





**FUSS & O'NEILL**  
Manufacturing Solutions, LLC

September 19, 2013

Jesse A. Langer  
Updike, Kelly & Spellacy, P.C.  
One Century Tower  
265 Church Street  
New Haven, CT 06510

RE: Noise Level Study  
Intersection Route 5/245 Chapel Road  
South Windsor, CT

Dear Mr. Langer:

This letter report is to document the noise level collection services at 245 Chapel Road, South Windsor, Connecticut. These services were retained to estimate noise levels at abutting properties of this site. We understand the results of these calculations may be used by you in connection with the submission of a petition to the Connecticut Siting Council. The following information consolidates our findings and provides illustrations for your use as part of the permit process.

### **Site Overview**

The proposed site will include a 15,400 FT<sup>2</sup> gated, gravel compound containing two fuel cell generators and associated support infrastructure enclosed within an eight-foot tall, chain link fence. Twin custom-designed FuelCell Energy fuel cells based on their commercial DFC3000 system, each producing 2.49 MW, will be located within the fenced compound on concrete pads. Each fuel cell generation system will include two fuel cell modules, main process components, electric balancing system, and water treatment unit. The fuel cell generators will share a desulphurization system and system switch gear, both also located within the compound.

If the project is awarded a grant under the Connecticut Department of Energy and Environmental Protection's (CTDEEP) Microgrid Grant and Loan Pilot Program ("Microgrid Program"), then a 250-kilowatt diesel standby generator, fuel cell switching gear, and electric load control center will be located outside of the fenced compound area. The standby generator will only be used to start up the fuel cells in the absence of utility power during a blackstart condition. A seven foot tall earthen berm will be constructed north of the fuel cell facility to obstruct direct access from Chapel Street and provide noise and visual dampening of the two fuel cell units.

146 Hartford Road  
Manchester, CT  
06040  
1 860.646.2469  
800.286.2469  
f 860.645.0717

[www.fando.com](http://www.fando.com)

Connecticut  
Massachusetts  
Rhode Island  
South Carolina



Mr. Jesse Langer  
September 19, 2013  
Page 2

## Regulatory Applicability

As noise propagates outdoors it generally decreases in magnitude with increasing distance from the noise source. There are also several meteorological and physical conditions that affect the rate of attenuation and include variations in air temperature, increased elevation, relative humidity, wind speed and direction, and atmospheric factors such as cloud coverage. The physical effects include topography, natural and artificial barriers, and vegetation.

Because high-frequency noises have relatively short wave lengths their noise energy will decrease rapidly with increasing distance due to atmospheric absorption. Conversely, low-frequency noises with much longer wave-lengths will often carry several kilometers from the source and are usually the cause for complaints from citizens and other property owners.

The Town of South Windsor received approval on November 3, 1982 from the CTDEEP to enforce local noise control standards. The Town of South Windsor has established Article III, Section 50-61 through 50-69 of the South Windsor Code as Noise Control and the limits established by the article were used as the basis for this survey. The Class C Emitter to Class C Receptor noise limits are the same as the limits established by the CTDEEP Section 22a-69-3.5 Noise Zone Standards. Furthermore, based on the criteria established the South Windsor Noise Control requirements, South Windsor has requirements that are more strict than those established by the CTDEEP.

Applying the Town of South Windsor Zoning classifications, the property located at 245 Chapel Road and the abutting properties to the east along Chapel Road and across the street to the north are classified as Industrial zones. The Town of South Windsor regulations establish noise levels from an Industrial Emitter Zone to an Industrial Receptor Zone to 70-dBA. The hour of day does not play a factor in the zone to zone noise level.

## Project Approach

Our first step was to research the noise limit obligations established by the Town of South Windsor. We used the on-line GIS available from the South Windsor web-site to establish the zone classification. Based on this information, the site and abutting sites are classified to be Industrial Emitters and Receptor's. The South Windsor Code, Article III, Section 50-65(2) establishes the maximum noise level at the property line for an Industrial emitter to an Industrial receptor to be 70-dBA. The South Windsor Code is included as *Attachment A*.



Mr. Jesse Langer  
September 19, 2013  
Page 3

Our second step was to establish the background noise level for this location. We collected twenty-four 1-hour background noise samples at the property line abutting the intersection of Chapel Road and John Fitch Boulevard. Based on our understanding, this is a representative location where the two fuel cells are planned for installation.

To complete this step, we used calculations developed by Associates in Acoustics, Inc. to calculate the Average Day-Night Sound Level background noise level using the hourly noise data and the definitions established by South Windsor Code, Article III, Section 50-64.

Our third step was to use data sheets representative of the DFC3000 fuel cell as well as the 250-kilowatt diesel generator to estimate noise levels at the abutting property lines. This estimation was then compared to the background noise levels collected from our second step as described above. These data sheets are included as *Attachment B*.

## Noise Level Determination

*Attachment C* contains the calculation to determine the Day – Night Average Sound Level for this location. The Day – Night Average is based on hourly equivalent continuous sound levels (Leq). The Leq, commonly called the average sound level, is a widely used noise descriptor that is commonly adopted in many developed countries. The Leq is the constant noise level which, under a given situation and time period, contains the same acoustic energy as the actual time-varying noise level. Based on the hourly data collected, the Leq ranged from 53.8dBA to 65.6dBA with the 24-hour Leq to be calculated at 67.3dBA.

In contrast to the Leq, many regulatory agencies use the  $L_{90}$  as the indicator of background noise. The  $L_{90}$  represents a statistical average of noise level that is exceeded 90% of the time. Over the 24-hour sampling period the  $L_{90}$  for this location ranged from 45.5dBA to 60.0dBA with the 24-hour  $L_{90}$  to be 53.3dBA.

The manufacturer fuel cell literature indicates that the noise level for each fuel cell unit is 72dBA measured at 10 feet. As previously identified, if the project is selected under the Microgrid Program, the installation will also include a stand-by generator. Based on the proposed site location for each fuel cell, we calculated the noise level at the closest abutting property line taking into account only the reduction in noise level due to geometrical divergence; e.g. distance.

*Attachment D* contains the proposed arrangement of the fuel cells and stand-by diesel generator. *Attachment E* contains the calculations for the noise level at the property line for each fuel cell unit, the combined noise level for both fuel cells, and the combined noise for



FUSS & O'NEILL

Mr. Jesse Langer  
September 19, 2013  
Page 4

both fuel cell units and the diesel generator fitted with Level II noise attenuating equipment based on the measurements identified in *Attachment D*.

## Conclusions

There are additional factors not practical to estimate but will likely further reduce the combined noise level at the property line; e.g. fuel cell # 2 acting as a barrier for fuel cell # 1. Furthermore, the stand-by diesel generator is only used to start-up the fuel cells and is not intended to continuously run to support the functionality of the fuel cells.

Based on the calculations, the combined noise level at the closest property line applicable to the two fuel cells and stand-by diesel generator will be 68dB which is below the Industrial Emitter Zone to Industrial Receiver Zone noise level as established by South Windsor Code, Article III, Section 50-65(2). In addition, the noise level from each fuel cell and the diesel generator meet the performance standard established by South Windsor Code, Article III, Section 50-65(3) as they do not emit noise in excess of 80-dBA at any time.

Sincerely,

Robert Levandoski, CSP, CIH  
Vice President

Attachments

## **Attachment A**

---

South Windsor Code

(e) *Abatement by chief of police.* If any person upon whom an order to abate or remove a nuisance is served fails or neglects to comply with the terms thereof in the manner and time specified, the chief of police may cause such nuisance to be removed or abated; and the expenses thereof shall be collected by the town through legal action if necessary.

(Code 1978, §§ 5-305—5-309)

**Sec. 50-36. Penalty.**

Any person who shall commit or assist in the committing of any act defined under the provisions of this article to be unlawful or to be a nuisance shall be subject to punishment as provided in section 1-12 of this Code upon conviction thereof. Each day's violation of this article after the time specified in an order for abatement or removal of a nuisance may be considered a separate offense.

(Code 1978, § 5-310; Ord. No. 126, 11-9-90)

**Secs. 50-37—50-60. Reserved.**

**ARTICLE III. NOISE CONTROL**

**Sec. 50-61. Purpose of article.**

The policy of the state under C.G.S. § 22a-67 is to promote an environment free from noise that jeopardizes the health and welfare of the citizens of the state. To that end, the purpose of this article is to establish a means for effective enforcement of a noise pollution standard. Further, the state legislature has found, and the town council finds and declares that:

- (1) Excessive noise is a serious hazard to the health, welfare and quality of life of the citizens of the state and the town.
- (2) Exposure to certain levels of noise can result in physiological, psychological and economic damage.
- (3) A substantial body of science and technology exists by which excessive noise may be substantially abated.
- (4) The primary responsibility for control of noise rests with the state and towns.

- (5) Each person has a right to an environment free from excessive noise that may jeopardize his health, safety or welfare.  
(Ord. No. 145, § 1, 12-15-97)

**Sec. 50-62. Penalty for violation of article.**

Any person or business violating any of the provisions of this article shall be deemed guilty of a municipal violation and punished as provided in section 1-12.

(Ord. No. 145, § 7, 12-15-97)

**Sec. 50-63. Effect of more stringent zoning regulations.**

All provisions of the zoning regulations of the town which are more stringent than those set forth in this article, shall remain in force. If, for any reason, any word, clause, paragraph or section of this article shall be held to make the same unconstitutional or superceded by any state law or regulation, this article shall not thereby be invalidated, and the remainder of the article shall continue in effect.

(Ord. No. 145, § 8, 12-15-97)

**Sec. 50-64. Definitions.**

The following words, terms and phrases, when used in this article, shall have the meanings ascribed to them in this section, except where the context clearly indicates a different meaning:

*Background noise* means noise which exists at a point as a result of a combination of many distant sources individually indistinguishable.

*Daytime hours* means the hours between 7:00 a.m. and 8:00 p.m. on every day but Sunday and the hours of 9:00 a.m. through 8:00 p.m. on Sundays.

*Decibel* means a unit of measurement of the sound level.

*Impulse noise* means a sound of short duration, usually less than one second, with an abrupt onset and rapid decay, where such sound is not repetitive.

*Nighttime hours* means the hours between 8:00 p.m. and 7:00 a.m. each day from Sunday evening

through Saturday morning except that night shall mean the hours between 8:00 p.m. Saturday and 9:00 a.m. Sunday.

*Noise control officer* means the individual so designated by the town manager as the person responsible to enforce this article and report to the town manager regarding violations and/or noncompliance with this article.

*Noise level* means the sound pressure level measured with a sound level meter using the A-weighting network. The level so read is designated dBa(A) or dBA.

(Ord. No. 145, § 2, 12-15-97)

Cross reference—Definitions generally, § 1-2.

#### Sec. 50-65. Performance standards.

It shall be the responsibility of the designated noise control officer to enforce all aspects of this article, including the following:

- (1) No noise shall be emitted beyond the boundaries of a lot or parcel in excess of the noise levels established in this article;

- (2) Noise emitted from commercial and industrial zones beyond the boundary of the lot or parcel shall not exceed the levels stated in the following table to the respective adjacent residential, commercial or industrial zones:

| <i>Emitter's Zone</i> | <i>Receptor's Zone</i> |                   |                             |                               |
|-----------------------|------------------------|-------------------|-----------------------------|-------------------------------|
|                       | <i>Industrial</i>      | <i>Commercial</i> | <i>Residential/<br/>Day</i> | <i>Residential/<br/>Night</i> |
| Commercial:           | 62dBA                  | 62dBA             | 55dBA                       | 45dBA                         |
| Industrial:           | 70dBA                  | 66dBA             | 61dBA                       | 51dBA                         |

The above levels represent the current levels adopted by the state. If the state changes its levels in the future, the levels of this article will automatically be changed to correspond with the new state levels. Measurements shall be taken at several different points located beyond the boundary of the emitter's lot or parcel in various locations throughout the receptor parcel or parcels in an attempt to locate the loudest noise level emitted;

- (3) High background noise levels and impulse noises are those individual cases where the background noise levels caused by sources not subject to this article exceed the standards contained in this section. A source shall be considered to cause excessive noise if the noise emitted by such source exceeds the background noise levels by 5dBA, provided that no source subject to the provisions of this article shall emit noise in excess of 80dBA at any time; and provided that this section does not decrease the permissible levels of other sections of this article. Further, no impulse noise shall be caused or allowed in excess of 80dBA peak sound pressure level during the nighttime hours to any resi-

dential zone or use and the emission of impulse noise shall not be caused or allowed in excess of 100dBA peak sound pressure level at any time to any zone or use; and

- (4) Exclusions and exceptions shall be in accordance with regulations of the state department of environmental protection, C.G.S. §§ 22a-69-1.7, 22a-69-1.8.  
(Ord. No. 145, § 3, 12-15-97)

#### Sec. 50-66. Specific prohibitions.

The operation of lawnmowers, leaf blowers, snow blowers, tractors, chain saws or other machinery powered by an internal combustion engine is prohibited between the hours of 8:00 p.m.

and 8:00 a.m., except during the 24-hour period immediately following a snowfall or other weather-related emergency.  
(Ord. No. 145, § 4(a), 12-15-97)

**Sec. 50-67. Exempted activities and uses.**

The following activities and uses shall be exempt from this article:

- (1) Noises resulting from any authorized emergency vehicle when responding to an emergency call or acting in time of emergency; and
- (2) Noises emanating from municipal vehicles, such as snow plows, garbage trucks, emergency road trucks and other emergency vehicles.

(Ord. No. 145, § 4(b), 12-15-97)

**Sec. 50-68. Determination of offense.**

The standards which shall be considered by the noise control officer in determining whether a violation of this article exists shall include, but shall not be limited to, the following:

- (1) The level of noise;
- (2) Whether the origin of the noise is natural or unnatural;
- (3) The background noise level, if any;
- (4) The zoning of the area from which the noise is emitted and the zoning of the area within which the noise is received;
- (5) The time of day or night the noise occurs;
- (6) The duration of the noise; and
- (7) The day of the week, or holiday, on which the noise occurs.

(Ord. No. 145, § 5, 12-15-97)

**Sec. 50-69. Temporary variance from article provisions.**

(a) *Application; contents.* Any person residing or doing business in the town may apply to the town manager for a temporary variance from one or more of the provisions of this article if they are more stringent than the state department of environmental protection's regulations for the control of noise, provided that the applicant supplies

all of the following information to the town manager at least 20 days prior to the date of the activity:

- (1) The location and nature of activity;
- (2) The time period and hours of operation of the activity;
- (3) The nature and intensity of the noise that will be generated;
- (4) A plan to be implemented which will correct the noise problem requiring the temporary variance; and
- (5) Any other information required by the town manager.

(b) *Conditions for issuance.* No variance from this article shall be issued unless it has been demonstrated that:

- (1) The proposed activity will not violate any provisions of the state department of environmental protection regulations;
- (2) The noise levels generated by the proposed activity will not constitute danger to the public health; and
- (3) Compliance with this article constitutes an unreasonable hardship on the applicant.

(c) *Review; approval or rejection.* The application for variance shall be reviewed and either approved or rejected at least five days prior to the proposed start of the activity. The approval or rejection shall be in writing and shall state the condition of approval, if any, or the reasons for rejection.

(d) *Failure to rule.* Failure to rule on the application in the designated time shall constitute approval of the temporary variance.

(Ord. No. 145, § 6, 12-15-97)

**Sec. 50-70. Reserved.**

**ARTICLE IV. BLIGHT AND NUISANCE ORDINANCE**

**Sec. 50-71. Purpose.**

The purpose of this ordinance is to define, prohibit and abate blights and nuisances and to



FUSS & O'NEILL

## Attachment B

---

Data Sheets

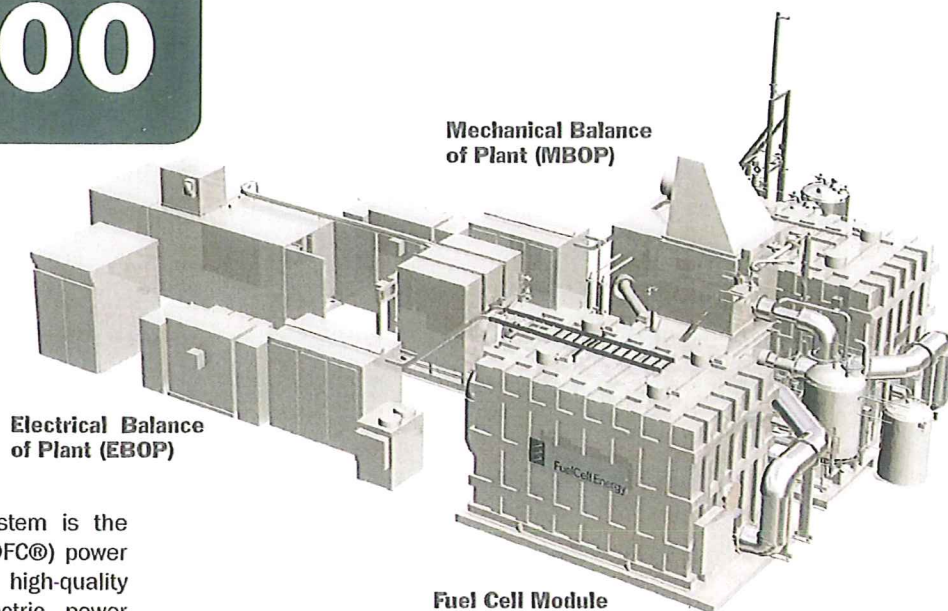
# 2.8 MEGAWATTS DFC3000

## KEY FEATURES

- High Efficiency
- Low Environmental Impact
- Fuel Flexibility
- High Reliability
- Quiet Operation

## ADVANTAGES

FuelCell Energy's DFC3000™ system is the largest of the Direct FuelCell® (DFC®) power plant fleet, capable of providing high-quality baseload power with 47% electric power generation efficiency around-the-clock. Scalable for Multi-Megawatt Fuel Cell Parks, the system is especially suitable for applications with larger load requirements such as universities, manufacturing facilities, wastewater treatment plants, and utility/grid support.



**2.8 MW, 13.8 kVAC,  
3,110 kVA, 50 or 60 Hz**

## PERFORMANCE

### Gross Power Output

|                             |            |
|-----------------------------|------------|
| Power @ Plant Rating        | 2,800 kW   |
| Standard Output AC voltage  | 13,800 V   |
| Standard Frequency          | 60 Hz      |
| Optional Output AC Voltages | By Request |
| Optional Output Frequency   | 50 Hz      |

### Efficiency

|     |            |
|-----|------------|
| LHV | 47 +/- 2 % |
|-----|------------|

### Available Heat

|                        |               |
|------------------------|---------------|
| Exhaust Temperature    | 700 +/- 50 °F |
| Exhaust Flow           | 36,600 lb/h   |
| Allowable Backpressure | 5 inwc        |

### Heat Energy Available for Recovery

|             |                 |
|-------------|-----------------|
| (to 250 °F) | 4,433,000 Btu/h |
| (to 120 °F) | 7,460,000 Btu/h |

### Fuel Consumption

|   |               |
|---|---------------|
| Natural gas (at 930 Btu/ft <sup>3</sup> ) | 362 scfm      |
| Heat rate, LHV                            | 7,260 Btu/kWh |

### Water Consumption

|                           |        |
|---------------------------|--------|
| Average                   | 9 gpm  |
| Peak during WTS backflush | 30 gpm |

### Water Discharge

|                           |         |
|---------------------------|---------|
| Average                   | 4.5 gpm |
| Peak during WTS backflush | 30 gpm  |

### Pollutant Emissions

|      |                |
|------|----------------|
| NOx  | 0.01 lb/MWh    |
| SOx  | 0.0001 lb/MWh  |
| PM10 | 0.00002 lb/MWh |

### Greenhouse Gas Emissions

|  |                |
|--|----------------|
| CO <sub>2</sub>                            | 980 lb/MWh     |
| CO <sub>2</sub> (with waste heat recovery) | 520-680 lb/MWh |

### Sound Level

|          |                     |
|----------|---------------------|
| Standard | 72 dB(A) at 10 feet |
|----------|---------------------|



**FuelCell Energy**

Ultra-Clean, Efficient, Reliable Power

# SPECIFICATIONS

## DFC3000

### WEIGHTS

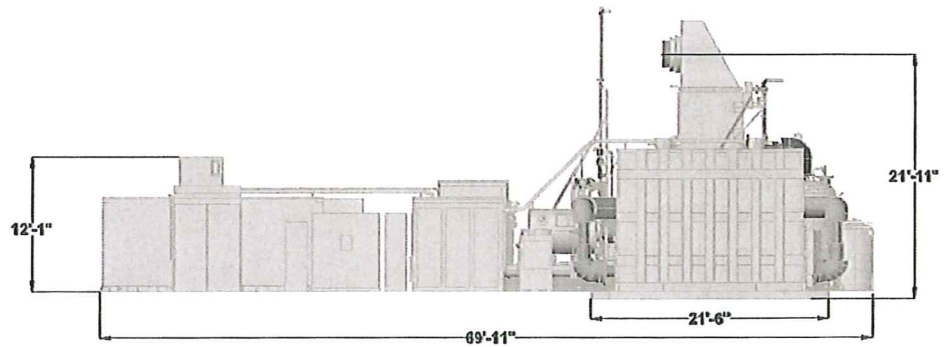
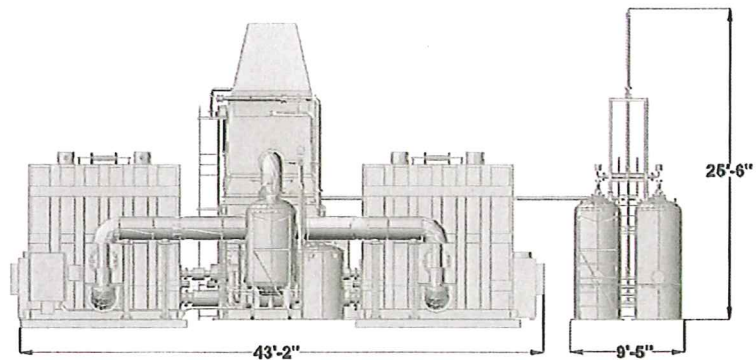
**Water Treatment Skid**  
20,000 lb

**Main Process Skid**  
50,000 lb

**Desulfurization**  
15,000 lb

**Electrical Balance of Plant**  
52,000 lb

**Fuel Cell Module**  
107,000 lb (each module)



### EXPERIENCE & CAPABILITIES

Direct FuelCell® power plants are generating ultra-clean, efficient and reliable power at more than 50 locations worldwide. With more than 300 megawatts of power generation capacity installed or in backlog, FuelCell Energy is a global leader in providing ultra-clean baseload distributed generation to utilities, industrial operations, universities, municipal water treatment facilities, government installations and other customers around the world. The Company's power plants have generated more than 1.7 billion kilowatt hours of ultra-clean power using a variety of fuels including renewable biogas from wastewater treatment and food processing, as well as clean natural gas.

This brochure provides a general overview of FuelCell Energy products and services. This brochure is provided for informational purposes only. Warranties for FuelCell Energy products and services are provided only by individual sales and service contracts, and not by this brochure. This brochure is not an offer to sell any FuelCell Energy products and services. Contact FuelCell Energy for detailed product information suitable for your specific application. FuelCell Energy reserves the right to modify its products, services, and related information at any time without prior notice.

FuelCell Energy's fleet of Direct FuelCell power plants are certified to or comply with a variety of commercial and industrial standards, such as: ANSI/CSA America, UL, CARB, OSHA, IEEE and NFPA.

FuelCell Energy with the corresponding logo is a registered trademark of FuelCell Energy, Inc. "Direct FuelCell," "DFC" and "DFC/T" are registered trademarks of FuelCell Energy, Inc. © FuelCell Energy, Inc. 2013: All rights reserved.





# Power Solutions — North America

Fully Integrated, Reliable, Efficient

Our energy working for you.™



# Global Power Leader

With more than 90 years of experience in power generation and an extensive global distributor network across 190 countries, Cummins Power Generation is ready to match the right generating, transfer and control technologies with your power needs — whether you require continuous, prime, peaking or standby power; cogeneration; or a complete turnkey power plant.

## Our global operations:

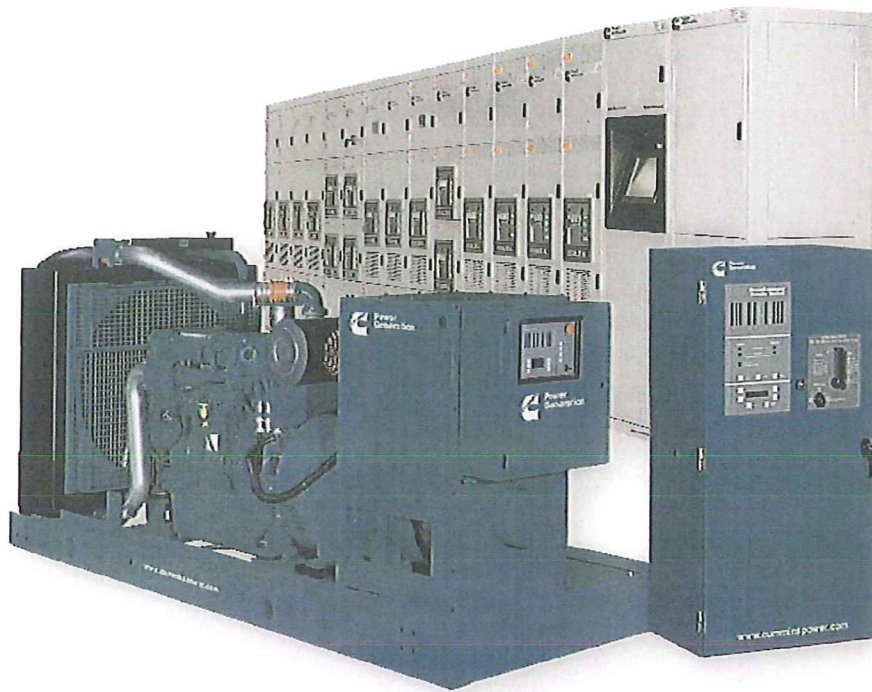


**79 Factories**  
**19 Technical Centers**  
**20 Parts Distribution Centers**  
**550 Distributors**  
**5,200 Sales and Service Centers**  
**190 Countries**  
**40,000 Employees**

### Contents

|   |   |                                |       |
|---|---|--------------------------------|-------|
| Diesel generator sets.....                    | 4 | Enclosures.....                | 10-11 |
| Diesel generator sets: 10 kW to 300 kW.....   | 5 | Generator set controls.....    | 12-13 |
| Diesel generator sets: 350 kW to 2750 kW..... | 6 | Power transfer equipment ..... | 14-15 |
| Low-emissions technologies.....               | 7 | Paralleling systems .....      | 16    |
| Lean-burn gas generator sets.....             | 8 | Rental power .....             | 17    |
| Spark-ignited generator sets.....             | 9 | Software and networking.....   | 18-19 |

# Global Strength, Local Partnership



Cummins Power Generation is committed to understanding and meeting our customers' needs worldwide — through trusted local relationships, innovative solutions and dedicated customer service. This promise enables us to deliver power wherever, whenever and however it is needed.

Our worldwide distribution network includes 550 distributors and 5,200 sales and service locations and 20 parts distribution centers. That means you can expect a face-to-face, trustworthy relationship and fast access to reliable service, engineering expertise and parts support. Our service centers, located strategically throughout the world, are staffed with technicians trained to the highest Cummins Power Generation standards.

Wherever you need fully integrated, reliable and efficient power, your local Cummins Power Generation distributor is available. Visit [www.cumminspower.com/local](http://www.cumminspower.com/local) to find the distributor nearest you.

## **Fully integrated, reliable, efficient**

For more than a decade, Cummins Power Generation has been the industry leader in power system integrated designs. All major components of our systems — the engine, alternator, generator sets, transfer switches and paralleling controls — are manufactured by Cummins. Because they are designed by one manufacturer, all of the elements of our power generation systems work in harmony from the start. This integral approach — what we call the Power of One™ — gives you the peace of mind that comes from premium customer support and reliable, trouble-free operation.

Cummins Power Generation PowerCommand® diesel-powered generator sets are available in sizes ranging from 10 to 2750 kW. Our spark-ignited generator sets are available from 20 to 150 kW. A complete range of transfer switches and paralleling controls supports our generator sets. As a result, you can expect an industry-leading power solution with unrivaled reliability.

# PowerCommand<sup>®</sup> Diesel Generator Sets

Integrated design and manufacturing combine to give you unequaled reliability, power quality, rated performance and efficient operation.

PowerCommand diesel-powered generator sets remain the best-value choice for standby and emergency power systems worldwide. Known for their rugged dependability and reliable mechanical and electrical performance, our diesel generators are also well suited to utility peaking plants, distributed generation facilities, peak shaving (or peak lopping), and power management at large commercial or industrial sites.

Powered by Cummins engines, PowerCommand diesel generator sets are available in sizes ranging from 10 to 2750 kW. Heavy-duty Cummins engines are known for their fuel efficiency, responsive transient performance and rugged reliability. Cooling systems are prototype-tested to provide guaranteed performance in high ambient applications, so you get all the power you pay for every day.

## Reliability and redundancy meet hospital requirements

### Alberta Children's Hospital, Calgary

Three 2 MW diesel generators provide emergency standby power for the 133-bed hospital. The PowerCommand paralleling system features complete integration and interoperability between the generator sets and controls.

High-performance, low-reactance Cummins-manufactured alternators provide good voltage waveform and exceptional motor starting in demanding applications such as data centers, hospitals and industrial facilities.

PowerCommand generator sets are controlled by the world's first and most fully integrated microprocessor-based control system. The system seamlessly integrates governing, voltage regulation, generator set control and protection functions.

You can rely on PowerCommand diesel-powered generator sets to provide these benefits:

- International Building Code (IBC) seismic certification on all emissions-regulated products (up to 2500 kW)
- Proven reliability and low life-cycle costs
- High efficiency and operational flexibility
- High-quality electrical performance
- Well-established service and fuel supply infrastructure
- Optional factory-integrated exhaust after-treatments to reduce emissions for high-hour use in environmentally sensitive locations



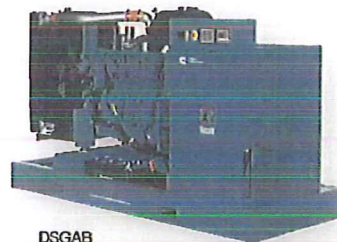
# Diesel 10 kW to 300 kW

## Power output

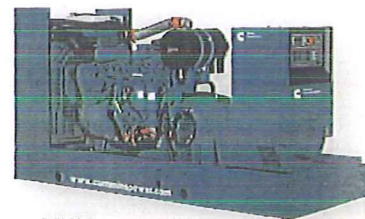
| Model   | Standby kW |       | Prime kW |       | Standby kVA |       | Prime kVA |       | Engine type            |
|---------|------------|-------|----------|-------|-------------|-------|-----------|-------|------------------------|
|         | 60 Hz      | 50 Hz | 60 Hz    | 50 Hz | 60 Hz       | 50 Hz | 60 Hz     | 50 Hz |                        |
| DSKAA*  | 10         | -     | 9.1      | -     | 12.5        | -     | 11.4      | -     | Kubota D1703-M         |
| DSKAB*  | 15         | -     | 13.6     | -     | 18.8        | -     | 17        | -     | Kubota D1703-M         |
| DSKBA*  | 20         | -     | 18.2     | -     | 25          | -     | 22.7      | -     | Kubota V2203-M         |
| DSKCA*  | 25         | -     | 22.7     | -     | 31.3        | -     | 28.4      | -     | Kubota V3300           |
| DGHCA*  | 30         | -     | 27       | -     | 38          | -     | 34        | -     | 4BT3.3G5 NR4i          |
| DGHCB*  | 35         | -     | 32       | -     | 44          | -     | 40        | -     | 4BT3.3G5 NR4i          |
| DSFAA*  | 35         | -     | 32       | -     | 44          | -     | 40        | -     | QSB5-G3 NR3            |
| DGHCC*  | 40         | -     | 36       | -     | 50          | -     | 45        | -     | 4BT3.3G5 NR4i          |
| DSFAB*  | 40         | -     | 35       | -     | 50          | -     | 44        | -     | QSB5-G3 NR3            |
| DGCA    | 50         | 40    | 45       | 36    | 63          | 50    | 56        | 45    | 4BT3.9-G4              |
| DSFAC*  | 50         | -     | 45       | -     | 63          | -     | 56        | -     | QSB5-G3 NR3            |
| DGCB    | 60         | 50    | 55       | 45    | 75          | 63    | 69        | 56    | 4BT3.9-G4              |
| DSFAD*  | 60         | -     | 55       | -     | 75          | -     | 69        | -     | QSB5-G3 NR3            |
| DGCG    | 80         | 65    | 72       | 60    | 100         | 81    | 90        | 75    | 4BTA3.9-G3             |
| DSFAE*  | 80         | -     | 72       | -     | 100         | -     | 90        | -     | QSB5-G3 NR3            |
| DGDB    | 100        | 85    | 90       | 80    | 125         | 106   | 113       | 100   | 4BT3.9-G4              |
| DSGAA** | 100        | -     | 90       | -     | 125         | -     | 113       | -     | QSB7-G3 NR3            |
| DGDK    | 125        | 100   | 113      | 90    | 156         | 125   | 141       | 113   | 6BTA5.9-G3             |
| DSGAB** | 125        | -     | 113      | -     | 156         | -     | 141       | -     | QSB7-G3 NR3            |
| DGFA    | 150        | 140   | 135      | 125   | 188         | 175   | 169       | 156   | 6CTA8.3-G2             |
| DSGAC** | 150        | -     | 135      | -     | 188         | -     | 169       | -     | QSB7-G3 NR3            |
| DGFB    | 175        | 150   | 160      | 135   | 219         | 188   | 200       | 169   | 6CTA8.3-G2             |
| DSHAB** | 175        | -     | 160      | -     | 219         | -     | 200       | -     | QSL9-G2 NR3            |
| DGFC    | 200        | 178   | 180      | 180   | 250         | 220   | 225       | 200   | 6CTAA8.3-G2            |
| DSHAC** | 200        | -     | 180      | -     | 250         | -     | 225       | -     | QSL9-G2 NR3            |
| DGFS    | 230        | -     | -        | -     | 288         | -     | -         | -     | 6CTAA8.3-G2            |
| DSHAD   | 230        | -     | 209      | -     | 288         | -     | 261       | -     | QSL9-G2 NR3            |
| DQDAA*  | 250        | 220   | 225      | 200   | 313         | 275   | 281       | 250   | QSL9-G3 NR3<br>QSL9-G5 |
| DQDAB   | 275        | 250   | 250      | 227   | 344         | 313   | 313       | 284   | QSL9-G5                |
| DQHAA** | 275        | -     | 250      | -     | 344         | -     | 313       | -     | QSM11-G4 NR3           |
| DQDAC   | 300        | 265   | 270      | 240   | 375         | 331   | 338       | 300   | QSL9-G5                |
| DQHAB** | 300        | -     | 270      | -     | 375         | -     | 338       | -     | QSM11-G4 NR3           |



DSFAE



DSGAB



DSHAC

\*Available with EPA Nonroad Emissions Certification

\*\*Available with EPA Stationary Emergency Certification  
Most models UL 2200-listed.

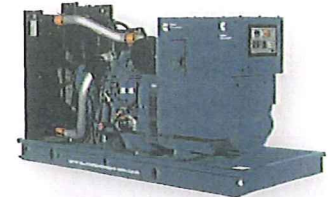
See your distributor for specific details.

For additional technical specifications, visit:  
<http://www.cumminspower.com/na/products/generators/diesel>

# Diesel 350 kW to 2750 kW

## Power output

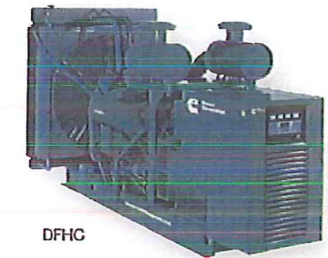
| Model   | Standby kW |       | Prime kW |       | Standby kVA |       | Prime kVA |       | Engine type                            |
|---------|------------|-------|----------|-------|-------------|-------|-----------|-------|--|
|         | 60 Hz      | 50 Hz | 60 Hz    | 50 Hz | 60 Hz       | 50 Hz | 60 Hz     | 50 Hz |  |
| DFEG**  | 350        | -     | 320      | -     | 438         | -     | 400       | -     | QSX15-G9 NR2                           |
| DFEH**  | 400        | 352   | 350      | 320   | 500         | 440   | 438       | 400   | QSX15-G9 NR2 (60Hz)<br>QXS15-G8 (50Hz) |
| DFEJ**  | 450        | 400   | 410      | 364   | 563         | 500   | 513       | 455   | QSX15-G9 NR2 (60Hz)<br>QXS15-G8 (50Hz) |
| DFEK**  | 500        | 440   | 455      | 400   | 625         | 550   | 569       | 500   | QSX15-G9 NR2 (60Hz)<br>QXS15-G8 (50Hz) |
| DFGB    | 600        | 550   | 545      | 500   | 750         | 688   | 681       | 625   | VTA28-G5                               |
| DQCA**  | 600        | 545   | 545      | 500   | 750         | 681   | 681       | 625   | QSK23-G7 (60Hz)<br>QSK23-G3 (50Hz)     |
| DFGE    | 750        | -     | -        | -     | 938         | -     | -         | -     | VTA28-G7                               |
| DFHA    | 750        | 620   | 680      | 560   | 938         | 775   | 850       | 700   | QST30-G1                               |
| DQCB**  | 750        | 660   | 680      | 600   | 938         | 825   | 850       | 750   | QSK23-G7 (60Hz)<br>QSK23-G3 (50Hz)     |
| DQFAA** | 750        | -     | 680      | -     | 1000        | -     | 850       | -     | QST30-G5 NR2                           |
| DFHB    | 800        | 700   | 725      | 640   | 1000        | 875   | 906       | 800   | QST30-G2                               |
| DQCC**  | 800        | 720   | 725      | 656   | 1000        | 900   | 906       | 820   | QSK23-G7 (60Hz)<br>QSK23-G3 (50Hz)     |
| DQFAB** | 800        | -     | 725      | -     | 1125        | -     | 907       | -     | QST30-G5 NR2                           |
| DFHC    | 900        | 800   | 818      | 725   | 1125        | 1000  | 1023      | 906   | QST30-G3                               |
| DQFAC** | 900        | -     | 818      | -     | 1250        | -     | 1023      | -     | QST30-G5 NR2                           |
| DFHD    | 1000       | 880   | 900      | 800   | 1250        | 1100  | 1125      | 1000  | QST30-G5 (60Hz)<br>QST30-G4 (50Hz)     |
| DQFAD** | 1000       | -     | 900      | -     | 1563        | -     | 1125      | -     | QST30-G5 NR2                           |
| DFLC    | 1250       | 1120  | 1100     | 1000  | 1563        | 1400  | 1375      | 1250  | KTA50-G3                               |
| DQGAA** | 1250       | -     | 1100     | -     | 1563        | -     | 1375      | -     | QSK50-G4 NR2                           |
| DQGAE** | 1250       | -     | 1135     | -     | 1563        | -     | 1419      | -     | QSK50-G5                               |
| DFLE    | 1500       | 1290  | 1250     | 1100  | 1875        | 1613  | 1563      | 1375  | KTA50-G9 (60Hz)<br>KTA50-G8 (50Hz)     |
| DQGAB** | 1500       | -     | 1350     | -     | 1875        | -     | 1688      | -     | QSK50-G4 NR2                           |
| DQGAJ** | 1500       | -     | 1365     | -     | 1875        | -     | 1706      | -     | QSK50-G5                               |
| DQKB    | 1750       | 1500  | 1600     | 1350  | 2188        | 1875  | 2000      | 1688  | QSK60-G6 (60Hz)<br>QSK60-G3 (50Hz)     |
| DQKAA** | 1750       | -     | 1600     | -     | 2188        | -     | 2000      | -     | QSK60-G6 NR2                           |
| DQKAD** | 1750       | -     | 1600     | -     | 2188        | -     | 2000      | -     | QSK60-G6                               |
| DQKC    | 2000       | 1650  | 1825     | 1500  | 2500        | 2063  | 2281      | 1875  | QSK60-G6 (60Hz)<br>QSK60-G3 (50Hz)     |
| DQKAB** | 2000       | -     | 1825     | -     | 2500        | -     | 2281      | -     | QSK60-G6 NR2                           |
| DQKAE** | 2000       | -     | 1825     | -     | 2500        | -     | 2281      | -     | QSK60-G6                               |
| DQKD    | -          | 1800  | -        | 1600  | -           | 2250  | -         | 2000  | QSK60-G4                               |
| DQKH    | 2250       | 2000  | -        | -     | 2813        | 2500  | -         | -     | QSK60-G9 (60Hz)<br>QSK60-G8 (50Hz)     |
| DQKAF** | 2250       | -     | 1825     | -     | 2813        | -     | 2281      | -     | QSK60-G14                              |
| DQLC    | 2500       | -     | 2335     | -     | 3125        | -     | 2920      | -     | QSK78-G6                               |
| DQLE**  | 2500       | -     | -        | -     | -           | -     | -         | -     | QSK78-G10                              |
| DQLD    | 2750       | -     | 2500     | -     | -           | -     | -         | -     | QSK78-G8                               |



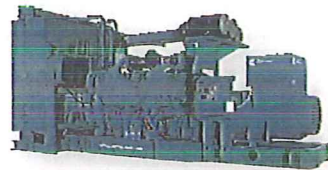
DQDAA



DFEK



DFHC



DQKAA

\*\*Available with EPA Stationary  
Emergency Certification  
Most models UL 2200-listed.  
See your distributor for specific details.

For additional technical specifications, visit  
<http://www.cumminspower.com/na/products/generators/diesel>

# Low-Emissions Technologies

We are committed to meeting and exceeding clean air standards worldwide.

## Developing products for a cleaner tomorrow

Cummins Power Generation leads the industry in the development of cleaner, quieter and more efficient diesel-powered generators. We are committed to meeting and exceeding all global air-quality regulatory standards for stationary and nonroad diesel engine generators through 2017 and beyond. This protects public health and conserves vital natural resources.



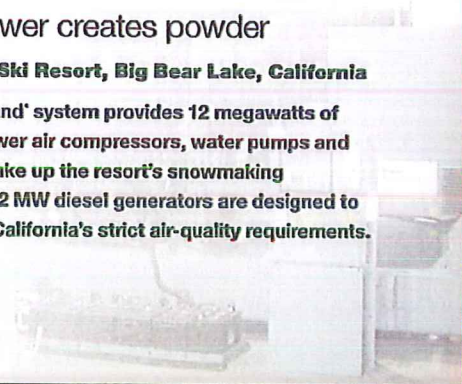
## New technologies to reduce emissions

Since 1996, when U.S. EPA emissions regulations for nonroad diesel engines first went into effect, Cummins Power Generation has developed technologies that reduce the primary pollutants in the exhaust of diesel generator sets by approximately 80 percent. Pollutants such as nitrogen oxides (NOx), hydrocarbons (HC) and particulate matter (PM) from diesel engines are precursors to smog and ozone in many populated areas of the world. Our emissions reductions result from a careful balance of in-cylinder and after-treatment technologies.

## "Clean" power creates powder

### Snow Summit Ski Resort, Big Bear Lake, California

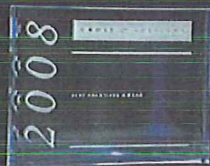
A PowerCommand<sup>®</sup> system provides 12 megawatts of electricity to power air compressors, water pumps and fan guns that make up the resort's snowmaking equipment. The 2 MW diesel generators are designed to meet Southern California's strict air-quality requirements.



## Award-winning product quality

Cummins Power Generation received the 2008 North American Product Quality Leadership of the Year Award from Frost & Sullivan, a global growth consulting company. In granting the national award, Frost & Sullivan recognized Cummins Power Generation for its "effective business strategies and adoption of eco-friendly guidelines that establish the superiority of its products."

This was the second time that Frost & Sullivan recognized Cummins Power Generation. In 2006, the company won the North American Diesel Engine Technology Leadership of the Year Award.



# Lean-Burn Gas 315 kW to 2 MW

Lean-burn gas generator sets provide premier performance, fuel efficiency, and low emissions for high hour peaking, prime power, combined heat and power (CHP), and waste to energy applications.

Using a lean mixture of fuel and air, this design significantly reduces combustion temperatures, which minimizes the production of nitrogen oxides (NOx). The result is high power output with maximum thermal efficiency and minimal emissions.

The Power Projects Group of Cummins Power Generation can handle the most complex requirements surrounding lean-burn gas applications, from initial site planning to system design, construction and installation, through operation and maintenance. We are a total solutions provider, with a single point of contact for seamless global support.

## Power output

50 Hz

| Model     | RPM  | Continuous kW | Engine Type |
|-----------|------|---------------|-------------|
| 315GFBE   | 1500 | 315           | QSK19G      |
| C995 N5C  | 1500 | 995           | QSK60G      |
| C1160 N5C | 1500 | 1160          | QSK60G      |
| C1200 N5C | 1500 | 1200          | QSK60G      |
| C1400 N5C | 1500 | 1400          | QSV91G      |
| C1540 N5C | 1500 | 1540          | QSV91G      |
| C1750 N5C | 1500 | 1750          | QSV91G      |
| C2000 N5C | 1500 | 2000          | QSV91G      |

For additional technical specifications, visit <http://www.cumminspower.com/na/products/generators/leanburn>

## Power output

60 Hz

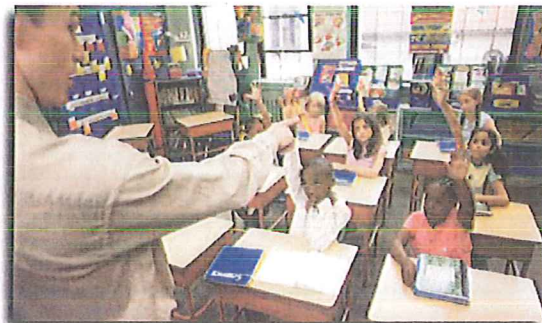
| Model     | Continuous kW | Standby kW | RPM  | Engine Type |
|-----------|---------------|------------|------|-------------|
| 334GFBE   | 334           | -          | 1800 | QSK19G      |
| C1000 N6C | 1000          | -          | 1200 | QSK60G      |
| C1000 N6  | -             | 1000       | 1800 | QSK60G      |
| C1100 N6C | 1100          | -          | 1200 | QSK60G      |
| C1250 N6  | -             | 1250       | 1800 | QSK60G      |
| C1250 N6C | 1250          | -          | 1200 | QSV91G      |
| C1350 N6  | -             | 1350       | 1800 | QSK60G      |
| C1400 N6C | 1400          | -          | 1800 | QSK60G      |
| C1700 N6  | -             | 1700       | 1500 | QSV91G      |
| C1750 N6C | 1750          | -          | 1500 | QSV91G      |
| C2000 N6C | 2000          | -          | 1500 | QSV91G      |

For additional technical specifications, visit <http://www.cumminspower.com/na/products/generators/leanburn>

## CHP system saves money on high on-peak electric rates

**William Floyd School District, Shirley, New York**

Facing rapidly rising electricity costs, school district officials installed a 2.5 MW combined heat and power system to power three buildings of the Shirley campus. The CHP system provides nearly all of the electricity, heating and cooling for the campus during the local utility's daily peak usage hours when power is very expensive. In the first three years of operation, the CHP system saved more than \$1.2 million.



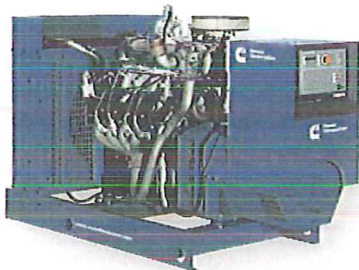
# Spark-Ignited 20 kW to 150 kW

Spark-ignited generator sets are a convenient choice for a variety of emergency and standby applications, including healthcare offices and retail businesses that require gaseous fuel options to meet local codes or fuel containment and economic requirements. They are available with natural gas, propane and dual fuel systems.

Installation and connection to the fuel source lines are both basic and convenient. As with our diesel generator sets, a complete selection of voltages, accessories, generator sets and control options are available for customizing to your specific needs.

Major features include:

- Multiple control system options, including NFPA 110 compliance
- Natural gas, propane or dual fuel systems
- Weather-protective and sound-attenuated enclosures (steel or aluminum)
- Good motor-starting capability and fast recovery from transient load changes
- Closed-loop fuel control system and three-way catalyst to reduce emissions (select models)
- U.S. EPA emissions compliance



GGLA/GGLB

## Power output

| Model |             | Standby kW |       | Prime kW | Standby kVA |       | Prime kVA | Engine type    |
|-------|-------------|------------|-------|----------|-------------|-------|-----------|----------------|
|       |             | 60 Hz      | 50 Hz | 50 Hz    | 60 Hz       | 50 Hz | 50 Hz     |                |
| GGMA* | Natural gas | 20         | -     | -        | 25          | -     | -         | GM i4 3.0L     |
|       | Propane**   | 20         | -     | -        | 25          | -     | -         | GM i4 3.0L     |
| GGMB* | Natural gas | 25         | -     | -        | 31          | -     | -         | GM i4 3.0L     |
|       | Propane**   | 25         | -     | -        | 31          | -     | -         | GM i4 3.0L     |
| GGMC* | Natural gas | 29         | -     | -        | 36          | -     | -         | GM i4 3.0L     |
|       | Propane**   | 30         | -     | -        | 38          | -     | -         | GM i4 3.0L     |
| GGPA* | Natural gas | 35         | -     | -        | 44          | -     | -         | GM v8 5.0L     |
|       | Propane*    | 35         | -     | -        | 44          | -     | -         | GM v8 5.0L     |
| GGPB* | Natural gas | 40         | -     | -        | 50          | -     | -         | GM v8 5.0L     |
|       | Propane*    | 40         | -     | -        | 50          | -     | -         | GM v8 5.0L     |
| GGPC* | Natural gas | 45         | 35    | 30       | 56          | 44    | 38        | GM v8 5.0L     |
|       | Propane*    | 50         | 35    | 30       | 63          | 44    | 38        | GM v8 5.0L     |
| GGHE* | Natural gas | 60         | -     | -        | 75          | -     | -         | Ford v10 6.8L  |
|       | Propane*    | 60         | -     | -        | 75          | -     | -         | Ford v10 6.8L  |
| GGHF* | Natural gas | 70         | 55    | 47       | 88          | 69    | 59        | Ford v10 6.8L  |
|       | Propane*    | 75         | 60    | 51       | 94          | 75    | 64        | Ford v10 6.8L  |
| GGHG* | Natural gas | 85         | -     | -        | 106         | -     | -         | Ford v10T 6.8L |
|       | Propane*    | 85         | -     | -        | 106         | -     | -         | Ford v10T 6.8L |
| GGHH* | Natural gas | 100        | 75    | -        | 125         | 94    | -         | Ford v10T 6.8L |
|       | Propane*    | 100        | 75    | -        | 125         | 94    | -         | Ford v10T 6.8L |
| GGLA* | Natural gas | 125        | -     | -        | 156         | -     | -         | GM v8T 8.1L    |
| GGLB* | Natural gas | 150        | -     | -        | 188         | -     | -         | GM v8TA 8.1L   |
|       | Propane*    | 140        | -     | -        | 175         | -     | -         | GM v8TA 8.1L   |

For additional technical specifications, visit:  
<http://www.cumminspower.com/na/products/generators/sparkIgnited>

\* Liquid or vapor withdrawal

\*\* Vapor withdrawal only

\* Models are available with EPA Stationary Emergency Emissions Certification

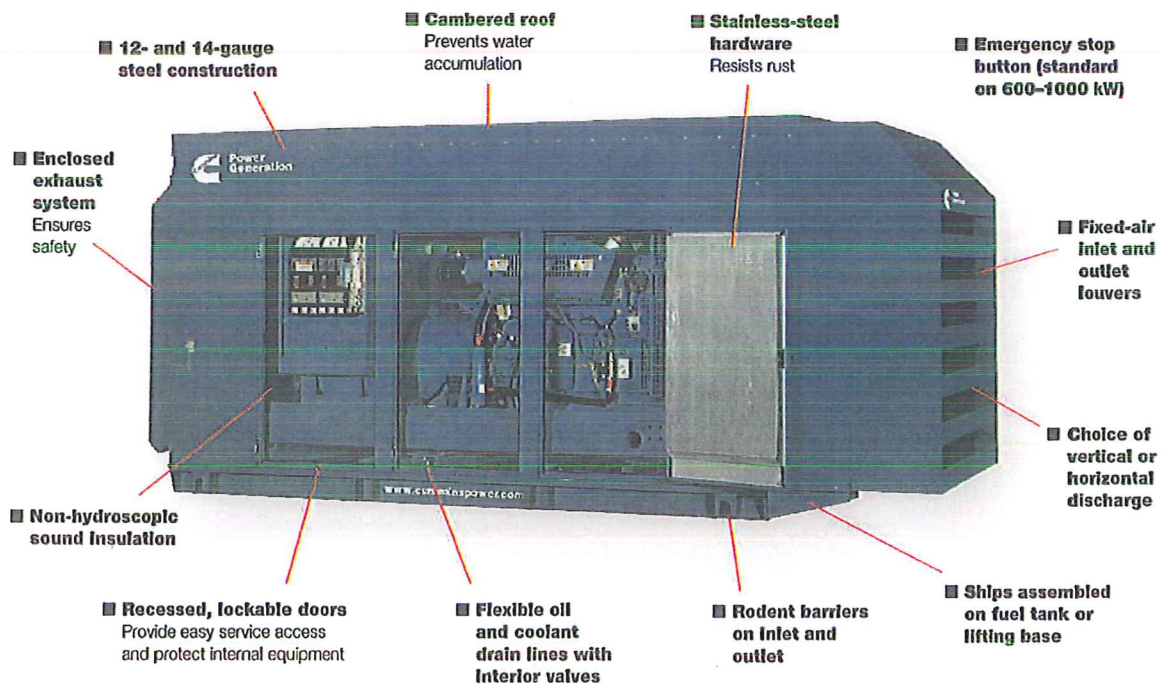
# Enclosures

## Sound-Attenuated and Weather-Protective

Sound-attenuated and weather-protective enclosures from Cummins Power Generation meet the strictest sound requirements and provide optimum protection from inclement weather.

Cummins Power Generation diesel and spark-ignited generator sets are available with sound-attenuated and weather-protective enclosures. Pre-assembled, pre-integrated and delivered as part of the entire power system, these enclosures are designed to speed installation time and reduce costs.

- Three levels of sound attenuation
- Compact footprint, low-profile design
- Easy access to all major generator and engine control components for servicing
- Fully housed, enclosed exhaust silencer ensures safety and protects against rust
- All-steel construction with stainless-steel hardware offers durability
- Direct-mounted to a sub-base fuel tank or lifting base
- Prototype-tested to verify sound attenuation, cooling and ventilation system performance in extreme temperature environments
- UL2200-listed
- IBC Seismic Certification option available



| Sound levels (dB(A))* |                   |                    |         |          |
|-----------------------|-------------------|--------------------|---------|----------|
| kW                    | Model             | Weather-protective | Level I | Level II |
| <b>Diesel</b>         |                   |                    |         |          |
| 10                    | DSKAA             | 78                 | 68      | 65       |
| 15                    | DSKAB             | 81                 | 69      | 66       |
| 20                    | DSKBA             | 80                 | 70      | 67       |
| 25                    | DSKCA             | 82                 | 72      | 69       |
| 30                    | DGHCA             | 75                 | 68      | 62       |
| 35                    | DGHCB             | 76                 | 68      | 62       |
| 35                    | DGBB <sup>o</sup> | 82                 | 71      | 63       |
| 40                    | DGHCC             | 76                 | 69      | 62       |
| 40                    | DGBC <sup>o</sup> | 82                 | 72      | 63       |
| 50                    | DGCA              | 83                 | 72      | 66       |
| 50                    | DGHE              | 79                 | 70      | 65       |
| 60                    | DGCB              | 84                 | 73      | 67       |
| 60                    | DSFAD             | 87                 | 79      | 71       |
| 80                    | DGCG              | 84                 | 76      | 67       |
| 80                    | DSFAE             | 87                 | 82      | 72       |
| 100                   | DGDB              | 86                 | 77      | 70       |
| 100                   | DSGAA*            | 87                 | -       | 73       |
| 100                   | DSHAF             | 95                 | 88      | 78       |
| 125                   | DGDK              | 86                 | 80      | 71       |
| 125                   | DSGAB*            | 87                 | -       | 74       |
| 125                   | DSHAE             | 95                 | 88      | 78       |
| 150                   | DGFA              | 89                 | 77      | 72       |
| 150                   | DSGAC*            | 88                 | -       | 75       |
| 150                   | DSHAA             | 95                 | 88      | 78       |
| 175                   | DGFB              | 90                 | 78      | 72       |
| 175                   | DSHAB             | 95                 | 88      | 78       |
| 200                   | DGFC              | 91                 | 80      | 74       |
| 200                   | DSHAC             | 95                 | 88      | 78       |
| 230                   | DGFS              | 91                 | 81      | 75       |
| 230                   | DSHAD             | 96                 | 89      | 78       |
| 250                   | DQDAA             | 90                 | 86      | 71       |
| 275                   | DQDAB             | 89                 | 86      | 71       |
| 275                   | DQHAA             | 86                 | 85      | 74       |
| 300                   | DFCB              | 86                 | 84      | 71       |
| 300                   | DQDAC             | 89                 | 86      | 71       |
| 300                   | DQHAB             | 89                 | 88      | 76       |
| 350                   | DFEG              | 85                 | 83      | 72       |
| 400                   | DFEJ              | 89                 | 85      | 73       |
| 450                   | DFEJ              | 87                 | 84      | 73       |
| 500                   | DFEK              | 88                 | 85      | 76       |
| 600                   | DFGB              | 85                 | 78      | 74       |
| 600                   | DQCA              | 87                 | 79      | 74       |
| 750                   | DFGE              | 87                 | 80      | 75       |
| 750                   | DFHA              | 91                 | 81      | 77       |
| 750                   | DQCB              | 87                 | 79      | 74       |
| 750                   | DQFAA             | 89                 | 79      | 75       |
| 800                   | DFHB              | 91                 | 81      | 77       |
| 800                   | DQCC              | 87                 | 79      | 74       |
| 800                   | DQFAB             | 89                 | 79      | 75       |
| 900                   | DFHC              | 93                 | 83      | 78       |
| 900                   | DQFAC             | 88                 | 80      | 76       |
| 1000                  | DFHD              | 90                 | 80      | 76       |
| 1000                  | DQFAD             | 90                 | 80      | 76       |

| Sound levels (dB(A))* |       |                    |         |          |
|-----------------------|-------|--------------------|---------|----------|
| kW                    | Model | Weather-protective | Level I | Level II |
| <b>Natural gas</b>    |       |                    |         |          |
| 20                    | GGMA  | 77                 | N/A     | 66       |
| 25                    | GGMB  | 78                 | N/A     | 66       |
| 30                    | GGMC  | 79                 | N/A     | 67       |
| 35                    | GGPA  | 82                 | 74      | 63       |
| 40                    | GGPB  | 83                 | 74      | 65       |
| 50                    | GGPC  | 83                 | 74      | 65       |
| 60                    | GGHE  | 86                 | 77      | 68       |
| 70                    | GGHF  | 87                 | 77      | 69       |
| 85                    | GGHG  | 85                 | 79      | 75       |
| 100                   | GGHH  | 86                 | 80      | 76       |
| 125                   | GGLA  | 85                 | 79      | 75       |
| 150                   | GGLB  | 85                 | 79      | 75       |

**\*Also available Level III**

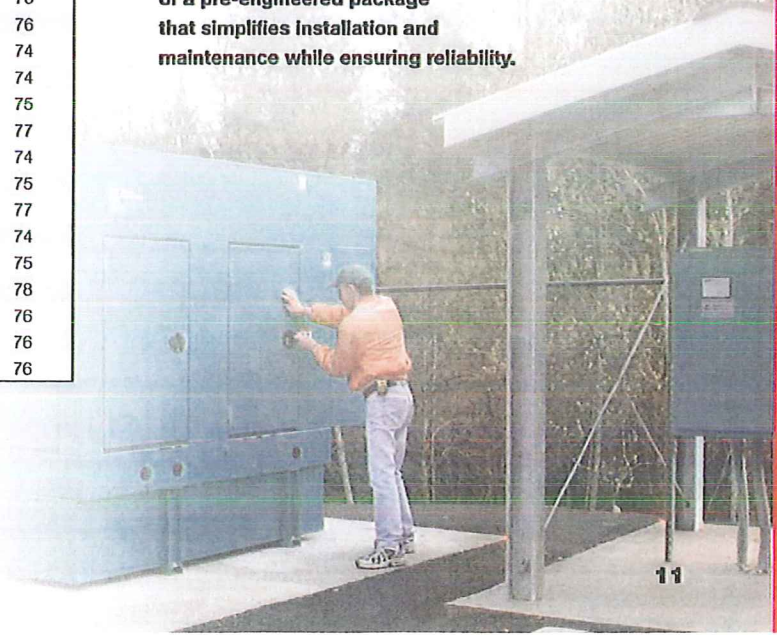
|        |       |          |
|--------|-------|----------|
| 100 kW | DSGAA | 68 dB(A) |
| 125 kW | DSGAB | 69 dB(A) |
| 150 kW | DSGAC | 70 dB(A) |

**<sup>o</sup>Models to be discontinued in 2011**



DSGAA

Sound-attenuated generator sets are installed at wastewater lift stations in Camas, Washington, as part of a pre-engineered package that simplifies installation and maintenance while ensuring reliability.



# PowerCommand® Generator Set Controls

PowerCommand controls give you reliable, cost-effective solutions to integrated digital paralleling.

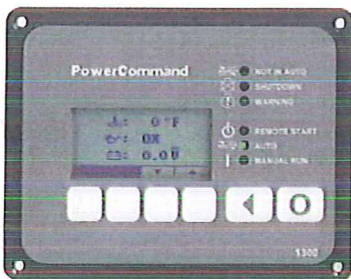
Only generator sets from Cummins Power Generation are available with industry-leading PowerCommand controls. Standard features include not only integrated digital governing and voltage regulation, but also analog and digital metering, digital engine monitoring systems, smart-starting systems, battery monitoring systems, AmpSentry™ true alternator protection, and more.

## For non-paralleling applications:

PowerCommand 1.1 and 2.2 controls are your best choice for emergency, standby and prime power applications that do not require paralleling.

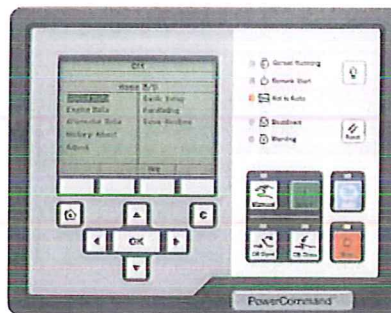
## For paralleling applications:

For complex applications, PowerCommand 3.3 controls parallel with other generator sets or with the utility service.



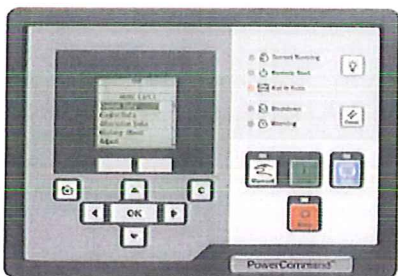
### PowerCommand 1.1

Reliable and cost-effective control for NFPA 110-level 1 applications



### PowerCommand 3.3

Paralleling and power transfer control for generator sets with emissions-controlled engines and hydro mechanical fuel system controls



### PowerCommand 2.2

Premium control and flexibility for demanding applications such as data centers

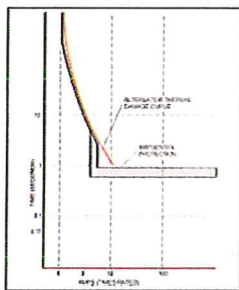
## Major features

|   | PowerCommand |     |     |
|---|--------------|-----|-----|
|   | 1.1          | 2.2 | 3.3 |
| <b>General</b>  |              |     |     |
| AVR   | ●            | ●   | ●   |
| Digital 3-phase sensing voltage regulator                         | -            | ●   | ●   |
| Glow plug control   | ●            | -   | -   |
| Cycle cranking  | ●            | ●   | ●   |
| Full authority engine control                                     | ●            | -   | ●   |
| Networking (LonWorks)   | -            | ●   | ●   |
| Networking (PCCNet)   | ●            | -   | -   |
| Networking (Modbus)   | ●            | ●   | ●   |
| Fault history   | ●            | ●   | ●   |
| <b>Operator interface</b>   |              |     |     |
| Manual start/stop   | ●            | ●   | ●   |
| Auto/remote start   | ●            | ●   | ●   |
| Exercise function   | -            | -   | ●   |
| Emergency stop (local and remote)                                 | ●            | ●   | ●   |
| Alphanumeric screen   | ●            | ●   | ●   |
| Remote start input active led                                     | ●            | -   | ●   |
| Fault reset   | ●            | ●   | ●   |
| <b>Paralleling capability</b>                                     |              |     |     |
| First start sensor system   | -            | ●   | ●   |
| Phase lock loop synchronizer                                      | -            | ●   | ●   |
| Manual sync with synchroscope                                     | -            | ●   | ●   |
| kW and kVAR load sharing  | -            | ●   | ●   |
| Import/export and Var/PF control                                  | -            | ●   | ●   |
| Base loading (utility bus)  | -            | ●   | ●   |
| Power transfer control  | -            | -   | ●   |
| Peak shaving  | -            | ●   | ●   |
| <b>Environment</b>  |              |     |     |
| Interface temp. range -20°C to +70°C<br>(optional -40°C to +70°C) | ●            | ●   | ●   |
| Humidity up to 95% (noncondensing)                                | ●            | ●   | ●   |
| <b>Codes and standards</b>  |              |     |     |
| CE-compliant  | ●            | ●   | ●   |
| NFPA110   | ●            | ●   | ●   |
| UL 508-listed/recognized  | ●            | ●   | ●   |
| UL-certified  | ●            | ●   | ●   |

● Standard      ○ Option      - Not Available

|  | PowerCommand |     |     |
|--|--------------|-----|-----|
|  | 1.1          | 2.2 | 3.3 |
| <b>Shutdown protection and indication — engine</b>     |              |     |     |
| Low fuel level   | ○            | ●   | ●   |
| High fuel level  | -            | -   | ○   |
| Low oil pressure                                       | ●            | ●   | ●   |
| High engine coolant temperature                        | ●            | ●   | ●   |
| Failure to crank shutdown                              | ●            | ●   | ●   |
| Over crank (failure to start)                          | ●            | ●   | ●   |
| High/low battery voltage/weak battery                  | ●            | ●   | ●   |
| Overspeed  | ●            | ●   | ●   |
| <b>Shutdown protection and indication — alternator</b> |              |     |     |
| Under and over voltage                                 | ●            | ●   | ●   |
| Under and over frequency                               | ●            | ●   | ●   |
| Overcurrent and short circuit                          | ●            | ●   | ●   |
| Ground fault (earth leakage)                           | ○            | ○   | ○   |
| Reverse power  | -            | ○   | ●   |
| Reverse Var  | -            | ○   | ●   |
| <b>Measurement and instrumentation — engine</b>        |              |     |     |
| Oil pressure   | ●            | ●   | ●   |
| Oil temperature  | -            | ○   | ○   |
| Coolant temperature                                    | ●            | ●   | ●   |
| Engine speed   | ●            | ●   | ●   |
| Engine running hours                                   | ●            | ●   | ●   |
| Number of starts                                       | ●            | ●   | ●   |
| Battery voltage  | ●            | ●   | ●   |
| Exhaust temperature                                    | -            | ○   | ○   |
| <b>Measurement and instrumentation — alternator</b>    |              |     |     |
| 3-phase L-L & L-N voltage, frequency                   | ●            | ●   | ●   |
| 3-phase current  | ●            | ●   | ●   |
| kWh  | -            | ●   | ●   |
| Total kVa  | ●            | ●   | ●   |
| Total kWe and kVAR                                     | -            | -   | ●   |
| PF   | -            | ●   | ●   |
| Per phase kVAR, kWe                                    | -            | -   | ●   |
| Per phase kVa  | -            | -   | ●   |

For additional technical specifications, visit:  
<http://www.cumminspower.com/na/products/generators/diesel>



## AmpSentry™ protective relay for monitoring and control

AmpSentry protective relays guard the electrical integrity of the alternator and power system, and facilitate selective coordination while protecting against a wide range of fault conditions.

Single- and three-phase fault regulation gives downstream protective devices reliable levels of fault current to clear faults quickly, without risking the life of the alternator or exposing loads to potentially damaging voltage levels.

AmpSentry protective relays are UL-listed as utility-grade protective relays and are standard on **PowerCommand 2.2 and 3.3 controls**.

# Power Transfer Equipment

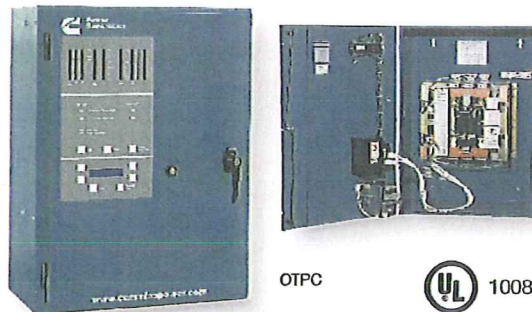
PowerCommand® automatic transfer switches communicate directly with the generator set controller, providing more reliable communication across the entire system.

In addition to a full line of standard transfer switches, custom-engineered switches are available to fit unique project requirements anywhere in the world.



**Orange County Convention Center, Orlando, Florida**

A 6 MW standby power system in the Phase V expansion includes 72 automatic transfer switches. The transfer switches are used for load distribution and for switching between the utility source and four 1500 kW PowerCommand diesel generator sets.



## Automatic transfer switches

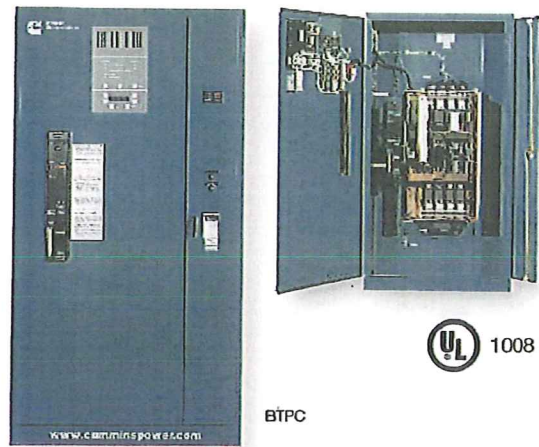
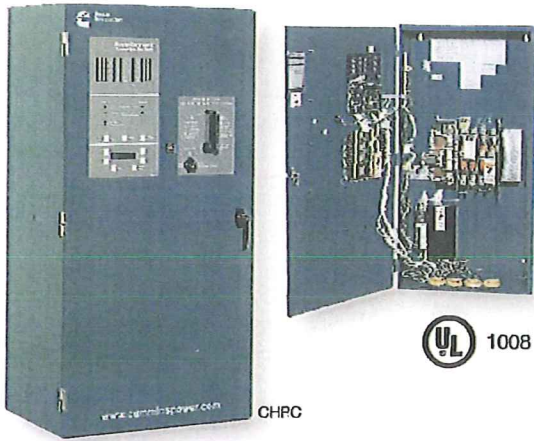
PowerCommand automatic transfer switches feature microprocessor-based control technology for easy operation and robust, high-contact-force design to withstand thousands of switching cycles. Applications include utility-to-generator-set, utility-to-utility or generator-set-to-generator-set. Open transition switches can be adjusted to completely disconnect the load from both sources for a programmed time period to prevent unnecessary circuit breaker tripping and load damage.

Major features include:

- UL 1008-listed withstand and closing ratings up to 200kA
- Convenient front-panel display to easily review power and load conditions, make adjustments, review events, and check network status
- Service entrance configurations to 1000 amps

## Closed-transition transfer switches

For critical applications where even a momentary loss of power makes a difference, closed transition provides make-before-break transfer between live sources by momentarily paralleling the two sources.



For installations rated from 800 to 3,000 amps, our digital paralleling load transfer (PLT) equipment, specifically designed for ramping closed-transition transfer, transfers power between a generator set and utility service without disturbing power to critical loads.

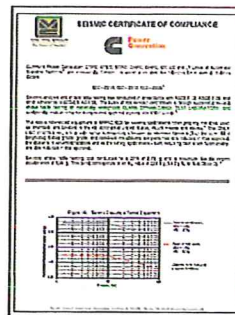
### Bypass-isolation switches

PowerCommand bypass-isolation transfer switches allow maintenance, service and testing of the automatic transfer switch without disrupting power to critical loads. They are ideal for critical-need applications where any disruption of supply power, even for routine maintenance, is unacceptable.

Major features include:

- Closed-door drawout isolation mechanism
- Two-source bypass switch
- Microprocessor-based controls
- Optional <100-millisecond closed-transition transfer

| Model   | Features  | # poles | Size (amps) |
|---------|---|---------|-------------|
| OTEC    | Basic feature package, heavy-duty switch                          | 3, 4    | 40-1200 A   |
| OTPC    | Fully featured, heavy-duty switch                                 | 3, 4    | 40-4000 A   |
| OTEC-SE | Basic feature package, service entrance switch                    | 3, 4    | 40-1000 A   |
| OTPC-SE | Fully featured, service entrance switch                           | 3, 4    | 40-1000 A   |
| BTPC    | Fully featured, bypass isolation, heavy-duty switch               | 3, 4    | 150-4000 A  |
| OHPC    | Premium featured, high withstand rated, heavy-duty switch         | 2, 3, 4 | 125-800 A   |
| CHPC    | Closed transition, 100ms, high withstand rated, heavy-duty switch | 2, 3, 4 | 125-800 A   |
| PLT     | Open, closed or soft transition, breaker-based                    | 3, 4    | 800-3000 A  |



Transfer switches are seismically tested and third-party approved in compliance to IBC requirements.

# Paralleling Systems

PowerCommand® paralleling systems are operated by DMC Digital MasterControls that interface directly with PowerCommand generator sets. The DMC is a complete logic control system for complex and demanding on-site power systems where reliability, performance and flexibility are paramount.

In PowerCommand paralleling systems, the generator set-mounted control provides all the paralleling functions: generator control and protection, synchronizing, first-to-bus logic, load sharing, and load governing.

The DMC provides system-level functions, including load add and load shed sequencing, load demand, and system operator interface.

DMC controls are available with a wide range of control and display options, so custom control configurations can be achieved with minimal design work.



## Parallel system synchronizes with utility grid

**McMinnville Township, Tennessee**

The McMinnville Electric System, a Tennessee Valley Authority member utility, relies on a 20 MW diesel power plant to help the TVA meet its peak demand and provide emergency backup power for up to 40 percent of McMinnville's load.



# Rental Power

## Whatever your power need

From providing prime power for a remote gold mine, to backup power for scheduled maintenance, to emergency power after a hurricane, Cummins Power Generation has a Rental Power solution to meet your needs. From a single temporary Rental Power unit to turnkey packages, including product specifications, delivery start-up and fueling, we pair our tailored solution with unparalleled support 24 hours a day, seven days a week.

Cummins Power Generation offers a wide range of Rental Power systems, from 60 kW to 2 MW,

and all units are pre-integrated, skid-mounted and containerized or enclosed. Our Rental Power units are configured especially for the rental power market and packaged in an easy-to-operate customer interface to maximize flexibility and minimize setup. Systems include engines, generators, monitoring controls, automatic transfer switches and switchgear equipment.



### 60-300 kW

| Model         |                                 | C60                   | C80     | C100    | C150          | C200         | C300                  |          |
|---------------|---------------------------------|-----------------------|---------|---------|---------------|--------------|-----------------------|----------|
| Generator set | Power factor                    | 0.8                   |         |         |               |              |                       |          |
|               | Standby output (kW)             | 60                    | 80      | 100     | 150           | 200          | 300                   |          |
|               | Prime output (kW)               | 55                    | 72      | 90      | 135           | 180          | 270                   |          |
|               | Voltage - 3 phase (V)           | 208/480 or 600        |         |         |               |              |                       |          |
|               | Cooling System                  | 122°F (50°C)          |         |         | 120°F (49°C)  | 118°F (48°C) | 122°F (50°C)          |          |
|               | Fuel consumption at prime       | at Full load          | 5 gph   | 6 gph   | 7.2 gph       | 10.1 gph     | 13 gph                | 19.8 gph |
| at 3/4 load   |                                 | 4.1 gph               | 5 gph   | 5.8 gph | 8 gph         | 10.9 gph     | 15 gph                |          |
| at 1/2 load   |                                 | 2.3 gph               | 3.3 gph | 3.9 gph | 5.9 gph       | 7.8 gph      | 10.8 gph              |          |
| at 1/4 load   |                                 | 1.9 gph               | 2.1 gph | 2.3 gph | 3.1 gph       | 4.5 gph      | 6.5 gph               |          |
| Engine(s)     | Model                           | QSB5-G1               | QSB5-G2 | QSB5-G5 | QSB7-G3       | QSB7-G3      | QSM11-G4              |          |
|               | EPA nonroad tier rating         | Tier III              |         |         | Tier III/TPEM |              |                       |          |
|               | Displacement (in <sup>3</sup> ) | 272                   | 272     | 272     | 408           | 408          | 661                   |          |
|               | Starting voltage                | 12 V, negative ground |         |         |               |              | 24 V, negative ground |          |
|               | Battery capacity                | 1000 CCA              |         |         | 2 x 750 CCA   |              | 1000 CCA              |          |

### 500-2000 kW

| Model                     |                                 | C500                    | C800            | C1000    | C1500    | C1600           | C2000        |              |
|---------------------------|---------------------------------|-------------------------|-----------------|----------|----------|-----------------|--------------|--------------|
| Generator set             | Power factor                    | 0.8                     |                 |          |          |                 |              |              |
|                           | Standby output (kW)             | 500                     | 800             | 1000     | 1500     | 1600            | 2000         |              |
|                           | Prime output (kW)               | 455                     | 725             | 900      | 1350     | 1450            | 1800         |              |
|                           | Voltage - 3 phase (V)           | 208/480 or 600          |                 |          |          | 480/600         |              |              |
|                           | Cooling System                  | 122°F (50°C)            |                 |          |          | 113°F (45°C)    | 113°F (45°C) | 122°F (50°C) |
|                           | Paralleling                     | Standard 480 & 600 only |                 |          |          | Standard        |              |              |
| Fuel consumption at prime |                                 | at Full load            | 30 gph          | 48 gph   | 64 gph   | 95 gph          | 96 gph       | 128 gph      |
|                           |                                 | at 3/4 load             | 24 gph          | 38 gph   | 47 gph   | 71 gph          | 76 gph       | 94 gph       |
|                           |                                 | at 1/2 load             | 18 gph          | 27 gph   | 32 gph   | 53 gph          | 54 gph       | 64 gph       |
|                           | at 1/4 load                     | 11 gph                  | 15 gph          | 17 gph   | 29 gph   | 30 gph          | 34 gph       |              |
| Engine(s)                 | Model                           | QSX15-G9                | QSK23-G7        | QST30-G5 | QSK50-G4 | QSK23-G7 x 2    | QST30-G5 x 2 |              |
|                           | EPA nonroad tier rating         | Tier II/TPEM            |                 |          |          |                 |              |              |
|                           | Displacement (in <sup>3</sup> ) | 912                     | 1413            | 1860     | 3067     | 1413 x 2        | 1860 x 2     |              |
|                           | Starting voltage                | 24 V, negative ground   |                 |          |          |                 |              |              |
|                           | Battery capacity                | 2 x 12V 1235 CCA        | 4 x 8D 1250 CCA |          |          | 8 x 8D 1250 CCA |              |              |

# Software and Networking

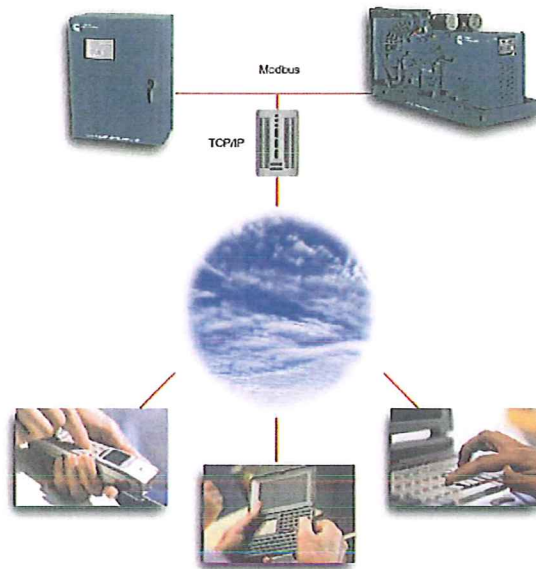
PowerCommand® software and networking tools let you easily manage on-site and off-site power systems from one location.

Whether you're using a desktop computer, a laptop or a cell phone, PowerCommand remote monitoring systems help you reduce power setup time, operation and maintenance.

## PowerCommand accessories for reliable web-based monitoring

PowerCommand remote monitoring systems let you monitor generator set and transfer switch functions via the Internet. You can:

- Monitor remotely via wireless connection using cellular or satellite communications
- Communicate via an Ethernet connection, phone line or available wireless configuration
- Connect via an Internet browser on a remote PC
- Send alarms to cell phones, pagers or e-mail addresses
- Display voltage and frequency of each source
- Monitor one or two generator sets and up to four transfer switches

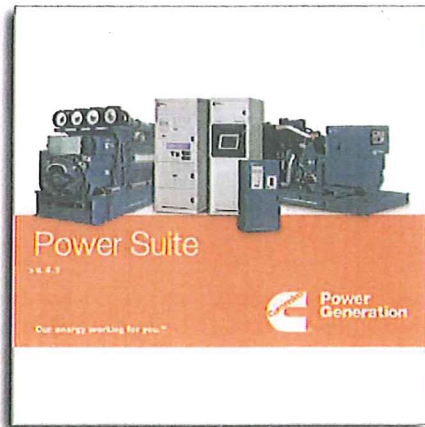


## PowerCommand InPower™ for planned maintenance

PowerCommand InPower for service and planned maintenance provides both local and remote setup and diagnostics. The PC-based software allows a technician to "talk to" a remote PowerCommand system, determine its status and make adjustments.

An Internet browser interface provides easy access to PowerCommand InPower's useful functions:

- *Strip charts* — Obtain real-time recordings of changing conditions and performance
- *Adjustments* — Change system operating parameters
- *Monitoring functions* — Use real-time monitoring and data recording to simplify testing and diagnostics
- *Report generation* — Automatically record test data and formats for quick test reporting
- *Fault simulations* — Simulate warning or shutdown conditions



### **PowerSuite**

PowerSuite, on CD-ROM, is available from your local Cummins distributor. This tool contains easy-to-use generator set sizing software, product specification and data sheets, key drawings in both PDF and CAD formats, along with other application technical information. This comprehensive set of product information and software tools helps you select appropriate power generation products and identify facility design and installation requirements.

PowerSuite includes:

#### **GenSize™**

A comprehensive, easy-to-use generator set sizing software that lets you quickly determine the optimum generator set required for your application.

#### **Library**

This is the electronic version of our power systems manual containing all product specification and data sheets, plus much more. The Library also contains outline, installation and wiring drawings in both PDF and CAD formats.

#### **GenSpec™**

This includes a series of product sample specifications in Word format that can be used as a source for power generation project specifications.

## Reliability, responsiveness and relationships — that's what you can expect from Cummins Power Generation.

Innovative technology, dependable products and custom solutions for your specific applications are all brought to you by people you can trust: the people of Cummins Power Generation.

You can rely on Cummins Power Generation to deliver complete power equipment solutions plus a full range of services, including system design, project management, financing, operation and maintenance contracts, and development of turnkey power plants.

### **Dedicated support team**

PowerCommand® systems are supported by one of the largest service and support organizations in the world — more than 5,200 sales and service centers in 190 countries. Cummins Power Generation distributors deliver single-source warranty, planned maintenance and round-the-clock emergency service with technicians continually trained and certified in paralleling power system design.

Our planned maintenance program, staffed by factory-certified technicians, not only increases your system reliability and maintains your factory warranty coverage, it also gives you the flexibility to tailor the program to your specific needs. You can count on Cummins Power Generation for expert local service, planned maintenance, troubleshooting, quality parts and comprehensive power systems support.

**Put our energy to work for you.**



**North America**  
1400 73rd Ave, NE,  
Minneapolis, MN 55432  
USA  
Phone 1 763 574 5000  
Fax 1 763 574 5298

**Asia Pacific**  
10 Toh Guan Road, #07-01,  
TT International Tradepark  
Singapore 608838  
Phone 65 6417 2388  
Fax 65 6417 2399

**Brazil**  
Rua Jati, 310, Cumbica  
Guarulhos, SP 07180-900  
Brazil  
Phone 55 11 2186 4195  
Fax 55 11 2186 4729

**China**  
8 Wanyuan Street, Beijing Economic  
and Technological Dev. Area  
Beijing 100176  
P.R. China  
Phone 86 10 6788 2258  
Fax 86 10 6788 2285

**Europe, CIS, Middle East and Africa**  
Manston Park Columbus Ave.  
Manston Ramsgate, Kent CT 12 5BF  
United Kingdom  
Phone 44 1843 255000  
Fax 44 1843 255902

**India**  
35A/1/2, Erandawana,  
Pune 411 038  
India  
Phone 91 020 6602 7525  
Fax 91 020 6602 8030

**Latin America**  
3350 Southwest 148th Ave.  
Suite 205, Miramar, FL 33027  
USA  
Phone 1 954 431 5511  
Fax 1 954 433 5797

**Mexico**  
Eje 122 No. 200 Zona Industrial  
San Luis Potosí, S.L.P. 78395  
Mexico  
Phone 52 444 870 6700  
Fax 52 444 824 0082

[www.cumminspower.com](http://www.cumminspower.com)

©2010 Cummins Power Generation Inc.  
All rights reserved. Cummins Power  
Generation and Cummins are registered  
trademarks of Cummins Inc.  
PowerCommand is a registered trademark  
of Cummins Power Generation. "The  
Power of One," InPower and "Our energy  
working for you." are trademarks of  
Cummins Power Generation. Other  
company, product, or service names may  
be trademarks or service marks of others.  
Specifications are subject to change  
without notice. F-1185 (12/10)

## Attachment C

---

### Day-Night Average Sound Level

## DAY-NIGHT AVERAGE SOUND LEVEL

245 Chapel Road  
South Windsor, CT

| <u>Hr Start</u> | <u>Hr End</u> | <u>Hourly</u><br><u>Leq</u> |   |
|-----------------|---------------|-----------------------------|---|
| 7:00 AM         | 8:00 AM       | 65.6                        | The Daytime<br>Average is:<br><br>LD = 63.41573 |
| 8:00 AM         | 9:00 AM       | 65.0                        |   |
| 9:00 AM         | 10:00 AM      | 64.9                        |   |
| 10:00 AM        | 11:00 AM      | 65.3                        |   |
| 11:00 AM        | 12:00 PM      | 63.9                        |   |
| 12:00 PM        | 1:00 PM       | 64.7                        |   |
| 1:00 PM         | 2:00 PM       | 63.8                        |   |
| 2:00 PM         | 3:00 PM       | 64.5                        |   |
| 3:00 PM         | 4:00 PM       | 64.6                        |   |
| 4:00 PM         | 5:00 PM       | 63.7                        |   |
| 5:00 PM         | 6:00 PM       | 61.8                        |   |
| 6:00 PM         | 7:00 PM       | 60.8                        |   |
| 7:00 PM         | 8:00 PM       | 60.4                        |   |
| 8:00 PM         | 9:00 PM       | 59.6                        |   |
| 9:00 PM         | 10:00 PM      | 58.6                        |   |
| 10:00 PM        | 11:00 PM      | 57.8                        |   |
| 11:00 PM        | 12:00 AM      | 60.5                        |   |
| 12:00 AM        | 1:00 AM       | 55.8                        |   |
| 1:00 AM         | 2:00 AM       | 53.8                        |   |
| 2:00 AM         | 3:00 AM       | 56.4                        |   |
| 3:00 AM         | 4:00 AM       | 55.5                        |   |
| 4:00 AM         | 5:00 AM       | 57.6                        |   |
| 5:00 AM         | 6:00 AM       | 62.2                        |   |
| 6:00 AM         | 7:00 AM       | 64.1                        |   |

Ldn = 67.3 dBA

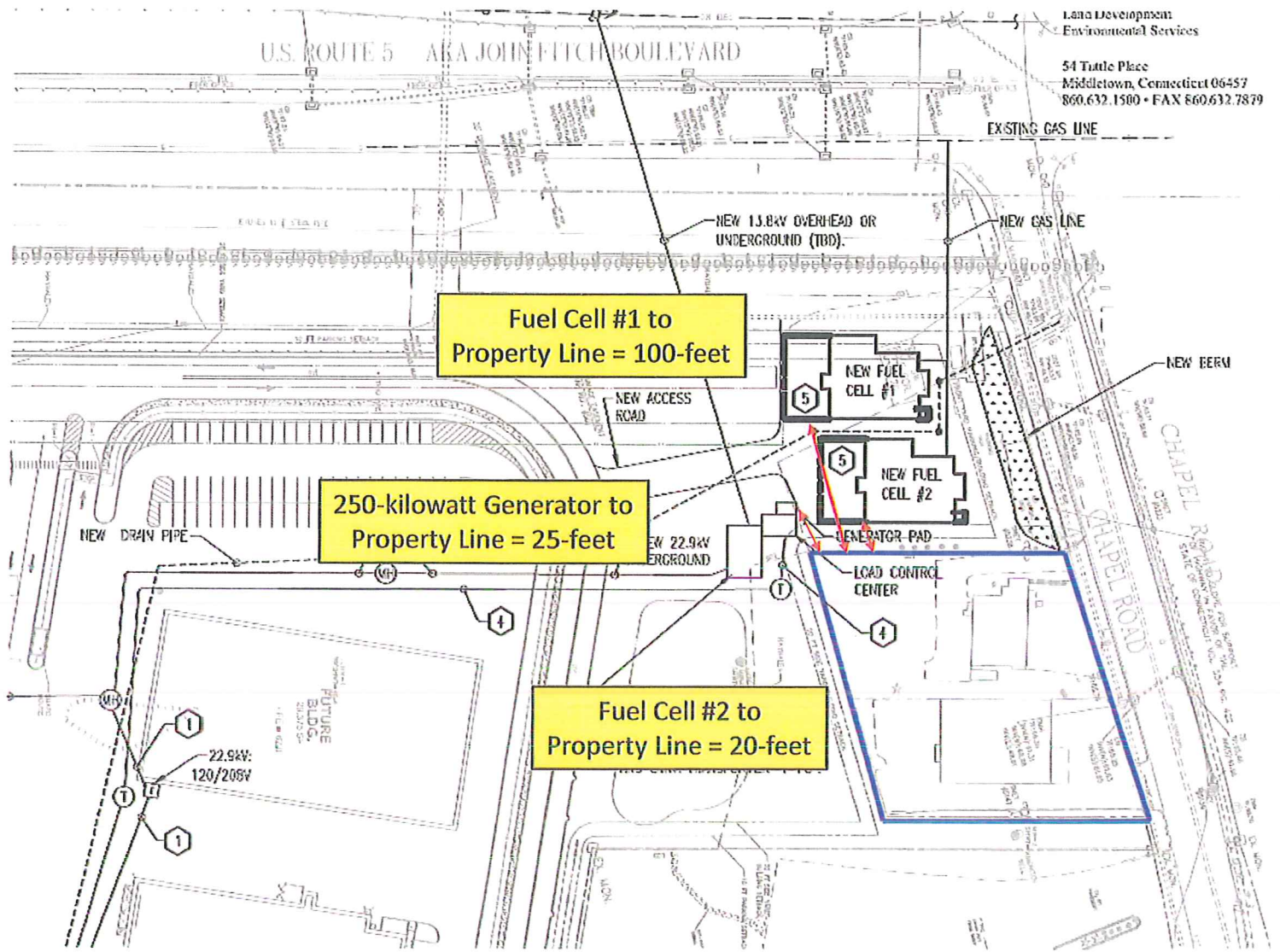


FUSS & O'NEILL

## **Attachment D**

---

### Property Line Distance Measurements



Lana Development  
 Environmental Services  
 54 Tuttle Place  
 Middletown, Connecticut 06457  
 860.632.1500 • FAX 860.632.7879

Fuel Cell #1 to  
 Property Line = 100-feet

250-kilowatt Generator to  
 Property Line = 25-feet

Fuel Cell #2 to  
 Property Line = 20-feet

## **Attachment E**

---

### Noise Level Calculations

NOISE LEVEL CALCULATIONS  
AT PROPERTY LINE DUE TO  
GEOMETRICAL DIVERGENCE

Fuel Cell # 1

Edge of Fuel Cell # 1 distance to property line = 100-feet

$$\text{Using formula } 20\text{LOG} \frac{r_1}{r_0} = 20\text{LOG} \frac{100\text{ft}}{10\text{ft}} = 20\text{dB reduction}$$

$$72\text{dB} - 20\text{dB} = \underline{52\text{dB}}$$

Fuel Cell # 2

Edge of Fuel Cell # 2 distance to property line = 20-feet

$$\text{Using formula } 20\text{LOG} \frac{r_1}{r_0} = 20\text{LOG} \frac{20\text{ft}}{10\text{ft}} = 6\text{dB reduction}$$

$$72\text{dB} - 6\text{dB} = \underline{66\text{dB}}$$

250-kilowatt Generator (fitted with Level II attenuation)

Edge of Generator distance to property line = 25-feet

$$\text{Using formula } 20\text{LOG} \frac{r_1}{r_0} = 20\text{LOG} \frac{25}{10} = 8\text{dB reduction}$$

$$71\text{dB} - 8\text{dB} = \underline{63\text{dB}}$$

Applying the additive properties of sound, we can estimate the combined noise levels for each combination of equipment using the following formula:

$$\text{SPL}_T = 10 \times \text{Log} \left( \sum_{i=1}^n 10^{\left(\frac{\text{SPL}_i}{10}\right)} \right)$$

(2) Fuel Cells Running

$$\text{SPL} = 10\text{LOG}(10^{6.6} + 10^{5.2}) = \underline{66\text{dB}} \text{ at the closest property line.}$$

(2) Fuel Cells Running plus Diesel Generator Running (fitted with Level II attenuation)

$$\text{SPL} = 10\text{LOG}(10^{5.2} + 10^{6.6} + 10^{6.3}) = \underline{67.8\text{dB}} \text{ at the closest property line.}$$