.1) | | 430 (27.1) | |
| 376 (23.7) | | 376 (23.7) | |
| 35720 (630) | | 36620 (645) | |
| 26110 (460) | | 15600 (275) | |
| 97 (6.1) | | 97 (6.1) | |
| 94 (5.9) | | 94 (5.9) | |

* See AEB 90.39 1 Pump / 2 Loop KTA50-G8/9 system.

- N.A.** - Data is Not Available
- N/A** - Not Applicable to this Engine
- TBD** - To Be Determined

ENGINE MODEL : KTA50-P2220
DATA SHEET : DS-6244
DATE : 26Nov01
CURVE NO. : FR-6244 (1P / 2L)
FR-6295 (2P / 2L)

CUMMINS ENGINE COMPANY, INC.

Columbus, Indiana 47202-3005