# Gaseous Fuel Generator Set
# QSK19G Engine Series

**Specification Sheet**
**Model GFEB EPA SI NSPS Compliant Capable**

| KW(KVA) @ 0.8 P.F. | |
|---|---|
| Compression Ratio | 60 HZ-1800 RPM Standby |
| 8.5:1 (note 1) | 350 (437) |

Notes:
(1) 54°C (130° F) or lower water temperature to the aftercooler

**NOTE: This engine is EPA compliant capable. A site validation emission test must be performed to EPA requirements**

| Fuel Application Guide | |
|---|---|
| Compression Ratio | 8.5:1 |
| Dry Processed Natural Gas | Yes |
| Propane (HD-5) | N/A |
| All gases such as field gas, digester and sewage gas will require an analysis of the specified gas and pre-approval from CNGE. Consult your Cummins Distributor for details. | |

## Description

The Cummins NPower GF-series commercial generator set is a fully integrated power generation system providing optimum performance, reliability, and versatility for stationary standby or prime power applications.

A primary feature of the GF GenSet is strong motor-starting capability and fast recovery from transient load changes. The torque-matched system includes a heavy-duty Cummins 4-cycle spark ignited engine, an AC alternator with high motor-starting kVA capacity, and an electronic voltage regulator with three phase sensing for precise regulation under steady-state or transient loads. The GF GenSet accepts 75% of the nameplate standby rating in one step. *

The standard PowerCommand® digital electronic control is an integrated system that combines engine and alternator controls for high reliability and optimum GenSet performance.

Optional weather-protective housings and coolant heaters shield the generator set from extreme operating conditions. Environmental concerns are addressed by low exhaust emission engines, sound-attenuated housings, and exhaust silencers. A wide range of options, accessories, and services are available, allowing configuration to your specific power generation needs.

Every production unit is factory tested at rated load and power factor. This testing includes demonstration of rated power and single-step rated load pickup. Cummins NPower manufacturing facilities include quality standards, emphasizing our commitment to high quality in the design, manufacture, and support of our products. The generator is CSA certified. The PowerCommand control is UL508 Listed.

All Cummins NPower generator sets are backed by a comprehensive warranty program and supported by a worldwide network of 170 distributors and service branches to assist with warranty, service, parts, and planned maintenance support.

## Features

**Cummins Heavy-Duty Engine** - Rugged 4-cycle industrial spark ignited engine delivers reliable power, low emissions, and fast response to load changes.

**Alternator** - Several alternator sizes offer selectable motor-starting capability with low reactance 2/3 pitch windings, low waveform distortion with non-linear loads, fault-clearing short-circuit capability, and class H insulation. The alternator electrical insulation system is UL1446 Recognized.

**Control Systems** - The PowerCommand electronic control is standard equipment and provides total genset system integration, including automatic remote starting/stopping, precise voltage regulation, alarm and status message display, AmpSentry™ protection, output metering, auto-shutdown at fault detection, and NFPA 110 compliance. PowerCommand control is Listed to UL508.

**Cooling System** - Standard cooling package provides reliable running at the rated power level, at up to 100°F ambient temperature.

**Housings** - Optional weather-protective housings are available.

**Certifications** - Generators are designed, manufactured, tested, and certified to relevant UL, NFPA, ISO, IEC, and CSA standards.

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

*Adequate fuel pressure and volume must be provided. Engines must be equipped with a functioning jacket water heater.

# Generator Set

The general specifications provide representative configuration details. Consult the outline drawing for installation design.

## Specifications – General

See outline drawing for installation design specifications.

| | |
|---|---|
| **Unit Width, in (mm)** | 66” (1676) Open set |
| **Unit Height, in (mm)** | 80” (2032) Open set |
| **Unit Length, in (mm)** | 147” (3734) Open set |
| **Unit Dry Weight, lb (kg)** | 14,280 lbs (6477) |
| **Rated Speed, rpm** | 1800 |
| **Voltage Regulation, No Load to Full Load** | ±1.0% |
| **Random Voltage Variation** | ±1.0% |
| **Frequency Regulation** | 5% |
| **Random Frequency Variation** | ±0.5% |
| **Radio Frequency Interference** | Optional PMG excitation operates in compliance with BS800 and VDE level G and N. Addition of RFI protection kit allows operation per MIL-STD-461 and VDE level K. |

# Rating Definitions

**Standby Rating based on:** Applicable for supplying emergency power for the duration of normal power interruption. No sustained overload capability is available for this rating. (Equivalent to Fuel Stop Power in accordance with ISO3046, AS2789, DIN6271 and BS5514). Nominally rated.

# Site Derating Factors

Engine power available up to 3000’ (m) at ambient temperatures up to 100°F. Above 3000’ (m)derate at 4% per 1000 ft (305 m), and 1% per 10°F (2% per 11°C) above 100°F.

1) Data represents gross engine performance capabilities obtained and corrected in accordance with SAEJ1349 conditions of 29.61 in. Hg.(100KPa) barometric pressure [300 ft. (91m) altitude], 77ºF (25ºC) inlet air temperature, and 0.30 in Hg.(100KPa) water vapor pressure using dry processed natural gas fuel with 905 BTU per standard cubic foot (33.72 ki/l) lower heating value. Deration may be required due to altitude, temperature or type of fuel. Consult your local Cummins Distributor for details.

2) FUEL SYSTEM

Standard Carburetor – IMPCO Make
Low Pressure Dry Processed Natural Gas – ( 905 BTU/ft.² L.H.V.)
Running Pressure to Carburetor (After Regulation) – in. $H_20$ (mm $H_20$) ..... 5 ~ 7 (127~177)
Running Pressure to Engine Mounted Regulator ~ in. $H_20$ (mm $H_20$) .....10 ~ 20 (254 ~ 508)
Minimum Gas Supply Pipe Size @ Engine – in. (mm).....2.0 (50.8)
Gas Supply Filter Pressure Rating – PSI (kPa).....100 (690)

The preceding pipe sizes are only suggestions and piping may vary with temperatures, distance from fuel supply and application of local codes. Gas must be available at adequate volume and pressure for engine at the regulator.

# Engine

Cummins heavy-duty spark ignited engines use advanced combustion technology for reliable and stable power, low emissions, and fast response to sudden load changes.

Electronic governing is standard for applications requiring constant (isochronous) frequency regulation such as Uninterruptible Power Supply (UPS) systems, non-linear loads, or sensitive electronic loads. Optional coolant heaters are recommended for all emergency standby installations or for any application requiring fast load acceptance after start-up.

## Specifications – Engine

| | |
|---|---|
| **Base Engine** | Cummins Model QSK19G |
| **Displacement in$^3$ (L)** | 1150 (19) |
| **Overspeed Limit, rpm** | 2100 |
| **Regenerative Power, kW** | - |
| **Cylinder Block Configuration** | Cast iron with replaceable wet cylinder liners |
| **Cranking Current** | 550 amps at ambient temperature of 32°F (0°C) |
| **Battery Charging Alternator** | 37 amps |
| **Starting Voltage** | 24-volt, negative ground |
| **Lube Oil Filter Types** | Single spin-on canister-combination full flow with bypass |
| **Standard Cooling System** | 100°F ambient radiator |

| **Fuel** | | **STANDBY** | | |
|---|---|---|---|---|
| Fuel Consumption | Load | 1/2 | 3/4 | Full |
| (Approximate) | kW | 175 | 263 | 350 |
| | CFH | 2560 | 3588 | 4615 |
| **Cooling** | | | | |
| Heat Rejection to Coolant* | | 10900 BTU/min | 13847 BTU/min | 16573 BTU/min |
| Heat Rejection to Room | | 1545 BTU/min | 2165 BTU/min | 2785 BTU/min |
| Coolant Capacity (with radiator)* | | 20 gal | | |
| Coolant Flow Rate* | | 139 GPM | | |
| Maximum Coolant Friction Head* | | 5 psi | | |
| Maximum Coolant Static Head* | | 60 ft | | |
| Radiator Fan Load | | 35 hp | | |
| **Air** | | | | |
| Combustion Air | | 644 CFM | 924 CFM | 1219 CFM |
| Maximum Air Cleaner Restriction | | TBD | | |
| Alternator Cooling Air | | 2202 CFM | | |
| Radiator Cooling Air | | 36,000 CFM | | |
| Maximum Restriction at Radiator Discharge (static) | | 0.5 in water | | |
| **Exhaust** | | | | |
| Gas Flow (Full Load) | | 3120 CFM | | |
| Gas Temperature | | 1286° F | | |
| Maximum Back Pressure | | 2 in Hg | | |
| **Engine** | | | | |
| Gross Engine Power Output | | 265 hp | 398 hp | 530 hp |
| BMEP | | TBD | | |
| Piston Speed | | TBD | | |

* Jacket water only. Contact factory for aftercooler heat rejections and coolant flows

# Alternator

Several alternators are available for application flexibility based on the required motor-starting kVA and other requirements. Larger alternator sizes have lower temperature rise for longer life of the alternator insulation system. In addition, larger alternator sizes can provide a cost-effective use of engine power in across-the-line motor-starting applications and can be used to minimize voltage waveform distortion caused by non-linear loads.

Single-bearing alternators couple directly to the engine flywheel with flexible discs for drivetrain reliability and durability. No gear reducers or speed changers are used. Two-thirds pitch windings eliminate third-order harmonic content of the AC voltage waveform and provide the standardization desired for paralleling of generator sets. The standard excitation system is a self (shunt) excited system with the voltage regulator powered directly from the generator set output.

## Alternator Application Notes

**Separately Excited Permanent Magnet Generator (PMG) System** - This option uses an integral PMG to supply power to the voltage regulator. A PMG system generally has better motor-starting performance, lower voltage dip upon load application, and better immunity from problems with harmonics in the main alternator output induced by non-linear loads. This option is recommended for use in applications that have large transient loads, sensitive electronic loads (especially UPS applications), harmonic content, or that require sustained short-circuit current (sustained 3-phase short circuit current at approximately 3 times rated for 10 seconds).

**Alternator Sizes** - On any given model, various alternator sizes are available to meet individual application needs. Alternator sizes are differentiated by maximum winding temperature rise, at the generator set standby or prime rating, when operated in a 40°C ambient environment. Available temperature rises range from 80°C to 150°C. Not all temperature rise selections are available on all models. Lower temperature rise is accomplished using larger alternators at lower current density. Lower temperature rise alternators have higher motor-starting kVA, lower voltage dip upon load application, and they are generally recommended to limit voltage distortion and heating due to harmonics induced by non-linear loads.

Alternator Space Heater - is recommended to inhibit condensation.

## Available Output Voltages

**Three Phase Reconnectable**

[ ] 120/208
[ ] 127/220
[ ] 139/240
[ ] 120/240
[ ] 240/416
[ ] 254/440
[ ] 277/480

**Single Phase Non-Reconnectable**

[ ] 120/240

**Three Phase Non-Reconnectable**

[ ] 220/380
[ ] 347/600

# Specifications – Alternator

| | |
|---|---|
| **Design** | Brushless, 4-pole, drip-proof revolving field |
| **Stator** | 2/3 pitch |
| **Rotor** | Direct-coupled by flexible disc |
| **Insulation System** | Class H per NEMA MG1-1.65 |
| **Standard Temperature Rise** | 125°C standby |
| **Exciter Type** | PMG |
| **Phase Rotation** | A (U), B (V), C (W) |
| **Alternator Cooling** | Direct-drive centrifugal blower |
| **AC Waveform Total Harmonic Distortion** | <5% total no load to full linear load<br><3% for any single harmonic |
| **Telephone Influence Factor (TIF)** | <50 per NEMA MG1-22.43. |
| **Telephone Harmonic Factor (THF)** | <3 |

| | 80°C Alternator | | 105°C Alternator | | 125°C Alternator | | | |
|---|---|---|---|---|---|---|---|---|
| Voltage Ranges<br>The broad range alternator can supply single phase output up to 2/3 of the set rated 3-phase KW at 1.0 power factor | 110/190 thru 139/240 220/380 Thru 277/480 120/240* | 347/600 | 110/190 thru 139/240 220/380 Thru 277/480 120/240 | 347/600 | 110/190 Thru 139/240 220/380 Thru 277/480 120/240* | 120/208 Thru 139/240 240/416 Thru 277/480 120/240* | 277/480 | 347/600 |
| Motor Starting<br><br>Maximum kVA (90% Sustained Voltage) | Broad Range<br>1896 | 600 V<br>1749 | Broad Range<br>1749 | 600V<br>1749 | Broad Range<br>1372 | 480V<br>1372 | 600V<br>1372 | |
| Alternator Data Sheet Numbers | 306 | 305 | 305 | 305 | 304 | 304 | 304 | |
| Full Load Current (Amps @ Standby Rating) | 120/208<br>1214 | 127/220<br>1148 | 139/240<br>1052 | 220/380<br>665 | 240/416<br>607 | 254/440<br>547 | 277/480<br>526 | 347/600<br>421 |

Notes:
1. The broad range alternators can supply single phase output up to 2/3 set rated 3-phase kW at 1.0 power factor.
2. The extended stack (full single phase output) and 4 lead alternators can supply single phase output up to full set rated 3-phase kW at 1.0 power factor.

# Control System


## PowerCommand Control with AmpSentry™ Protection

- The PowerCommand Control is an integrated generator set control system providing governing, voltage regulation, engine protection, and operator interface functions.
- PowerCommand Controls include integral AmpSentry protection. AmpSentry provides a full range of alternator protection functions that are matched to the alternator provided.
- Controls provided include Battery monitoring and testing features, and Smart-Starting control system.
- InPower PC-based service tool available for detailed diagnostics.
- Available with Echelon LonWorks™ network interface.
- NEMA 3R enclosure.
- Suitable for operation in ambient temperatures from -40C to +70C, and altitudes to 13,000 feet (5000 meters).
- Prototype tested; UL, CSA, and CE compliant.

### AmpSentry AC Protection

- Overcurrent and short circuit shutdown
- Overcurrent warning
- Single & 3-phase fault regulation
- Over and under voltage shutdown
- Over and under frequency shutdown
- Overload warning with alarm contact
- Reverse power and reverse Var shutdown
- Excitation fault

### Engine Protection

- Overspeed shutdown
- Low oil pressure warning and shutdown
- High coolant temperature warning and shutdown
- High oil temperature warning (optional)
- Low coolant level warning or shutdown
- Low coolant temperature warning
- High and low battery voltage warning
- Weak battery warning
- Dead battery shutdown
- Fail to start (overcrank) shutdown
- Fail to crank shutdown
- Redundant start disconnect
- Cranking lockout
- Sensor failure indication

### Operator Interface

- OFF/MANUAL/AUTO mode switch
- MANUAL RUN/STOP switch
- Panel lamp test switch
- Emergency Stop switch
- Alpha-numeric display with pushbutton access, for viewing engine and alternator data and providing setup, controls, and adjustments
- LED lamps indicating genset running, not in auto, common warning, common shutdown
- (5) configurable LED lamps
- LED Bargraph AC data display (optional)

### Alternator Data

- Line-to-line and line-to-neutral AC volts
- 3-phase AC current
- Frequency
- Total and individual phase kW and kVA

### Engine Data

- DC voltage
- Lube oil pressure
- Coolant temperature
- Lube oil temperature (optional)

### Other Data

- Genset model data
- Start attempts, starts, running hours
- KW hours (total and since reset)
- Fault history
- Load profile (hours less than 30% and hours more than 90% load)
- System data display (optional with network and other PowerCommand gensets or transfer switches

### Voltage Regulation

- Integrated digital electronic voltage regulator
- 3-phase line to neutral sensing
- PMG (Optional)
- Single and three phase fault regulation
- Configurable torque matching

### Control Functions

- Data logging on faults
- Fault simulation (requires InPower)
- Time delay start and cooldown
- Cycle cranking
- (4) Configurable customer inputs
- (4) Configurable customer outputs
- (8) Configurable network inputs and (16) outputs (with optional network)

### Options

[ ] Power Transfer Control
[ ] Analog AC Meter Display
[ ] Thermostatically Controlled Space Heater
[ ] Key-type mode switch
[ ] Ground fault module
[ ] Engine oil temperature
[ ] Auxiliary Relays (3)
[ ] Echelon LonWorks interface
[ ] Digital input and output module(s) (loose)
[ ] Remote annunciator (loose)

# Generator Set Options

**Engine**
[ ] 120/240 V, W coolant heaters
[ ] 120/240 V, W lube oil heater
[ ] Electronic governor

**Cooling System**
[ ] Heat exchanger cooling
[ ] Remote radiator cooling

**Fuel System**
[ ] Flexible fuel connector
[ ] Fuel strainer
[ ] Dual fuel systems

**Alternator**
[ ] 105°C rise alternator
[ ] 125°C rise alternator
[ ] 120/240 V, 100 W anti-condensation heater
[ ] Single phase

**Exhaust System**
[ ] GenSet mounted muffler
[ ] Heavy duty exhaust elbow
[ ] Slip on exhaust connection

**Generator Set**
[ ] AC entrance box
[ ] Batteries
[ ] Battery charger
[ ] Export box packaging
[ ] Main line circuit breaker
[ ] PowerCommand Network Communication Module (NCM)
[ ] Stage 1 housing w/silencer
[ ] Stage II housing w/silencer
[ ] Remote annunciator panel
[ ] Spring isolators
[ ] Weather protective enclosure with silencer
[ ] 2 year standby warranty
[ ] 5 year basic power warranty

# Available Products and Services

A wide range of products and services is available to match your power generation system requirements. Cummins Power Generation products and services include:

- Diesel and Spark-Ignited Generator Sets
- Transfer Switches
- Bypass Switches
- Parallel Load Transfer Equipment
- Digital Paralleling Switchgear
- PowerCommand Network and Software
- Distributor Application Support
- Planned Maintenance Agreements

## Warranty

All components and subsystems are covered by an express limited one-year warranty. Other optional and extended factory warranties and local distributor maintenance agreements are available. Contact your distributor/dealer for more information.

## Certifications

**CSA** - This generator is CSA certified to product class 4215-01.

**PTS** - The Prototype Test Support (PTS) program verifies the performance integrity of the generator set design. Products bearing the PTS symbol have been subjected to demanding tests in accordance to NFPA 110 to verify the design integrity and performance under both normal and abnormal operating conditions including short circuit, endurance, temperature rise, torsional vibration, and transient response, including full load pickup.

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