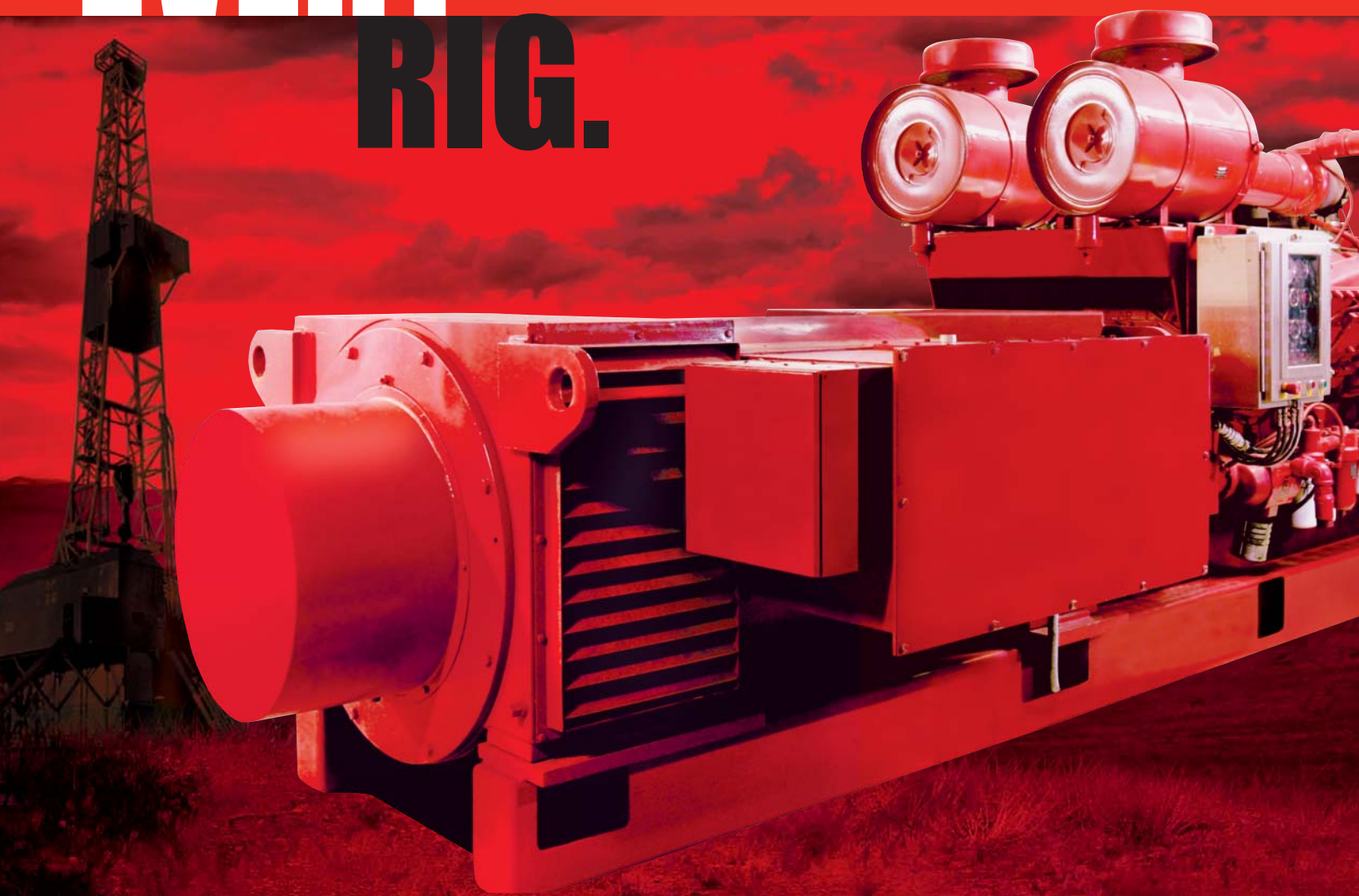




**Southern  
Plains**

**EVERY  
RIG.**



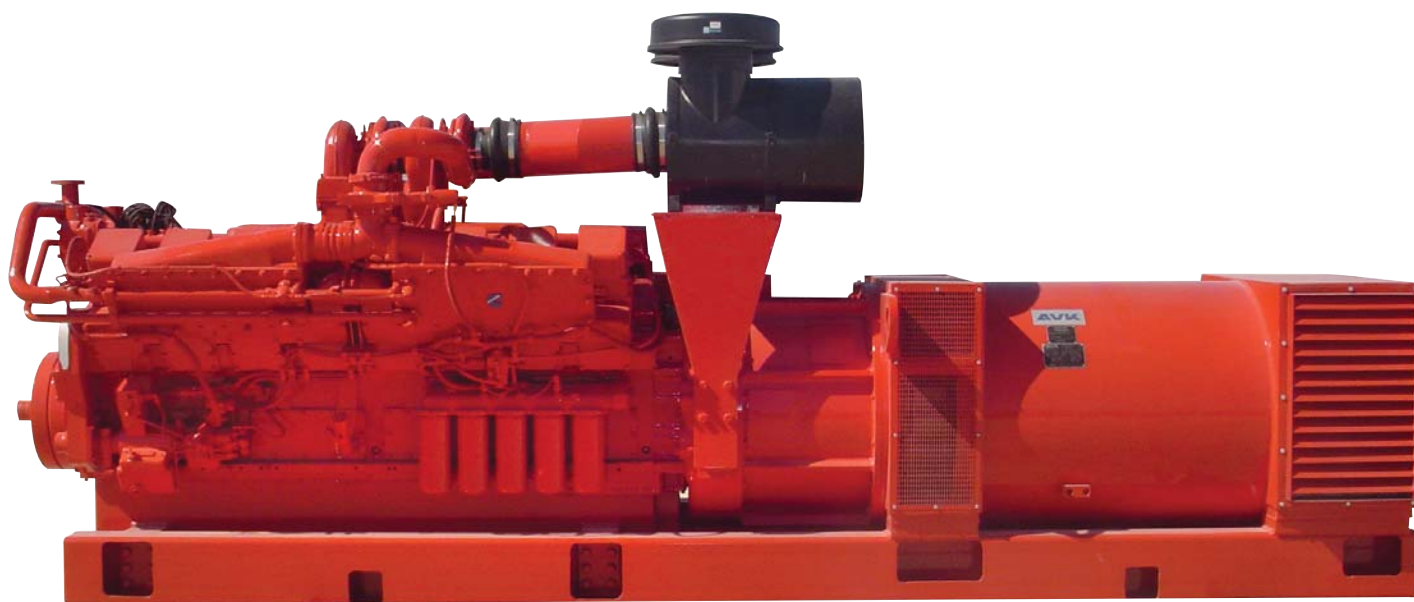
**CUMMINS OIL AND GAS  
LAND BASED DRILLING POWER MODULES**



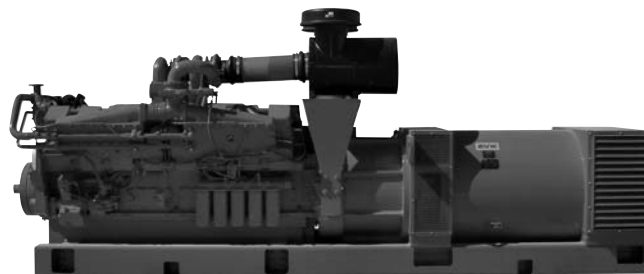
**Southern  
Plains**

# **KTA50 SCR SET**

**1470 HORSEPOWER AT 1200 RPM**



# KTA50 Land Based Drilling Power Modules



## Description

Cummins® Land Based Drilling Power Modules are designed and tested based on oil field customer requirements to provide optimum performance, reliability, and versatility for oil and gas land drilling applications.

## General specifications

### V-16, 4 Stroke Diesel

Bore	159 mm
Stroke	159 mm
Displacement	50.3 L
Aspiration	Turbocharged and aftercooled
Governor	Electronic
Cooling System	Vert or horz discharge options
Weight w/o radiator	29,500 lbs (13,385 kg)
Cooling system capacity	Vert: 37 gal. Horz: 26 gal.
Lube oil capacity	72 gal. (272 liter)
Base design	Three point mounting
Alternator rotor design	Two bearing
Alternator insulation	Class H
Voltage	600 V
Power factor	0.7

## Rating details

Model	Frequency	Voltage	Speed RPM	Engine power HP (kWm)	Alternator Rating
DFLK	50	347/600	1200	1470 (1096)	1571 kVa (1100 kW @ 0.7 pf)

## Rating description

These modules are to be used in prime power variable load land drilling applications where maximum power is needed for short periods of time during initial starting or sudden overload.

## Features

**Single source supplier** - The entire power module is designed and manufactured in facilities certified to ISO9001 or ISO9002.

**Cummins heavy-duty engine** - Rugged 4-cycle industrial diesel delivers reliable power, low emissions, and fast response to load changes.

**Alternator** - Form wound stator and rotor; designed, tested and sized for drill rig service; 2/3 pitch windings; low waveform distortion with non-linear loads; fault clearing short-circuit capability.

**Control system** - Engine monitoring and shutdown functions with easy to read analog gauges for critical parameters and a digital display for alarm and status message display.

**Testing and validation** - Prototype tested to verify computer aided designs, confirm torsional stability, and system functionality. Every Cummins engine is dynamometer tested to ensure optimal engine performance.

**Low exhaust emissions** - Engine certified to U.S. EPA Nonroad Source Emissions Standards, 40 CFR 89, Tier 2.

**Warranty and service** - Backed by a comprehensive warranty and worldwide distributor network.

**Web** - [www.CumminsOilandGas.com](http://www.CumminsOilandGas.com)

## Standard equipment

### Air inlet system

Aftercooler core, corrosion resistant coating  
Heavy duty air cleaner  
Air cleaner restriction gauge

### Oilfield base

Engine and generator 3-point mounted  
Oil drain extension  
Tailboarding provisions  
Oilfield subbase not included in standard package

### Control system

Fully instrumented safety and alarm panel  
(24 volt DC10 amp continuous, 15 amp intermittent, clean electrical power)

### Cooling system

Radiator Cooled Land Base  
Outlet controlled thermostat and housing  
Jacket water pump – gear driven  
Dual outlet  
Aftercooler fresh water cooling pump – gear driven centrifugal  
SCAC pump circuit contains a thermostat to keep the aftercooler coolant from falling below 78° F

### Exhaust system

90° exhaust outlet elbows with 6" ANSI flanges  
Flexible exhaust fittings  
Weldable exhaust flange  
Dry exhaust manifolds

### Flywheels and Flywheel Housings

SAE No. 00, 168 teeth flywheel

### Fuel System

Mechanically controlled unit injectors  
LH fuel filter  
Flexible fuel lines

### Generator

Synchronous 3-phase alternator, brushless, with built-in exciter  
Class H insulated  
Resistance temperature detectors (100 ohm platinum) and generator anticondensation heater  
Terminal box and copper bus bars  
Two-bearing design with PMG  
Standard air filter  
Standard bearing RTDs

### Instrumentation

Electronic instrument panel  
- RH with analog gauges for oil and fuel pressure, oil and filter differential, exhaust and water temperature, fuel pressure, air inlet restriction  
- Analog for tachometer, service meters, hrs.

### Lube system

Deep sump oil pan  
Oil filler and dipstick  
Cartridge type, LH oil filters (3)  
Gear type oil pump

### Protection system

Safety monitoring system provides engine duration, alarm or shutdown strategies to protect against adverse operating conditions  
Status available on engine mounted instrument panel and can be broadcast through the optional customer communications module or programmable relay control modules

### Starting and Control

Air silencer and vapor arrestor, air starting motor

## Standard equipment (continued)

### Engine package

Cummins KTA50-DR 50 Liter, 1200rpm diesel engine  
1470 bhp / 1096 kWm prime power rating  
Robust triangulated 3-point mount pony skid  
Structural steel oil pan rigidly mounted to pony skid  
Oil pan equipped with integral drain ball valve  
Exhaust elbows with 6" Cummins flanges  
2-pump 2-loop cooling circuit (jacket water and low temperature aftercooler)  
DCA coolant corrosion inhibitor filters  
Dedicated by-pass oil filtration  
(Qty 2) spin-on fuel filters  
(Qty 5) spin-on oil filters  
Ingersol-Rand air starter with relay valves, pilot valve, lubricator, and muffler  
Dual heavy duty air filters, enclosures, piping, and air restriction indicators  
Electrical air shut down valves installed in air intake tract  
User friendly Woodward EG1P hydraulic-mechanical actuator  
Cummins PT (Pressure/Time) engine driven fuel pump  
Exhaust manifold heat shields  
Robust rubber elastomer drive coupling  
Engine mounted electrical wiring harness with customer connectors  
Engine mounted control system

### Alternator

AVK DSG-86 L1-6 synchronous 6-pole alternator  
1100kW, 1571kVA@0.7pf, 600V, 1200 rpm rating  
40°C Temp rise with class H insulation  
12.5% sub-transient reactance  
Dual bearing design (front and rear)  
Built in air filtration  
Customer terminal box for load connections  
Customer terminal box for alternator heater and exciter connections  
Rotor, stator, and bearing RTD's  
Lifting provisions integrated into the alternator frame to ease maintenance

### Exhaust system

To be provided by customer (see options section)  
Engine equipped with exhaust elbows with 6" Cummins flanges

### Fuel system

To be provided by customer (see options section)  
Engine equipped with Cummins PT (Pressure/Time) engine driven fuel pump  
Engine equipped with (Qty 2) spin-on fuel filters

### Radiator package

Mechanically driven radiator package with vertical discharge  
Single pass core design with 50°C ambient capability  
Independent top tanks  
84" diameter fan with 11 blades  
Independent mounting configuration  
Radiator equipped with integral mounting skid  
(Qty 2) Low coolant level switches with sight glass indicators  
(Qty 2) 7 psi pressure caps  
(Qty 2) ¼" LTA vent lines and (1) 1" LTA fill line provisions  
(Qty 2) ¼" JW vent lines and (1) 1" JW fill line provisions  
Externally accessible grease fitting to ease maintenance  
Engine mounted stub shaft  
Stub shaft drive pulleys  
(Qty 6) V-belts to drive radiator  
Piping kit to connect engine to radiator  
Clam shell pipe clamps  
2" and 3" hump hose and t-bolt hose clamps  
Vent and fill lines to be provided by the customer (see options section)



## Standard equipment (continued)

### Controls

Digital control system interface  
J1939 and ModBus architecture  
304 SS NEMA 4X weather tight control enclosure  
Military “spec” harness and control box connectors  
Controller digitally displays all critical engine functions  
Start/Stop push-button control  
Analog gauge instrumentation:  
    Engine speed (Tachometer)  
    Jacket water coolant temperature  
    Aftercooler coolant temperature  
    Oil Pressure  
(Qty 2) coolant temp senders and (Qty 1) oil pressure sender included  
Warning/Indicator lamps  
    Common alarm  
    Common shutdown  
    Prelube  
    Air shutdown valves closed  
Common/shutdown alarm 85dB piezo-electric siren  
On/Off switch  
Customer programmable interface  
Independent overspeed trip unit  
Externally mounted E-Stop push-button with hinged protective cover  
Built in preventative maintenance timers:  
    Oil life  
    Oil filter life  
    Fuel filter life  
    Air filter life  
    Belt life  
    Battery Life  
    Overhaul life  
Built in hourmeter  
User definable and programmable alarms  
Simple 14-pin customer connector on engine harness (customer side provided)  
Automatic cool down sequence programmed into controller  
Electronic air shutdown valve control  
Customer fault diagnostics screen  
Built in reverse battery polarity protection  
Protective fusing  
Built in expandability (i.e. AC metering, remote control, “**see options section**”)

## Optional equipment

**\*\*Note: Quantities are for one engine**

### Optional radiator package

(Qty 1) Electrically driven radiator package with horizontal discharge  
40 hp, 1800 rpm, 3-phase, 60 Hz, 230-460V electrical motor  
Single pass core design with 50°C ambient capability  
Independent top tanks  
72” diameter fan with 11 blades  
Independent mounting configuration  
Radiator equipped with integral mounting skid  
(Qty 2) Low coolant level switches with sight glass indicators  
(Qty 2) 7 psi pressure caps  
(Qty 2) ¼” LTA vent line and (1) 1” LTA fill line provisions  
(Qty 2) ¼” JW vent line and (1) 1” JW fill line provisions  
Externally accessible grease fitting to ease maintenance  
Piping kit to connect engine to radiator  
Clam shell pipe clamps  
2” and 3” hump hose and t-bolt hose clamps

### Optional exhaust system components

(Qty 1) Dual 6” ANSI inlet/ 12” ANSI outlet pancake muffler  
(Qty 2) 6” corrugated exhaust flex with 6” Cummins flange to 6” ANSI flange  
(Qty 2) 6” Cummins flange nut, bolt, and gasket kit  
(Qty 2) 6” ANSI flange nut, bolt, and gasket kit  
(Qty 1) 12” ANSI flange nut, bolt, and gasket kit  
(Qty 1) 12” ANSI flange 90° elbow  
(Qty 1) 12” rain cap  
(Qty 1) Dual bank pyrometer kit (gauge, thermocouples, and wiring)

## Optional equipment (continued)

**\*\*Note: Quantities are for one engine**

### Optional control system components

AC metering functionality (i.e. to display current, voltage, power, freq., etc)  
(Qty.3) Current transformers  
(Qty.1) Voltage transformer  
(Qty.1) AC metering wiring harness  
Remote control and annunciation (allows for remote control in control house)  
(Qty.1) Mimic/Annunciator  
Automatic Voltage Regulator (AVR)  
(Qty.1) Bassler Decs100  
Engine Governor Controller  
(Qty.1) Woodward 2301A governor controller

### Optional engine components

Engine Oil  
Coolant  
Replacement filters  
Lubricator/pneumatic oil  
Radiator vent and fill lines (each installation is unique)  
Alternator bearing grease (Unirex N3 grease)


### Customer Packaging Responsibilities

1. Plumbing the radiator to the engine with the supplied piping kit. Some welding and cutting will be required. The customer will be responsible for fabricating and installing the necessary vent and fill lines to allow proper filling of the radiator. All coolant plumbing must meet Cummins established guide lines and pass an installation review.
2. Filling the engines with oil and filling the radiators/engines with coolant.
3. Plumbing the exhaust outlets to an appropriately sized muffler. System must not allow water to egress into the engine. All exhaust plumbing must meet Cummins established guide lines and pass an installation review.
4. Interfacing the control house with the alternator load cables, exciter, and heater. All other

connections will be made via the supplied 14-pin connector on the engine wiring harness. The customer 14-pin connection will provide the house with an engine speed signal, actuator input, and will provide 24VDC battery power to the panel.

5. Plumbing the engine mounted air starters to the air compressor.

6. Plumbing appropriately sized fuel supply and return lines to the engine mounted fuel pump. All fuel plumbing must meet Cummins established guide lines and pass an installation review. The proper operating fuel pressure for the Cummins PT style fuel pump is 6 psi with a maximum head restriction of 4 in/Hg. Given the high possibility of fuel pressure fluctuations with unregulated systems (i.e. as successive engines are brought on line), it is highly advisable that the customer use day tanks to regulate the supply fuel pressure.

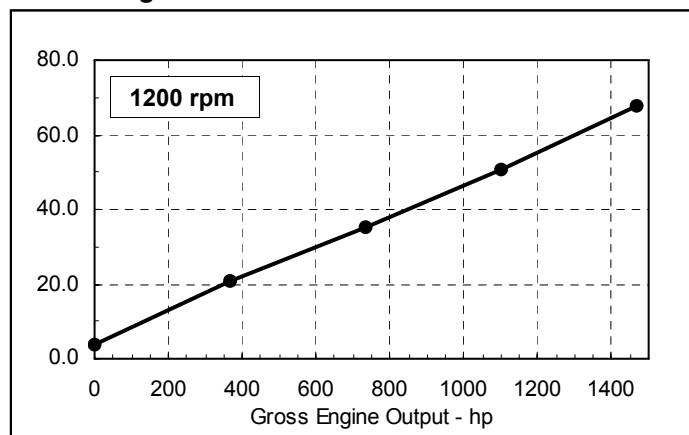
	<b>Cummins Inc.</b>	Basic Engine Model: <b>KTA50-DR1470</b>	Curve Number: <b>FR-6572 (2P/2L)</b>	<i>G-DRIVE</i> <b>KTA</b> <b>1</b>
	Columbus, Indiana 47202-3005 <b>ENGINE PERFORMANCE CURVE</b>	Engine Critical Parts List: <b>CPL: 1756 (2 Pump/2 Loop)</b>	Date: <b>06Nov07</b>	
Displacement : <b>50.3 litre (3067 in<sup>3</sup> )</b>		Bore : <b>159 mm (6.25 in.)</b> Stroke : <b>159 mm (6.25 in.)</b>		
No. of Cylinders : <b>16</b>		Aspiration : <b>Turbocharged and Low Temperature Aftercooled</b>		

Engine Speed	Drilling Rating	
	kWm	hp
<b>1200</b>	<b>1096</b>	<b>1470</b>

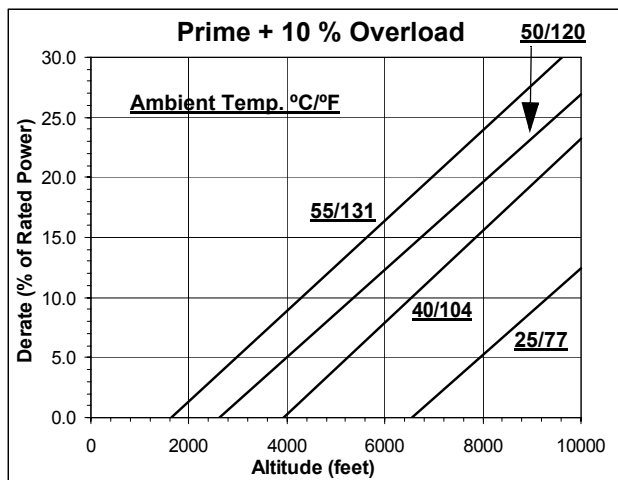
## Engine Performance Data @ 1200 rpm

OUTPUT POWER			FUEL CONSUMPTION			
%	kWm	hp	kg/ kWm·h	lb/ hp·h	liter/ hour	US gal/ hour
<b>DRILLING POWER</b>						
100	1096	1470	0.199	0.326	256	67.6
75	822	1102	0.199	0.327	143	50.8
50	548	735	0.208	0.342	134	35.4
25	274	368	0.242	0.397	78	20.6

## US gallons/hour



## Derate Curves KTA50-DR1470 1200 rpm



## Operation At Elevated Temperature And Altitude:

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

## CONVERSIONS: (Liters = US Gal x 3.785) (USGal = Liters x 0.2642)

**DRILLING RATING:** To be used in variable load drilling applications where maximum power is needed for short periods of time during either initial starting or sudden overload. Average power output is not to exceed 70% of the maximum power rating.

## Data Subject to Change Without Notice

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 H<sub>2</sub>O 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/US 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:





# Cummins Inc.

## Engine Data Sheet

G-DRIVE

**KTA**

**2**

**ENGINE MODEL : KTA50-DR1470 CONFIGURATION NUMBER : D283042GX02**

**DATA SHEET : DS-6572**

**DATE : 06Nov07**

**PERFORMANCE CURVE : FR-6572 (2P/2L)**

### INSTALLATION DIAGRAM

• Fan to Flywheel (2P/2L):

### CPL NUMBER

• Engine Critical Parts List: 1756 (2 Pump/2 Loop)

## GENERAL ENGINE DATA

Type .....	4-Cycle; 60° Vee; 16-Cylinder Diesel	
Aspiration.....	Turbocharged & Low Temp. Aftercooled	
Bore x Stroke .....	— in x in (mm x mm)	6.25 x 6.25 (159 x 159)
Displacement .....	— in <sup>3</sup> (liter)	3067 (50.3)
Compression Ratio .....	13.9 : 1	
Dry Weight		
Fan to Flywheel Engine .....	— lb (kg)	11820 (5360)
Wet Weight		
Fan to Flywheel Engine .....	— lb (kg)	12485 (5662)
Moment of Inertia of Rotating Components		
• with FW 6017 Flywheel.....	— lb <sub>m</sub> • ft <sup>2</sup> (kg • m <sup>2</sup> )	515 (21.7)
Center of Gravity from Rear Face of Flywheel Housing (FH 6020).....	— in (mm)	49.4 (1254)
Center of Gravity above Crankshaft Centerline .....	— in (mm)	11.0 (279)
Maximum Static Loading at Rear Main Bearing .....	— lb (kg)	2000 (908)

## ENGINE MOUNTING

Maximum Bending Moment at Rear Face of Block.....	— lb • ft (N • m)	4500 (6100)
---	-------------------	-------------

## EXHAUST SYSTEM

Maximum Back Pressure .....	— in Hg (kPa)	2 (7)
-----------------------------	---------------	-------

## AIR INDUCTION SYSTEM

Maximum Intake Air Restriction		
• with Dirty Filter Element .....	— in H <sub>2</sub> O (kPa)	25 (6.2)
• with Clean Filter Element .....	— in H <sub>2</sub> O (kPa)	15 (3.7)

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

Coolant Capacity — Engine Only.....	— US gal (liter)	37 (140)
— Aftercoolers .....	— US gal (liter)	9 (34)
Maximum Static Head of Coolant Above Engine Crank Centerline .....	— ft (m)	60 (18.3)
Thermostat Modulating Range — High Flow (Jacket) .....	— °F (°C)	180-200 (82-93)
Maximum Top Tank Temperature .....	— °F (°C)	220 (104)
Target Coolant Inlet Temperature to Aftercoolers @ 77 °F (25 °C) Ambient .....	— °F (°C)	130 (55)
Maximum Coolant Temperature to Aftercoolers .....	— °F (°C)	163 (73)

### Additional 2 Pump / 2 Loop Requirements

Maximum Coolant Friction Head External to Engine— High Flow (Jacket).....	— psi (kPa)	10 (69)
— Low Flow (Aftercooler).....	— psi (kPa)	5 (34)
Thermostat Modulating Range — Low Flow (Aftercooler) (2P / 2L) w/ HX .....	— °F (°C)	120-130 (49-54)
Minimum Pressure Cap (for Cooling Systems with less than 2 m [6 ft.] Static Head)...	— psi (kPa)	14 (97)

## LUBRICATION SYSTEM

Oil Pressure @ Idle Speed.....	— psi (kPa)	20 (138)
@ Governed Speed.....	— psi (kPa)	50-70 (345-483)
Maximum Oil Temperature .....	— °F (°C)	250 (121)
Oil Capacity with OP 6010 Oil Pan : High - Low .....	— US gal (liter)	64-45 (246-170)
Total System Capacity (Including Bypass Filter) .....	— US gal (liter)	72 (272)

## FUEL SYSTEM

Type Injection System .....	Direct Injection Cummins PT	
Maximum Restriction at Lift Pump(clean/dirty filter).....	— in Hg (kPa)	4.0/8.0 (14/27)
Maximum Allowable Head on Injector Return Line (Consisting of Friction Head and Static Head).....	— in Hg (kPa)	6.5 (22)
Maximum Fuel Flow to Injection Pump .....	— US gph (liter/hr)	183 (693)
Maximum Return Fuel Flow .....	— US gph (litre/hr)	0 (0)
Maximum Fuel Inlet Temperature .....	— °F (°C)	0 (0)

**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 @ 0 °F to 32 °F (-18 °C to 0 °C) .....	— 0°F CCA	1800

**COLD START CAPABILITY**

Minimum Ambient Temperature for NFPA 110 Cold Start (90 degree °F Coolant Temperature) .....	— °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	TBD
Exhaust Noise at 1 m Horizontally from Centerline of Exhaust Pipe Outlet Upwards at 45° .....	— dBA	TBD

	<b>DRILL RATING</b>	
	<b>60 hz</b>	
Governed Engine Speed .....	rpm	1200
Engine Idle Speed .....	rpm	725 - 775
Gross Engine Power Output .....	hp (kW)	1470 (1096)
Brake Mean Effective Pressure .....	psi (kPa)	315 (2172)
Piston Speed .....	ft/min (m/s)	1250 (6.3)
Friction Horsepower .....	hp (kW)	TBD (TBD)
Engine Water Flow at Stated Friction Head External to Engine:		
• 4 psi Friction Head .....	US gpm (liter/s)	320 (20.1)
• Maximum Friction Head .....	US gpm (liter/s)	352 (22.2)
<b>Engine Data</b>		
Intake Air Flow .....	cfm (liter/s)	2760 (1302)
Exhaust Gas Temperature .....	°F (°C)	950 (510)
Exhaust Gas Flow .....	cfm (liter/s)	6900 (3256)
Air to Fuel Ratio .....	air : fuel	24.2 : 1
Radiated Heat to Ambient .....	BTU/min (kW)	3565 (63)
Heat Rejection to Exhaust .....	BTU/min (kW)	46900 (824)
Heat Rejection to Jacket Coolant .....	BTU/min (kW)	10300 (181)
Heat Rejection to Exhaust .....	BTU/min (kW)	46900 (824)
<b>Engine Aftercooler Data</b>		
Heat Rejection to Coolant .....	BTU/min (kW)	24500 (430)
Heat Rejection to Aftercooler .....	BTU/min (kW)	0 (0)
Aftercooler Water Flow at Stated Friction Head External to Engine:		
• 2 psi Friction Head .....	US gpm (liter/s)	78 (4.9)
• Maximum Friction Head .....	US gpm (liter/s)	73 (4.6)

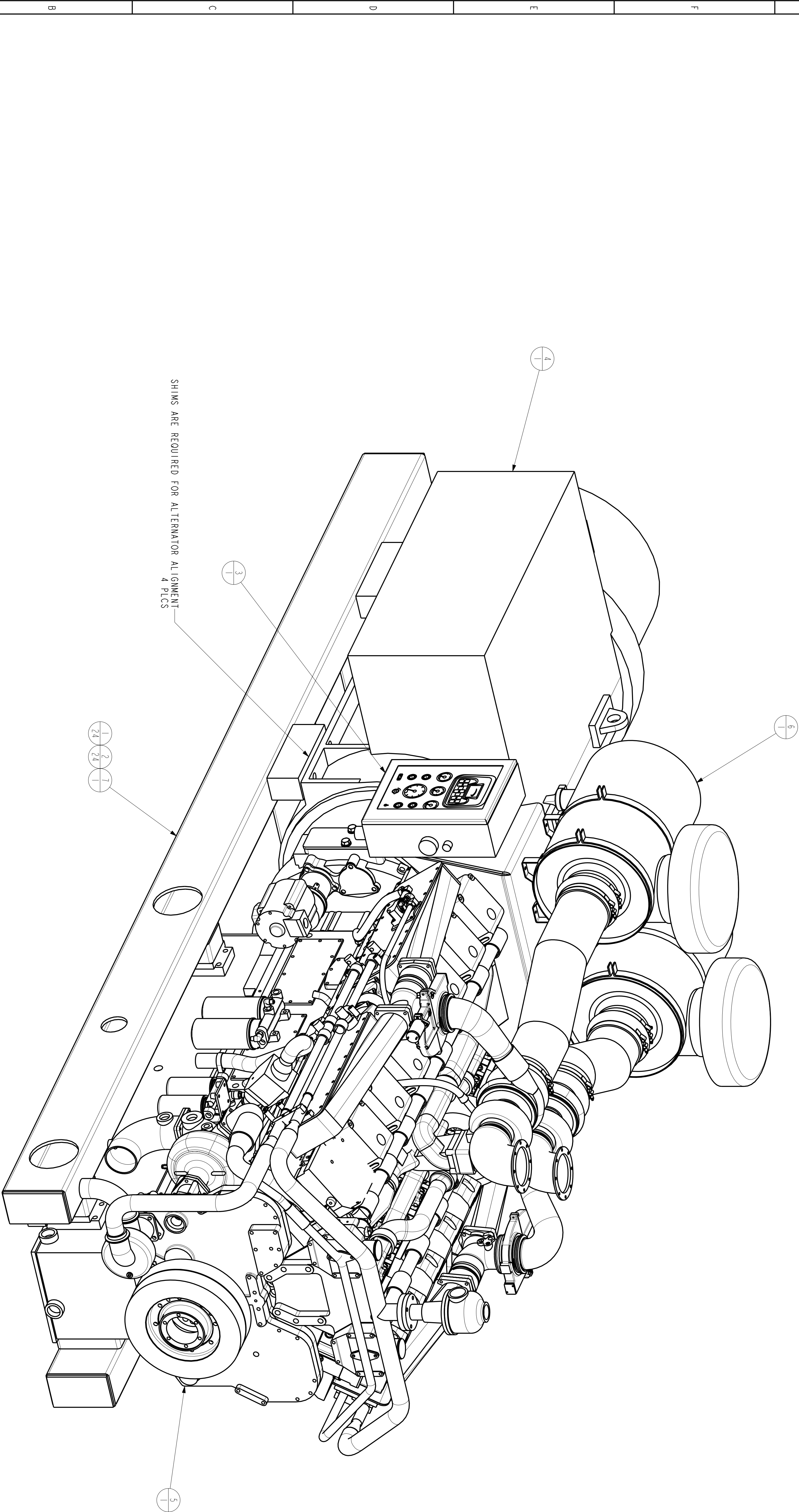
N.A. - Data is Not Available

N/A - Not Applicable to this Engine

TBD - To Be Determined

Item:	Vendor:	Part Number:	Description:	Qty:
1	KAR	30160	SCREW, HEX HD, CAP., 3/4-10NC x 2	24
2	KAR	KP80419	WASHER, 3/4 (SAE) FLAT	24
3		60033	ASSEMBLY, CONTROL PANEL	1
4	KATO	6P6-3300	ALTERNATOR, KATO	1
5	CUMMINS ENGINE CO.	KTA-0004	ASSEMBLY, ENGINE	1
6	CSPL	M0031	ASSEMBLY, INTAKE	1
7		S0108	SKID, SCR GENSET	1

Revision:	Drawn By:	Checked By:	Date:	Revision Description:
00	JLR	TPR	1-14-08	INITIAL RELEASE PER ECO #8003



- NOTES: (UNLESS OTHERWISE SPECIFIED)
- REFER TO CUMMINS ENGINE CO. DRAWING 3626420
  - REMOVE ALL BURRS AND SHARP EDGES

TOLERANCES				THIS DRAWING AND THE INFORMATION SHOWN THEREOF IS CONFIDENTIAL AND PROPRIETARY INFORMATION OF CUMMINS ENGINE CO. AND IS TO BE KEPT SECRET AND NOT REPRODUCED OR DISTRIBUTED WITHOUT THE WRITTEN CONSENT OF CUMMINS ENGINE CO. ENGINEERING DEPARTMENT, LTD.			
.X	±.1						
.XX	±.06						
.XXX	±.031						
ANGULAR	±.2°						
WEIGHT	±5%						
DIMENSIONS IN INCHES UNLESS OTHERWISE NOTED				Form:	Scale:	Drawing Title:	Sheet:
				D	0.125	KTA-2-0004	1 OF 2

Cummins Southern Plains, LLC.  
600 N. Wilson Rd.  
Arlington, TX 76011



ASSEMBLY, GENSET

Part Number: KTA50

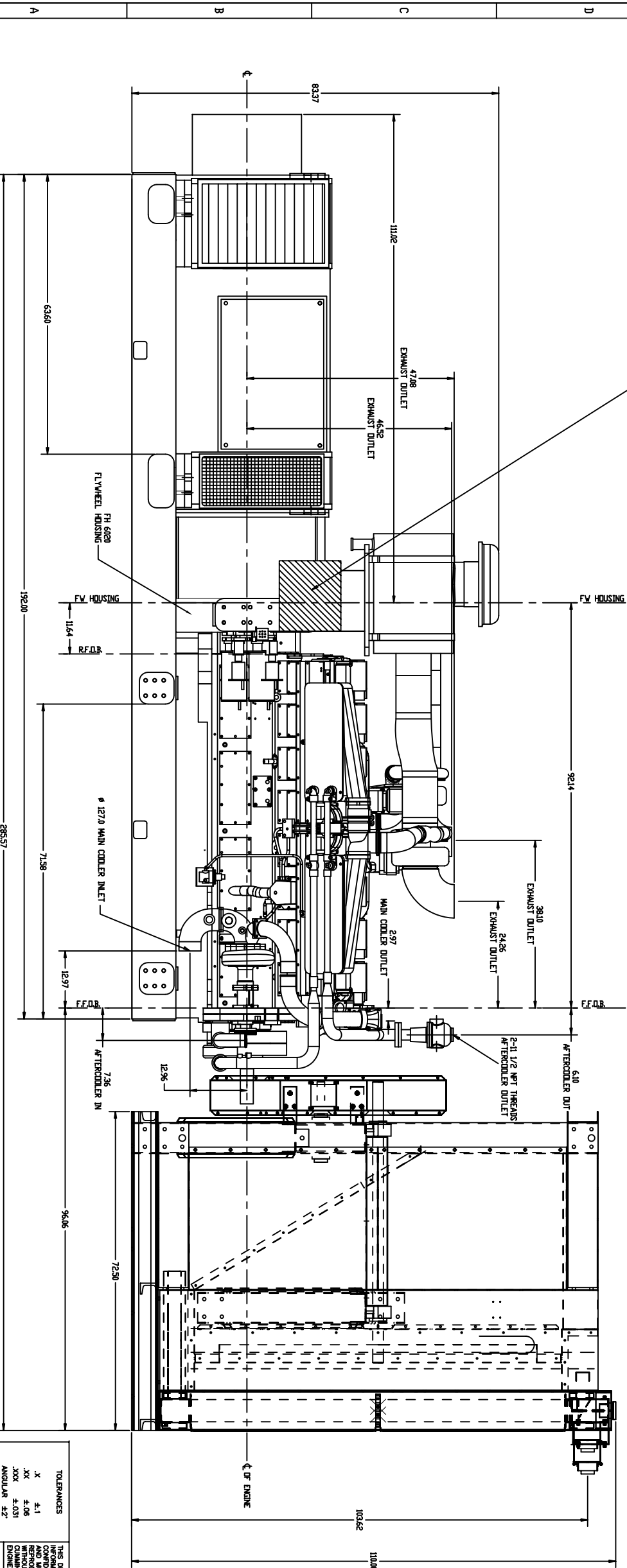
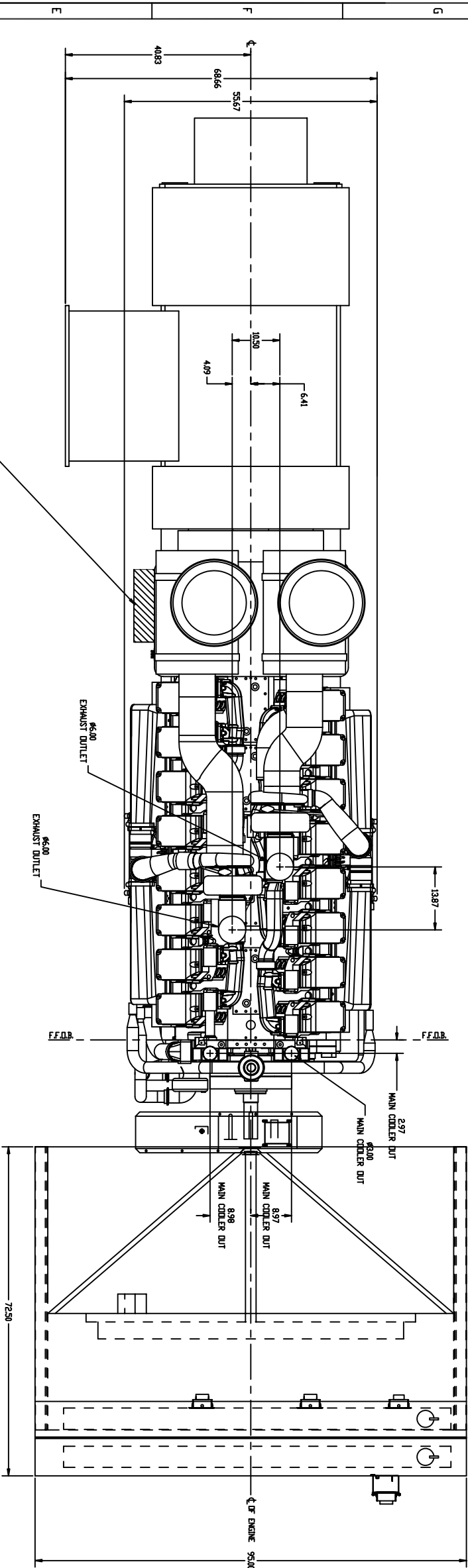
Weight (lbs):

Scale:

Form:



Revision:		Drawn By:	Checked By:	Date:	Revision Description:
00		KCE	JLR	08-22-05	RELEASED PER ECO# 5074
01		KCE	JLR	01-20-06	REVISED TURBO OUTLET LOC.



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**Cummins Southern Plains, Ltd.**  
480 N. Watson Rd.  
Arlington, TX 76010

Engine Model: **KTA50-ORD**  
Weight (lbs):  
Drawing Title: **KTA50-ORD SCR Package**  
Form: **D** Scale: **1/8** Drawing Number: **KTA-2-0002** Sheet: **1 OF 1**

TOLERANCES  
X ±.1  
XX ±.06  
XXX ±.031  
ANGULAR ±.2°  
WEIGHT ±.5%

DIMENSIONS IN  
INCHES UNLESS  
OTHERWISE NOTED

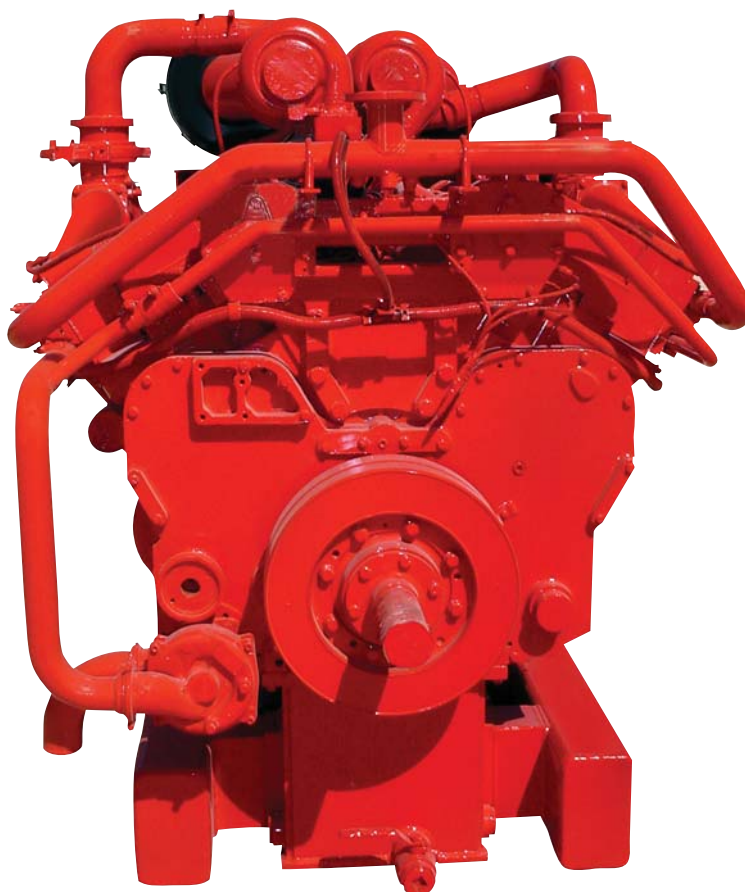
**AUTOCAD**



**Southern  
Plains**

# **KTA50 SCR SET**

**1750 HORSEPOWER AT 1500 RPM**





# KTA50 Land Based Drilling Power Modules



## Description

Cummins® Land Based Drilling Power Modules are designed and tested based on oil field customer requirements to provide optimum performance, reliability, and versatility for oil and gas land drilling applications.

## General specifications

### V-16, 4 Stroke Diesel

Bore	159 mm
Stroke	159 mm
Displacement	50.3 L
Aspiration	Turbocharged and aftercooled
Governor	Electronic
Cooling system	Vertical or horizontal discharge options
Weight w/o radiator	29,500 lbs (13,385 kg)
Cooling system capacity	Vertical: 37 gallons Horizontal: 26 gallons
Lube oil capacity	72 gal (272 liter)
Base design	Three point mounting
Alternator rotor design	Two bearing
Alternator insulation	Class H
Voltage	600 V
Power factor	0.7

## Rating details

Model	Frequency	Voltage	Speed RPM	Engine power HP (kWm)	Alternator rating*
DFLK	50	347/600	1500	1750 (1306)	1900 kVA (1330 kW @ 0.7 pf)

## Rating description

These modules are to be used in prime power variable load land drilling applications where maximum power is needed for short periods of time during initial starting or sudden overload.

## Features

**Single source supplier** - The entire power module is designed and manufactured in facilities certified to ISO9001 or ISO9002.

**Cummins heavy-duty engine** - Rugged 4-cycle commercial diesel delivers reliable power, low emissions, and fast response to load changes.

**Alternator** - Form wound stator and rotor; designed, tested and sized for drill rig service; 2/3 pitch windings; low waveform distortion with non-linear loads; fault clearing short-circuit capability.

**Control system** - Engine monitoring and shutdown functions with easy to read analog gauges for critical parameters and a digital display for alarm and status message display.

**Testing and validation** - Prototype tested to verify computer aided designs, confirm torsional stability, and system functionality. Every Cummins engine is dynamometer tested to ensure optimal engine performance.

**Warranty and service** - Backed by a comprehensive warranty and worldwide distributor network.

**Web** - [www.CumminsOilandGas.com](http://www.CumminsOilandGas.com)

## Standard equipment

### Air inlet system

Factory installed heavy duty air cleaners  
Factory installed air inlet shutoff valve

### Control system

Electronic power module monitoring

### Cooling system

Base mounted radiator  
Corrosion resistant coating for jacket water and aftercooler cores  
Dual core  
Horizontal and vertical discharge systems available  
Ambient capability up to 55 °C at rated power output  
Thermostat controlled outlets  
Gear driven jacket water pump  
Dual outlet  
Aftercooler centrifugal pump

### Exhaust system

Dry gas-tight exhaust manifolds  
Dual turbochargers  
Vertical exhaust outlet  
Flanged Exhaust fittings

### Fuel system

Direct Injection Cummins PT system for increased reliability  
Skid Mounted Fuel filters  
Pre-filtering system available

### Instrumentation

Electronic instrument panel - left side  
DC Power, warning and shutdown indicators

### Analog gauges

Oil pressure  
Fuel filter differential  
Exhaust temperature (Left and Right Bank)  
Jacket Water Temperature  
Aftercooler Water Temperature  
Engine speed

### Digital display

Air cleaner restriction warning  
Hours  
Warning and shutdown information  
Fault history.

### Starting system

Ingersoll Rand - 90 to 150 PSI

### Lube oil system

Crankcase breather - top mounted  
High capacity structural oil pan  
Oil filler and dipstick  
Oil filter - spin-on type  
Secondary bypass oil filter

### Protection system

PowerCommand monitoring system provides warning or engine shutdown strategies to protect against adverse operating conditions.

### Safety shutoff protection - electrical

Oil pressure  
Water temperature  
Overspeed  
Aftercooler temperature  
Air inlet shutoff activated on overspeed or emergency stop

### Alarms - electrical

Oil pressure  
Water temperature (low and high)  
Overspeed  
Aftercooler temperature  
Low water level  
Air inlet restriction  
Exhaust stack temperature  
Filter differential pressure (oil and fuel)

### Emergency stop

Instrument panel mounted - pushbutton type

### Mounting arrangement

Inner rail system  
Engine and generator mounting groups  
Three-point mounted to sub-base  
Vibration isolators at mounting points  
Lift provisions on base

### Generator

Two-bearing, 600 V, 60 Hz, 3-phase, 0.7 pf, 6 wire,  
Wye connected  
Brushless type  
Standard anti-condensation heater  
Standard winding RTDs  
Standard bearing RTDs

### Flywheels and flywheel housings

Flywheel - SAE 21  
Flywheel housing - SAE No. 00  
Coupling and generator hub

## Power module specification

Governor regulation class	ISO8528 Part 1 Class G3
Voltage regulation, no load to full load	± 0.5%
Random voltage variation	± 0.5%
Frequency regulation	Isochronous
Random frequency variation	± 0.25%

## Engine

Engine manufacturer	Cummins Inc.
Model	KTA50-DR1750
Design	4 cycle, V-block, turbocharged and after-cooled
Cylinder block configuration	Cast iron, 60°V, 16 cylinder
Aspiration	Turbocharged and low temperature aftercooled
Gross engine power output	1750 hp (1306 kW <sub>m</sub> )
Displacement	50.3 liter (3087 in <sup>3</sup> )
Fuel system	Direct injection: number 2 diesel fuel
Fuel filter	Triple element, 10 micron filtration, spin on fuel filters with water separator
Standard cooling system	55 °C high ambient radiator with vertical or horizontal airflow discharge
Engine speed	1500 rpm
Brake mean effective pressure	2068 kPa (302 psi)
Compression ratio	14.9:1
Piston speed	7.9 m/s (1562 ft/min)

## Fuel system

Injection system	Direct injection Cummins PT
Maximum fuel inlet restriction	Clean filter - 4.0 in Hg (13.5 kPa)
Maximum fuel flow to injection pump	183 gal/hr (693 liter/hr)
Maximum return restriction	6.5 in Hg (22 kPa)

## Air

Intake combustion airflow	93.5 m <sup>3</sup> /min (3330 scfm)
Maximum air cleaner restriction	15 in H <sub>2</sub> O (3.7 kPa)

## Exhaust

Exhaust gas flow	245 m <sup>3</sup> /min (8640 scfm)
Exhaust gas temperature	925 °F (495 °C)
Max exhaust backpressure	6.7 kPa (27 in. H <sub>2</sub> O)

## Radiated heat performance

Radiated heat to ambient	130 kWm (7200 BTU/min)
Exhaust heat rejection	925 kW (52525 BTU/min)
Aftercooler heat rejection	235 kWm (13130 BTU/min)
Jacket water (JW) heat rejection	580 kWm (32825 BTU/min)

## Cooling

Ambient design	55 °C (131 °F)
Fan load	Vertical: 59 HP, horizontal: 74 HP
Coolant capacity with radiator	Vertical: 37 gallons, horizontal: 26 gallons
Cooling system air flow	Vertical: 57185 CFM, horizontal: 68817 CFM
Maximum air flow static restriction	Vertical: no additional external restriction allowed, horizontal: 0.75 inches of Water
Jacket water (JW) flow at max friction head	320 gpm (20.2 liter/sec)
Maximum friction head (JW)	10 psi (67 kPa)
Aftercooler water flow at max friction head	80 gpm (5.0 liter/sec)
Maximum friction head (aftercooler)	5 psi (34.4 kPa)

## Alternator specifications

Design	Brushless, 4 pole, revolving field
Stator	2/3 pitch
Rotor	2-bearing
Insulation system	Class H
Temperature rise	80 °C over 50 °C
Alternator cooling	Direct drive centrifugal blower fan
AC waveform total harmonic distortion	< 5% no load to full linear load, < 3% for any single harmonic
Telephone influence factor (TIF)	< 50 per NEMA MG1-22.43
Telephone harmonic factor (THF)	< 3

## Technical data

Rating	1900 kVA (1330 kWe)
Power factor	0.70
Voltage (line-neutral/line-line)	347/600 V
Current	1828 A
Frequency	50 Hz
Poles	4
Speed	1500 rpm
Overspeed limit (60 seconds)	125%
Enclosure	IP23 with air inlet filter

## Efficiencies

Power factor	25% Load PU	50% Load PU	75% Load PU	100% Load PU
0.7	91.3	94.2	95.3	95.45
0.8	91.42	94.4	95.63	95.87
0.9	91.53	94.6	95.97	96.28
1.0	91.65	94.8	96.3	96.7

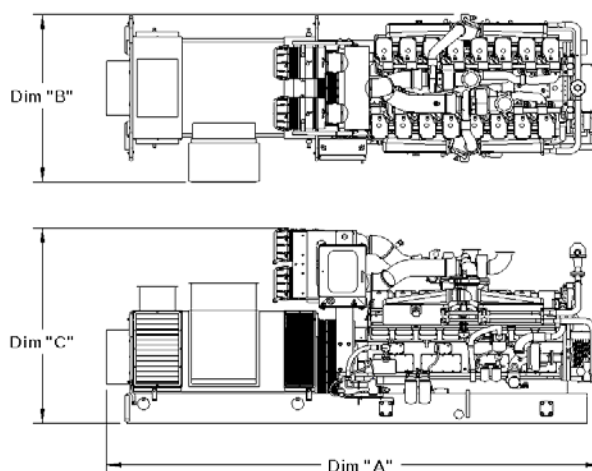
## Time constraints (seconds)

OC transient — direct axis	T'DO	3.450
SC transient — direct axis	T'D	0.340
SC subtransient — direct axis	T"D	0.015

## Reactances (per unit)

Subtransient direct axis	X"D	0.108
Subtransient quadrature axis	X"Q	0.119
Transient direct axis	X'D	0.184
Transient quadrature axis	X'Q	0.940
Synchronous direct axis	XD	1.880
Synchronous quadrature axis	XQ	0.940
Negative sequence	X2	0.114
Zero sequence	X0	0.032

This outline drawing is for reference only. See respective model data sheet for specific model outline drawing number. Do not use for installation design




## Dimensions and weights (without cooling system)

Model	Dim "A" mm (in.)	Dim "B" mm (in.)	Dim "C" mm (in.)	Set dry weight* kg (lbs)	Set wet weight* kg (lbs)
DFLK	5159 (203.1)	2040 (80.3)	1756 (69.1)	13154 (29000)	14061 (31000)

Note: Weights represent a set with standard features. See outline drawings for weights of other configurations.

### Cummins Inc.

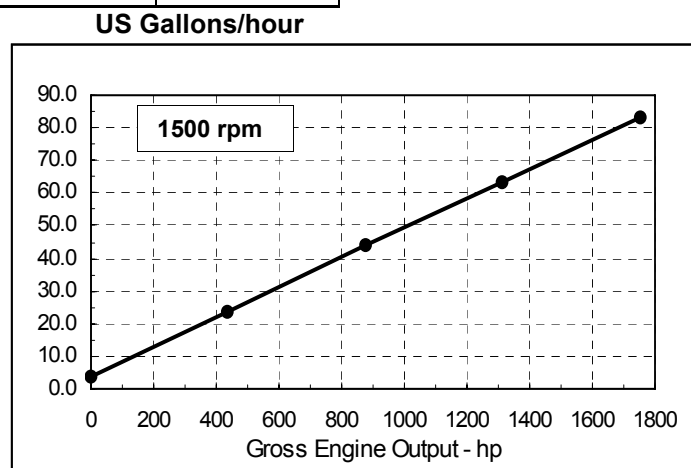
Telephone: 763 574 5000  
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Web: [www.CumminsOilandGas.com](http://www.CumminsOilandGas.com)

	<b>Cummins Inc.</b>	Basic Engine Model: <b>KTA50-DR1750</b>	Curve Number: <b>FR-6620 (2P/2L)</b>	<i>G-DRIVE</i> <b>KTA</b> <b>1</b>
	Columbus, Indiana 47202-3005 <b>ENGINE PERFORMANCE CURVE</b>	Engine Critical Parts List: <b>CPL: 2859 (2 Pump/2 Loop)</b>	Date: <b>06Nov07</b>	
Displacement : <b>50.3 litre (3067 in<sup>3</sup> )</b>		Bore : <b>159 mm (6.25 in.)</b> Stroke : <b>159 mm (6.25 in.)</b>		
No. of Cylinders : <b>16</b>		Aspiration : <b>Turbocharged and Low Temperature Aftercooled</b>		

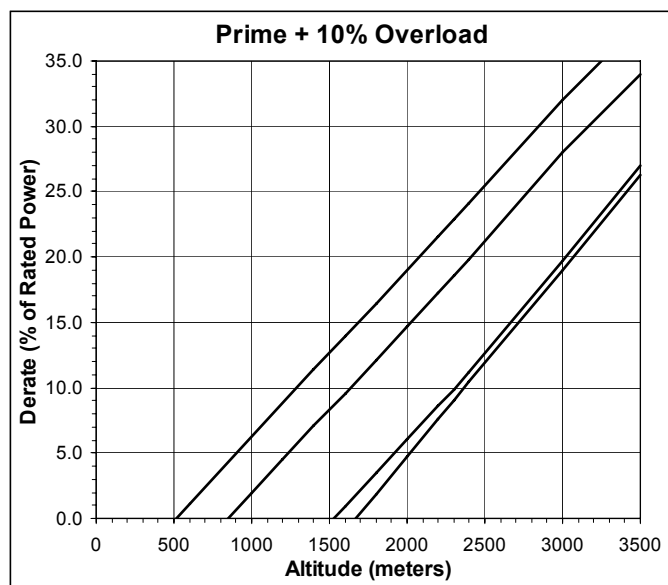
Engine Speed rpm	Drilling Rating	
	kWm	hp
<b>1500</b>	<b>1306</b>	<b>1750</b>

## Engine Performance Data @ 1500 rpm

OUTPUT POWER			FUEL CONSUMPTION			
%	kWm	hp	kg/ kWm·h	lb/ hp·h	liter/ hour	US gal/ hour
<b>DRILLING POWER</b>						
100	1306	1750	0.205	0.337	315	83.1
75	979	1313	0.209	0.343	240	63.5
50	653	875	0.218	0.359	168	44.3
25	326	438	0.232	0.381	89	23.5



## Derate Curves KTA50-DR1750 1500 rpm




### Operation At Elevated Temperature And Altitude:

For operation above these conditions, derate by an additional 9% per 300 m (1000 ft), and 15% per 10° C (18° F).

**CONVERSIONS:**(Liters = US Gal x 3.785) (US Gal = Liters x 0.2642)

Data Subject to Change Without Notice

<b>DRILLING RATING:</b> To be used in variable load drilling applications where maximum power is needed for short periods of time during either initial starting or sudden overload. Average power output is not to exceed 70% of the maximum power 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 H <sub>2</sub> O 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/US 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: 

Cummins Inc.  
Engine Data Sheet

ENGINE MODEL : KTA50-DR1750 CONFIGURATION NUMBER : D283022GX02

DATA SHEET : DS-6620

DATE : 06Nov07

PERFORMANCE CURVE : FR-6620 (2P/2L)

PERFORMANCE CURVE :

INSTALLATION DIAGRAM

• Fan to Flywheel (2P/2L):

CPL NUMBER

• Engine Critical Parts List: 2859 (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 .....	14.9 : 1
Dry Weight (Approximate), Fan to Flywheel Engine .....	— lb (kg) 11820 (5360)
Wet Weight (Approximate), Fan to Flywheel Engine .....	— lb (kg) 12485 (5662)
Moment of Inertia of Rotating Components • with FW 6017 Flywheel .....	— lb <sub>m</sub> • ft <sup>2</sup> (kg • m <sup>2</sup> ) 515 (21.7)
Center of Gravity from Rear Face of Flywheel Housing (FH 6020) .....	— in (mm) 49.4 (1254)
Center of Gravity above Crankshaft Centerline .....	— in (mm) 11.0 (279)
Maximum Static Loading at Rear Main Bearing .....	— lb (kg) 2000 (908)

## ENGINE MOUNTING

Maximum Bending Moment at Rear Face of Block .....	— lb • ft (N • m) 4500 (6100)
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## EXHAUST SYSTEM

Maximum Back Pressure .....	— in Hg (kPa) 2 (6.7)
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## AIR INDUCTION SYSTEM

Maximum Intake Air Restriction	
• with Dirty Filter Element .....	— in H <sub>2</sub> O (kPa) 25 (6.2)
• with Clean Filter Element .....	— in H <sub>2</sub> O (kPa) 15 (3.7)

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

Coolant Capacity — Engine Only .....	— US gal (liter) 37 (140)
— Aftercoolers .....	— US gal (liter) 9 (34)
Maximum Static Head of Coolant Above Engine Crank Centerline .....	— ft (m) 60 (18.3)
Thermostat Modulating Range — High Flow (Jacket) .....	— °F (°C) 180-200 (82-93)
Maximum Top Tank Temperature .....	— °F (°C) 220 (104)
Target Coolant Inlet Temperature to Aftercoolers @ 77 °F (25 °C) Ambient .....	— °F (°C) 130 (55)
Maximum Coolant Temperature to Aftercoolers .....	— °F (°C) 160 (66)

Additional 2 Pump / 2 Loop Requirements

Maximum Coolant Friction Head External to Engine— High Flow (Jacket) .....	— psi (kPa) 10 (67)
— Low Flow (Aftercooler) .....	— psi (kPa) 5 (34.4)
Thermostat Modulating Range — Low Flow (Aftercooler) (2P / 2L) w/ HX .....	— °F (°C) 120-130 (49-54)
Minimum Pressure Cap (for Cooling Systems with less than 2 m [6 ft.] Static Head) .....	— psi (kPa) 14 (96)

## LUBRICATION SYSTEM

Oil Pressure @ Idle Speed .....	— psi (kPa) 20 (138)
@ Governed Speed .....	— psi (kPa) 50-70 (345-483)
Maximum Oil Temperature .....	— °F (°C) 250 (121)
Oil Capacity with OP 6010 Oil Pan : High - Low .....	— US gal (liter) 64-45 (246-170)
Total System Capacity (Including Bypass Filter) .....	— US gal (liter) 72 (272)

## FUEL SYSTEM

Type Injection System .....	Direct Injection Cummins PT
Maximum Restriction at Lift Pump(clean/dirty filter) .....	— in Hg (kPa) 4.0/8.0 (13.5/27)
Maximum Allowable Head on Injector Return Line (Consisting of Friction Head and Static Head) .....	— in Hg (kPa) 6.5 (22)
Maximum Fuel Flow to Injector Pump .....	— US gph (liter/hr) 183 (693)
Maximum Return Fuel Flow .....	— US gph (litre/hr) 0 (0)
Maximum Fuel Inlet Temperature .....	— °F (°C) 0 (0)



**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 @ 0 °F to 32 °F (-18 °C to 0 °C).....	— 0°F CCA	1800	

**COLD START CAPABILITY**

Minimum Ambient Temperature for NFPA 110 Cold Start (90 degree °F Coolant Temperature) .....	— °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	TBD
Exhaust Noise at 1 m Horizontally from Centerline of Exhaust Pipe Outlet Upwards at 45° .....	— dBA	TBD

Governed Engine Speed.....	— rpm	
Engine Idle Speed.....	— rpm	
Gross Engine Power Output .....	— hp (kW)	
Brake Mean Effective Pressure.....	— psi (kPa)	
Piston Speed .....	— ft/min (m/s)	
Friction Horsepower.....	— hp (kW)	
Engine Water Flow at Stated Friction Head External to Engine:		
• 4 psi Friction Head.....	— US gpm (liter/s)	
• Maximum Friction Head .....	— US gpm (liter/s)	

**Engine Data**

Intake Air Flow.....	— cfm (liter/s)	3330	(1575)
Exhaust Gas Temperature.....	— °F (°C)	925	(495)
Exhaust Gas Flow.....	— cfm (liter/s)	8640	(4080)
Air to Fuel Ratio.....	— air : fuel	24.2	: 1
Radiated Heat to Ambient .....	— BTU/min (kW)	7200	(130)
Heat Rejection to Exhaust .....	— BTU/min (kW)	52525	(925)
Heat Rejection to Jacket Coolant .....	— BTU min (kW)	13130	(235)
Heat Rejection to Coolant .....	— BTU/min (kW)	32825	(580)

**Engine Aftercooler Data**

Aftercooler Water Flow at Stated Friction Head External to Engine:		
• 2 psi Friction Head.....	— US gpm (liter/s)	85 (5.4)
• Maximum Friction Head .....	— US gpm (liter/s)	80 (5.0)

**DRILL RATING****50 hz**

1500
725 - 775
1750 (1306)
302 (2068)
1562 (7.9)
155 (116)
352 (22.2)
320 (20.2)

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

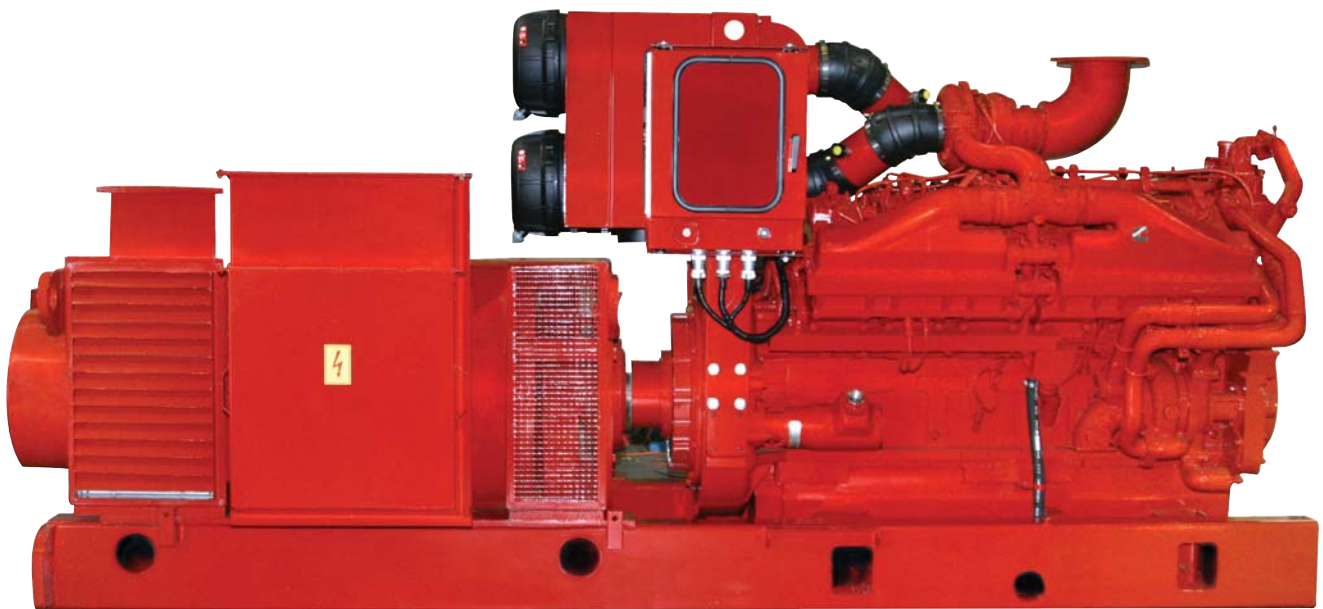
**ENGINE MODEL :** KTA50-DR1750  
**DATA SHEET :** DS-6620  
**DATE :** 06Nov07  
**CURVE NO. :** FR-6620 (2P/2L)



**Southern  
Plains**

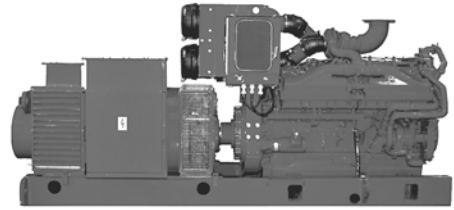
# OSK38 SCR SET

**1030 HORSEPOWER AT 1200 RPM**



# QSK38

## Land Based Drilling Power Modules



### Description

Cummins® land based drilling power modules provide optimum performance, reliability, and versatility for oil and gas applications.

### General specifications

#### V-12, 4 Stroke Diesel

Emissions	US EPA Tier II
Bore	159 mm
Stroke	159 mm
Displacement	37.9 L (2313 in <sup>3</sup> )
Aspiration	Turbocharged and Aftercooled
Governor	Electronic
Cooling system	Vertical or Horizontal Discharge
Lube oil capacity	57 gal (216 liters)
Base design	Three Point Mounting
Alternator rotor design	Two bearing
Alternator insulation	Class H
Alternator rating	1320 kVA
Voltage	600 V
Power factor	0.7

### Rating details

Model	Frequency	Speed RPM	Engine power HP (kWm)	Alternator rating*
QSK38DR	60	1200	1034 (772)	1320 kVA (924 kW <sub>e</sub> @ 0.7 pf)

\* Alternator oversized to meet low power factor requirements.

As a result of Cummins global leadership in emissions control technology, Cummins oil and gas customers are well prepared with products that provide built-in solutions for meeting regulations wherever and whatever they are. Our comprehensive product planning includes integrated solutions for achieving compliance with all local, regional, and national regulations worldwide.

### Features

**Single source supplier** – The entire power module is designed and manufactured in facilities certified to ISO9001 or ISO9002.

**Cummins heavy-duty engine** - Rugged 4-cycle industrial diesel delivers reliable power, low emissions, and fast response to load changes.

**Cummins alternator** - Form wound stator and rotor; designed, tested and sized for drill rig applications; 2/3 pitch windings; low waveform distortion with non-linear loads; fault clearing short-circuit capability.

**Control system** - Engine monitoring and shutdown functions with easy to read analog gauges for critical parameters and a digital display for alarm and status message display.

**Warranty and service** - Backed by a comprehensive warranty and worldwide distributor network.

**Testing and validation** – All power modules have been prototype tested in order to verify computer aided designs, confirm torsional stability, and full package functionality. Every Cummins engine is dynamometer tested to ensure optimal engine performance.

**Installation** – Cummins is committed to on-site installation and Start-up support on all applications.

**Web** – [www.CumminsOilandGas.com](http://www.CumminsOilandGas.com)

## Standard equipment

### Air inlet system

Factory installed heavy duty cleaners  
Factory installed air shutoff valves

### Communications

Electronic power module monitoring

### Cooling system

Base mounted radiator  
Corrosion resistant coating for jacket water & aftercooler cores  
Horizontal and vertical discharge systems available  
Ambient capacity up to 50 °C at rated power  
Thermostat controlled outlets  
Gear driven jacket water pump  
Dual outlet  
Aftercooler centrifugal pump

### Exhaust system

Dry gas-tight exhaust manifolds  
Dual turbochargers  
Vertical exhaust outlet  
Flange exhaust fittings

### Fuel system

Direct Injection  
Cummins Modular Common Rail System (MCRS)  
Skid mounted fuel filters  
Pre-filtering systems available

### Instrumentation

Electronic instrument panel – left side mounted  
DC power, warning and shutdown indicators

### Analog gauges

Oil pressure  
Fuel filter differential  
Exhaust temperature (left and right bank)  
Jacket water temperature  
Aftercooler water temperature  
Engine speed

### Digital display

Air cleaner restriction warning  
Hours  
Warning and shutdown information  
Fault history  
Fuel consumption

### Starting system

Ingersoll Rand – 90 to 150 psi

### Lube oil system

Crankcase breather – top mounted  
High capacity structural oil pan  
Oil filler and dipstick  
Spin-on oil filters

### Protection system

PowerCommand monitoring system provides warning or engine shutdown strategies to protect against adverse operating conditions.

### Safety shutoff protection - electrical

Oil pressure  
Water temperature  
Overspeed  
Aftercooler temperature  
Air inlet shutoff activated on overspeed or emergency stop

### Alarms - electrical

Oil pressure  
Coolant temperature (low and high)  
Overspeed  
Aftercooler temperature  
Low coolant level  
Air inlet restriction  
Exhaust stack temperature  
Filter differential pressure (oil and fuel)

### Emergency stop

Instrument panel mounted – push button type  
Remote capable

### Mounting arrangement

Inner rail system  
Engine and generator mounting groups  
Three-point mounted to sub-base  
Vibration isolators at mounting points  
Lift provisions on base

### Generator

Two bearing, 600V, 60Hz, 3-phase, 0.7 pf  
Wye connected  
Brushless type  
Standard anti-condensation heater  
Standard windings RTDs  
Standard bearing RTDs

### Flywheel and flywheel housing

Flywheel – SAE 21  
Flywheel housing – SAE No. 00  
Coupling and generator hub

## Power module

Governor regulation class	ISO8528 Part 1 Class G3
Voltage regulation, no load to full load	± 0.5%
Random voltage variation	± 0.5%
Frequency regulation	Isochronous
Random frequency variation	± 0.25%

## Engine

Engine Manufacturer	Cummins Inc.
Model	QSK38 – DR1034
Design	4 cycle, V-block, turbocharged and aftercooled
Cylinder block configuration	Cast iron, 60° V-12 cylinder
Aspiration	Turbocharged and low temperature aftercooled
Gross engine power output	1034 hp ( 772 kW <sub>m</sub> )
Displacement	37.9 liters ( 3087 in <sup>3</sup> )
Fuel system	Direct injection: number 2 diesel fuel
Fuel filter	Triple element, 10 micron filtration, spin on filters with water separation
Standard cooling system	50° C high ambient radiator with vertical or horizontal airflow discharge
Engine speed	1200 rpm
Brake mean effective pressure	297 psi (2048 kPa)
Compression ratio	15.0 : 1.0
Piston speed	1250 ft/min (6.3 m/s)

## Fuel system

Injection system	Cummins modular common rail system
Maximum fuel inlet restriction	Clean filters – 5.0 in. Hg (16.9 kPa)
Maximum fuel flow to injection pump	143 US gph (541 liter/hr)
Maximum return restriction	10 in. Hg (33.8 kPa)

## Air handling

Intake combustion airflow	2565 cfm (1210 liter/s)
Maximum air cleaner restriction	15 in. Hg (50.8 kPa)

## Exhaust handling

Exhaust gas flow	5740 cfm (2710 liter/s)
Exhaust gas temperature	775 °F (415 °C)
Maximum exhaust backpressure	6.7 kPa (27 in. H <sub>2</sub> O)

## Radiant heat performance

Radiated heat to ambient	4395 BTU/min (80 kW)
Exhaust heat rejection	13600 BTU/min (245 kW)
Aftercooler heat rejection	12655 BTU/min (225 kW)
Jacket water heat rejection	13945 BTU/min (245kW)

## Cooling

Ambient design	50 °C (122 °F)
Jacket water flow at maximum friction head	300 gpm (18.9 liter/s)
Maximum friction head (JW)	5 psi (43.4 kPa)
Aftercooler water flow at maximum friction head	97 gpm (6.1 liter/s)
Maximum friction head (aftercooler)	5 psi (43.4 kPa)

## Alternator specifications

Alternator manufacturer	Cummins Generator Technologies
Design	Form wound, brushless, 6 pole (60 Hz), revolving field
Stator	2/3 pitch
Rotor	2-bearing
Insulation system	Class H
Temperature rise	80 °C rise over 40 °C ambient temperature
Alternator cooling	Direct drive centrifugal blower fan
AC waveform total harmonic distortion	< 5% no load to full linear load; < 3% for any single harmonic
Telephone influence factor (TIF)	< 50 per NEMA MG1-22.43
Telephone harmonic factor (THF)	< 3

## Technical data

Rating	1320 kVA (924 kW <sub>e</sub> )
Power Factor	0.70
Voltage (line-neutral / line-line)	347/600 V
Current	1270.2 A
Frequency	60 Hz
Poles	6
Speed	1200 rpm
Overspeed Limit (60 seconds)	125%
Enclosure	IP23 with air inlet filter

## Efficiencies

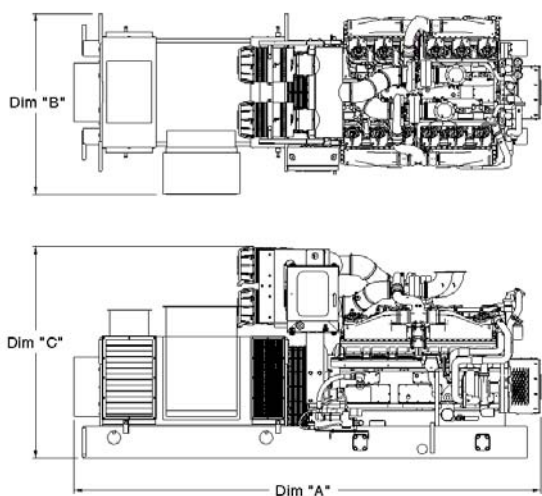
Power Factor	25% Load PU	50% Load PU	75% Load PU	100% Load PU
0.7	92.14	94.09	94.74	94.72
0.8	92.40	94.48	95.24	95.28
0.9	92.67	94.88	95.74	95.84
1.0	92.93	95.27	96.23	96.40

## Time constraints (seconds)

OC Transient — direct axis	$T_{d0'}$	2.42
SC Transient — direct axis	$T_{d'}$	0.29
SC Subtransient — direct axis	$T_{d''}$	0.015

## Reactances (per unit)

		Unsaturated	Saturated
Subtransient direct axis	$X_{d''}$	0.131	0.119
Subtransient quadrature axis	$X_{q''}$	0.131	0.131
Transient direct axis	$X_{d'}$	0.207	0.207
Transient quadrature axis	$X_{q'}$	0.850	0.830
Synchronous direct axis	$X_d$	1.710	1.510
Synchronous quadrature axis	$X_q$	0.850	0.830
Negative Sequence	$X_2$	0.138	0.125
Zero Sequence	$X_0$	0.040	0.036



This outline drawing is for reference only. See respective model data sheet for specific model outline drawing number.

### Dimensions


Model	Dim "A" mm (in.)	Dim "B" mm (in.)	Dim "C" mm (in.)
QSK38DR	4485 (176.7)	1745 (68.7)	2040 (80.3)

Model	Set weight* -- dry kg (lbs)	Set weight* -- wet kg (lbs)
QSK38DR	9,934 (21,900)	10,206 (22,500)

Note: Weights represent a set with standard features. See outline drawings for weights of other configurations.

Warning: Backfeed to a utility system can cause electrocution and/or property damage. Do not connect power module to any building electrical system except through an approved device or after building main switch is open



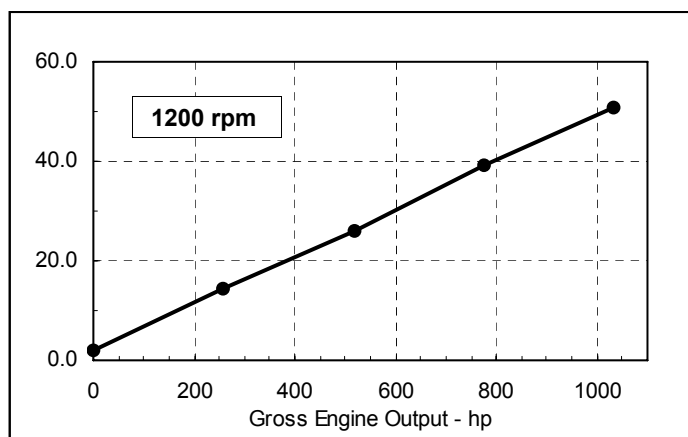
	<b>Cummins Inc.</b>  Columbus, Indiana 47202-3005  <b>Engine Data Sheet</b>	Basic Engine Model: <b>QSK38-DR1034</b>	Curve Number: <b>FR-6639 (2P/2L)</b>	<i>G-DRIVE</i> <b>QSK</b> <b>1</b>
		Engine Critical Parts List: <b>CPL: 2759 (2P/2L)</b>	Date: <b>18Oct07</b>	
Displacement : <b>37.9 litre (2313 in<sup>3</sup> )</b>		Bore : <b>159 mm (6.25 in.)</b> Stroke : <b>159 mm (6.25 in.)</b>		
No. of Cylinders : <b>12</b>		Aspiration : <b>Turbocharged and Low Temperature Aftercooled</b>		

Engine Speed	Drilling Rating	
	kWm	hp
<b>1200</b>	<b>772</b>	<b>1034</b>

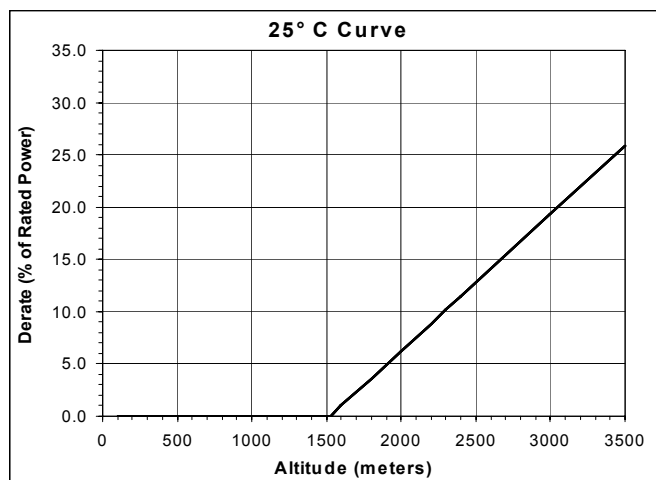
## Engine Performance Data @ 1200 rpm

OUTPUT POWER			FUEL CONSUMPTION			
%	kWm	hp	kg/ kWm·h	lb/ hp·h	litre/ hour	US gal/ hour
<b>DRILLING POWER</b>						
100	772	1034	0.212	0.348	192	50.7
75	579	776	0.218	0.358	148	39.1
50	386	517	0.218	0.358	99	26.1
25	193	259	0.239	0.393	54	14.3

US gallons/hour



## Derate Curves QSK38 - 1200 rpm



### Operation At Elevated Temperature And Altitude:

For operation above these conditions, derate by an additional 4% per 300 m (1000 ft), and 9% per 10° C (18° F).

**CONVERSIONS:**(litres = US Gal x 3.785) (US Gal = litres x 0.2642)

Data Subject to Change Without Notice

**DRILLING RATING:** To be used in variable load drilling applications where maximum power is needed for short periods of time during either initial starting or sudden overload. Average power output is not to exceed 70% of the maximum power 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 H<sub>2</sub>O air intake restriction and 1.5 in Hg exhaust back pressure.

The fuel consumption data is based on No. 2 diesel fuel weight at 0.85 kg/litre (7.1 lbs/US 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:

*C. J. Martin*

## Cummins Inc.

## Engine Data Sheet

ENGINE MODEL : QSK38-DR1034 CONFIGURATION NUMBER : D233042GX03

DATA SHEET : DS-6639

DATE : 18Oct07

PERFORMANCE CURVE : FR-6639 (2P/2L)

INSTALLATION DIAGRAM

• Fan to Flywheel (2P/2L): TBD

CPL NUMBER

• Engine Critical Parts List: 2759

**GENERAL ENGINE DATA**

Type .....	4-Cycle; 60° Vee; 12-Cylinder Diesel	
Aspiration .....	Turbocharged & Low Temp. Aftercooled	
Bore x Stroke .....	6.25 x 6.25 (159 x 159)	
Displacement .....	2313 (37.9)	
Compression Ratio .....	15.0 : 1	
Dry Weight (Approximate), Fan to Flywheel Engine .....	9546	(4330)
Wet Weight (Approximate), Fan to Flywheel Engine .....	9039	(4100)
Moment of Inertia of Rotating Components • with FW 6077 Flywheel .....	493	(20.8)
Center of Gravity from Rear Face of Flywheel Housing (FH 6062) .....	41.7	(1060)
Center of Gravity Above Crankshaft Centerline .....	6.8	(173)
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 .....	2	(6.7)
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**AIR INDUCTION SYSTEM**

Maximum Intake Air Restriction • with Dirty Filter Element .....	25	(6.2)
• with Clean Filter Element .....	15	(3.7)

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

Coolant Capacity — Engine Only .....	28	(105)
— Aftercoolers .....	6	(23)
Maximum Static Head of Coolant Above Engine Crank Centerline .....	60	(18.3)
Thermostat Modulating Range — High Flow (Jacket) .....	180 - 202	(82 - 94)
Maximum Top Tank Temperature .....	212	(100)
Target Coolant Inlet Temperature to Aftercoolers @ 77 °F (25 °C) Ambient .....	120	(49)
Maximum Coolant Temperature to Aftercoolers .....	155	(68)

Additional 2 Pump / 2 Loop Requirements

Maximum Coolant Friction Head External to Engine— High Flow (Jacket) .....	5	(35)
— Low Flow (Aftercooler) .....	5	(34.4)
Thermostat Modulating Range — Low Flow (Aftercooler) (2P / 2L) w/ HX .....	115-135	(46-57)
Minimum Pressure Cap (for Cooling Systems with less than 2 m [6 ft.] Static Head) ..	11	(76)

**LUBRICATION SYSTEM**

Oil Pressure @ Idle Speed .....	20	(138)
@ Governed Speed .....	45-58	(310/400)
Maximum Oil Temperature .....	248	(120)
Oil Capacity with OP 6126 Oil Pan : Low - High .....	34-49	(129-185)
Total System Capacity (Including Filter) .....	TBD	(TBD)

**FUEL SYSTEM**

Type Injection System .....	Cummins MCRS	
Maximum Restriction at Fuel Injection Pump(clean/dirty filter) .....	5.0/10.0	(16.9/30.5)
Typical Clean Fuel Filter Restriction .....	2.0	(6.7)
Maximum Allowable Head on Injector Return Line (Consisting of Friction Head and Static Head) ..	10.0	(33.8)
Maximum Fuel Flow to Injector Pump .....	143	(541)
Maximum Drain Flow .....	88	(334)

**ELECTRICAL SYSTEM**

Cranking Motor (Heavy Duty, Positive Engagement) .....	— volt	24
Maximum Allowable Resistance of Cranking Circuit .....	— ohm	0.002
Minimum Recommended Battery Capacity		
• Cold Soak @ 0 °F to 32 °F (-18 °C to 0 °C) .....	— 0°F CCA	1800

**COLD START CAPABILITY**

Minimum Ambient Temperature for NFPA 110 Cold Start (90 degree F Coolant Temperature) .....	— °F (°C)	N/A	(N/A)
Minimum Ambient Temperature for Unaided Cold Start .....	— °F (°C)	10	(-12)

**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) .....	— dBA		TBD
Exhaust Noise at 1 m Horizontal from Centerline of Exhaust Pipe Outlet Upwards at 45 ° .....	— dBA		TBD

Governed Engine Speed .....	rpm
Engine Idle Speed .....	rpm
Gross Engine Power Output .....	hp (kW)
Brake Mean Effective Pressure .....	psi (kPa)
Piston Speed .....	ft/min (m/s)
Friction Horsepower .....	hp (kW)

**Engine Data**

Intake Air Flow .....	cfm (liter/s)	2565	(1210)
Exhaust Gas Temperature .....	°F (°C)	775	(415)
Exhaust Gas Flow .....	cfm (liter/s)	5740	(2710)
Air to Fuel Ratio .....	air : fuel	30.5 : 1	
Radiated Heat to Ambient .....	BTU/min (kW)	4395	(80)
Heat Rejection to Exhaust .....	BTU/min (kW)	13700	(245)

**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)	333	(21.0)
• Maximum Friction Head .....	US gpm (liter/s)	325	(18.9)
Heat Rejection to Coolant (Aftercooler) .....	BTU/min (kW)	12655	(225)
Heat Rejection to Coolant (Engine) .....	BTU/min (kW)	13945	(245)

Aftercooler Coolant Flow at Stated Friction Head External to Engine: .

• 2 psi Friction Head .....	US gpm (liter/s)	109	(6.9)
• Maximum Friction Head .....	US gpm (liter/s)	97	(6.1)

**DRILL RATING**  
**60 hz**

1200
700 - 900
1034 (772)
297 (2048)
1250 (6.3)
TBD (TBD)

**N.A.** - Not Available

**N/A** - Not Applicable to this Engine

**TBD** - To Be Determined

**ENGINE MODEL : QSK38-DR1034**

**DATA SHEET : DS-6639**

**DATE : 18Oct07**

**CURVE NO. : FR-6639**

**Cummins Inc.**

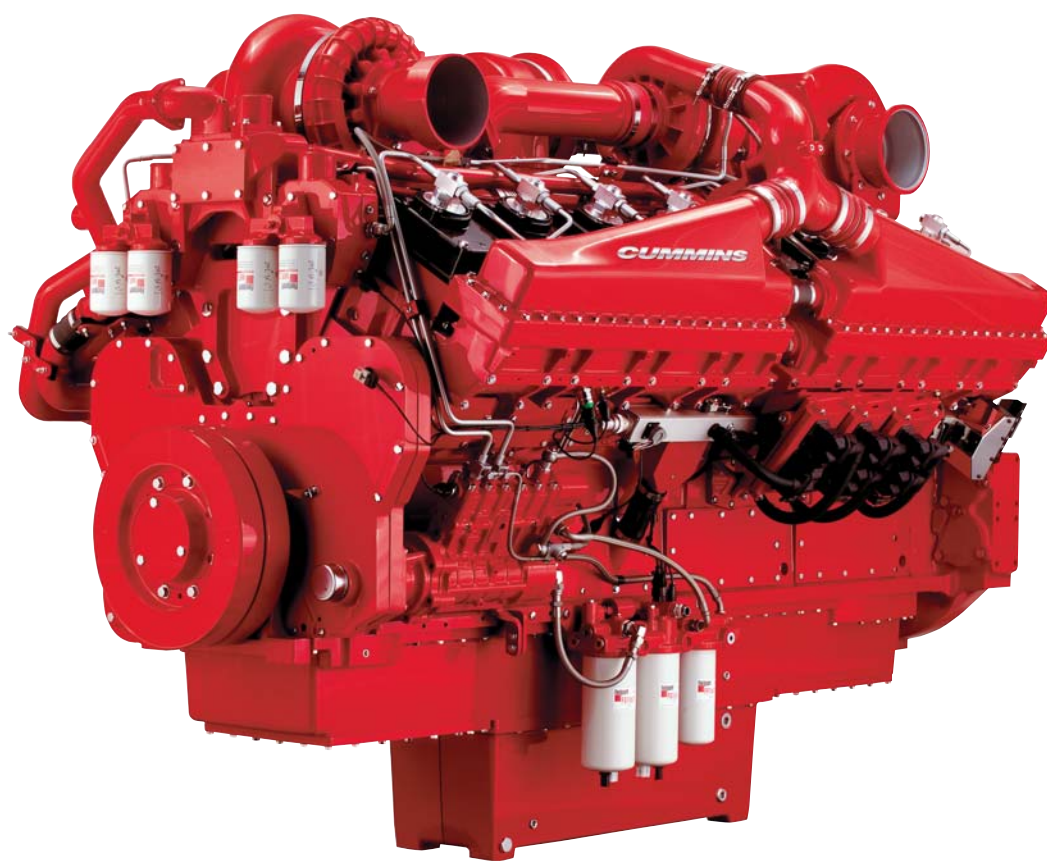
Columbus, Indiana 47202-3005



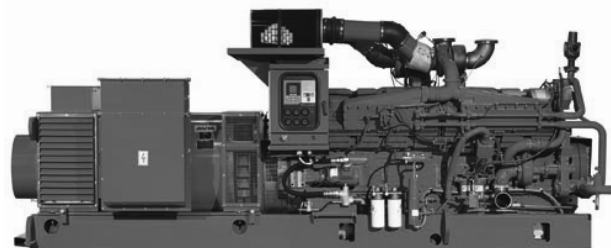
**Southern  
Plains**

# QSK50 SCR SET

**1480 HORSEPOWER AT 1200 RPM**



# QSK50 Land Based Drilling Power Modules



## Description

Cummins® Land Based Drilling Power Modules are designed and tested based on oil field customer requirements to provide optimum performance, reliability, and versatility for oil and gas land drilling applications.

## General specifications

### V-16, 4 Stroke Diesel

Bore	159 mm
Stroke	159 mm
Displacement	50.3 L
Aspiration	Turbocharged and aftercooled
Governor	Electronic
Cooling system	Vertical or horizontal discharge options
Weight w/o radiator	29,500 lbs (13,385 kg)
Cooling system capacity	Vertical: 117 gallons Horizontal: 110 gallons
Lube oil capacity	72 gal (272 liter)
Base design	Three point mounting
Alternator rotor design	Two bearing
Alternator insulation	Class H
Voltage	600 V
Power factor	0.7

## Rating details

Model	Frequency	Voltage	Speed RPM	Engine power HP (kWm)	Alternator rating*
DQGAC	60	347/600	1200	1480 (1104)	1750 kVA (1225 kW @ 0.7 pf)

## Rating description

These modules are to be used in prime power variable load land drilling applications where maximum power is needed for short periods of time during initial starting or sudden overload.

## Features

**Single source supplier** - The entire power module is designed and manufactured in facilities certified to ISO9001 or ISO9002.

**Cummins heavy-duty engine** - Rugged 4-cycle industrial diesel delivers reliable power, low emissions, and fast response to load changes.

**Alternator** - Form wound stator and rotor; designed, tested and sized for drill rig service; 2/3 pitch windings; low waveform distortion with non-linear loads; fault clearing short-circuit capability.

**Control system** - Engine monitoring and shutdown functions with easy to read analog gauges for critical parameters and a digital display for alarm and status message display.

**Testing and validation** - Prototype tested to verify computer aided designs, confirm torsional stability, and system functionality. Every Cummins engine is dynamometer tested to ensure optimal engine performance.

**Low exhaust emissions** - Engine certified to U.S. EPA Nonroad Source Emissions Standards, 40 CFR 89, Tier 2.

**Warranty and service** - Backed by a comprehensive warranty and worldwide distributor network.

**Web** - [www.CumminsOilandGas.com](http://www.CumminsOilandGas.com)

## Standard equipment

### Air inlet system

Factory installed heavy duty air cleaners  
Factory installed air inlet shutoff valve

### Control system

Electronic power module monitoring

### Cooling system

Base mounted radiator  
Corrosion resistant coating for jacket water and aftercooler cores  
Dual core  
Horizontal and vertical discharge systems available  
Ambient capability up to 50 °C at rated power output  
Thermostat controlled outlets  
Gear driven jacket water pump  
Dual outlet  
Aftercooler centrifugal pump

### Exhaust system

Dry gas-tight exhaust manifolds  
Dual turbochargers  
Vertical exhaust outlet  
Flanged Exhaust fittings

### Fuel system

Direct Injection Cummins MCRS system for increased reliability  
Skid Mounted Fuel filters  
Pre-filtering system available

### Instrumentation

Electronic instrument panel - left side  
DC Power, warning and shutdown indicators

### Analog gauges

Oil pressure  
Fuel filter differential  
Exhaust temperature (Left and Right Bank)  
Jacket Water Temperature  
Aftercooler Water Temperature  
Engine speed

### Digital display

Air cleaner restriction warning  
Hours  
Warning and shutdown information  
Fault history  
Fuel consumption

### Starting system

Ingersoll Rand - 90 to 150 PSI

### Lube oil system

Crankcase breather - top mounted  
High capacity structural oil pan  
Oil filler and dipstick  
Oil filter - spin-on type

### Protection system

PowerCommand monitoring system provides warning or engine shutdown strategies to protect against adverse operating conditions.

### Safety shutoff protection - electrical

Oil pressure  
Water temperature  
Overspeed  
Aftercooler temperature  
Air inlet shutoff activated on overspeed or emergency stop

### Alarms - electrical

Oil pressure  
Coolant temperature (low and high)  
Overspeed  
Aftercooler temperature  
Low coolant level  
Air inlet restriction  
Exhaust stack temperature  
Fuel filter differential pressure

### Emergency stop

Instrument panel mounted - pushbutton type  
Remote - capable

### Mounting arrangement

Inner rail system  
Engine and generator mounting groups  
Three-point mounted to sub-base  
Vibration isolators at mounting points  
Lift provisions on base

### Generator

Two-bearing, 600 V, 60 Hz, 3-phase, 0.7 pf, 6 wire,  
Wye connected  
Brushless type  
Standard anti-condensation heater  
Standard winding RTDs  
Standard bearing RTDs

### Flywheels and flywheel housings

Flywheel - SAE 21  
Flywheel housing - SAE No. 00  
Coupling and generator hub



## Power module specification

Governor regulation class	ISO8528 Part 1 Class G3
Voltage regulation, no load to full load	± 0.5%
Random voltage variation	± 0.5%
Frequency regulation	Isochronous
Random frequency variation	± 0.25%

## Engine

Engine manufacturer	Cummins Inc.
Model	QSK50 - DR1480
Design	4 cycle, V-block, turbocharged and after-cooled
Cylinder block configuration	Cast iron, 60°V, 16 cylinder
Aspiration	Turbocharged and low temperature aftercooled
Gross engine power output	1480 hp (1104 kW <sub>m</sub> )
Displacement	50.3 liter (3087 in <sup>3</sup> )
Fuel system	Direct injection: number 2 diesel fuel
Fuel filter	Triple element, 10 micron filtration, spin on fuel filters with water separator
Standard cooling system	50 °C high ambient radiator with vertical or horizontal airflow discharge
Engine speed	1200 rpm
Brake mean effective pressure	2193 kPa (318 psi)
Compression ratio	15.0:1
Piston speed	6.3 m/s (1250 ft/min)

## Fuel system

Injection system	Cummins MCRS
Maximum fuel inlet restriction	Clean filter - 5.0 in Hg (16.9 kPa)
Maximum fuel flow to injection pump	150 gal/hr (568 liter/hr)
Maximum return restriction	10 in Hg (33.8 kPa)

## Air

Intake combustion airflow	88.5 m <sup>3</sup> /min (3125 scfm)
Maximum air cleaner restriction	15 in H <sub>2</sub> O (3.7 kPa)

## Exhaust

Exhaust gas flow	163 m <sup>3</sup> /min (5760 scfm)
Exhaust gas temperature	920 °F (495 °C)
Max exhaust backpressure	6.7 kPa (27 in. H <sub>2</sub> O)

## Radiated heat performance

Radiated heat to ambient	115 kWm (6340 BTU/min)
Exhaust heat rejection	905 kWm (51250 BTU/min)
Aftercooler heat rejection	260 kWm (14710 BTU/min)
Jacket water (JW) heat rejection	425 kWm (24015 BTU/min)

## Cooling

Ambient design	50 °C (122 °F)
Fan load	Vertical: 50 HP, horizontal: 49 HP
Coolant capacity with radiator	Vertical: 117 gallons, horizontal: 110 gallons
Cooling system air flow	Vertical: 47458 CFM, horizontal: 58367 CFM
Maximum air flow static restriction	Vertical: no additional external restriction allowed, horizontal: 0.75 inches of Water
Jacket water (JW) flow at max friction head	300 gpm (18.9 liter/sec)
Maximum friction head (JW)	10 psi (67 kPa)
Aftercooler water flow at max friction head	90 gpm (5.7 liter/sec)
Maximum friction head (aftercooler)	5 psi (34.4 kPa)

## Alternator specifications

Alternator manufacturer	Cummins Generator Technologies
Design	Brushless, 6 pole, revolving field
Stator	2/3 pitch
Rotor	2-bearing
Insulation system	Class H
Temperature rise	80 °C over 50 °C
Alternator cooling	Direct drive centrifugal blower fan
AC waveform total harmonic distortion	< 5% no load to full linear load, < 3% for any single harmonic
Telephone influence factor (TIF)	< 50 per NEMA MG1-22.43
Telephone harmonic factor (THF)	< 3

## Technical data

Rating	1750 kVA (1225 kWe)
Power factor	0.70
Voltage (line-neutral/line-line)	347/600 V
Current	1605 A
Frequency	60 Hz
Poles	6
Speed	1200 rpm
Overspeed limit (60 seconds)	125%
Enclosure	IP23 with air inlet filter

## Efficiencies

Power factor	25% Load PU	50% Load PU	75% Load PU	100% Load PU
0.7	92.42	94.54	95.35	95.36
0.8	92.56	94.77	95.67	95.77
0.9	92.71	95.00	95.99	96.18
1.0	92.85	95.23	96.31	96.59

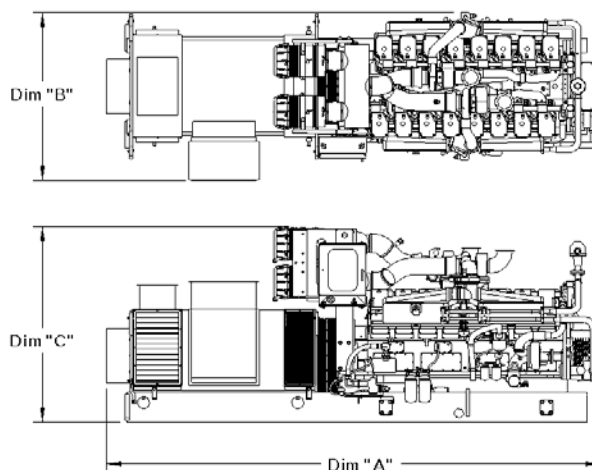
## Time constraints (seconds)

OC Transient — direct axis	T'DO	2.35
SC Transient — direct axis	T'D	0.31
SC Subtransient — direct axis	T"D	0.015

## Reactances (per unit)

	Saturated	Unsaturated
Subtransient direct axis	X"D 0.140	0.154
Subtransient quadrature axis	X"Q 0.154	0.154
Transient direct axis	X'D 0.230	0.230
Transient quadrature axis	X'Q 0.85	0.88
Synchronous direct axis	XD 1.59	1.77
Synchronous quadrature axis	XQ 0.85	0.88
Negative sequence	X2 0.148	0.162
Zero sequence	X0 0.042	0.046

This outline drawing is for reference only. See respective model data sheet for specific model outline drawing number. Do not use for installation design



## Dimensions and weights (without cooling system)

Model	Dim "A" mm (in.)	Dim "B" mm (in.)	Dim "C" mm (in.)	Set dry weight* kg (lbs)	Set wet weight* kg (lbs)
DQGAC	5159(203.1)	2040(80.3)	1756(69.1)	13154 (29000)	14061 (31000)


Note: Weights represent a set with standard features. See outline drawings for weights of other configurations.

### Cummins Inc.

Telephone: 763 574 5000

Fax: 763 574 5298

Web: [www.CumminsOilandGas.com](http://www.CumminsOilandGas.com)

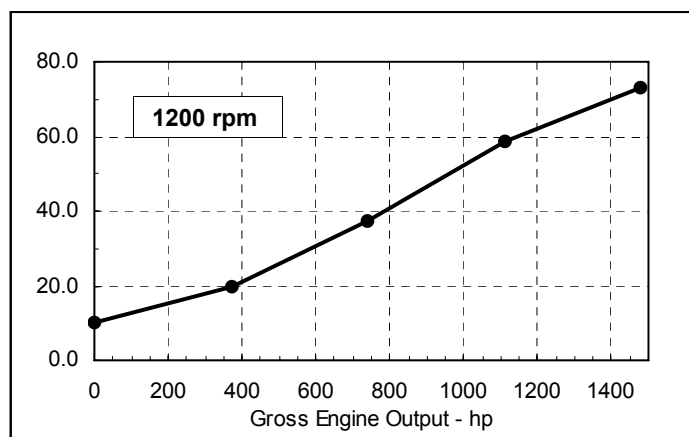
	<b>Cummins Inc.</b>  Columbus, Indiana 47202-3005  <b>Engine Data Sheet</b>	Basic Engine Model: <b>QSK50-DR1480</b>	Curve Number: <b>FR-6622 (2P/2L)</b>	<i>G-DRIVE</i> <b>QSK</b> <b>1</b>
		Engine Critical Parts List: <b>CPL: 2912 (2P/2L)</b>	Date: <b>06Nov07</b>	
Displacement : <b>50.3 litre (3067 in<sup>3</sup>)</b>		Bore : <b>159 mm (6.25 in.)</b> Stroke : <b>159 mm (6.25 in.)</b>		
No. of Cylinders : <b>16</b>		Aspiration : <b>Turbocharged and Low Temperature Aftercooled</b>		

Engine Speed	Drilling Rating	
	kWm	hp
<b>1200</b>	<b>1104</b>	<b>1480</b>

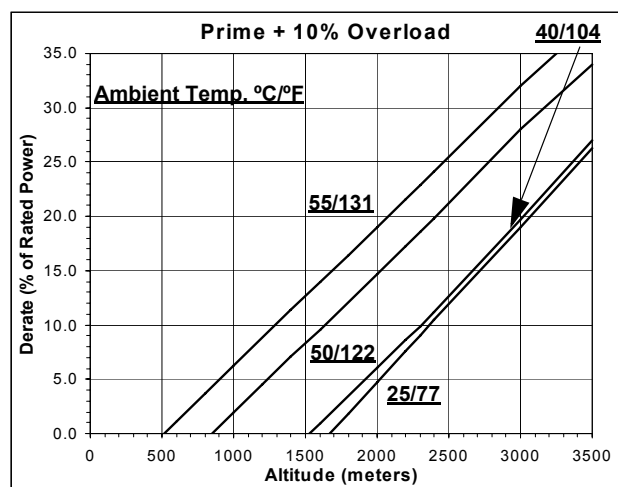
## Engine Performance Data @ 1200 rpm

OUTPUT POWER			FUEL CONSUMPTION			
%	kWm	hp	kg/ kWm·h	lb/ hp·h	litre/ hour	US gal/ hour
<b>DRILLING POWER</b>						
100	1104	1480	0.214	0.350	276	73.0
75	828	1110	0.230	0.377	223	58.9
50	552	740	0.219	0.359	142	37.5
25	276	370	0.233	0.382	75	19.9

## US gallons/hour



## Derate Curves QSK50-DR1480 1200 rpm




## Operation At Elevated Temperature And Altitude:

For operation above these conditions, derate by an additional 4% per 300 m (1000 ft), and 9% per 10° C (18° F).

**CONVERSIONS:**(litres = US Gal x 3.785) (US Gal = litres x 0.2642)

Data Subject to Change Without Notice

<b>DRILLING RATING:</b> To be used in variable load drilling applications where maximum power is needed for short periods of time during either initial starting or sudden overload. Average power output is not to exceed 70% of the maximum power 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 H <sub>2</sub> O 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/litre (7.1 lbs/US 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: 

# Cummins Inc.

## Engine Data Sheet

ENGINE MODEL : **QSK50-DR1480** CONFIGURATION NUMBER : D283039GX03

DATA SHEET : DS-6622

DATE : 06Nov07

PERFORMANCE CURVE : FR-6622 (2P/2L)

**INSTALLATION DIAGRAM**

- Fan to Flywheel (2P/2L): TBD

**CPL NUMBER**

- Engine Critical Parts List: 2912

**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 .....	15.0 : 1	
Dry Weight (Approximate), Fan to Flywheel Engine .....	— lb (kg)	11927 (5410)
Wet Weight (Approximate), Fan to Flywheel Engine .....	— lb (kg)	12593 (5712)
Moment of Inertia of Rotating Components • with FW 6067 Flywheel .....	— lb <sub>m</sub> • ft <sup>2</sup> (kg • m <sup>2</sup> )	515 (21.7)
Center of Gravity from Rear Face of Flywheel Housing (FH 6062) .....	— in (mm)	49.4 (1254)
Center of Gravity Above Crankshaft Centerline .....	— in (mm)	11.0 (279)
Maximum Static Loading at Rear Main Bearing .....	— lb (kg)	2000 (908)

**ENGINE MOUNTING**

Maximum Bending Moment at Rear Face of Block .....	— lb • ft (N • m)	4500 (6100)
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**EXHAUST SYSTEM**

Maximum Back Pressure .....	— in Hg (kPa)	2 (6.7)
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**AIR INDUCTION SYSTEM**

Maximum Intake Air Restriction • with Dirty Filter Element .....	— in H <sub>2</sub> O (kPa)	25 (6.2)
• with Clean Filter Element .....	— in H <sub>2</sub> O (kPa)	15 (3.7)

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

Coolant Capacity — Engine Only .....	— US gal (liter)	37 (140)
— Aftercoolers .....	— US gal (liter)	9 (34)
Maximum Static Head of Coolant Above Engine Crank Centerline .....	— ft (m)	60 (18.3)
Thermostat Modulating Range — High Flow (Jacket) .....	— °F (°C)	180 - 200 (82 - 93)
Maximum Top Tank Temperature .....	— °F (°C)	220 (104)
Target Coolant Inlet Temperature to Aftercoolers @ 77 °F (25 °C) Ambient— .....	— °F (°C)	120 (49)
Maximum Coolant Temperature to Aftercoolers .....	— °F (°C)	160 (71)

**Additional 2 Pump/2 Loop Requirements**

Maximum Coolant Friction Head External to Engine— High Flow (Jacket) .....	— psi (kPa)	10 (67)
— Low Flow (Aftercooler) .....	— psi (kPa)	5 (34.4)
Thermostat Modulating Range — Low Flow (Aftercooler) (2P / 2L) w/ HX .....	— °F (°C)	115-135 (46-57)
Minimum Pressure Cap (for Cooling Systems with less than 2 m [6 ft.] Static Head) ..	— psi (kPa)	14 (96)

**LUBRICATION SYSTEM**

Oil Pressure @ Idle Speed .....	— psi (kPa)	20 (138)
@ Governed Speed .....	— psi (kPa)	50-70 (345-483)
Maximum Oil Temperature .....	— °F (°C)	250 (121)
Oil Capacity with OP 6127 Oil Pan : Low - High .....	— US gal (litre)	64-45 (246-170)
Total System Capacity (with Combo Filter) .....	— US gal (litre)	72 (272)

**FUEL SYSTEM**

Type Injection System .....	Cummins MCRS	
Maximum Restriction at Fuel Injection Pump(clean/dirty filter) .....	— in Hg (kPa)	5.0/9.0 (16.9/30.4)
Typical Clean Fuel Filter Restriction .....	— in Hg (kPa)	2.0 (6.7)
Maximum Allowable Head on Injector Return Line (Consisting of Friction Head and Static Head) ..	— in Hg (kPa)	10.0 (33.8)
Maximum Fuel Flow to Injector Pump .....	— US gph (litre/hr)	150 (568)
Maximum Drain Flow .....	— US gph (litre/hr)	90 (341)

**ELECTRICAL SYSTEM**

Cranking Motor (Heavy Duty, Positive Engagement) .....	— volt	24
Maximum Allowable Resistance of Cranking Circuit .....	— ohm	0.002
Minimum Recommended Battery Capacity		
• Cold Soak @ 0 °F to 32 °F (-18 °C to 0 °C) .....	— 0°F CCA	1800

**COLD START CAPABILITY**

Minimum Ambient Temperature for NFPA 110 Cold Start (90 degree °F Coolant Temperature) .....	— °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) .....	— dBA		TBD
Exhaust Noise at 1 m Horizontal from Centerline of Exhaust Pipe Outlet Upwards at 45 ° .....	— dBA		TBD

<b>DRILL RATING</b>	
<b>60 hz</b>	
Governed Engine Speed .....	rpm 1200
Engine Idle Speed .....	rpm 700 - 900
Gross Engine Power Output .....	hp (kW) 1480 (1104)
Brake Mean Effective Pressure .....	psi (kPa) 318 (2193)
Piston Speed .....	ft/min (m/s) 1250 (6.3)
Friction Horsepower .....	hp (kW) TBD (TBD)
Engine Water Flow at Stated Friction Head External to Engine:	
• 4 psi Friction Head .....	US gpm (liter/s) 330 (20.8)
• Maximum Friction Head .....	US gpm (liter/s) 300 (18.9)
<b>Engine Data</b>	
Intake Air Flow .....	cfm (liter/s) 3125 (1475)
Exhaust Gas Temperature .....	°F (°C) 920 (495)
Exhaust Gas Flow .....	cfm (liter/s) 5760 (2720)
Air to Fuel Ratio .....	air : fuel 25.8 : 1
Radiated Heat to Ambient .....	BTU/min (kW) 6340 (115)
Heat Rejection to Jacket Coolant .....	BTU/min (kW) 24015 (425)
Heat Rejection to Exhaust .....	BTU/min (kW) 51250 (905)
<b>Engine Aftercooler Data</b>	
Heat Rejection to Aftercooler .....	BTU/min (kW) 14170 (260)
Aftercooler Water Flow at Stated Friction Head External to Engine:	
• 2 psi Friction Head .....	US gpm (liter/s) 93 (5.9)
• Maximum Friction Head .....	US gpm (liter/s) 90 (5.7)

N.A. - Not Available

N/A - Not Applicable to this Engine

TBD - To Be Determined

ENGINE MODEL : QSK50-DR1480

DATA SHEET : DS-6622

DATE : 06Nov07

CURVE NO. : FR-6622