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SpecSizer

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IPSD/GPSD

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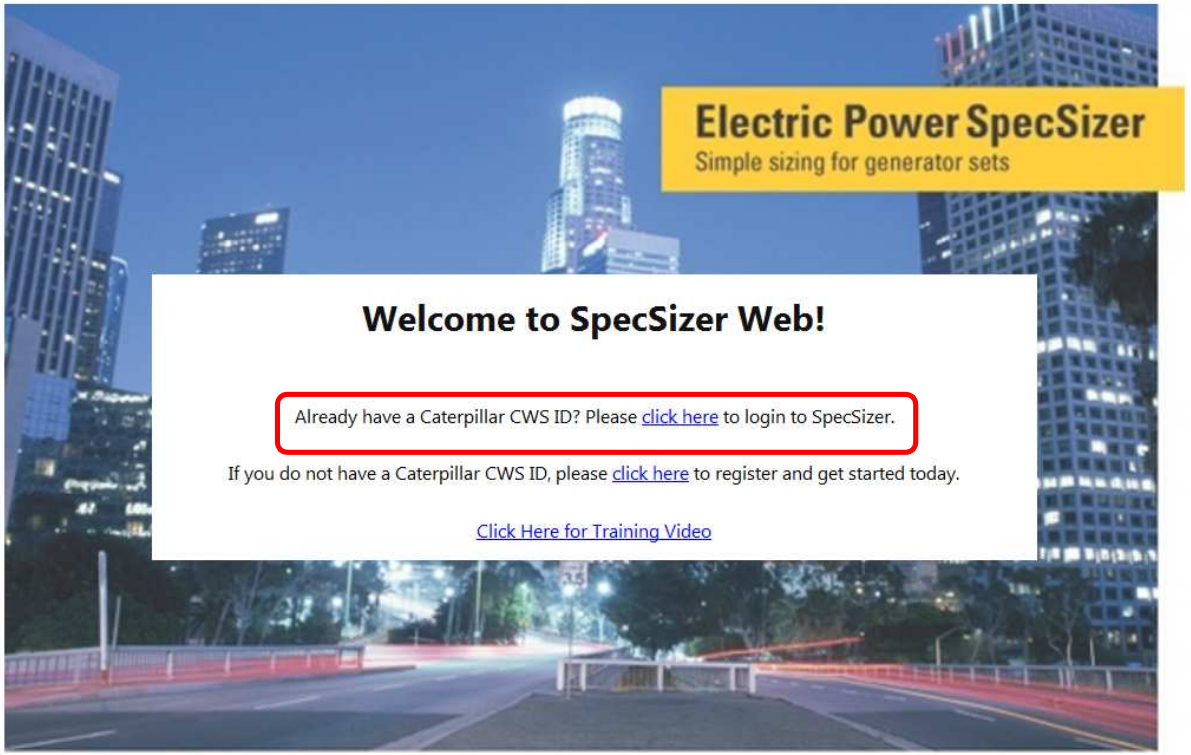
Electric Power SpecSizer

- SpecSizer Web - https://specsizer.cat.com

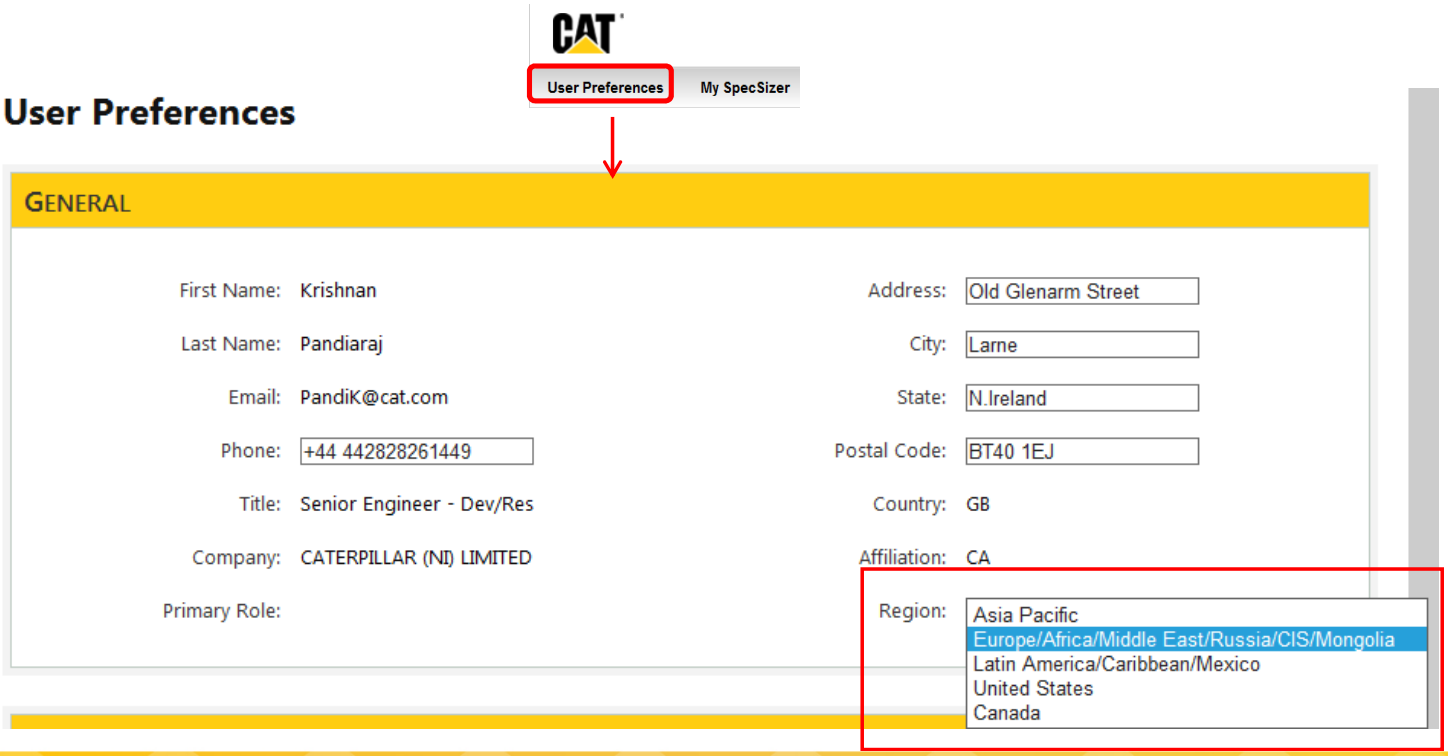


Electric Power SpecSizer

- Generator Set Sizing Program
  - User Preferences, My SpecSizer – Site Conditions
- Load Analysis and Load Step Optimization
  - Add Loads: Template loads, Optimizer
- Genset Selection
  - Site Specific Environmental Considerations
  - Generator Set Details
  - Cooling system/enclosure performance data (C9-C18: May 2017)
- Reports and Guide Specifications
- File Sharing | Help & Support
  - specsizersupport@cat.com

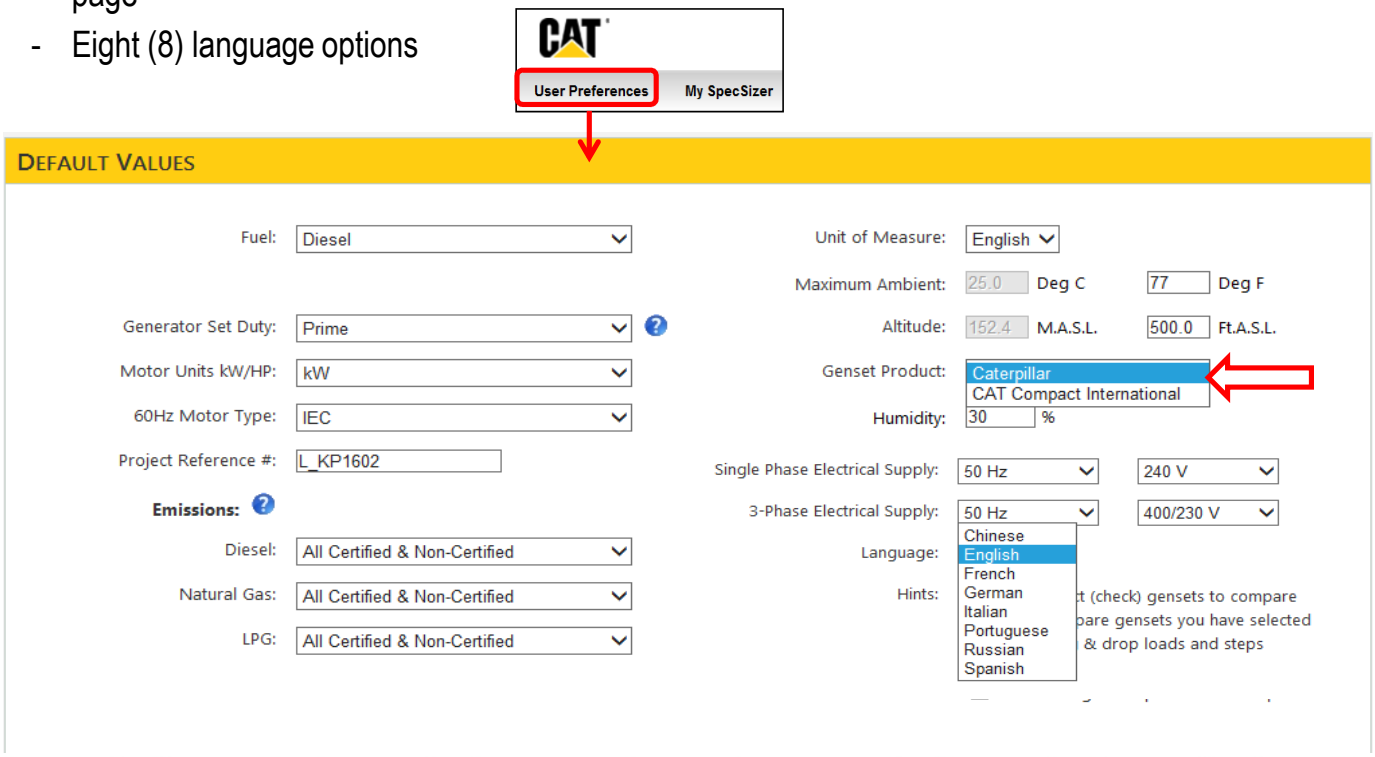
ELECTRIC POWER SPECSIZER

- User Preferences (top half of page) - Set defaults for Site Conditions for new projects
  - Set “Region” here: (aligns product selection to regional price lists / product offerings)



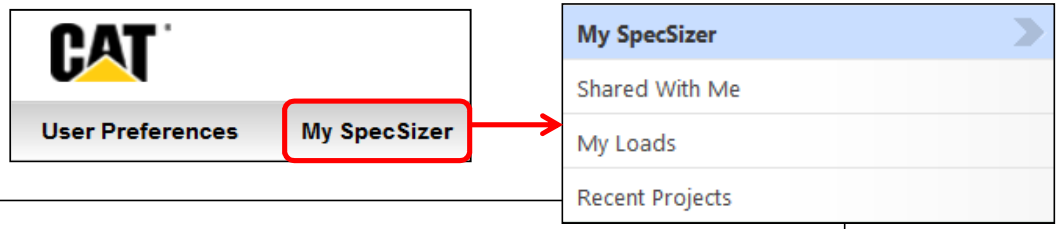
ELECTRIC POWER SPECSIZER

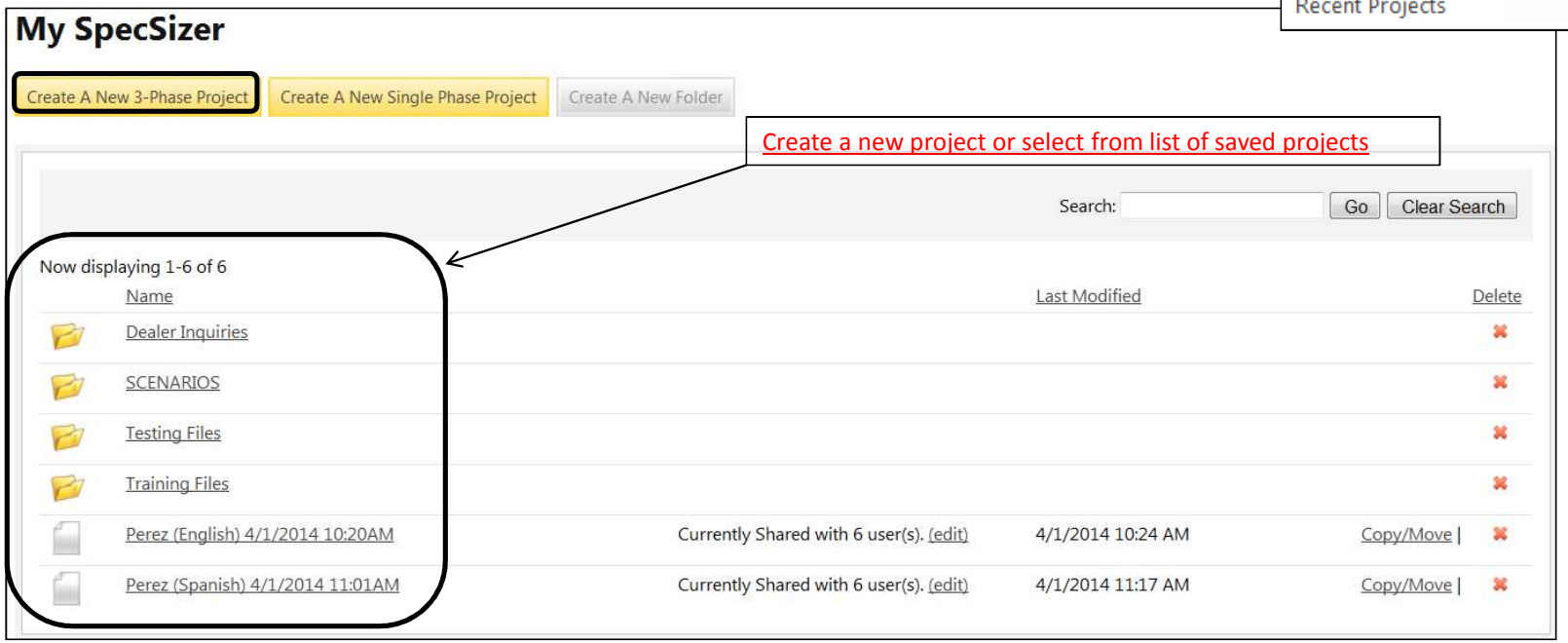
- User Preferences (bottom half of page) – set defaults for Site Conditions for new projects
  - Genset Product: Caterpillar or Cat Compact International - filters genset list for 'Select Genset' page
  - Eight (8) language options



ELECTRIC POWER SPECSIZER

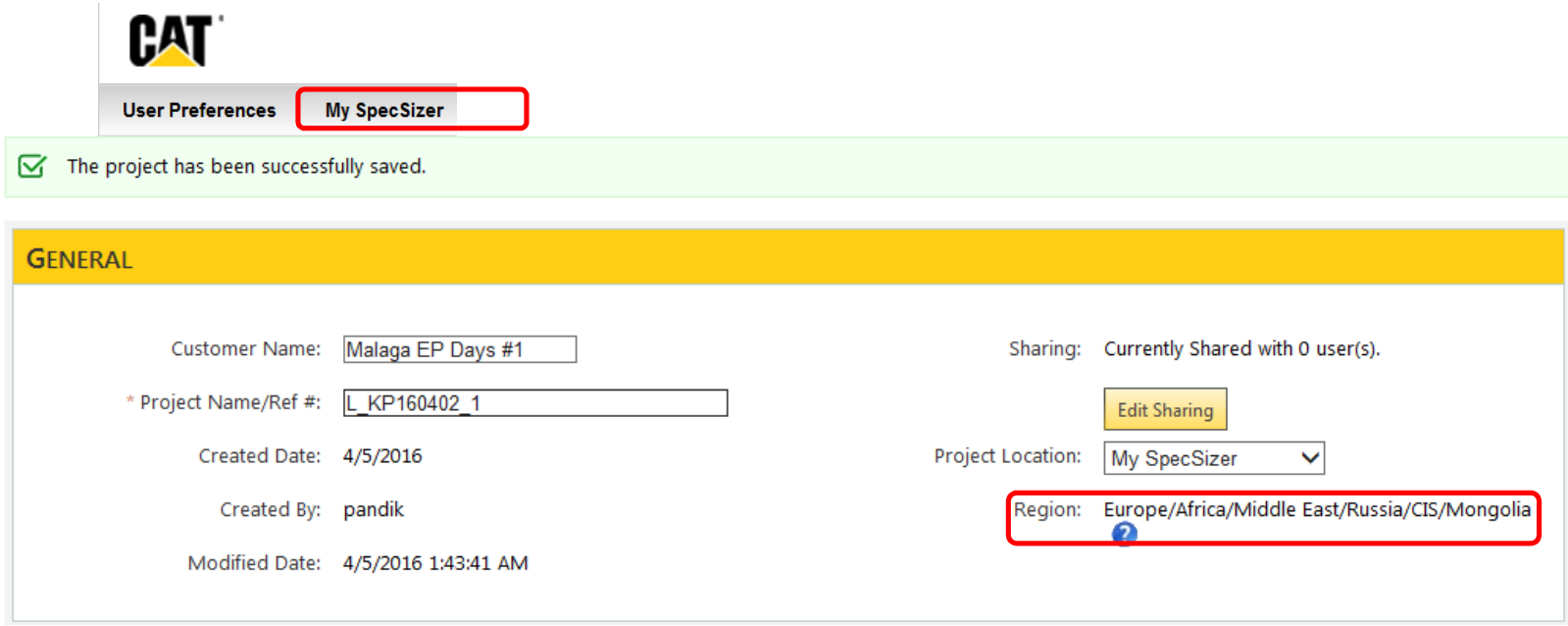
- User Preferences → My SpecSizer (main page)





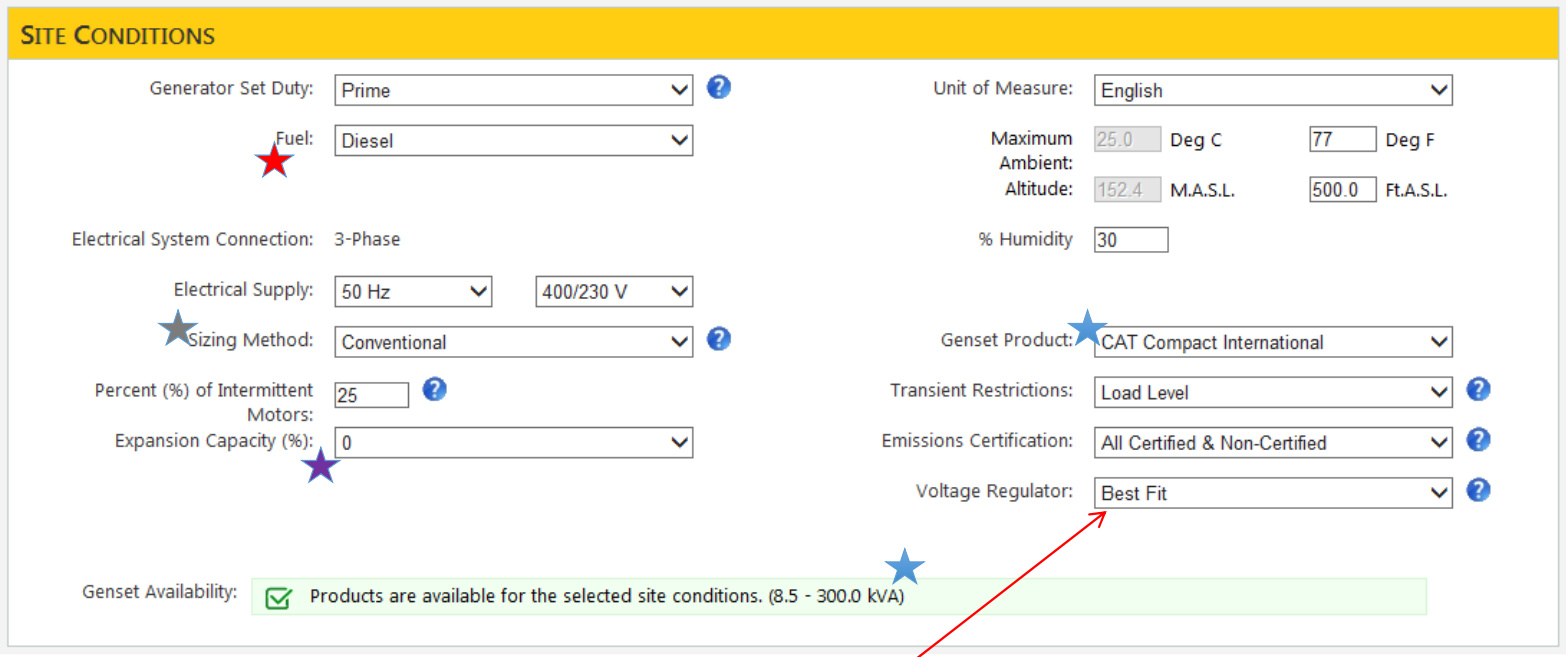
ELECTRIC POWER SPECSIZER

- My SpecSizer → Create A New 3-Phase Project → Define Site Conditions
  - GENERAL (top half of page): Defaults auto-populated from User Preferences, are editable. Region not editable here, editable on User Preferences only

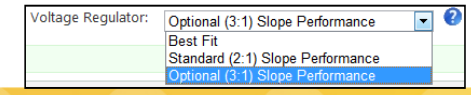


ELECTRIC POWER SPECSIZER

- My SpecSizer → Create A New 3-Phase Project → Define Site Conditions

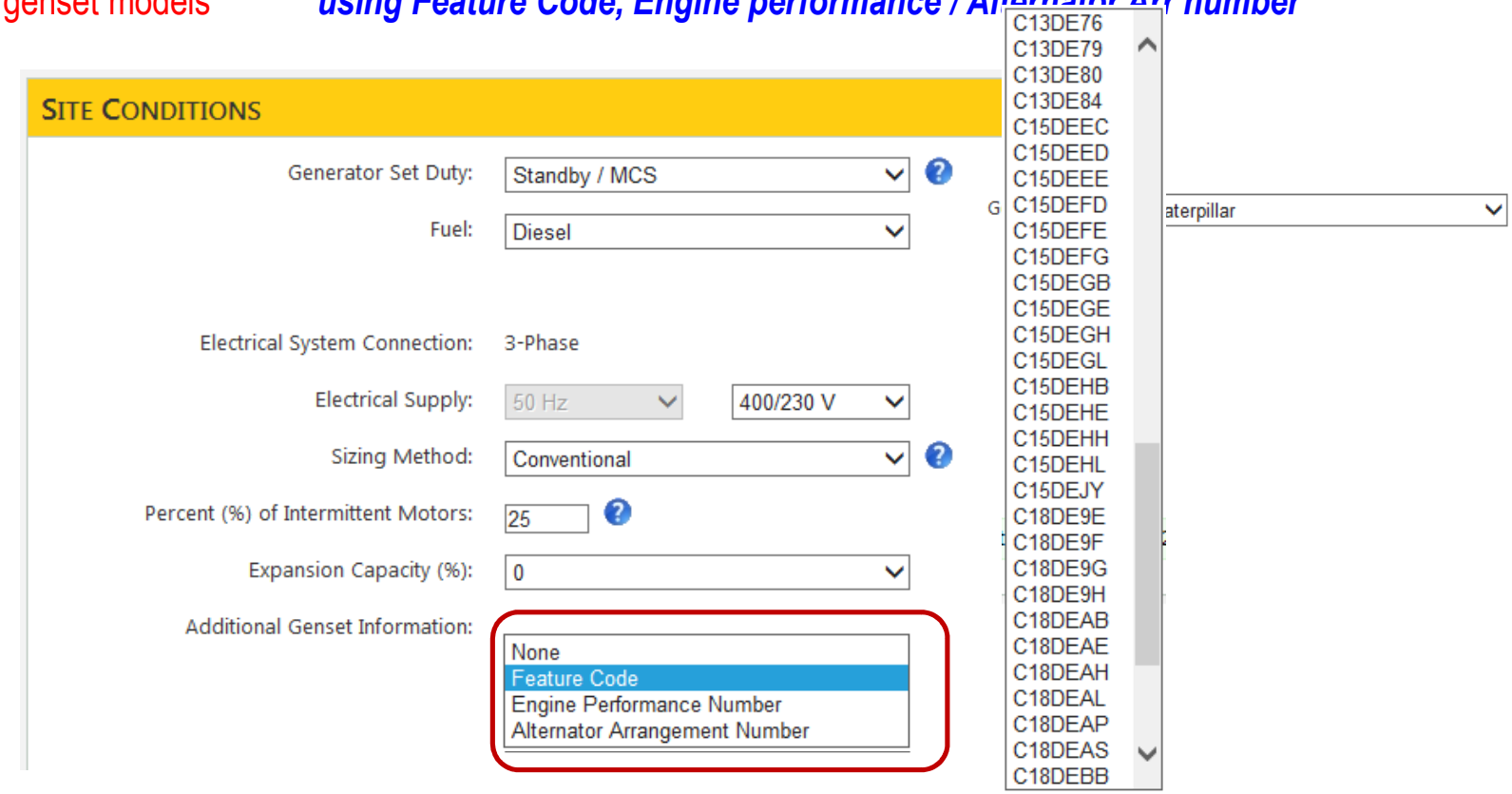


Voltage Regulator: CDVR can be forced by selecting: Optional (3:1) Slope Performance



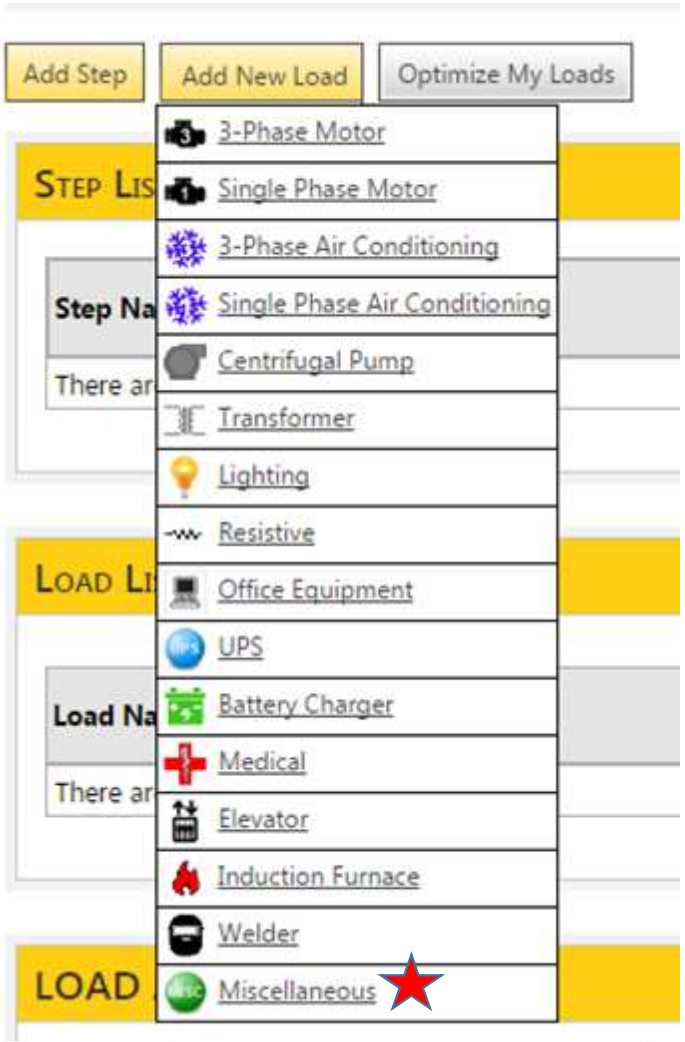
ELECTRIC POWER SPECSIZER

- Filtering genset models ***using Feature Code, Engine performance / Alternator Arr number***



ELECTRIC POWER SPECSIZER

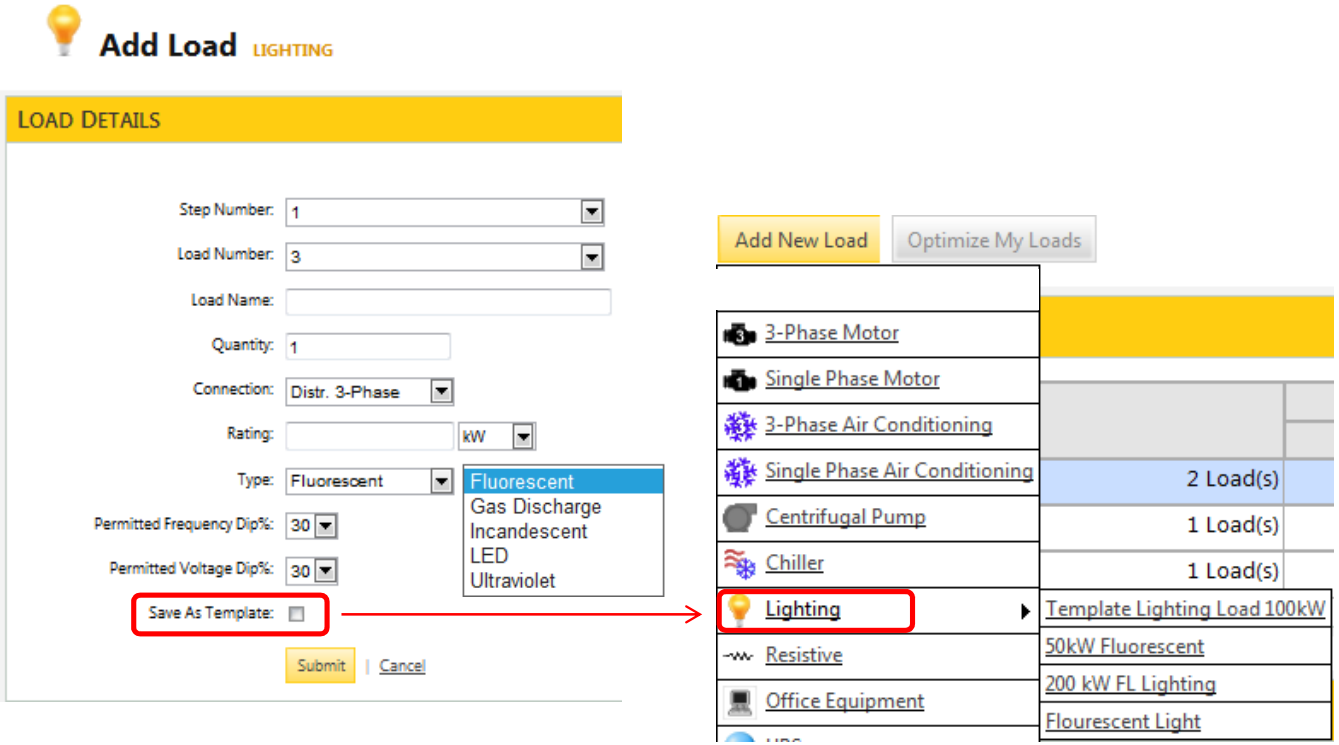
- Define Site Conditions → **Add Loads**
  - New feature – Template loads
  - Add Loads page displays “Effective” Frequency and “Effective” Voltage
    - Effective Fdip/Vdip vs. User Defined Fdip/Vdip
      - Subsequent loads and load steps adopt
      - the most restrictive Fdip or Vdip of prior loads or load steps



Add loads using ‘Add New Load’ button or load icons

ELECTRIC POWER SPECSIZER

- **Add Loads**: New feature – lets you create a template load



ELECTRIC POWER SPECSIZER

- **Add Loads**: New Feature - Effective frequency/voltage dip: added to help user see effect of restrictive fdip/vdip rule: Sequence restrictive loads later if possible to downsize genset

STEP LIST

Step Name	Step		Effective	
	SkVA	SkW	Frequency	Voltage
Step1 2 Load(s)	128.0	106.3	10.0	10.0
Step2 1 Load(s)	1,557.0	544.9	10.0	10.0
Step3 1 Load(s)	200.0	150.0	10.0	10.0

LOAD LIST

Load Name	User Defined/Effective	
	Frequency	Voltage
User Defined UPS, 3-Phase, IGBT, 9% Walk-In, 30% Battery Recharge, No Battery Revert 1 X 500.00 kVA	10.0/10.0	10.0/10.0
Fluorescent Lighting, Distr, 3-Phase 1 X 50.00 kW	30.0/10.0	30.0/10.0
Summary	-/10.0	-/10.0

- 3-Phase Motor in Step 2 and Fluorescent Lighting in Steps 1 & 3 adopted 10% Fdip/Vdip of Step#1 UPS load;
- Motors & Lighting were spec'ed for 30% Fdip/Vdip, restricted to 10% Fdip/Vdip due to UPS sequenced prior

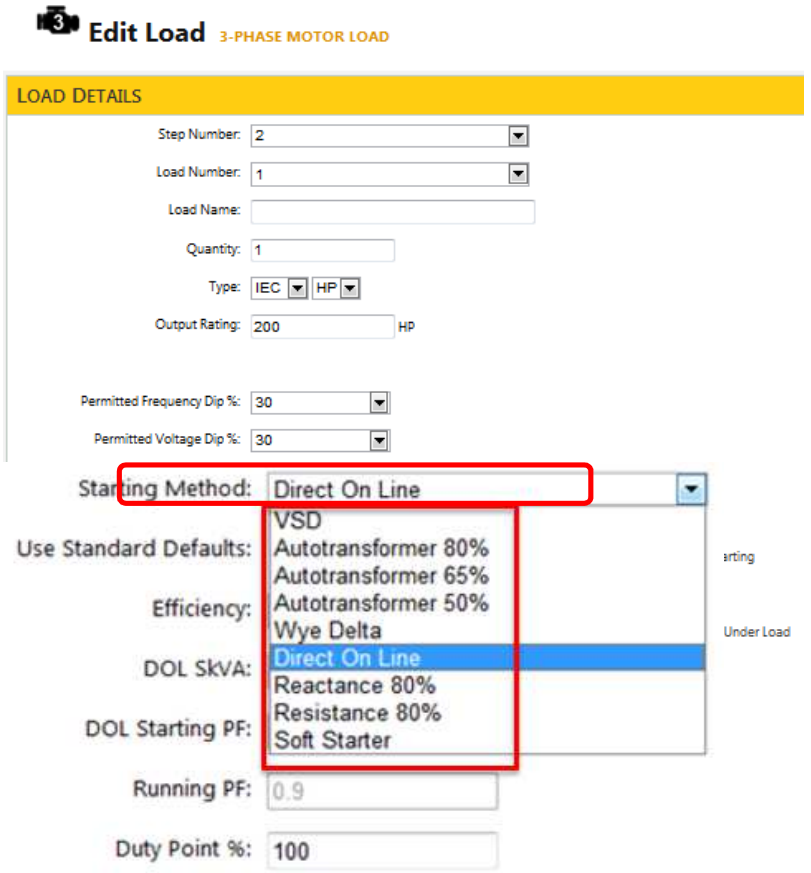
ELECTRIC POWER SPECSIZER

- **Motors:** DOL/ATL can result in oversizing the genset

– Reduced Voltage Starters can help to optimize the genset size

Reduced Voltage Starters			
Type of Starter	*Motor Voltage % Line Voltage*	*Line Current % Full Voltage Starting Current*	*Starting Torque % of Full Voltage Starting Torque*
Full Voltage Starter	100	100	100
Autotransformer			
80% Tap	80	*68	64
65% Tap	65	*46	42
50% Tap	50	*29	25
Resistor Starter			
Single Step (Adjusted for motor voltage to be 80% of line voltage)	80	80	64
Reactor			
50% Tap	50	50	5
45% Tap	45	45	20
37.5% Tap	37.5	37.5	14
Part Winding (Low speed motors only)			
75% Winding	100	75	75
50% Winding	100	50	50
Star Delta	57	33	33
Solid State	Adjustable		

* % line current is 64%, 42% and 24% before addition of autotransformer magnetizing current.

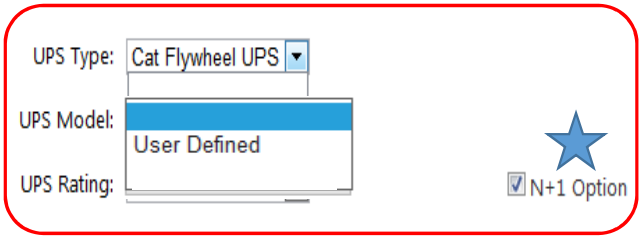


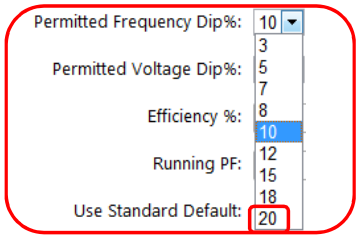
- VFD/VSD - non linear load which can influence the sizing

ELECTRIC POWER SPECSIZER

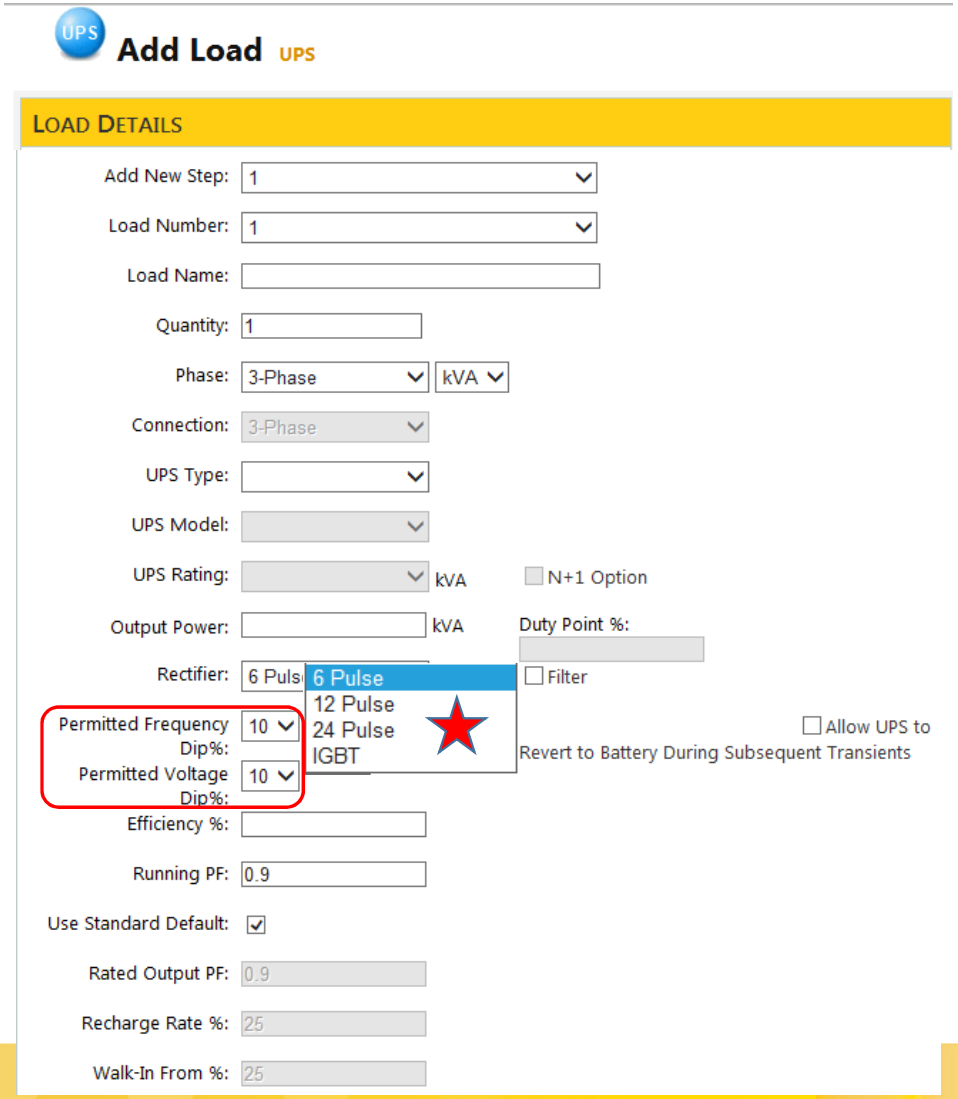
- **UPS load:** Static Battery UPS

UPS Types:



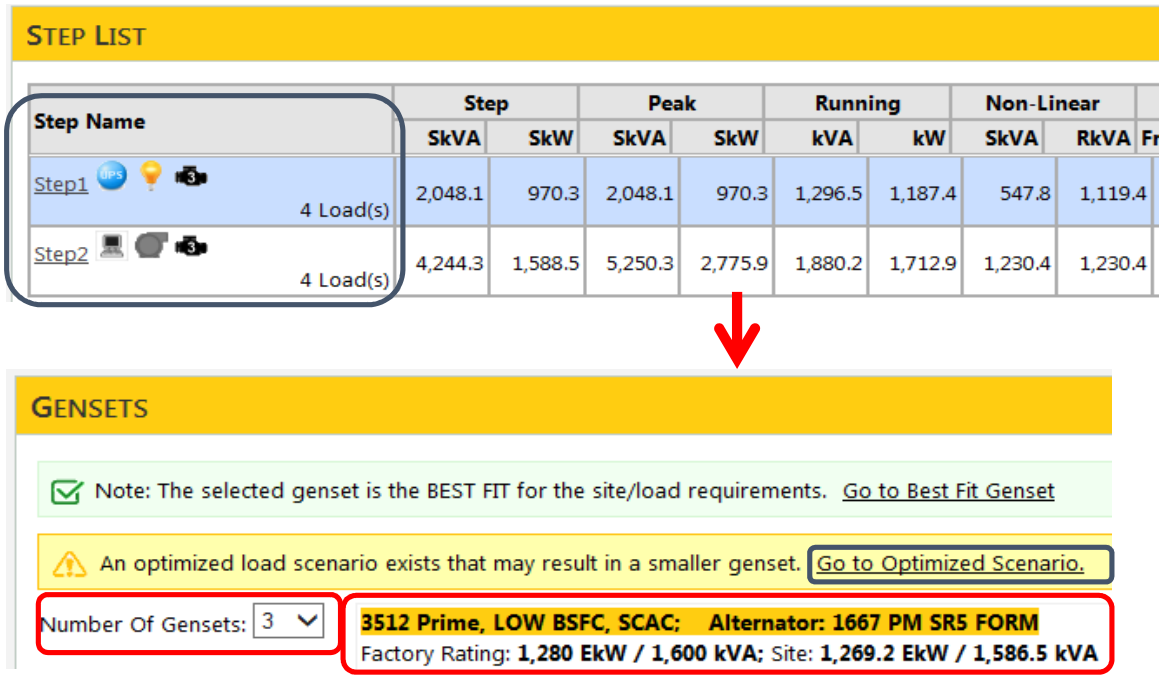


- 20% max allowed Fdip/Vdip on all UPS
- Sequence later in load scenario if possible

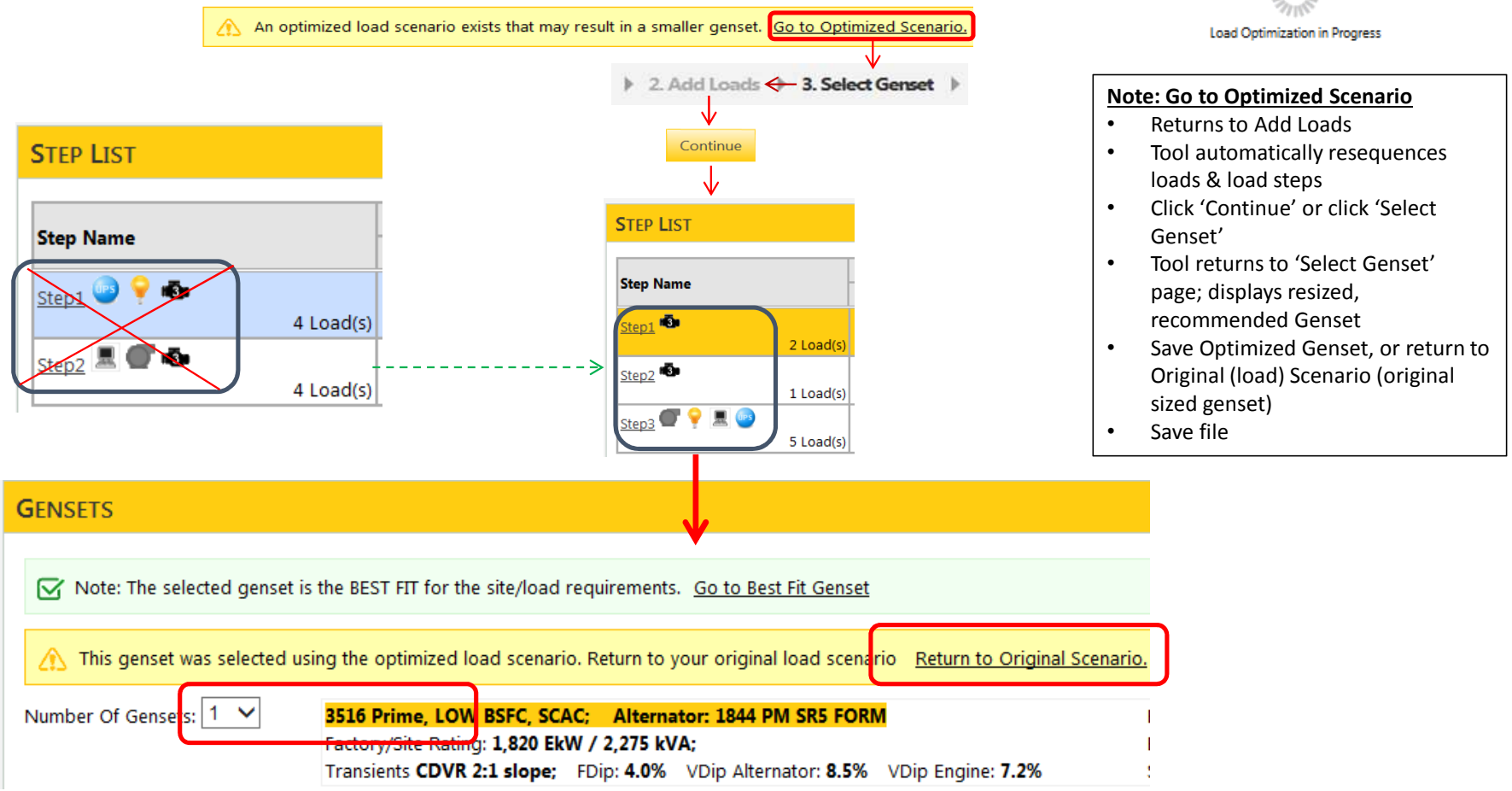


ELECTRIC POWER SPECSIZER

- **Select Genset**: Optimized genset may be possible (downsizes genset!)
  - Optimizer runs automatically in background & prompts user if Optimized load scenario or genset is possible



ELECTRIC POWER SPECSIZER



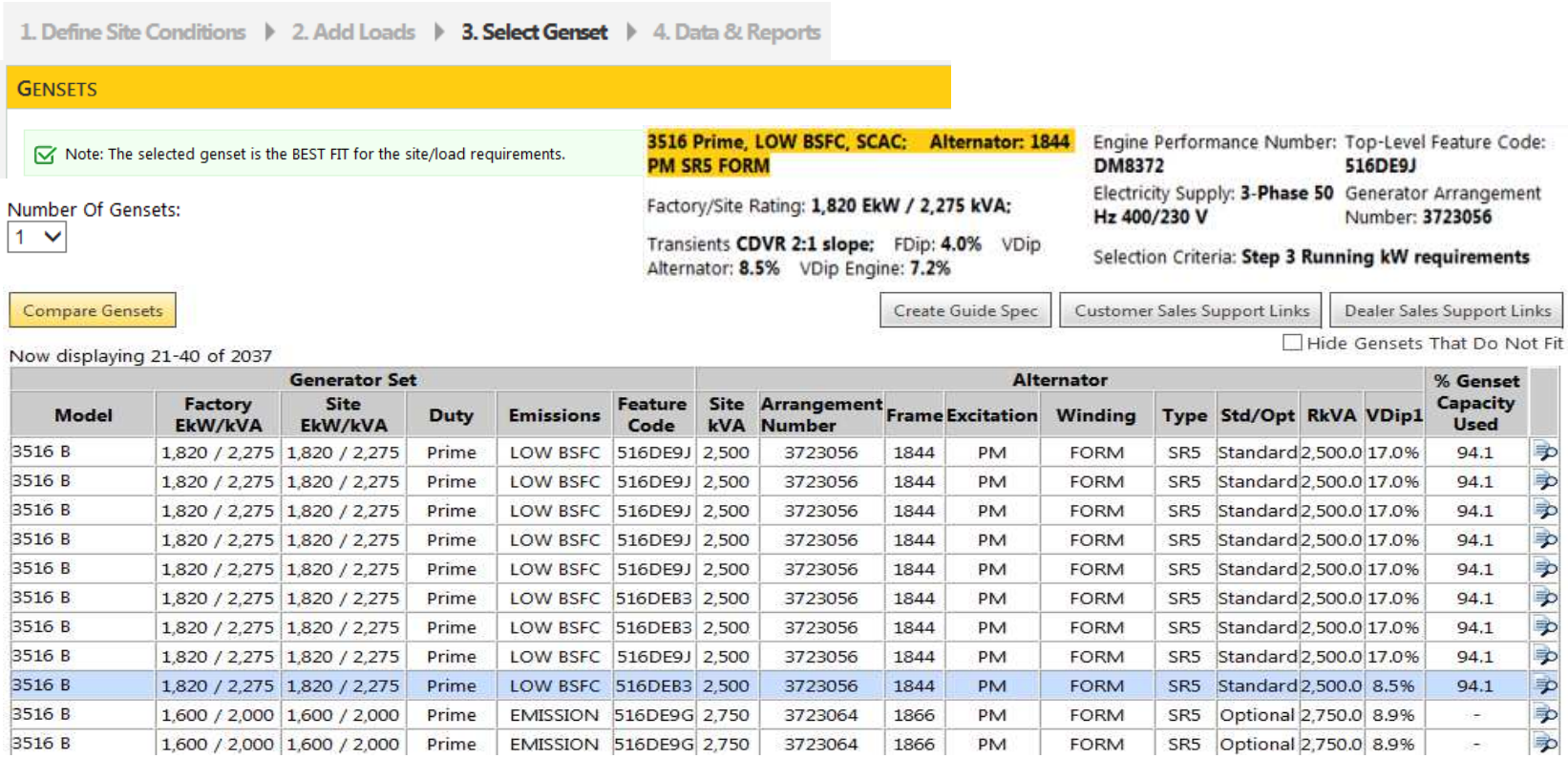
Note: Go to Optimized Scenario

- Returns to Add Loads
- Tool automatically resequences loads & load steps
- Click 'Continue' or click 'Select Genset'
- Tool returns to 'Select Genset' page; displays resized, recommended Genset
- Save Optimized Genset, or return to Original (load) Scenario (original sized genset)
- Save file

ELECTRIC POWER SPECSIZER

- Select Genset:

Malaga EP Days#1- Optimized



1. Define Site Conditions ▸ 2. Add Loads ▸ **3. Select Genset** ▸ 4. Data & Reports

GENSETS

☑ Note: The selected genset is the BEST FIT for the site/load requirements.

3516 Prime, LOW BSFC, SCAC: Alternator: 1844 PM SR5 FORM

Factory/Site Rating: **1,820 EkW / 2,275 kVA;**

Transients **CDVR 2:1 slope;** FDip: **4.0%** VDip Alternator: **8.5%** VDip Engine: **7.2%**

Engine Performance Number: **DM8372**

Top-Level Feature Code: **516DE9J**

Electricity Supply: **3-Phase 50 Hz 400/230 V**

Generator Arrangement Number: **3723056**

Selection Criteria: **Step 3 Running kW requirements**

Number Of Gensets: 1

Now displaying 21-40 of 2037

Generator Set						Alternator									% Genset Capacity Used	
Model	Factory EkW/kVA	Site EkW/kVA	Duty	Emissions	Feature Code	Site kVA	Arrangement Number	Frame	Excitation	Winding	Type	Std/Opt	RkVA	VDip1		
3516 B	1,820 / 2,275	1,820 / 2,275	Prime	LOW BSFC	516DE9J	2,500	3723056	1844	PM	FORM	SR5	Standard	2,500.0	17.0%	94.1	🔍
3516 B	1,820 / 2,275	1,820 / 2,275	Prime	LOW BSFC	516DE9J	2,500	3723056	1844	PM	FORM	SR5	Standard	2,500.0	17.0%	94.1	🔍
3516 B	1,820 / 2,275	1,820 / 2,275	Prime	LOW BSFC	516DE9J	2,500	3723056	1844	PM	FORM	SR5	Standard	2,500.0	17.0%	94.1	🔍
3516 B	1,820 / 2,275	1,820 / 2,275	Prime	LOW BSFC	516DE9J	2,500	3723056	1844	PM	FORM	SR5	Standard	2,500.0	17.0%	94.1	🔍
3516 B	1,820 / 2,275	1,820 / 2,275	Prime	LOW BSFC	516DE9J	2,500	3723056	1844	PM	FORM	SR5	Standard	2,500.0	17.0%	94.1	🔍
3516 B	1,820 / 2,275	1,820 / 2,275	Prime	LOW BSFC	516DEB3	2,500	3723056	1844	PM	FORM	SR5	Standard	2,500.0	17.0%	94.1	🔍
3516 B	1,820 / 2,275	1,820 / 2,275	Prime	LOW BSFC	516DEB3	2,500	3723056	1844	PM	FORM	SR5	Standard	2,500.0	17.0%	94.1	🔍
3516 B	1,820 / 2,275	1,820 / 2,275	Prime	LOW BSFC	516DE9J	2,500	3723056	1844	PM	FORM	SR5	Standard	2,500.0	17.0%	94.1	🔍
3516 B	1,820 / 2,275	1,820 / 2,275	Prime	LOW BSFC	516DEB3	2,500	3723056	1844	PM	FORM	SR5	Standard	2,500.0	8.5%	94.1	🔍
3516 B	1,600 / 2,000	1,600 / 2,000	Prime	EMISSION	516DE9G	2,750	3723064	1866	PM	FORM	SR5	Optional	2,750.0	8.9%	-	🔍
3516 B	1,600 / 2,000	1,600 / 2,000	Prime	EMISSION	516DE9G	2,750	3723064	1866	PM	FORM	SR5	Optional	2,750.0	8.9%	-	🔍

ELECTRIC POWER SPECSIZER

- Select Genset: Best Fit Vs User Selected

Now displaying 161-180 of 970

Generator Set						Alternator									% Genset Capacity Used	
Model	Factory EkW/kVA	Site EkW/kVA	Duty	Emissions	Feature Code	Site kVA	Arrangement Number	Frame	Excitation	Winding	Type	Std/Opt	RkVA	VDip1		
3516 B	+ 1,600 / 2,000	+ 1,591.3 / 1,989.1	Prime	EMISSION	516DEB2	2,000	2523850	1625	PM	RANDOM	SR5	Optional	2,000.0	21.1%	98.1	
3516 B	+ 1,600 / 2,000	+ 1,591.3 / 1,989.1	Prime	EMISSION	516DEB2	2,000	2523850	1625	PM	RANDOM	SR5	Optional	2,000.0	21.1%	98.1	
3516 B	+ 1,600 / 2,000	+ 1,591.3 / 1,989.1	Prime	LOW BSFC	516DEB2	2,000	2523850	1625	PM	RANDOM	SR5	Optional	2,000.0	21.1%	98.1	
3516 B	+ 1,600 / 2,000	+ 1,590.3 / 1,987.9	Prime	LOW BSFC	516DEB2	2,000	2523850	1625	PM	RANDOM	SR5	Optional	2,000.0	21.1%	98.2	
3516 B	+ 1,600 / 2,000	+ 1,591.3 / 1,989.1	Prime	LOW BSFC	516DEB2	2,000	2523850	1625	PM	RANDOM	SR5	Optional	2,000.0	9.7%	98.1	
3516	+ 1,460 / 1,825	+ 1,460 / 1,825	Prime	LOW BSFC	516DE9F	2,750	3723064	1866	PM	FORM	SR5	Optional	2,750.0	8.1%	-	
3516	+ 1,460 / 1,825	+ 1,460 / 1,825	Prime	LOW BSFC	516DE9F	2,750	3723064	1866	PM	FORM	SR5	Optional	2,750.0	8.1%	-	
3516	+ 1,460 / 1,825	+ 1,451.8 / 1,814.7	Prime	LOW BSFC	516DR9N	2,500	3723056	1844	PM	FORM	SR5	Optional	2,500.0	7.8%	-	
3516	+ 1,460 / 1,825	+ 1,454.8 / 1,818.5	Prime	LOW BSFC	516DR9N	2,150	2523866	1647	PM	RANDOM	SR5	Optional	2,150.0	8.4%	-	

Note: The selected genset is USER SELECTED and meets or exceeds the site/load requirements. Go to Best Fit Genset

ELECTRIC POWER SPECSIZER

- Select Genset: click **View** → Generator Set Details

Generator Set Details

Starting & Selection Analysis

Alternator Frame Options

Diagnostics

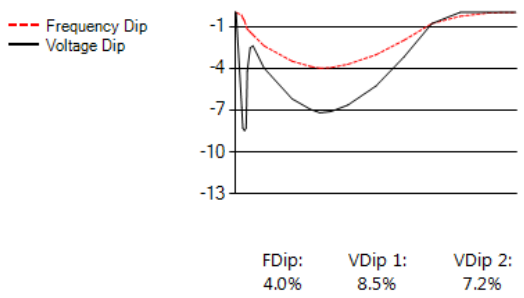
<< Back To Generator Set Selection

Note: The selected genset is the BEST FIT for the site/load requirements. Go to Best Fit Genset

3516 Prime, LOW BSFC, SCAC; Alternator: 1844 PM SR5 FORM
Factory/Site Rating: **1,820 EkW / 2,275 kVA;**
Transients **CDVR 2:1 slope;** FDip: **4.0%** VDip Alternator: **8.5%** VDip Engine: **7.2%**

Engine Performance Number: **DM7968**
Electricity Supply: **3-Phase 50 Hz 400/230 V**
Selection Criteria: **Step 3 Running kW requirements**

Top-Level Feature Code: **516DEB3**
Generator Arrangement Number: **3723056**



	Selected Generator Set (User Selected Regulator: Best Fit)
Voltage Regulator & Slope	**(Standard) 2:1 slope**
Gensets Required	**1**
Factory Genset EkW / kVA	**1,820 / 2,275**
Genset Model	**3516 B**
Alternator Frame	**1844**

		User Defined/Effective Limit		Voltage Regulator Effect on Transient Response	
				CDVR (Standard)	
Step Number	**%SkW of Genset**	**Frequency Dip-%**	**Voltage Dip-%**	**Frequency Dip-%**	**Voltage Dip-%**
Step1	59.9%	30.0% / 30.0%	30.0% / 30.0%	**5.1%**	**17.0%**
Step2	29.9%	30.0% / 30.0%	30.0% / 30.0%	**2.0%**	**9.3%**
Step3	50.8%	10.0% / 10.0%	10.0% / 10.0%	**4.0%**	**8.5%**

Step 3 Running kW requirements

Performance assumes voltage and frequency stabilization between steps

ELECTRIC POWER SPECSIZER

- Select Genset: click **View** → Generator Set Details → Alternator Frame Options
  - Provides details of all Alternators that are options for selected genset model & rating
  - Can order an Alternator with better Non-Linear load capability
    - e.g. for Data Centers, an option for sites with high harmonic & voltage & current distortion loads

Generator Set Details

Starting & Selection Analysis

Alternator Frame Options

Diagnostics

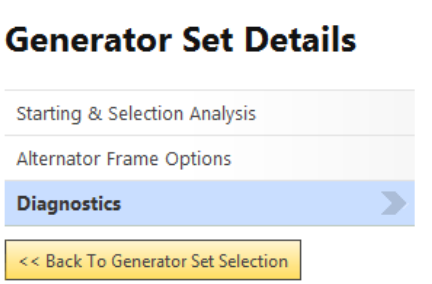
<< Back To Generator Set Selection

Selected Generator Set Standard & Optional Alternator Frames								Alternator Frame	
Genset Model	**Alternator Type**	**Alternator Arrangement Number**	**Winding Type**	**Excitation** ★	**Temperature Rise** ★	**Standard**	**Optional**	**1868**	**1866**
C175-16	SR5	3723068	FORM	PM	105 C		X	3,000.0	
C175-16	SR5	3723068	FORM	PM	105 C		X	3,000.0	
C175-16	SR5	3723064	FORM	PM	125 C		X		2,750.0
C175-16	SR5	3723064	FORM	PM	125 C		X		2,750.0
C175-16	SR5	3723064	FORM	PM	125 C	X			2,750.0
C175-16	**SR5**	**3723064**	**FORM**	**PM**	**125 C**	**X**			**2,750.0**

Alternator RkVA (selected generator set)

ELECTRIC POWER SPECSIZER

- Select Genset: click **View** → Generator Set Details → Diagnostics
  - Technical data for sized genset: Genset, Alternator, Engine and Project information
  - Diagnose sized genset's technical capabilities; provides useful product numbers for TMI searches, On-Line Price List searches



Cooling system Performance

Alternator Performance

Engine Performance

L_KP170504_3

Note: The selected genset is USER SELECTED and meets or exceeds the site/load requirements. Go to Best Fit Genset

DE88E0 (C4.4) Prime, Not Certifie , Alternator: R1973L4 SE SR500.
Factory Rating: **64 EkW / 80 kVA;** ite: **59.3 EkW / 74.1 kVA**
Transients **Mark 2:1 slope;** FDip: VDip Alternator: VDip Engine:
Electricity Supply: **3-Phase 50 Hz 400/230 V**
Selection Criteria: **Step Passed**

Genset Diagnostics

Genset Model	Site kW/kVA	Rating kW	Top-Level Feature Code	Facility Code		Source (Price List)		Region	
DE88E0 (C4.4)	59.3 / 74.1	64.0 / 80.0						E901 EPNA	
								E860 APPS	X
								E500 EAME	X
								E50W Canada	
								E50Z LACD	X

Alternator Diagnostics

Genset Model	Site kW/kVA	Rating kW	Alternator Arrangement Number	Alternator Rating kVA	Efficiency	Temperature Rise	Standard	Optional
DE88E0 (C4.4)	59.3 / 74.1	64.0 / 80.0		80.0	90.7	H		

Engine Diagnostics

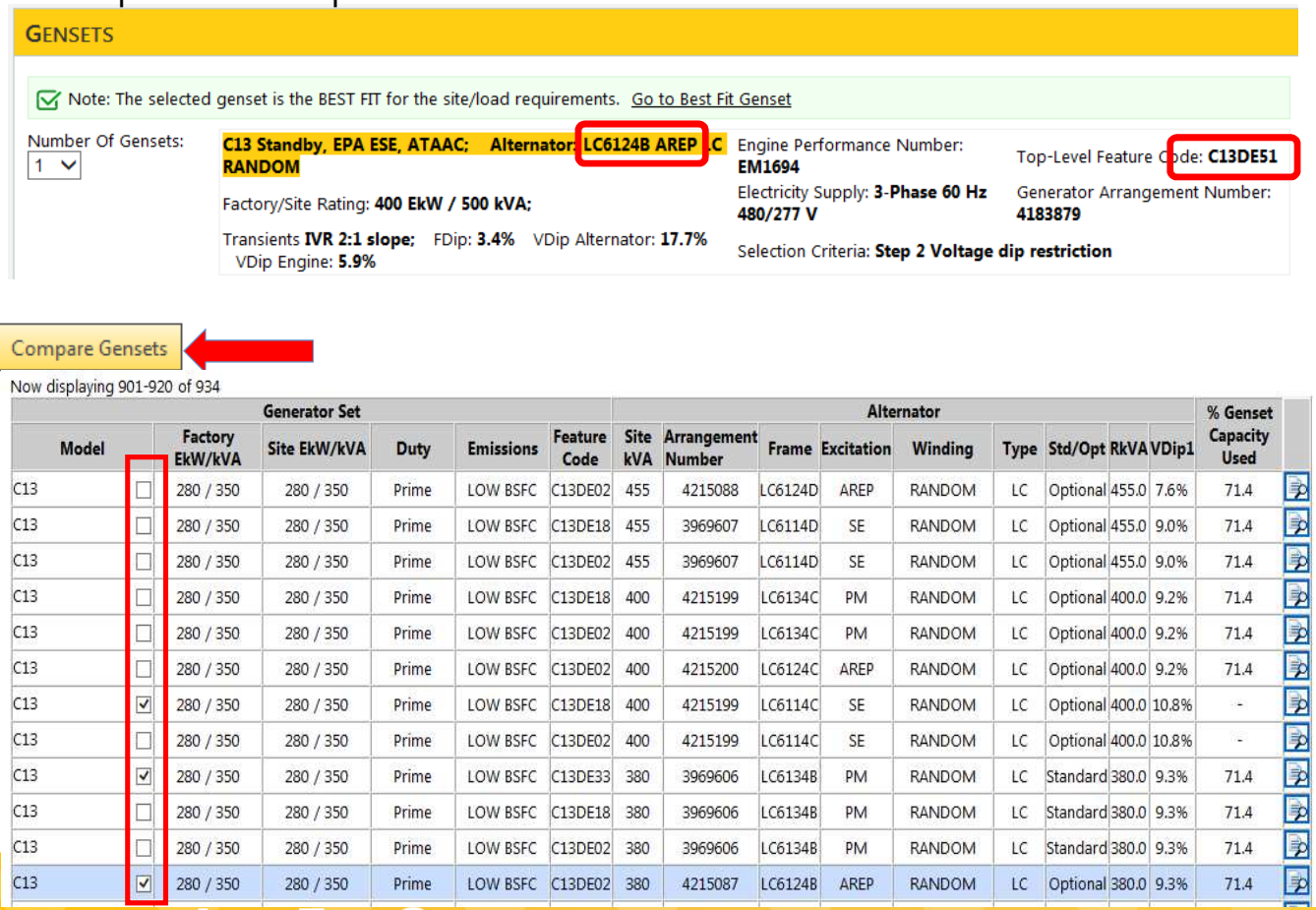
Genset Model	Site kW/kVA	Rating kW	Performance Number	Rack Stop kW	Max Single Step kW	Fan kW (Power)	Fan Ratio
DE88E0 (C4.4)	59.3 / 74.1	64.0 / 80.0		80.7	70.4	1.0	

Project Diagnostics

Created Date	Last Modified Date	Region Code	Maximum Ambient Temperature	Altitude
5/4/2017	5/4/2017	E500	42.0 C	1,500.0 M.A.S.L.

ELECTRIC POWER SPECSIZER

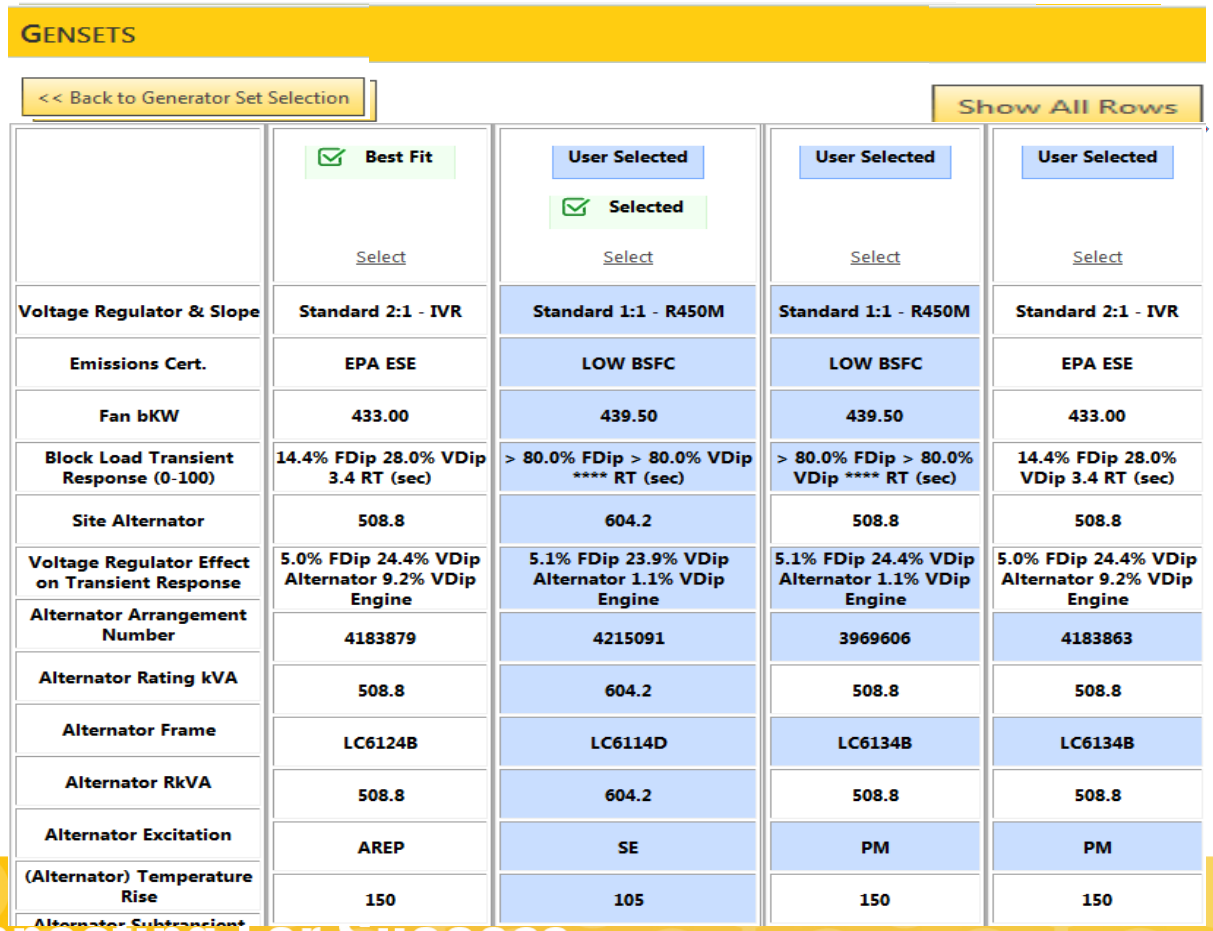
- Compare Gensets' performance: click **View** → Generator Set Details



Generator Set							Alternator									% Genset Capacity Used	
Model		Factory EkW/kVA	Site EkW/kVA	Duty	Emissions	Feature Code	Site kVA	Arrangement Number	Frame	Excitation	Winding	Type	Std/Opt	RkVA	VDip1		
C13	☐	280 / 350	280 / 350	Prime	LOW BSFC	C13DE02	455	4215088	LC6124D	AREP	RANDOM	LC	Optional	455.0	7.6%	71.4	
C13	☐	280 / 350	280 / 350	Prime	LOW BSFC	C13DE18	455	3969607	LC6114D	SE	RANDOM	LC	Optional	455.0	9.0%	71.4	
C13	☐	280 / 350	280 / 350	Prime	LOW BSFC	C13DE02	455	3969607	LC6114D	SE	RANDOM	LC	Optional	455.0	9.0%	71.4	
C13	☐	280 / 350	280 / 350	Prime	LOW BSFC	C13DE18	400	4215199	LC6134C	PM	RANDOM	LC	Optional	400.0	9.2%	71.4	
C13	☐	280 / 350	280 / 350	Prime	LOW BSFC	C13DE02	400	4215199	LC6134C	PM	RANDOM	LC	Optional	400.0	9.2%	71.4	
C13	☐	280 / 350	280 / 350	Prime	LOW BSFC	C13DE02	400	4215200	LC6124C	AREP	RANDOM	LC	Optional	400.0	9.2%	71.4	
C13	☑	280 / 350	280 / 350	Prime	LOW BSFC	C13DE18	400	4215199	LC6114C	SE	RANDOM	LC	Optional	400.0	10.8%	-	
C13	☐	280 / 350	280 / 350	Prime	LOW BSFC	C13DE02	400	4215199	LC6114C	SE	RANDOM	LC	Optional	400.0	10.8%	-	
C13	☑	280 / 350	280 / 350	Prime	LOW BSFC	C13DE33	380	3969606	LC6134B	PM	RANDOM	LC	Standard	380.0	9.3%	71.4	
C13	☐	280 / 350	280 / 350	Prime	LOW BSFC	C13DE18	380	3969606	LC6134B	PM	RANDOM	LC	Standard	380.0	9.3%	71.4	
C13	☐	280 / 350	280 / 350	Prime	LOW BSFC	C13DE02	380	3969606	LC6134B	PM	RANDOM	LC	Standard	380.0	9.3%	71.4	
C13	☑	280 / 350	280 / 350	Prime	LOW BSFC	C13DE02	380	4215087	LC6124B	AREP	RANDOM	LC	Optional	380.0	9.3%	71.4	

ELECTRIC POWER SPECSIZER

- Compare Gensets' performance – compares 37 parameters of the selected gensets



GENSETS

<< Back to Generator Set Selection

Show All Rows

	Best Fit Select	User Selected Selected Select	User Selected Select	User Selected Select
Voltage Regulator & Slope	Standard 2:1 - IVR	Standard 1:1 - R450M	Standard 1:1 - R450M	Standard 2:1 - IVR
Emissions Cert.	EPA ESE	LOW BSFC	LOW BSFC	EPA ESE
Fan bKW	433.00	439.50	439.50	433.00
Block Load Transient Response (0-100)	14.4% FDip 28.0% VDip 3.4 RT (sec)	> 80.0% FDip > 80.0% VDip **** RT (sec)	> 80.0% FDip > 80.0% VDip **** RT (sec)	14.4% FDip 28.0% VDip 3.4 RT (sec)
Site Alternator	508.8	604.2	508.8	508.8
Voltage Regulator Effect on Transient Response	5.0% FDip 24.4% VDip Alternator 9.2% VDip Engine	5.1% FDip 23.9% VDip Alternator 1.1% VDip Engine	5.1% FDip 24.4% VDip Alternator 1.1% VDip Engine	5.0% FDip 24.4% VDip Alternator 9.2% VDip Engine
Alternator Arrangement Number	4183879	4215091	3969606	4183863
Alternator Rating kVA	508.8	604.2	508.8	508.8
Alternator Frame	LC6124B	LC6114D	LC6134B	LC6134B
Alternator RkVA	508.8	604.2	508.8	508.8
Alternator Excitation	AREP	SE	PM	PM
(Alternator) Temperature Rise	150	105	150	150

- Max 3 products can be compared against the best fit genset.

ELECTRIC POWER SPECSIZER

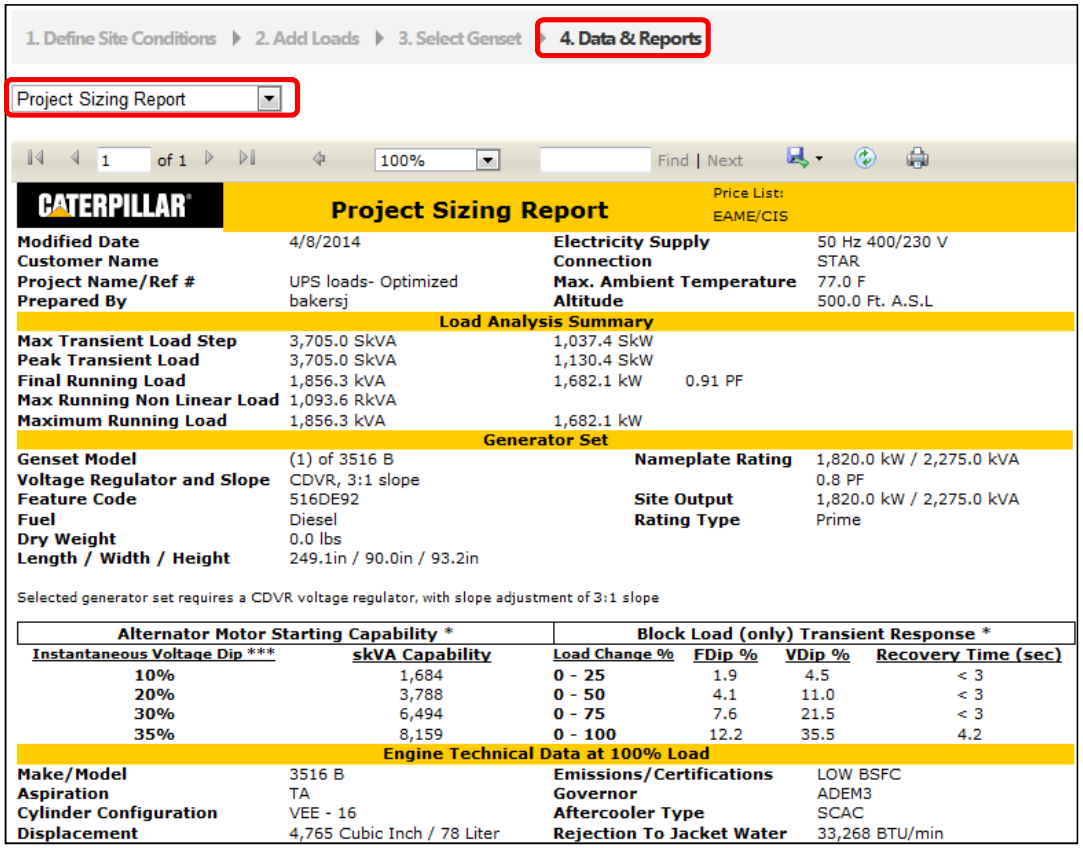
- Data & Reports:

Project Sizing Report

Load Report

Transient Performance Report

  - Sizing Report – Provides Project, Load Analysis, Genset, Engine & Alternator data for sized Genset



1. Define Site Conditions ▸ 2. Add Loads ▸ 3. Select Genset ▸ 4. Data & Reports

Project Sizing Report

1 of 1 | 100% | Find | Next

CATERPILLAR

Project Sizing Report

Price List: EAME/CIS

Modified Date	4/8/2014	**Electricity Supply**	50 Hz 400/230 V
Customer Name		**Connection**	STAR
Project Name/Ref #	UPS loads- Optimized	**Max. Ambient Temperature**	77.0 F
Prepared By	bakersj	**Altitude**	500.0 Ft. A.S.L

Load Analysis Summary

Max Transient Load Step	3,705.0 SkVA	1,037.4 SkW	
Peak Transient Load	3,705.0 SkVA	1,130.4 SkW	
Final Running Load	1,856.3 kVA	1,682.1 kW	0.91 PF
Max Running Non Linear Load	1,093.6 RkVA		
Maximum Running Load	1,856.3 kVA	1,682.1 kW	

Generator Set

Genset Model	(1) of 3516 B	**Nameplate Rating**	1,820.0 kW / 2,275.0 kVA
Voltage Regulator and Slope	CDVR, 3:1 slope		0.8 PF
Feature Code	516DE92	**Site Output**	1,820.0 kW / 2,275.0 kVA
Fuel	Diesel	**Rating Type**	Prime
Dry Weight	0.0 lbs		
Length / Width / Height	249.1in / 90.0in / 93.2in		

Selected generator set requires a CDVR voltage regulator, with slope adjustment of 3:1 slope

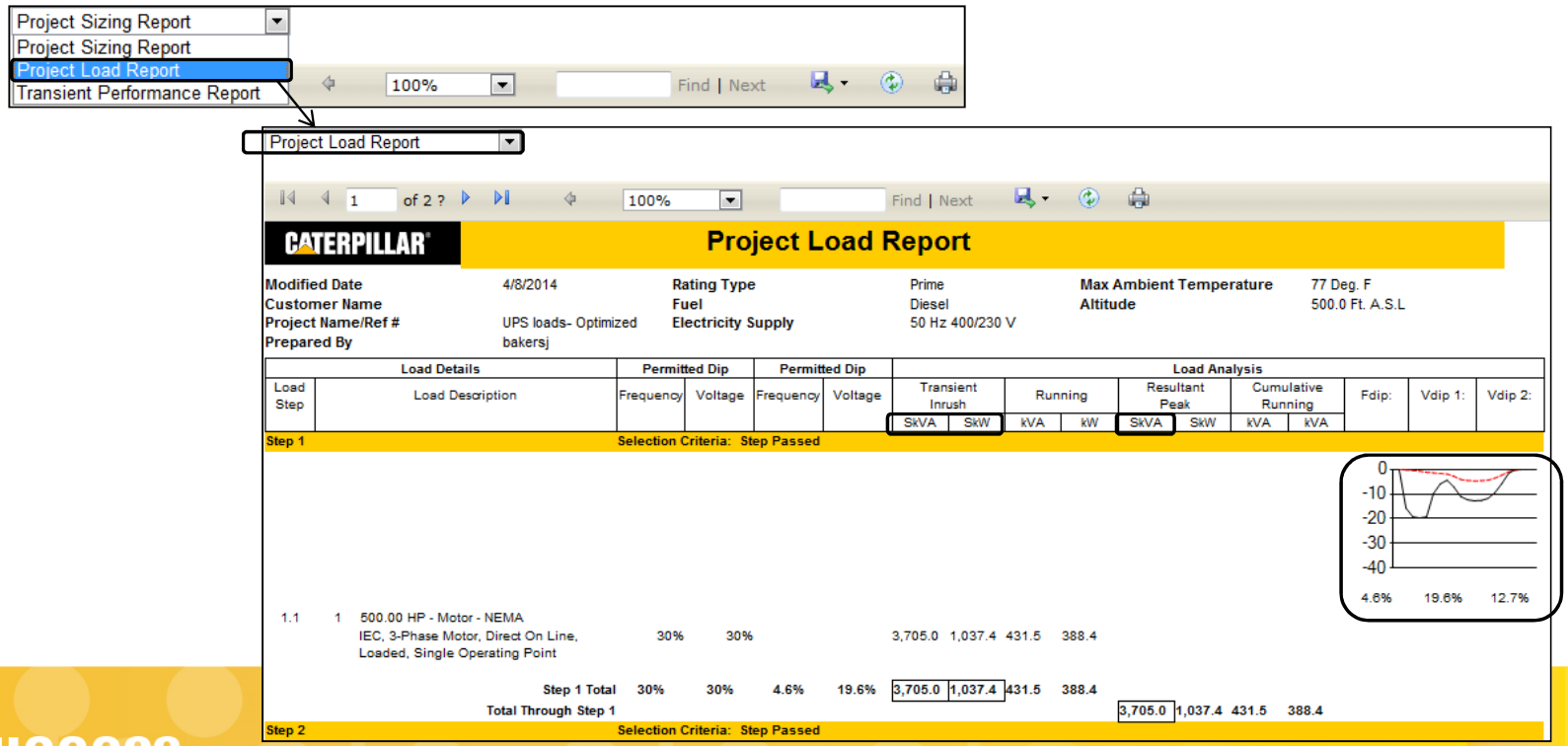
Alternator Motor Starting Capability *		Block Load (only) Transient Response *			
Instantaneous Voltage Dip ***	skVA Capability	Load Change %	FDip %	VDip %	Recovery Time (sec)
10%	1,684	**0 - 25**	1.9	4.5	< 3
20%	3,788	**0 - 50**	4.1	11.0	< 3
30%	6,494	**0 - 75**	7.6	21.5	< 3
35%	8,159	**0 - 100**	12.2	35.5	4.2

Engine Technical Data at 100% Load

Make/Model	3516 B	**Emissions/Certifications**	LOW BSFC
Aspiration	TA	**Governor**	ADEM3
Cylinder Configuration	VEE - 16	**Aftercooler Type**	SCAC
Displacement	4,765 Cubic Inch / 78 Liter	**Rejection To Jacket Water**	33,268 BTU/min

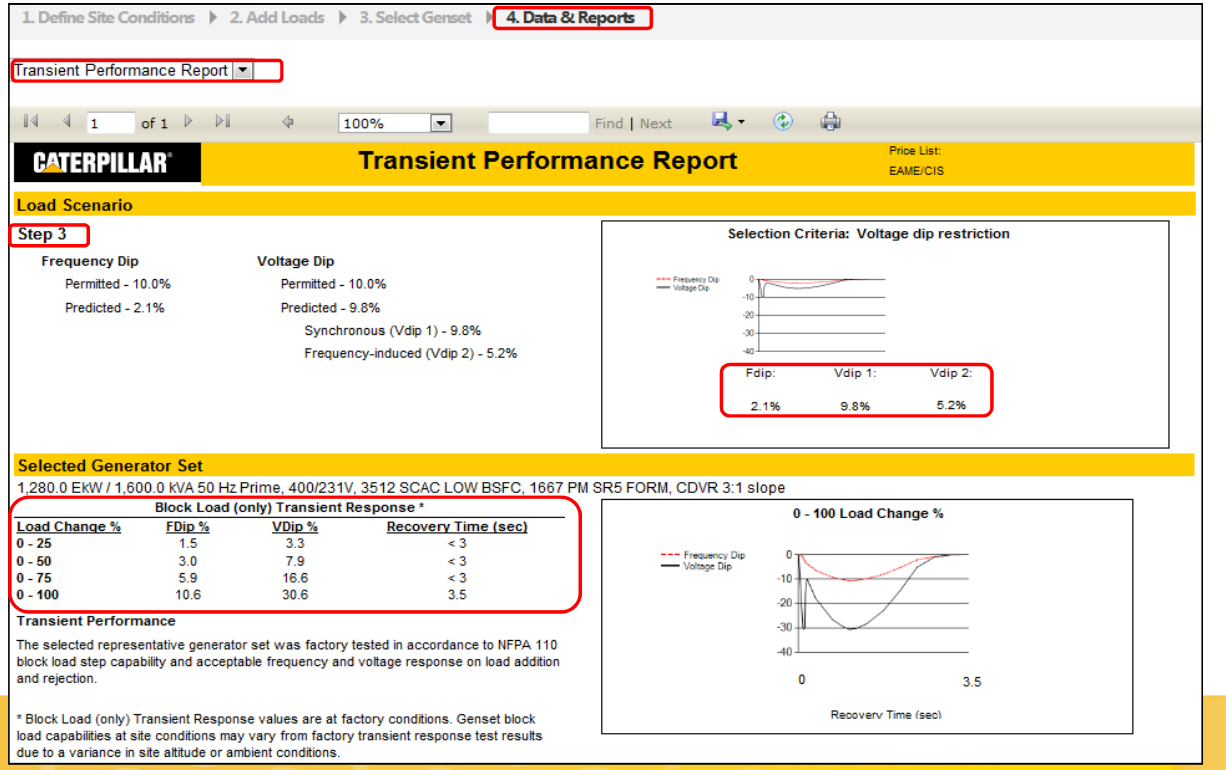
ELECTRIC POWER SPECSIZER

- Data & Reports: Load Report
  - Worst sizing factors (Inrush, Running & Non-Linear) are boxed in load step they occur; work to reduce these sizing parameters to downsize genset
  - Transient graph provided for each load step



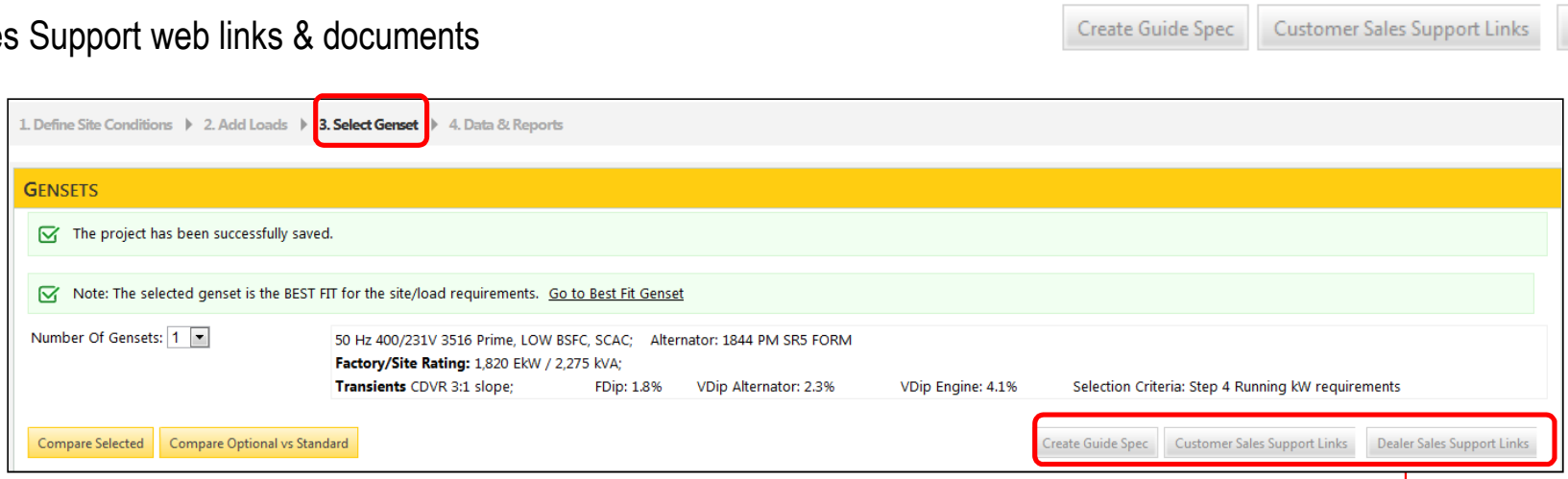
ELECTRIC POWER SPECSIZER

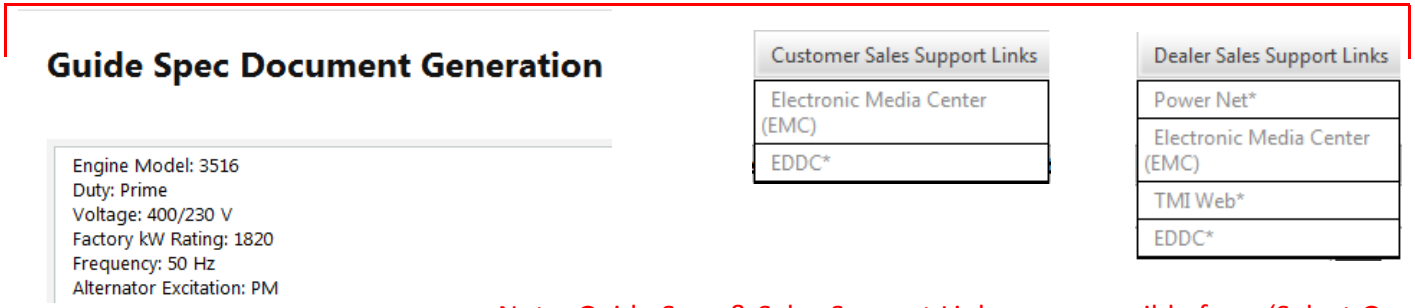
- Data & Reports: Transient Performance Report
  - Load Scenario – load step & step's transients that the genset sizing is based upon
  - Selected Generator Set – factory block load test, transient response at 25% load changes



ELECTRIC POWER SPECSIZER

- Sales Support web links & documents

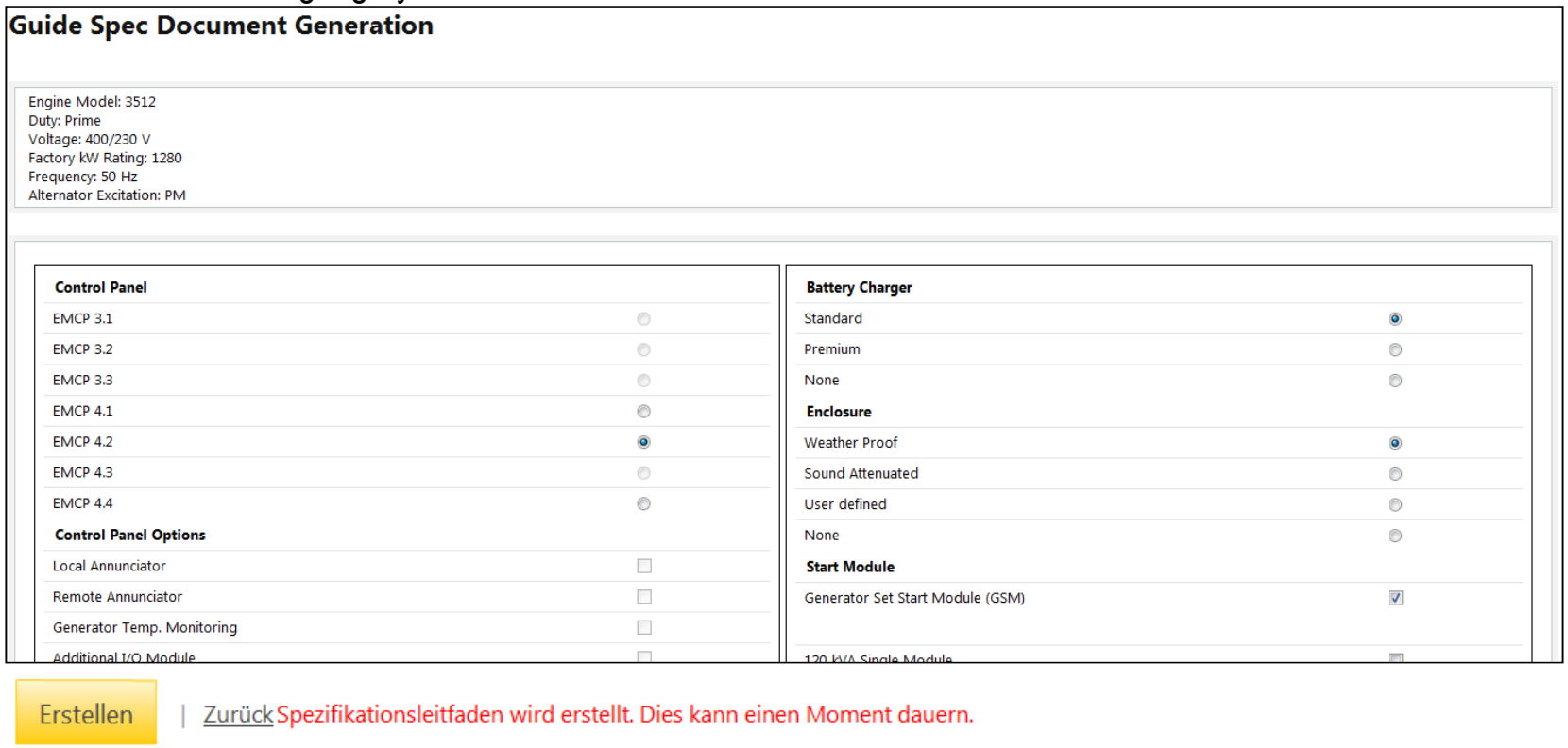




Note: Guide Spec & Sales Support Links are accessible from 'Select Genset' page

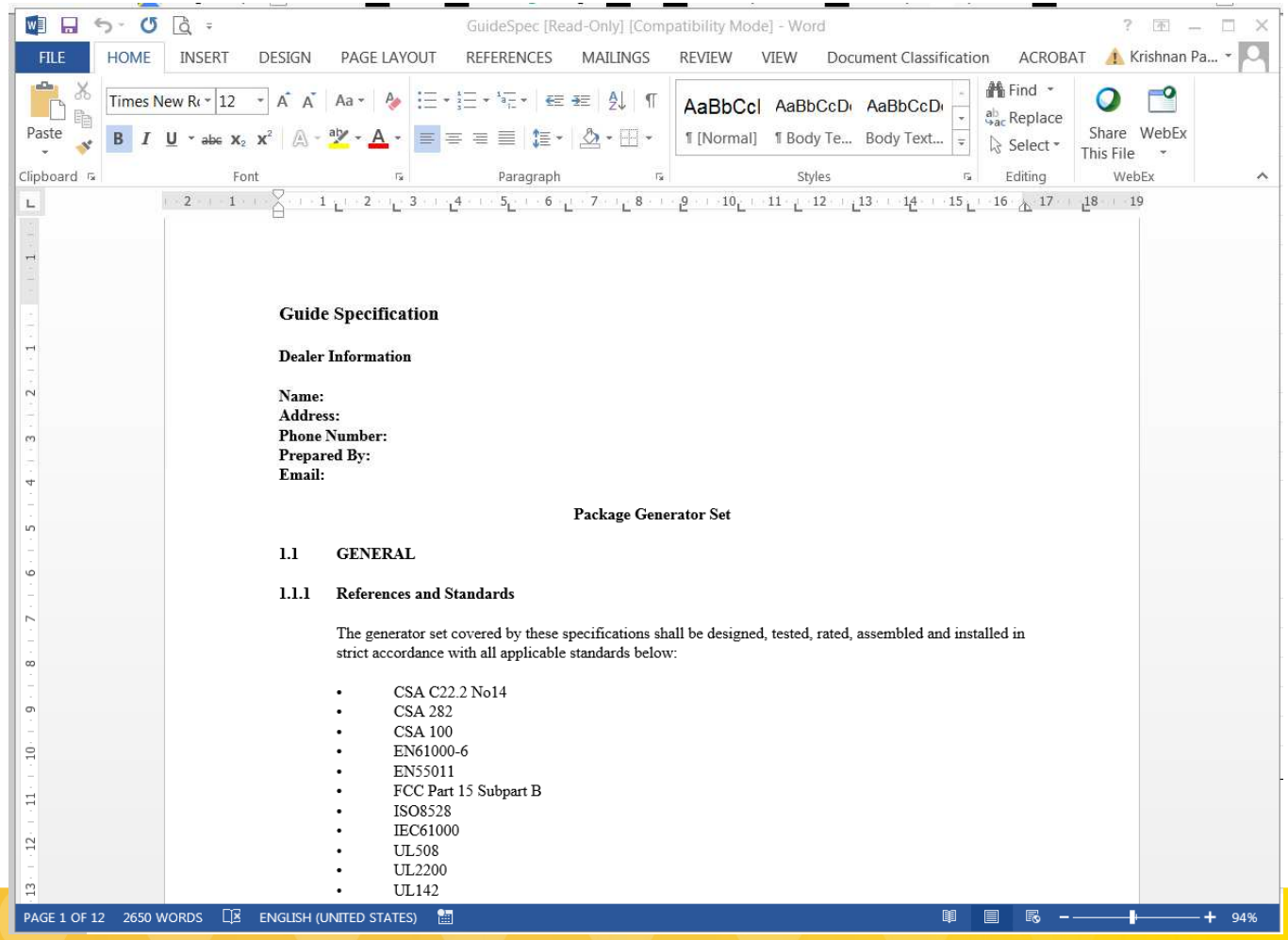
ELECTRIC POWER SPECSIZER

- Guide Spec – Editable MSWord doc
  - Available in language you have selected in “User Preferences”



ELECTRIC POWER SPECSIZER

Note: Guide Spec comprised of (3) sections: Genset, ATS & Switchgear



Connecting For Success…

ELECTRIC POWER SPECSIZER

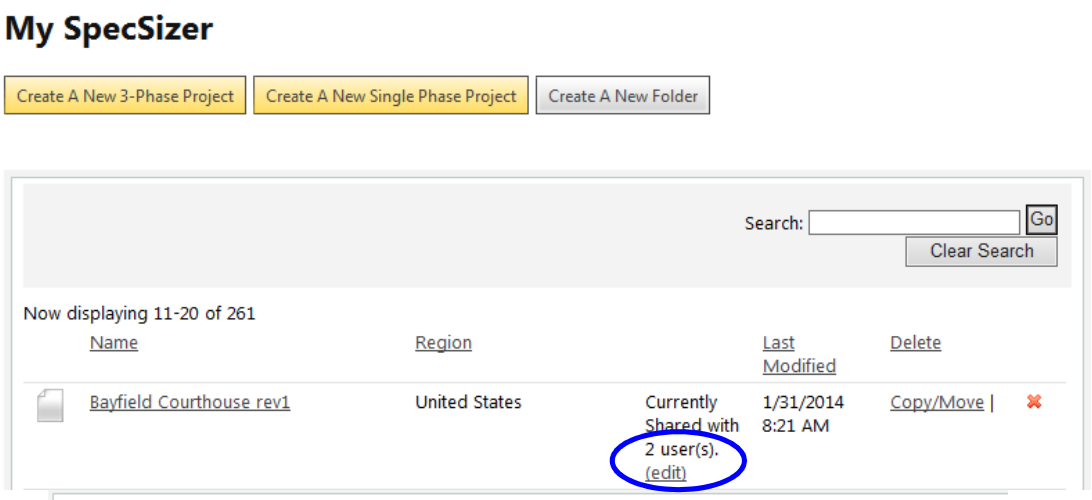
- **File Sharing**:

Click (edit) command located on line with file name

Select from previously added Users

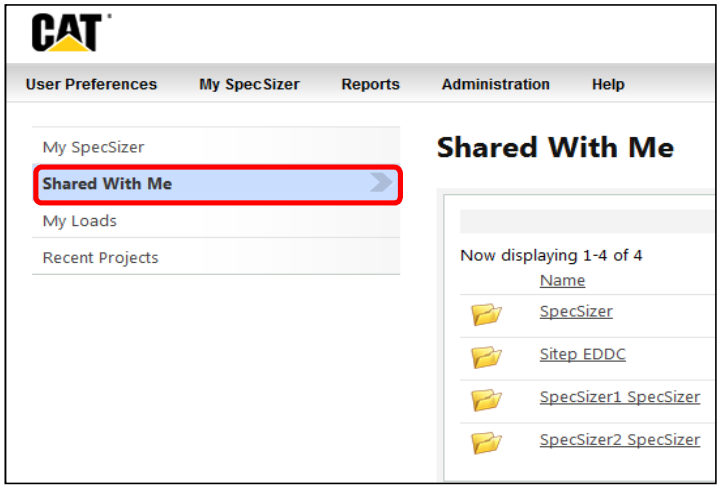
Or

Add user's email address in 'Add' box. Save.

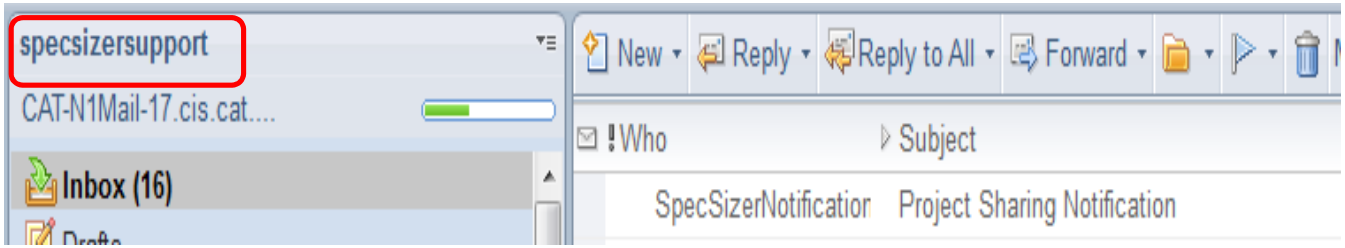


ELECTRIC POWER SPECSIZER

- **File Sharing**: To view files shared with you - Select “Shared With Me”

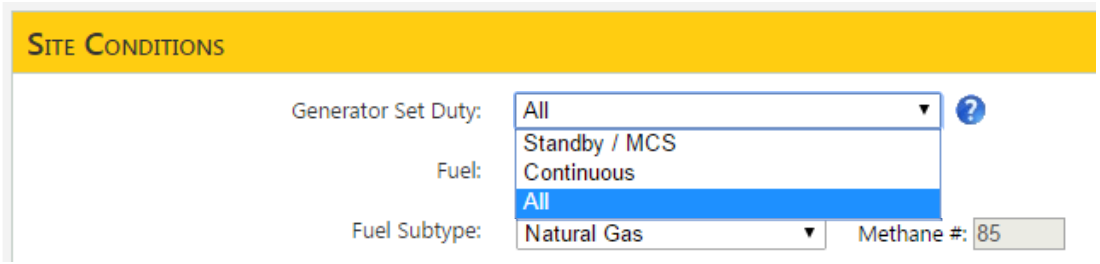


- **SpecSizer Help & Support – email inquiry to specsizersupport@cat.com**
  - Share user sizing file with specsizersupport@cat.com | Share file using (edit) link



GAS GENSETS IN SPECSIZER

Site Conditions - Generator Set Duty

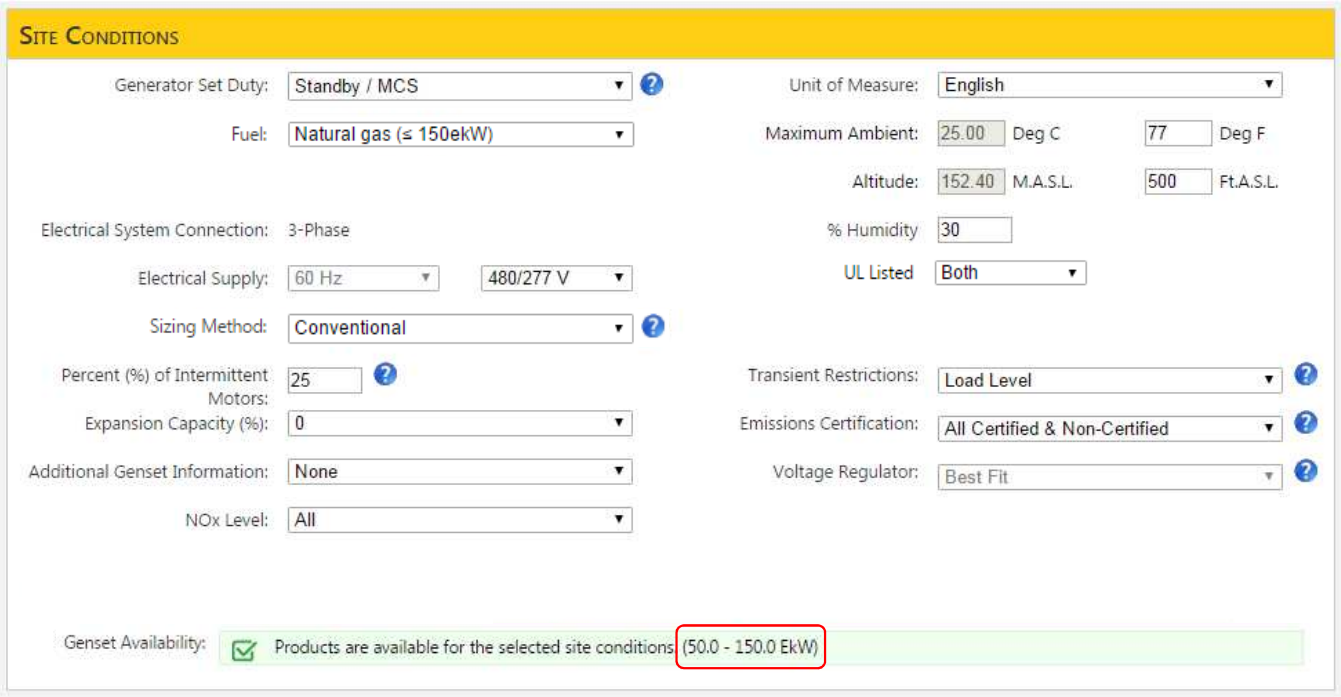


Genset Availability: Products are available for the selected site conditions (423.0 - 1,500.0 EkW)

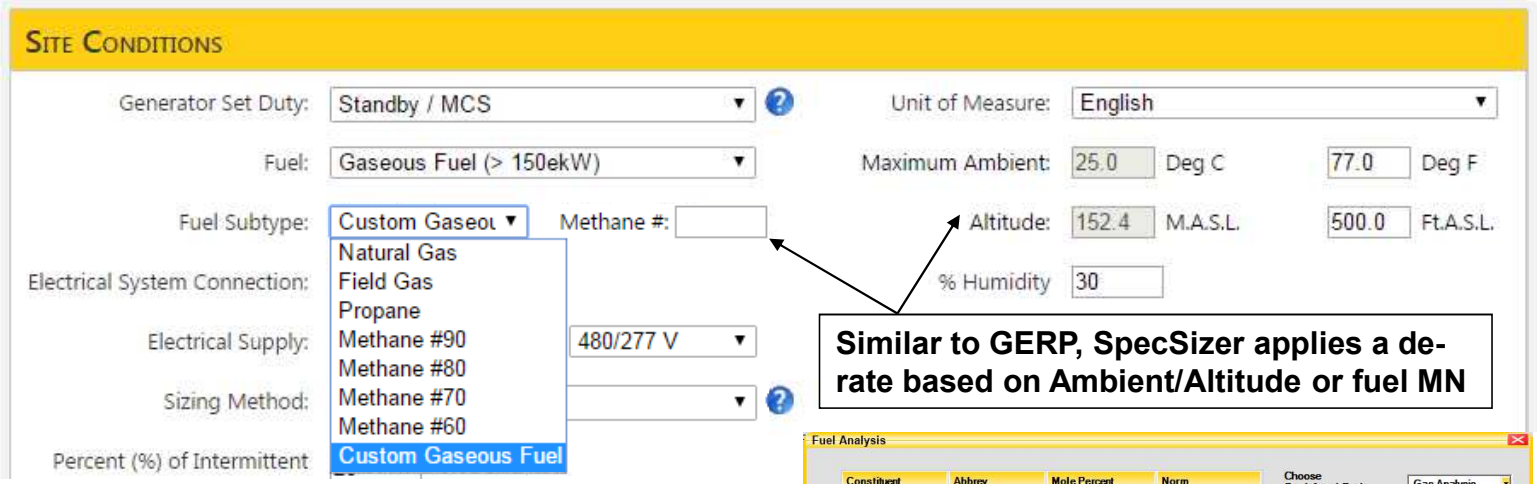
	Continuous	Prime	Standby	Emergency Standby	Mission Critical
Average Power Output	70 - 100%	70%	70%	70%	85%
Load	Non-Varying		Varying		
Typical Hours/Year	Unlimited	Unlimited	200	50	200
Typical Peak Demand	100%	100% of Prime with 10% Overload for a max of 1 hour in 12			100% for 5% of operating time
Maximum Expected Usage			500	200	
Typical Application	Base Load, Utility or Co-Gen	Industrial, Pumping, Construction, Rental, or Co-Gen	Standby	Building Service Standby	Data Centers, Healthcare

NG Gas Genset	Continuous Power Output
G3412C	61 - 100%
G3500TA	51 - 100%

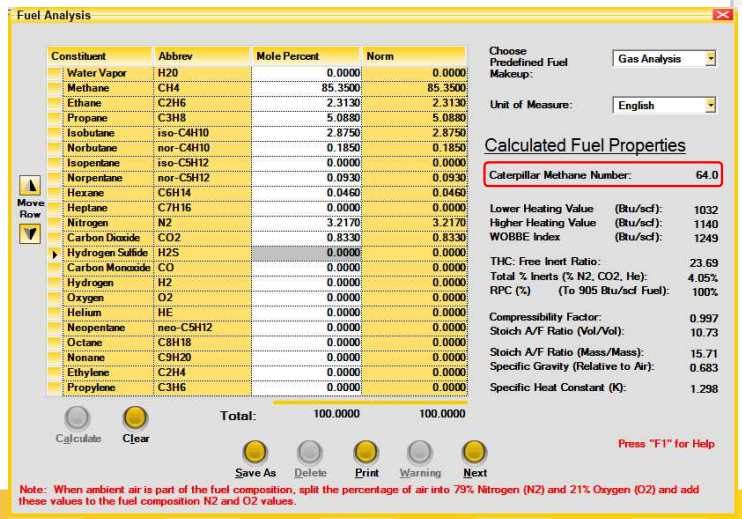
Site Conditions – Small Gas Gensets (≤ 150ekW)



Site Conditions – Fuel Subtype, Ambient , & Altitude

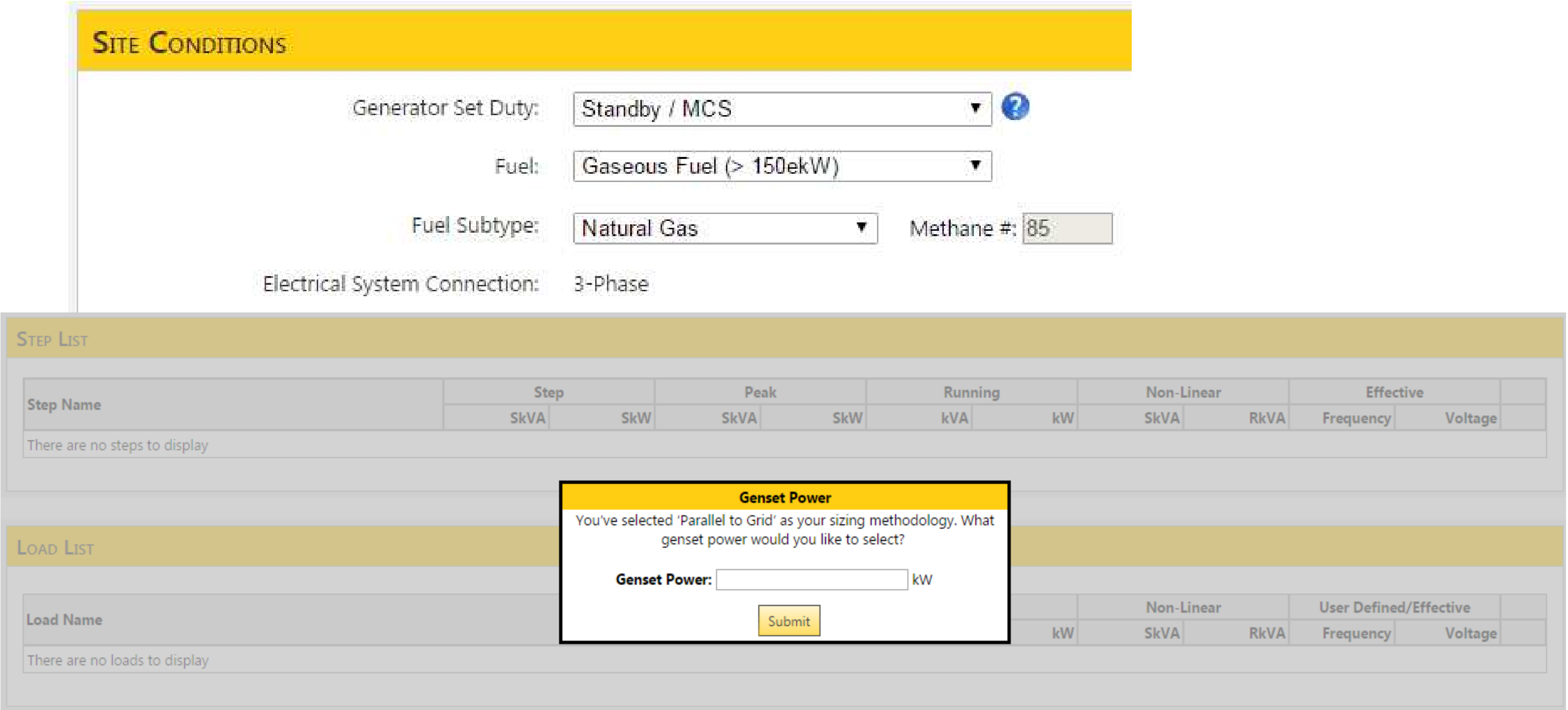


Similar to GERP, SpecSizer applies a de-rate based on Ambient/Altitude or fuel MN



- **Site Specific Fuel** - calculate the MN using the GERP fuel editor. Select the Custom Gaseous Fuel subtype and enter in the MN value.
- Methane Number (MN) is a measure of a gaseous fuel's resistance to uncontrolled combustion or detonation.

Site Conditions – Sizing Method



Island Mode (Stand-Alone) sizing mode

Sizing as Conventional, allowing user selected adjust the frequency and voltage deviations (5% to 35%)

Parallel to Grid sizing mode

Sizing based just on fuel or ambient/altitude derate, as transients will be picked up by the grid

Site Conditions – Parallel to Grid Sizing

SITE CONDITIONS

Lowest Purchase (Initial) Cost | Lowest Operational (Fuel) Cost | Hide Gensets That Do Not Fit

Now displaying 21-40 of 40

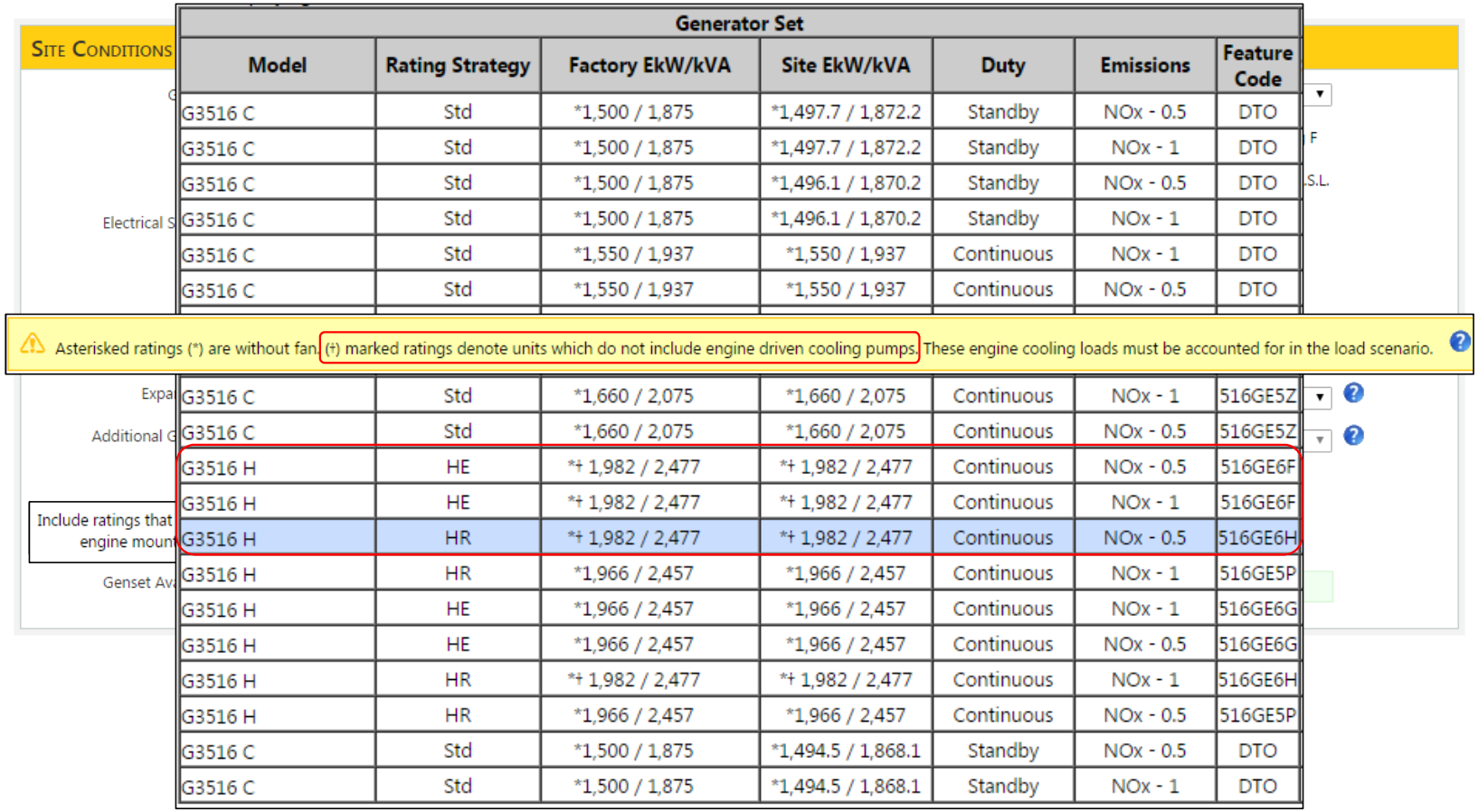
Generator Set							Alternator									% Genset Capacity Used	
Model	Rating Strategy	Factory EkW/kVA	Site EkW/kVA	Duty	Emissions	Feature Code	Site kVA	Arrangement Number	Frame	Excitation	Winding	Type	Std/Opt	RkVA	VDip1		
G3516 C	Std	*1,475 / 1,843	*1,365.1 / 1,706.4	Continuous	NOx - 0.5	DTO	2,563	2947498	826	PM	FORM	SR4B	Standard	2,563.0	-	73.3	
G3516 C	Std	*1,475 / 1,843	*1,365.1 / 1,706.4	Continuous	NOx - 1	DTO	2,563	2947498	826	PM	FORM	SR4B	Standard	2,563.0	-	73.3	
G3516 C	Std	*1,500 / 1,875	*1,494.5 / 1,868.1	Standby	NOx - 0.5	DTO	2,813	1441826	826	PM	FORM	SR4B	Standard	2,813.0	-	66.9	
G3516 C	Std	*1,500 / 1,875	*1,496.1 / 1,870.2	Standby	NOx - 0.5	DTO	3,125	1441828	827	PM	FORM	SR4B	Optional	3,125.0	-	66.8	
G3516 C	Std	*1,500 / 1,875	*1,497.7 / 1,872.2	Standby	NOx - 0.5	DTO	3,438	1441830	828	PM	FORM	SR4B	Optional	3,438.0	-	66.8	
G3516 C	Std	*1,500 / 1,875	*1,494.5 / 1,868.1	Standby	NOx - 1	DTO	2,813	1441826	826	PM	FORM	SR4B	Standard	2,813.0	-	66.9	
G3516 C	Std	*1,500 / 1,875	*1,496.1 / 1,870.2	Standby	NOx - 1	DTO	3,125	1441828	827	PM	FORM	SR4B	Optional	3,125.0	-	66.8	
G3516 C	Std	*1,500 / 1,875	*1,497.7 / 1,872.2	Standby	NOx - 1	DTO	3,438	1441830	828	PM	FORM	SR4B	Optional	3,438.0	-	66.8	
G3516 C	Std	*1,660 / 2,075	*1,460.5 / 1,825.6	Continuous	NOx - 0.5	516GE5Z	2,281	1638544	825	PM	FORM	SR4B	Standard	2,281.0	-	68.5	
G3516 C	Std	*1,660 / 2,075	*1,465 / 1,831.3	Continuous	NOx - 0.5	516GE5Z	2,563	1441826	826	PM	FORM	SR4B	Optional	2,563.0	-	68.3	
G3516 C	Std	*1,660 / 2,075	*1,468.1 / 1,835.1	Continuous	NOx - 0.5	516GE5Z	2,844	1441828	827	PM	FORM	SR4B	Optional	2,844.0	-	68.1	
G3516 C	Std	*1,660 / 2,075	*1,460.5 / 1,825.6	Continuous	NOx - 1	516GE5Z	2,281	1638544	825	PM	FORM	SR4B	Standard	2,281.0	-	68.5	
G3516 C	Std	*1,660 / 2,075	*1,465 / 1,831.3	Continuous	NOx - 1	516GE5Z	2,563	1441826	826	PM	FORM	SR4B	Optional	2,563.0	-	68.3	
G3516 C	Std	*1,660 / 2,075	*1,468.1 / 1,835.1	Continuous	NOx - 1	516GE5Z	2,844	1441828	827	PM	FORM	SR4B	Optional	2,844.0	-	68.1	
G3516 C	Std	*1,550 / 1,937	*1,550 / 1,937	Continuous	NOx - 0.5	DTO	3,094	1441830	828	PM	FORM	SR4B	Optional	3,094.0	-	64.5	
G3516 C	Std	*1,550 / 1,937	*1,550 / 1,937	Continuous	NOx - 0.5	DTO	2,844	1441828	827	PM	FORM	SR4B	Optional	2,844.0	-	64.5	
G3516 C	Std	*1,550 / 1,937	*1,550 / 1,937	Continuous	NOx - 0.5	DTO	2,563	1441826	826	PM	FORM	SR4B	Standard	2,563.0	-	64.5	
G3516 C	Std	*1,550 / 1,937	*1,550 / 1,937	Continuous	NOx - 1	DTO	3,094	1441830	828	PM	FORM	SR4B	Optional	3,094.0	-	64.5	
G3516 C	Std	*1,550 / 1,937	*1,550 / 1,937	Continuous	NOx - 1	DTO	2,844	1441828	827	PM	FORM	SR4B	Optional	2,844.0	-	64.5	
G3516 C	Std	*1,550 / 1,937	*1,550 / 1,937	Continuous	NOx - 1	DTO	2,563	1441826	826	PM	FORM	SR4B	Standard	2,563.0	-	64.5	

Max EkW/kVA + Rating 1 2 - Rating Min EkW/kVA

Jump to EkW:
(* denotes Bestfit EkW) 2,483 2,469 2,050 1,982 1,966 1,660 1,600 *1,550 1,500 1,475

Connecting For Success…

Site Conditions – Include Without Engine Driven Pumps Ratings Filter



SITE CONDITIONS

Electrical S

Expa

Additional G

Include ratings that engine mount

Genset Av

Asterisked ratings (*) are without fan. (†) marked ratings denote units which do not include engine driven cooling pumps. These engine cooling loads must be accounted for in the load scenario.

Generator Set						
Model	Rating Strategy	Factory EkW/kVA	Site EkW/kVA	Duty	Emissions	Feature Code
G3516 C	Std	*1,500 / 1,875	*1,497.7 / 1,872.2	Standby	NOx - 0.5	DTO
G3516 C	Std	*1,500 / 1,875	*1,497.7 / 1,872.2	Standby	NOx - 1	DTO
G3516 C	Std	*1,500 / 1,875	*1,496.1 / 1,870.2	Standby	NOx - 0.5	DTO
G3516 C	Std	*1,500 / 1,875	*1,496.1 / 1,870.2	Standby	NOx - 1	DTO
G3516 C	Std	*1,550 / 1,937	*1,550 / 1,937	Continuous	NOx - 1	DTO
G3516 C	Std	*1,550 / 1,937	*1,550 / 1,937	Continuous	NOx - 0.5	DTO
G3516 C	Std	*1,660 / 2,075	*1,660 / 2,075	Continuous	NOx - 1	516GE5Z
G3516 C	Std	*1,660 / 2,075	*1,660 / 2,075	Continuous	NOx - 0.5	516GE5Z
G3516 H	HE	*† 1,982 / 2,477	*† 1,982 / 2,477	Continuous	NOx - 0.5	516GE6F
G3516 H	HE	*† 1,982 / 2,477	*† 1,982 / 2,477	Continuous	NOx - 1	516GE6F
G3516 H	HR	*† 1,982 / 2,477	*† 1,982 / 2,477	Continuous	NOx - 0.5	516GE6H
G3516 H	HR	*1,966 / 2,457	*1,966 / 2,457	Continuous	NOx - 1	516GE5P
G3516 H	HE	*1,966 / 2,457	*1,966 / 2,457	Continuous	NOx - 1	516GE6G
G3516 H	HE	*1,966 / 2,457	*1,966 / 2,457	Continuous	NOx - 0.5	516GE6G
G3516 H	HR	*† 1,982 / 2,477	*† 1,982 / 2,477	Continuous	NOx - 1	516GE6H
G3516 H	HR	*1,966 / 2,457	*1,966 / 2,457	Continuous	NOx - 0.5	516GE5P
G3516 C	Std	*1,500 / 1,875	*1,494.5 / 1,868.1	Standby	NOx - 0.5	DTO
G3516 C	Std	*1,500 / 1,875	*1,494.5 / 1,868.1	Standby	NOx - 1	DTO

Data & Reports – Recovery Time

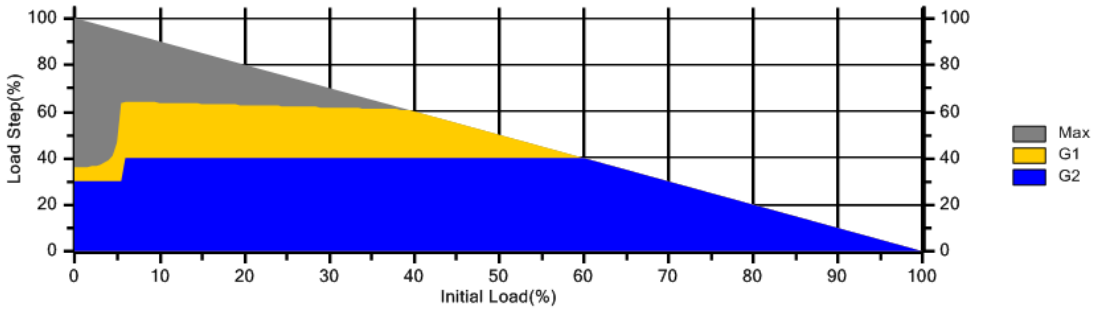
CATERPILLAR

Transient Performance Report

"Cold Soaked"

EM1508 -02

Load Acceptance



Transient Load Acceptance

Load Step	Frequency Deviation +/- (%)	Voltage Deviation +/- (%)	Recovery Time (sec)	Classification as Defined by ISO 8528 - 5	Notes
100	+3/-18	+3/-50	50		
75	+3/-18	+3/-50	50		
50	+3/-13	+1/-24	35		
40	+3/-9	+6/-24	20		
30	+2/-6	+1/-12	5	G2	3
20	+1/-5	+1/-8	4.5	G2	3
10	+2/-4	+1/-6	4.5	G2	3
Breaker Open	+11/-2	+12/-2	3.5		1
Recovery Specification	+3.5/-3.5	+5/-5			
Steady State Specification	+2.5/-2.5	+5/-5			

Gas Genset Selection Tools

SpecSizer

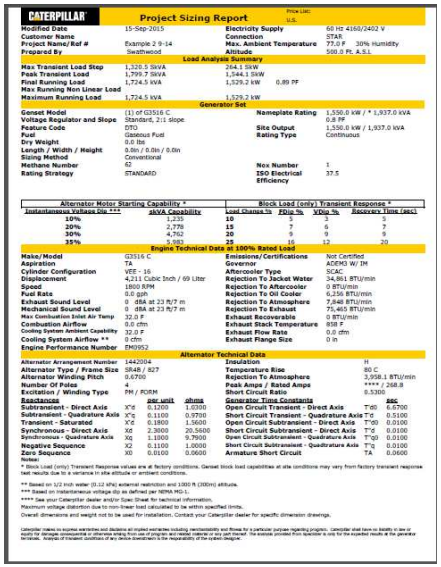
- Project Sizing Report

GERP

- Site Specific Datasheet

CSQ

- Genset Quote



CATERPILLAR

Project Sizing Report

Modified Date	15-Sep-2015	Electricity Supply	60 Hz 4160/2402 V
Customer Name		Connection	STAR
Project Name/Ref #	Example 2 9-14	Max. Ambient Temperature	77.0 F 30% Humidity
Prepared By	Swathwood	Altitude	500.0 Ft. A.S.L.

Load Analysis Summary

Max Transient Load Step	1,320.5 SkVA	264.1 SkW	
Peak Transient Load	1,799.7 SkVA	1,344.1 SkW	
Final Running Load	1,724.5 kVA	1,529.2 kW	0.89 PF
Max Running Non Linear Load			
Maximum Running Load	1,724.5 kVA	1,529.2 kW	

Generator Set

Genset Model	(1) of G3516 C	Nameplate Rating	1,550.0 kW / * 1,937.0 kVA
Voltage Regulator and Slope	Standard, 2:1 slope		0.8 PF
Feature Code	DT01	Site Output	1,550.0 kW / 1,937.0 kVA
Fuel	Gaseous Fuel	Rating Type	Continuous
Dry Weight	0.0 lbs		
Length / Width / Height	0.0in / 0.0in / 0.0in		
Sizing Method	Conventional		
Methane Number	60	Nox Number	1
Rating Strategy	STANDARD	ISO Electrical Efficiency	37.5

Alternator Motor Starting Capability *		Block Load (only) Transient Response *			
Instantaneous Voltage Dip ***	skVA Capability	Load Change %	FDip %	VDip %	Recovery Time (sec)
10%	1,235	10	5	3	5
20%	2,778	15	7	6	7
30%	4,762	20	9	9	9
35%	5,980	25	10	12	20

Engine Technical Data at 100% Rated Load

Make/Model	G3516 C	Emission/Certifications	Not Certified
Aspiration	TA	Governor	ADEM4 W/ IM
Cylinder Configuration	VEE - 16	Aftercooler Type	SCAC
Displacement	4,211 Cubic Inch / 69 Liter	Rejection To Jacket Water	34,861 BTU/min
Speed	1800 RPM	Rejection To Aftercooler	0 BTU/min
Fuel Rate	0.0 gph	Rejection To Oil Cooler	6,256 BTU/min
Exhaust Sound Level	0 dBA at 23 ft/7 m	Rejection To Atmosphere	7,648 BTU/min
Mechanical Sound Level	0 dBA at 23 ft/7 m	Rejection To Exhaust	75,465 BTU/min
Max Combustion Inlet Air Temp	32.0 F	Exhaust Recoverable	0 BTU/min
Combustion Airflow	0.0 cfm	Exhaust Stack Temperature	858 F
Cooling System Ambient Capability	32.0 F	Exhaust Flow Rate	0.0 cfm
Cooling System Airflow **	0 cfm	Exhaust Flange Size	0 in
Engine Performance Number	EM0952		

Alternator Technical Data

Alternator Arrangement Number	1442004	Insulation	H
Alternator Type / Frame Size	SR4B / 827	Temperature Rise	80 C
Alternator Winding Pitch	0.6700	Rejection To Atmosphere	3,958.1 BTU/min
Number Of Poles	4	Peak Amps / Rated Amps	**** / 268.8
Excitation / Winding Type	PM / RXRM	Short Circuit Ratio	0.5300

Reactances	per unit	ohms	Generator Time Constants	sec
Subtransient - Direct Axis	X"d 0.1200	1.0300	Open Circuit Transient - Direct Axis	T'do 6.6700
Subtransient - Quadrature Axis	X"q 0.1100	0.9700	Short Circuit Transient - Quadrature Axis	T'q 0.5100
Transient - Saturated	X'd 0.1900	1.5600	Open Circuit Subtransient - Direct Axis	T"do 0.0100
Synchronous - Direct Axis	Xd 2.3000	20.5600	Short Circuit Subtransient - Direct Axis	T"d 0.0100
Synchronous - Quadrature Axis	Xq 1.1000	9.7900	Open Circuit Subtransient - Quadrature Axis	T"qo 0.0100
Negative Sequence	X2 0.1100	1.0000	Short Circuit Subtransient - Quadrature Axis	T"q 0.0100
Zero Sequence	X0 0.0100	0.0600	Armature Short Circuit	TA 0.0600

Notes:

* Block Load (only) Transient Response values are at factory conditions. Genset block load capabilities at site conditions may vary from factory transient response. Net results due to a variance in site altitude or ambient conditions.

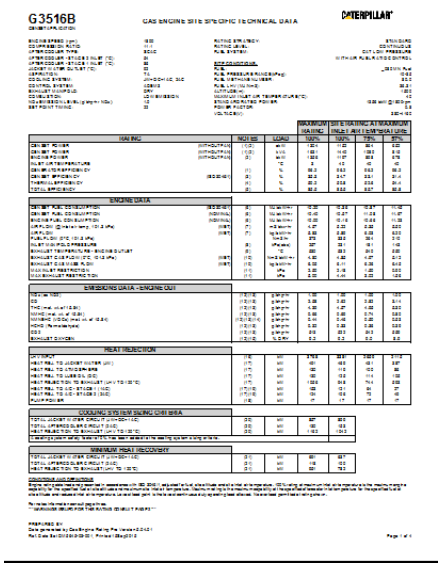
** Based on 1/2 inch water (0.12 kPa) external restriction and 1000 ft (300m) altitude.

*** 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.



G3516B

GAS ENGINE SITE SPECIFIC TECHNICAL DATA

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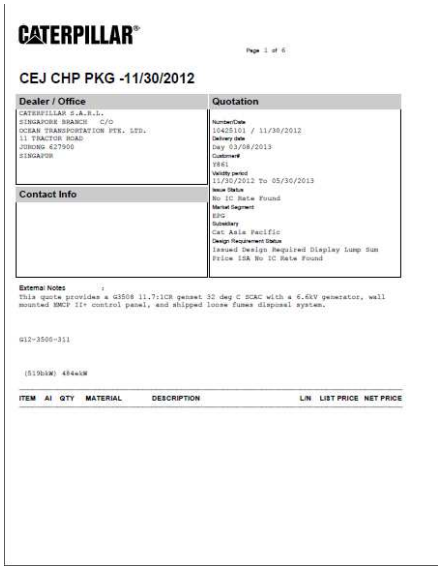

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CEJ CHP PKG -11/30/2012

Dealer / Office	Quotation
CATERPILLAR S.A.R.L. SINGAPORE BRANCH C/O OCEAN TRANSPORTATION PTE. LTD. 11 TRACTOR ROAD JURONG 627900 SINGAPOR	Number/Date 104251011 / 11/30/2012 Delivery date Day 03/08/2013 Customer# 9861 Validity period 11/30/2012 To 05/30/2013 Issue Status No IC Rate Found Market Segment EPG Subsidiary Cat Asia Pacific Design Requirement Status Issued Design Required Display Lump Sum Price ISA No IC Rate Found
Contact Info	

External Notes

This quote provides a G3508 11.7:1CR genset 32 deg C SCAC with a 6.6kV generator, wall mounted MMCP II+ control panel, and shipped loose fumes disposal system.

G12-3500-311

(519kW) 484kWM

ITEM	AI	QTY	MATERIAL	DESCRIPTION	LIN	LIST PRICE	NET PRICE

ELECTRIC POWER SPECSIZER

- Thank You….

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