Empire Southwest

Generator Set Submittal

Image shown may not reflect actual configuration.

Prepared By:

Empire Southwest

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TAB 4: REVISION HISTORY AND APPROVALS PAGE

4.1 Revision History and Approval

TAB 1: GENERAL INFORMATION

1.1 Bill of Materials

1.2 Notes & Exceptions

1.3 Project Specific Notes and Technical Information

BILL OF MATERIALS

Generator Set
Approximate Dimensions: 182.8"L x 64.2"W x 104.16"H
Approximate Dry Weight: 22,205 lbs.
Approximate Wet Weight: 26,930 lbs.

EXTENDED DESCRIPTION:

Qty. (1) CAT Generator Set
Model: D400GC
Rating: 400kW / 500kVA Max Electrical Output (368kW @ 2,500 ft. ASL, 100F Ambient Temperature)
Voltage: 480Y, 3-phase, 4-wire, 60 Hz
Certificates: EPA Certified for Stationary Emergency Application, UL 2200 Listed, IBC Seismic Certified
Engine: ULSD Engine, 1800 RPM, Electronic Engine Controller

Cooling System:
- Unit Mounted Radiator
- Rated for operation in 122°F ambient temperature
- 50/50 Antifreeze & Water Mixture

Starting System:
- Electric Starting Motor
- 24V Lead Acid Battery Sets, 1000 CCA, 90AH, 24VDC
- UL Listed Battery Charger:
  - 10ADC Maximum Charging Current
  - NFPA 110 Alarm Contacts
- Jacket Water Heater (to facilitate quicker starting times)

Alternator End & Attachments:
- M3134L41 Frame Generator, Single Bearing, Rated for 105°C Temperature Rise
- CAT Electronic Voltage Regulator
- Space Heater
- Permanent Magnet Excitation

Enclosure & Mounting System:
- Generator set is suitable for outdoor installation
- Level 2 Sound Attenuated Enclosure w/ muffler (71 dBA @ 23 feet, based on "free field" conditions)
- Rubber vibration isolators between engine-generator and skid base
- UL 142 Listed 675 Gallon Integral Base Fuel Tank (24Hr. run-time at full load)

Control Panel: GCCP 1.2
- NFPA 110 Compliant Remote Annunciator Panel in NEMA 1 wall mount enclosure (requires Belden 9841 cable; cable by others)
- External Emergency Stop Pushbutton Station

Circuit Breaker:
- Qty. (1) 800A Manually Operated Circuit Breaker, UL-Listed, 100% Rated, Adjustable LSI Trip

Factory and Onsite Testing, Startup, and Commissioning:
- CAT Startup Services with CAT certified technicians (includes lube oil and coolant)
- 2-hour 1.0PF Resistive Load Bank Testing Included

NOTES, CLARIFICATIONS, DEVIATIONS, AND EXCEPTIONS

NOTES

1. This submittal is based on the following documents (no other documents or plans have been reviewed):
    a. Customer request – Adan Carrillo, dated 8/9/23.
    b. Electrical Single Line Diagram, Sheet E5.01
2. Proposal scope limited to items specifically listed in this proposal.
3. Fuel for startup or testing not included.
4. Temporary generator set (if required) not included in Empire's scope of work or supply.
5. Offloading not included.
6. Installation, including but not limited to: anchoring, electrical conduit, fuel oil and exhaust piping, interconnecting wire and cable, not included.
7. NETA testing to be done by others (independent testing agency)
8. Protective device coordination, short circuit study, and arc flash analysis by others.
9. Ground testing by others.
10. Scope of Work/Supply is based on all onsite work being performed M-F 8AM-4PM. Weekend and/or overtime service hours are available. A copy of our non-standard service rates is available upon request. Four (4) week notice is required for field service.

CLARIFICATIONS, DEVIATIONS, EXCEPTIONS (C/D/E)

1. A full submittal will be issued for review and approval before equipment is released to order.
2. All installation provided by others.
3. All nameplates, infrared scanning and coordination study provided by others.
4. All anchoring by others.
5. Clarification – 233213.13 2.09 5. 2. – Automatic Dampers provide marginal benefit in Las Vegas ambient temperatures and will not be provided.
6. Clarification – 263213.13 3.06 A. – Maintenance contract cost will be provided upon installation and commissioning of equipment. A Product Support Sakes Representative will be chosen and will contact the end user for contract pricing.

GENERATOR WORK SCOPE

EMPIRE SOUTHWEST'S SCOPE OF SUPPLY

1. Provide freight to jobsite.
2. Provide Project Manager and Project Engineering services to supervise/assist installing contractor to ensure proper installation.
3. Terminate all control/interconnect wiring.
4. Provide onsite startup and commissioning services.
5. Provide equipment manuals and in-person training sessions.

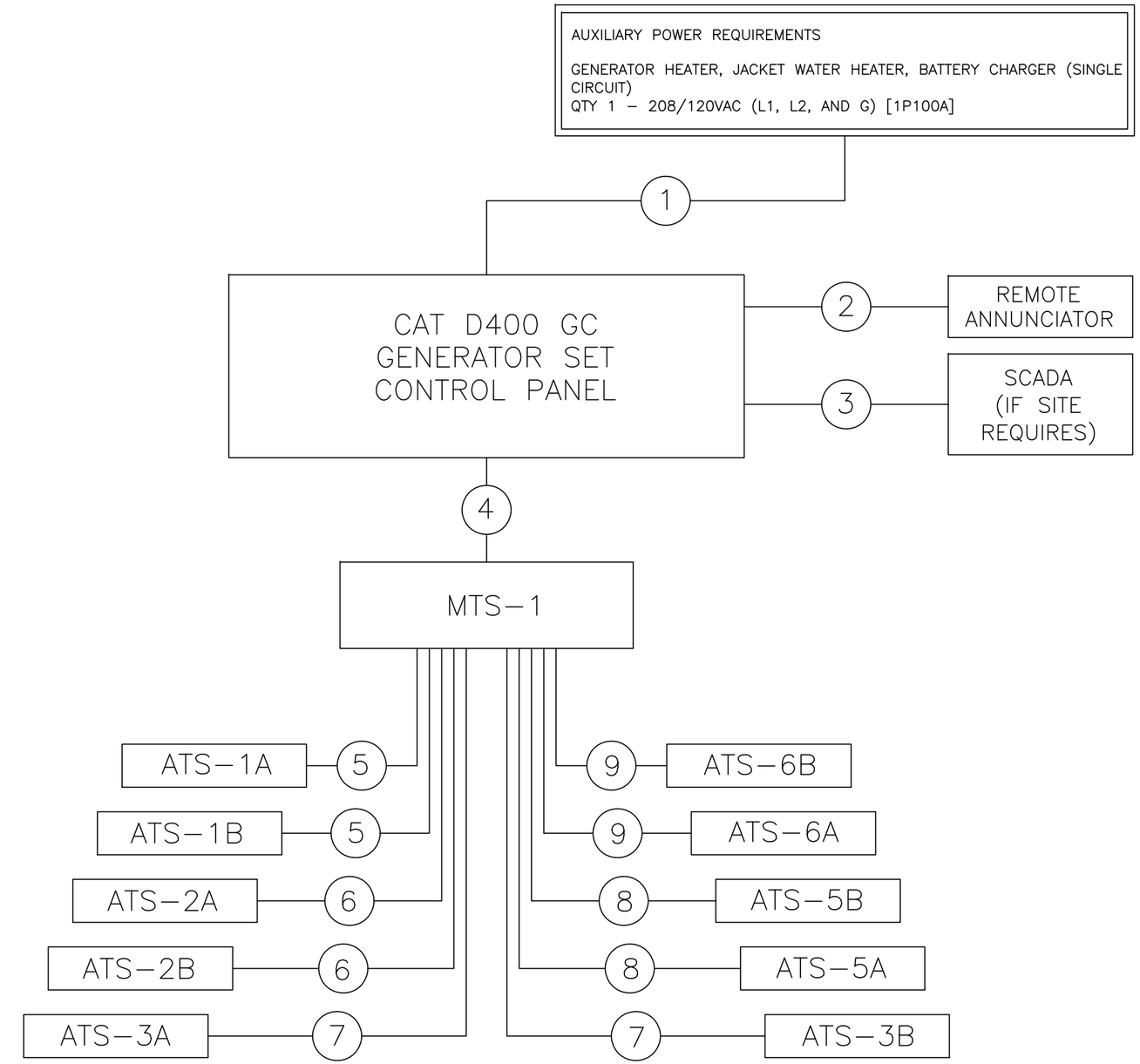
CUSTOMER/INSTALLING CONTRACTOR'S SCOPE OF SUPPLY

1. Provide offloading of all equipment delivered to site (generator set will require a large crane to offload and set).
2. Set all equipment (anchoring to pad).
3. Provide and install all required conduit, fuel lines (external to generator set fuel tank), and other infrastructure external to generator set package.
4. Provide and terminate all power/feeder cabling (including power source for generator set auxiliaries).
5. Provide all required control/interconnect wiring.

NOT INCLUDED IN EMPIRE SOUTHWEST'S SCOPE OF SUPPLY

1. Permits (fuel tank, emissions, etc.). Any permitting and testing related to Title V compliance and/or other local air board compliance is by others.
2. Coordination of testing with facility load.
3. Fuel for testing finished installation.

Project Specific Notes and Technical Information



GARSIDE JHS			
DRN	P. PHEM		
CHK			
APPD			
CONCEPT	EXP / PRE PROD. / PROD.		
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN MM [INCH] DIMENSIONS W/O TOL ARE BASIC			
SCALE: NTS			23AUG2023
SHEET 1 of 2		CHG	DATE
EMPIRE SOUTHWEST			

Project Specific Notes and Technical Information

CONDUIT	REQUIRED WIRING	VOLTAGE/ TYPE	PURPOSE	RECOMMENDED CONDUIT SIZE	FROM	TO
1	100A, 208VAC, 1-Phase Service **Maximum Load: 34.29A**	208VAC	Auxiliary Power	By Installing Contractor	Site Provided Auxiliary Panelboard	CAT D400GC Generator Control Panel
2	Qty. (6) 14AWG THHN	24VDC Power	Remote Annunciator Power, Remote Start/Stop Wiring	1/2"	CAT D400GC Generator Control Panel	GENERATOR REMOTE ANNUNCIATOR
	Qty. (1) Belden 9841 or Approved Equal	Data Link	Remote Annunciator Data Link			
3	Qty. (1) Belden 9841 or Approved Equal	5VDC	Modbus RTU Communications	1/2"		SCADA (IF SITE REQUIRES)
4	Qty. (6) 14AWG THHN	24VDC Dry Contact	Start Signal, Switch Position, Spare	1/2"		MTS-1
5	Qty. (6) 14AWG THHN	24VDC Dry Contact	Start Signal, Switch Position, Spare	1/2"	MTS-1	ATS-1A
	Qty. (6) 14AWG THHN	24VDC Dry Contact	Start Signal, Switch Position, Spare			ATS-1B
6	Qty. (6) 14AWG THHN	24VDC Dry Contact	Start Signal, Switch Position, Spare	1/2"		ATS-2A
	Qty. (6) 14AWG THHN	24VDC Dry Contact	Start Signal, Switch Position, Spare			ATS-2B
7	Qty. (6) 14AWG THHN	24VDC Dry Contact	Start Signal, Switch Position, Spare	1/2"		ATS-3A
	Qty. (6) 14AWG THHN	24VDC Dry Contact	Start Signal, Switch Position, Spare			ATS-3B
8	Qty. (6) 14AWG THHN	24VDC Dry Contact	Start Signal, Switch Position, Spare	1/2"		ATS-5A
	Qty. (6) 14AWG THHN	24VDC Dry Contact	Start Signal, Switch Position, Spare			ATS-5B
9	Qty. (6) 14AWG THHN	24VDC Dry Contact	Start Signal, Switch Position, Spare	1/2"		ATS-6A
	Qty. (6) 14AWG THHN	24VDC Dry Contact	Start Signal, Switch Position, Spare			ATS-6B

GARSIDE JHS

DRN P. PHEM

CHK

APPD

CON-CEPT | EXP | PRE-PROD. | PROD.

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN MM [INCH]
DIMENSIONS W/O TOL ARE BASIC

SCALE: NTS

SHEET 2 of 2

CHG 23AUG2023 DATE

EMPIRE SOUTHWEST

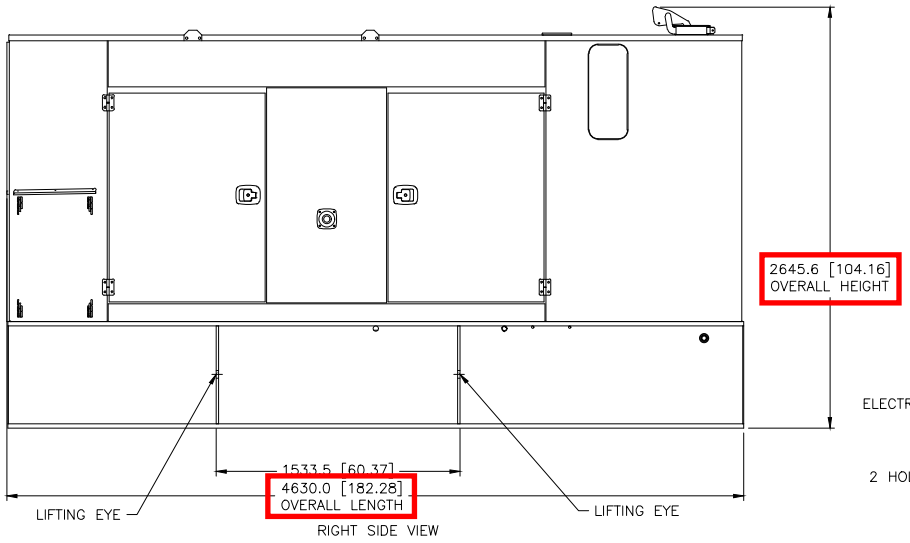
TAB 2: DRAWINGS

2.1 Caterpillar D400GC Standby Generator Set

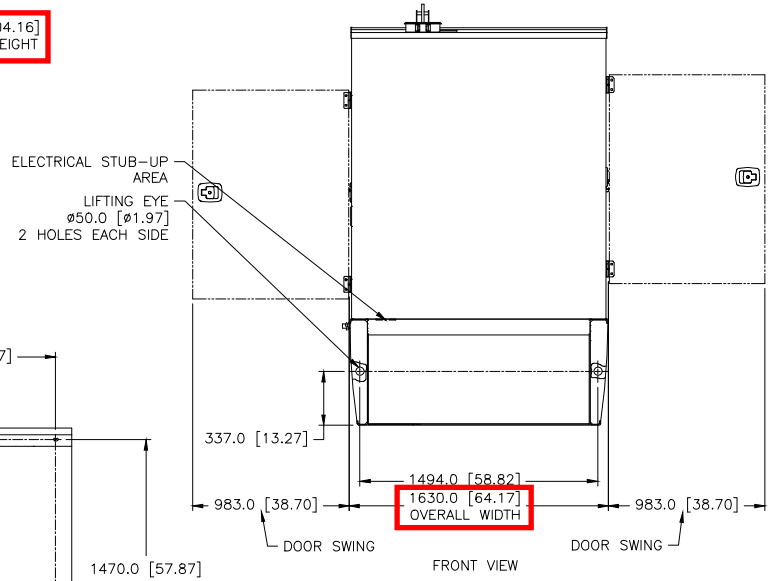
METRIC 588-8337

QTY	ENGINE CONNECTIONS	SIZE	SHEET
1	COOLANT DRAIN	ø19.05 [ø0.75] I.D.	2,3
1	OIL DRAIN	1-1/8-12 THD	2,3
1	EXHAUST	ø203.2 [ø8.00] O.D.	2
1	FUMES DISPOSAL HOSE	ø35.00 [ø1.38] I.D.	3

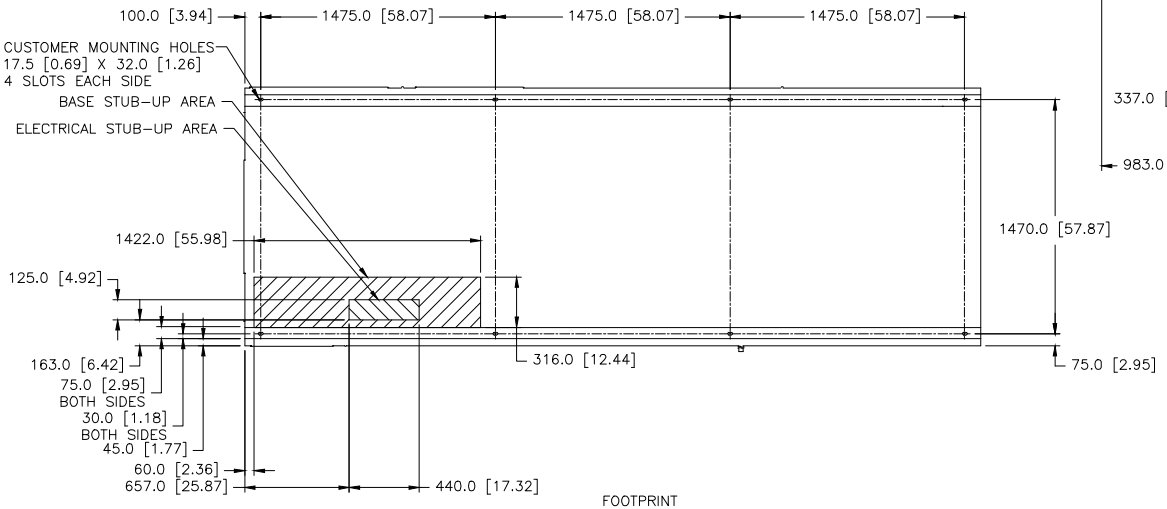
QTY	POSSIBLE TANK CONNECTIONS	SIZE	SHEET
1	FUEL SUPPLY	13/16-16 THD	3
1	FUEL RETURN	13/16-16 THD	3
2	SPARE PORTS	2" NPTF THD	3
1	FUEL FILL	4" NPT THD	3
1	MAIN TANK EMERGENCY VENT	4-8 NPTF THD	3
1	MAIN TANK NORMAL VENT	2' NPTF THD	2,3
1	BASIN TANK EMERGENCY VENT	4-8 NPT THD	3



RIGHT SIDE VIEW



FRONT VIEW



FOOTPRINT
(DIMENSIONED OUTLINE VIEW FROM ABOVE)
(RIGHT SIDE ORIENTATION)

MODEL	TYPE	ENGINE AR	ENCLOSURE AR	TANK AR
C13	Y	LS-3973 CHG 00	LS-3858 CHG 00	LS-3870 CHG 00
		LS-3974 CHG 00		
		LS-3975 CHG 00		
		LS-3976 CHG 00		

PACKAGE LIFTED IN 4 PLACES

PACKAGE SHOWN WITH MORE DETAIL ON SHEETS 2 & 3

1E2966B IDENT
1E2733 DRAWING-AUTOCAD
1E0136W BRAND MARKINGS
1E0013C CONFIDENTIALITY
1E0012A INTERPRETATION
1E0011 INTER & TOL

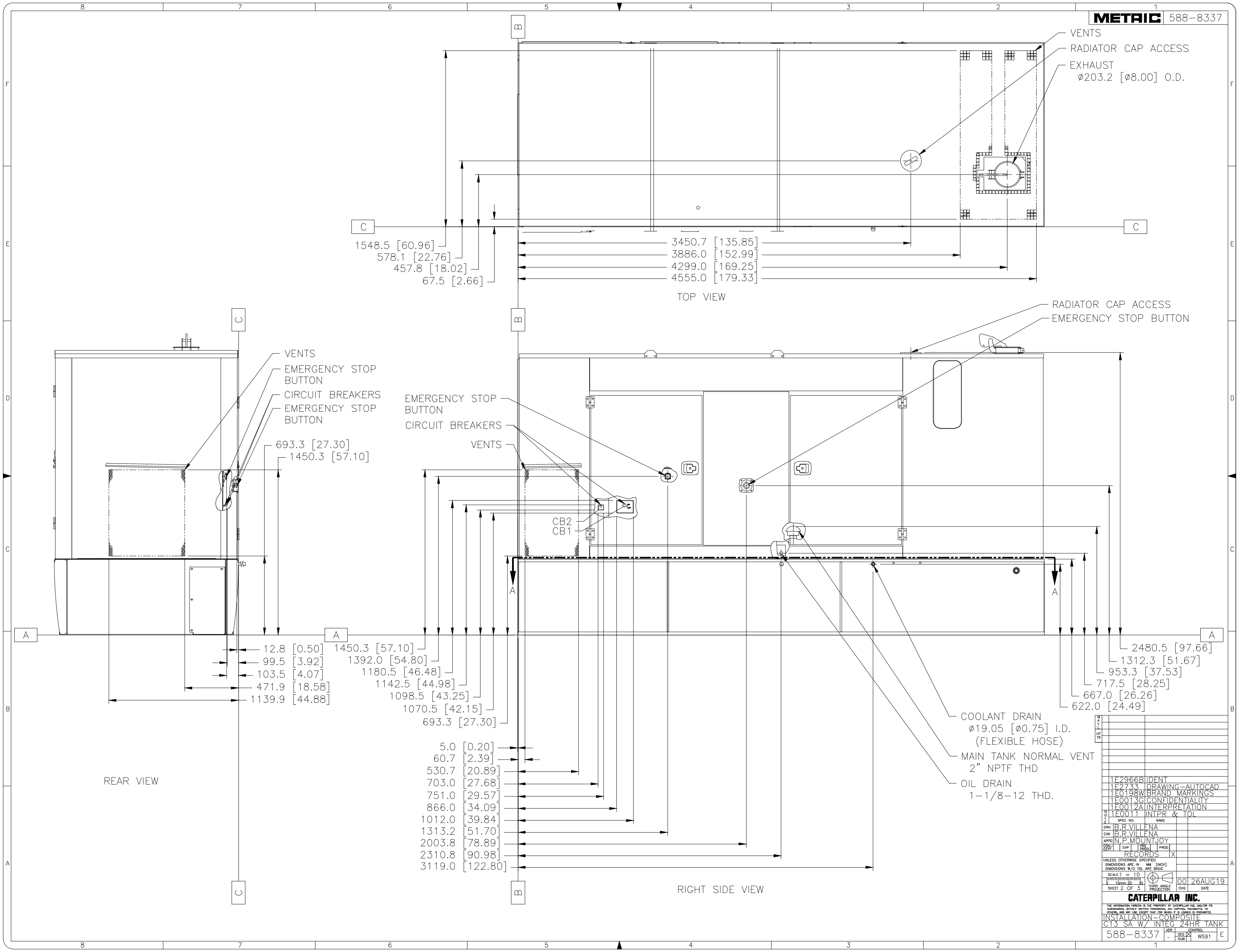
SPEC NO.	MAKE
DRN B.R.VILLENA	
CHK B.R.VILLENA	
APVD N.P.MOUNTJOY	

RECORDS

SCALE 1 = 10
SHEET 1 OF 3
00 26AUG19

CATERPILLAR INC.

INSTALLATION-COMPOSITE
C13 SA W/ INTEG 24HR TANK
588-8337 - W591 E


METRIC 588-8337
VENTS
RADIATOR CAP ACCESS
EXHAUST
ø203.2 [ø8.00] O.D.
1548.5 [60.96]
578.1 [22.76]
457.8 [18.02]
67.5 [2.66]
3450.7 [135.85]
3886.0 [152.99]
4299.0 [169.25]
4555.0 [179.33]
TOP VIEW
RADIATOR CAP ACCESS
EMERGENCY STOP BUTTON
VENTS
EMERGENCY STOP BUTTON
CIRCUIT BREAKERS
EMERGENCY STOP BUTTON
693.3 [27.30]
1450.3 [57.10]
12.8 [0.50]
99.5 [3.92]
103.5 [4.07]
471.9 [18.58]
1139.9 [44.88]
REAR VIEW
EMERGENCY STOP BUTTON
CIRCUIT BREAKERS
VENTS
CB2
CB1
1450.3 [57.10]
1392.0 [54.80]
1180.5 [46.48]
1142.5 [44.98]
1098.5 [43.25]
1070.5 [42.15]
693.3 [27.30]
5.0 [0.20]
60.7 [2.39]
530.7 [20.89]
703.0 [27.68]
751.0 [29.57]
866.0 [34.09]
1012.0 [39.84]
1313.2 [51.70]
2003.8 [78.89]
2310.8 [90.98]
3119.0 [122.80]
2480.5 [97.66]
1312.3 [51.67]
953.3 [37.53]
717.5 [28.25]
667.0 [26.26]
622.0 [24.49]
COOLANT DRAIN
ø19.05 [ø0.75] I.D.
(FLEXIBLE HOSE)
MAIN TANK NORMAL VENT
2" NPTF THD
OIL DRAIN
1-1/8-12 THD.
RIGHT SIDE VIEW
1E2966B IDENT
1E2733 DRAWING-AUTOCAD
1E0198W BRAND MARKINGS
1E0013G CONFIDENTIALITY
1E0012A INTERPRETATION
1E0011 INTPR & TOL
SPEC NO. NAME
DRN B.R.VILLENA
CHK B.R.VILLENA
APPD N.P.MOUNTJOY
CON-CEPT EXP PRE PROD. PROD.
RECORDS X
UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN MM [INCH]
DIMENSIONS W/O TOL ARE BASIC
SCALE 1 = 10
SHEET 2 OF 3
THIRD ANGLE PROJECTION
00 26AUG19
CHG DATE
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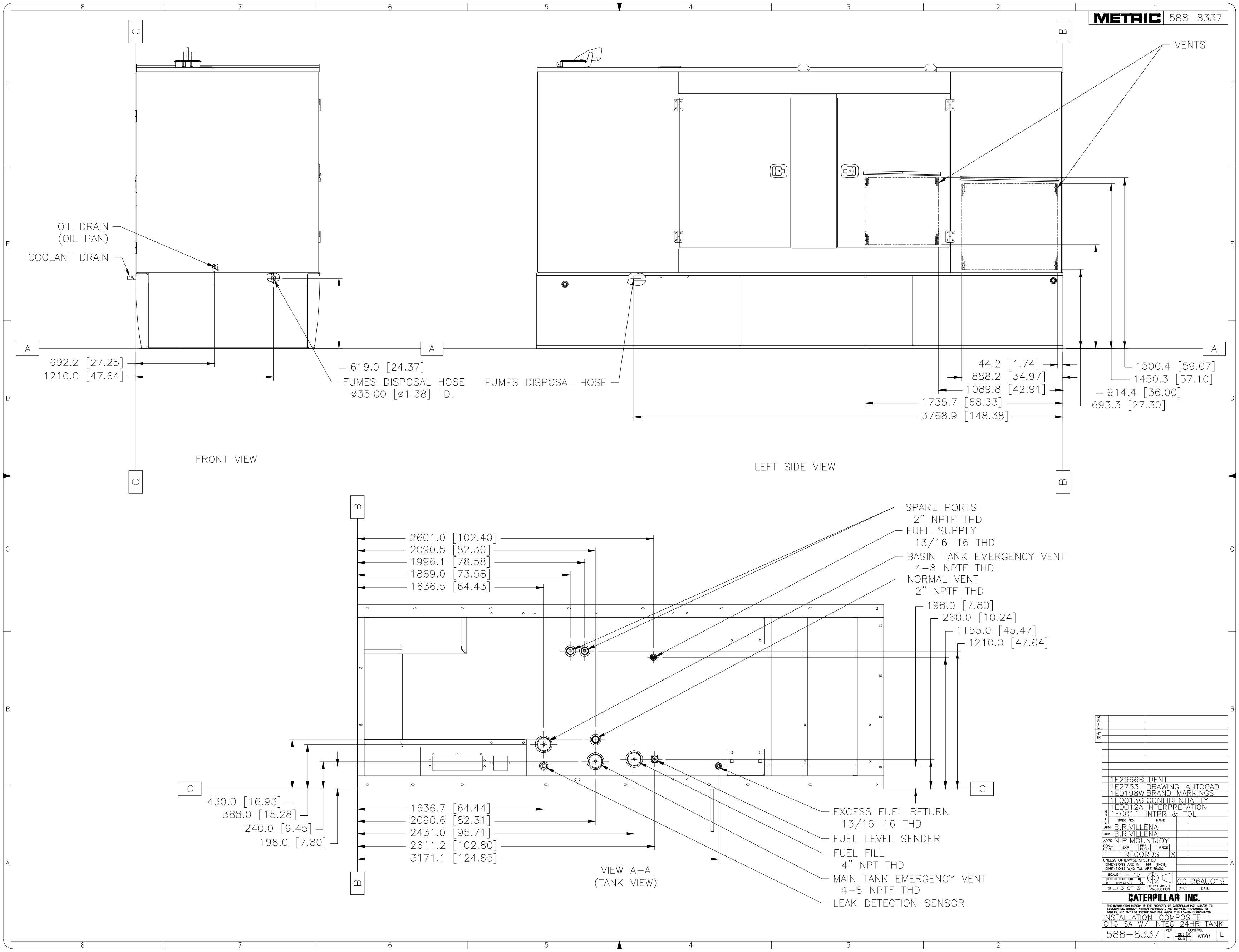
INSTALLATION-COMPOSITE
C13 SA W/ INTEG 24HR TANK
588-8337 VER - DES SUB CONTROL W591 E


METRIC 588-8337
VENTS
OIL DRAIN
(OIL PAN)
COOLANT DRAIN
692.2 [27.25]
1210.0 [47.64]
619.0 [24.37]
FUMES DISPOSAL HOSE
ø35.00 [ø1.38] I.D.
FUMES DISPOSAL HOSE
44.2 [1.74]
888.2 [34.97]
1089.8 [42.91]
1735.7 [68.33]
3768.9 [148.38]
1500.4 [59.07]
1450.3 [57.10]
914.4 [36.00]
693.3 [27.30]
FRONT VIEW
LEFT SIDE VIEW
2601.0 [102.40]
2090.5 [82.30]
1996.1 [78.58]
1869.0 [73.58]
1636.5 [64.43]
SPARE PORTS
2" NPTF THD
FUEL SUPPLY
13/16-16 THD
BASIN TANK EMERGENCY VENT
4-8 NPTF THD
NORMAL VENT
2" NPTF THD
198.0 [7.80]
260.0 [10.24]
1155.0 [45.47]
1210.0 [47.64]
430.0 [16.93]
388.0 [15.28]
240.0 [9.45]
198.0 [7.80]
1636.7 [64.44]
2090.6 [82.31]
2431.0 [95.71]
2611.2 [102.80]
3171.1 [124.85]
EXCESS FUEL RETURN
13/16-16 THD
FUEL LEVEL SENDER
FUEL FILL
4" NPT THD
MAIN TANK EMERGENCY VENT
4-8 NPTF THD
LEAK DETECTION SENSOR
VIEW A-A
(TANK VIEW)
1E2966B IDENT
1E2733 DRAWING-AUTOCAD
1E0198W BRAND MARKINGS
1E0013G CONFIDENTIALITY
1E0012A INTERPRETATION
1E0011 INTPR & TOL
B.R.VILLENA
B.R.VILLENA
N.P.MOUNTJOY
RECORDS
SCALE 1 = 10
SHEET 3 OF 3
00 26AUG19
CATERPILLAR INC.
INSTALLATION-COMPOSITE
C13 SA W/ INTEG 24HR TANK
588-8337
W591
E

TAB 3: GENERATOR CUTSHEETS

ATTACHMENTS

ULCERT
UL 2200 LISTING

INCLUDES THE FOLLOWING:

ALTERNATOR
Alternator insulation system is UL Recognized (UL 1446). PMG and AREP alternators are available. Automatic voltage regulators are UL Recognized.

WIRE HARNESS
AC, DC, and power harnesses are made with UL Listed wire and UL Listed terminals.

CONTROL PANEL
Control panels are comprised of UL Listed and UL Recognized components. EMCP is UL Recognized.

CIRCUIT BREAKER
Output circuit breaker is 100% rated and UL Listed.

TESTING
All UL Listed sets are designed and rigorously tested in accordance with UL Standard for Safety, UL 2200.

LABELING
Labeling meets UL requirements.

MECHANICAL OPTIONS
Mechanical options do not require UL Listing and, therefore, are not affected. The exceptions to this are:

FUEL TANKS
If a fuel tank is ordered with the unit, it must be UL Listed. Two versions are available: 24 hour integral (FCUL2) and 24/48 hour sub-base (FSBT)

ENCLOSURES
Factory installed enclosures meet UL requirements. Weatherproof and sound attenuated versions are

available.

ELECTRICAL OPTIONS
The table below shows electrical options that meet UL requirements:

EOS	Lube Oil Sump Heater
WCA1	Low Coolant Level Shutdown
WSS1	Low Coolant Temperature Alarm
AH1H	Anti-Condensation Heater
WHH	Coolant Heater
GOVES	Electronic Governor (Fully Adjustable)
FSS1	Critical Low Fuel Level Shutdown
FSS2	Low Fuel Level Alarm
FSSS	Critical High Fuel Alarm
PBCSUL	UL Listed Battery Charger
PBC10NU	NFPA Battery Charger, UL Listed

UL Listing is available on all diesel fuelled generator sets up to 17S kW at 60 Hz, 600 vac maximum.

LEHE0410-01 (11-

BUILT FOR IT.™

VMC GROUP
THE POWER OF TOGETHER™

CATERPILLAR®

CERTIFICATE OF COMPLIANCE
SEISMIC DESIGN OF NONSTRUCTURAL COMPONENTS AND SYSTEMS

Certification No.

VMA-53383-01C (Revision 0)

Expiration Date: 7/31/2023

Certification Parameters:

The nonstructural products (mechanical and/or electrical components) listed on this certificate are CERTIFIED[1] FOR SEISMIC APPLICATIONS in accordance with the following building code[2] releases.

IBC 2018, 2015, 2012, 2009

The following model designations, options, and accessories are included in this certification. Reference report number VMA-53383-01 as issued by The VMC Group for a complete list of certified models, included accessories/options, and certified installation methods.

Caterpillar; Diesel Gensets
i6 GC Models; 250 kW - 600 kW

The above referenced equipment is **APPROVED** for seismic application when properly installed[3], used as intended, and contains a Seismic Certification Label referencing this Certificate of Compliance[4]. As limited by the tabulated values, below grade, grade, and roof-level installations, installations in essential facilities, for life safety applications, and/or of equipment containing hazardous contents are permitted and included in this certification with an Equipment Importance Factor assigned as I_p=1.5. The equipment is qualified by successful seismic shake table testing at the nationally recognized University of California Berkeley Pacific Earthquake Engineering Research Center under the witness of the ISO Accredited Product Certification Agency, the VMC Group.

Certified Seismic Design Levels			
Certified IBC	**Importance $I_p \leq 1.5$** Soil Classes A-E Risk Categories I-IV Design Categories A-F	z/h ≤ 1.0	z/h = 0.0
		$S_{DS} \leq 0.567$ g	$S_{DS} \leq 1.700$ g

Certified Seismic Installation Methods
Rigid Mounting From Unit Base To Rigid Structure

HEADQUARTERS
113 Main Street
Bloomingdale, NJ 07403
Phone: 973.838.1780
Toll Free: 800.569.8423
Fax: 973.492.8430

CALIFORNIA
180 Promenade Circle
Suite 300
Sacramento, CA 95834
Phone: 916.634.7771

TEXAS
11930 Brittmoore Park Drive
Houston, TX 77041
Phone: 713.466.0003
Fax: 713.466.1355

thevmcgroup.com

VMC GROUP
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CATERPILLAR®

CERTIFICATE OF COMPLIANCE

SEISMIC DESIGN OF NONSTRUCTURAL COMPONENTS AND SYSTEMS

Certified Product Table:

Model	Max Rating [kW]	On/Off Tank	Length [in.]	Width [in.]	Height [in.]	Max Weight [lbs]
D250GC	250	Off Tank	156	57	78	6,299
D300GC	300				64	5,750
D350GC	350		182	64	88	8,781
D400GC	400					8,856
D450GC	450					9,718
D500GC	500					9,826
D550GC	550		196	73		10,481
D600GC	600				86	10,664
D250GC	250	On tank	181	57	93	12,040
D300GC	300					12,234
D350GC	350		207	64	101	15,854
D400GC	400					15,929
D450GC	450		234		102	18,774
D500GC	500					17,950
D550GC	550		196	73	99	19,850
D600GC	600		261	74	103	22,077

Group	Type	S_{DS} (z/h=0)	S_{DS} (z/h=1)	A_{Flex-H}	A_{Rig-H}	A_{Flex-V}	A_{Rig-V}	F_p/W_p
Seismic	AC156	1.70	0.57	1.70	0.68	1.13	0.45	0.77

This certification includes the diesel generator set and included factory supplied options. This certification only covers accessoriesand options directly mounted to the genset. The genset and applicable options shall be installed per the manufacturer supplied seismic installationinstructions. For a list of certified configurations and options please directly contact the manufacturer. This certification excludes all non-factory supplied accessories and options, including but not limited toisolation/restraint devices, other electrical/mechanical components and all connections for electrical, fuel, heating or cooling fluid, or otherpipe/conduit connections and configurations not detailed in the above charts. Flexibility in the connections must be maintained as to not transmitload into the equipment. Design specials are outside the scope of this certification.

IBC CERTIFIED
VMC GROUP

VMA-53383-01C (Revision 0)
Issue Date: Wednesday, July 22, 2020
Revision Date: Wednesday, July 22, 2020
Expiration Date: Monday, July 31, 2023

CERTIFICATE OF COMPLIANCE
SEISMIC DESIGN OF NONSTRUCTURAL COMPONENTS AND SYSTEMS

Notes & Comments:

1. All equipment listed herein successfully passed the seismic acceptance criteria for shake testing non-structural components and systems as set forth in the ICC AC-156. The Test Response Spectrum (TRS) enveloped the Required Response Spectrum (RRS) for all units tested. The units cited in this certification were representative sample(s) of a contingent of models and all remained captive and structurally sound after the seismic shake simulation. The units also remained functionally operational after the simulation testing as functional testing was completed by the equipment manufacturer before and after the seismic simulations. Although a seismic qualified unit inherently contains some wind resisting capacity, that capacity is undetermined and is excluded from this certification. Snow/Ice loads have been neglected and thus limit the unit to be installed both indoors (covered by an independent protective structure) and out of doors (exposed to accumulating snow/ice) for ground snow loads no greater than 30 psf for all applications.

2. The following building codes are addressed under this certification:
   IBC 2018 referencing ASCE7-16 and ICC-ES AC-156
   IBC 2015 referencing ASCE7-10 and ICC-ES AC-156
   IBC 2012 referencing ASCE7-10 and ICC-ES AC-156
   IBC 2009 referencing ASCE7-05 and ICC-ES AC-156

3. Refer to the manufacturer supplied installation drawings for anchor requirements and mounting considerations for seismic applications. Required anchor locations, size, style, and load capacities (tension and shear) may be specified on the installation drawings or specified by a 3rd party. Mounting requirement details such as anchor brand, type, embedment depth, edge spacing, anchor-to-anchor spacing, concrete strength, special inspection, wall design, and attachment to non-building structures must be outlined and approved by the Engineer of Record for the project or building. Structural walls, structural floors, and housekeeping pads must also be seismically designed and approved by the project or building Structural Engineer of Record to withstand the seismic anchor loads as defined on the installation drawings. The installing contractor is responsible for ensuring the proper installation of all anchors and mounting hardware.

4. For this certificate and certification to remain valid, this certificate must correspond to the "Seismic Certification Label" found affixed to the unit by the factory. The label ensures the manufacturer built the unit in conformance to the IBC seismic design criteria set forth by the Certified Seismic Qualification Agency, the VMC Group, and meets the seismic design levels claimed by this certificate.

5. Mechanical, Electrical, and Plumbing connections to the equipment must be flexibly attached as to not transfer load through the connection. The structural integrity of any conduit, cable trays, piping, ductwork and/or flexible connections is the responsibility of others. This certification does not guarantee the equipment will remain compliant to NEMA, IP, UL, or CSA standards after a seismic event.

6. This certificate applies to units manufactured at:
   1720 West Kingsbury Street, Seguin, TX 78155

7. This certification follows the VMC Group's ISO-17065 Scheme.

John P. Giuliano, PE
President, VMC Group

VMA-53383-01C (Revision 0)
Issue Date: Wednesday, July 22, 2020
Revision Date: Wednesday, July 22, 2020
Expiration Date: Monday, July 31, 2023

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
2023 MODEL YEAR
CERTIFICATE OF CONFORMITY
WITH THE CLEAN AIR ACT

OFFICE OF TRANSPORTATION AND AIR QUALITY
ANN ARBOR, MICHIGAN 48105

Certificate Issued To: **Caterpillar Inc.**
(U.S. Manufacturer or Importer)

Certificate Number: PCPXL12.5NYS-002

Effective Date: 06/08/2022

Expiration Date: 12/31/2023

Byron J. Bunker, Division Director
Compliance Division

Issue Date: 06/08/2022

Revision Date: N/A

Model Year: 2023
Manufacturer Type: Original Engine Manufacturer
Engine Family: PCPXL12.5NYS

Mobile/Stationary Indicator: Stationary
Emissions Power Category: 225<=kW<450
Fuel Type: Diesel
After Treatment Devices: No After Treatment Devices Installed
Non-after Treatment Devices: Electronic Control, Smoke Puff Limiter, Engine Design Modification

Pursuant to Section 111 and Section 213 of the Clean Air Act (42 U.S.C. sections 7411 and 7547) and 40 CFR Part 60, and subject to the terms and conditions prescribed in those provisions, this certificate of conformity is hereby issued with respect to the test engines which have been found to conform to applicable requirements and which represent the following engines, by engine family, more fully described in the documentation required by 40 CFR Part 60 and produced in the stated model year.

This certificate of conformity covers only those new compression-ignition engines which conform in all material respects to the design specifications that applied to those engines described in the documentation required by 40 CFR Part 60 and which are produced during the model year stated on this certificate of the said manufacturer, as defined in 40 CFR Part 60.

It is a term of this certificate that the manufacturer shall consent to all inspections described in 40 CFR 1068 and authorized in a warrant or court order. Failure to comply with the requirements of such a warrant or court order may lead to revocation or suspension of this certificate for reasons specified in 40 CFR Part 60. It is also a term of this certificate that this certificate may be revoked or suspended or rendered void *ab initio* for other reasons specified in 40 CFR Part 60.

This certificate does not cover engines sold, offered for sale, or introduced, or delivered for introduction, into commerce in the U.S. prior to the effective date of the certificate.

The actual engine power may lie outside the limits of the Emissions Power Category shown above. See the certificate application for details.

Cat® D400 GC
Diesel Generator Sets

Standby : 60 Hz

Image shown may not reflect actual configuration

Engine Model	Cat® C13 In-line 6, 4-cycle diesel
Bore x Stroke	130 mm x 157 mm (5.1 in x 6.2 in)
Displacement	12.5 L (763 in³)
Compression Ratio	16.3:1
Aspiration	Turbocharged Air-to-Air Aftercooled
Fuel Injection System	MEUI
Governor	Electronic ADEM™ A4

Model	Standby	Emission Strategy
D400 GC	400 ekW, 500 kVA	EPA Certified for Stationary Emergency Application

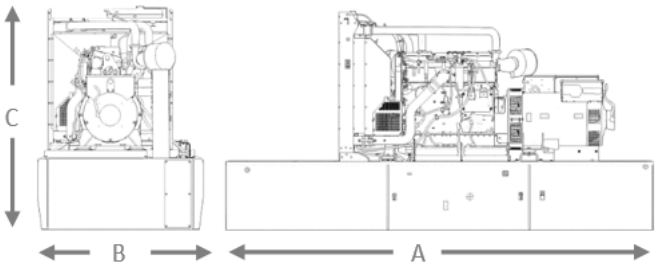
PACKAGE PERFORMANCE

Performance	Standby
Frequency	60 Hz
Genset Power Rating	500 kVA
Genset power rating with fan @ 0.8 power factor	400 ekW
Emissions	EPA TIER 3
Performance Number	EM1694
Fuel Consumption	
100% load with fan, L/hr (gal/hr)	105.8 (27.9)
75% load with fan, L/hr (gal/hr)	90.7 (24.0)
50% load with fan, L/hr (gal/hr)	66.2 (17.5)
25% load with fan, L/hr (gal/hr)	37.7 (10.0)
Cooling System[1]	
Radiator air flow restriction (system), kPa (in water)	105.8 (0.48)
Radiator air flow, m³/min (cfm)	90.7 (17551)
Engine coolant capacity, L (gal)	66.2 (3.8)
Radiator coolant capacity, L (gal)	37.7 (8)
Total coolant capacity, L (gal)	105.8 (12)
Inlet Air	
Combustion air inlet flow rate m³/min (cfm)	24.4 (966.6)
Max. Allowable Combustion Air Inlet Temp, °C (°F)	47 (116)
Exhaust System	
Exhaust stack gas temperature, °C (°F)	567.4 (966.6)
Exhaust gas flow rate, m³/min (cfm)	82.0 (116)
Exhaust system backpressure (maximum allowable) kPa (in. water)	10.0 (40)
Heat Rejection	
Heat rejection to jacket water, kW (Btu/min)	156 (8857)
Heat rejection to exhaust (total), kW (Btu/min)	398 (22607)
Heat rejection to aftercooler, kW (Btu/min)	71 (4023)
Heat rejection to atmosphere from engine, kW (Btu/min)	52 (2945)
Heat rejection from alternator, kW (Btu/min)	29 (1661)
Emissions (Nominal)[2]	
NOx, mg/Nm³ (g/hp-hr)	2274.7 (4.58)
CO, mg/Nm³ (g/hp-hr)	666.9 (1.35)
HC, mg/Nm³ (g/hp-hr)	6.2 (0.01)
PM, mg/Nm³ (g/hp-hr)	39.4 (0.10)

Alternator[3]		
Voltages	480V	600V
Motor starting capability @ 30% Voltage Dip, skVA	1045	951
Current Amps	601.4	481.1
Frame Size	M3134L41	M3115L41
Excitation	S.E	AREP
Temperature Rise, °C	105	130

NOT FOR CONSTRUCTION. Dimensions below do not include enclosure and fuel tank. See Tab 2 for package dimensions.

WEIGHTS & DIMENSIONS – OPEN SET



FUEL TANK CAPACITY

Tank Design	Total Capacity L (gal)	Useable Capacity L (gal)
Integral	2820 (744.9)	2553 (674.4)

Base	Length "A" mm (in)	Width "B" mm (in)	Height "C" mm (in)	Generator Set Weight kg (lb)
Skid (Wide Base)	4625 (182.8)	1630 (64.2)	2039 (80.3)	3325 (7330.4)
Integral Tank Base	4625 (182.8)	1630 (64.2)	2456 (96.7)	4107 (9054.4)

Note: General configuration not to be used for installation. See general dimension drawings for detail.

APPLICABLE CODES AND STANDARDS:

AS1359, CSA C22.2 No100-04, UL142, UL489, UL869, UL2200, NFPA37, NFPA70, NFPA99, NFPA110, IBC, IEC60034-1, ISO3046, ISO8528, NEMA MG1-22, NEMA MG1-33, 2006/95/EC, 2006/42/EC, 2004/108/EC.
Note: Codes may not be available in all model configurations. Please consult your local Cat Dealer representative for availability.

STANDBY: Output available with varying load for the duration of the interruption of the normal source power. Average power output is 70% of the standby power rating. Typical operation is 200 hours per year, with maximum expected usage of 500 hours per year.

RATINGS: Ratings are based on SAE J1349 standard conditions. These ratings also apply at ISO3046 standard conditions.

FUEL RATES: Based on fuel oil of 35° API [16° C (60° F)] gravity having an LHV of 42 780 kJ/kg (18,390 Btu/lb) when used at 29° C
(85° F) and weighing 838.9 g/litre (7.001 lbs/U.S. gal.). Additional ratings may be available for specific customer requirements, contact your Caterpillar representative for details. For information regarding Low Sulfur fuel and Biodiesel capability, please consult your Cat dealer.

DEFINITIONS AND CONDITIONS

[1] For ambient and altitude capabilities consult your Cat dealer. Air flow restriction (system) is added to existing restriction from factory.

[2] Emissions data measurement procedures are consistent with those described in EPA CFR 40 Part 89, Subpart D & E and ISO8178-1 for measuring HC, CO, PM, NOx. Data shown is based on steady state operating conditions of 77° F, 28.42 in HG and number 2 diesel fuel with 35° API and LHV of 18,390 BTU/lb. The nominal emissions data shown is subject to instrumentation, measurement, facility and engine to engine variations. Emissions data is based on 100% load and thus cannot be used to compare to EPA regulations which use values based on a weighted cycle.

[3] UL 2200 Listed packages may have oversized generators with a different temperature rise and motor starting characteristics. Generator temperature rise is based on a 40° C ambient per NEMA MG1-32.

LET'S DO THE WORK.™

GENERATOR DATA

(AT400240)-ENGINE (BAA126422A)-CEM

AUGUST 14, 2023

For Help Desk Phone Numbers Click here

Selected Model

Engine: C13	**Generator Frame:** M3134L4	**Genset Rating (kW):** 400.0	**Line Voltage:** 480
Fuel: Diesel	**Generator Arrangement:** 5652326	**Genset Rating (kVA):** 500.0	**Phase Voltage:** 277
Frequency: 60	**Excitation Type:** Self Excited	**Pwr. Factor:** 0.8	**Rated Current:** 601.4
Duty: STANDBY	**Connection:** - STAR	**Application:** EPG	**Status:** Current

Version: 42423 /44642 /43655 /8548

Spec Information

Generator Specification

Frame: M3134L4 **Type:** SR500	**No. of Bearings:** 1
Winding Type: RANDOM WOUND	**Flywheel:** 14.0
Connection: - STAR	**Housing:** 1
Phases: 3	**No. of Leads:** 6
Poles: 4	**Wires per Lead:** 0
Sync Speed: 1800	**Generator Pitch:** 0.6667

Generator Efficiency

Per Unit Load	kW	Efficiency %
0.25	100.0	93.1
0.5	200.0	94.8
0.75	300.0	95.0
1.0	400.0	94.7

Reactances	Per Unit	Ohms
SUBTRANSIENT - DIRECT AXIS X''_d	0.1274	0.0587
SUBTRANSIENT - QUADRATURE AXIS X''_q	0.1595	0.0735
TRANSIENT - SATURATED X'_d	0.1819	0.0838
SYNCHRONOUS - DIRECT AXIS X_d	3.1033	1.4300
SYNCHRONOUS - QUADRATURE AXIS X_q	1.5827	0.7293
NEGATIVE SEQUENCE X_2	0.1434	0.0661
ZERO SEQUENCE X_0	0.0074	0.0034

Time Constants	Seconds
OPEN CIRCUIT TRANSIENT - DIRECT AXIS T'_{d0}	1.7060
SHORT CIRCUIT TRANSIENT - DIRECT AXIS T'_d	0.1000
OPEN CIRCUIT SUBSTRANSIENT - DIRECT AXIS T''_{d0}	0.0142
SHORT CIRCUIT SUBSTRANSIENT - DIRECT AXIS T''_d	0.0100
OPEN CIRCUIT SUBSTRANSIENT - QUADRATURE AXIS T''_{q0}	0.0992
SHORT CIRCUIT SUBSTRANSIENT - QUADRATURE AXIS T''_q	0.0100
EXCITER TIME CONSTANT T_e	0.0220
ARMATURE SHORT CIRCUIT T_a	0.0150

Short Circuit Ratio: 0.35	Stator Resistance = 0.0124 Ohms	Field Resistance = 0.5214 Ohms

Voltage Regulation

Voltage level adjustment: +/-	5.0%
Voltage regulation, steady state: +/-	0.8%
Voltage regulation with 3% speed change: +/-	0.8%
Waveform deviation line - line, no load: less than	2.0%
Telephone influence factor: less than	50

Generator Excitation

	No Load	Full Load, (rated) pf	
		Series	Parallel
Excitation voltage:	9.58 Volts	41.83 Volts	Volts
Excitation current	0.9 Amps	3.23 Amps	Amps

Selected Model

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Version: 42423 /44642 /43655 /8548

Generator Mechanical Information

Center of Gravity

Dimension X	-471.0 mm	-18.5 IN.
Dimension Y	0.0 mm	0.0 IN.
Dimension Z	0.0 mm	0.0 IN.

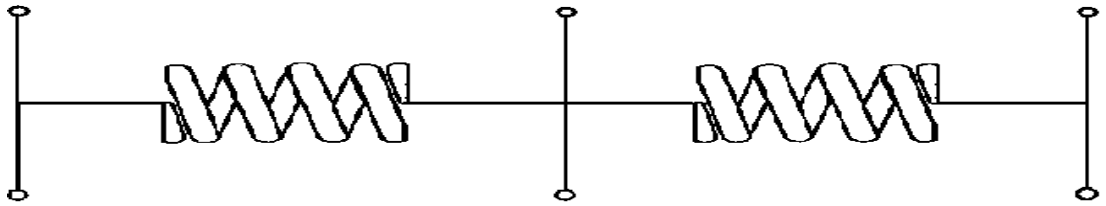
- "X" is measured from driven end of generator and parallel to rotor. Towards engine fan is positive. See General Information for details
- "Y" is measured vertically from rotor center line. Up is positive.
- "Z" is measured to left and right of rotor center line. To the right is positive.

Generator WT = 1113 kg * Rotor WT = 445 kg * Stator WT = 668 kg
2,454 LB 981 LB 1,473 LB

Rotor Balance = 0.0 mm deflection PTP

Overspeed Capacity = 125% of synchronous speed

Generator Torsional Data



J1 = Coupling and Fan | **J2 = Rotor** | **J3 = Exciter End**

TOTAL J = J1 + J2 + J3

K1 = Shaft Stiffness between J1 + J2 (Diameter 1)

K2 = Shaft Stiffness between J2 + J3 (Diameter 2)

J1	K1	Min Shaft Dia 1	J2	K2	Min Shaft Dia 2	J3
17.5 LB IN. s^2	54.8 MLB IN./rad	4.2 IN.	42.9 LB IN. s^2	40.5 MLB IN./rad	4.5 IN.	1.9 LB IN. s^2
1.976 N m s^2	6.19003 MN m/rad	106.0 mm	4.843 N m s^2	4.58 MN m/rad	115.0 mm	0.213 N m s^2

Total J

62.2 LB IN. s^2

7.032 N m s^2

Selected Model

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Duty: STANDBY	**Connection:** - STAR	**Application:** EPG	**Status:** Current

Version: 42423 /44642 /43655 /8548

Generator Cooling Requirements - Temperature - Insulation Data

Cooling Requirements:		**Temperature Data: (Ambient 40 ^{0}C)**	
Heat Dissipated:	22.4 kW	**Stator Rise:**	105.0 ^{0}C
Air Flow:	66.0 m^3/min	**Rotor Rise:**	105.0 ^{0}C

Insulation Class: H

Insulation Reg. as shipped: 100.0 MΩ minimum at 40 ^{0}C

Thermal Limits of Generator

Frequency:	60 Hz
Line to Line Voltage:	480 Volts
B BR 80/40	500.0 kVA
F BR -105/40	568.8 kVA
H BR - 125/40	625.0 kVA
F PR - 130/40	625.0 kVA
H PR - 150/40	662.5 kVA
H PR27 - 163/27	687.5 kVA

Selected Model

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Fuel: Diesel	**Generator Arrangement:** 5652326	**Genset Rating (kVA):** 500.0	**Phase Voltage:** 277
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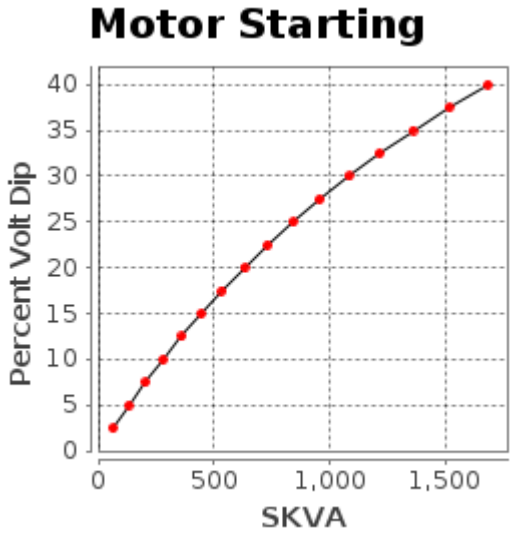
Version: 42423 /44642 /43655 /8548

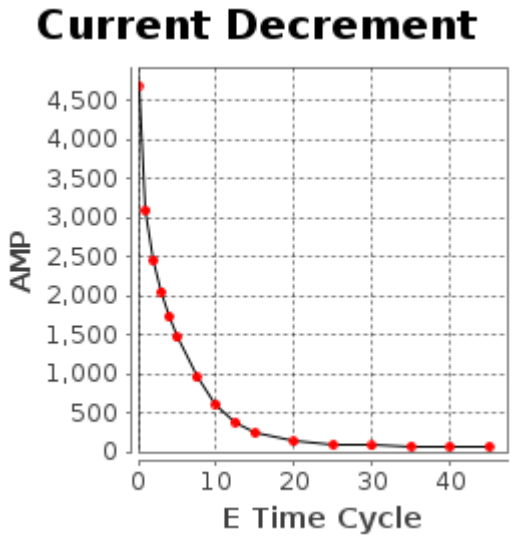
Starting Capability & Current Decrement
Motor Starting Capability (0.6 pf)

SKVA	Percent Volt Dip
65	2.5
133	5.0
205	7.5
281	10.0
361	12.5
446	15.0
536	17.5
632	20.0
733	22.5
842	25.0
958	27.5
1,083	30.0
1,216	32.5
1,360	35.0
1,516	37.5
1,684	40.0



Current Decrement Data

E Time Cycle	AMP
0.0	4,695
1.0	3,092
2.0	2,456
3.0	2,054
4.0	1,735
5.0	1,466
7.5	955
10.0	611
12.5	381
15.0	249
20.0	135
25.0	96
30.0	81
35.0	75
40.0	72
45.0	71



Instantaneous 3 Phase Fault Current: 4695 Amps **Instantaneous Line - Line Fault Current:** 3824 Amps

Instantaneous Line - Neutral Fault Current: 6445 Amps

Selected Model

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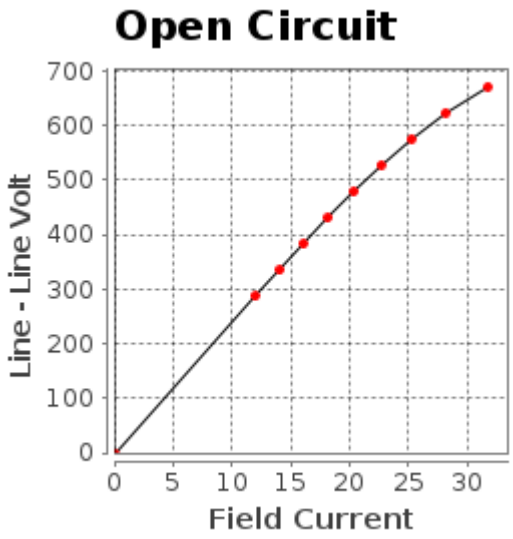
Fuel: Diesel	**Generator Arrangement:** 5652326	**Genset Rating (kVA):** 500.0	**Phase Voltage:** 277
Frequency: 60	**Excitation Type:** Self Excited	**Pwr. Factor:** 0.8	**Rated Current:** 601.4
Duty: STANDBY	**Connection:** - STAR	**Application:** EPG	**Status:** Current

Version: 42423 /44642 /43655 /8548

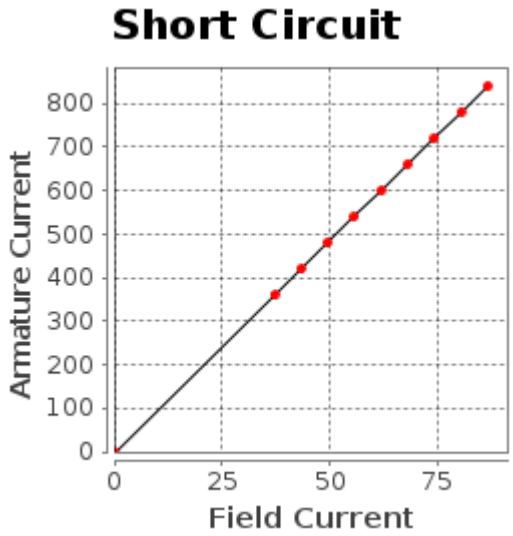
Generator Output Characteristic Curves
Open Circuit Curve

Field Current	Line - Line Volt
0.0	0
12.0	288
14.1	336
16.1	384
18.2	432
20.4	480
22.7	528
25.3	576
28.2	624
31.8	672



Short Circuit Curve

Field Current	Armature Current
0.0	0
37.2	361
43.4	421
49.5	481
55.7	541
61.9	601
68.1	662
74.3	722
80.5	782
86.7	842



Selected Model

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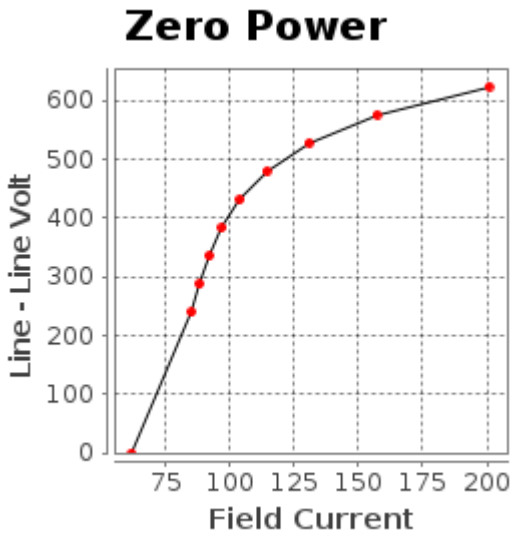
Fuel: Diesel	**Generator Arrangement:** 5652326	**Genset Rating (kVA):** 500.0	**Phase Voltage:** 277
Frequency: 60	**Excitation Type:** Self Excited	**Pwr. Factor:** 0.8	**Rated Current:** 601.4
Duty: STANDBY	**Connection:** - STAR	**Application:** EPG	**Status:** Current

Version: 42423 /44642 /43655 /8548

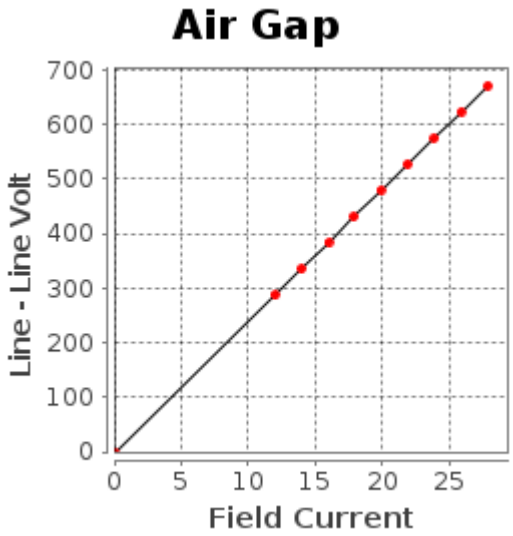
Generator Output Characteristic Curves
Zero Power Factor Curve

Field Current	Line - Line Volt
61.9	0
85.1	240
88.2	288
92.0	336
97.0	384
104.0	432
114.4	480
130.8	528
157.2	576
200.8	624



Air Gap Curve

Field Current	Line - Line Volt
0.0	0
12.0	288
14.0	336
16.0	384
17.9	432
19.9	480
21.9	528
23.9	576
25.9	624
27.9	672



Selected Model

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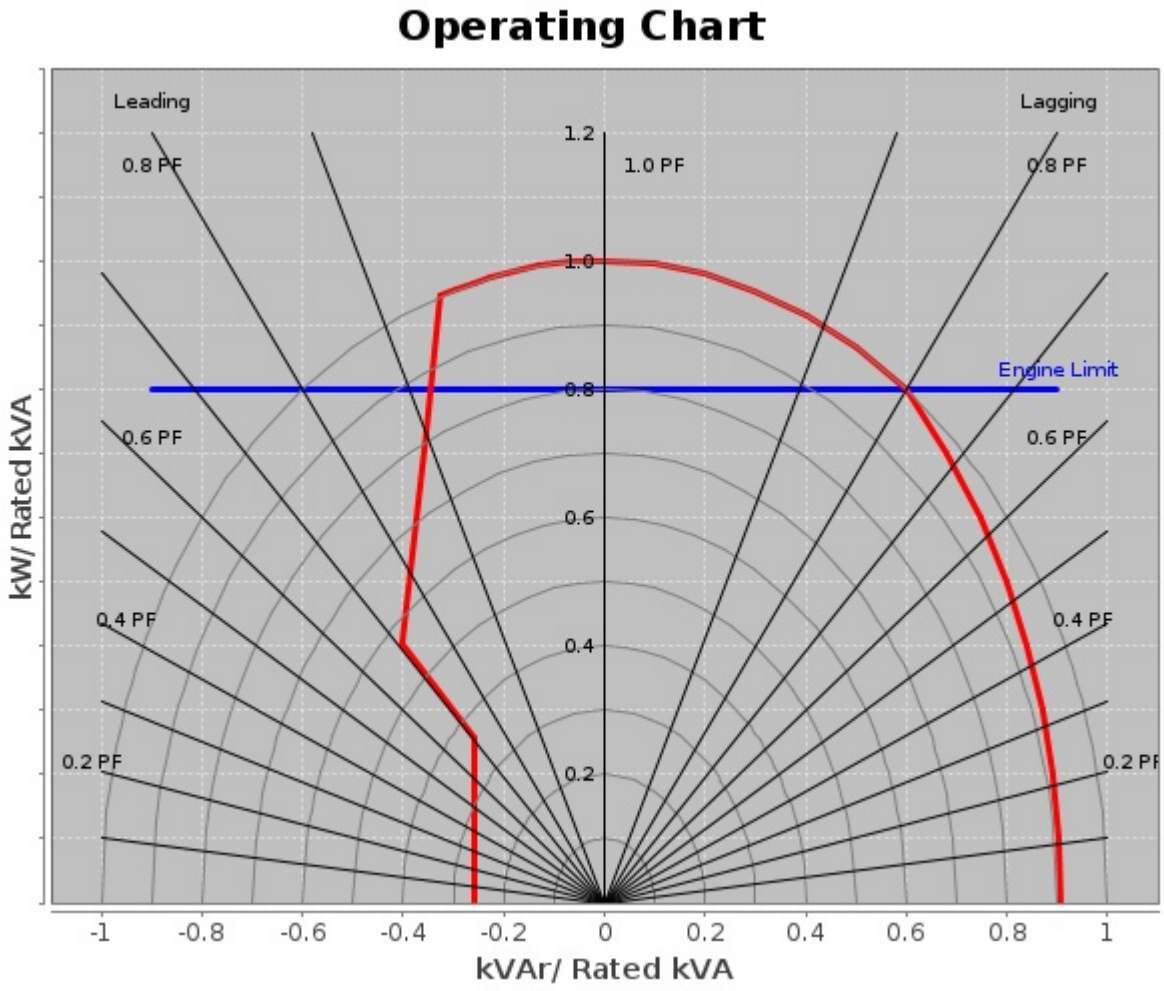
Fuel: Diesel	**Generator Arrangement:** 5652326	**Genset Rating (kVA):** 500.0	**Phase Voltage:** 277
Frequency: 60	**Excitation Type:** Self Excited	**Pwr. Factor:** 0.8	**Rated Current:** 601.4
Duty: STANDBY	**Connection:** - STAR	**Application:** EPG	**Status:** Current

Version: 42423 /44642 /43655 /8548

Reactive Capability Curve



Selected Model

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Fuel: Diesel	**Generator Arrangement:** 5652326	**Genset Rating (kVA):** 500.0	**Phase Voltage:** 277
Frequency: 60	**Excitation Type:** Self Excited	**Pwr. Factor:** 0.8	**Rated Current:** 601.4
Duty: STANDBY	**Connection:** - STAR	**Application:** EPG	**Status:** Current

Version: 42423 /44642 /43655 /8548

General Information

GENERATOR INFORMATION (DM7900)

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1. Motor Starting
Motor starting curves are obtained in accordance with IEC60034, and are displayed at 0.6 power factor.

2. Voltage Dip
Prediction of the generator synchronous voltage dip can be made by consulting the plot for the voltage dip value that corresponds to the desired motor starting kVA value.

3. Definitions
A) Generator Keys
Frame: abbreviation of generator frame size
Freq: frequency in hertz.
PP/SB: prime/standby duty respectively
Volts: line - line terminal voltage
kW: rating in electrical kilo watts
Model: engine sales model

B) Generator Temperature Rise
The indicated temperature rises are the IEC/NEMA limits for standby or prime power applications. The quoted rise figures are maximum limits only and are not necessarily indicative of the actual temperature rise of a given machine winding.

C) Centre of Gravity
The specified centre of gravity is for the generator only. For single bearing, and two bearing close coupled generators, the center of gravity is measured from the generator/engine flywheel-housing interface and from the centreline of the rotor Shaft.

For two bearing, standalone generators, the center of gravity is measured from the end of the rotor shaft and from the centerline of the rotor shaft.

D) Generator Current Decrement Curves
The generator current decrement curve indicates the generator armature current arising from a symmetrical three-phase fault at the generator terminals. Generators equipped with AREP or PMG excitation systems will sustain 300% of rated armature current for 10 seconds.

E) Generator Efficiency Curves
The efficiency curve is displayed for the generator only under the given conditions of rating, voltage, frequency and power factor. This is not the overall generating set efficiency curve.

PERFORMANCE DATA [EM1694]

For Help Desk Phone Numbers Click here

Perf No: EM1694 **Change Level:** 03

General Heat Rejection Emissions Regulatory Altitude Derate Cross Reference Perf Param Ref

View PDF

SALES MODEL:	C13	**COMBUSTION:**	DIRECT INJECTION
BRAND:	CAT	**ENGINE SPEED (RPM):**	1,800
MACHINE SALES MODEL:		**HERTZ:**	60
ENGINE POWER (BHP):	609	**FAN POWER (HP):**	20.1
GEN POWER WITH FAN (EKW):	400.0	**ADDITIONAL PARASITICS (HP):**	10.4
COMPRESSION RATIO:	16.3	**ASPIRATION:**	TA
RATING LEVEL:	STANDBY	**AFTERCOOLER TYPE:**	ATAAC
PUMP QUANTITY:	1	**AFTERCOOLER CIRCUIT TYPE:**	JW+OC, ATAAC
FUEL TYPE:	DIESEL	**INLET MANIFOLD AIR TEMP (F):**	120
MANIFOLD TYPE:	DRY	**JACKET WATER TEMP (F):**	192.2
GOVERNOR TYPE:	ELEC	**TURBO CONFIGURATION:**	SINGLE
ELECTRONICS TYPE:	ADEM4	**TURBO QUANTITY:**	1
CAMSHAFT TYPE:	STANDARD	**TURBOCHARGER MODEL:**	GTA5002BS 1.60A/R
IGNITION TYPE:	CI	**CERTIFICATION YEAR:**	2015
INJECTOR TYPE:	EUI	**PISTON SPD @ RATED ENG SPD (FT/MIN):**	1,854.3
REF EXH STACK DIAMETER (IN):	5		
MAX OPERATING ALTITUDE (FT):	1,640		

INDUSTRY	SUB INDUSTRY	APPLICATION
ELECTRIC POWER	STANDARD	PACKAGED GENSET

General Performance Data Top

GENSET POWER WITH FAN	PERCENT LOAD	ENGINE POWER	BRAKE MEAN EFF PRES (BMEP)	BRAKE SPEC FUEL CONSUMPTN (BSFC)	ISO BRAKE SPEC FUEL CONSUMPTN (BSFC)	VOL FUEL CONSUMPTN (VFC)	ISO VOL FUEL CONSUMPTN (VFC)	ELEC SPEC FUEL CONSUMPTN (ESFC)	ISO ELEC SPEC FUEL CONSUMPTN (ESFC)
EKW	%	BHP	PSI	LB/BHP-HR	LB/BHP-HR	GAL/HR	GAL/HR	LB/EKW-HR	LB/EKW-HR
400.0	100	609	351	0.326	0.323	28.0	27.7	0.497	0.492
360.0	90	546	315	0.326	0.323	25.1	24.8	0.494	0.489
320.0	80	486	280	0.355	0.351	24.3	24.0	0.538	0.533
300.0	75	457	263	0.367	0.364	23.6	23.4	0.559	0.554
280.0	70	428	247	0.373	0.369	22.5	22.3	0.570	0.564
240.0	60	372	214	0.381	0.378	20.0	19.8	0.591	0.585
200.0	50	316	182	0.387	0.383	17.3	17.1	0.612	0.606
160.0	40	261	151	0.389	0.385	14.3	14.2	0.635	0.629
120.0	30	206	119	0.390	0.387	11.3	11.2	0.669	0.663
100.0	25	178	102	0.392	0.388	9.8	9.7	0.696	0.690
80.0	20	149	86	0.396	0.392	8.3	8.3	0.739	0.732
40.0	10	90.8	52	0.427	0.423	5.5	5.4	0.971	0.961

GENSET POWER WITH FAN	PERCENT LOAD	ENGINE POWER	INLET MFLD PRES	INLET MFLD TEMP	EXH MFLD TEMP	EXH MFLD PRES	ENGINE OUTLET TEMP	COMPRESSOR OUTLET PRES	COMPRESSOR OUTLET TEMP
EKW	%	BHP	IN-HG	DEG F	DEG F	IN-HG	DEG F	IN-HG	DEG F
400.0	100	609	56.6	117.0	1,287.5	38.0	1,058.8	61	357.2
360.0	90	546	50.2	112.8	1,239.3	32.8	1,026.2	54	330.0
320.0	80	486	53.7	115.3	1,243.0	36.2	1,014.2	58	344.8

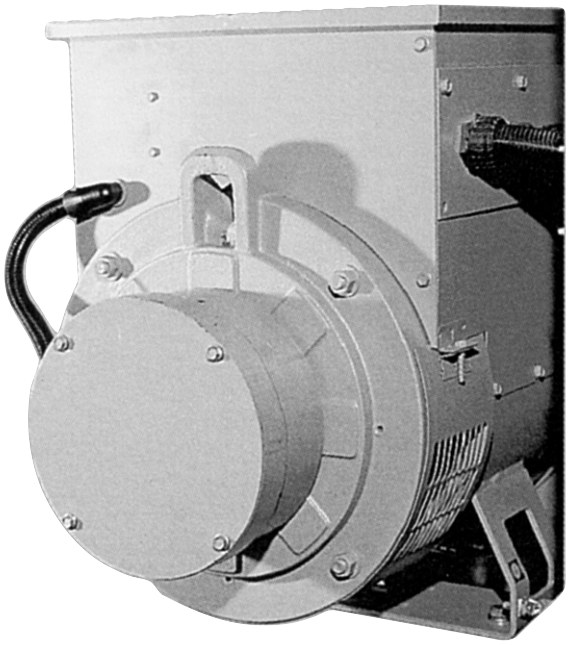
GENSET POWER WITH FAN	PERCENT LOAD	ENGINE POWER	INLET MFLD PRES	INLET MFLD TEMP	EXH MFLD TEMP	EXH MFLD PRES	ENGINE OUTLET TEMP	COMPRESSOR OUTLET PRES	COMPRESSOR OUTLET TEMP
300.0	75	457	54.1	115.3	1,242.2	36.6	1,006.9	59	347.3
280.0	70	428	51.8	113.2	1,230.3	34.6	994.7	56	338.9
240.0	60	372	45.8	108.4	1,193.6	30.2	964.8	50	314.6
200.0	50	316	37.8	103.0	1,140.2	25.0	927.6	41	280.3
160.0	40	261	27.4	96.5	1,080.7	18.9	889.3	30	234.0
120.0	30	206	17.1	90.3	998.9	12.9	840.0	19	186.1
100.0	25	178	12.4	87.5	948.6	10.3	810.6	14	163.5
80.0	20	149	8.5	85.3	886.6	8.2	770.9	10	143.6
40.0	10	90.8	3.6	82.6	689.5	5.6	609.6	5	114.6

GENSET POWER WITH FAN	PERCENT LOAD	ENGINE POWER	WET INLET AIR VOL FLOW RATE	ENGINE OUTLET WET EXH GAS VOL FLOW RATE	WET INLET AIR MASS FLOW RATE	WET EXH GAS MASS FLOW RATE	WET EXH VOL FLOW RATE (32 DEG F AND 29.98 IN HG)	DRY EXH VOL FLOW RATE (32 DEG F AND 29.98 IN HG)
EKW	%	BHP	CFM	CFM	LB/HR	LB/HR	FT3/MIN	FT3/MIN
400.0	100	609	978.1	2,936.2	4,292.2	4,490.4	950.7	854.7
360.0	90	546	915.9	2,656.6	3,998.8	4,176.7	879.0	792.5
320.0	80	486	970.5	2,788.5	4,248.8	4,421.0	930.2	846.5
300.0	75	457	982.7	2,801.1	4,301.0	4,468.6	939.1	857.4
280.0	70	428	963.1	2,705.2	4,203.1	4,362.5	914.6	836.0
240.0	60	372	901.9	2,463.5	3,915.9	4,057.6	850.3	779.2
200.0	50	316	812.5	2,156.6	3,510.3	3,632.6	764.3	702.0
160.0	40	261	687.0	1,781.4	2,955.8	3,057.3	649.3	597.7
120.0	30	206	559.5	1,398.1	2,396.3	2,476.6	528.9	488.0
100.0	25	178	501.9	1,216.0	2,144.3	2,213.9	470.7	434.8
80.0	20	149	454.1	1,050.9	1,934.8	1,994.0	419.9	388.7
40.0	10	90.8	397.9	789.9	1,686.8	1,725.7	363.2	341.4

Heat Rejection Data Top

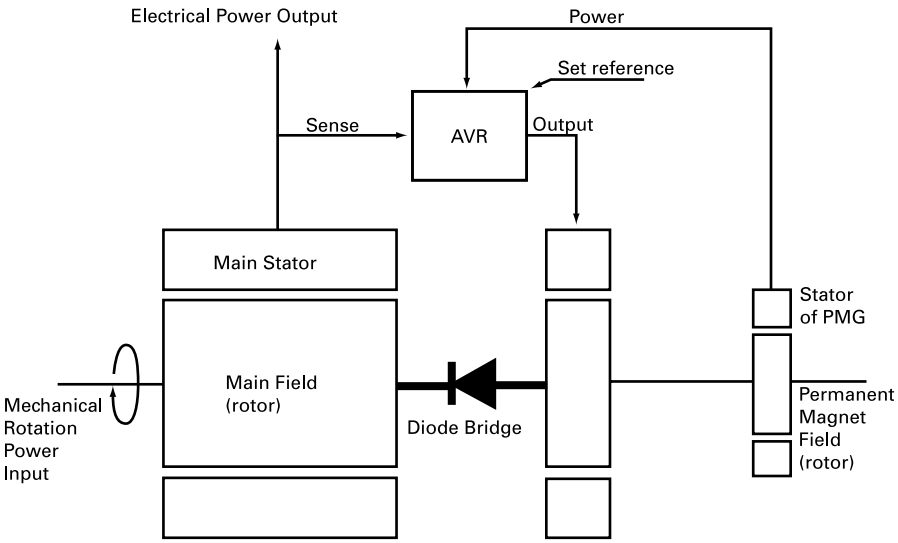
GENSET POWER WITH FAN	PERCENT LOAD	ENGINE POWER	REJECTION TO JACKET WATER	REJECTION TO ATMOSPHERE	REJECTION TO EXH	EXHAUST RECOVERY TO 350F	FROM OIL COOLER	FROM AFTERCOOLER	WORK ENERGY	LOW HEAT VALUE ENERGY	HIGH HEAT VALUE ENERGY
EKW	%	BHP	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN
400.0	100	609	8,952	2,925	23,022	13,776	3,243	4,130	25,831	60,887	64,860
360.0	90	546	8,186	2,654	20,622	12,177	2,905	3,479	23,152	54,534	58,093
320.0	80	486	7,906	2,618	21,212	12,600	2,812	3,904	20,601	52,796	56,241
300.0	75	457	7,710	2,546	21,145	12,570	2,738	3,995	19,365	51,406	54,761
280.0	70	428	7,378	2,442	20,304	12,022	2,604	3,800	18,150	48,885	52,075
240.0	60	372	6,706	2,418	18,182	10,623	2,315	3,233	15,765	43,469	46,305
200.0	50	316	6,033	2,483	15,558	8,900	1,999	2,492	13,418	37,535	39,984
160.0	40	261	5,465	2,508	12,515	6,965	1,660	1,628	11,079	31,161	33,194
120.0	30	206	4,843	2,208	9,534	5,102	1,312	920	8,725	24,624	26,230
100.0	25	178	4,472	1,897	8,187	4,276	1,137	653	7,535	21,350	22,743
80.0	20	149	4,040	1,542	6,945	3,504	965	452	6,327	18,124	19,307
40.0	10	90.8	2,963	1,112	4,536	1,834	634	216	3,852	11,904	12,681

CATERPILLAR®



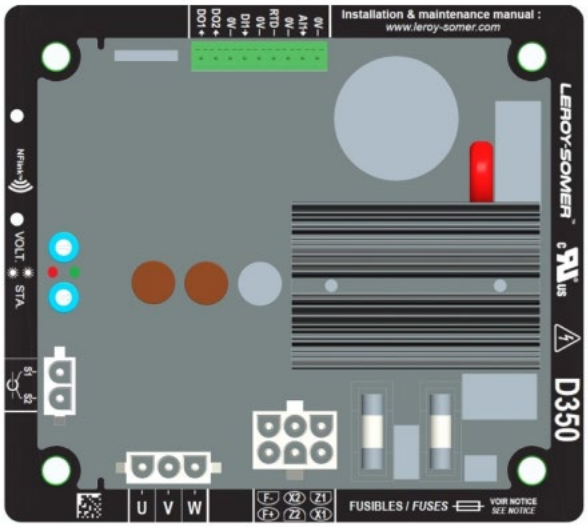
AVR12 – PERMANENT MAGNET GENERATOR

The permanent magnet generator (PMG) option upgrades the excitation system of the generator from the standard self-excited system to a separately-excited system. The PMG couples to the non-drive end of the generator and provides an independent source of excitation power that ensures initial voltage build-up. The PMG improves the voltage response of the generator during transient load application, such as motor starting, and provides a sustained short-circuit current for the operation of protective devices. Isolation of the excitation power ensures that regulation is not affected by non-linear distorting loads.



BLOCK DIAGRAM OF PMG

AUTOMATIC VOLTAGE REGULATOR



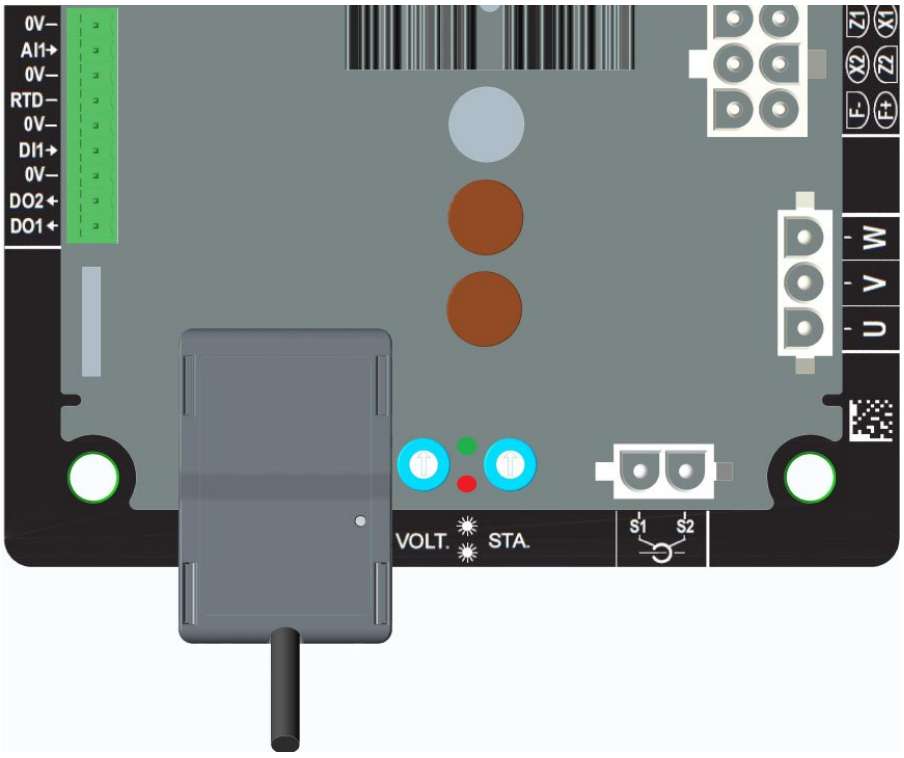
D350 AVR

The D350, Digital Voltage Regulator is used to regulate alternators with a field current of less than 5 A in continuous operations, and 10 A maximum in the event of short-circuit for 10 seconds maximum.

Its design is in accordance with mounting in a generator terminal box or a control cabinet. It is required, at a minimum, to follow the local protection and safety standards, especially those specific to electrical installations for voltages of 300 VAC phase-to-neutral maximum.

NFLink™ configuration module

The D350 is equipped with NFC technology for communication and configuration purposes. The configuration module is placed over the two dedicated positioning holes on the plastic enclosure as shown below. Once the configuration is done, the NF Link must be removed as it is not supposed to be left on the D350 when it is in continuous operation.



AUTOMATIC VOLTAGE REGULATOR

Technical characteristics

D350 regulator can be used to perform the following functions:

Voltage regulation

- With or without reactive droop compensation (Reactive droop to allow parallel operation)
- With or without line droop compensation.

Regulation of the field current, or manual mode, which allows direct control of the field current.

The D350 can also be used to:

- Adjust the reference for the regulation mode in progress, using an analogue input (0-10V and potentiometer)
- Monitoring of temperature sensor (Pt100 or CTP)
- Limit the minimum field current delivered to the exciter field
- Monitoring of the maximum stator current limit
- Loss of voltage sensing
- Withstand a sudden short-circuit for 10 seconds maximum in AREP, PMG
- Signals monitoring (events logger).
- 2 digital outputs for various trip, regulation mode and measurement data

Alternator voltage sensing:

- 3 phases without neutral, 2 phases or 1 phase with neutral
- Three-phase range 0-530VAC
- Consumption < 2VA

Stator current measurement with CT:

- Range 0-1A or 0-5A
- Consumption < 2VA

Power supply:

- 4 terminals for PMG, AREP, SHUNT
- Range 50-277 VAC
- Consumption max < 3000VA

Field excitation:

- Rated 0-5 A
- Short-circuit 10A max.
- Field winding resistance > 4 ohms

Frequency:

- Range 10-100Hz

AUTOMATIC VOLTAGE REGULATOR

- Regulation accuracy: +/-0.25% of the average of the three phases on a linear load, with harmonic distortion less than 5%
- Voltage adjustment range: 0 to 150% of the rated voltage
- Quadrature droop adjustment range: -20% to 20%
- Under frequency protection: integrated, adjustable threshold, slope adjustable from 0.5 to 3V/Hz in steps of 0.1 V/Hz
- Excitation ceiling: adjustable by configuration at 3 points
- Environment: ambient temperature from -40°C to +65°C, relative humidity of less than 95% non-condensing, mounted in a cabinet or in a terminal box

Easy Reg Advanced:

- All the D350 settings are entered / configured using the "EasyReg Advanced" software.
- This program is only compatible with computers running WINDOWS® versions Windows 7 and Windows 10 operating systems.

Dimensions:

- Height : 52.9mm
- width : 125mm
- Length : 140mm

Mounting:

- Holes spacing on the Length : 115mm
- Holes spacing on the width: 100mm

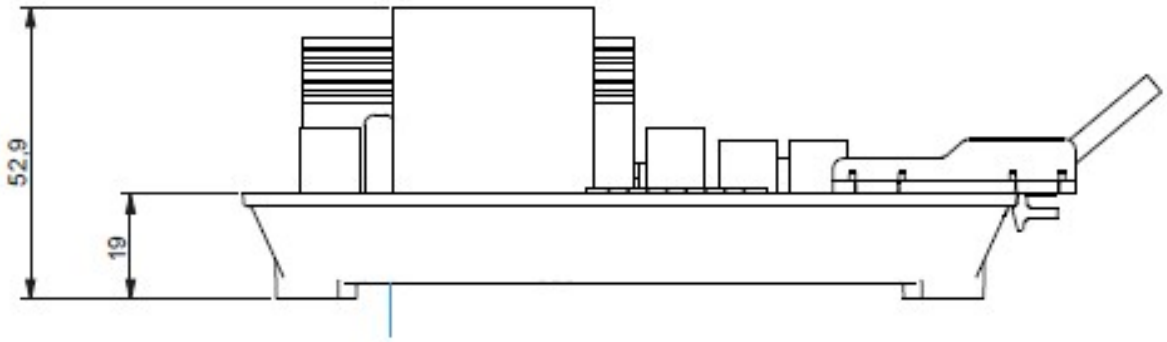
Weight: 0.45kg

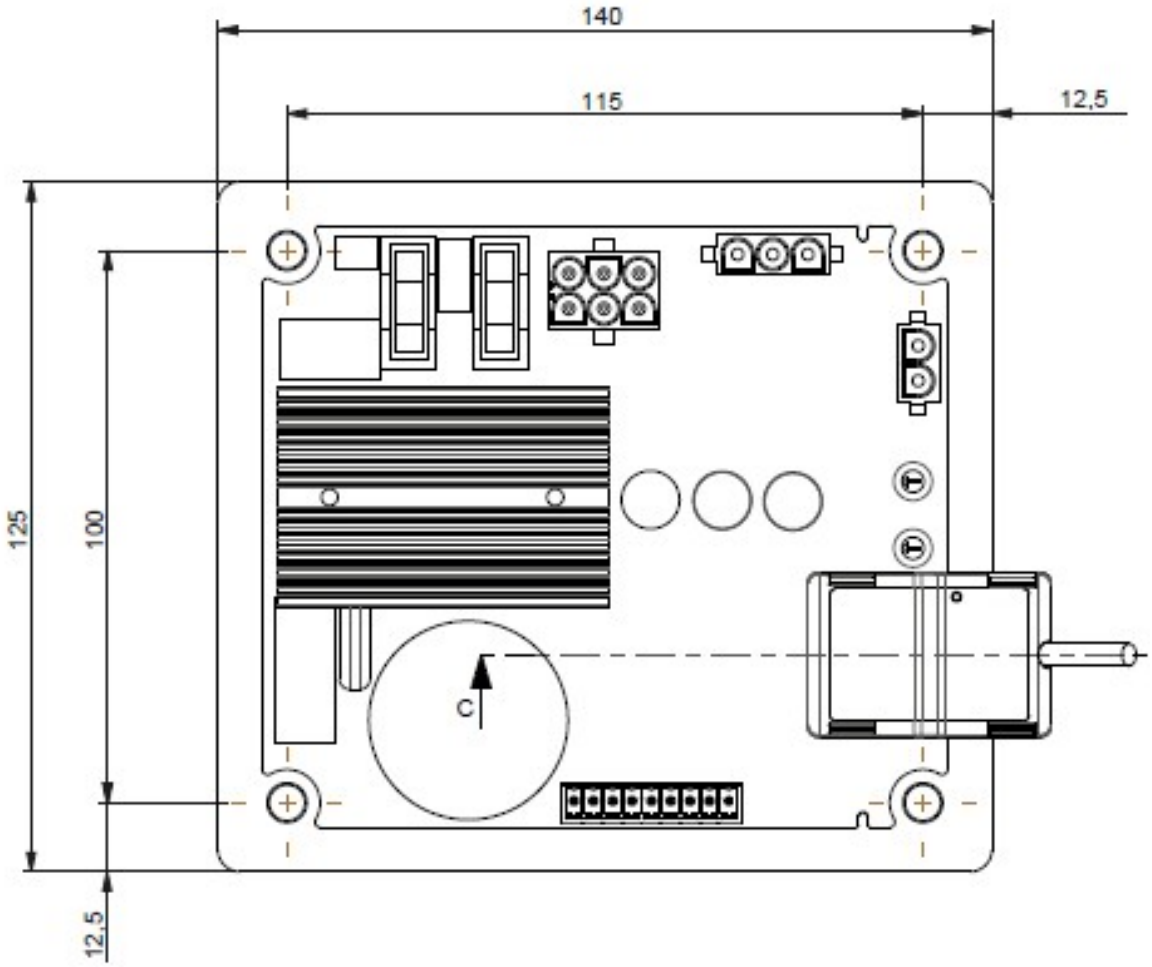
Conformity to standards

- EMC: IEC 61000-6-2, IEC 61000-6-4
- Humidity: IEC 60068-1 and test in accordance with IEC 60068-2-14
- Dry heat: IEC 60068-2-2
- Damp heat: IEC 60028-2-30
- Cold: IEC 600068-2-1

AUTOMATIC VOLTAGE REGULATOR

D350 AVR and NFLink™ Dimensions





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Engine Controller

ADEM™ A4 Engine Controller

The ADEM™ A4 is the main Electronic Control Module (ECM) used on select diesel engines. The ADEM A4 provides a higher degree of control over a large number of combustion variables. The ADEM A4 is designed to control/interface Electronic Unit Injector (EUI) equipped engines. The ADEM A4 engine system is composed of the ADEM A4 ECM, control software, sensors, actuators, fuel injectors, and interface to the generator system. The prime benefit of an ADEM A4 engine system is to better control and maintain the particulate emissions, both steady state and transient, while improving engine performance.

Features

Reliable, Durable

All ADEM A4 controllers are designed to survive the harshest environments.

- Environmentally sealed, die-cast aluminum housing solates and protects electronic components from moisture and dirt contamination
- Rigorous vibration testing ensures product reliability and durability
- Accuracy maintained from –40°C to 85°C
- Electrical noise immunity to 100 volts / meter
- Internal circuits are designed to withstand shorts to + battery and – battery

Simple Servicing

Each ADEM A4 system works in combination with the Cat® ET service tool software to keep the engine operating at peak performance.

- Displays measured parameters
- Retrieves active and logged event code documenting abnormal system operation
- Performs calibrations and diagnostic tests
- Supports flash programming of new software into the ADEM A4 ECM

Self Diagnostics

Each ADEM A4 ECM has a full compliment of diagnostics. The ECM can detect faults in the electrical system and report those faults to the service technician for quick repair.

- Self-diagnostic capability pinpoints operational prob-lems in need of attention.

Advanced Features

- Enhanced performance from fuel injection timing and limiting
- Adjustable monitoring of vital engine parameters
- Programmable speed acceleration ramp rate
- Data link interfaces

Description

The ECM is housed in an environmentally sealed cast-ing. All wiring connections to the ECM are made using two sealed connectors: a single seventy-pin connector and a single one hundred twenty-pin connector.

Engine Speed Governing

Desired engine speed is calculated by the ECM and held within ±0.2 Hz for isochronous and droop mode. The ECM accounts for droop that is requested. The proper amount of fuel is sent to the injectors due to these calculations. The ECM also employs cooldown/shutdown strategies, acceleration delays on startup, acceleration ramp times and speed reference.

Fuel Limiting

Warm and cold fuel-air ratio control limits are con-trolled by the ECM. Electronic monitoring system derates, torque limit, and cranking limit, programmable torque scaling, and cold cylinder cutout mode are standard features.

Fuel Injection Timing

Master timing for injection is controlled by the ECM control. Temperature dependencies are accounted for in the fuel injection calculations.

Electronic Monitoring

Electronic monitoring of vital engine parameters can be programmed. Warning, derate, and shutdown event conditions may be customized by the user.

Information Management

The ECM stores information to assist with electronic troubleshooting. Active and logged diagnostic codes, active events, logged events, fuel consumption, engine hours, and instantaneous totals aid service technicians when diagnosing electronic faults and scheduling preventive maintenance.

Calibrations

Engine performance is optimized through injection timing. Auto/manual sensor calibrations are standard features.

On-Board System Tests

System tests are available to assist in electronic trou-bleshooting. These tests include: injector activation, injector cutout, and override of control outputs.

Data Link Interfaces

The ADEM A4 communicates with the EMCP via a dedicated communication network.

Electronic Sensing

The following sensing is available on the ADEM A4: oil pressure, fuel pressure, fuel temperature, atmospheric pressure, air inlet temperature, turbo outlet pressure, engine coolant temperature, engine speed, throttle, position, exhaust temperature, oil filter pressure differential, fuel filter pressure differential, air filter pressure differential and crankcase pressure.

Engine Controller

SPECIFICATIONS

Impervious to:

Salt spray, fuel, oil and oil additives, coolant, spray cleaners, chlorinated solvents, hydrogen sulfide and methane gas, and dust.

Input and output protection

All inputs and outputs are protected against short circuits to +battery and –battery

Input voltage range (24 VDC nominal)

18 to 32 VDC

Mounting

Engine mounted

Reverse polarity protected

Shock, withstands 20g

Temperature range

Operating: –40°C to 85°C (–40°F to 185°F)
Storage: –50°C to 120°C (–58°F to 248°F)

Vibration

Withstands 8.0g @ 24 to 2 kHz

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LEHE5347-03 (02/19)

Cat® GC Control Panel

Image shown might not reflect actual configuration

GCCP 1.2 - Control Panel

GCCP 1.2 is an auto Start Control Module suitable for a wide variety of diesel gen-set applications. Monitoring an extensive number of engine parameters, the modules will display warnings, shutdown and engine status information on the back-lit LCD screen, illuminated LEDs and remote PC.

FEATURES

- 4-line back-lit LCD text display
- Multiple display languages
- Five-key menu navigation
- LCD alarm indication
- Customisable power-up text and images
- Data logging facility
- Internal PLC editor
- Protections disable feature
- Fully configurable via PC using USB & RS485 communication
- Front panel configuration with PIN protection
- Power save mode
- 3-phase generator sensing and protection
- Generator current and power monitoring (kW, kvar, kVA, pf)
  kW and kvar overload and reverse power alarms
- Over current protection
- Unbalanced load protection
- Breaker control via fascia buttons
- Fuel and start outputs configurable when using
  CAN Support for 0 V to 10 V & 4 mA to 20 mA sensors
- 8 configurable digital inputs (3 available for Customer use)
- 8 configurable digital outputs (5 available for Customer use)
- 4 configurable analogue inputs (3 available for Customer Use)
- CAN, MPU and alternator frequency speed sensing in one variant
- Real time clock
- Engine pre-heat and post-heat functions
- Engine run-time scheduler
- Engine idle control for starting &stopping
- Fuel usage monitor and low fuel level alarms
- 3 configurable maintenance alarms

BENEFITS

- Hours counter provides accurate information for monitoring and maintenance periods
- User-friendly set-up and button layout for ease of use
- Multiple parameters are monitored & displayed simultaneously for full visibility
- The module can be configured to suit a wide range of applications for user flexibility
- PLC editor allows user configurable functions to meet user specific application requirements.
- RS485 Communication port can be used for the Remote Monitoring Communication (Compatible with Cat PLG)

SPECIFICATION

DC SUPPLY
CONTINUOUS VOLTAGE RATING
8 V to 35 V Continuous
5 V for upto 1 minute

CRANKING DROPOUTS
Able to survive 0 V for 100 mS, providing supply was at least 10 V before dropout and supply recovers to 5 V. This is achieved without the need for internal batteries.
LEDs and backlight will not be maintained during cranking.

MAXIMUM OPERATING CURRENT
260 mA at 12 V, 150 mA at 24 V

MAXIMUM STANDBY CURRENT
145 mA at 12 V, 85 mA at 24 V

CHARGE FAIL/EXCITATION RANGE
0 V to 35 V

GENERATOR & MAINS (UTILITY) VOLTAGE RANGE
15 V to 415 V AC (Ph to N)
26 V to 719 V AC (Ph to Ph)

FREQUENCY RANGE
3.5 Hz to 75 Hz

MAGNETIC PICKUP VOLTAGE RANGE
+/- 0.5 V to 70 V

FREQUENCY RANGE
10,000 Hz (max)

INPUTS
DIGITAL INPUTS A TO H
Negative switching

ANALOGUE INPUTS A & D
Configurable as:
Negative switching digital input 0 V to 10 V sensor
4 mA to 20 mA sensor Resistive sensor

ANALOGUE INPUTS B & C
Configurable as:
Negative switching digital input Resistive sensor

OUTPUTS
OUTPUT A & B (FUEL & START)
15 A DC at supply voltage

AUXILIARY OUTPUTS C, D, E, F, G & H
2 A DC at supply voltage

DIMENSIONS OVERALL
216 mm x 158 mm x 43 mm
8.5" x 6.2" x 1.5"

PANEL CUT-OUT
184 mm x 137 mm
7.2" x 5.3"

MAXIMUM PANEL THICKNESS
8 mm
0.3"

STORAGE TEMPERATURE RANGE
-40°C to +85°C
-40 °F to +185 °F

OPERATING TEMPERATURE RANGE
-30°C to +70°C
-22 °F to +158 °F

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Cat® GC Control Panel Options

Image shown might not reflect actual configuration

Remote Annunciator Module

It is an LED expansion module that can be used with compatible control modules. The module has been designed to display a maximum of eight individual LED indications up to a maximum distance of 1 KM (0.6miles).

The Annunciator will consist of two modules to provide a 16 Channel Fault annunciation.

It is presented in a vertical enclosure. It includes an alarm sounder that is triggered when the host controller detects an alarm condition. The alarm can be muted using the front push button.

The Panels will be fitted with removable label cards which can be used to identify the standard NFPA alarms. If desired

It includes individual LEDs for each channel and a 'Power On' LED that flashes when the link with the host controller is lost.

FEATURES

- The Remote annunciator has an integral Sounder / Horn
- Eight configurable LEDs (per module)
- Works up to 1 KM (0.6 miles) from the host controller
- A single Controller can support five Caterpillar Configured remote annunciator control boxes

ENVIRONMENTAL TESTING STANDARDS

ELECTRO-MAGNETIC COMPATIBILITY
BS EN 61000-6-2
EMC Generic Immunity Standard for the Industrial Environment
BS EN 61000-6-4
EMC Generic Emission Standard for the Industrial Environment

ELECTRICAL SAFETY
BS EN 60950
Safety of Information Technology Equipment, including Electrical Business Equipment

TEMPERATURE
BS EN 60068-2-1
Ab/Ae Cold Test -30 °C BS EN 60068-2-2
Bb/Be Dry Heat+70°C

VIBRATION
BS EN 60068-2-6
Ten sweeps in each of three major axes
5 Hz to 8 Hz @ +/-7.5 mm, 8 Hz to 500 Hz @ 2 gn

SHOCK
BS EN 60068-2-27
Three shocks in each of three major axes 15 gn in 11 Ms

HUMIDITY
BS EN 60068-2-30
Db Damp Heat Cyclic 20/55 °C @ 95% RH 48 Hours
BS EN 60068-2-78
Cab Damp Heat Static 40 °C @ 93% RH 48 Hours

DEGREES OF PROTECTION PROVIDED BY ENCLOSURES BS EN 60529
IP65 - Front of module when installed into the control panel with the supplied sealing gasket.

SPECIFICATION

CONTINUOUS VOLTAGE RATING
8 V to 35 V Continuous

CRANKING DROPOUTS
Able to survive 0 V for 50 mS, providing supply was at least 10 V before dropout and supply recovers to 5 V. This is achieved without the need for internal batteries. LEDs and backlight will not be maintained during cranking.

MAXIMUM OPERATING CURRENT
112 mA at 12 V, 53 mA at 24 V

MAXIMUM STANDBY CURRENT
74 mA at 12 V, 35 mA at 24 V

DIMENSIONS OVERALL
355 mm x 369 mm x 90 mm
13.97" x 14.52" x 3.54"

PANEL CUT-OUT
286 mm x 326 mm x 93 mm
11.25" x 12.83" x 3.66"

MAXIMUM PANEL THICKNESS
8 mm
0.3"

LEHE2021-01 (03-21)
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Factory Installed enclosure emergency stop button.

Image shown may not reflect actual configuration.

Remote Emergency Stop Button

Features and Benefits

- Enclosure degree of protection – IP 69K (NEMA 6)
- UL Listed (NKCR)
- Assembled enclosure with shroud
- 40 mm mushroom emergency stop
- Twist release
- 2NC – horizontally mounted

Dimensions

- Net Width: 0.065 m
- Net Height: 0.078 m
- Net Depth: 0.065 m
- Net Weight: 0.124 kg

Circuit Breakers [C9,C13,C15,C18]

D250 GC,D300 GC,D350 GC,D400 GC,D450 GC,D500 GC,D550 GC,D600 GC

Manually Operated Circuit Breakers

Current (A)	Frame	Number of Poles	Interrupting Ratings (kA rms)			Trip Units	(Lugs) Cable Size Range / Phase	Auxilliary Options
			240V	480V	600V			
100	XT2	3	65	25	18	Electronic LS/I or LSI	14-1/0AWG	1 Form C + 1 Bell Alarm Shunt Trip 24VDC
250	XT4	3	65	25	18	Electronic LS/I or LSI	14-1/0AWG	1 Form C + 1 Bell Alarm Shunt Trip 24VDC
400	XT5	3	65	35	18	Electronic LS/I (S or I) or LSI	(2) 2/0 – 500 kcmil	1 Form C + 1 Bell Alarm 60VAC/VDC Shunt Trip 24VDC
600	XT6	3	65	35	20		(3) 2/0 – 400 kcmil	
800	XT6	3	65	35	20		(3) 2/0 – 400 kcmil	
1200	XT7	3	65	50	25		(4) 4/0 – 500 kcmil	1 Form C + 1 Bell Alarm Shunt Trip 24VAC/VDC

1st Breaker Options (400 – 1200A)

Model	Current (A)	Operation
C9, C13, C15	400	Manually Operated
C9, C13, C15, C18	600	Manually Operated
C9, C13, C15, C18	800	Manually Operated
C9, C18	1200	Manually Operated

1st Breaker FLC Capacity or one frame less than FLC capacity except when 1st breaker is 400 A

2nd Breaker Options

Model	Current (A)	Operation
C9, C13, C15, C18	100 / 250	Manually Operated

2nd breaker either 100A or 250A

XT6 Ekip Dip LSI
L-S-I Functions

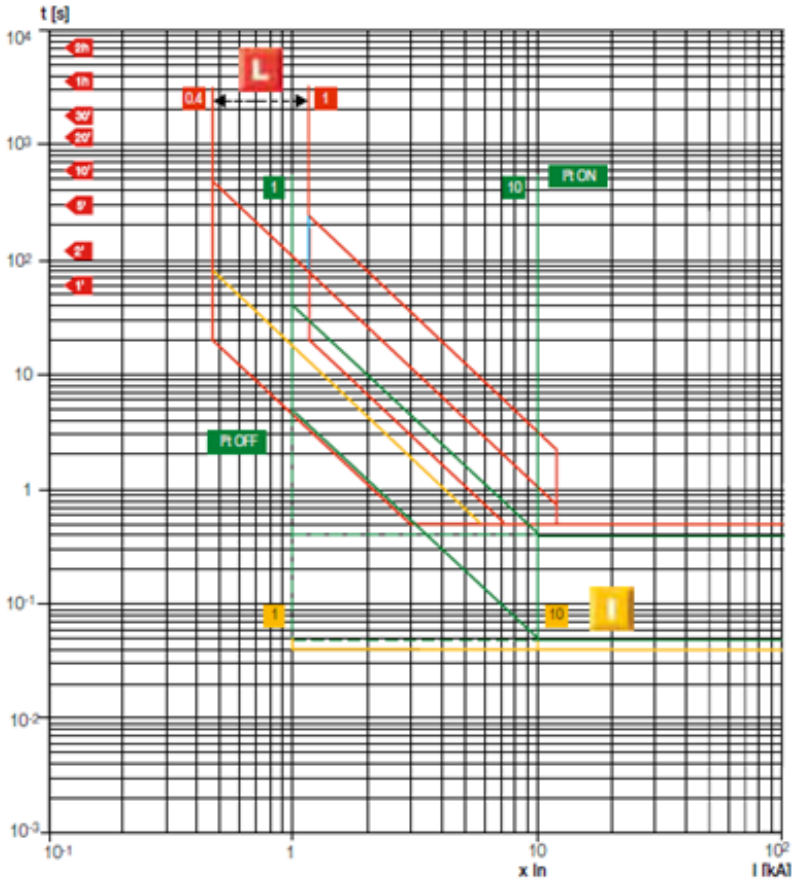


Figure - 5

XT5-XT6 Ekip Dip LS/I
L-S-I Functions

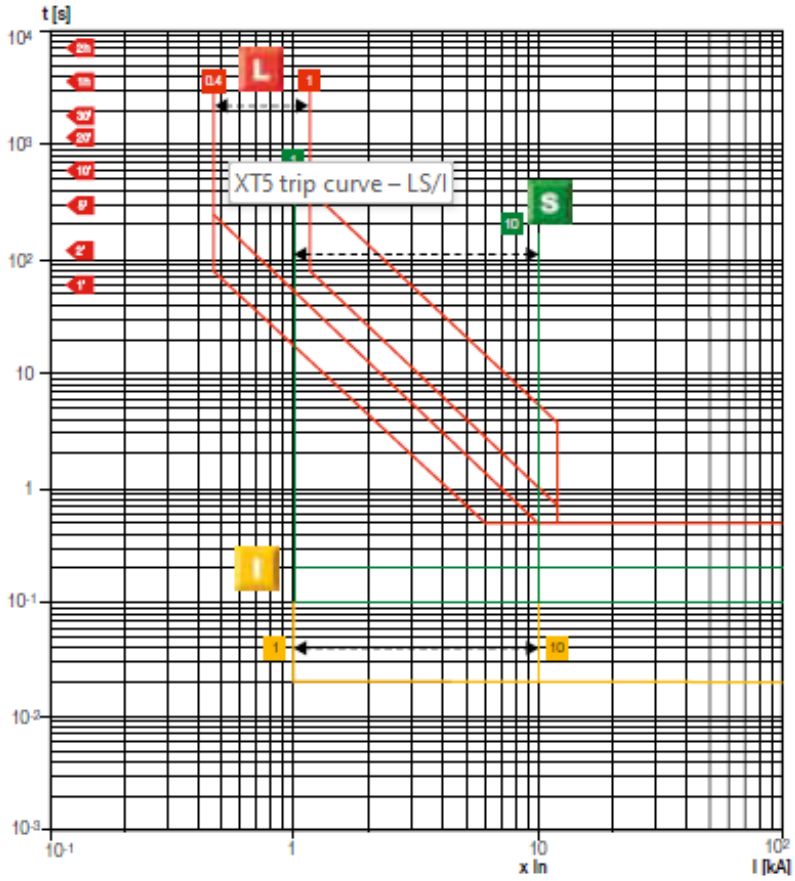


Figure - 6

Cat® Batteries

Cat Batteries – Greater Starting Power – Lower Maintenance – Longer Life

Cat Premium High Output (PHO) batteries are used in all Caterpillar Machines and Engine Gen-Sets. They are designed to meet stringent Caterpillar design specifications, which provide industry leading cold cranking amp (CCA) capability and maximum vibration resistance.

Maintenance Free or low maintenance designs are available in wet and dry configurations.

General Service Line batteries are available in Maintenance Free or low maintenance designs and in wet or dry configurations. Wide selections of BCI group sizes are available for automotive, light truck, bus, industrial, agricultural, marine, recreational and valve regulated (VRLA-AGM & Gel) applications.

Caterpillar. The difference counts.™

Cat Dealers define world – class product support. We offer you the right parts and service solutions, when and where you need them.

The Cat Dealer network of highly trained experts keeps your entire fleet up and running to maximize your equipment investments.

CATERPILLAR®

World's Toughest Batteries

Premium High Output – Maximum Vibration Resistance

- Vibration Resistance...five times the Industry Standard
- Exclusive "flat top" BCI group 4D & 8D batteries are Maintenance Free and have the industries highest cold cranking amps (CCA)
- Popular BCI group 31 Maintenance Free batteries with industry leading cold cranking amps...up to 1000 (CCA), for electric power, machine or on-highway truck and bus applications. Deep cycle models available for truck, marine or recreational usage

Specifications for Cat Premium High Output Batteries – Available Worldwide

Qty. (2) Wet Batteries

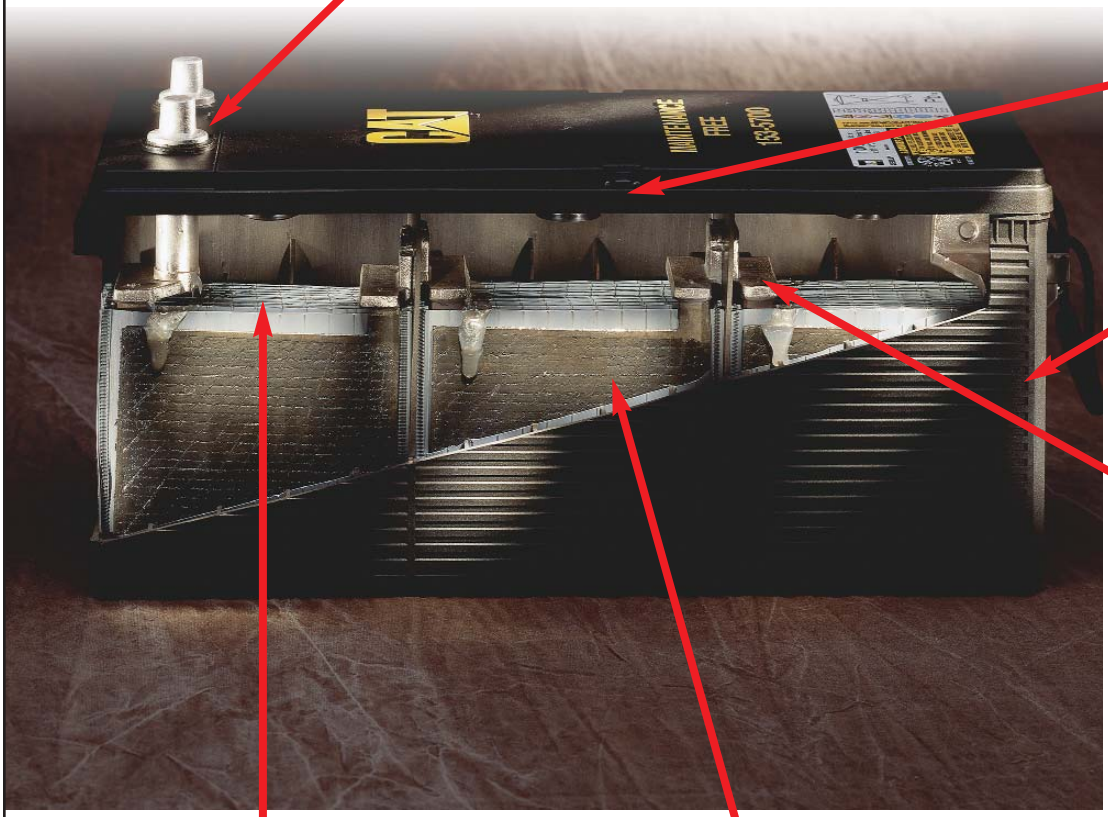
BCI Group Size	Part No.	Cold Cranking Amps"	Reserve Capacity Minutes'	Volts	Amp Hr. Capacity @ 20 Hrs.	Construction	Add Water Maintenance Check Hours	BCI Overall Dimensions Length In (mm)	Width In (mm)	Height In (mm)	Nominal Weight Wet Lb (kg)	Dry Lb (kg)	Nominal Acid to Fill Qt (liter)
8D	153-5720	1500	465	12	210	C	MF	20.47 (520)	10.8 (275)	9.76 (248)	132 (60)	–	–
8D	101-4000	1400	400	12	190	LAC+	1000	20.7 (526.5)	10.96 (278)	9.76 (248)	132 (60)	86 (39)	18.0 (17.0)
4D	153-5710	1400	425	12	200	C	MF	20.47 (520)	8.58 (218)	9.76 (248)	119 (54)	–	–
4D	153-5700	1125	305	12	145	C	MF	20.47 (520)	8.58 (218)	9.76 (248)	101 (46)	–	–
4D	9X-9730	1300	400	12	190	LAC+	1000	20.75 (527)	8.58 (218)	9.76 (248)	119 (54)	81 (37)	14.8 (14.0)
4D	9X-9720	1000	275	12	140	LAC+	1000	20.75 (527)	8.58 (218)	9.76 (248)	101 (46)	59 (27)	15.9 (15.0)
31	175-4390	1000	180	12	90	C/S	MFA	12.9 (328.4)	6.74 (171.2)	9.29 (236)	60 (27)	–	–
31	175-4370	825	190	12	100	C/S**	MFA	12.9 (328.4)	6.74 (171.2)	9.29 (236)	60 (27)	–	–
31	175-4360	710	185	12	100	C/S***	MFA	12.9 (328.4)	6.74 (171.2)	9.29 (236)	60 (27)	–	–
31	**250-0480**	710	185	12	100	C/SDT***	MF	12.9 (328.4)	6.74 (171.2)	9.29 (236)	60 (27)	–	–
31	115-2422	1000	170	12	90	C SAE	MFA	12.9 (328.4)	6.74 (171.2)	9.46 (240.3)	60 (27)	–	–
31	115-2421	950	170	12	90	C SAE +	MFA	12.9 (328.4)	6.74 (171.2)	9.46 (240.3)	60 (27)	44 (20)	6.6 (6.2)
31	9X-3404	950	165	12	100	C SAE	MF	13 (330.2)	6.77 (172)	9.46 (240.3)	58 (26)	–	–
31	3T-5760	750	165	12	100	C SAE	MF	13 (330.2)	6.77 (172)	9.46 (240.3)	55 (25)	–	–
24	153-5656	650	110	12	52	SC	MF	10.98 (278.9)	6.85 (174)	9.0 (229.1)	39 (18)	–	–
65	230-6368	880	140	12	80	SC	MF	11.9 (303.4)	7.5 (190.8)	7.5 (191.4)	45.5 (21)	–	–
74	153-5660	650	110	12	52	SC*	MF	10.98 (278.9)	7.0 (178.2)	8.15 (206.9)	39 (18)	–	–
58	175-4280	500	70	12	35	SC	MF	9.96 (253.1)	7.2 (182.5)	6.9 (176)	31 (14)	–	–
2	153-5690	765	210	6	90	LAC+	1000	10.24 (260)	6.8 (173)	8.72 (221.6)	37 (17)	22 (10)	4.8 (4.5)

Construction Notes:
LAC = Low Maintenance, Hybrid Construction
C = Calcium Lead Alloy Grid Design
MF = Maintenance Free
MFA = Maintenance Free with Accessible Vent Caps
S = Stud Terminals
+ = Shipped Dry Only
* = Side Terminals
** = Starting and Deep Cycle Battery
*** = Deep Cycle and Starting Battery
" = For 30 seconds at 0° F (-18° C)
' = Minimum of 25 amp output at 80° F (27° C)
SAE = Uses SAE Posts
SDT = Dual, Top mounted Terminals, Stud and SAE Post, Marine Deep Cycle/Starting Battery
SC = Silver (Ag) Calcium Alloy Grids for resistance to high underhood temperatures

Rugged Design – Built Tough – Reliable Starting

- Positive and Negative plates are anchored to container bottom and locked at the top of cell element for maximum vibration resistance.
- Heavy-duty forged terminal post bushings provide maximum strength and resistance to acid seepage.
- Hefty full-frame grids, no sharp edges, optimum acid/paste combination provides better charge acceptance after deep discharge.
- Manifold vented cover with built-in Flame Arrestor…a safety feature that directs corrosive gases away from the battery and hold-downs.
- Thick, robust container resists rugged treatment typical of heavy-duty commercial use. Embossed part number & descriptors for easy serviceability.

Cat Batteries



Robust Components = Long Life + Reliable Starts

- Heavy-duty forged terminal post bushings provide maximum strength and resistance to acid seepage that causes corrosion and black posts. Thicker internal terminal posts provide lower electrical resistance and higher cold cranking amp output.
- Rugged microporous polyethylene envelope separators protect against “shorts” and vibration damage. Deep Cycle batteries utilize double insulated Glass mat separators for longer cycling life.
- Maintenance Free batteries utilize calcium lead alloy on both positive and negative plates that reduces gassing and water consumption. Automotive batteries have Silver (Ag) Calcium Alloy Grids for resistance to high underhood temperatures.
- Heavy-duty, full frame battery grids with no sharp edges. An optimum acid/paste combination provides better charge acceptance after a deep discharge.
- Positive and Negative plates are anchored to the container bottom and the cell element is locked at the top for maximum vibration resistance. Straps are thicker, heavier and cast (not welded) into the plates.
- Manifold vented cover with built-in Flame Arrestor…a safety feature that directs corrosive gases away from the battery and hold-downs.
- Robust reinforced case provides extra strength in all temperature extremes. Brickwork design on sides reduces chance of punctures and case flexing. Embossed part number and descriptors for easy serviceability.

For more information, see us today or visit our web site at www.cat.com

Caterpillar. The difference counts.™

CATERPILLAR®

PEHJ0073-01 Printed in the U.S.A.

Attachments

Image shown might not reflect actual configuration

BATTERY CHARGER

The intelligent battery charger has been developed with safety, usability, optimised battery performance and maximum battery lifetimes in mind.

A comprehensive range of input and output protections ensures a continued safe charging environment also enabling the use of the charger as a power supply.

FEATURES

- Intelligent two, three and four stage charging profiles
- Configurable to suit most battery types (12V/24V)
- Adjustable current limit
- Can be used as a battery charger, power supply or both at the same time
- Automatic or Manual boost and storage charge functions to help maintain battery condition
- Digital Microprocessor Technology
- Temperature compensation for battery charging
- Low Output Ripple and superb line regulation
- Three LED Indicators
- AC input Under voltage
- AC input Over voltage
- Battery charger output Over voltage
- Battery charger output Over current
- Optional battery temperature compensation with over temperature protection
- Output short circuit and Inversion polarity with auto recovery
- Configurable charge termination
- UL1236 /UL1564 Compliant

Automatic Boost Mode
- Boosts and equalises cell charge improving battery performance and life

Power Save Mode
- Once the battery is fully charged the chargers switch to Eco-Power to save energy

Communication
- Can be integrated into external systems through MODBUS RTU using RS485
- Fully configurable via PC Software

BENEFITS

- Fully flexible to maximise the life of the battery
- Suitable for a wide range of battery types
- Switched mode design
- Minimum 86% efficiency throughout full operating range
- No external intervention for boost mode
- Multiple chargers can be linked together to provide larger current output
- Can be permanently connected to battery and mains (utility) supply. No need to disconnect through high load conditions.

SPECIFICATION

AC SUPPLY
VOLTAGE RANGE 90 V to 305 V (L-N)

FREQUENCY RANGE
48 Hz to 64 Hz (L-N)

DC OUTPUT RATING
10 A DC at 24 V DC

RIPPLE AND NOISE
<1%

EFFICIENCY
>86%

REGULATION LINE
<0.5%

LOAD
2%

TEMPERATURE SENSOR INPUT
PT1000

PROTECTIONS
Short Circuit
DC Over Voltage
DC Over Current
Reverse Polarity
Over Temperature
AC Under & Over Voltage

CHARGE FAILURE RELAY
3 A at 30 V DC volt free relay

DIMENSIONS OVERALL
70 mm x200 mm x 130 mm
2.7" x 7.9" x 5.1"

WEIGHT
0.75 kg

OPERATING TEMPERATURE RANGE
-30 °C to +80 °C
-22 °F to +176 °F

STORAGE TEMPERATURE RANGE
-40 °C to +70 °C
-22 °F to +158 °F

Battery charger comes factory installed on generator set skid base. **No contractor installation required.**

Input supply is sourced from the factory installed auxiliary panelboard in the generator enclosure.

208VAC customer-supplied shore power is distributed to the Battery Charger internal to the generator cabinet. **Separate 208VAC circuit not required.** See 'Project Specific Notes & Technical Information' for details.

Jacket Water Heater (WHHH01/ WHHH03)

Appropriate when the generator set is to be sited in a low ambient environment, the heater maintains the engine coolant at a temperature [typically 38°C (100°F)] which facilitates rapid starting and load acceptance. The heater assembly uses UL compliant components (to UL1030) and has CSA certification which is to both CSA and UL Standards.

The heater itself is powered by a 240V for 60 Hz AC auxiliary supply. A thermostatic controller is included to regulate the output temperature to within safe limits. When the generator set is not running the heater is automatically connected to the AC supply through a power relay mounted in the control panel.

Upon receiving a start signal the AC supply is automatically disconnected by the power relay and automatically reconnected when the start signal is removed, and the engine has stopped.

Features

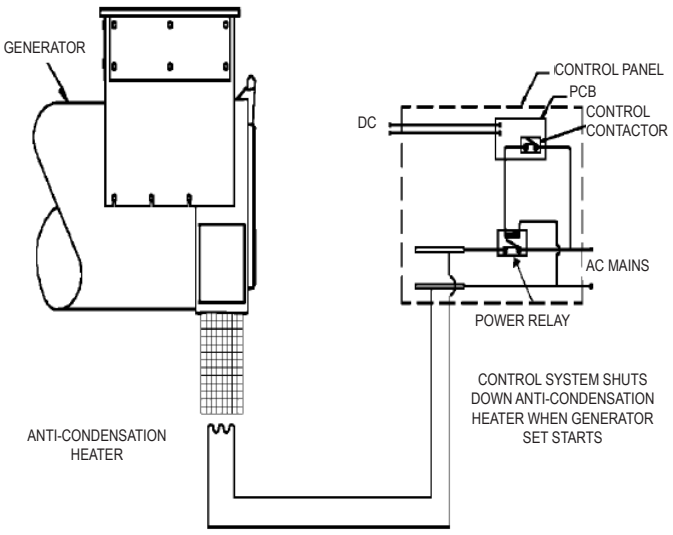
- Uniform heat distribution
- Reduces wear from cold spots
- Improves startability
- Thermostatically controlled and protected
- 6’ (1.8m) cord length (577-1758)
- 16.4’ (5.0m) cord length (578-9355).
- Ensures generator is at optimal starting temperature and ready to accept load
- Durable pump with non-magnetic impeller that does not attract metal debris
- Robust die cast aluminum housing improves sealing of the hoses, eliminates leaking and breakage
- Corrosion resistant steel brackets for superior strength and durability
- Reduces thermal stress on coolant hoses
- Element designed for long life with maximum heat transfer
- IP44 Ingress Protection Rating
- No evaporation of coolant from hoses
- Reduces low coolant level alarms because coolant does not boil

Part No	Outlet Location	Watts	Volts	Amps	Regulating Thermostat	Safety Thermostat
577-1758/578-9355	Right	2700	240	11.25	On 90°F (32°C) Off 115°F (46°C)	210°F (98°C)

Jacket Water Heater comes factory installed on generator set skid base. **No contractor installation required.**

Input supply is sourced from the factory installed auxiliary panelboard in the generator enclosure.

208VAC customer-supplied shore power is distributed to the JWH internal to the generator cabinet. **Separate 208VAC circuit not required.** See 'Project Specific Notes & Technical Information' for details.



Generator Anti-condensation Heater AH1H

Appropriate when the generator set is to be sited in a low ambient and/or high humidity environment, the heater maintains the AC generator at a suitable temperature to prevent winding corrosion due to condensation.

The heater itself is powered by a 110/120 volt (VAC 120) or 208/240 volt (VAC 240) AC auxiliary supply protected by a fuse inside the main control panel. When the generator set is not running the heater is automatically connected to the AC supply through a power relay mounted in the control panel. Upon receiving a start signal the AC supply is automatically disconnected by the power relay and automatically reconnected when the start signal is removed and the engine has stopped.

Generator Frame	Nominal Heater Power Consumption (Watts)
LC15XX, M17XX	60
LC31XX, M22XX	100
LC50XX, M27XX	250

Anti-condensation heater comes factory installed on generator set skid base. **No contractor installation required.**

Input supply is sourced from the factory installed auxiliary panelboard in the generator enclosure.

208VAC customer-supplied shore power is distributed to the space heater internal to the generator cabinet. **Separate 208VAC circuit not required.** See 'Project Specific Notes & Technical Information' for details.

Cat® GC ENCLOSURES

Image shown may not reflect actual configuration.

D250 GC – D600 GC Sound Attenuated Enclosures

60 Hz

Features

Robust/Highly Corrosion Resistant Construction

- Factory installed on skid base or tanks base
- Environmentally friendly, polyester powder baked paint
- Enclosure constructed with 18-gauge steel
- Interior zinc plated fasteners
- Internally mounted exhaust silencing system
- Comply with ASCE /SEI 7 for Wind loads up to 100 mph
- Designed and tested to comply with UL 2200 Listed generator set package

Excellent Access

- Large cable entry area for installation ease.
- Accommodates side mounted single or multiple breakers.
- Two doors on both sides.
- Vertically hinged allow 180° opening rotation
- Radiator fill cover.

Security and Safety

- Lockable access doors which give full access to control panel and breaker.
- Cooling fan and battery charging alternator fully guarded.
- Fuel fill, oil fill and battery can only be reached via lockable access.
- Externally mounted emergency stop button (Optional).
- Designed for spreader bar lifting to ensure safety.
- Stub-up area is rodent proof.

Sound Attenuated Level 2

- Caterpillar white paint
- UL Listed integral fuel tank with 24 hours running time capacity (Optional).
- DC lighting package (Optional)

Enclosure Package Operating Characteristics

Enclosure Type	Standby	Cooling Air Flow Rate		Ambient Capability*		Sound Pressure Levels (dBA) at 7m (23 ft)
	ekW	m^3/s	cfm	°C	°F	100% Load
Level 2 Sound Attenuated Enclosure (Steel)	250	6.4	13561	57	135	74
	300	6.4	13561	51	125	74
	350	7.4	15680	57	134	71
	400	7.4	15680	53	127	71
	450	8.4	17692	54	130	73
	500	8.4	17692	50	122	73
	550	11.2	23731	56	133	73
	600	11.2	23731	53	127	73

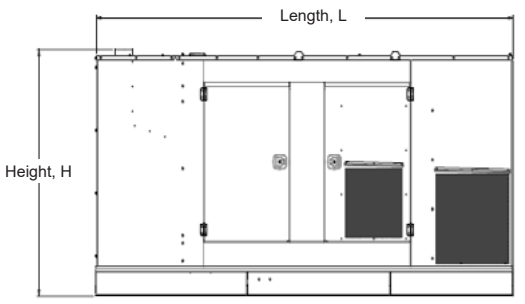
*Cooling system performance at sea level. Consult your Cat® dealer for site specific ambient and altitude capabilities.
Note: Sound level measurements are subject to instrumentation, installation and manufacturing variability, as well as ambient site conditions

Cat® GC ENCLOSURES

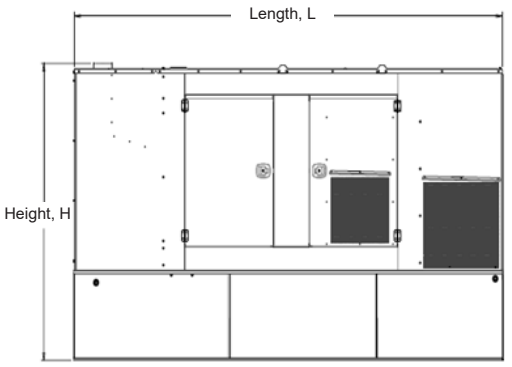
DO NOT USE FOR CONSTRUCTION. See Tab 2 Drawings for exact package dimensions.

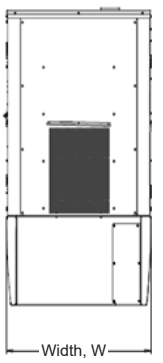
Weights and Dimensions

Enclosure Type	Standby Ratings	Length, L		Width, W		Height, H		Package Weights	
	ekW	mm	in	mm	in	mm	in	kg	lb
Sound Attenuated Enclosure on Skid Base	250	3958	155.8	1440	56.7	1991	78.4	2857	6298.6
	300							2945	6492.6
	350	4633	182.4	1630	64.2	2227	87.7	3983	8781.0
	400							4017	8856.0
	450	4823	189.8	1630	64.2	2227	87.7	4408	9718.0
	500							4457	9826.0
	550	4980	196.1	1865	73.4	2172	85.5	4754	10480.8
	600							4837	10663.8
Sound Attenuated Enclosure on UL Listed Integral Fuel Tank Base	250	3958	155.8	1440	56.7	2487	97.9	3497	7709.6
	300							3585	7903.6
	350	4633	182.4	1630	64.2	2644	104.1	4765	10505.0
	400							4799	10580.0
	450	4823	189.8	1630	64.2	2777	109.3	5345	11783.7
	500							5394	11891.7
	550	4980	196.1	1865	73.4	2723	107.2	5973	13168.2
	600							6056	13351.2
Sound Attenuated Enclosure on UL Listed Extended Integral Fuel Tank Base	250	4608	181.4	1430	56.3	2379	93.7	3590	7914.6
	300							3678	8108.6
	350	5251	203.7	1620	63.8	2561	100.8	4876	10749.7
	400							4910	10824.7
	450	5909	232.6	1620	63.8	2612	102.8	5497	12118.8
	500							5546	12226.8
	550	6759	266.1	1865	73.4	2487	97.9	6237	13750.2
	600							6320	13933.2



Sound Attenuated Enclosure on Skid Base





Sound Attenuated Enclosure on a UL Listed Integral Fuel Tank Base

Image shown may not reflect actual configuration

LET'S DO THE WORK.™

100 Amp Load Center

Image shown may not reflect actual package.

100 Amp Load Center

Specifications	
Number of Spaces	6
System Voltage	120 / 240VAC
Number of Tandem Circuit Breakers	6
Phase	1 Ph
NEMA Degree of Protection	NEMA 3R Outdoor
Electrical Connection	Lugs
Wiring Configuration	3-Wire
Material	Tin Plated Aluminum Busbar
Enclosure Material	Welded Galvanized Steel
Cover Finish	Gray Baked Enamel
Product Certifications	UL E-6294
Gauge	AWG 8…AWG 1 (Aluminium / Copper)

Dimensions and Specifications	
Height / Width / Depth	321 mm / 226 mm / 127 mm
GFCI	16A (120V)
Battery Charger	6A (120V)
Jacket Water Heater	11.25A (240V)
Alternator Heater	1.04A (240V)
Total Load	34.29A Max

L1	
GFCI	16A (120V)
Jacket Water Heater	11.25A (240V)
Alternator Heater	1.04A (240V)
Total Load	28.29A Max

L2	
Battery Charger	6A (120V)
Jacket Water Heater	11.25A (240V)
Alternator Heater	1.04A (240V)
Total Load	18.29A Max

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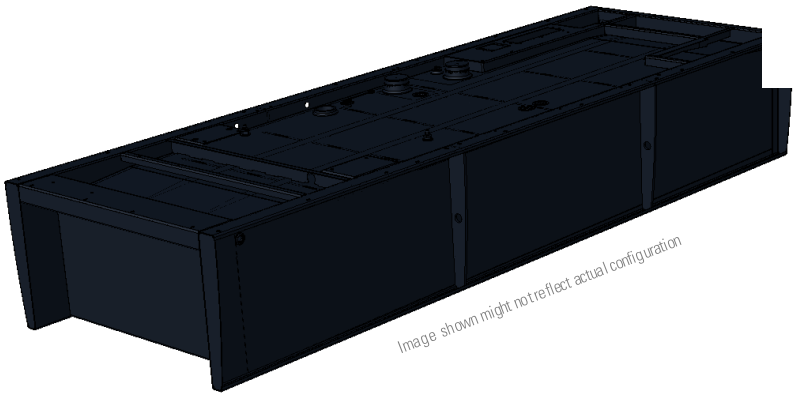
Cat® GC INTEGRAL FUEL TANKS



INTEGRAL FUEL TANKS
D250 GC – D600 GC

FEATURES

- UL Listed for United States (UL 142) and Canada (CAN/ULC S601)
- Facilitates compliance with NFPA 30 code, NFPA 37 and 110 standards and CSA C282 code
- Dual wall
- Low fuel level warning standard, customer configurable warning or shutdown
- Primary tank leak detection switch in containment basin
- Tank design provides capacity for thermal expansion of fuel
- Fuel supply dip tube is positioned so as not to pick up fuel sediment
- Fuel return and supply dip tube is separated by an internal baffle to prevent immediate re-supply of heated return fuel
- Pressure washed with an iron phosphate solution
- Interior tank surfaces coated with a solvent-based thin-film rust preventative
- Heavy gauge steel gussets with internal lifting rings
- Primary and secondary tanks are leak tested at 20.7 kPa (3 psi) minimum
- Compatible with open packages and enclosures
- Gloss black polyester alkyd enamel exterior paint
- Welded steel containment basin (minimum of 110% of primary tank capacity)
- Direct reading fuel gauge with variable electrical output
- Emergency vents on primary and secondary tanks are sized in accordance with NFPA 30.

INTEGRAL

- Integral diesel fuel tank is incorporated into the generator set base frame
- Robust base design includes linear vibration isolators between tank base and engine generator.

OPTIONS

- Audio/visual fuel level alarm panel
- 5gal (18.9 L) spill containment*
- Locking Fuel Fill
- Overfill prevention Valve*

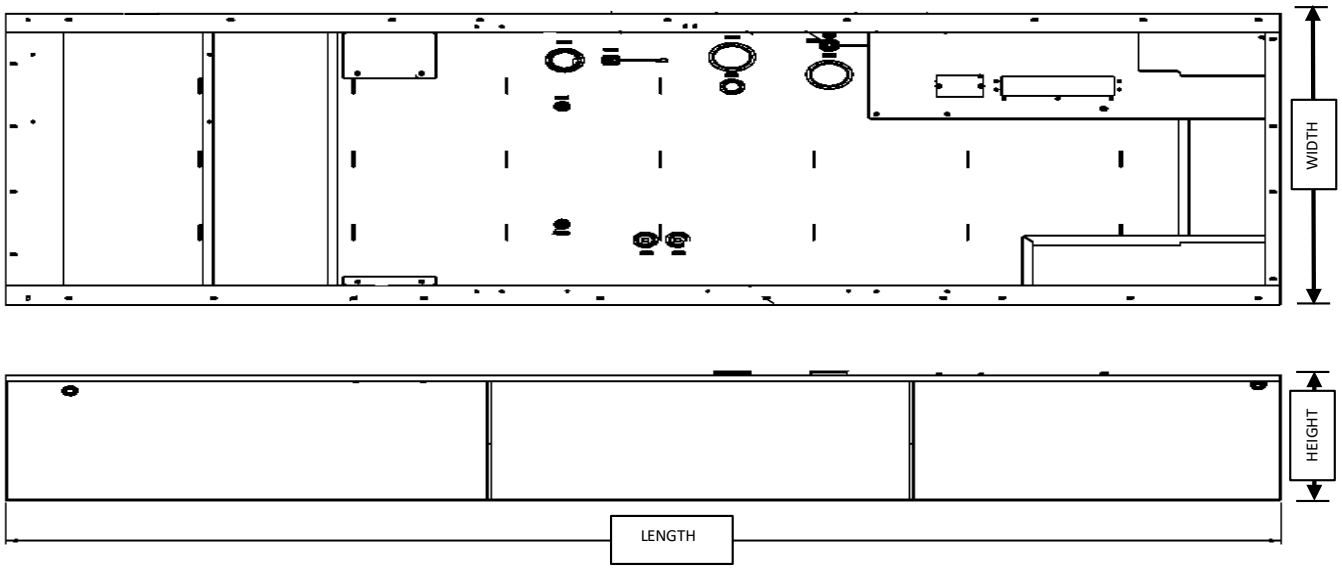
*Applicable for D350GC-D600GC Models only

Cat® GC INTEGRAL FUEL TANKS

DO NOT USE FOR CONSTRUCTION.
See Tab 2 Drawings for exact package dimensions.

Integral Fuel Tank Base Useable Capacities with Fuel Tank Dimensions & Weights

Standby ekW	Width mm	Width in
250-300	1430	56.3
350-400	1630	64.1
450-500	1630	64.1
550-600	1865	73.4



The heights listed above do not include lumber used during manufacturing and shipping

A. Open Set & Sound Attenuated Enclosure

Tank Design	Feature Code	Total Capacity		Useable Capacity		Tank Only						Overall Package Height with Tank			
						Dry Weight		Height 'H'		Length 'L'		Open		Enclosure	
		Litre	Gallon	Litre	Gallon	kg	lb	mm	in	mm	in	mm	in	mm	in
Integral Tank	FTDW035	2270.7	599.8	2059.9	543.9	970	2138	762.4	30.0	3958	155.8	2202	86.7	2487	97.9
	FTDW036	2820	744.9	2553	674.4	1165	2568	818.8	32.2	4625	182.1	2584	101.7	2644	104
	FTDW037	3671	969.7	3323	877.8	1331	2934	668.2	26.3	4622	181.9	2456	96.7	2644	104
	FTDW038	4292	1133.8	3889	1027.3	1657	3653	816.4	32.1	4980	196	2560	100.7	2721	107.1

B. Estimated Run Time (Hours)

Tank Design	Feature Code	Standby Ratings (kVA)						
		ekW	100%		75%		50%	
			Hrs	L/hr	Hrs	L/hr	Hrs	L/hr
Integral Tank	FTDW035	250	28.1	73.3	35	58.8	47	43.8
		300	24	86.0	30.8	66.8	40	51.5
	FTDW036	350	27.1	94.3	31.2	81.9	42.4	60.2
		400	24.1	105.9	28.1	90.7	38.6	66.2
	FTDW037	450	25.2	131.7	31.3	106.1	42.0	79.1
		500	24.3	137	30.1	110.5	46.6	71.3
	FTDW038	550	25.7	151.1	32.9	118.1	45.2	86.1
		600	24.1	161.6	30.0	129.6	42.4	91.7

Tanks with full electrical stub-up area include removable end channel. Tanks with RH stub-up include stubup area directly below the circuit breaker or power terminal strips.

Fuel tanks and applicable options facilitate compliance with the following United States NFPA Code and Standards:

NFPA 30: Flammable and Combustible Liquids Code

NFPA 37: Standard for the Installation and Use of Stationary Combustion Engines and Gas Turbines

NFPA 110: Standard for Emergency and Standby Power Systems

Fuel tanks and applicable options facilitate compliance with the following Canadian Standard and Code:

CSA C282 – Emergency Electrical Power Supply for Buildings

CSA B139-09 – Installation Code for Oil-Burning Equipment

TAB 4: REVISION HISTORY AND APPROVALS PAGE

4.1 Revision History and Approval

Revision History

Revision No.	Date	Description	Submitted By

Signature: _____

Name: _____

Revision No.: _____

Date: _____