TAB 2

City of Palmetto Agenda Item

Meeting Date

9/13/10

Presenter: **Jim Freeman** **Department:** **City Clerk**

Title:

Capital Purchase of a new generator for City Hall

The current approved CIP for FY 2010 includes a budget of $50,000 for the purchase of a new generator for City Hall. The current generator is over 33 years old and not sufficient for the needs of City Hall should we have an emergency. Staff contacted Manatee County EOC to obtain a vendor recommendation to help us evaluate and assess the needs for a new generator at City Hall. ATP Engineering South came highly recommended by the County and staff contracted with them to perform a generator study which included electrical design and construction oversight. The total cost for this study was $6,850 and would ensure a proper installation (see attached proposal-Exhibit A). The study was separated into 3 tasks with option to perform each task individually. The first task was authorized and ATP is here today to present the findings from the study for task 1. Once we receive confirmation from the Commission regarding a couple of decision points (size of generator and fuel), staff proposes to allow ATP to complete tasks 2 and 3.

Based on the results of task 1, ATP estimates the total cost for the generator ranges from $65,000 to $92,000 depending on the size and fuel type chosen. This budget also includes a contingency of 25% which may or may not be used. Staff is requesting input from Commission regarding the size of the generator, which depends on what we want to power. The three options are included in the study. In addition, the fuel type will also need to be selected. Staff recommends option 3 (100kw) generators with Natural Gas. The reason for selecting option 3 is because the staff believes it would be nice to power the auditorium which does not currently have emergency power because it may serve as a nice meeting place for residents post disaster (i.e., option 2). However, the incrementally cost associated with moving to option 3 (all of City Hall) is only $3,000 more. This is due to the fact that many of the electrical changes and construction costs are the same regardless of the size of the generator.

Budgeted Amount:	50,000	**Budget Page No(s):**		**Available Amount:**	$0.00	**Expenditure Amount:**	Up to $98,850

Additional Budgetary Information: Staff proposed to move $50,000 from CIP project to fund the additional expense associated with the City Hall generator. Any dollars associated with the contingency that are not utilized will be returned to the CIP budget for re-allocation.

Funding Source(s): | **Sufficient Funds Available:** X☐ Yes ☐ No | **Budget Amendment Required:** X☐ Yes ☐ No | **Source:** CIP Funds

City Attorney Reviewed: ☐ Yes X☐ No ☐ N/A | **Advisory Board Recommendation:** ☐ For ☐ Against X☐ N/A | **Consistent With:** ☐ Yes ☐ No ☐ N/A

Potential Motion/ Direction Requested: **Motion to authorize ATP to complete tasks 2 and 3 of the generator study which includes design specifications and construction management and instruct staff to proceed with purchase and installation of a 100kw natural gas generator for**

	City Hall in accordance with existing purchasing polices.
Staff Contact:	Jim Freeman
Attachments:	Generator Proposal, Report for Task 1

1283 TALLEVAST ROAD• SARASOTA, FLORIDA • 34243
PHONE: (941)360-2181 • FAX: (941)360-2971
ENGR.BUSINESS #8909

"Striving to Make Your Facility Energy Efficient"
atpengrsouth@verizon.net

Engineering
South,
PL.

July 23, 2010

Mr. James Freeman, CMC, CIA ,City Clerk
City of Palmetto
516 8th Ave. West
Palmetto, Florida 24221

RE: City of Palmetto - Emergency Generator
ATP Engineering Project #2010.63

Dear Mr. Freeman,

It was a pleasure to meet with you last week to discuss future projects. Thank you for the opportunity to submit this proposal for City Hall's emergency power system.

The scope of work includes the review, report, and electrical design to support the new emergency generator power system.

Scope of Services:

Task 1 Report:

1. Field review of all equipment, panel boards, and receptacles for electrical data required to provide the selection verification and design of the new emergency generator replacement and automatic transfer switch.

2. Provide two copies of the written report that include options for a generator size that would meet the various needs of the Client, and a cost opinion and options as to which equipment can be used when the emergency generator is activated.

3. Meet with Client to review report data and to verify any load relocations for the new system.

   If ATP Engineering is selected to provide services, please provide the Engineer with the last 12 months of utility (FPL) records showing demand for the building to assist in the study.

Task 2 Electrical Design:

1. After Client approvals generator selection, ATP engineering will provide a preliminary design for the electrical system to allow for peak usage of the generator's capacity. Two sets of preliminary design documents will be presented to the Client for review. After Client review and approval, provide 4

sets and one reproducible set of sealed design documents with specifications for permitting.

Task 3: Construction Administration: Construction administration services performed by the Engineer are undertaken to determine in general that the work being performed is in accordance with the construction documents. The Engineer shall not have control over construction means, methods, techniques, sequences, procedures, safety precautions, and schedule of construction, these being the sole responsibility of the contractor.

- Respond to contractor questions concerning the design.
- Prepare and distribute answers to contractor questions.
- Review shop drawings and equipment documentation as submitted by the contractor for conformance with the design documents.
- Site visits as follows: One pre-construction conference, site observations as equipment is installed, and one completion observation with punch list.

If ATP Engineering is selected to provide services, please provide all existing record/as built plans of the electrical systems.

Additional Services: If structural work is required for a larger concrete pad to accommodate a larger generator, a request for those services will be necessary.

Fees:

Task 1 Report: $2,600.00 (includes printing cost for Task 1)

Accepted for City of Palmetto:_____Date:_____
Signature

Task 2 Electrical Design: $3,250.00 (includes printing cost for Task 2)

Accepted for City of Palmetto:_____Date:_____
Signature

Task 3 Construction Administration: $1,000.00

Accepted for City of Palmetto:_____Date:_____
Signature

Thank you once again for this opportunity. We look forward to being of service. If you have questions or concerns, please don't hesitate to contact me at (941) 360-2181.

Sincerely,

John Camden

John D. Camden, PE, LEED AP
ATP Engineering South, PL

Engineering
South,
PL.

ENGINEERING BUSINESS#8908

August 27, 2010

Mr. Jim Freeman, CMC, CIA
City Clerk
City of Palmetto
516 8th Ave. W., P.O. BOX 1209
Palmetto, FL 34220-1209

Re: City of Palmetto- City Hall Emergency Generator Study

Dear Mr. Freeman:

On August 24, 2010, observations and a study were started for the City of Palmetto City Hall emergency generator. The observation was requested due to the possible replacement of the existing emergency generator system. There were three options given for a new emergency generator. The options included:

1. Directly replace the existing generator that will maintain the computer systems.
2. Increase the size of the generator to cover the auditorium.
3. Fully power the existing facility and have room for future growth or expansion.

The sizing of the generator was based upon the connected load of the system and the Caterpillar Power SpecSizer computer program. The connected load and the computer analysis both showed the same results for the emergency generator sizes. The analysis also showed that the existing generator was significantly under sized for the existing system if computers are in use.

Option 1 was to replace the existing generator; the emergency system would be required to have a new 40kW/50KVA emergency generator with new electrical equipment. Option 1 has a budgetary cost opinion of ~$70,000.00.

Option 2 was to increase the size of the system to cover the auditorium. This would require an increase in size to a new 80kW/100KVA generator and additional electrical work to increase the emergency panel would have to be done. Option 2 has a budgetary cost opinion of ~ $88,000.00.

Option 3 was to power the entire building. The emergency generator for this system would be a new 125kW/156KVA generator, and minimal electrical work to add the generator to the electrical system would be performed. Option 3 has a budgetary cost opinion of ~ $92,000.00.

Thank you for the opportunity to provide this service, if further clarification is required, please feel free to contact this engineer.

Sincerely,

JOHN D. CAMDEN LICENSE No. 53458 STATE OF FLORIDA PROFESSIONAL ENGINEER

John D. Camden, PE, LEED AP
FL#53458 ATP Engineering South, P.L.

EMERGENCY GENERATOR STUDY

The purpose of the evaluation is to review the existing emergency electrical systems within the City of Palmetto, City Hall Building. The project will provide the City of Palmetto three options for emergency power:

1. Directly replace the existing generator that will maintain the computer systems.
2. Increase the size of the generator to cover the auditorium.
3. Fully power the existing facility and have room for future growth or expansion.

1.0 Field Observation and Generator Sizing

A site visit was conducted for the purpose of observing the visible portions of the Emergency Electrical system to determine the future use and requirements for the system.

Generators are sized based upon the connected load of the system. This data should give the power factor required to meet the electrical demands of the building.

A sampling and observation was made of the main electrical area, the electrical panels, and the standby emergency generator.

FP&L data was also reviewed to verify unit sizing. The Caterpillar Electric SpecSizer computer program was used to verify the emergency generator systems. The recommended systems were sized so that they will withstand the demand of the UPS/computer systems and the power requirements for the specified areas. The sizing data is attached after the cost opinions. Included in the sizing data there is an analysis that shows a similar sized single-phase 240V generator to the existing emergency system with a full load of 48 Amps. The system does not meet the requirements of the facility.

The systems were sized to meet the requirements of the facility.

2.0 Electrical Systems

2.1 Current System:

The current emergency system has a 12.5kW single-phase 240V generator; which provides a maximum of 52 Amps. The existing system connected current load on the emergency panel is 46.75 Amps. There is no room on the current system to expand. The system is currently too small and will not support the desired computer use. The frequency drop and voltage drop on the Caterpillar Electric Power Sizer computer program shows a significant drop on the system. It also states the system would not recover with a full load on the UPS system.

The total building system connected load is 290 Amps. An existing 400 Amp double throw safety switch with a 100 Amp receptacle is located on the exterior of the building for a trailer pull-up generator.

2.2 Fuel Options:

The site presently has a 150-gallon propane tank. The tank conditions will have to be reviewed prior to a new generator installation. The propane tank may be replaced with a larger tank or completely removed. Another possible option for the fuel source is the installation of natural gas. Mr. Freeman is currently checking into this option with TECO/Peoples Gas. A natural gas source with meter may be installed for the generator. Natural gas would provide a source without having to call for propane refills frequently. The third option for the fuel source is an under-belly diesel tank. The three options will be provided with the cost opinion. Tank size and options are dependent upon the demand of the generator and the requests of the owner. There are different code requirements for the different types of fuel and the amount of fuel that is stored.

2.3 Fault Current and FPL Demand:

The maximum building demand from FP&L over the past 24 months was 42kW or 101 Amps at 240V three-phase. The fault current rating of the existing system is 10KAIC per the panel and the disconnect ratings.

2.4 Recommendations:

2.4.1 40kW System:

The voltage drop and frequency deviation for the existing generator system is not recommended for computer or air conditioner use. The voltage drop may damage some of the systems if connected. A larger generator of 40kW/50KVA at 240V three-phase is recommended for the future use. This generator requires an ATS of at least 200 Amps. A 40kW unit would provide approximately 100 Amps of three-phase 240V power. The larger generator will remove the deviations in the inrush current, frequency, and the voltage drop of the system.

Some future expansion would be built into the system. It is not recommended that a full 100 Amp load be placed onto the system due to possible problems with inrush current and voltage drop, and the ability to compensate for the frequency deviations.

A UPS is recommended for sensitive systems such as computers and electronics to soften the transfer to emergency power. The current UPS system is large enough to handle the computer room area load at this time.

A load relocation and redistribution may be required to install the emergency generator system. The current panel is undersized for the recommended system. Small additions, up to 80 amps demand, can be made to the emergency system with the recommended generator. A new panel will have to be installed.

2.4.2 80kW System:

Current System plus Auditorium Area:

In looking at the generator and emergency system sizing, the major additions would be the auditorium air conditioner, the outlets, and the audio system. The size of the generator would increase to 80kW/100KVA. The generator would provide approximately 240 Amps of three-phase 240V power that would be able to handle the computers and the air conditioning systems added to the system. The size of the ATS would be 400 Amps. The connected load for the system would be 163 Amps of three-phase 240V power.

Again, it is not recommended that the full 240 Amps of demand load be placed onto the system. The generator would start to show signs of inrush current and voltage drop compensation problems.

A UPS is recommended for electronics. The current inrush on the system can be softened with the use of UPS systems. The recommended generator system should be able to handle the required voltage and frequency drop problems with computer and electronic equipment.

A load relocation and redistribution may be required to install the emergency generator system. The existing panel is undersized for the recommended system. Small additions, up to 192 amps demand, can be made to the emergency system with the recommended generator. A new panel will have to be installed.

2.4.3 125kW System:
Entire Building Added:

In reviewing the entire building, if the entire building power system were to be added to the emergency generator then the size of the generator would increase to 125KW/156KVA. The recommended generator would provide approximately 376 Amps of three-phase 240V power. The total connected load for the system would be approximately 290 Amps. The building would have plenty of power to run all systems on the generator. This unit would provide some future electrical growth up to 301 Amps of demand, if necessary. It would also be large enough to handle the computer room and all of the electronic systems.

It is not recommended that the full 376 Amps of demand load be placed on the generator. The generator may eventually show signs of voltage drop and current inrush problems if the full-load (376 Amps) demand is placed onto the emergency system. A full load example can be observed on the 13kW system data.

The size of the ATS would be 400 Amps. A UPS system would be recommended to soften the transition between the power outage and the generator turning on.

The existing emergency panels may have to be replaced and a new panel may be installed or a disconnect switch between the ATS and main can be made.

2.5 Conclusions:

There were three options given for a new emergency generator. The options included:

1. Directly replace the existing generator that will maintain the computer systems.
2. Increase the size of the generator to cover the auditorium.
3. Fully power the existing facility and have room for future growth or expansion.

The sizing of the generator was based upon the connected load of the system and the Caterpillar Power SpecSizer computer program. The connected load and the computer analysis both showed the same results for the emergency generator sizes. The analysis also showed that the existing generator was significantly under sized for the existing system if computers are in use.

Option 1 was to replace the existing generator; the emergency system would be required to have a new 40kW/50KVA emergency generator with new electrical equipment. Option 1 has a budgetary cost opinion of ~$70,000.00.

Option 2 was to increase the size of the system to cover the auditorium. This would require an increase in size to a new 80kW/100KVA generator and additional electrical work to increase the emergency panel would have to be done. Option 2 has a budgetary cost opinion of ~ $88,000.00.

Option 3 was to power the entire building. The emergency generator for this system would be 125kW/156KVA, and minimal electrical work to add the generator to the electrical system would be performed. Option 3 has a budgetary cost opinion of ~ $92,000.00.

3.0 Budget Cost Opinion

3.1 Generator Options:

1. Replace the existing generator with a new generator system that will support computer systems.
2. Increase the size of the generator to cover the auditorium.
3. Fully power the existing facility and have room for future growth or expansion.

3.2 Cost Opinion for the Options:

These are cost opinions for the options. Prices can go up and down based upon the options that are placed on the emergency generator system. The owner should obtain at least three cost estimates from contractors to obtain an actual price. Due to the current environment the contractor values will vary. There is also a 25% contingency value that is added into the opinion values. Both total and subtotal without contingency values are given in the cost opinion. See the next page for the break down for the cost opinion. Three additional opinions were given for the three different fuel types.

Option 1: Cost Opinion 40kW/50KVA:
Propane Fuel Type: $65,625.00
Natural Gas Fuel Type: $69,375.00
Diesel Fuel Type: $60,937.00

Option 2: Cost Opinion 80kW/100KVA:
Propane Fuel Type: $85,312.50
Natural Gas Fuel Type: $87,187.50
Diesel Fuel Type: $79,687.50

Option 3: Cost Opinion 100kW/125KVA:
Propane Fuel Type: $91,875.00
Natural Gas Fuel Type: $91,875.00
Diesel Fuel Type: $86,250.00

See next page for break down values.

Emergency Generator System Cost Opinion:
Size of Generator: 40kW/50KVA
Opinion-1 = Propane Fuel Type
Opinion-2 = Natural Gas Fuel Type
Opinion-3 = Diesel Fuel Type

Item	Opinion-1	Opinion-2	Opinion-3
Generator	$ 16,000.00	$ 16,000.00	$ 15,500.00
Automatic Transfer Switch	$ 3,000.00	$ 3,000.00	$ 3,000.00
New Electrical Panel and Breakers	$ 5,000.00	$ 5,000.00	$ 5,000.00
Generator Pad with Engineering Services	$ 3,000.00	$ 3,000.00	$ 3,000.00
Partial Equipment Subtotal	$ 27,000.00	$ 27,000.00	$ 26,500.00
Removal of Old Tank/Installation of New Propane Tank	$ 8,000.00	$ 3,000.00	$ 3,000.00
Installation of TECO/Peoples Gas NG line		$ 7,000.00	
Under-Belly Tank for Diesel			$ 3,000.00
General Contractor Installation Fees-	$ 17,500.00	$ 18,500.00	$ 16,250.00
Subtotal	$ 52,500.00	$ 55,500.00	$ 48,750.00
Contingency - 25% of Subtotal	$ 13,125.00	$ 13,875.00	$ 12,187.50
Total Cost Opinion	$ 65,625.00	$ 69,375.00	$ 60,937.50

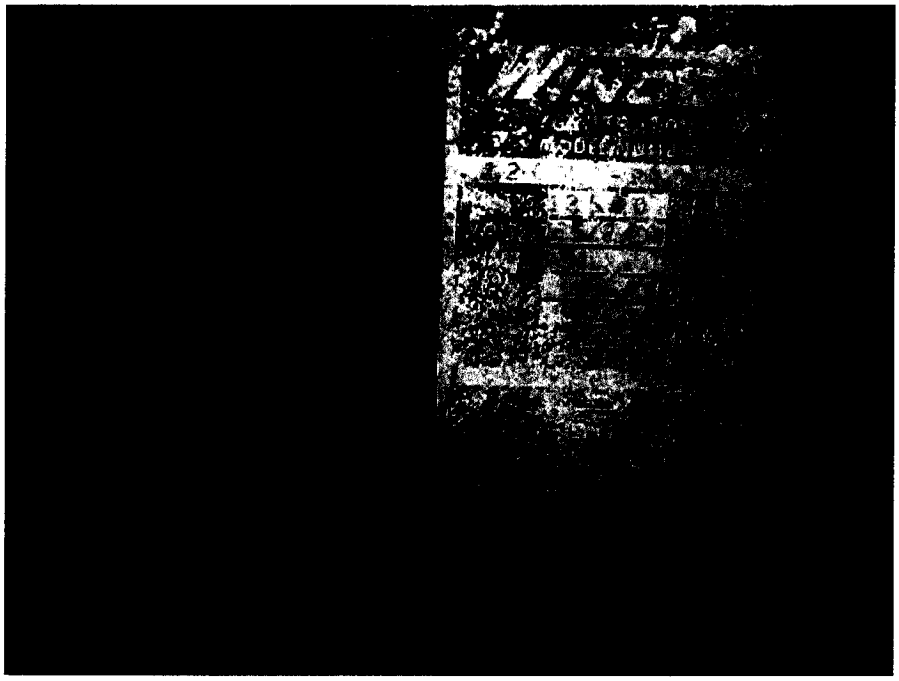
Size of Generator: 80kW/100KVA
Opinion-1 = Propane Fuel Type
Opinion-2 = Natural Gas Fuel Type
Opinion-3= Diesel Fuel Type

Item	Opinion-1	Opinion-2	Opinion-3
Generator	$ 25,000.00	$ 25,000.00	$ 24,000.00
Automatic Transfer Switch	$ 3,500.00	$ 3,500.00	$ 3,500.00
New Electrical Panel and Breakers	$ 5,000.00	$ 5,000.00	$ 5,000.00
Generator Pad with Engineering Services	$ 3,000.00	$ 3,000.00	$ 3,000.00
Partial Equipment Subtotal	$ 36,500.00	$ 36,500.00	$ 35,500.00
Removal of Old Tank/Installation of New Propane Tank	$ 9,000.00	$ 3,000.00	$ 3,000.00
Installation of TECO/Peoples Gas NG line		$ 7,000.00	
Under-Belly Tank for Diesel			$ 4,000.00
General Contractor Installation Fees	$ 22,750.00	$ 23,250.00	$ 21,250.00
Subtotal	$ 68,250.00	$ 69,750.00	$ 63,750.00
Contingency - 25% of Subtotal	$ 17,062.50	$ 17,437.50	$ 15,937.50
Total Cost Opinion	$ 85,312.50	$ 87,187.50	$ 79,687.50

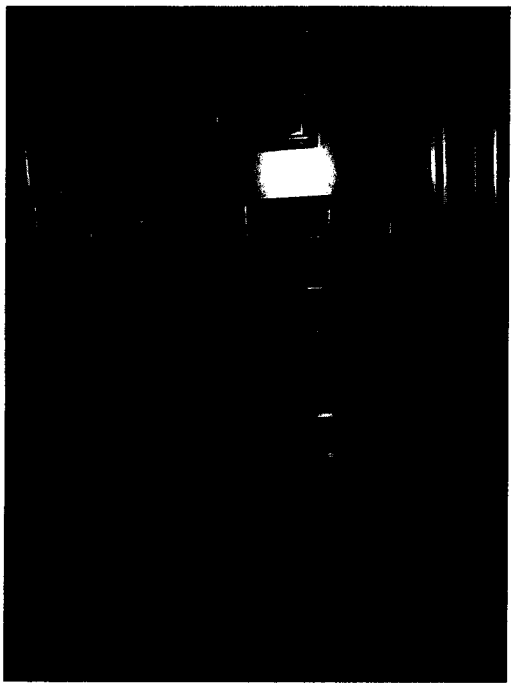
Size of Generator: 100kW/125KVA
Opinion-1 = Propane Fuel Type
Opinion-2 = Natural Gas Fuel Type
Opinion-3= Diesel Fuel Type

Item	Opinion-1	Opinion-2	Opinion-3
Generator	$ 30,000.00	$ 30,000.00	$ 29,500.00
Automatic Transfer Switch	$ 4,000.00	$ 4,000.00	$ 4,000.00
New Electrical Contingency	$ 2,000.00	$ 2,000.00	$ 2,000.00
Generator Pad with Engineering Services	$ 3,000.00	$ 3,000.00	$ 3,000.00
Partial Equipment Subtotal	$ 39,000.00	$ 39,000.00	$ 38,500.00
Removal of Old Tank/Installation of New Propane Tank	$ 10,000.00	$ 3,000.00	$ 3,000.00
Installation of TECO/Peoples Gas NG line		$ 7,000.00	
Under-Belly Tank for Diesel			$ 4,500.00
General Contractor Installation Fees	$ 24,500.00	$ 24,500.00	$ 23,000.00
Subtotal	$ 73,500.00	$ 73,500.00	$ 69,000.00
Contingency - 25% of Subtotal	$ 18,375.00	$ 18,375.00	$ 17,250.00
Total Cost Opinion	$ 91,875.00	$ 91,875.00	$ 86,250.00

Pictures of Existing Emergency Generator Systems:
Actual Emergency Generator (12.5kW):

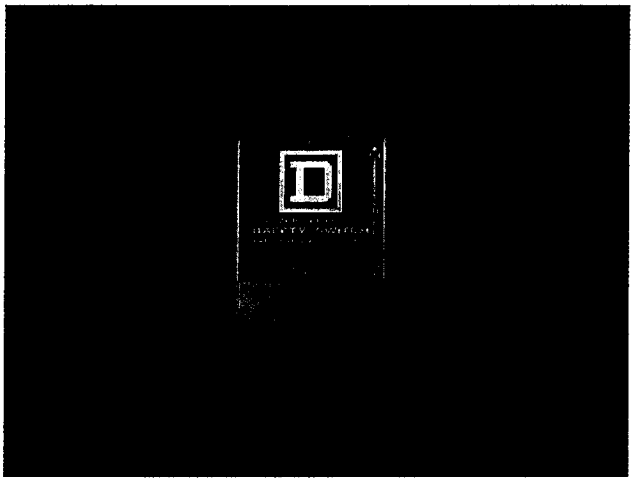


Emergency Panel for Existing System 10KAIC:



Rated at 100 Amps single-phase 240V.

Double Throw Safety Switch:



Rated at 400Amps and 240V.

100 Amp Receptacle off of Safety Switch:

Caterpillar Power SpecSizer Data

Notes:

The Caterpillar Power SpecSizer computer program does not contain a three-phase 240V system. A simple calculation for the connected load to a three-phase KW or KVA load was performed for the sizing of the generators. This is the reason why the 120/208V – voltage shows up in the data. At this time Caterpillar does not manufacture a three-phase 240V system but Kohler, Generac, and several other manufacturers do. Caterpillar does manufacture single-phase 120/240V systems.

Calculation for Data:

Amps of connected load x 240 V x 1.732 = KW of Power

At 80% Power Factor: KW of Power / 0.8 = KVA of Power

CATERPILLAR

Project Sizing Report

Price List: U.S.

Version: 2.5.1

Data Date: 5/4/2010

Modified Date	8/26/2010	Electricity Supply	60 Hz 240/120 V
Customer Name		Connection	***
Project Name/Ref #		Max Ambient Temperature	104.0F
Prepared By	Matt Camden	Altitude	0.0 Ft. A.S.L

Load Analysis Summary

Max Transient Load Step	16.7 SkVA	13.3 SkW	
Peak Transient Load	18.6 SkVA	15.0 SkW	
Final Running Load	18.6 kVA	15.1 kW	0.81 PF
Max Running Non Linear Load	18.6 RkVA		
Maximum Running Load	18.6 kVA	15.1 kW	

Generator Set

Genset Model	(1) of D13-4S	Nameplate Rating	13.0 kW / 13.0 kVA
Voltage Regulator and Slope	***		1 PF
Feature Code	***	Site Output	12.6 kW / 12.6 kVA
Fuel	Diesel	Rating Type	Standby
Dry Weight	***		
Length / Width / Height	*** / *** / ***		

Alternator Motor Starting Capability		Block Load (only) Transient Response			
Instantaneous Voltage Dip **	skVA Capability	Load Change %	FDip %	VDip %	Recovery Time (sec)
10%	***	0 - 25	< 5.0	11.4	< 3
20%	***	0 - 50	< 5.0	20.5	< 3
30%	***	0 - 75	< 5.0	27.8	< 3
35%	***	0 - 100	< 5.0	34.0	< 3

Engine Technical Data at 100% Load

Make/Model	C1.5	Emissions/Certifications	EPA T3
Aspiration	***	Governor	MECH
Cylinder Configuration	***	Aftercooler Type	None
Displacement	***	Rejection To Jacket Water	***
Speed	RPM	Rejection To Aftercooler	***
Fuel Rate	***	Rejection To Oil Cooler	***
Exhaust Sound Level	***	Rejection To Atmosphere	***
Mechanical Sound Level	***	Rejection To Exhaust	***
Max Combustion Inlet Air Temp	***	Exhaust Recoverable	***
Combustion Airflow	***	Exhaust Stack Temperature	***
Cooling System Ambient Capability	***	Exhaust Flow Rate	***
Cooling System Airflow *	***	Exhaust Flange Size	***
Engine Performance Number	***		

Alternator Technical Data

Alternator Arrangement Number	***	Insulation	***
Alternator Type / Frame Size	LC / LCB1014H	Temperature Rise	***
Alternator Winding Pitch	***	Rejection To Atmosphere	***
Number Of Poles	***	Peak Amps / Rated Amps	*** / ***
Excitation / Winding Type	SE / RANDOM WOUND	Short Circuit Ratio	***

Reactances		per unit	ohms	Generator Time Constants		sec
Subtransient - Direct Axis	X"d	***	***	Open Circuit Transient - Direct Axis	T'd0	***
Subtransient - Quadrature Axis	X"q	***	***	Short Circuit Transient - Quadrature Axis	T'd	***
Transient - Saturated	X'd	***	***	Open Circuit Subtransient - Direct Axis	T"d0	***
Synchronous - Direct Axis	Xd	***	***	Short Circuit Subtransient - Direct Axis	T"d	***
Synchronous - Quadrature Axis	Xq	***	***	Open Circuit Subtransient - Quadrature Axis	T"q0	***
Negative Sequence	X2	***	***	Short Circuit Subtransient - Quadtrature Axis	T"q	***
Zero Sequence	X0	***	***	Armature Short Circuit	TA	***

Notes:

* Based on 1/2 inch water (0.12 kPa) external restriction and 1000 ft (300m) altitude.

** Based on instantaneous voltage dip as defined per NEMA MG-1.

*** See your Caterpillar dealer and/or Spec Sheet for technical information.

Maximum voltage distortion due to non-linear load calculated to be within specified limits.

Overall dimensions and weight not to be used for installation. Contact your Caterpillar dealer for specific dimension drawings.

CATERPILLAR

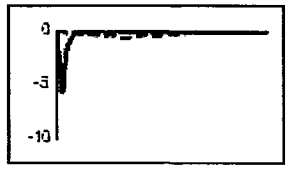
Project Load Report

Version: 2.5.1

Data Date: 5/4/2010

Modified Date	8/26/2010	**Rating Type**	Standby	**Max Ambient Temperature**	104 Deg. F
Customer Name:		**Fuel**	Diesel	**Altitude**	0.0 Ft. A.S.L
Project Name/Ref #		**Electricity Supply**	60 Hz 240/120 V		
Prepared By	Matt Camden				

Load Details			Permitted Dip		Predicted Dip		Load Analysis										
Load Step	Load Description		Frequency	Voltage	Frequency	Voltage	Transient Inrush		Running		Resultant Peak		Cumulative Running		Fdip	Vdip 1	Vdip 2
							SkVA	SkW	kVA	kW	SkVA	SkW	kVA	kW			
Step 1			**Selection Criteria: Step Passed**														
1.1	1	8.00 Amps - Office Equipment Office Equipment, Single Phase	30%	30%			1.9	1.7	1.9	1.7							
		Step 1 Total	**30%**	**30%**	**<5.0%**	**5.7%**	**1.9**	**1.7**	**1.9**	**1.7**							
		Total Through Step 1									**1.9**	**1.7**	**1.9**	**1.7**			
Step 2			**Selection Criteria: Running kW requirements**														
2.1	1	9.60 kVA - UPS UPS, Single Phase, Single Phase, 2 Pulse, 100% Walk-In, 25% Battery Recharge	10%	10%			16.7	13.3	16.7	13.3							
		Step 2 Total	**10%**	**10%**	**>60.0%**	**>60.0%**	**16.7**	**13.3**	**16.7**	**13.3**							
		Total Through Step 2									**18.6**	**15.0**	**18.6**	**15.1**			



<5.0% 5.7% <5.0%

Genset Will Not Recover

>60.0% 34.6% >60.0%

Load Analysis Summary

Maximum Step		Maximum Peak		Final Running	
SkVA	SkW	SkVA	SkW	kVA	kW
16.7	13.3	18.6	15.0	18.6	15.1

CATERPILLAR

Transient Performance Report

Price List: U.S.

Version: 2.5.1

Data Date: 5/4/2010

Load Scenario

Step 2

Frequency Dip

Permitted - 10.0%

Predicted - >60.0%

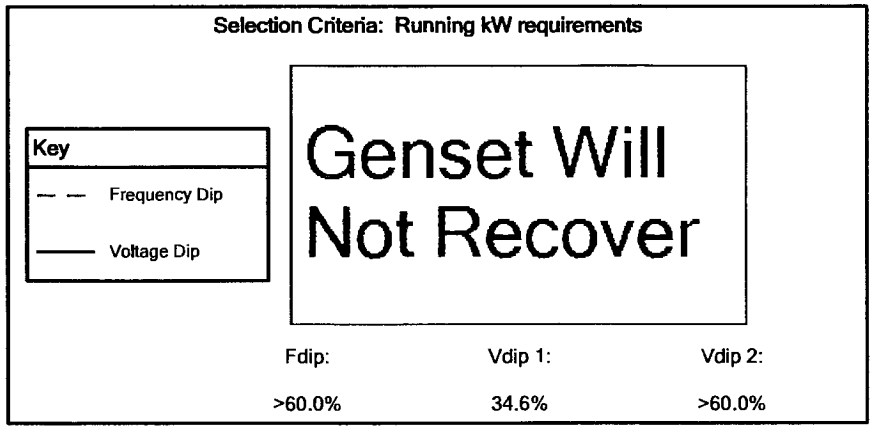
Voltage Dip

Permitted - 10.0%

Predicted - >60.0%

Synchronous (Vdip 1) - 34.6%

Frequency-induced (Vdip 2) - >60.0%

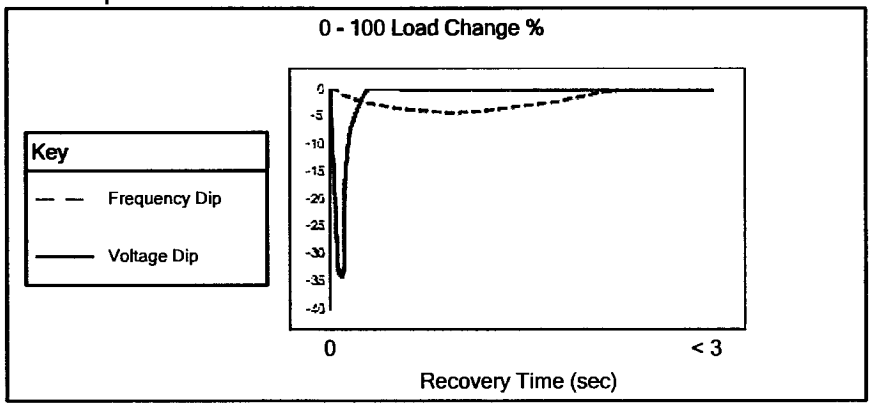


Selected Generator Set

13.0 EkW / 13.0 kVA 60 Hz Standby, 240/240V, D13-4S EPA T3, LCB1014H SE LC, R250 1:1 slope

Block Load (only) Transient Response

Load Change %	FDip %	VDip %	Recovery Time (sec)
0 - 25	< 5.0	11.4	< 3
0 - 50	< 5.0	20.5	< 3
0 - 75	< 5.0	27.8	< 3
0 - 100	< 5.0	34.0	< 3



Transient Performance

The selected representative generator set was factory tested in accordance to NFPA 110 block load step capability and acceptable frequency and voltage response on load addition and rejection.

Audit Rule(s)

Warning: The specified genset(s) do not meet site running power requirements. The program calculates on the basis that any 120 Volt loads will be evenly divided across the two 120 Volt outputs.

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Project Sizing Report

Price List: U.S.

Version: 2.5.1

Data Date: 5/4/2010

Modified Date	8/27/2010	Electricity Supply	60 Hz 208/120 V
Customer Name		Connection	***
Project Name/Ref #		Max Ambient Temperature	104.0F
Prepared By	Matt Camden	Altitude	0.0 Ft. A.S.L

Load Analysis Summary

Max Transient Load Step	19.5 SkVA	17.5 SkW	
Peak Transient Load	23.6 SkVA	20.8 SkW	
Final Running Load	36.0 kVA	30.8 kW	0.86 PF
Max Running Non Linear Load	36.0 RkVA		
Maximum Running Load	36.0 kVA	30.8 kW	

Generator Set

Genset Model	(1) of D40-4+AU1	Nameplate Rating	40.0 kW / 50.0 kVA
Voltage Regulator and Slope	R438, 1:1 slope		0.8 PF
Feature Code	***	Site Output	40.0 kW / 50.0 kVA
Fuel	Diesel	Rating Type	Standby
Dry Weight	***		
Length / Width / Height	*** / *** / ***		

Alternator Motor Starting Capability		Block Load (only) Transient Response			
Instantaneous Voltage Dip **	skVA Capability	Load Change %	FDip %	VDip %	Recovery Time (sec)
10%	***	0 - 25	< 5.0	< 5.0	< 3
20%	***	0 - 50	< 5.0	7.0	< 3
30%	***	0 - 75	< 5.0	10.2	< 3
35%	***	0 - 100	< 5.0	13.1	< 3

Engine Technical Data at 100% Load

Make/Model	C4.4	Emissions/Certifications	EPA T2
Aspiration	***	Governor	MECH
Cylinder Configuration	***	Aftercooler Type	None
Displacement	***	Rejection To Jacket Water	***
Speed	RPM	Rejection To Aftercooler	***
Fuel Rate	***	Rejection To Oil Cooler	***
Exhaust Sound Level	***	Rejection To Atmosphere	***
Mechanical Sound Level	***	Rejection To Exhaust	***
Max Combustion Inlet Air Temp	***	Exhaust Recoverable	***
Combustion Airflow	***	Exhaust Stack Temperature	***
Cooling System Ambient Capability	***	Exhaust Flow Rate	***
Cooling System Airflow *	***	Exhaust Flange Size	***
Engine Performance Number	***		

Alternator Technical Data

Alternator Arrangement Number	***	Insulation	***
Alternator Type / Frame Size	LC / LC2024D	Temperature Rise	***
Alternator Winding Pitch	***	Rejection To Atmosphere	***
Number Of Poles	***	Peak Amps / Rated Amps	*** / ***
Excitation / Winding Type	AREP / RANDOM WOUND	Short Circuit Ratio	***

Reactances		per unit	ohms	Generator Time Constants		sec
Subtransient - Direct Axis	X"d	***	***	Open Circuit Transient - Direct Axis	T'd0	***
Subtransient - Quadrature Axis	X"q	***	***	Short Circuit Transient - Quadrature Axis	T'd	***
Transient - Saturated	X'd	***	***	Open Circuit Subtransient - Direct Axis	T"d0	***
Synchronous - Direct Axis	Xd	***	***	Short Circuit Subtransient - Direct Axis	T"d	***
Synchronous - Quadrature Axis	Xq	***	***	Open Circuit Subtransient - Quadrature Axis	T"q0	***
Negative Sequence	X2	***	***	Short Circuit Subtransient - Quadtrature Axis	T"q	***
Zero Sequence	X0	***	***	Armature Short Circuit	TA	***

Notes:

* Based on 1/2 inch water (0.12 kPa) external restriction and 1000 ft (300m) altitude.

** Based on instantaneous voltage dip as defined per NEMA MG-1.

*** See your Caterpillar dealer and/or Spec Sheet for technical information.

Maximum voltage distortion due to non-linear load calculated to be within specified limits.

Overall dimensions and weight not to be used for installation. Contact your Caterpillar dealer for specific dimension drawings.

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Project Load Report

Version: 2.5.1
Data Date: 5/4/2010

Modified Date	8/27/2010	**Rating Type**	Standby	**Max Ambient Temperature**	104 Deg. F
Customer Name:		**Fuel**	Diesel	**Altitude**	0.0 Ft. A.S.L
Project Name/Ref #		**Electricity Supply**	60 Hz 208/120 V		
Prepared By	Matt Camden				

Load Details			Permitted Dip		Predicted Dip		Load Analysis										
Load Step	Load Description		Frequency	Voltage	Frequency	Voltage	Transient Inrush SkVA	Transient Inrush SkW	Running kVA	Running kW	Resultant Peak SkVA	Resultant Peak SkW	Cumulative Running kVA	Cumulative Running kW	Fdip	Vdip 1	Vdip 2
Step 1		**Selection Criteria: Non-linear load requirements**															
															0 -5 -10		
															<5.0%	5.6%	<5.0%
1.1	1	54.00 Amps - Office Equipment															
		Office Equipment, Distr. 3-Phase	30%	30%			19.5	17.5	19.5	17.5							
		Step 1 Total	**30%**	**30%**	**<5.0%**	**5.6%**	**19.5**	**17.5**	**19.5**	**17.5**							
		Total Through Step 1									**19.5**	**17.5**	**19.5**	**17.5**			
Step 2		**Selection Criteria: Non-linear load requirements**															
															0 -5 -10		
															<5.0%	<5.0%	<5.0%
2.1	1	12.00 kVA - UPS															
		UPS, 3-Phase, 6 Pulse, 25% Walk-In, 25% Battery Recharge	10%	10%			4.2	3.3	16.7	13.3							
		Step 2 Total	**10%**	**10%**	**<5.0%**	**<5.0%**	**4.2**	**3.3**	**16.7**	**13.3**							
		Total Through Step 2									**23.6**	**20.8**	**36.0**	**30.8**			

Load Analysis Summary

Maximum Step		Maximum Peak		Final Running	
SkVA	SkW	SkVA	SkW	kVA	kW
19.5	17.5	23.6	20.8	36.0	30.8

Transient Performance Report

Price List: U.S.

Version: 2.5.1
Data Date: 5/4/2010

Load Scenario

Step 1

Frequency Dip

Permitted - 30.0%

Predicted - <5.0%

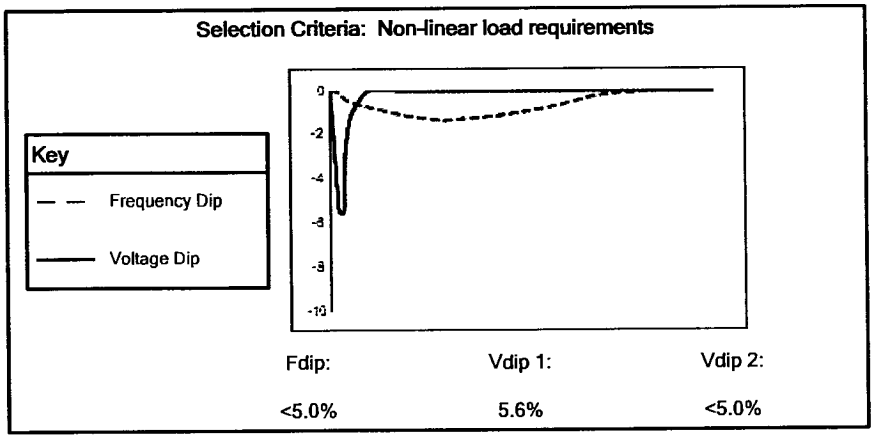
Voltage Dip

Permitted - 30.0%

Predicted - 5.6%

Synchronous (Vdip 1) - 5.6%

Frequency-induced (Vdip 2) - <5.0%



Selected Generator Set

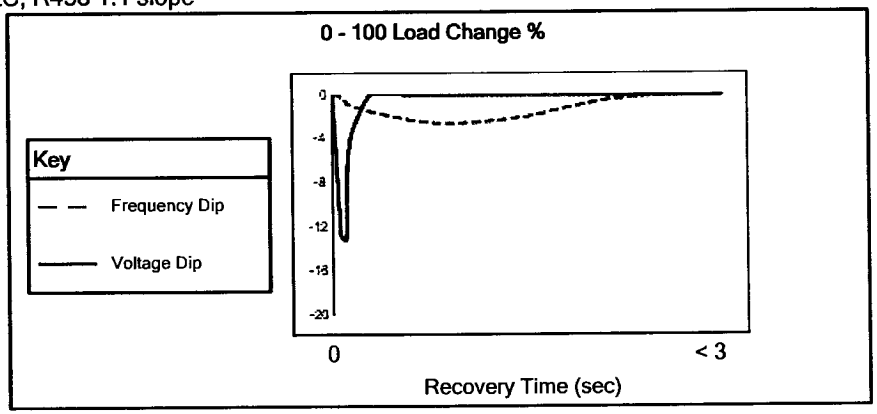
40.0 EkW / 50.0 kVA 60 Hz Standby, 208/120V, D40-4+AU1 EPA T2, LC2024D AREP LC, R438 1:1 slope

Block Load (only) Transient Response

Load Change %	FDip %	VDip %	Recovery Time (sec)
0 - 25	< 5.0	< 5.0	< 3
0 - 50	< 5.0	7.0	< 3
0 - 75	< 5.0	10.2	< 3
0 - 100	< 5.0	13.1	< 3

Transient Performance

The selected representative generator set was factory tested in accordance to NFPA 110 block load step capability and acceptable frequency and voltage response on load addition and rejection.



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Project Sizing Report

Price List: U.S.

Version: 2.5.1

Date Date: 5/4/2010

Modified Date	8/27/2010	Electricity Supply	60 Hz 208/120 V
Customer Name		Connection	***
Project Name/Ref #		Max Ambient Temperature	104.0F
Prepared By	Matt Camden	Altitude	0.0 Ft. A.S.L

Load Analysis Summary

Max Transient Load Step	68.1 SkVA	61.3 SkW	
Peak Transient Load	72.2 SkVA	64.6 SkW	
Final Running Load	84.5 kVA	74.6 kW	0.88 PF
Max Running Non Linear Load	84.5 RkVA		
Maximum Running Load	84.5 kVA	74.6 kW	

Generator Set

Genset Model	(1) of D80-6+AU1	Nameplate Rating	80.0 kW / 100.0 kVA 0.8 PF
Voltage Regulator and Slope	R438, 1:1 slope		
Feature Code	***	Site Output	79.9 kW / 99.8 kVA
Fuel	Diesel	Rating Type	Standby
Dry Weight	***		
Length / Width / Height	*** / *** / ***		

Alternator Motor Starting Capability		Block Load (only) Transient Response			
Instantaneous Voltage Dip **	skVA Capability	Load Change %	FDip %	VDip %	Recovery Time (sec)
10%	***	0 - 25	< 5.0	< 5.0	< 3
20%	***	0 - 50	5.1	7.6	< 3
30%	***	0 - 75	7.4	11.0	< 3
35%	***	0 - 100	9.4	14.2	< 3

Engine Technical Data at 100% Load

Make/Model	C4.4	Emissions/Certifications	EPA T3
Aspiration	***	Governor	ELEC
Cylinder Configuration	***	Aftercooler Type	ATAAC
Displacement	***	Rejection To Jacket Water	***
Speed	RPM	Rejection To Aftercooler	***
Fuel Rate	***	Rejection To Oil Cooler	***
Exhaust Sound Level	***	Rejection To Atmosphere	***
Mechanical Sound Level	***	Rejection To Exhaust	***
Max Combustion Inlet Air Temp	***	Exhaust Recoverable	***
Combustion Airflow	***	Exhaust Stack Temperature	***
Cooling System Ambient Capability	***	Exhaust Flow Rate	***
Cooling System Airflow *	***	Exhaust Flange Size	***
Engine Performance Number	***		

Alternator Technical Data

Alternator Arrangement Number	***	Insulation	***
Alternator Type / Frame Size	LC / LC3024B	Temperature Rise	***
Alternator Winding Pitch	***	Rejection To Atmosphere	***
Number Of Poles	***	Peak Amps / Rated Amps	*** / ***
Excitation / Winding Type	AREP / RANDOM WOUND	Short Circuit Ratio	***

Reactances		per unit	ohms	Generator Time Constants		sec
Subtransient - Direct Axis	X"d	***	***	Open Circuit Transient - Direct Axis	T'd0	***
Subtransient - Quadrature Axis	X"q	***	***	Short Circuit Transient - Quadrature Axis	T'd	***
Transient - Saturated	X'd	***	***	Open Circuit Subtransient - Direct Axis	T"d0	***
Synchronous - Direct Axis	Xd	***	***	Short Circuit Subtransient - Direct Axis	T"d	***
Synchronous - Quadrature Axis	Xq	***	***	Open Circuit Subtransient - Quadrature Axis	T"q0	***
Negative Sequence	X2	***	***	Short Circuit Subtransient - Quadtrature Axis	T"q	***
Zero Sequence	X0	***	***	Armature Short Circuit	TA	***

Notes:

* Based on 1/2 inch water (0.12 kPa) external restriction and 1000 ft (300m) altitude.

** Based on instantaneous voltage dip as defined per NEMA MG-1.

*** See your Caterpillar dealer and/or Spec Sheet for technical information.

Maximum voltage distortion due to non-linear load calculated to be within specified limits.

Overall dimensions and weight not to be used for installation. Contact your Caterpillar dealer for specific dimension drawings.

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Project Load Report

Version: 2.5.1

Data Date: 5/4/2010

Modified Date	8/27/2010	**Rating Type**	Standby	**Max Ambient Temperature**	104 Deg. F
Customer Name:		**Fuel**	Diesel	**Altitude**	0.0 Ft. A.S.L
Project Name/Ref #		**Electricity Supply**	60 Hz 208/120 V		
Prepared By	Matt Camden				

Load Details			Permitted Dip		Predicted Dip		Load Analysis										
Load Step	Load Description		Frequency	Voltage	Frequency	Voltage	Transient Inrush		Running		Resultant Peak		Cumulative Running		Fdip	Vdip 1	Vdip 2
							SkVA	SkW	kVA	kW	SkVA	SkW	kVA	kW			
Step 1		**Selection Criteria: Non-linear load requirements**															
															7.5%	10.1%	<5.0%
1.1	1	189.00 Amps - Office Equipment															
		Office Equipment, Distr. 3-Phase	30%	30%			68.1	61.3	68.1	61.3							
		Step 1 Total	**30%**	**30%**	**7.5%**	**10.1%**	68.1	61.3	68.1	61.3							
		Total Through Step 1									**68.1**	**61.3**	**68.1**	**61.3**			
Step 2		**Selection Criteria: Non-linear load requirements**															
															<5.0%	<5.0%	<5.0%
2.1	1	12.00 kVA - UPS															
		UPS, 3-Phase, 6 Pulse, 25% Walk-In, 25% Battery Recharge	10%	10%			4.2	3.3	16.7	13.3							
		Step 2 Total	**10%**	**10%**	**<5.0%**	**<5.0%**	4.2	3.3	16.7	13.3							
		Total Through Step 2									72.2	64.6	84.5	74.6			

Load Analysis Summary

Maximum Step		Maximum Peak		Final Running	
SkVA	SkW	SkVA	SkW	kVA	kW
68.1	61.3	72.2	64.6	84.5	74.6

CATERPILLAR

Transient Performance Report

Price List: U.S.

Version: 2.5.1

Data Date: 5/4/2010

Load Scenario

Step 1

Frequency Dip

Permitted - 30.0%

Predicted - 7.5%

Voltage Dip

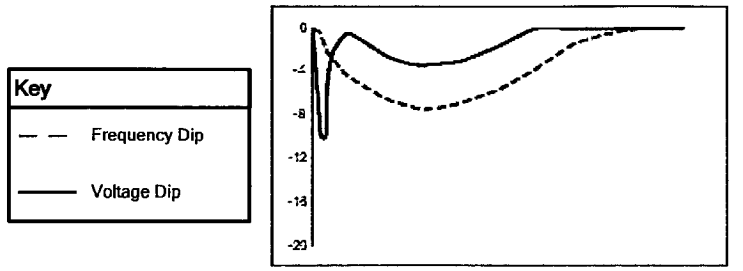
Permitted - 30.0%

Predicted - 10.1%

Synchronous (Vdip 1) - 10.1%

Frequency-induced (Vdip 2) - <5.0%

Selection Criteria: Non-linear load requirements



Fdip:	Vdip 1:	Vdip 2:
7.5%	10.1%	<5.0%

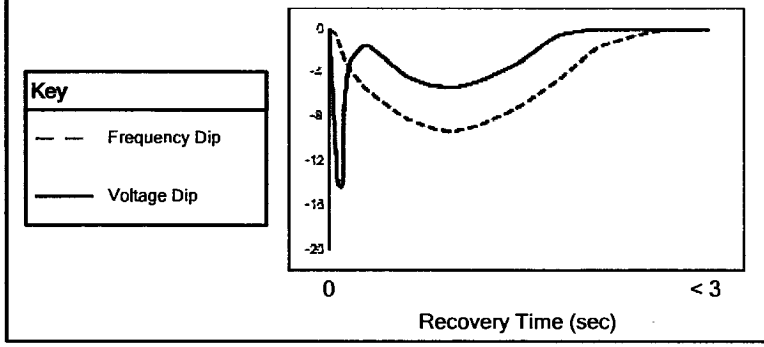
Selected Generator Set

80.0 EkW / 100.0 kVA 60 Hz Standby, 208/120V, D80-6+AU1 EPA T3, LC3024B AREP LC, R438 1:1 slope

Block Load (only) Transient Response

Load Change %	FDip %	VDip %	Recovery Time (sec)
0 - 25	< 5.0	< 5.0	< 3
0 - 50	5.1	7.6	< 3
0 - 75	7.4	11.0	< 3
0 - 100	9.4	14.2	< 3

0 - 100 Load Change %



Transient Performance

The selected representative generator set was factory tested in accordance to NFPA 110 block load step capability and acceptable frequency and voltage response on load addition and rejection.

CATERPILLAR

Project Sizing Report

Price List: U.S.

Version: 2.5.1

Data Date: 5/4/2010

Modified Date	8/27/2010	Electricity Supply	60 Hz 208/120 V
Customer Name		Connection	***
Project Name/Ref #		Max Ambient Temperature	104.0F
Prepared By	Matt Camden	Altitude	0.0 Ft. A.S.L

Load Analysis Summary

Max Transient Load Step	124.7 SkVA	112.2 SkW	
Peak Transient Load	124.7 SkVA	112.2 SkW	
Final Running Load	124.7 kVA	112.2 kW	0.90 PF
Max Running Non Linear Load	124.7 RkVA		
Maximum Running Load	124.7 kVA	112.2 kW	

Generator Set

Genset Model	(1) of D125-6	Nameplate Rating	125.0 kW / 156.3 kVA
Voltage Regulator and Slope	R438, 1:1 slope		0.8 PF
Feature Code	***	Site Output	125.0 kW / 156.3 kVA
Fuel	Diesel	Rating Type	Standby
Dry Weight	***		
Length / Width / Height	*** / *** / ***		

Alternator Motor Starting Capability		Block Load (only) Transient Response			
Instantaneous Voltage Dip **	skVA Capability	Load Change %	FDip %	VDip %	Recovery Time (sec)
10%	***	0 - 25	< 5.0	< 5.0	< 3
20%	***	0 - 50	5.3	7.1	< 3
30%	***	0 - 75	7.6	10.2	< 3
35%	***	0 - 100	10.1	13.2	< 3

Engine Technical Data at 100% Load

Make/Model	C6.6	Emissions/Certifications	EPA T3
Aspiration	***	Governor	ELEC
Cylinder Configuration	***	Aftercooler Type	ATAAC
Displacement	***	Rejection To Jacket Water	***
Speed	RPM	Rejection To Aftercooler	***
Fuel Rate	***	Rejection To Oil Cooler	***
Exhaust Sound Level	***	Rejection To Atmosphere	***
Mechanical Sound Level	***	Rejection To Exhaust	***
Max Combustion Inlet Air Temp	***	Exhaust Recoverable	***
Combustion Airflow	***	Exhaust Stack Temperature	***
Cooling System Ambient Capability	***	Exhaust Flow Rate	***
Cooling System Airflow *	***	Exhaust Flange Size	***
Engine Performance Number	***		

Alternator Technical Data

Alternator Arrangement Number	***	Insulation	***
Alternator Type / Frame Size	LC / LC3024F	Temperature Rise	***
Alternator Winding Pitch	***	Rejection To Atmosphere	***
Number Of Poles	***	Peak Amps / Rated Amps	*** / ***
Excitation / Winding Type	AREP / RANDOM WOUND	Short Circuit Ratio	***

Reactances		per unit	ohms	Generator Time Constants		sec
Subtransient - Direct Axis	X"d	***	***	Open Circuit Transient - Direct Axis	T'd0	***
Subtransient - Quadrature Axis	X"q	***	***	Short Circuit Transient - Quadrature Axis	T'd	***
Transient - Saturated	X'd	***	***	Open Circuit Subtransient - Direct Axis	T"d0	***
Synchronous - Direct Axis	Xd	***	***	Short Circuit Subtransient - Direct Axis	T"d	***
Synchronous - Quadrature Axis	Xq	***	***	Open Circuit Subtransient - Quadrature Axis	T"q0	***
Negative Sequence	X2	***	***	Short Circuit Subtransient - Quadtrature Axis	T"q	***
Zero Sequence	X0	***	***	Armature Short Circuit	TA	***

Notes:

* Based on 1/2 inch water (0.12 kPa) external restriction and 1000 ft (300m) altitude.

** Based on instantaneous voltage dip as defined per NEMA MG-1.

*** See your Caterpillar dealer and/or Spec Sheet for technical information.

Maximum voltage distortion due to non-linear load calculated to be within specified limits.

Overall dimensions and weight not to be used for installation. Contact your Caterpillar dealer for specific dimension drawings.

CATERPILLAR

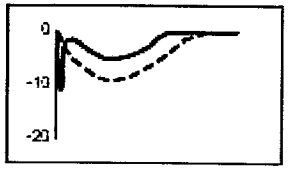
Project Load Report

Version: 2.5.1

Data Date: 5/4/2010

Modified Date	8/27/2010	**Rating Type**	Standby	**Max Ambient Temperature**	104 Deg. F
Customer Name:		**Fuel**	Diesel	**Altitude**	0.0 Ft. A.S.L
Project Name/Ref #		**Electricity Supply**	60 Hz 208/120 V		
Prepared By	Matt Camden				

Load Details		Permitted Dip		Predicted Dip		Load Analysis										
Load Step	Load Description	Frequency	Voltage	Frequency	Voltage	Transient Inrush		Running		Resultant Peak		Cumulative Running		Fdip	Vdip 1	Vdip 2
						SkVA	SkW	kVA	kW	SkVA	SkW	kVA	kW			
Step 1	**Selection Criteria: Non-linear load requirements**															
1.1	1 346.00 Amps - Office Equipment Office Equipment, Distr. 3-Phase	30%	30%			124.7	112.2	124.7	112.2							
	Step 1 Total	**30%**	**30%**	**9.2%**	**10.8%**	124.7	112.2	124.7	112.2							
	Total Through Step 1									124.7	112.2	124.7	112.2			



9.2% 10.8% 5.2%

Load Analysis Summary

Maximum Step		Maximum Peak		Final Running	
SkVA	SkW	SkVA	SkW	kVA	kW
124.7	112.2	124.7	112.2	124.7	112.2

CATERPILLAR

Transient Performance Report

Price List: U.S.

Version: 2.5.1

Data Date: 5/4/2010

Load Scenario

Step 1

Frequency Dip

Permitted - 30.0%

Predicted - 9.2%

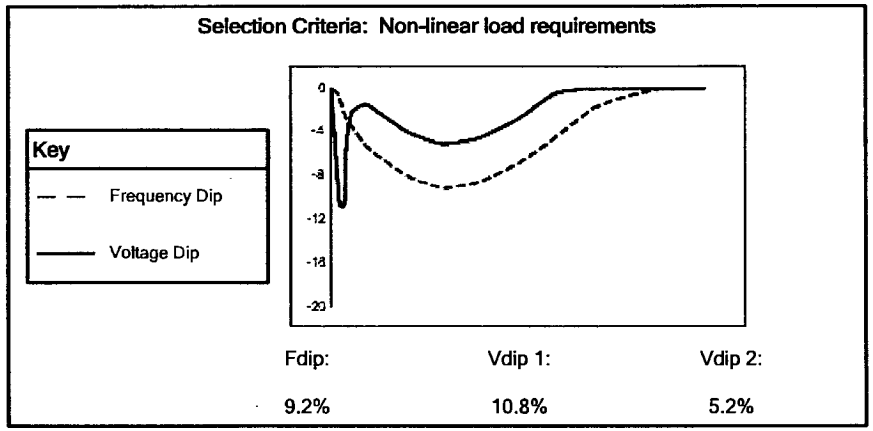
Voltage Dip

Permitted - 30.0%

Predicted - 10.8%

Synchronous (Vdip 1) - 10.8%

Frequency-induced (Vdip 2) - 5.2%

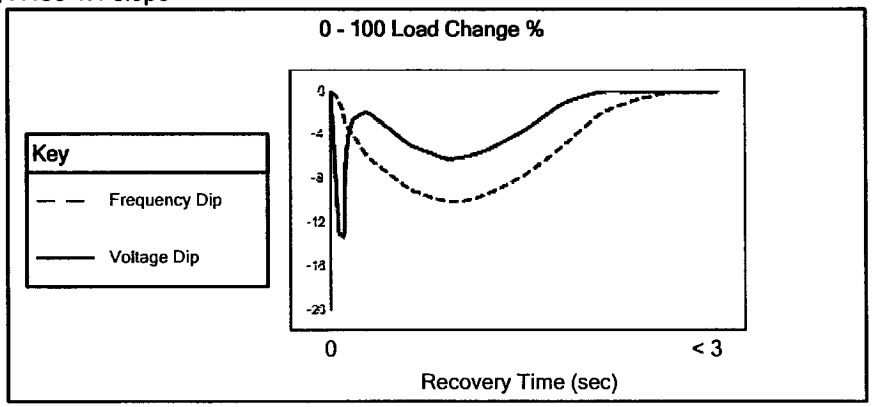


Selected Generator Set

125.0 EkW / 156.3 kVA 60 Hz Standby, 208/120V, D125-6 EPA T3, LC3024F AREP LC, R438 1:1 slope

Block Load (only) Transient Response

Load Change %	FDip %	VDip %	Recovery Time (sec)
0 - 25	< 5.0	< 5.0	< 3
0 - 50	5.3	7.1	< 3
0 - 75	7.6	10.2	< 3
0 - 100	10.1	13.2	< 3



Transient Performance

The selected representative generator set was factory tested in accordance to NFPA 110 block load step capability and acceptable frequency and voltage response on load addition and rejection.