RECORD ONLY SUBMITTAL PACKAGE

Prepared for:

Central States Diesel Generators
2001 South Prairie Avenue
Waukesha, Wisconsin 53189

THIS SUBMITTAL IS BEING PREPARED FOR RECORD PURPOSES ONLY

Serving Cummins Customers

Cummins power solutions are supported by the largest and best-trained worldwide-certified sales/distributor network in the industry. This network will help you select and install the critical power solution to meet the requirements of your specific application. This same network provides experts with advanced technology to make your life easier while providing a seamless support experience.

IMPORTANT: *The critical power solution information and specifications included in this pdf can be used by the site contractor(s) and/or engineer(s) to assist with planning for and accomplishing the overall power solution installation. Please forward this document to the appropriate personnel, as necessary.*

It is the obligation of the electrical contractor and reviewing engineer to determine that the item quantities and accuracy of this submittal is correct as required for the job. Any inaccuracies or deviations must be addressed with Cummins Inc. before release to manufacturing. Any releases of material to manufacturing by the above parties constitute an acceptance of the accuracy of the submittal. Any changes after release will be viewed as a change order, subject to pricing changes. Please take the time to review this package for accuracy to prevent any after-shipment problems that could cause delay in energization.

Cummins certifies that these drawings, material lists, specification and datasheets have been checked prior to submittal and they:

- *accurately depict the proposed equipment*
- *provide current information to the date of the submittal and*
- *present true and accurate equipment information.*

This Approval Drawing Package is submitted as our interpretation of the project requirements and/or the specifications for this job. Please note that issuance of these submittals shall not be deemed or interpreted as performance nor acceptance of your purchase order terms and conditions.

For questions or comments regarding this submittal, please contact the Cummins Project Manager listed on the title page.

Sales and Service

TABLE OF CONTENTS

SECTION 1

PROJECT INFORMATION

Sales and Service

Bill of Material

Feature Code	Description	Qty
C3000D6EB	**C3000D6EB, Diesel Genset, 60Hz, 3000kW**	**21**
Install-US-Stat	U.S. EPA, Stationary Emergency Application	
C3000D6EB	C3000D6EB, Diesel Genset, 60Hz, 3000kW	
A331-2	Duty Rating - Standby Power (ESP)	
L170-2	Emission Certification, EPA, Tier 2, NSPS CI Stationary Emergency	
L039-2	Certification - Canadian Standards Association (CSA)	
L090-2	Listing - UL 2200	
L193-2	NFPA 110 Type 10 Level 1 Capable	
L224-2	IBC Seismic Certification	
E170-2	Ambient Temperature (40C/104F)	
BE11-2	125C Temperature Rise	
R002-2	Voltage - 277/480, 3 Phase, Wye, 4 Wire	
C127-2	Fuel Water Separator	
C286-2	Fuel Filters - Stage 1 Redundant	
A333-2	Battery Charging Alternator	
A334-2	Engine Starter - 24 Volt DC Motor	
H751-2	Forced Circulation Coolant Heater - 480V	
H735-2	Closed Crankcase Ventilation (CCV)	
H607-2	Engine Oil Filters, Full Flow with Bypass	
H663-2	Priming - Engine Lube Oil, Starting Only	
H734-2	Oil Sampling Valve	
D041-2	Engine Air Cleaner - Normal Duty	
E128-2	Engine Cooling - Radiator, High Ambient Air Temperature, Ship Loose	
DC02-2	Air Cleaner Restriction Indicator - Mechanical	
B801-2	Alternator - 60Hz, 3 Phase, 480 Volt, 125/105/80C - Standby/Prime/Continuous	
A416-2	Alternator Heater, 110/220 (120/240) Volt AC	
B225-2	Stator Winding Temperature Sensors, 2 RTD per Phase	
B244-2	Bearing Temperature Sensor RTDs	
H609-2	Control Mounting - Left Facing	
H704-2	PowerCommand 3.3 Controller, Paralleling Capable	
H244-2	Gauge - Exhaust Gas Temperature	
H606-2	Analog Meters - AC Output	
KA08-2	Alarm - Audible, Engine Shutdown	
H678-2	LCD Control Display	
H720-2	AmpSentryTM UL Listed Protective Relay	
K020-2	Display, Running Time	
KX24-2	Relays - User Configured	
H536-2	Control Display Language - English	
F258-2	Terminal Housing - Alternator Mounted, Bottom Entry, LV, NEMA 2 - Hole Connectors	
H389-2	Shutdown - Low Coolant Level	
H527-2	Warning - Low Coolant Level	
L050-2	Literature - English	
L312-2	Genset Warranty - 3 Years Base, 1000 hours	
A358-2	Packing - Standard. This is the standard packing for domestic over-the-road deliveries	
A071Y896-FRD	Seismic AVM - 4626 lbs/In Spring Rate - VMC - M2SSH-1E-5150N	

A072A360-FRD	Eng Cooling-High Ambient Air Temp, Ship Loose	

NOTES:

Proposal is for equipment only, offloading, rigging, and installation by others.
Fuel and permits, unless listed above, is not included.
Cummins Standard Start-up and testing is included. Additional tests, such as NETA testing, if required, is by others
Coordination Study not provided.

SECTION 2

GENERATOR SPECIFICATIONS

C3000D6EB
C2750D6E

DIESEL GENERATOR SET SPECIFICATION SHEET

QSK78 SERIES ENGINE, 2500-3000 kWe, 60 Hz, EPA TIER 2 NSPS CERT. (STATIONARY EMERGENCY)

DESCRIPTION

Cummins commercial generator sets are fully integrated power generation systems for stationary standby power and data center applications.

The Centum™ Series meets the demand for efficient and sustainable power with performance, flexibility and commitment – for the next generation of power.

FEATURES

Cummins Heavy-Duty Engine: Rugged, four-cycle industrial diesel delivers reliable power, low emissions and fast response to load changes.

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

ISO 8528-5: Consult factory for site and configuration specific transient performance information.

Low NOx: Enables compliance with 6 g/bhp-hr NOx site requirements.

HVO Fuel Compatible: Approved for use with paraffinic fuels (EN15940), including Hydrotreated Vegetable Oil (HVO), which has a very low life cycle carbon emission.

Data Center Continuous: Applicable for supplying power continuously to a constant or varying electrical load for unlimited hours in a data center application.

Uptime Compliant: Meets the requirement of a Tier III and IV data center site by being rated to run for unlimited hours of operation when loaded to 'N' demand for the engine generator set.

Permanent Magnet Generator (PMG): Offers enhanced motor starting and fault clearing short circuit capability.

Control System: The PowerCommand® digital control is standard equipment and provides total genset system integration including automatic remote starting/stopping, precise frequency and voltage regulation, alarm and status message display, AmpSentry™ protective relay, output metering, auto-shutdown at fault detection and NFPA 110 Level 1 compliance.

Cooling System: High ambient and enhanced high ambient, integral, set-mounted radiator systems, designed and tested for rated ambient temperatures, simplify facility design requirements for rejected heat.

Compliance: Capable of meeting NFPA 110 Type 10 for Level 1 Emergency or Standby Power Supply Systems (EPSSs) when installed and operated per Cummins and NFPA guidelines. The genset is UL listed, CSA certified and is available certified for seismic application in accordance with IBC.

Warranty and Service: Backed by a standard three-year warranty and worldwide distributor network.

MODELS

	Emergency Standby Power (ESP) Rating[1] kWe (kVA)	Prime Power (PRP) Rating[1,2] kWe (kVA)	Data Center Continuous (DCC) Rating[1,2] kWe (kVA)	Emissions Certification and Compliance	Data Sheet[2]
C2750D6E	2750 (3438)	2500 (3125)	2500 (3125)	EPA T2 NSPS (Low NOx)[3]	D-6764
C3000D6EB	3000 (3750)	2750 (3438)	2750 (3438)	EPA T2 NSPS	D-6765
	3000 (3750)	2750 (3438)	2750 (3438)	EPA T2 NSPS (Low NOx)[3]	D-6766

[1] All ratings include radiator fan losses
[2] Prime rating and DCC at standby power rating available subject to Cummins' site-specific assessment; contact your Cummins distributor
[3] Designed to comply with 6 g/bhp-hr NOx site requirement. Certain conditions apply; refer to emissions data sheet for more information

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Centum™ SERIES GENERATORS

GENERATOR SET SPECIFICATIONS

Performance class	Genset models have been tested in accordance with ISO 8528-5. Consult factory for transient performance information
Voltage regulation, no load to full load	± 1.0%
Random voltage variation	± 1.0%
Frequency regulation	Isochronous
Random frequency variation	± 0.5%
Electromagnetic compatibility performance	Emissions to EN 61000-6-2:2005 Immunity to EN 61000-6-4:2007+A1:2011 Complies with FCC PART 15 subpart B and ICES-002

ENGINE SPECIFICATIONS

Bore	170 mm (6.69 in)
Stroke	190 mm (7.48 in)
Displacement	77.6 L (4735 in^3)
Configuration	Four-cycle; vee; 18-cylinder
Battery capacity	2200 A minimum at ambient temperature of -18 °C (0 °F) to 0 °C (32 °F)
Battery charging alternator	55 A
Starting voltage	24 V, negative ground
Fuel system	Modular Common Rail System (MCRS)
Fuel filter	Two-stage, spin-on fuel filter and water separator system. Stage 1: remote mounted, 5 µm duplex filter with two priming pumps. Stage 2: engine mounted, 3 µm triple element filter
Air cleaner	Four unhoused, dry replaceable elements standard
Lube oil filter	Four spin-on, combination full flow filter and bypass filters
Cooling system	Charge-air cooled and jacket water cooled

ALTERNATOR SPECIFICATIONS

Design	Brushless, 4-pole, drip proof, revolving field
Stator	2/3 pitch
Rotor	Two bearing, flexible coupling
Insulation system	Class H
Standard temperature rise	125ºC standby at 40 ºC ambient
Exciter type	Permanent Magnet Generator (PMG)
Phase rotation	A (U), B (V), C (W)

AVAILABLE VOLTAGES (60 Hz LINE-TO-NEUTRAL / LINE-TO-LINE)[4]

240 / 416	277 / 480	347 / 600	2400 / 4160
3810 / 6600	7200 / 12470	7620 / 13200	7976 / 13800

[4] Additional voltages may be available; contact your Cummins distributor

GENERATOR SET OPTIONS AND ACCESSORIES[5]

Engine
- 208 V and 480 V, 3 Phase, 12 kW forced-type coolant heater
- Oil sampling valve
- Redundant starting
- Closed crankcase ventilation
- Automatic oil make-up system

Cooling System (ship loose)
- High ambient standard
- Enhanced high ambient

Control Panel
- Masterless load demand
- Multiple language support
- Low coolant level warning and shutdown

Control Panel (cont.)
- Left facing mounting
- Warning high bearing temperature
- Alternator temp. monitoring
- Exhaust gas temp. monitoring
- 6x user-configurable relays
- 120 / 240 V heater control cabinet
- Mechanical hour meter
- 2x digital input/output

Alternator
- 80 °C / 105 °C / 125 °C / 150 °C rise
- 120 / 240 V, 300 W anti-condensation heater
- Top and bottom entrance boxes

Alternator (cont.)
- Temp. sensor - RTDs, 2 / phase
- Temp. sensor - alternator bearing RTD
- Differential current transformers for various voltages

Generator Set
- Battery
- Floor-mount battery tray, hold-down
- PowerCommand® network
- Remote annunciator panel
- Vibration isolators
- Standby 3yr/1000hr standard, 5yr/2500hr and 10yr/5000hr warranties
- DCC 3-, 5- and 10-year unlimited hour warranties

[5] Some options may not be available on all models; contact your Cummins distributor

Bulletin S-6763 PD00002097 Produced in U.S.A. (Rev. 09/24)

Centum™ SERIES GENERATORS

PowerCommand® 3.3

CONTROL SYSTEM DESCRIPTION

The PowerCommand® 3.3 is an integrated, microprocessor-based, generator set control system providing voltage regulation, engine protection, alternator protection, operator interface and isochronous governing. Refer to document S-1570 for more detailed information on the control.

AmpSentry™: Includes integral AmpSentry™ protection, which provides a full range of alternator protection functions that are matched to the alternator provided.

Power Management: Control function provides battery monitoring and testing features and smart starting control system.

Advanced Control Methodology: Three-phase sensing, full wave rectified voltage regulation, with a PWM output for stable operation with all load types.

Communications Interface: Control comes standard with PCCNet and Modbus interface.

Service: InPower™ PC-based service tool available for detailed diagnostics, setup, data logging and fault simulation.

Easily Upgradeable: PowerCommand® controls are designed with common control interfaces.

Reliable Design: The control system is designed for reliable operation in harsh environment.

Multi-Language Support

OPERATOR PANEL FEATURES

Operating/Display Functions

- Displays paralleling breaker status
- Provides direct control of the paralleling breaker
- 320 x 240 pixels graphic LED backlight LCD
- Auto, manual, start, stop, fault reset and lamp test/panel lamp switches
- Alpha-numeric display with pushbuttons
- LED lamps indicating genset running, remote start, not in auto, common shutdown, common warning, manual run mode, auto mode and stop

Paralleling Control Functions

- First Start Sensor™ system selects first genset to close to bus
- Phase lock loop synchronizer with voltage matching
- Sync check relay
- Isochronous kW and kVAR load sharing
- Load govern control for utility paralleling
- Extended paralleling (base load/peak shave) mode
- Digital power transfer control, for use with a breaker pair to provide open transition, closed transition, ramping closed transition, peaking and base load functions

Alternator Data

- Line-to-neutral and line-to-line AC volts
- Three-phase AC current
- Frequency
- kW, kVAR, power factor kVA (three-phase and total)

Engine Data

- DC voltage
- Engine speed
- Lube oil pressure and temperature
- Coolant temperature
- Comprehensive FAE data (where applicable)

OPERATOR PANEL FEATURES (CONT.)

Other Data

- Genset model data
- Start attempts, starts, running hours, kWh
- Load profile (operating hours at %load in 5% increments)
- Fault history
- Data logging and fault simulation (requires InPower™)

STANDARD CONTROL FEATURES

Digital Governing

- Integrated digital electronic isochronous governor
- Temperature dynamic governing

Digital Voltage Regulation

- Integrated digital electronic voltage regulator
- Three-phase, four-wire line-to-line sensing
- Configurable torque matching

AmpSentry™ AC Protection

- AmpSentry™ protective relay
- Over current and short circuit shutdown
- Over current warning
- Single-phase and three-phase fault regulation
- Over and under voltage shutdown
- Over and under frequency shutdown
- Overload warning with alarm contact
- Reverse power and reverse VAR shutdown
- Field overload shutdown

Engine Protection

- Battery voltage monitoring, protection, and testing
- Overspeed shutdown
- Low oil pressure warning and shutdown
- High coolant temperature warning and shutdown
- Low coolant level warning or shutdown
- Fail to start (overcrank) shutdown
- Fail to crank shutdown
- Cranking lockout
- Sensor failure indication
- Full authority electronic engine protection

Control Functions

- Time delay start and cool down
- Real time clock for fault and event time stamping
- Exerciser clock and time of day start/stop
- Data logging
- Cycle cranking
- Load shed
- Configurable inputs and outputs (4)
- Remote emergency stop

Options

- Auxiliary output relays (2)

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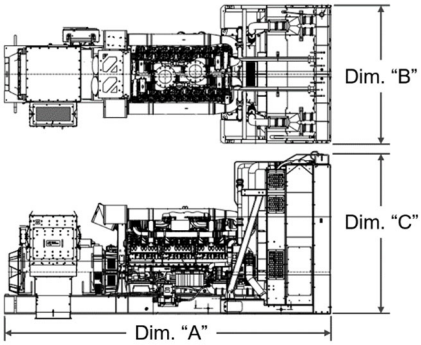
Centum™ SERIES GENERATORS

RATING DEFINITIONS

Emergency Standby Power (ESP)	Prime Power (PRP)	Data Center Continuous (DCC)
Applicable for supplying power to varying electrical loads for the duration of power interruption of a reliable utility source. Emergency Standby Power (ESP) is in accordance with ISO 8528. Data shown above represents gross engine performance and capabilities as per ISO 3046-1, obtained and corrected in accordance with ISO 15550.	Prime Power for Stationary Emergency ratings apply to installations served by a reliable utility source. Applicable for supplying power to varying electrical loads for unlimited hours. Prime Power (PRP) is in accordance with ISO 8528. Ten percent overload capability is available in accordance with ISO 3046-1. Data shown above represents gross engine performance and capabilities as per ISO 3046-1, obtained and corrected in accordance with ISO 15550.	Applicable for supplying power continuously to a constant or varying electrical load for unlimited hours in a data center application. Designed to comply with Uptime Institute® Tier III and IV data center site requirements by being rated to run for unlimited hours of operation when loaded to 'N' demand for the engine generator set.

GENERATOR SET DIMENSIONS AND WEIGHTS[6]



Model Name	Dim. "A" mm (in)	Dim. "B" mm (in)	Dim. "C" mm (in)
C2750D6E C3000D6EB	7328 (288.5)	3064 (120.6)	3614 (142.3)

Model Name	As Shipped Set Weight (No Cooling System) kg (lb)	As Shipped Cooling System Weight (Dry) kg (lb)	Installed Set Weight (Wet) kg (lb)
C2750D6E C3000D6EB	21527 (47459)	3532 (7787)	25361 (55911)

Refer to drawings for specific weights and dimensions

[6] Do not use for installation design. Longest alternator (G-core) used for dimension "A". All weights are approximate and represent a generator set with standard features and heaviest alternator (low voltage G-core). "As Shipped Set Weight (No Cooling System)" includes weight from engine oil. "Installed Set Weight (Wet)" includes weight from engine oil and coolant. See respective model data sheet for specific model outline drawing number that contains weights of other configurations.

CODES AND STANDARDS[7]

ISO 9001 ISO 14001 ISO 45001	This product was manufactured in a facility whose quality management system is certified to ISO 9001 and its Health Safety Environmental Management Systems certified to ISO 14001 and ISO 45001.	UL LISTED	This product is listed to UL 2200, Stationary Engine Generator Assemblies.
PTS PROTOTYPE TEST SUPPORTED	The Prototype Test Support (PTS) program verifies the performance integrity of the generator set design. Cummins products bearing the PTS symbol meet the prototype test requirements of NFPA 110 for Level 1 systems.	UNITED STATES ENVIRONMENTAL PROTECTION AGENCY	Engine certified to Stationary Emergency U.S. EPA New Source Performance Standards (NSPS), 40 CFR 60 subpart IIII Tier 2 exhaust emission levels. U.S. applications must be applied per this EPA regulation.
CSA®	All genset models are available as CSA certified to CSA C22.2 No. 100.	IBC INTERNATIONAL BUILDING CODE	The generator set package is available certified for seismic application in accordance with International Building Code.

[7] Codes or standards compliance may not be available with all model configurations; contact your Cummins distributor

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C3000D6EB

DIESEL GENERATOR SET DATA SHEET

MODEL:	**C3000D6EB**
FREQUENCY:	**60 Hz**
FUEL TYPE:	**DIESEL**
RATING:	**3000 kWe (3750 kVA) EMERGENCY STANDBY POWER (ESP)[1]**
	2750 kWe (3438 kVA) DATA CENTER CONTINUOUS (DCC)[1,2]
EMISSIONS CERTIFICATION:	**EPA TIER 2 NSPS (STATIONARY EMERGENCY)**

GENERATOR SET PUBLICATIONS

Exhaust emission data sheet	EDS-3158
Exhaust emission compliance statement	EPA-2106
Sound data sheet	MSP-4190
Cooling system data sheet	MCP-2284
Seismic certificate of compliance	OSP-0813, VMA-50998-01C
Prototype test support data sheet	PTS-797
Alternator data sheet	See “Alternator Data” section for complete list of ADS-###
Genset outline drawing	A073W614
Genset wiring schematic diagram	A067W397

ENGINE SPECIFICATIONS

		Emergency Standby Power (ESP)	Data Center Continuous (DCC)
Manufacturer		Cummins Inc.	
Model		QSK78-G37	
Configuration		Four-cycle; vee; 18-cylinder	
Aspiration		Turbocharged and charge-air cooled	
Gross engine power output	kWm (bhp)	3312 (4441)	3019 (4049)
Brake mean effective pressure at set rated load	kPa (psi)	2841 (412)	2592 (376)
Bore	mm (in)	170 (6.69)	
Stroke	mm (in)	190 (7.48)	
Displacement	L (in^3)	77.6 (4737)	
Rated speed	rpm	1800	
Piston speed at rated speed	m/s (ft/min)	11.4 (2244)	
Compression ratio		15.3:1	
Lube oil capacity	L (US gal)	405 (107)	
Overspeed limit	rpm	1980	
Regenerative power	kWm (hp)	256 (343)	

FUEL CONSUMPTION

Rating	kWe (kVA)	3000 (3750)				2750 (3438)			
Load		25%	50%	75%	100%	25%	50%	75%	100%
Fuel Consumption	US gph	61	111	160	204	56	101	147	186
Fuel Consumption	L/h	229	419	604	773	213	384	557	706

[1] Generator set ratings include radiator fan losses
[2] DCC at standby power available subject to Cummins’ site-specific assessment; contact your Cummins distributor

Centum™ SERIES GENERATORS

FUEL SYSTEM

		Emergency Standby Power (ESP)	Data Center Continuous (DCC)
Maximum fuel flow	L/h (US gph)	1080 (285)	
Allowable fuel inlet pressure[3] (single/duplex operating mode)	kPa (inHg)	-27 to +14.5 (-8 to +4.3)	-17 to +14.5 (-5 to +4.3)
Allowable fuel inlet pressure[3] (dual operating mode)	kPa (inHg)	-31 to +14.5 (-9 to +4.3)	-21 to +14.5 (-6 to +4.3)
Maximum fuel return line restriction	kPa (inHg)	34 (10)	
Maximum fuel inlet temperature	°C (°F)	70 (158)	

AIR SYSTEM

Combustion air flow (at set rated load)	m^3/min (scfm)	262 (9236)	249 (8800)
Maximum air cleaner restriction (dirty filter)	kPa (inH2O)	6 (25)	
Alternator cooling air flow	m^3/min (scfm)	199.8 (7056)	

EXHAUST SYSTEM

Exhaust flow (at set rated load)	m^3/min (scfm)	631 (22293)	589 (20793)
Exhaust temperature (at set rated load)	°C (°F)	462 (863)	444 (831)
Maximum back pressure	kPa (inH_2O)	6.8 (27.3)	

COOLING SYSTEM (SET MOUNTED) – HIGH AMBIENT

Ambient design (limiting ambient temp.)	°C (°F)	44.3 (111.7)	47.1 (116.8)
Maximum air flow static restriction	kPa (inH_2O)	0.25 (1.0)	
Cooling system air flow (at max. restriction)	m^3/min (acfm)	2751 (97140)	
Fan load	kWm (hp)	78 (105)	
Coolant capacity (engine + radiator)	L (US gal)	455 (120.2)	

COOLING SYSTEM (SET MOUNTED) – ENHANCED HIGH AMBIENT

Ambient design (limiting ambient temp.)	°C (°F)	50.0 (122.0)	52.9 (127.2)
Maximum air flow static restriction	kPa (inH_2O)	0.25 (1.0)	
Cooling system air flow (at max. restriction)	m^3/min (acfm)	3294 (116320)	
Fan load	kWm (hp)	112 (150)	
Coolant capacity (engine + radiator)	L (US gal)	455 (120.2)	

COOLING SYSTEM (REMOTE MOUNTED)[4] – JACKET WATER CIRCUIT

Maximum static head above engine crank centerline	m (ft)	Not applicable	
Maximum friction head external to engine (at set rated speed)	kPa (psi)	Not applicable	
Maximum flow rate (at max. friction head)	L/min (US gal/min)	Not applicable	
Engine jacket water circuit coolant capacity	L (US gal)	Not applicable	
Maximum outlet temperature	°C (°F)	Not applicable	Not applicable
Heat rejected, jacket water coolant circuit	MJ/min (Btu/min)	Not applicable	Not applicable
Heat rejected, fuel circuit	MJ/min (Btu/min)	Not applicable	Not applicable
Total heat radiated to room	MJ/min (Btu/min)	Not applicable	Not applicable

[3] Allowable fuel inlet gauge pressure in single/duplex or dual operating condition is measured at the Stage 1 fuel filter head inlet. Value includes filter life allowance, which is smaller for standby applications. This range translates to the available pressure drop for customer fuel supply plumbing restriction and lift or the maximum head pressure at the customer connection. Gauge pressure limit at on-engine fuel inlet connection is -13 inHg (-44 kPa).

[4] For non-standard remote installations contact your Cummins distributor

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Centum™ SERIES GENERATORS

COOLING SYSTEM (REMOTE MOUNTED)[5] – AFTERCOOLER CIRCUIT

		Emergency Standby Power (ESP)	Data Center Continuous (DCC)
Maximum static head above engine crank centerline	m (ft)	Not applicable	
Maximum friction head external to engine (at set rated speed)	kPa (psi)	Not applicable	
Maximum flow rate (at max. friction head)	L/min (US gal/min)	Not applicable	
Engine aftercooler circuit coolant capacity	L (US gal)	Not applicable	
Maximum aftercooler inlet temperature (at limiting ambient temperature)	°C (°F)	Not applicable	Not applicable
Maximum aftercooler inlet temperature (at 25 °C (77 °F) ambient air temperature)	C (°F)	Not applicable	Not applicable
Heat rejected, aftercooler coolant circuit	MJ/min (Btu/min)	Not applicable	Not applicable
Heat rejected, fuel circuit	MJ/min (Btu/min)	Not applicable	Not applicable
Total heat radiated to room	MJ/min (Btu/min)	Not applicable	Not applicable

[5] For non-standard remote installations contact your Cummins distributor

GENERATOR SET WEIGHTS[6]

		Refer to drawings for specific weights and dimensions	nstalled Set Weight (Wet)
C2750D6E	kg (lb)		25361 (55911)

[6] All weights are approximate and represent a generator set with standard features and heaviest alternator (low voltage G-core). "As Shipped Set Weight (No Cooling System)" includes weight from engine oil. "Installed Set Weight (Wet)" includes weight from engine oil and coolant. See respective model data sheet for specific model outline drawing number that contains weights of other configurations.

GENERATOR SET DERATING FACTORS[7]

Emergency Standby Power (ESP)	**High Ambient Cooling System:** Full genset power available up to 524 m (1719 ft) at ambient temperatures up to 40 °C (104 °F). Above these conditions, derate at 5.8% per 305 m (1000 ft) and 33% per 10 °C (18 °F). **Enhanced High Ambient Cooling System:** Full genset power available up to 1022 m (3353 ft) at ambient temperatures up to 40 °C (104 °F) and 409 m (1342 ft) at ambient temperatures up to 50 °C (122 °F). Above these conditions, derate at 5.5% per 305 m (1000 ft) and 27% per 10 °C (18 °F).
Data Center Continuous (DCC)	**High Ambient Cooling System:** Full genset power available up to 1013 m (3323 ft) at ambient temperatures up to 40 °C (104 °F). Above these conditions, derate at 6.4% per 305 m (1000 ft) and 26% per 10 °C (18 °F). **Enhanced High Ambient Cooling System:** Full genset power available up to 1819 m (5968 ft) at ambient temperatures up to 40 °C (104 °F) and 911 m (2989 ft) at ambient temperatures up to 50 °C (122 °F). Above these conditions, derate at 5.8% per 305 m (1000 ft) and 31% per 10 °C (18 °F).

[7] Ambient operating temperature is defined as the air temperature measured at the turbocharger compressor inlet. Derate statements assume a cooling system with 0.25 kPa (1.0 inH_2O) backpressure and 50% relative humidity. Please contact Sales Application Engineering for operation above 3000 m (9843 ft) of altitude or outside of the temperature range in the derate statement.

RATING DEFINITIONS

Emergency Standby Power (ESP):	Data Center Continuous (DCC)
Applicable for supplying power to varying electrical loads for the duration of power interruption of a reliable utility source. Emergency Standby Power (ESP) is in accordance with ISO 8528. Data shown above represents gross engine performance and capabilities as per ISO 3046-1, obtained and corrected in accordance with ISO 15550.	Applicable for supplying power continuously to a constant or varying electrical load for unlimited hours in a data center application. Designed to comply with Tier III and IV data center site requirements by being rated to run for unlimited hours of operation when loaded to 'N' demand for the engine generator set.

Centum™ SERIES GENERATORS

ALTERNATOR DATA[8] (ESP: 3000 kWe, DCC: 2750 kWe)									
Voltage	Connection	Winding Number	Ambient Temp. (°C)	Temp. Rise (°C)	Duty Rating[9]	Model	Max. Surge[10] (kVA)	Alternator Data Sheet	Feature Code
416	Wye; 3-phase	312	40	150	DCC	S9L1D-E4	11520	ADS-682	BE74-2
					ESP	S9L1D-E4	11520	ADS-682	BE81-2
416	Wye; 3-phase	312	40	125	DCC	S9L1D-E4	11520	ADS-682	BE75-2
					ESP	S9L1D-F4	12390	ADS-683	BC39-2
416	Wye; 3-phase	312	40	105	DCC	S9L1D-F4	12390	ADS-683	BE76-2
					ESP	S9L1D-G4	13725	ADS-684	B867-2
416	Wye; 3-phase	312	40	80	DCC	S9L1D-G4	13725	ADS-684	BE77-2
					ESP	N/A	N/A	N/A	N/A
416	Wye; 3-phase	312	50	150	DCC	S9L1D-E4	11520	ADS-682	BE74-2
					ESP	S9L1D-F4	12390	ADS-683	BE81-2
416	Wye; 3-phase	312	50	125	DCC	S9L1D-F4	12390	ADS-683	BE75-2
					ESP	S9L1D-G4	13725	ADS-684	BC39-2
416	Wye; 3-phase	312	50	105	DCC	S9L1D-G4	13725	ADS-684	BE76-2
					ESP	N/A	N/A	N/A	N/A
416	Wye; 3-phase	312	50	80	DCC	N/A	N/A	N/A	N/A
					ESP	N/A	N/A	N/A	N/A
480	Wye; 3-phase	312	40	150	DCC	S9L1D-D4	11745	ADS-681	BD49-2
					ESP	S9L1D-D4	11745	ADS-681	BE80-2
480	Wye; 3-phase	312	40	125	DCC	S9L1D-D4	11745	ADS-681	BD48-2
					ESP	S9L1D-E4	13290	ADS-682	B801-2
480	Wye; 3-phase	312	40	105	DCC	S9L1D-E4	13290	ADS-682	BD47-2
					ESP	S9L1D-E4	13290	ADS-682	B280-2
480	Wye; 3-phase	312	40	80	DCC	S9L1D-F4	14310	ADS-683	BD46-2
					ESP	S9L1D-G4	15825	ADS-684	B601-2
480	Wye; 3-phase	312	50	150	DCC	S9L1D-D4	11745	ADS-681	BD49-2
					ESP	S9L1D-E4	13290	ADS-682	BE80-2
480	Wye; 3-phase	312	50	125	DCC	S9L1D-D4	11745	ADS-681	BD48-2
					ESP	S9L1D-E4	13290	ADS-682	B801-2
480	Wye; 3-phase	312	50	105	DCC	S9L1D-E4	13290	ADS-682	BD47-2
					ESP	S9L1D-F4	14310	ADS-683	B280-2
480	Wye; 3-phase	312	50	80	DCC	S9L1D-G4	15825	ADS-684	BD46-2
					ESP	N/A	N/A	N/A	N/A
600	Wye; 3-phase	607	40	150	DCC	S9L1D-E4	13293	ADS-682	BD57-2
					ESP	S9L1D-E4	13293	ADS-682	BD50-2
600	Wye; 3-phase	607	40	125	DCC	S9L1D-E4	13293	ADS-682	BD56-2
					ESP	S9L1D-E4	13293	ADS-682	B465-2
600	Wye; 3-phase	607	40	105	DCC	S9L1D-E4	13293	ADS-682	BD55-2
					ESP	S9L1D-E4	13293	ADS-682	B839-2
600	Wye; 3-phase	607	40	80	DCC	S9L1D-F4	14343	ADS-683	BD54-2
					ESP	N/A	N/A	N/A	N/A
600	Wye; 3-phase	607	50	150	DCC	S9L1D-E4	13293	ADS-682	BD57-2
					ESP	S9L1D-E4	13293	ADS-682	BD50-2
600	Wye; 3-phase	607	50	125	DCC	S9L1D-E4	13293	ADS-682	BD56-2
					ESP	S9L1D-E4	13293	ADS-682	B465-2
600	Wye; 3-phase	607	50	105	DCC	S9L1D-E4	13293	ADS-682	BD55-2
					ESP	S9L1D-F4	14343	ADS-683	B839-2
600	Wye; 3-phase	607	50	80	DCC	N/A	N/A	N/A	N/A
					ESP	N/A	N/A	N/A	N/A

(Alternator data table is continued on next page)

Refer to alternator datasheet for project specific temperature ratings

(Alternator data table is continued from previous page)

ALTERNATOR DATA[8] (ESP: 2750 kWe, DCC: 2500 kWe)

Voltage	Connection	Winding Number	Ambient Temp. (°C)	Temp. Rise (°C)	Duty Rating[9]	Model	Max. Surge[10] (kVA)	Alternator Data Sheet	Feature Code
13200	Wye; 3-phase	991	40	150	DCC	S9H1D-F4	12294	ADS-659	BE58-2
					ESP	S9H1D-F4	12294	ADS-659	BE44-2
13200	Wye; 3-phase	991	40	125	DCC	S9H1D-F4	12294	ADS-659	BE78-2
					ESP	S9H1D-G4	13908	ADS-660	B803-2
13200	Wye; 3-phase	991	40	105	DCC	S9H1D-G4	13908	ADS-660	BE28-2
					ESP	S9H1D-H4	15180	ADS-661	B501-2
13200	Wye; 3-phase	991	40	80	DCC	S9H1D-H4	15180	ADS-661	BE27-2
					ESP	N/A	N/A	N/A	N/A
13200	Wye; 3-phase	991	50	150	DCC	S9H1D-F4	12294	ADS-659	BE58-2
					ESP	S9H1D-G4	13908	ADS-660	BE44-2
13200	Wye; 3-phase	991	50	125	DCC	S9H1D-G4	13908	ADS-660	BE78-2
					ESP	S9H1D-G4	13908	ADS-660	B803-2
13200	Wye; 3-phase	991	50	105	DCC	S9H1D-G4	13908	ADS-660	BE28-2
					ESP	S9H1D-H4	15180	ADS-661	B501-2
13200	Wye; 3-phase	991	50	80	DCC	N/A	N/A	N/A	N/A
					ESP	N/A	N/A	N/A	N/A
13800	Wye; 3-phase	991	40	150	DCC	S9H1D-E4	10890	ADS-658	BE59-2
					ESP	S9H1D-F4	12294	ADS-659	BE46-2
13800	Wye; 3-phase	991	40	125	DCC	S9H1D-F4	12294	ADS-659	BE79-2
					ESP	S9H1D-G4	13908	ADS-660	B803-2
13800	Wye; 3-phase	991	40	105	DCC	S9H1D-G4	13908	ADS-660	BE30-2
					ESP	S9H1D-G4	13908	ADS-660	B908-2
13800	Wye; 3-phase	991	40	80	DCC	S9H1D-H4	15180	ADS-661	BE29-2
					ESP	N/A	N/A	N/A	N/A
13800	Wye; 3-phase	991	50	150	DCC	S9H1D-F4	12294	ADS-659	BE59-2
					ESP	S9H1D-G4	13908	ADS-660	BE46-2
13800	Wye; 3-phase	991	50	125	DCC	S9H1D-F4	12294	ADS-659	BE79-2
					ESP	S9H1D-G4	13908	ADS-660	B803-2
13800	Wye; 3-phase	991	50	105	DCC	S9H1D-G4	13908	ADS-660	BE30-2
					ESP	S9H1D-H4	15180	ADS-661	B908-2
13800	Wye; 3-phase	991	50	80	DCC	N/A	N/A	N/A	N/A
					ESP	N/A	N/A	N/A	N/A

[8] Alternator data is configured for a set with ratings including engine cooling fan losses and standard features at 40 °C ambient temperature. For non-standard configurations, including remote radiator applications, check appropriate alternator data sheets or contact your Cummins distributor. N/A: Not Applicable

[9] DCC: Data Center Continuous; ESP: Emergency Standby Power

[10] Maximum surge: maximum rated starting kVA that results in a minimum of 90% of rated sustained voltage during starting

FORMULAS

Calculating Power Factor	Calculating Full Load Current (Three Phase AC Output)	Calculating Full Load Current (Single Phase AC Output)
$\cos\theta = \frac{Active\ (True, Real)\ Power}{Apparent\ Power} = \frac{P_{(kW)}}{\lvert S\rvert_{(kVA)}}$ Power Factor = 0.8 (industry standard)	$I = \frac{\lvert S\rvert_{(kVA)}}{\sqrt{3} \times V} = \frac{1000 \times P_{(kW)}}{\sqrt{3} \times V \times \cos\theta}$	$I = \frac{\lvert S\rvert_{(kVA)}}{V} = \frac{1000 \times P_{(kW)}}{V \times \cos\theta}$

Centum SERIES GENERATORS

Specification Sheet

PowerCommand® 3.3 Generator Set Digital Integrated Control System

Bargraph Optional

Introduction

The PowerCommand® 3.3 control system is a microprocessor-based generator set monitoring, metering, and control system, which is comprised of PowerCommand® Control 3300 and the Human Machine Interface 320. PCC3300 supports multiple operation modes including:

- Standalone,
- Synchronization only,
- Isolated bus paralleling,
- Utility single generator set paralleling,
- Utility multiple generator set paralleling,
- Utility single generator set paralleling with power transfer control (automatic mains failure),
- Isolated bus paralleling with Masterless Load Demand

PowerCommand® Control 3300 is designed to meet the exacting demands of the harsh and diverse environments of today's typical power generation applications for Full Authority Electronic or Hydromechanical engine power generator sets.

Offering enhanced reliability and performance over more conventional generator set controls via the integration of all generator control functions into a single system, PCC3300 is your Power of One generator set control solution.

Benefits and Features

- 320 x 240 pixels graphical LED backlit LCD
- Multiple languages supported
- AmpSentry™ protection provides industry-leading generator overcurrent protection
- Digital Power Transfer Control (Automatic Mains Failure) provides load transfer operation in open transition, closed transition, or soft (ramping) transfer modes
- Extended Paralleling (Peak Shave/Base Load) regulates the genset real and reactive power output while paralleled to the utility. Power can be regulated at either the genset or utility bus monitoring point
- Digital frequency synchronization and voltage matching
- Isochronous Load Sharing
- Droop kW and kVAr control
- Real time clock for fault and event time stamping
- Exerciser clock and time of day start/stop initiate a test with or without load, or a Base Load or Peak Shave session
- Digital automatic voltage regulation is provided using three phase sensing and full wave FET type regulator, which is compatible with either shunt or PMG excited systems with a standard AUX103 AVR or an option for a more powerful high-current field drive capability AUX106 AVR
- Digital engine speed governing is provided on applicable platforms
- Generator set monitoring (including metering) and protection with PCC3300 measuring voltage, current, kW and kVAr offering a measurement accuracy of 1%
- Utility / AC Bus metering and protection with PCC3300 voltage, current, kW and kVAr offering a measurement accuracy of 1%
- 12 V (DC) and 24 V (DC) battery operation
- RS-485 Modbus® interface for interconnecting to customer equipment
- Warranty and service – Cummins Power Generation offers a comprehensive warranty and worldwide distributor service network
- Global regulatory certification and compliance: PCC3300 is suitable for use on gensets that are designed, manufactured, tested and certified to relevant UL, NFPA, ISO, IEC, Mil Std., UKCA, and CE standards

PowerCommand® Generator Set Digital Control System PCC 3300

Introduction

PCC3300 is an industry-leading digital generator set control suitable for usage on a wide range of diesel and lean burn natural gas generator sets in both standalone as well as paralleling applications.

PowerCommand® is compatible with either shunt or PMG excitation, and is suitable for usage with reconnectable or non-reconnectable generators. Configuration for any frequency, voltage and power connection from 120 V (AC) to 600 V (AC) line-to-line or 601 V (AC) to 45k V (AC) with an external PT is supported. The PCC3300 derives its own power from the generator set starting batteries and functions over a voltage range of 8 V (DC) to 30 V (DC).

Features

- PCC3300 supports configurable control features via software download using InPower PC-compatible software
- 12 V (DC) and 24 V (DC) battery operation
- Digital automatic voltage regulation is provided using three phase sensing and full wave FET type regulator, which is compatible with either shunt or PMG excited systems with a standard AUX103 AVR or an option for a more powerful high-current field drive capability AUX106 AVR
- Digital engine speed governing on applicable platform is provided, which is capable of providing isochronous frequency regulation
- Full authority J1939 CANBus® prime mover communications and control is provided for platforms with an Engine Control Module (ECM)
- AmpSentry" protection provides industry-leading alternator overcurrent protection:
  - Time-based generator protection applicable to both line-to-line and line-to-neutral, that can detect an unbalanced fault condition and swiftly react appropriately. Balanced faults can also be detected by AmpSentry and appropriate acted upon.
  - Reduces the risk of Arc Flash due to thermal overload or electrical faults by inverse time protection
- Generator set monitoring offers status information for all critical prime mover and generator functions
- AC and DC digital generator set metering is provided. AC measurements are configurable for single or three phase sensing with PCC3300 measuring voltage, current, kW and kVAr offering a measurement accuracy of 1%
- Battery monitoring system continually monitors the battery output and warns of the potential occurrence of a weak battery condition
- Relay drivers for prime mover starter, fuel shutoff (FSO), glow plug/spark ignition power and switched B+ applications are provided
- Integrated generator set protection is offered to protect the prime mover and generator
- Real time clock for fault and event time stamping
- Exerciser clock and time of day start/stop initiate a test with or without load, or a Base Load or Peak Shave session
- Digital Power Transfer Control (Automatic Mains Failure) provides load transfer operation in open transition, closed transition, or soft (ramping) transfer modes
- Extended Paralleling (Peak Shave/Base Load) regulates the genset real and reactive power output while paralleled to the utility. Power can be regulated at either the genset or utility bus monitoring point
- Digital frequency synchronization and voltage matching
- Isochronous Load Sharing
- Droop kW and kVAr Control
- The synchronization check function provides adjustments for phase angle window, voltage window, frequency window and time delay
- Utility / AC Bus metering and protection with PCC3300 voltage, current, kW and kVAr offering a measurement accuracy of 1%
- Advanced serviceability is offered via InPower™, a PC-based software service tool
- PCC3300 is designed for reliable operation in harsh environments with the unit itself being a fully encapsulated module
- RS-485 ModBus interface for interconnecting to customer equipment
- Native on PCC3300: Four discrete inputs, two dry contact relay outputs and two low-side driver outputs are provided and are all configurable.
  - Optional extra PCC3300 input and output capability available via AUX101
- Warranty and service – Cummins Power Generation offers a comprehensive warranty and worldwide distributor service network
- Global regulatory certification and compliance: PCC3300 is suitable for use on gensets that are designed, manufactured, tested and certified to relevant UL, NFPA, ISO, IEC, Mil Std., UKCA and CE standards

Base Control Functions

HMI capability

Options: Local and remote HMI320 options are available

Operator adjustments: The HMI320 includes provisions for many set up and adjustment functions.

Genset hardware data: Access to the control and software part number, genset rating in kVA and genset model number is provided from the HMI320 or InPower.

Data logs: Information concerning all of the following parameters is periodically logged and available for viewing; engine run time, controller on time, number of start attempts, total kilowatt hours, and load profile. (Control logs data indicating the operating hours at percent of rated kW load, in 5% increments. The data is presented on the operation panel based on total operating hours on the generator.)

Fault history: Provides a record of the most recent fault conditions with control date and time stamp. Up to 32 events are stored in the control non-volatile memory.

Alternator data

- Voltage (single or three phase line-to-line and line-to-neutral)
- Current (single or three phase)
- kW, kVAr, Power Factor, kVA (three phase and total)
- Frequency

For Lean Burn Natural Gas Engine applications:

- Alternator heater status
- Alternator winding temperature (per phase) as well as alternator drive end and non-drive end bearing

Utility/AC bus data

- Voltage (three phase line-to-line and line-to-neutral)
- Current (three phase and total)
- kW, kVAR, Power Factor, kVA (three phase and total)
- Frequency

AmpSentry: 3x current regulation for downstream tripping/motor inrush management. Thermal damage curve (3-phase short) or fixed timer (2 sec for 1-Phase Short or 5 sec for 2-Phase short).

Engine data

- Starting battery voltage
- Engine speed
- Engine temperature
- Engine oil pressure
- Engine oil temperature
- Intake manifold temperature
- Coolant temperature
- Comprehensive Full Authority Engine (FAE) data (where applicable)

Lean Burn Natural Gas (LBNG) application parameters include:

- Safety shutoff valve status
- Valve proving status
- Downstream gas pressure
- Gas inlet pressure
- Gas mass flow rate
- Control valve position
- Gas outlet pressure
- Manifold pressure and temperature
- Throttle position
- Compressor outlet pressure
- Turbo speed
- Compressor bypass position
- Cylinder configuration (e.g., drive end and non-drive end configurations)
- Coolant pressure 1 and 2 as well as coolant temperature 1 and 2 for both HT/LT respectively
- Exhaust port temperature (up to 18 cylinders)
- Pre-filter oil pressure
- Exhaust back pressure
- Parent ECM internal temperature and isolated battery voltage
- Speed bias
- Child ECM internal temperature and isolated battery voltage
- Knock level, spark advance, and knock count (for up to 18 cylinders)
- Auxiliary supply disconnector status
- Engine heater status
- Coolant circulating pump status
- Lube oil priming pump status
- Lube oil status
- Oil heater status
- Derate authorization status
- Start system status
- Ventilator fan status
- Ventilation louvre status
- Radiator fan status
- DC PSU status
- Start inhibit/enable status and setup

Service adjustments – The HMI320 includes provisions for adjustment and calibration of genset control functions. Adjustments are protected by a password. Functions include:

- Engine speed governor adjustments
- Voltage regulation adjustments
- Cycle cranking
- Configurable fault set up
- Configurable input and output set up
- Meter calibration
- Paralleling setup
- Display language and units of measurement

Prime Mover Control

SAE-J1939 CAN interface to full authority ECMs (where applicable). Provides data transfer between genset and engine controller for control, metering and diagnostics.

12 V (DC) or 24 V (DC) nominal battery voltage is supported by PCC3300 for normal operation.

Temperature dependant prime mover governing dynamics: This function is supported enabling the engine to be responsive when warm and more stable when operating at lower temperature via providing control and modification over electronic governing parameters as a function of engine temperature.

Isochronous governing is provided in order to control prime mover speed within ±0.25% of nominal rated speed for any steady state load from no load to full load. During operation frequency drift should not exceed ±0.5% of nominal frequency given a 33ºC (or 60ºF) chance in ambient temperature within an eight-hour period.

Droop electronic speed is governing capability is natively offered by PCC3300 to permit droop from 0% to 10% between no load to full load.

Remote start capability is built into the PCC3300 as the unit accepts a ground signal from remote devices to automatically command the starting of the generator set as well as the reaching of rated speed, voltage and frequency or otherwise run at idle speed until prime mover temperature is adequate. The presence of a remote start signal shall cause the PCC3300 to leave sleep mode and return to normal power mode. PCC3300 supports an option for delayed start or stop.

Remote Start Integrity: In compliance with NEC2017 Start Signal Integrity standard – NFPA70 Article 700.10(D)(3), the remote start circuit from ATS to PCC3300 is continuously monitored for signal disturbance due to broken, disconnected or shorted wires via a configurable input. Loss of signal integrity results in activation of a remote start signal.

Remote and local emergency stopping capability: PCC3300 accepts ground signal from a locally or remoted mounted emergency stop switch to cause the generator set to immediately shutdown. The generator set is prevented from either running or cranking with the emergency stop switch engaged. If PCC3300 is in sleep mode, then the activation of any emergency stop switch shall return PCC3300 is normal powered state along with the activation of the corresponding shutdown and run-prevention states.

Sleep mode: PowerCommand 3.3 supports a configurable low current draw state, which is design with consideration to the needs of prime applications or others application without a battery charger (in order to minimize battery current drain).

Automatic prime mover starting: Any generator set controlled by PCC3300 is capable of automatic starting achieved via either magnetic pickup or main alternator output frequency. PCC3300 additionally supports configurable glow plug control where applicable.

Prime mover cycle cranking: PCC3300 supports configurable starting cycles and rest periods. Built in starter protection are incorporated to prevent the operator from specifying a starting sequence that may be damaging.

Configurable time delay functionality: PCC3300 supports time delayed generator set starting and stopping (for cooldown). Permissible time delays are as follows (noting a default setting is 0 seconds):

1. Start delay: 0 seconds to 300 seconds prior to starting after receiving a remote start signal.
2. Stop delay: 0 seconds to 600 seconds prior to shut down after receiving a signal to stop in normal operation modes.

Lean Burn Natural Gas application specific parameters

PCC3300 supports prime mover inhibiting in order to permit application-specific processes (i.e. Auxiliaries) to be started first.

Generator Control

PCC3300 performs both Genset voltage sensing and Genset voltage regulation as follows:

- Voltage sensing is integrated into PCC3300 via three phase line-to-line sensing that is compatible with shunt or PMG excitation systems
- Automatic voltage regulation is accomplished by using a three phase fully rectified input and has a FET output for good motor starting capability.

Major features of generator control include:

Digital output voltage regulation - Capable of regulating output voltage to within +/-1.0% for any loads between no load and full load. Voltage drift will not exceed +/-1.5% for a 40 ºC (104 ºF) change in temperature in an eight-hour period. On engine starting or sudden load acceptance, voltage is controlled to a maximum of 5% overshoot over nominal level.

The automatic voltage regulator feature can be disabled to allow the use of an external voltage regulator.

Droop voltage regulation - Control can be adjusted to droop from 0-10% from no load to full load.

Torque-matched V/Hz overload control - The voltage roll-off set point and rate of decay (i.e. the slope of the V/Hz curve) is adjustable in the control.

Fault current regulation - PowerCommand® will regulate the output current on any phase to a maximum of three times rated current under fault conditions for both single phase and three phase faults. In conjunction with a permanent magnet generator, it will provide three times rated current on all phases for motor starting and short circuit coordination purpose.

Cylinder Cut-off System (CCS): PCC 3300 supports Cylinder Cut-off System which is used to operate the engines on half bank at no load and light load conditions. CCS has below benefits on engine

performance- improved emission standards, improved fuel efficiency, reduced hydrocarbons, reduced white smoke, reduced wet stacking and higher exhaust temperature at light loads to improve turbocharger operations and catalyst performance.

Step Timing Control (STC): PCC 3300 supports STC functionality which is used to advance the engine timing of a hydro-mechanical engine during start up and light load conditions. During ADVANCED injection timing, it:

- Improves cold weather idling characteristics
- Reduces cold weather white smoke
- Improves light load fuel economy
- Reduces injector carboning

Paralleling Functions

First Start Sensor™ system – PowerCommand® provides a unique control function that positively prevents multiple gensets from simultaneously closing to an isolated bus under black start conditions. The First Start Sensor system is a communication system between the gensets that allows the gensets to work together to determine which genset is a system should be the first to close to the bus. The system includes an independent backup function, so that if the primary system is disabled the required functions are still performed.

Synchronizing – Control incorporates a digital synchronizing function to force the genset to match the frequency, phase and voltage of another source such as a utility grid. The synchronizer includes provisions to provide proper operation even with highly distorted bus voltage waveforms. The synchronizer can match other sources over a range of 60-110% of nominal voltage and -24 to +6 hertz. The synchronizer function is configurable for slip frequency synchronizing for applications requiring a known direction of power flow at instant of breaker closure or for applications where phase synchronization performance is otherwise inadequate.

Load sharing control – The genset control includes an integrated load sharing control system for both real (kW) and reactive (kVar) loads when the genset(s) are operating on an isolated bus. The control system determines kW load on the engine and kVar load on the alternator as a percent of genset capacity, and then regulates fuel and excitation systems to maintain system and genset at the same percent of load without impacting voltage or frequency regulation. The control can also be configured for operation in droop mode for kW or Kvar load sharing.

Load govern control– When PowerCommand® receives a signal indicating that the genset is paralleled with an infinite source such as a utility (mains) service, the genset will operate in load govern mode. In this mode the genset will synchronize and close to the bus, ramp to a pre-programmed kW and kVar load level, and then operate at that point. Control is adjustable for kW values from 0-100% of standby rating, and 0.7-1.0 power factor (lagging). Default setting is 80% of standby and 1.0 power factor. The control includes inputs to allow independent control of kW and kVar load level by a remote device while in the load govern mode. The rate of load increase and decrease is also adjustable in the control. In addition, the control can be configured for operation in kW or kVAR load govern droop.

Load demand control – The control system includes the ability to respond to an external signal to initiate load demand operation. On command, the genset will ramp to no load, open its paralleling breaker, cool down, and shut down. On removal of the command, the genset will immediately start, synchronize, connect, and ramp to its share of the total load on the system.

Sync check – The sync check function decides when permissive conditions have been met to allow breaker closure. Adjustable criteria are: phase difference from 0.1-20 deg, frequency difference from 0.001-1.0 Hz, voltage difference from 0.5-10%, and a dwell time from 0.5-5.0 sec. Internally the sync check is used to perform closed transition operations. An external sync check output is also available.

Genset and utility/AC bus source AC metering – The control provides comprehensive three phase AC metering functions for both monitored sources, including: 3-phase voltage (L-L and L-N) and current, frequency, phase rotation, individual phase and totalized values of kW, kVAR, kVA and Power Factor; totalized positive and negative kW-hours, kVAR-hours, and kVA-hours. Three wire or four wire voltage connection with direct sensing of voltages to 600V, and up to 45kV with external transformers. Current sensing is accomplished with either 5 amp or 1 CT secondaries and with up to 10,000 amp primary. Maximum power readings are 32,000kW/kVAR/kVA.

Power transfer control – provides integrated automatic power transfer functions including source availability sensing, genset start/stop and transfer pair monitoring and control. The transfer/retransfer is configurable for open transition, fast closed transition (less than 100msec interconnect time), or soft closed transition (load ramping) sequences of operation. Utility source failure will automatically start genset and transfer load, retransferring when utility source returns. Test will start gensets and transfer load if test with load is enabled. Sensors and timers include:

Under voltage sensor: 3-phase L-N or L-L under voltage sensing adjustable for pickup from 85-100% of nominal. Dropout adjustable from 75-98% of pickup. Dropout delay adjustable from 0.1-30 sec.

Over voltage sensor: 3-phase L-N or L-L over voltage sensing adjustable for pickup from 95-99% of dropout. Dropout adjustable from 105-135% of nominal. Dropout delay adjustable from 0.5-120 sec. Standard configuration is disabled and is configurable to enabled in the field using the HMI or InPower service tools.

Over/Under frequency sensor: Center frequency adjustable from 45-65 Hz. Dropout bandwidth adjustable from 0.3-5% of center frequency beyond pickup bandwidth. Pickup bandwidth adjustable from 0.3-20% of center frequency. Field configurable to enable.

Loss of phase sensor: Detects out of range voltage phase angle relationship. Field configurable to enable.

Phase rotation sensor: Checks for valid phase rotation of source. Field configurable to enable.

Breaker tripped: If the breaker tripped input is active, the associated source will be considered as unavailable.

Timers: Control provides adjustable start delay from 0 - 300sec, stop delay from 0 - 800sec, transfer delay from 0-120sec, retransfer delay from 0-1800sec, programmed transition delay from 0-60sec, and maximum parallel time from 0-1800sec.

Negative Sequence Current Protection: PCC3300 supports this protection natively in order to determine if the generator is at any point was running subject to negative phase sequencing.

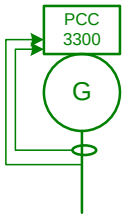
Breaker control – Utility and Genset breaker interfaces include separate relays for opening and closing breaker, as well as inputs for both 'a' and 'b' breaker position contacts and tripped status. Breaker diagnostics include Contact Failure, Fail to Close, Fail to Open, Fail to Disconnect, and Tripped. Upon breaker failure, appropriate control action is taken to maintain system integrity.

Exerciser clock –The exerciser clock (when enabled) allows the system to be operated at preset times in either test without load, test with load, or extended parallel mode. A Real Time Clock is built in. Up to 12 different programs can be set for day of week, time of day, duration, repeat interval, and mode. For example, a test with load for 1 hour every Tuesday at 2AM can be programmed. Up to 6 different exceptions can also be set up to block a program from running during a specific date and time period.

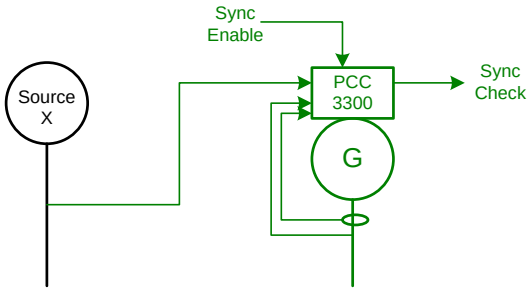
Extended paralleling – In extended paralleling mode (when enabled) the controller will start the genset and parallel to a utility source and then govern the real and reactive power output of the genset based on the desired control point. The control point for the real power (kW) can be configured for either the genset metering point ("Base Load") or the utility metering point ("Peak Shave"). The control point for the reactive power (kVAR or Power Factor) can also be independently configured for either the genset metering point or the utility metering point. This flexibility would allow base kW load from the genset while maintaining the utility power factor at a reasonable value to avoid penalties due to low power factor. The System always operates within genset ratings. The control point can be changed while the system is in operation. Set points can be adjusted via hardwired analog input or adjusted through an operator panel display or service tool.

Application types – Controller is configured to operating in one of six possible application types. These topologies are often used in combinations in larger systems, with coordination of the controllers in the system either by external device or by interlocks provided in the control. Topologies that may be selected in the control include:

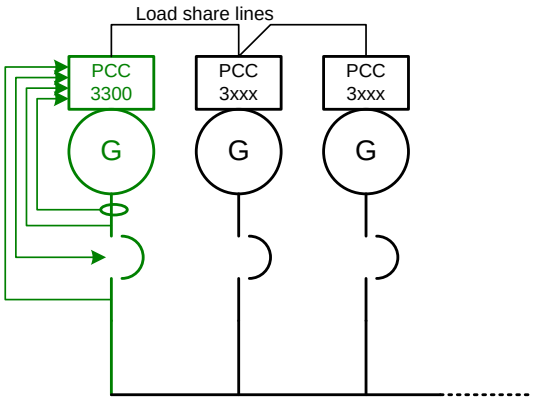
Standalone: Control provides monitoring, protection and control in a non-paralleling application.



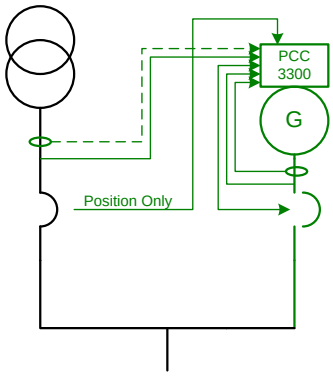
Synchronizer only: control will synchronize the genset to other source when commanded to either via a hardwired or Modbus driven input.



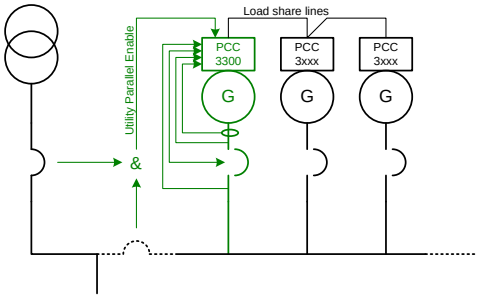
Isolated Bus: allows the genset to perform a dead bus closure or synchronize to the bus and isochronously share kW and kVAR loads with other gensets.



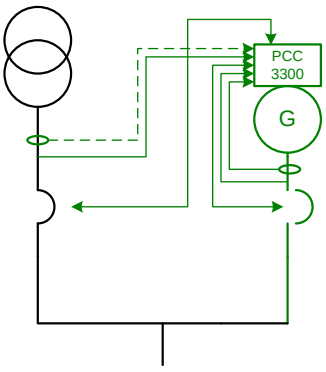
Utility Single: Control monitors one genset and utility. The control will automatically start and provide power to a load if the utility fails. The control will also resynchronize the genset back to the utility and provides extended paralleling capabilities.



Utility Multiple: Supports all functionality of Isolated Bus and provides extended paralleling to the utility. Extended paralleling load set points follow a constant setting; dynamically follow an analog input, Modbus register or HMI.

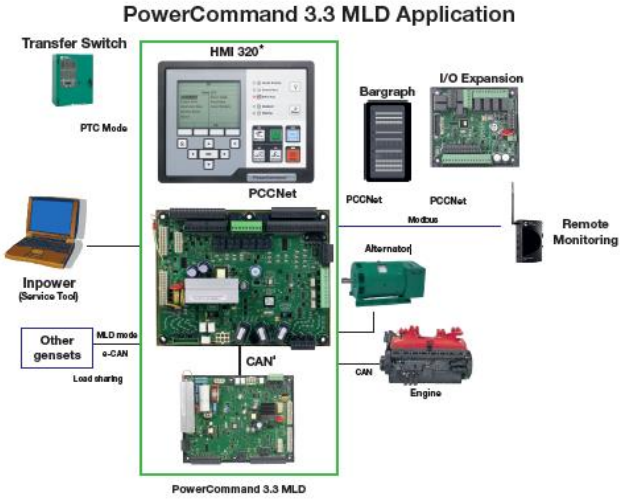


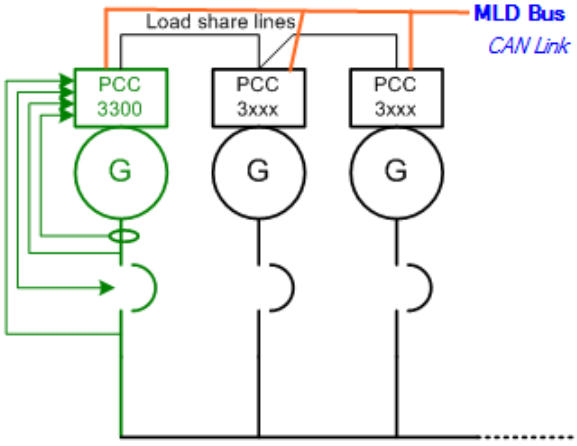
Power Transfer Control: Control operates a single genset/single utility transfer pair in open transition, fast closed transition, or soft closed transition. Extended paralleling functionality also provides base load and peak shave options.



Masterless Load Demand (Optional Feature):

PowerCommand® 3.3 with Masterless Load Demand (MLD) technology enables generator sets to start/stop automatically based on load demand. Masterless Load Demand-capable generators are equipped with an additional s-CAN network connection that allows sharing of information amongst paralleled generator sets. MLD has been designed for hassle-free installation, commissioning and operation. MLD functionality. Integrated on-board system logic provides the MLD topology control without the need for any additional system.





PCC3300 External Voltage and Frequency Biasing Inputs

PCC3300 supports externally driven voltage and frequency biasing capability in order to permit external paralleling (if intending to use this feature please contact your local distributor for further information).

Protective Functions

On operation of a protective function the control will indicate a fault by illuminating the appropriate status LED on the HMI, as well as display the fault code and fault description on the LCD. The nature of the fault and time of occurrence are logged in the control. The service manual and InPower service tool provide service keys and procedures based on the service codes provided. Protective functions include:

Battle short mode

When enabled and the *battle short* switch is active, the control will allow some shutdown faults to be bypassed. If a bypassed shutdown fault occurs, the fault code and description will still be annunciated, but the genset will not shutdown. This will be followed by a *fail to shutdown* fault. Emergency stop shutdowns and others that are critical for proper operation (or are handled by the engine ECM) are not bypassed. Please refer to the Control Application Guide or Manual for list of these faults.

Derate

The Derate function reduces output power of the genset in response to a fault condition. If a Derate command occurs while operating on an isolated bus, the control will issue commands to reduce the load on the genset via contact closures or Modbus. If a Derate command occurs while in utility parallel mode, the control will actively reduce power by lowering the base load kW to the derated target kW.

Configurable alarm and status inputs

The control accepts up to four alarm or status inputs (configurable contact closed to ground or open) to indicate a configurable (customer-specified) condition.

The control is programmable for warning, derate, shutdown, shutdown with cooldown or status indication and for labeling the input.

Emergency stop

Annunciated whenever either emergency stop signal is received from external switch.

General prime mover protection

Low and high battery voltage warning - Indicates status of battery charging system (failure) by continuously monitoring battery voltage.

Weak battery warning - The control system will test the battery each time the genset is signaled to start and indicate a warning if the battery indicates impending failure.

Low coolant level warning – Can be set up to be a warning or shutdown.

Low coolant temperature warning – Indicates that engine temperature may not be high enough for a 10 second start or proper load acceptance.

Fail to start (overcrank) shutdown - The control system will indicate a fault if the genset fails to start by the completion of the engine crack sequence.

Fail to crank shutdown - Control has signaled starter to crank engine but engine does not rotate.

Cranking lockout - The control will not allow the starter to attempt to engage or to crank the engine when the engine is rotating.

Fault simulation –The control in conjunction with InPower software, will accept commands to allow a technician to verify the proper operation of the control and its interface by simulating failure modes or by forcing the control to operate outside of its normal operating ranges. InPower also provides a complete list of faults and settings for the protective functions provided by the controller.

For Lean Burn Natural Gas Engine applications:

Off load running (protection) – This feature protects the engine in the event the genset is being called to go off load for too long.

Hydro Mechanical fuel system engine protection:

Overspeed shutdown – Default setting is 115% of nominal

Low lube oil pressure warning/shutdown – Level is preset (configurable with InPower or HMI) to match the capabilities of the engine used. Control includes time delays to prevent nuisance alarms.

High lube oil temperature warning/shutdown – Level is preset (configurable with InPower or HMI) to match the capabilities of the engine used. Control includes time delays to prevent nuisance alarms.

High engine temperature warning/shutdown – Level is preset (configurable with InPower or HMI) to match the capabilities of the engine used. Control includes time delays to prevent nuisance alarms.

Low coolant temperature warning – Indicates that engine temperature may not be high enough for a 10 second start or proper load acceptance.

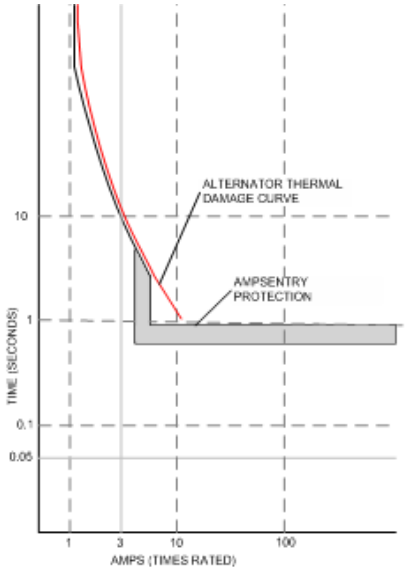
High intake manifold temperature shutdown – Level is preset (configurable with InPower or HMI) to match the capabilities of the engine used. Control includes time delays to prevent nuisance alarms.

Full authority electronic engine protection:

Engine fault detection is handled inside the engine ECM. Fault information is communicated via the SAE-J1939 data link for annunciation in the HMI.

Alternator Protection

AmpSentry protective relay - A comprehensive monitoring and control system integral to the PowerCommand® Control System that guards the electrical integrity of the alternator and power system by providing protection against a wide array of fault conditions in the genset or in the load. It also provides single and three phase fault current regulation (3x Current) so that downstream protective devices have the maximum current available to quickly clear fault conditions without subjecting the alternator to potentially catastrophic failure conditions. Thermal damage curve (3 phase short) or fixed timer (2sec for 1P short, 5sec for 2P short). See document R1053 for a full-size time over current curve. The control does not included protection required for interconnection to a utility (mains) service.



AmpSentry Maintenance Mode (AMM) - Instantaneous tripping, if AmpSentry Maintenance mode is active (50mS response to turn off AVR excitation/shutdown genset) for arc flash reduction when personnel are near genset.

High AC voltage shutdown (59) - Output voltage on any phase exceeds preset values. Time to trip is inversely proportional to amount above threshold. Values adjustable from 105-125% of nominal voltage, with time delay adjustable from 0.1-10 seconds. Default value is 110% for 10 seconds.

Low AC voltage shutdown (27) - Voltage on any phase has dropped below a preset value. Adjustable over a range of 50-95% of reference voltage, time delay 2-20 seconds. Default value is 85% for 10 seconds. Function tracks reference voltage. Control does not nuisance trip when voltage varies due to the control directing voltage to drop, such as during a V/Hz roll-off or synchronizing.

Under frequency shutdown (81 u) - Genset output frequency cannot be maintained. Settings are adjustable from 2-10 Hz below reference governor set point, for a 5-20 second time delay. Default: 6 Hz, 10 seconds. Under frequency protection is disabled when excitation is switched off, such as when engine is operating in idle speed mode.

Over frequency shutdown/warning (81o) - Genset is operating at a potentially damaging frequency level. Settings are adjustable from 2-10 Hz above nominal governor set point for a 1-20 second time delay. Default: 6 Hz, 20 seconds, disabled.

Overcurrent warning/shutdown (51) - Implementation of the thermal damage curve with instantaneous trip level calculated based on current transformer ratio and application power rating.

Loss of sensing voltage shutdown - Shutdown of genset will occur on loss of voltage sensing inputs to the control.

Field overload shutdown - Monitors field voltage to shutdown genset when a field overload condition occurs.

Over load (kW) warning - Provides a warning indication when engine is operating at a load level over a set point. Adjustment range: 80-140% of application rated kW, 0-120 second delay. Defaults: 105%, 60 seconds.

Reverse power shutdown (32) - Adjustment range: 5-20% of standby kW rating, delay 1-15 seconds. Default: 10%, 3 seconds.

Reverse Var shutdown (40) - Shutdown level is adjustable: 15-50% of rated Var output, delay 10-60 seconds. Default: 20%, 10 seconds.

Short circuit protection - Output current on any phase is more than 175% of rating and approaching the thermal damage point of the alternator. Control includes algorithms to protect alternator from repeated over current conditions over a short period of time.

Negative sequence overcurrent warning (46) – Control protects the generator from damage due to excessive imbalances in the three phase load currents and/or power factors.

Custom overcurrent warning/shutdown (51) – Control provides the ability to have a custom time overcurrent protection curve in addition to the AmpSentry protective relay function.

Ground fault overcurrent (51G) – Control detects a ground fault either by an external ground fault relay via a contact input or the control can measure the ground current from an external current transformer. Associated time delays and thresholds are adjustable via InPower or HMI.

Paralleling Protection

Breaker fail to close Warning: When the control signals a circuit breaker to close, it will monitor the breaker auxiliary contacts and verify that the breaker has closed. If the control does not sense a breaker closure within an adjustable time period after the close signal, the fail to close warning will be initiated.

Breaker fail to open warning: The control system monitors the operation of breakers that have been signaled to open. If the breaker does not open within and adjustable time delay, a Breaker Fail to Open warning is initiated.

Breaker position contact warning: The controller will monitor both 'a' and 'b' position contacts from the breaker. If the contacts disagree as to the breaker position, the breaker position contact warning will be initiated.

Breaker tripped warning: The control accepts inputs to monitor breaker trip / bell alarm contact and will initiate a breaker tripped warning if it should activate.

Fail to disconnect warning: In the controller is unable to open either breaker, a fail to disconnect warning is initiated. Typically, this would be mapped to a configurable output, allowing an external device to trip a breaker.

Fail to synchronize warning: Indicates that the genset could not be brought to synchronization with the bus. Configurable for adjustable time delay of 10 -900 seconds, 120 default.

Phase sequence sensing warning: Verifies that the genset phase sequence matches the bus prior to allowing the paralleling breaker to close.

Maximum parallel time warning (power transfer control mode only): During closed transition load transfers, control independently monitors paralleled time. If time is exceeded, warning is initiated and genset is disconnected.

Bus or genset PT input calibration warning: The control system monitors the sensed voltage from the bus and genset output voltage potential transformers. When the paralleling breaker is closed, it will indicate a warning condition if the read values are different.

Field Control Interface

Input signals to the PowerCommand® control include:

- Coolant level (where applicable)
- Fuel level (where applicable)
- Remote emergency stop
- Remote fault reset
- Remote start
- Rupture basin
- Start type signal
- Battle short
- Load demand stop
- Synchronize enable
- Genset circuit breaker inhibit
- Utility circuit breaker inhibit
- Single mode verify
- Transfer inhibit – prevent transfer to utility (in power transfer control mode)
- Retransfer inhibit – prevent retransfer to genset (in power transfer control mode)
- kW and kVAR load setpoints

Configurable inputs - Control includes (4) input signals from customer discrete devices that are configurable for warning, shutdown or status indication, as well as message displayed

Input signals for Lean Burn Natural Gas Engine applications:

- Gearbox oil pressure/temperature protection
- Fire fault
- Earth fault support as a discrete input via an appropriate secondary detection device
- Differential fault
- DC power supply fault
- Genset Interface Box (GIB) isolator open fault
- Start inhibit/enable (x3)
- Radiator fan trip
- Ventilator fan trip
- Ventilation louvers closed
- Start system trip
- Alternator heater trip
- Alternator heater status
- Alternator winding temperature (PT100 RTDx3)
- Alternator drive end bearing temperature (PT100 RTD)
- Alternator non-drive end bearing temperature (PT100 RTD)

Output signals from the PowerCommand® control include:

- Load dump signal: Operates when the genset is in an overload condition.
- Delayed off signal: Time delay-based output which will continue to remain active after the control has removed the run command. Adjustment range: 0 - 120 seconds. Default: 0 seconds.

- Configurable relay outputs: Control includes (4) relay output contacts (3 A, 30VDC). These outputs can be configured to activate on any control warning or shutdown fault as well as ready to load, not in auto, common alarm, common warning and common shutdown.
- Ready to load (genset running) signal: Operates when the genset has reached 90% of rated speed and voltage and latches until genset is switched to off or idle mode.
- Paralleling circuit breaker relays outputs: Control includes (4) relay output contacts (3.5A, 30 VDC) for opening and closing of the genset and utility breakers.

Output Signals for Lean Burn Natural Gas Engine applications:

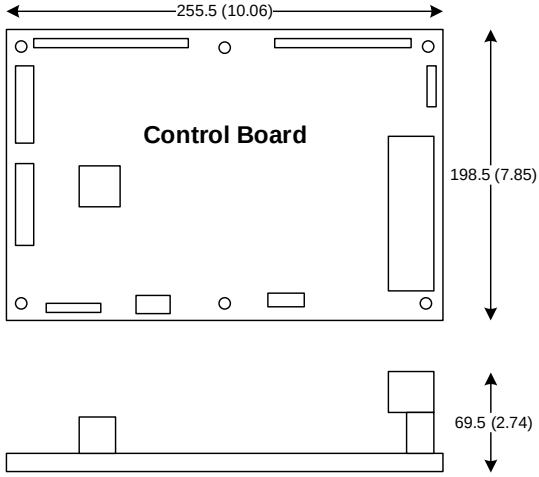
- Start inhibit/enable event
- Emergency stop event
- Ventilator fan run control
- Louvre control
- Radiator fan control
- Alternator heater control
- Engine at idle speed event

Communications connections include:

- PC tool interface: This RS-485 communication port allows the control to communicate with a personal computer running InPower software.
- Modbus RS-485 port: Allows the control to communicate with external devices such as PLCs using Modbus protocol.

  Note - An RS-232 or USB to RS-485 converter is required for communication between PC and control.
- Networking: This RS-485 communication port allows connection from the control to the other Cummins Power Generation products.

Mechanical Drawing



PowerCommand® Human Machine Interface HMI320

Description

This control system includes an intuitive operator interface panel that allows for complete genset control as well as system metering, fault annunciation, configuration and diagnostics. The interface includes five genset status LED lamps with both internationally accepted symbols and English text to comply with customer's needs. The interface also includes an LED backlit LCD display with tactile feel soft-switches for easy operation and screen navigation. It is configurable for units of measurement and has adjustable screen contrast and brightness.

The *run/off/auto* switch function is integrated into the interface panel.

All data on the control can be viewed by scrolling through screens with the navigation keys. The control displays the current active fault and a time-ordered history of the five previous faults.

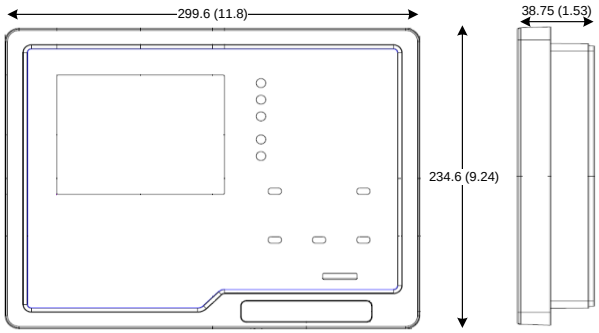
Features:

- LED indicating lamps
  - genset running
  - remote start
  - not in auto
  - shutdown
  - warning
  - auto
  - manual and stop
  - Circuit breaker open (if equipped)
  - Circuit breaker closed (if equipped)
- 320 x 240 pixels graphic LED backlight LCD.
- Four tactile feel membrane switches for LCD defined operation. The functions of these switches are defined dynamically on the LCD.
- Seven tactile feel membrane switches dedicated screen navigation buttons for up, down, left, right, ok, home and cancel.
- Six tactile feel membrane switches dedicated to control for auto, stop, manual, manual start, fault reset and lamp test/panel lamps.
- Two tactile feel membrane switches dedicated to control of circuit breaker (where applicable).
- Allows for complete genset control setup.
- Certifications: Suitable for use on gensets that are designed, manufactured, tested and certified to relevant UL, NFPA, ISO, IEC, Mil Std., UKCA and CE standards.
- Languages supported: English, Spanish, French, German, Italian, Greek, Portuguese, Finnish, Norwegian, Danish, Russian (Cyrillic), Chinese, Hungarian, Japanese, Polish, Korean, Romanian, Brazilian Portuguese, Turkish, Dutch, and Czech

Communications connections include:

- PC tool interface - This RS-485 communication port allows the HMI to communicate with a personal computer running InPower.
- This RS-485 communication port allows the HMI to communicate with the main control board.

Mechanical Drawing



HMI

Dimensions: mm (inches)

Software

InPower (beyond 6.5 version) is a PC-based software service tool that is designed to directly communicate to PowerCommand® gensets and transfer switches, to facilitate service and monitoring of these products.

Environment

The control is designed for proper operation without recalibration in ambient temperatures from -40 ºC (-40 ºF) to +70º C (158 ºF), and for storage from -55 ºC (-67 ºF) to +80 ºC (176 ºF). Control will operate with humidity up to 95%, non-condensing.

The HMI is designed for proper operation in ambient temperatures from -20 ºC (-4 ºF) to +70 ºC (158 ºF), and for storage from -30 ºC (-22 ºF) to +80 ºC (176 ºF).

The control board is fully encapsulated to provide superior resistance to dust and moisture. Display panel has a single membrane surface, which is impervious to effects of dust, moisture, oil and exhaust fumes. This panel uses a sealed membrane to provide long reliable service life in harsh environments.

The control system is specifically designed and tested for resistance to RFI/EMI and to resist effects of vibration to provide a long reliable life when mounted on a genset. The control includes transient voltage surge suppression to provide compliance to referenced standards.

Certifications

PowerCommand® meets or exceeds the requirements of the following codes and standards:

- NFPA 110 for level 1 and 2 systems.
- ISO 8528-4:2005 compliance, controls and switchgear (second edition)
- CE marking: The CE marking is only valid when equipment is used in a fixed installation application. Material compliance declaration is available upon request.
- UKCA marking- The UKCA marking is only valid when equipment is used in a fixed installation application. Material compliance declaration is available upon request.
- EN 61000-6-3,4 residential/light industrial emissions or industrial emissions.
- EN 50082-1,2 residential/light industrial or industrial susceptibility.
- ISO 7637-2, level 2; DC supply surge voltage test.
- Mil Std 202C, Method 101 and ASTM B117: Salt fog test.
- UL 6200 recognized, suitable for use on UL 2200 Listed generator sets.
- CSA C282-M1999 compliance
- CSA 22.2 No. 14 M91 industrial controls.
- PowerCommand® control systems and generator sets are designed and manufactured in ISO 9001 certified facilities.
- ROHS (Restriction of Hazardous substance) complaint both for HMI 320 & PCC3300v2.

Reference Documents

Please refer to the following reference documents available in the PowerSuite library:

- PowerCommand™ 3.3. Application Guide
- T-037: PowerCommand Control Application Manual (ANSI Protective Functions)
- T-040: PowerCommand 3.3 Paralleling Application Guide

Please refer to the following reference documents available on Cummins Quickserve:

- Service Manuals for PC3.3 (non-MLD) and PC3.3 (MLD)
- Modbus Register Mapping

Warranty

All components and subsystems are covered by an express limited one-year warranty. Other optional and extended factory warranties and local distributor maintenance agreements are available.

PCCNet COMPATIBLE

2025 EPA Tier 2 Exhaust Emission Compliance Statement C3000D6EB Stationary Emergency

60 Hz Diesel Generator Set

Compliance Information:

The engine used in this generator set complies with Tier 2 emissions limit of U.S. EPA New Source Performance Standards for stationary emergency engines under the provisions of 40 CFR 60 Subpart IIII when tested per ISO8178 D2.

Engine Manufacturer:	Cummins, Inc.
EPA Certificate Number:	SCEXL95.0AAA-020
Effective Date:	11/20/2024
Date Issued:	11/20/2024
EPA Engine Family (Cummins Emissions Family):	SCEXL95.0AAA

Engine Information:

Model:	QSK78-G37	Bore:	6.69 in. (170 mm)
Engine Nameplate HP:	4441	Stroke:	7.48 in. (190mm)
Type:	4 Cycle, V, 18 Cylinder Diesel	Displacement:	4737 cu. in. (78 liters)
Aspiration:	Turbocharged and Charge Air Cooled	Compression ratio:	15.3:1
Emission Control Device:	Turbocharged and Charge Air Cooled	Exhaust stack diameter:	12 in. (292 mm)

Diesel Fuel Emission Limits

D2 Cycle Exhaust Emissions

	Grams per BHP-hr			Grams per kWm-hr		
	NO_X + NMHC	CO	PM	NO_X + NMHC	CO	PM
EPA Emissions Limit	4.8	2.6	0.15	6.4	3.5	0.20

Test methods: EPA emissions recorded per 40CFR89 (ref ISO8178-1) and weighted at load points prescribed in the Subpart E, Appendix A for constant speed engines.

Diesel fuel specifications: 40-48 Cetane number, Reference: ASTM D975 No. 2-D, 0.0015 Max Wt % Sulphur

Reference conditions: Air Inlet Temperature: 25 °C (77 °F), Fuel Inlet Temperature: 40 °C (104 °F). Barometric Pressure: 100 kPa (29.53 in Hg), Humidity: 10.7 g/kg (75 grains H2O/lb) of dry air; required for NOx correction, Restrictions: Intake Restriction set to a maximum allowable limit for clean filter; Exhaust Back Pressure set to a maximum allowable limit..

Tests conducted using alternate test methods, instrumentation, fuel or reference conditions can yield different results. Engine operation with excessive air intake or exhaust restriction beyond published maximum limits, or with improper maintenance, may result in elevated emission levels.

Exhaust Emission Data Sheet
C3000D6EB
60 Hz Diesel Generator Set

Engine Information:

Model:	Cummins Inc. QSK78-G37	Bore:	6.69 in. (170 mm)
Type:	4 Cycle, V, 18 Cylinder Diesel	Stroke:	7.48 in. (190mm)
Aspiration:	Turbocharged and Charge Air Cooled	Displacement:	4737 cu. in. (78 liters)
Compression Ratio:	15.3:1		

Performance Data	1/4 Standby	1/2 Standby	3/4 Standby	Full Standby
Engine BHP @ 1800 RPM (60 Hz)	1110	2221	3331	4441
Fuel Consumption (US Gal/Hr)	61	111	160	204
Exhaust Gas Flow (CFM)	8424	14252	18987	22293
Exhaust Gas Temperature (°F)	762	816	807	863
Exhaust Emission Data				
HC (Total Unburned Hydrocarbons)	0.22	0.10	0.08	0.07
NOx (Oxides of Nitrogen as NO_2)	3.81	3.75	4.15	6.12
CO (Carbon Monoxide)	0.54	0.19	0.09	0.06
PM (Particulate Matter)	0.06	0.02	0.01	0.01
SO_2 (Sulfur Dioxide)	0.005	0.005	0.005	0.005
Smoke (FSN)	0.71	0.30	0.16	0.08

(All values are cited: g/HP-hr)

Test Conditions

Steady-state emissions recorded per ISO8178-1 during operation at rated engine speed (+/-2%) and stated constant load (+/-2%) with engine temperatures, pressures and emission rates stabilized.

Fuel Specification:	ASTM D975 No. 2-D S15 diesel fuel with 0.0015 Wt.% Sulfur content, 42-48 Cetane Number
Air Inlet Temperature	25 °C (77 °F)
Fuel Inlet Temperature:	40 °C (104 °F)
Barometric Pressure:	100 kPa (29.53 in Hg)
Humidity:	NOx measurement corrected to 10.7 g/kg (75 grains H_2O/lb) of dry air
Intake Restriction:	Set to 18 in of H_2O as measured from compressor inlet
Exhaust Back Pressure:	Set to 1.5 in Hg
Note:	mg/m^3 values are measured dry, corrected to 5% O_2 and normalized to standard temperature and pressure (0°C, 101.325 kPa)

The NOx, HC, CO and PM emission data tabulated here are representative of test data taken from a single engine under the test conditions shown above. Data for the other components are estimated. These data are subjected to instrumentation and engine-to-engine variability. Field emission test data are not guaranteed to these levels. Actual field test results may vary due to test site conditions, installation, fuel specification, test procedures and instrumentation. Engine operation with excessive air intake or exhaust restriction beyond published maximum limits, or with improper maintenance, may results in elevated emission levels.

Sound Data
C3000D6EB
QSK78-G37 60Hz Diesel

A-weighted Sound Pressure Level @ 7 meters, dB(A)

See notes 2, 5 and 7-11 listed below

Configuration	Exhaust	Applied Load	Position (Note 2)								8 Position Average
			1	2	3	4	5	6	7	8	
Standard – Unhoused (40°C Shipped Loose Cooling System)	Infinite Exhaust	0% Standby	89.3	96.0	92.8	94.3	91.4	94.4	95.5	96.1	94.2
		25% Standby	89.8	96.0	93.2	94.7	91.4	94.3	96.0	96.3	94.5
		50% Standby	90.6	96.7	94.6	95.6	92.0	95.4	96.5	97.0	95.3
		75% Standby	92.0	97.9	96.2	97.1	93.1	96.6	97.8	98.7	96.7
		100% Standby	93.2	99.3	97.7	98.6	94.4	98.4	98.7	100.2	98.1
		25% DCC	89.7	96.2	93.1	94.6	91.5	94.4	96.1	96.3	94.5
		50% DCC	90.4	96.7	94.6	95.5	92.0	95.4	96.3	96.7	95.1
		75% DCC	91.7	97.5	95.7	96.7	92.9	96.4	97.4	98.1	96.3
		100% DCC	92.7	98.7	97.2	98.0	93.9	97.6	98.4	99.4	97.5
Standard – Unhoused (40°C Shipped Loose Cooling System)	No Muffler	0% Standby	91.2	96.0	93.8	95.2	91.9	95.2	96.1	96.3	94.8
		25% Standby	93.8	97.8	95.4	96.4	92.6	96.7	98.0	98.0	96.5
		50% Standby	96.2	99.7	97.7	98.1	93.8	98.7	99.7	99.8	98.4
		75% Standby	99.0	101.8	100.1	100.2	96.0	101.2	101.6	102.7	100.7
		100% Standby	100.7	103.7	102.1	101.6	97.4	103.1	103.5	104.1	102.4
		25% DCC	93.6	97.6	95.4	96.3	92.5	96.5	97.7	97.9	96.3
		50% DCC	95.3	99.3	97.1	97.8	93.5	98.2	99.2	99.2	97.8
		75% DCC	98.3	101.4	99.7	99.7	95.3	100.7	101.3	102.0	100.2
		100% DCC	99.9	102.9	101.3	101.1	97.0	102.4	102.9	103.6	101.8
Standard – Unhoused (50°C Shipped Loose Cooling System)	Infinite Exhaust	0% Standby	90.9	96.5	93.8	95.5	92.8	95.2	96.6	97.1	95.2
		25% Standby	91.1	96.6	94.1	95.5	92.8	95.4	96.8	97.0	95.3
		50% Standby	91.7	97.3	95.3	96.4	93.2	96.3	97.2	97.8	96.0
		75% Standby	92.8	98.3	96.9	97.8	94.2	97.3	98.3	99.1	97.2
		100% Standby	94.1	99.9	98.1	99.3	95.3	98.7	99.6	100.3	98.6
		25% DCC	91.1	96.6	94.1	95.6	92.8	95.3	96.9	97.0	95.3
		50% DCC	91.5	97.1	95.1	96.2	93.1	96.1	97.0	97.3	95.8
		75% DCC	92.6	97.9	96.4	97.4	93.9	97.1	98.0	98.7	96.9
		100% DCC	93.6	99.1	97.7	98.8	94.9	98.3	99.1	99.9	98.1

Sound Data
C3000D6EB
QSK78-G37 60Hz Diesel

Average A-weighted Sound Pressure Level @ 1 meter, dB(A)

See notes 1, 5 and 7-14 listed below

Configuration	Exhaust	Applied Load	Octave Band Center Frequency (Hz)											Overall Sound Pressure Level
			16	31.5	63	125	250	500	1000	2000	4000	8000	16000	
Standard – Unhoused (40°C Shipped Loose Cooling System)	Infinite Exhaust	0% Standby	N/A	N/A	67.0	84.0	90.4	95.1	94.5	91.9	87.7	79.8	66.3	99.8
		25% Standby	N/A	N/A	66.9	84.3	90.3	95.4	94.4	92.1	89.3	82.9	74.4	100.0
		50% Standby	N/A	N/A	67.3	84.6	90.8	95.3	95.1	93.4	90.2	90.0	74.1	100.9
		75% Standby	N/A	N/A	68.3	85.6	91.1	95.8	95.9	95.0	92.3	94.4	77.2	102.2
		100% Standby	N/A	N/A	69.4	86.8	91.6	96.7	97.0	96.5	94.3	97.7	78.5	103.9
		25% DCC	N/A	N/A	67.0	84.5	90.4	95.4	94.4	92.0	89.2	82.8	70.8	100.0
		50% DCC	N/A	N/A	67.3	84.7	90.8	95.5	95.0	93.1	90.1	89.1	73.8	100.8
		75% DCC	N/A	N/A	67.8	85.3	91.0	95.6	95.6	94.6	91.6	93.7	76.3	101.9
		100% DCC	N/A	N/A	69.2	86.3	91.3	96.3	96.6	96.0	93.6	96.3	77.9	103.2
Standard – Unhoused (40°C Shipped Loose Cooling System)	No Muffler	0% Standby	N/A	N/A	68.6	86.8	92.0	96.1	95.2	93.1	89.1	80.7	66.9	100.8
		25% Standby	N/A	N/A	70.5	87.7	94.6	99.6	97.6	98.0	94.4	84.9	73.7	104.4
		50% Standby	N/A	N/A	71.7	90.1	97.1	100.9	99.8	103.2	99.0	92.4	75.4	107.7
		75% Standby	N/A	N/A	73.0	92.3	99.6	103.1	102.5	106.3	102.3	97.5	81.1	110.6
		100% Standby	N/A	N/A	74.6	93.9	101.4	105.1	104.2	107.9	105.0	101.3	82.7	112.6
		25% DCC	N/A	N/A	70.4	87.7	94.4	99.3	97.4	97.5	93.9	84.6	70.9	104.0
		50% DCC	N/A	N/A	71.8	89.8	96.4	100.4	99.5	102.5	98.4	91.2	75.0	107.1
		75% DCC	N/A	N/A	72.4	91.7	99.5	102.3	101.9	105.7	101.4	96.3	79.7	109.9
		100% DCC	N/A	N/A	74.2	93.2	100.7	104.4	103.7	107.3	104.0	100.3	81.9	111.9
Standard – Unhoused (50°C Shipped Loose Cooling System)	Infinite Exhaust	0% Standby	N/A	N/A	70.8	87.0	92.0	95.9	95.3	93.1	89.2	81.3	66.9	100.9
		25% Standby	N/A	N/A	70.6	87.1	92.0	96.2	95.1	93.0	90.6	83.5	73.1	101.1
		50% Standby	N/A	N/A	70.7	87.2	92.4	96.1	95.8	94.3	91.2	90.6	74.8	101.9
		75% Standby	N/A	N/A	71.8	87.9	92.5	96.5	96.6	95.7	93.2	95.1	77.6	103.1
		100% Standby	N/A	N/A	72.2	88.6	93.0	97.2	97.6	97.0	95.0	98.5	78.8	104.7
		25% DCC	N/A	N/A	70.6	87.1	91.9	96.1	95.2	93.0	90.4	83.7	72.2	101.1
		50% DCC	N/A	N/A	70.9	87.3	92.3	96.1	95.7	94.0	91.0	89.5	74.1	101.7
		75% DCC	N/A	N/A	71.3	87.5	92.5	96.4	96.3	95.4	92.5	94.4	76.6	102.8
		100% DCC	N/A	N/A	72.1	88.3	92.8	97.0	97.2	96.6	94.4	97.5	78.3	104.1

A-weighted Sound Pressure Level @ Operator Location, dB(A)

See notes 1, 5 and 7-15 listed below

Configuration	Exhaust	Applied Load	Octave Band Center Frequency (Hz)											Overall Sound Pressure Level
			16	31.5	63	125	250	500	1000	2000	4000	8000	16000	
Standard – Unhoused (40°C Shipped Loose Cooling System)	Infinite Exhaust	0% Standby	N/A	N/A	69.2	84.6	90.8	99.7	99.2	94.7	90.4	83.3	69.1	103.7
		25% Standby	N/A	N/A	69.2	86.0	91.1	99.9	99.4	94.8	92.6	87.0	79.6	104.1
		50% Standby	N/A	N/A	69.0	87.2	91.6	100.1	99.6	95.9	93.3	93.2	79.5	104.7
		75% Standby	N/A	N/A	69.2	88.6	92.1	100.4	100.2	96.9	94.4	98.8	82.2	105.9
		100% Standby	N/A	N/A	70.4	89.9	93.5	101.3	101.4	98.0	95.9	104.9	81.9	108.5
		25% DCC	N/A	N/A	69.5	85.9	91.0	99.6	99.3	94.8	92.5	86.9	75.7	103.9
		50% DCC	N/A	N/A	69.2	87.2	91.8	100.5	99.7	95.6	93.1	90.8	80.0	104.7
		75% DCC	N/A	N/A	69.4	88.1	91.9	100.4	100.2	96.7	93.9	96.5	81.3	105.5
		100% DCC	N/A	N/A	70.2	89.5	92.9	101.0	101.1	97.7	95.5	102.7	82.0	107.5
Standard – Unhoused (40°C Shipped Loose Cooling System)	No Muffler	0% Standby	N/A	N/A	69.9	87.6	92.0	99.9	99.0	95.2	91.1	83.8	69.5	103.9
		25% Standby	N/A	N/A	71.5	88.8	94.6	100.4	99.1	95.7	94.3	87.7	78.2	104.7
		50% Standby	N/A	N/A	72.2	91.3	96.0	101.6	99.9	97.6	94.8	95.6	80.4	106.2
		75% Standby	N/A	N/A	72.9	92.5	98.1	102.3	100.7	99.6	96.5	101.2	83.4	108.1
		100% Standby	N/A	N/A	74.5	94.8	100.5	104.0	101.8	100.8	98.2	102.0	82.5	109.5
		25% DCC	N/A	N/A	71.4	88.7	94.3	100.3	99.1	95.7	93.7	87.2	75.4	104.6
		50% DCC	N/A	N/A	72.4	91.1	95.8	101.8	99.8	97.2	94.6	93.1	78.9	106.0
		75% DCC	N/A	N/A	72.5	91.6	97.5	101.9	100.5	99.2	95.8	97.1	81.4	107.1
		100% DCC	N/A	N/A	73.9	94.1	99.5	103.4	101.6	100.4	97.6	105.6	82.6	110.1
Standard – Unhoused (50°C Shipped Loose Cooling System)	Infinite Exhaust	0% Standby	N/A	N/A	71.4	87.7	92.2	102.8	100.9	95.5	91.3	84.4	69.4	105.9
		25% Standby	N/A	N/A	71.6	88.7	92.4	102.5	100.7	95.3	94.2	87.2	78.4	105.9
		50% Standby	N/A	N/A	71.4	89.3	93.0	102.7	100.9	96.2	93.6	94.5	81.9	106.4
		75% Standby	N/A	N/A	71.6	90.2	93.6	102.7	101.5	97.2	94.9	100.6	82.6	107.5
		100% Standby	N/A	N/A	72.0	90.9	94.7	103.3	102.4	98.5	96.3	103.4	81.8	108.8
		25% DCC	N/A	N/A	71.6	88.8	92.4	102.4	100.7	95.4	92.7	87.3	76.2	105.7
		50% DCC	N/A	N/A	71.4	89.4	93.2	102.7	101.0	96.1	93.6	94.4	80.5	106.4
		75% DCC	N/A	N/A	71.4	89.7	93.1	102.5	101.2	96.9	94.4	96.9	80.9	106.7
		100% DCC	N/A	N/A	71.8	90.6	94.3	103.3	102.2	98.1	95.9	105.2	82.4	109.3

A-weighted Sound Power Level, dB(A)

See notes 1, 3 and 6-14 listed below

Configuration	Exhaust	Applied Load	Octave Band Center Frequency (Hz)											Overall Sound Power Level
			16	31.5	63	125	250	500	1000	2000	4000	8000	16000	
Standard – Unhoused (40°C Shipped Loose Cooling System)	Infinite Exhaust	0% Standby	N/A	N/A	89.6	106.6	113.0	117.7	117.1	114.5	110.3	102.4	88.9	122.5
		25% Standby	N/A	N/A	89.5	106.9	112.9	118.0	117.0	114.7	112.0	105.5	97.0	122.7
		50% Standby	N/A	N/A	89.9	107.2	113.4	117.9	117.7	116.0	112.8	112.6	96.7	123.5
		75% Standby	N/A	N/A	91.0	108.2	113.7	118.4	118.5	117.6	114.9	117.0	99.8	124.9
		100% Standby	N/A	N/A	92.0	109.4	114.2	119.3	119.6	119.1	116.9	120.4	101.1	126.5
		25% DCC	N/A	N/A	89.6	107.1	113.0	118.0	117.0	114.6	111.8	105.4	93.4	122.7
		50% DCC	N/A	N/A	89.9	107.4	113.4	118.1	117.6	115.7	112.7	111.7	96.4	123.5
		75% DCC	N/A	N/A	90.4	107.9	113.7	118.2	118.2	117.2	114.2	116.3	98.9	124.6
		100% DCC	N/A	N/A	91.8	108.9	113.9	118.9	119.2	118.6	116.2	118.9	100.6	125.9
Standard – Unhoused (40°C Shipped Loose Cooling System)	No Muffler	0% Standby	N/A	N/A	91.2	109.5	114.6	118.7	117.8	115.7	111.7	103.3	89.5	123.5
		25% Standby	N/A	N/A	93.1	110.3	117.2	122.2	120.2	120.7	117.0	107.5	96.4	127.0
		50% Standby	N/A	N/A	94.3	112.7	119.7	123.5	122.5	125.8	121.6	115.0	98.0	130.3
		75% Standby	N/A	N/A	95.6	114.9	122.2	125.8	125.2	128.9	124.9	120.1	103.8	133.2
		100% Standby	N/A	N/A	97.2	116.5	124.0	127.7	126.9	130.5	127.6	123.9	105.4	135.2
		25% DCC	N/A	N/A	93.0	110.3	117.0	121.9	120.0	120.1	116.5	107.2	93.5	126.7
		50% DCC	N/A	N/A	94.4	112.5	119.0	123.1	122.1	125.1	121.0	113.8	97.6	129.7
		75% DCC	N/A	N/A	95.0	114.3	122.1	125.0	124.5	128.3	124.0	118.9	102.3	132.5
		100% DCC	N/A	N/A	96.8	115.8	123.3	127.0	126.3	129.9	126.6	122.9	104.5	134.5
Standard – Unhoused (50°C Shipped Loose Cooling System)	Infinite Exhaust	0% Standby	N/A	N/A	93.4	109.6	114.6	118.5	118.0	115.7	111.9	103.9	89.5	123.5
		25% Standby	N/A	N/A	93.2	109.7	114.6	118.8	117.7	115.7	113.2	106.1	95.7	123.7
		50% Standby	N/A	N/A	93.3	109.8	115.0	118.7	118.4	116.9	113.8	113.2	97.4	124.5
		75% Standby	N/A	N/A	94.4	110.5	115.1	119.1	119.2	118.3	115.8	117.7	100.2	125.7
		100% Standby	N/A	N/A	94.8	111.3	115.6	119.9	120.2	119.7	117.6	121.1	101.4	127.2
		25% DCC	N/A	N/A	93.2	109.7	114.6	118.7	117.8	115.6	113.0	106.3	94.8	123.7
		50% DCC	N/A	N/A	93.5	109.9	114.9	118.7	118.3	116.6	113.6	112.1	96.7	124.3
		75% DCC	N/A	N/A	93.9	110.1	115.1	119.0	118.9	118.0	115.1	117.0	99.2	125.4
		100% DCC	N/A	N/A	94.7	110.9	115.4	119.6	119.9	119.2	117.0	120.1	100.9	126.7

Exhaust Sound Power Level, dB(A)

See notes 4 and 6-14 listed below

Configuration	Applied Load	Octave Band Center Frequency (Hz)											Overall Sound Power Level
		16	31.5	63	125	250	500	1000	2000	4000	8000	16000	
Standard - Unhoused (40°C Shipped Loose Cooling System, No Muffler)	0% Standby	N/A	N/A	84.7	104.5	107.7	110.3	106.9	105.8	102.9	92.6	77.9	114.8
	25% Standby	N/A	N/A	89.3	105.6	114.2	118.0	114.5	116.4	112.1	99.0	88.0	122.6
	50% Standby	N/A	N/A	91.2	109.6	117.7	120.0	118.1	122.4	118.1	107.6	89.0	126.8
	75% Standby	N/A	N/A	92.8	112.2	120.6	122.8	121.4	125.4	121.9	113.4	99.8	129.9
	100% Standby	N/A	N/A	95.0	113.8	122.3	124.8	123.3	126.8	124.9	118.6	102.5	132.0
	25% DCC	N/A	N/A	88.9	105.3	113.8	117.6	114.0	115.6	111.4	98.2	76.6	122.1
	50% DCC	N/A	N/A	91.5	109.0	116.6	119.3	117.5	121.8	117.3	107.0	87.8	126.1
	75% DCC	N/A	N/A	92.3	111.6	120.6	121.9	120.7	125.0	120.7	111.6	97.5	129.3
	100% DCC	N/A	N/A	94.5	113.1	121.7	124.1	122.7	126.5	123.8	117.0	101.4	131.3

Global Notes:

1. Sound pressure levels at 1 meter are measured per the requirements of ISO 3744, ISO 8528-10, and European Communities Directive 2000/14/EC as applicable. The microphone measurement locations are 1 meter from a reference parallelepiped just enclosing the generator set (enclosed or unenclosed).
2. Seven-meter measurement location 1 is 7 meters (23 feet) from the generator (alternator) end of the generator set, and the locations proceed counter-clockwise around the generator set at 45° angles at a height of 1.2 meters (48 inches) above the ground surface.
3. Sound Power Levels are calculated according to ISO 3744, ISO 8528-10, and or CE (European Union) requirements.
4. Exhaust Sound Levels are measured and calculated per ISO 6798, Annex A.
5. Reference Sound Pressure Level is 20 µPa.
6. Reference Sound Power Level is 1 pW (10^{-12} Watt).
7. Sound data for remote-cooled generator sets are based on rated loads without cooling fan noise.
8. Sound data for the generator set with infinite exhaust do not include the exhaust noise contribution.
9. Published sound levels are measured at CE certified test site and are subject to instrumentation, measurement, installation and manufacturing variability.
10. Unhoused/Open configuration generator sets refers to generator sets with no sound enclosures of any kind.
11. Housed/Enclosed/Closed/Canopy configuration generator sets refer to generator sets that have noise reduction sound enclosures installed over the generator set and usually integrally attached to the skid base/base frame/fuel container base of the generator set.
12. Published sound levels meet the requirements India's Central Pollution Control Board (Ministry of Environment & Forests),vide GSR 371 (E), which states the A-weighted sound level at1meter from any diesel generator set up to a power output rating of 1000kVA shall not exceed 75dB(A)
13. For updated noise pollution information for India see website: http://www.envfor.nic.in/legis/legis.html
14. Sound levels must meet India's Ambient Air Noise Quality Standards detailed for Daytime/Night-time operation in Noise Pollution (Regulation and Control) Rules, 2000
15. Operator Location is near genset control panel and is at 1 meter distance from genset control panel and at 1.6 meter height.

Prototype Test Support (PTS)
60 Hz test summary

Generator set models	Representative prototype	
C3000D6EB (-G37)	Model:	C3000D6EB
C3000D6EB (-G36)	Engine:	QSK78-G37
C2750D6E (-G36)	Alternator:	S9L1D-G4

The following summarizes prototype testing conducted on the designated representative prototype of the specified models. This testing is conducted to verify the complete generator set electrical and mechanical design integrity.

Prototype testing is conducted only on generator sets not sold as new equipment.

Maximum surge power: 3203 kW

The generator set was evaluated to determine the stated maximum surge power.

Maximum motor starting: N/A

The generator set was tested to simulate motor starting by applying the specified kVA load at low lagging power factor (0.4 or lower). With this load applied, the generator set recovered to a minimum of 90% rated voltage

Alternator temperature rise:

The highest rated temperature rise (150°C) test result are reported as follows to verify that worst case temperature rises do not exceed allowable NEMA MG1 limits for class H insulation. Tests were conducted per IEEE 115, rise by resistance and embedded detector, with rated voltages. Only the highest temperatures are reported.

Location	Maximum Rise (°C)
Alternator Stator:	150
Alternator Rotor:	150
Exciter Stator:	150
Exciter Rotor:	150

Torsional analysis and testing:

The generator set on S9L1D-G4 was tested to verify that the design is not subjected to harmful torsional stresses. A spectrum analysis of the transducer output was conducted over the speed range of 1650 to 1950 RPM.

Cooling system: 50 °C ambient
1.0 in H2O restriction

The cooling system was tested to determine ambient temperature and static restriction capabilities. The test was performed at full rated load elevated ambient temperature under static restriction conditions.

Durability:

The generator set was subjected to a minimum 24 hour endurance test operating at variable load to verify structural soundness and durability of the design.

Electrical and mechanical strength:

The generator set was tested to several single phase and three phase faults to verify that the generator can safely withstand the forces associated with short circuit conditions. The generator set was capable of producing full rated output at the conclusion of the testing.

Steady state performance:

The generator set was tested to verify steady state operating performance. It was within the specified maximum limits.

Voltage regulation:	± 1.0%
Random voltage variation:	± 1.0%
Frequency regulation:	Isochronous
Random frequency variation:	± 0.5%

Transient performance:

The generator set was tested with the listed alternator to verify single step loading capability as required by NFPA 110. Voltage and frequency response on load addition or rejection were evaluated. The following results were recorded at 0.8 power factor:

Full load acceptance:

Voltage dip:	50.5%
Recovery time:	7.6 seconds
Frequency dip:	13.7%
Recovery time:	7.7 seconds

Full load rejection:

Voltage rise:	17.1%
Recovery time:	2.0 seconds
Frequency rise:	5.0%
Recovery time:	1.2 seconds

All data based on 0.8 power factor:

Harmonic analysis:

(per MIL-STD-705B, Method 601.4)

	Line to Line		Line to Neutral	
Harmonic	No load	Full load	No load	Full load
3	0.02	N/A	0.05	N/A
5	1.19	N/A	1.19	N/A
7	0.74	N/A	0.75	N/A
9	0.01	N/A	0.01	N/A
11	0.02	N/A	0.02	N/A
13	0.04	N/A	0.04	N/A
15	0.00	N/A	0.01	N/A

Cooling System Data
C3000D6EB
QSK78-G37

High Ambient Air Temperature Radiator Cooling System									
				Max cooling @ air flow static restriction, unhoused (inches water/mm water)					Housed in free air, no air discharge restriction
				0.0/0.0	0.25/6.4	0.5/12.7	0.75/19.1	1.0/25.4	Enclosed
	Fuel Type	Duty	Rating (kW)	Maximum allowable ambient temperature, degree C					
60 Hz	Diesel	Standby	3000	56.1	53.1	50.1	47.2	44.3	N/A
		DCC	2750	58.5	56.1	53.7	50.4	47.1	N/A
				Airflow (m^3/s) – Actual @ Fan					
				52.53	50.82	49.10	47.48	45.86	N/A

Enhanced High Ambient Air Temperature Radiator Cooling System									
				Max cooling @ air flow static restriction, unhoused (inches water/mm water)					Housed in free air, no air discharge restriction
				0.0/0.0	0.25/6.4	0.5/12.7	0.75/19.1	1.0/25.4	Enclosed
	Fuel Type	Duty	Rating (kW)	Maximum allowable ambient temperature, degree C					
60 Hz	Diesel	Standby	3000	61.4	59.4	57.3	53.7	50.0	N/A
		DCC	2750	63.5	61.4	59.2	56.1	52.9	N/A
				Airflow (m^3/s) – Actual @ Fan					
				64.35	61.71	59.06	56.99	54.91	N/A

Notes:

1. Data shown are anticipated cooling performance for typical generator set.
2. Cooling data is based on 1000 ft (305 m) site test location.
3. Generator set power output may need to be reduced at high ambient conditions. Consult generator set data sheet for derate schedules.
4. Cooling performance may be reduced due to several factors including but not limited to: Incorrect installation, improper operation, fouling of the cooling system, and other site installation variables.

Alternator Data Sheet
Frame Size: S9L1D-E4

Characteristics

	No of Bearings:	1-bearing		2-bearing	
Weights:	Stator assembly:	N/A	N/A	7782 lb	3530 kg
	Rotor assembly:	N/A	N/A	5262 lb	2387 kg
	Complete assembly:	N/A	N/A	15542 lb	7050 kg
Maximum speed:		2250 rpm			
Excitation current:	Full load:	Wdg 312: 4; Wdg 607: 3.9, Wdg 613: 3.9			
	No load:	Wdg 312: 1-0.9; Wdg 607: 1.0, Wdg 613: 0.9			
Insulation system:	Class H throughout				

3 Ø Ratings (0.8 power factor)			**60 Hz** (winding no)							
			416 (312)	440 (312)	460 (312)	480 (312)	600 (607)	380 (613)	400 (613)	416 (613)
150° C rise ratings	@ 40° C	kW	3072	3248	3396	3544	3545	3200	3200	3200
		kVA	3840	4060	4245	4430	4431	4000	4000	4000
125° C rise ratings	@ 40° C	kW	2872	3040	3175	3314	3315	3000	3000	3000
		kVA	3590	3800	3969	4142	4144	3750	3750	3750
105° C rise ratings	@ 40° C	kW	2680	2840	2968	3097	3100	2760	2760	2760
		kVA	3350	3550	3710	3871	3875	3450	3450	3450
80° C rise ratings	@ 40° C	kW	2332	2468	2579	2691	2700	2425	2425	2425
		kVA	2915	3085	3224	3364	3375	3031	3031	3031

Reactances (per unit ± 10%)	416 (312)	440 (312)	460 (312)	480 (312)	600 (607)	380 (613)	400 (613)	416 (613)
(Based on full load at 125° C rise rating)								
Synchronous	2.454	2.322	2.219	2.126	1.960	2.090	1.886	1.744
Transient	0.231	0.219	0.209	0.200	0.173	0.230	0.207	0.191
Subtransient	0.156	0.148	0.141	0.135	0.120	0.136	0.122	0.113
Negative sequence	0.218	0.207	0.198	0.189	0.170	0.173	0.156	0.144
Zero sequence	0.089	0.084	0.080	0.077	0.064	0.006	0.005	0.005

Motor starting	416 (312)	440 (312)	460 (312)	480 (312)	600 (607)	380 (613)	400 (613)	416 (613)
Maximum kVA (90% sustained voltage)	11520	12180	12735	13290	13293	11250	11250	11250

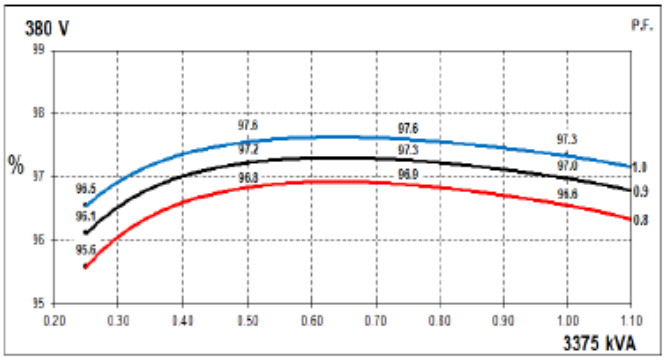
Time constants (sec)	416 (312)	440 (312)	460 (312)	480 (312)	600 (607)	380 (613)	400 (613)	416 (613)
Transient	0.24	0.24	0.24	0.24	0.23	0.363	0.363	0.363
Subtransient	0.0163	0.0163	0.0163	0.0163	0.0184	0.017	0.017	0.017
Open circuit	4.16	4.16	4.16	4.16	4.25	3.477	3.477	3.477
DC	0.034	0.034	0.034	0.034	0.039	0.025	0.025	0.025

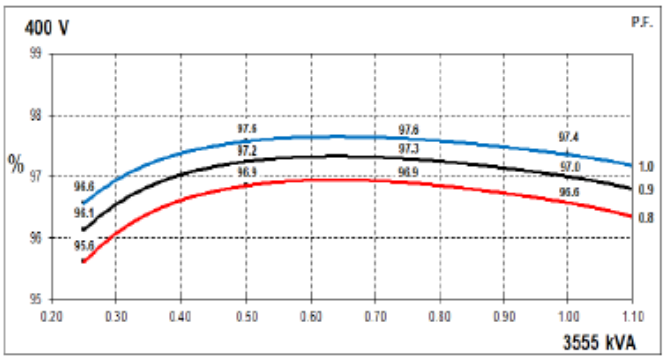
Windings (@22° C)	416 (312)	440 (312)	460 (312)	480 (312)	600 (607)	380 (613)	400 (613)	416 (613)
Stator resistance (L-L Ohms)	0.00066	0.00066	0.00066	0.00066	0.00096	0.0004	0.0004	0.0004
Rotor resistance (Ohms)	1.56	1.56	1.56	1.56	1.56	1.56	1.56	1.56
Number of leads	6	6	6	6	6	6	6	6

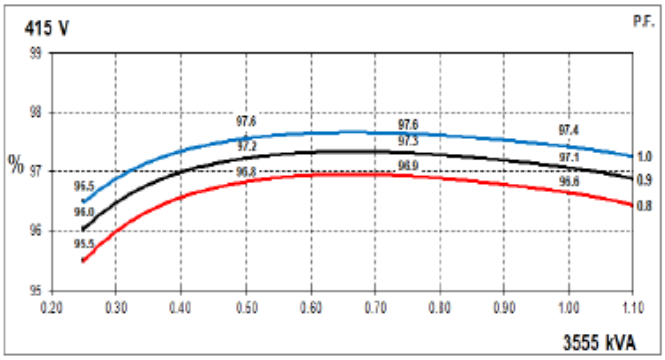
S9L1D-E4 Wdg.312

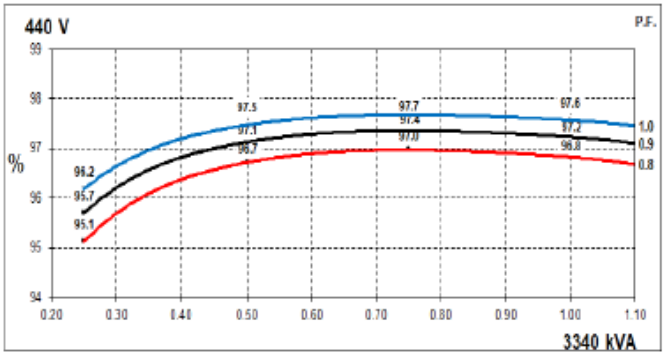
THREE PHASE EFFICIENCY CURVES

50Hz

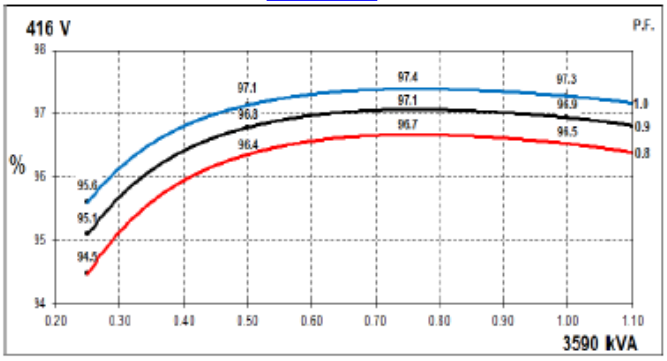


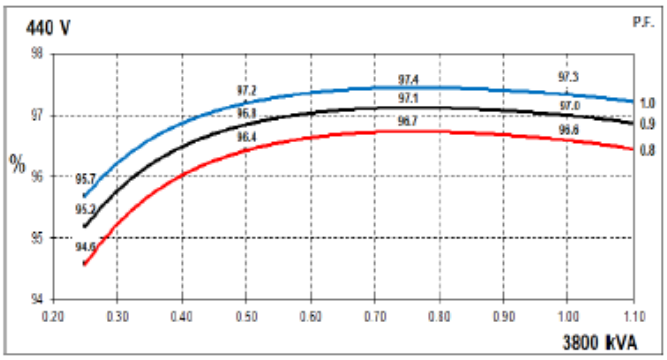


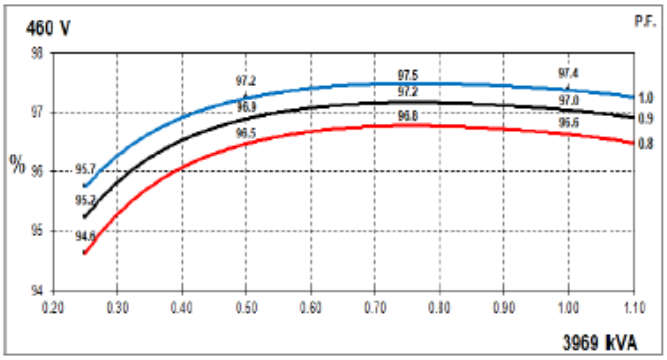


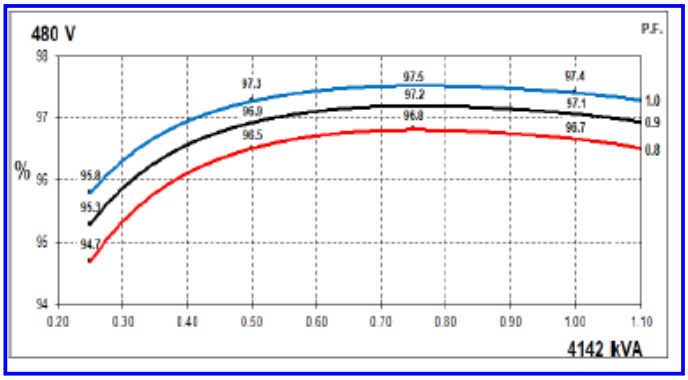


60Hz





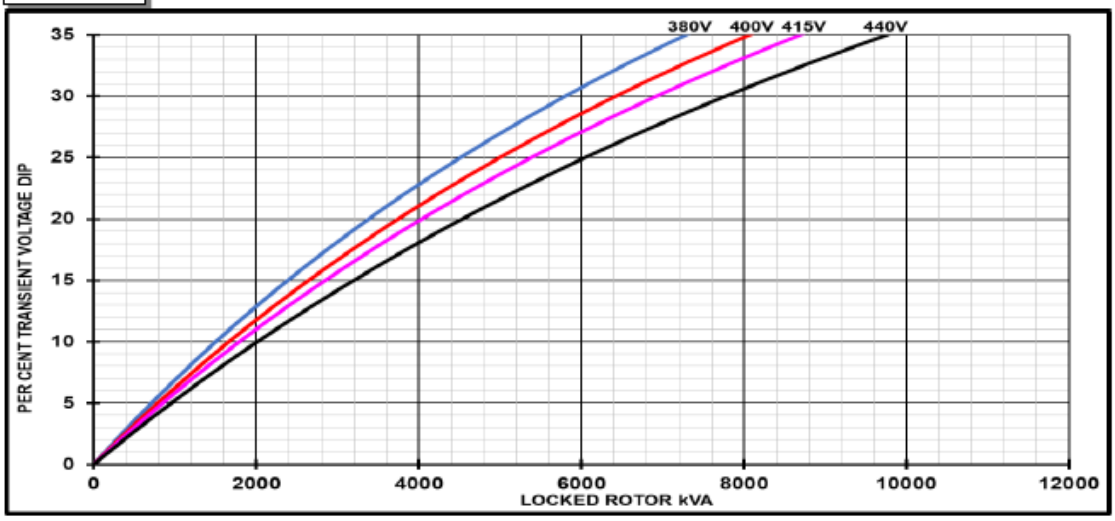




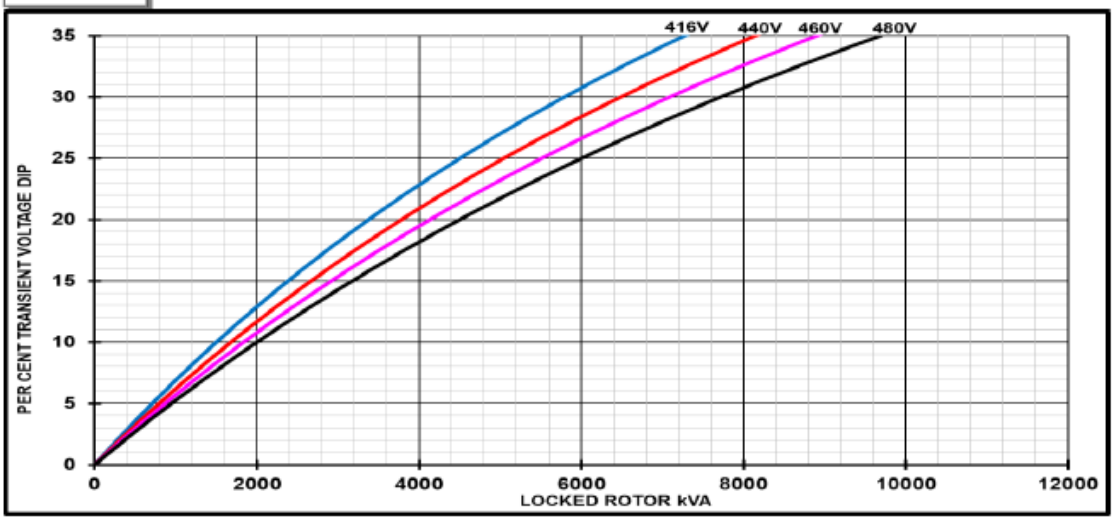
S9L1D-E4 Wdg.312

Locked Rotor Motor Starting Curves - Separately Excited

50Hz



60Hz



Transient Voltage Dip Scaling Factor	
Lagging PF	Scaling Factor
<= 0.4	1.00
0.5	0.95
0.6	0.90
0.7	0.86
0.8	0.83
0.9	0.75
0.95	0.70
1	0.65

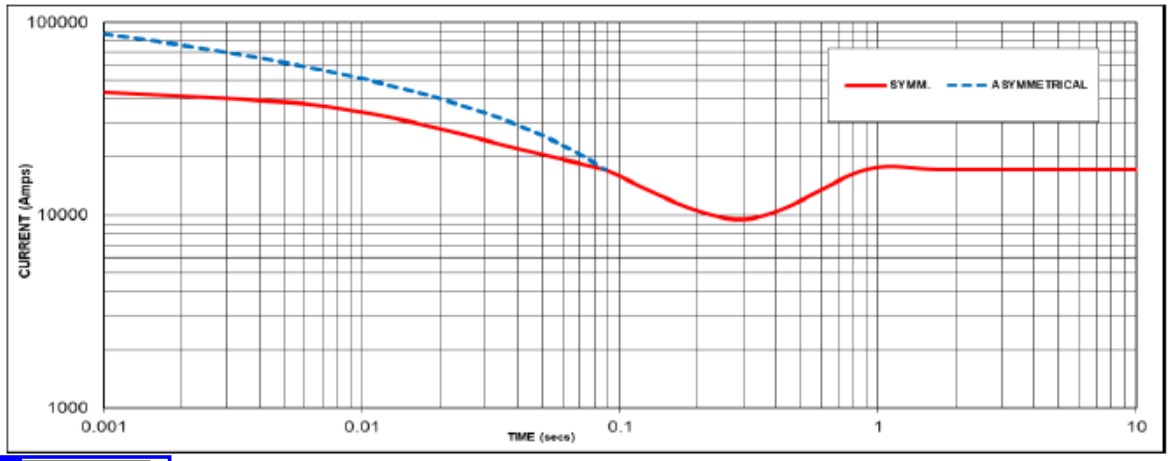
Transient Voltage Rise Scaling Factor	
Lagging PF	Scaling Factor
<= 0.4	1.25
0.5	1.20
0.6	1.15
0.7	1.10
> 0.7	1.00

Note: To determine % Transient Voltage Dip or Voltage Rise at various PF, multiply the % Voltage Dip from the curve directly by the Scaling Factor.

S9L1D-E4 Wdg.312

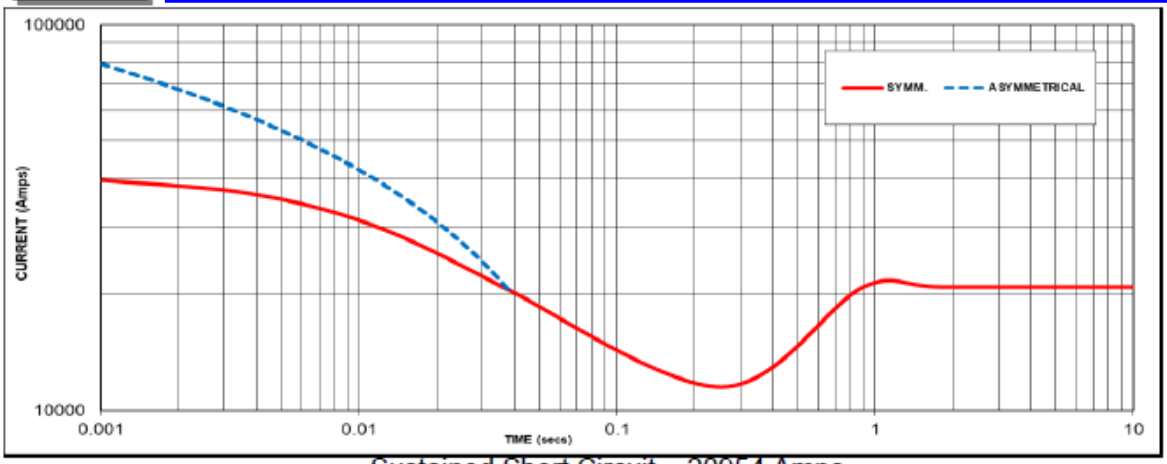
Three-phase Short Circuit Decrement Curve - Separately Excited

50Hz



Sustained Short Circuit = 17262 Amps

60Hz



Sustained Short Circuit = 20954 Amps

Note 1
The following multiplication factors should be used to adjust the values from curve between time 0.001 seconds and the minimum current point in respect of nominal operating voltage :

50Hz		60Hz	
Voltage	Factor	Voltage	Factor
380V	X 1.00	416V	X 1.00
400V	X 1.05	440V	X 1.06
415V	X 1.09	460V	X 1.11
440V	X 1.16	480V	X 1.15

The sustained current value is constant irrespective of voltage level

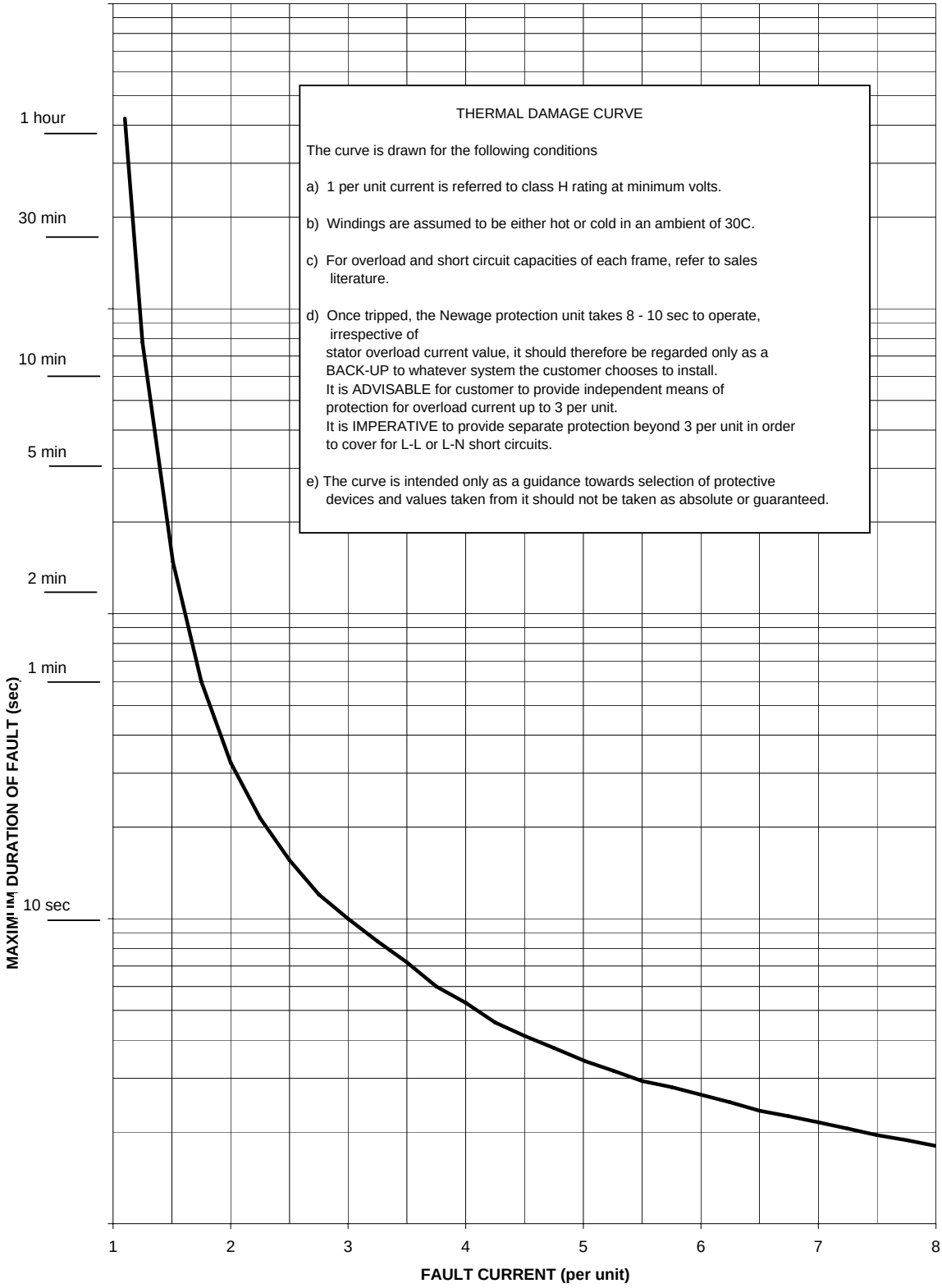
Note 2
The following multiplication factor should be used to convert the values calculated in accordance with NOTE 1 to those applicable to the various types of short circuit :

	3-phase	2-phase L-L	1-phase L-N
Instantaneous	x 1.00	x 0.87	x 1.30
Minimum	x 1.00	x 1.80	x 3.20
Sustained	x 1.00	x 1.50	x 2.50
Max. sustained duration	10 sec.	5 sec.	2 sec.

All other times are unchanged

Note 3
Curves are drawn for Star connections under no-load excitation at rated speeds. For other connection (where applicable) the following multipliers should be applied to current values as shown :
Parallel Star = Curve current value X 2
Series Delta = Curve current value X 1.732

THERMAL DAMAGE CURVE



THERMAL DAMAGE CURVE

The curve is drawn for the following conditions

a) 1 per unit current is referred to class H rating at minimum volts.

b) Windings are assumed to be either hot or cold in an ambient of 30C.

c) For overload and short circuit capacities of each frame, refer to sales literature.

d) Once tripped, the Newage protection unit takes 8 - 10 sec to operate, irrespective of stator overload current value, it should therefore be regarded only as a BACK-UP to whatever system the customer chooses to install. It is ADVISABLE for customer to provide independent means of protection for overload current up to 3 per unit. It is IMPERATIVE to provide separate protection beyond 3 per unit in order to cover for L-L or L-N short circuits.

e) The curve is intended only as a guidance towards selection of protective devices and values taken from it should not be taken as absolute or guaranteed.

VMC GROUP
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CERTIFICATE OF COMPLIANCE
SEISMIC DESIGN OF NONSTRUCTURAL COMPONENTS AND SYSTEMS

Certification No.

VMA-50998-01C (Revision 16)

Expiration Date: 6/30/2026

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 2021, 2018, 2015, 2012

The following model designations, options, and accessories are included in this certification. Reference report number VMA-50998-01 as issued by VMC Group for a complete list of certified models, included accessories/options, and certified installation methods.

Cummins Power Generation, Inc.; Diesel Gensets

DQGAx, DQKAx, DQKAN, DQLx, C3000D6EB, C2750D6E; 1250kW - 3000kW

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 and CERL (US Army Corp. of Engineers) Laboratory under the witness of the ISO Accredited Product Certification Agency, the VMC Group.

Certified Seismic Design Levels[8]			
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
		$S_{DS} \leq 2.000$ g	$S_{DS} \leq 2.200$ g

The qualified seismic design level stated is the highest for all series this certificate covers. For more information, see the certified product tables on page 2.

Certified Seismic Installation Methods[9]	
External Isolation Mounting From Unit Base To Fuel Tank	External Isolation Mounting From Unit Base To Rigid Structure
Rigid Mounting From Unit Base To Rigid Structure	Rigid Mounting From Unit Base To Fuel Tank

HEADQUARTERS
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Toll Free: 800.569.8423
Fax: 973.492.8430

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Suite 300
Sacramento, CA 95834
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11930 Brittmoore Park Drive
Houston, TX 77041
Phone: 713.466.0003
Fax: 713.466.1355

thevmcgroup.com

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CERTIFICATE OF COMPLIANCE

SEISMIC DESIGN OF NONSTRUCTURAL COMPONENTS AND SYSTEMS

Certified Product Table:

Series	Model	Max Rating [kW]	Length [in]	Width [in]	Height [in]	Max Weight [lbs]	Configuration
QSK50 Tier 2	DQGAA, B	1250, 1500	235	79	112	29,262	Off Tank
QSK50 Trinity	DQGAE, F, G, H, J, K, M, N, S		254	98	123	33,556	
QSK60	DQKAA, B	1750, 2000	244	100	120	35,846	
QSK60 Trinity	DQKAD, E, F, G, H, J, M	1750, 2000, 2250	275	98	161	43,805	
QSK60 Ghost	DQKAN	2500	278	104	125	51,366	
QSK78	C2750D6E, C3000D6EB	2750, 3000	284	121	143	55,600	
	DQLC, D, E, F, H	2500, 2750	292	125	153	57,168	
QSK60	DQKAA, B	1750, 2000	244	100	152	62,592	On Tank
QSK60 Trinity	DQKAD, E, F, G, H, J, M	1750, 2000, 2250	275	98	185	70,639	
QSK60 Ghost	DQKAN	2500	278	104	125	70,760	
QSK78	DQLC, D, E, F, H	2500, 2750	308	125	178		

Radiator Manufacturer	Type	S_{DS} (z/h=0)	S_{DS} (z/h=1)	A_{Flex-H}	A_{Rig-H}	A_{Flex-V}	A_{Rig-V}	Rigid F_p/W_p	Isolated F_p/W_p
Bearward	AC156	1.94	0.647	1.94	0.78	1.3	0.52	0.47	1.46
Modine			1.94	3.1	2.33			1.4	4.37
IEA		2.10	2.0	3.20	2.40	1.41	0.57	1.20	4.50
AKG		2.20	1.90	3.04	2.28	1.47	0.59	N/A	4.28

This certification includes the open generator set. The generator set and included options shall be a catalogue design and factory supplied. The generator set and applicable options shall be installed and attached to the building structure per the manufacturer supplied seismic installation instructions. This certification excludes tanks (but approves the attachment of the unit to tanks), After Treatment Units (ATUs), all non-factory supplied accessories, including but not limited to mufflers, isolation/restraint devices, remote control panels, pumps and other electrical/ mechanical components.

Notes
1: DQGAE-S and DQKAD-M generator sets are certified for the configuration that allows the use of remote radiators. However, the seismic certification of said remote radiators is the responsibility of others and is not covered under this certification.
2: This certification includes the use of the breather stand on the ECO generator set models. All other generator set models are not certified for use with the breather stand.
3: SDS level is limited by radiator manufacturer used.

IBC® CERTIFIED VMC GROUP

VMA-50998-01C (Revision 16)
Issue Date: Tuesday, May 2, 2017
Revision Date: Thursday, August 8, 2024
Expiration Date: Tuesday, June 30, 2026

VMC GROUP
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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 tested units 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 2021 referencing ASCE7-16 and ICC-ES AC-156
   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

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 makes no statements of compliance in regards to NEMA, IP, UL, CSA, or other relevant standards after a seismic event. For compliance to other relevant standards, please contact the manufacturer.

6. This certificate applies to units manufactured at:
   1400 73rd Ave NE, Minneapolis, MN 55432
   Royal Oak Way South, Daventry, NN11 8NU, United Kingdom

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

8. The qualified seismic design level stated is the highest for all series this certificate covers. For more information, see the certified product tables on page 2.

9. The certified seismic installation methods stated are a summary for all product lines this certificate covers. For individual certified seismic installation methods, see the certified product tables.

John P. Giuliano, PE
President, VMC Group

IAS ACCREDITED Product Certification Agency

VMA-50998-01C (Revision 16)
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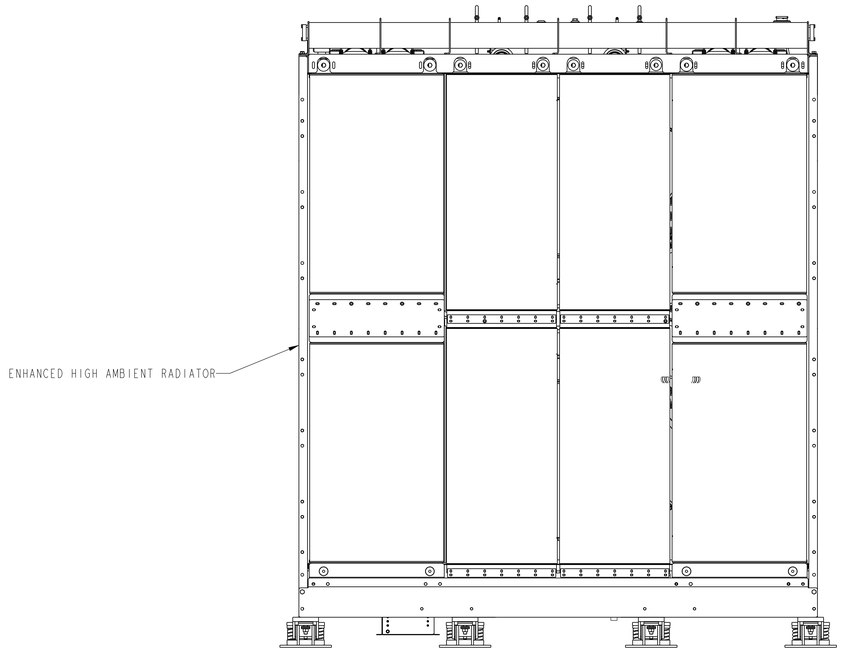
IBC® CERTIFIED VMC GROUP

SECTION 3

GENERATOR ACCESSORIES

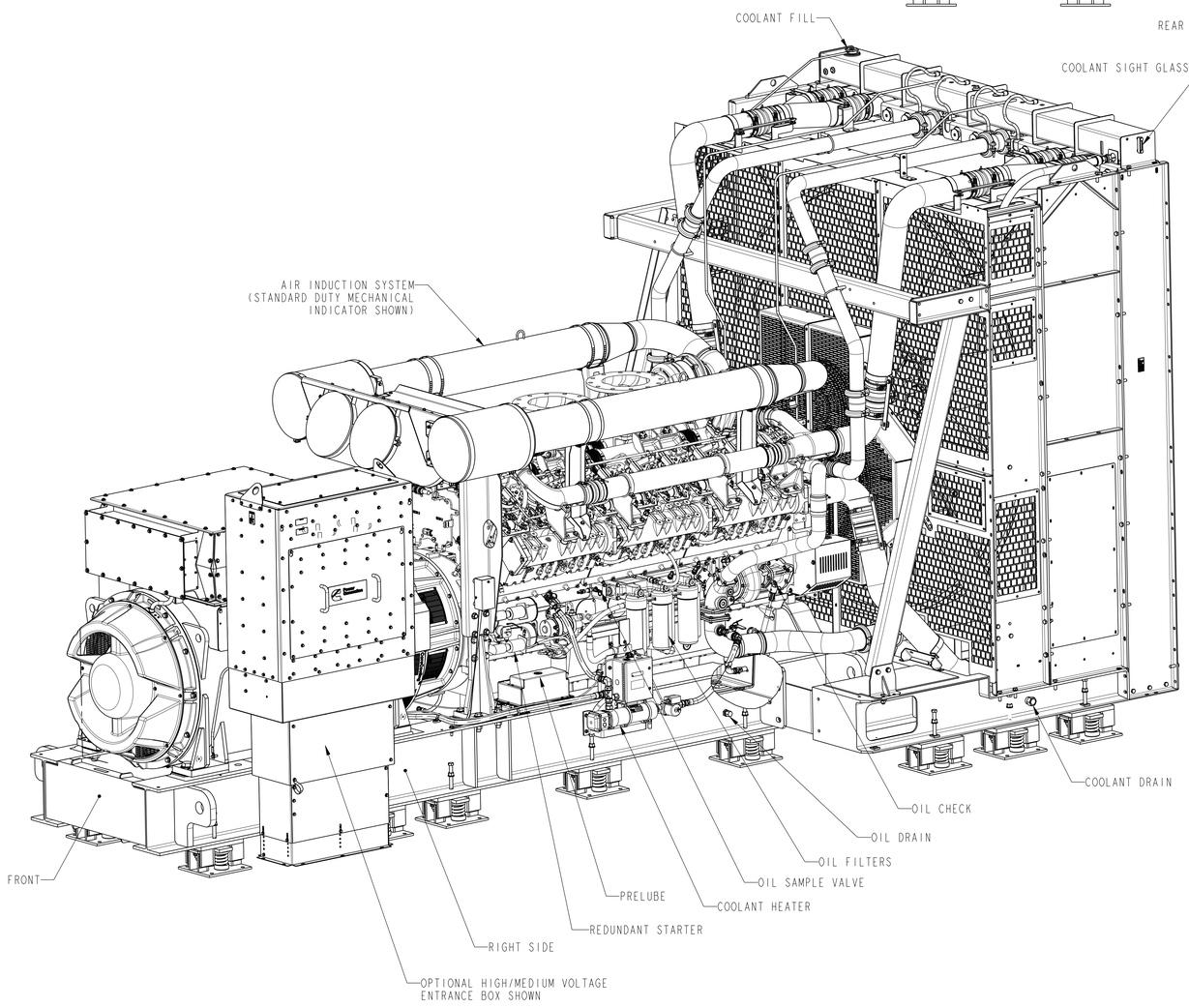
SECTION 3

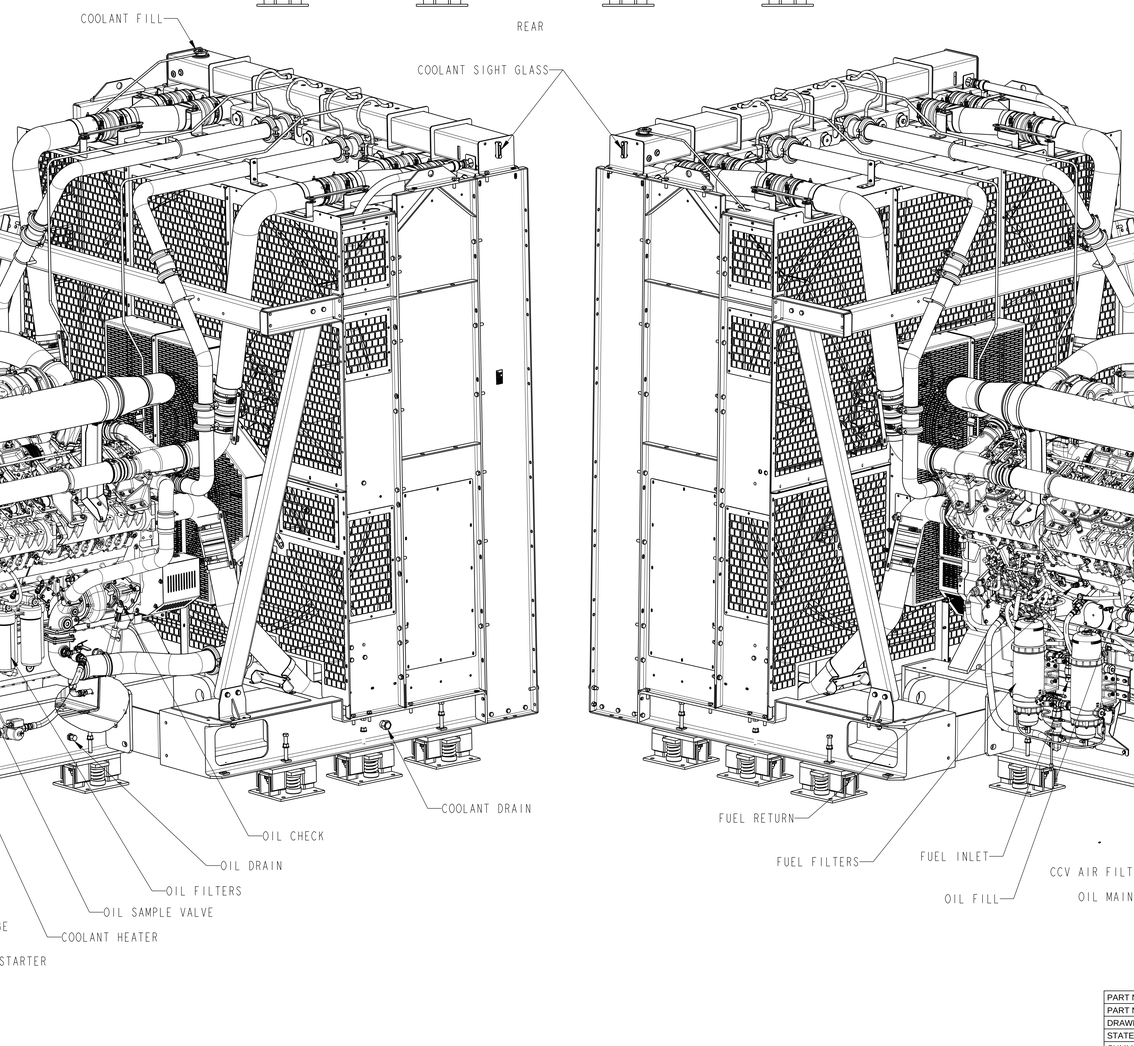
GENERATOR DRAWINGS
&
INTERCONNECTS



NOTES:

1. ALL DIMENSIONS IN [ ] ARE INCHES.
2. ALL DIMENSIONS ARE REFERENCE, UNLESS SPECIFICALLY TOLERANCED.
3. PROVIDE FLEXIBLE CONDUIT TO CONTROL BOX.
4. GENSET SHIPPED IS FILLED WITH ENGINE OIL.
5. GENSET LIFTING SHACKLES TO BE USED PER DIMENSIONS OF LIFTING EYES SHOWN. (SHEET 3)
6. DO NOT LIFT GENSET WITH COOLING SYSTEM ATTACHED.
7. REFER TO SHEET 2 FOR C OF G TABULATION.
8. LATERAL CENTER OF GRAVITY IS ON THE CRANK SHAFT CENTER LINE.
9. VIBRATION ISOLATORS SHOWN.
10. SUB-BASE ANTI-VIBRATION MOUNTS ARE REQUIRED TO BE INSTALLED PRIOR TO GENSET OPERATION.
11. LIFTING OPTIONS PROVIDED ON SHEETS 10 AND 11.
12. ALL LIFTING APPARATUS MUST HAVE VALID TEST CERTIFICATE.
13. PROTECTION REQUIRED TO PREVENT DAMAGE TO UNIT WHEN STROPS COME INTO CONTACT.
14. LIFTING OPTION 1 USING FOUR POINT LIFT IS THE PREFERRED METHOD OF LIFTING. SEE SHEET 10.
15. LIFT WITH CHARGE ALTERNATOR GUARD REMOVED FROM ENGINE. FOR LIFTING OPTION 1. SEE SHEET 10
16. LIFT WITH NO CAC ELBOWS FITTED. SEE SHEETS 10 & 11.
17. IT IS THE LIFTING ORGANIZATION'S RESPONSIBILITY TO PREFORM RECOMMENDED LIFTING SHOWN ON THIS DRAWING. SPREADER BARS AND LIFTING STROPS ARE NOT PROVIDED WITH GENSET. SEE SHEETS 10 & 11.
18. THE CRANE SPEED MUST NOT EXCEED 0.5 m/s IN ANY DIRECTION.
19. ALTERNATOR ENTRANCE BOX OPTION MUST BE REMOVED FOR BIRD CAGE LIFTING.





LAST DATUM LETTER USED:	LAST REFERENCE LETTER USED:
MODEL/PLATFORM: DRAGONFLY 60Hz	THIS PART IS SIMILAR TO:
PART NUMBER: A073W614	PART REVISION: B
PART NAME: OUTLINE,GENSET	
DRAWING CATEGORY: OUTLINE (TABULATION)	
STATE: RELEASED	SHEET: 1 OF 13
CUMMINS DATA CLASSIFICATION: CUMMINS CONFIDENTIAL	

Cummins Inc.

DIMENSIONS ARE IN: MILLIMETERS [ ] ARE IN: INCHES — SIZE: A0 — SCALE: 0.078

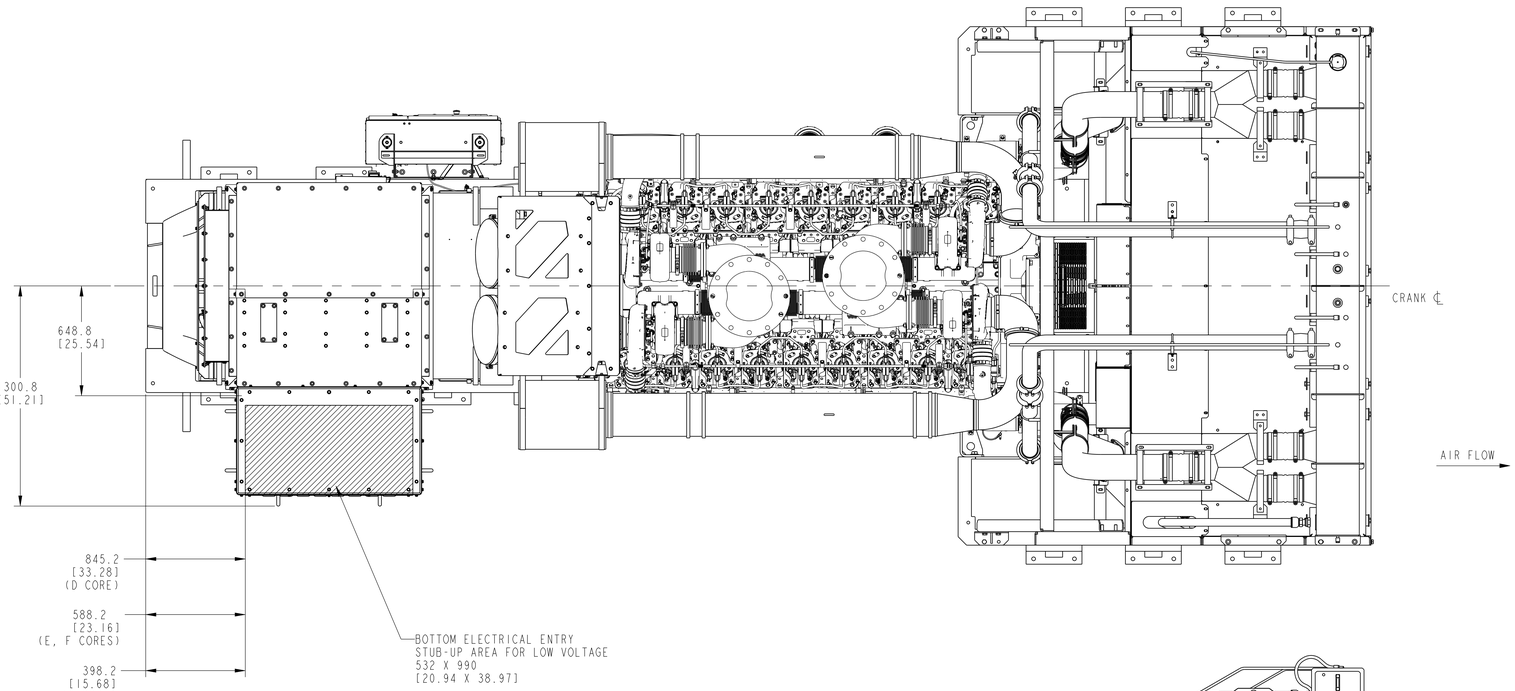
DIMENSIONING AND TOLERANCING PER: ASME Y14.5-2009 — THIRD ANGLE PROJECTION

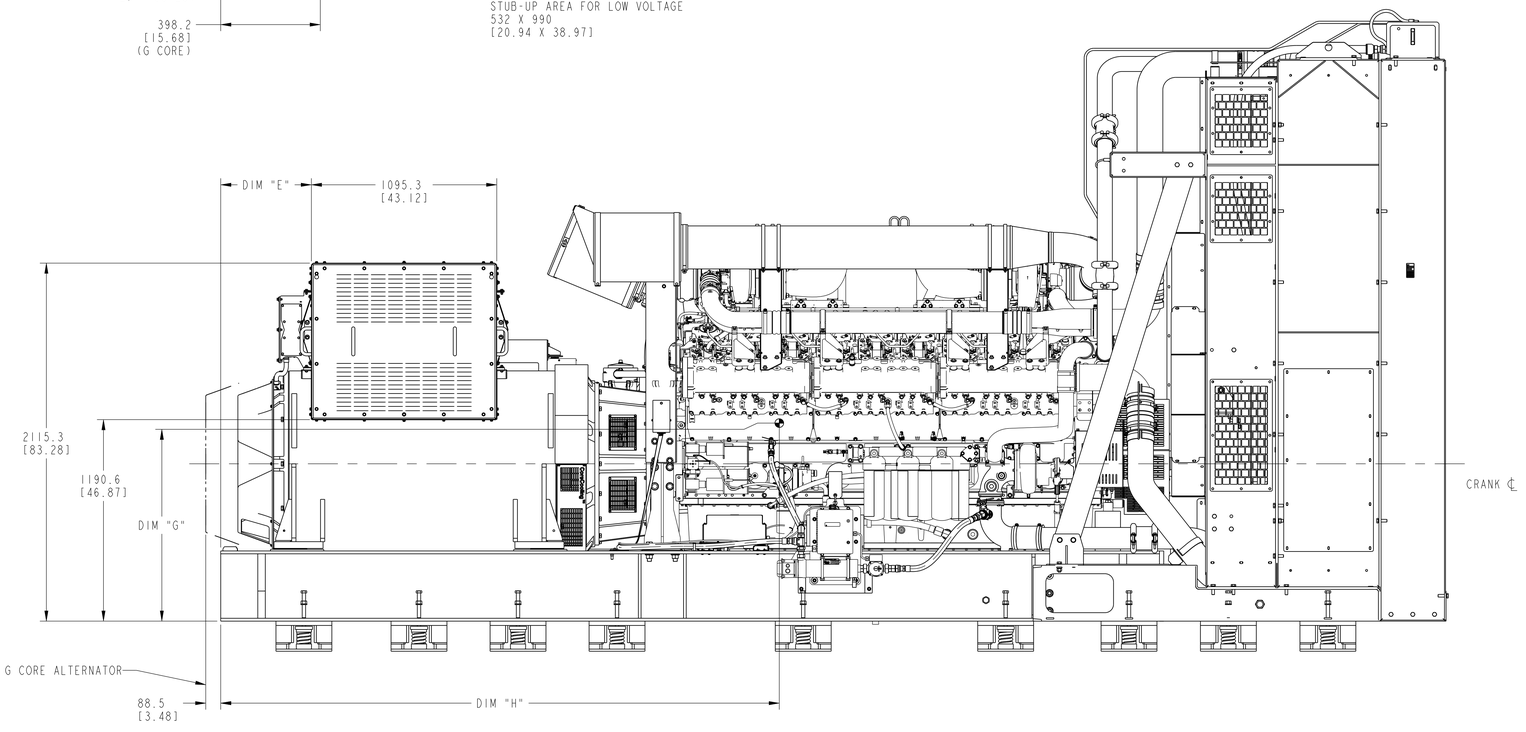
CAD SYSTEM: PTC® Creo® Parametric

LOW VOLTAGE
E-CORE ALTERNATOR SHOWN

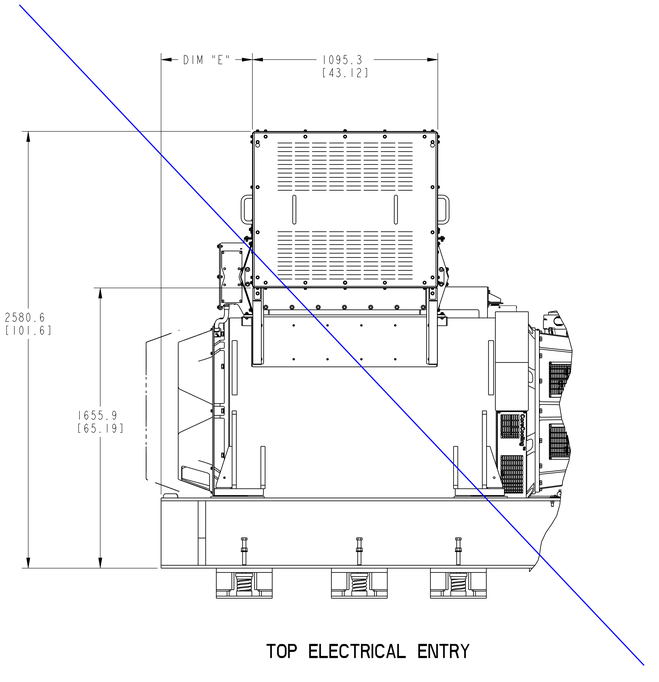
TABULATION

GENERATOR DESIGNATION	DIM "E"	AS SHIPPED - WITHOUT COOLING SYSTEM				INSTALLED - WITH COOLING SYSTEM			
		GENSET WEIGHT		DIM "G" CENTER OF GRAVITY	DIM "H" CENTER OF GRAVITY	GENSET WEIGHT		DIM "G" CENTER OF GRAVITY	DIM "H" CENTER OF GRAVITY
		KGS	LBS			KGS	LBS		
S9LID-D42	792.5 [31.20]	19227	42299	1081 [42.56]	3001 [118.1]	23061	50734	1151 [45.31]	3569 [140.5]
S9LID-E42	535.5 [21.08]	20377	44829	1072 [42.20]	2859 [112.6]	24211	53264	1141 [44.92]	3423 [134.8]
S9LID-F42	535.5 [21.08]	20577	45269	1071 [42.17]	2832 [111.5]	24411	53704	1139 [44.84]	3395 [133.7]
S9LID-G42	345.5 [13.60]	21527	47359	1066 [41.97]	2734 [107.6]	25361	55794	1132 [44.57]	3291 [129.6]





BOTTOM ELECTRICAL ENTRY



TOP ELECTRICAL ENTRY

PART NUMBER: A073W614	PART REVISION: B
PART NAME: OUTLINE,GENSET	
DRAWING CATEGORY: OUTLINE (TABULATION)	
STATE: RELEASED	SHEET: 3 OF 13
CUMMINS DATA CLASSIFICATION: CUMMINS CONFIDENTIAL	

Cummins Inc.

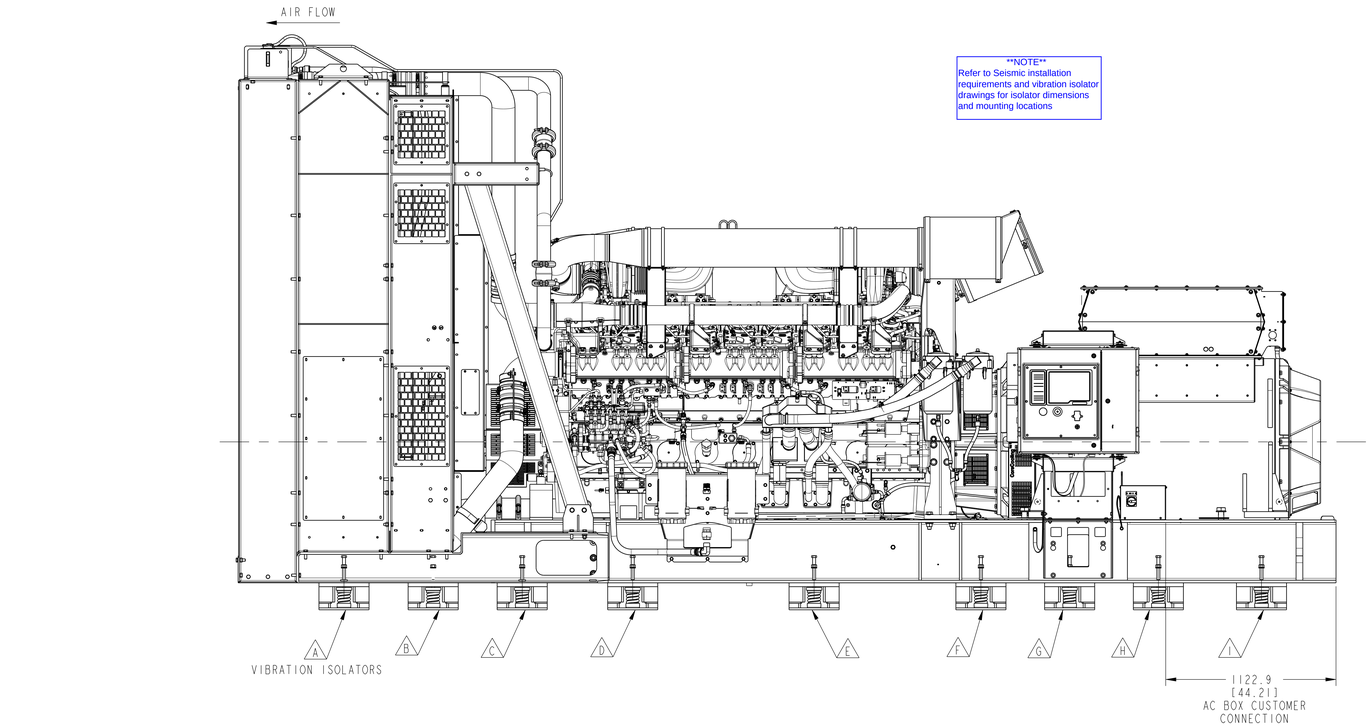
DIMENSIONS ARE IN: MILLIMETERS [ ] ARE IN: INCHES | SIZE: A0 | SCALE: 0.078

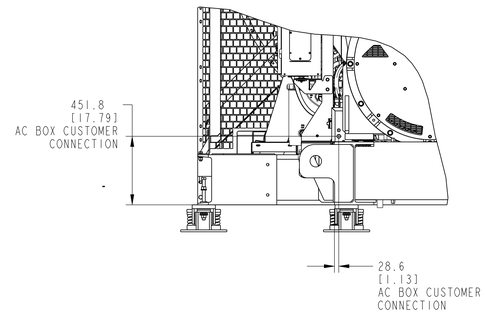
DIMENSIONING AND TOLERANCING PER: ASME Y14.5-2009 | THIRD ANGLE PROJECTION

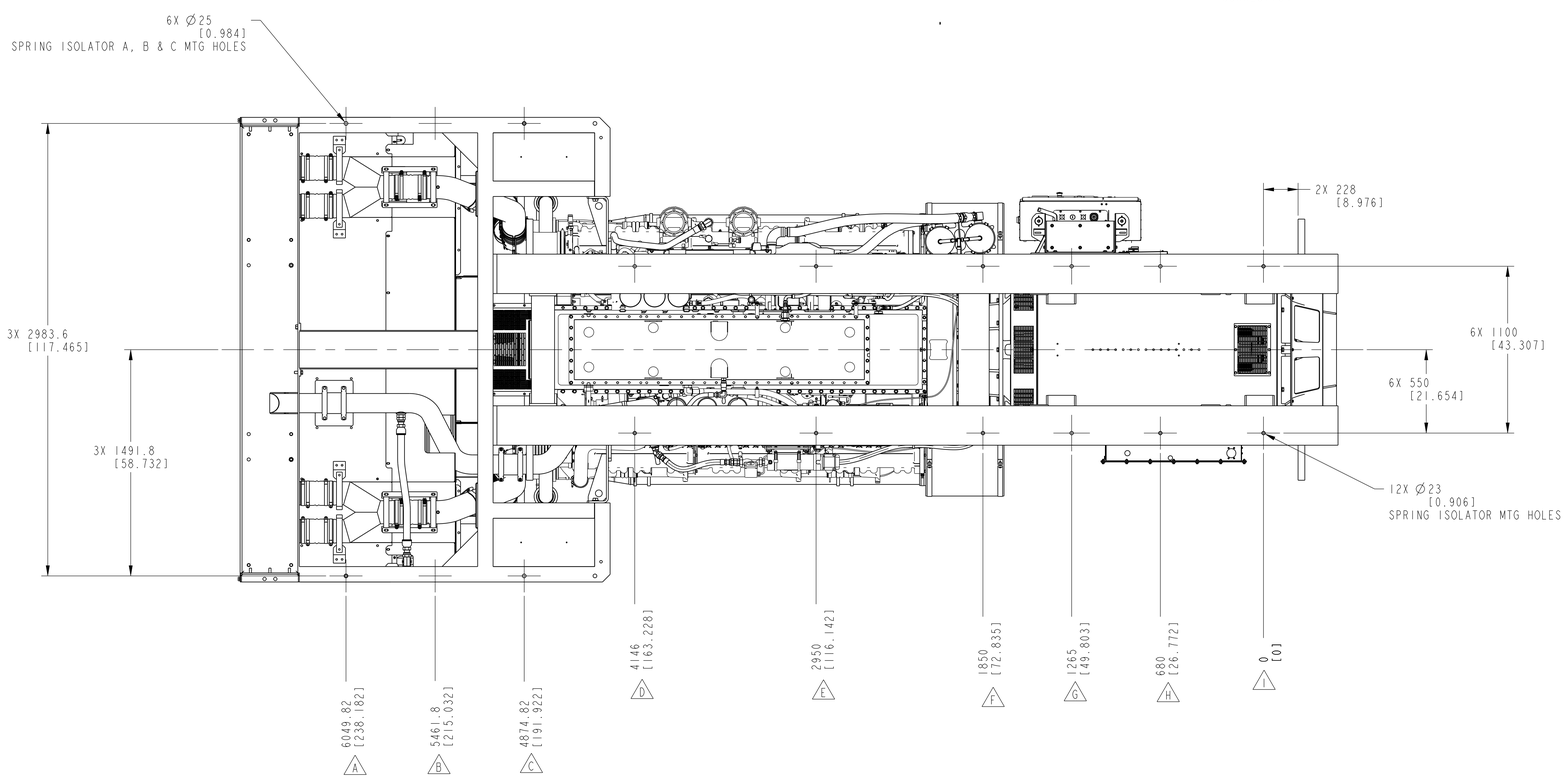
CAD SYSTEM: PTC® Creo® Parametric

AVM LOAD (N) (ISOLATOR A053L607 (A052K127))

GENSET CONFIGURATION	WEIGHT WITH COOLING SYSTEM WET (KGS)	A	B	C	D	E	F	G	H	I
S9 LV D-CORE	23061	12978	12898	12819	12720	12557	12408	12328	12249	12157
S9 LV E-CORE	24211	12280	12458	12636	12857	13220	13553	13730	13908	14114
S9 LV F-CORE	24411	12121	12352	12582	12867	13336	13767	13996	14225	14491
S9 LV G-CORE	25361	11588	12023	12457	12997	12882	14695	15128	15561	16064
S9 MV/HV D-CORE	22611	12949	12827	12705	12554	12306	12078	11957	11836	11695
S9 MV/HV E-CORE	23311	12480	12524	12567	12622	12711	12792	12836	12879	12930
S9 MV/HV F-CORE	23811	12249	12391	12532	12708	12996	13262	13403	13544	13708
S9 MV/HV G-CORE	24461	11829	12122	12414	12777	13371	13919	14210	14501	14839
S9 MV/HV H-CORE	24911	11592	11978	12364	12843	13630	14353	14737	15122	15569



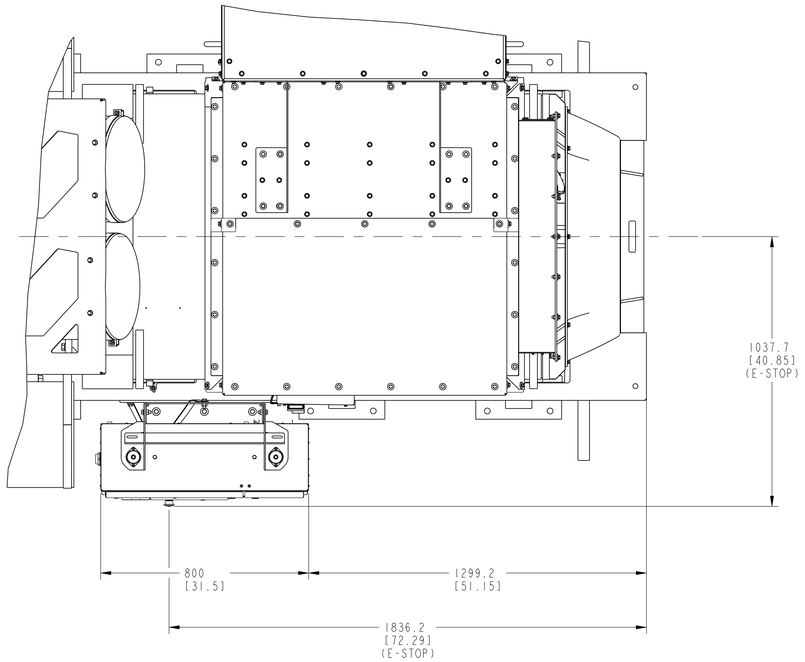


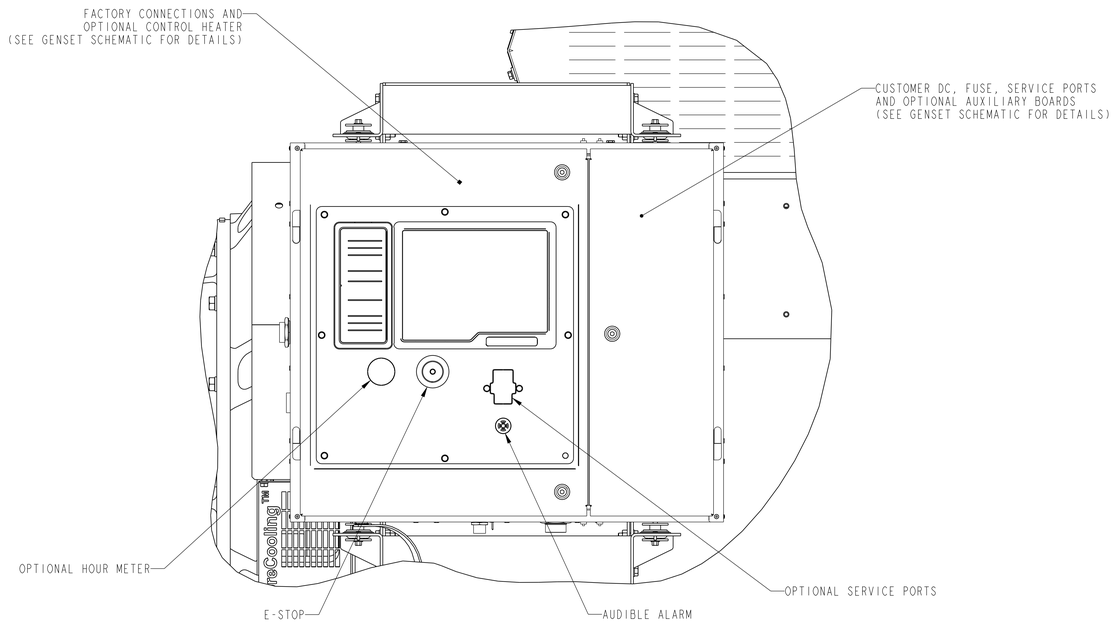


PART NUMBER: A073W614	PART REVISION: B
PART NAME: OUTLINE,GENSET	
DRAWING CATEGORY: OUTLINE (TABULATION)	
STATE: RELEASED	SHEET: 5 OF 13
CUMMINS DATA CLASSIFICATION: CUMMINS CONFIDENTIAL	

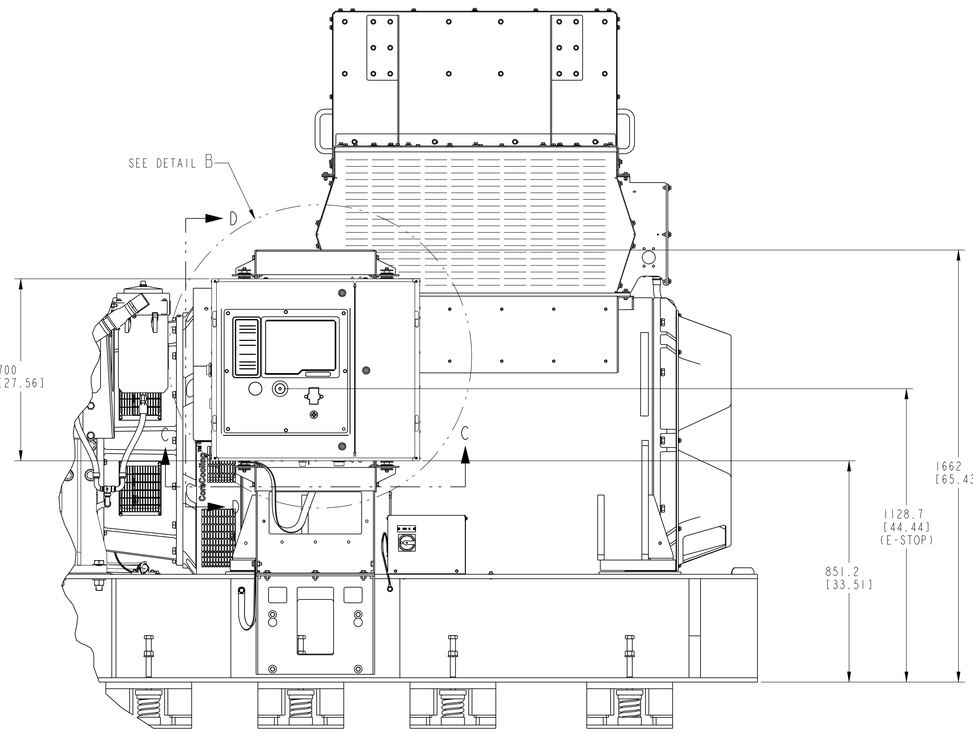
Cummins Inc.

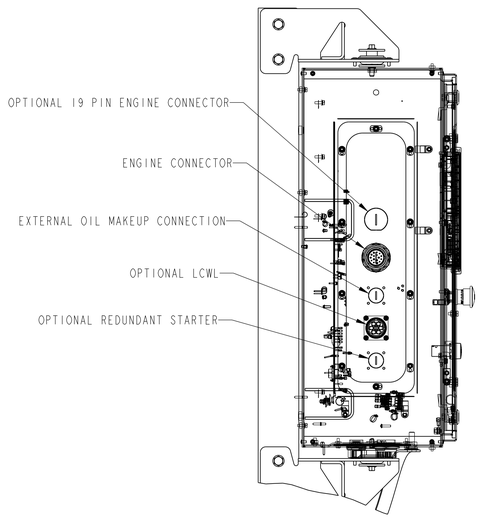
DIMENSIONS ARE IN: MILLIMETERS [ ] ARE IN: INCHES
SIZE: A0 SCALE: 0.07
DIMENSIONING AND TOLERANCING PER: ASME Y14.5-2009
THIRD ANGLE PROJECTION
CAD SYSTEM PTC® Creo® Parametric



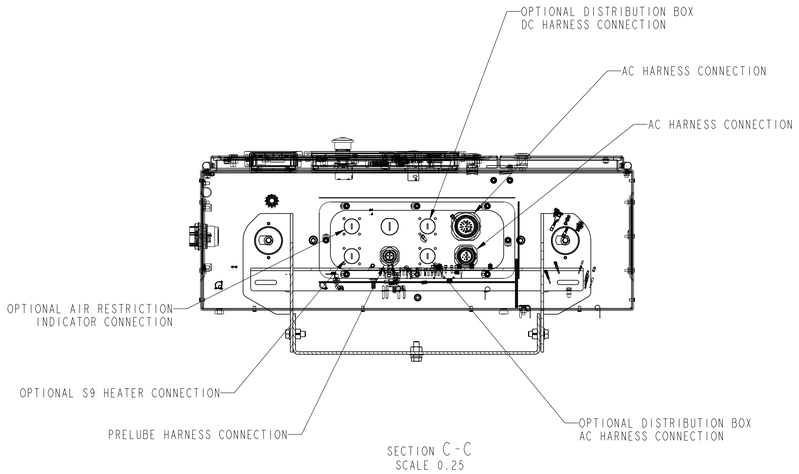


DETAIL B
SCALE 0.25





SECTION D-D
SCALE 0.25



SECTION C-C
SCALE 0.25

PART NUMBER: A073W614	PART REVISION: B
PART NAME: OUTLINE,GENSET	
DRAWING CATEGORY: OUTLINE (TABULATION)	
STATE: RELEASED	SHEET: 6 OF 13
CUMMINS DATA CLASSIFICATION: CUMMINS CONFIDENTIAL	

Cummins Inc.

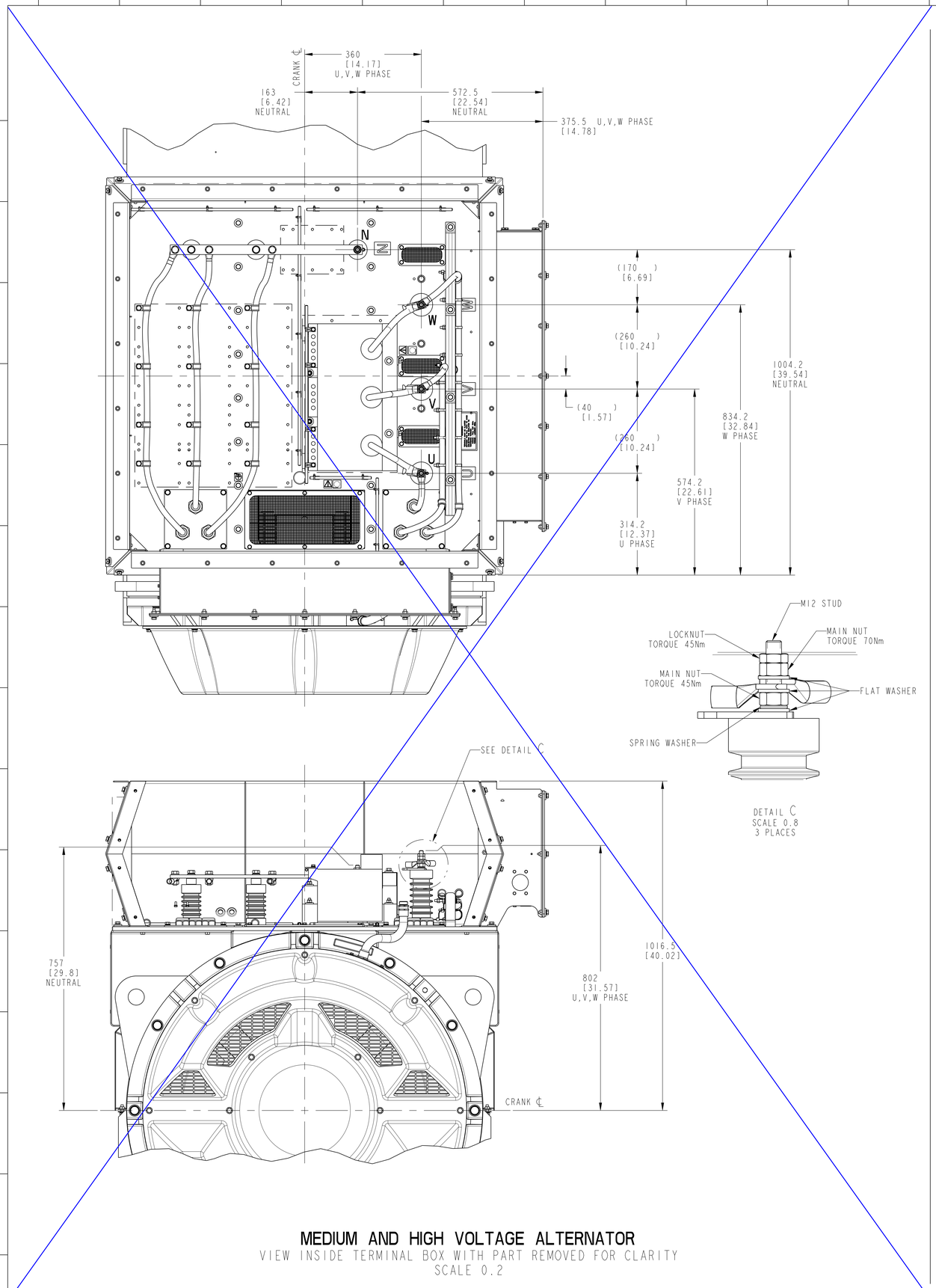
DIMENSIONS ARE IN: MILLIMETERS
[ ] ARE IN: INCHES

SIZE: A0 SCALE: 0.12

DIMENSIONING AND TOLERANCING PER: ASME Y14.5-2009

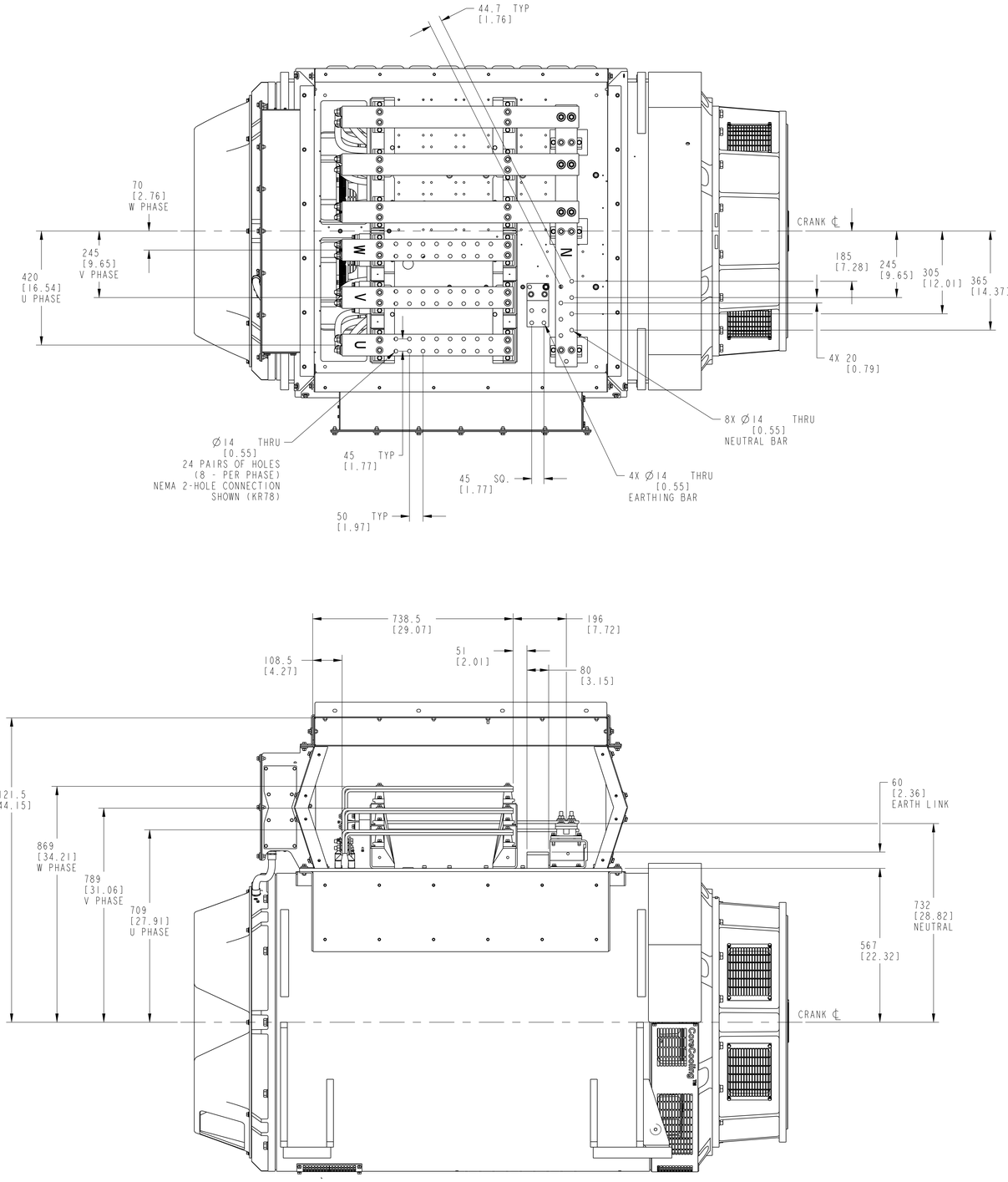
THIRD ANGLE PROJECTION

CAD SYSTEM
PTC® Creo® Parametric



MEDIUM AND HIGH VOLTAGE ALTERNATOR

VIEW INSIDE TERMINAL BOX WITH PART REMOVED FOR CLARITY
SCALE 0.2



LOW VOLTAGE ALTERNATOR

VIEW INSIDE TERMINAL BOX WITH PART REMOVED FOR CLARITY
SCALE 0.15

PART NUMBER: A073W614	PART REVISION: B
PART NAME: OUTLINE,GENSET	
DRAWING CATEGORY: OUTLINE (TABULATION)	
STATE: RELEASED	SHEET: 7 OF 13
CUMMINS DATA CLASSIFICATION: CUMMINS CONFIDENTIAL	

Cummins Inc.

DIMENSIONS ARE IN: MILLIMETERS
[ ] ARE IN: INCHES

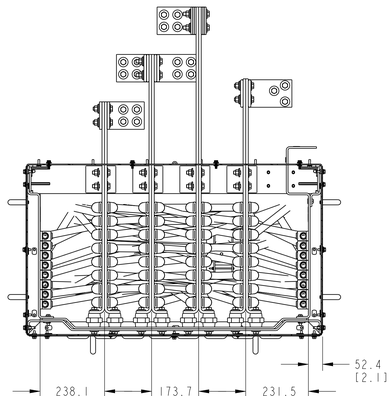
SIZE: A0 SCALE: 0.078

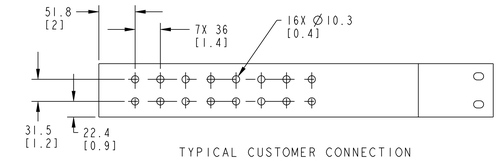
DIMENSIONING AND TOLERANCING PER: ASME Y14.5-2009

THIRD ANGLE PROJECTION

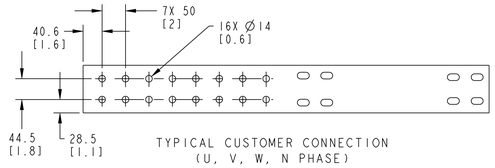
CAD SYSTEM
PTC® Creo® Parametric

LV BOTTOM ENTRY ALTERNATOR TERMINAL (ENTRANCE) BOX DETAILS

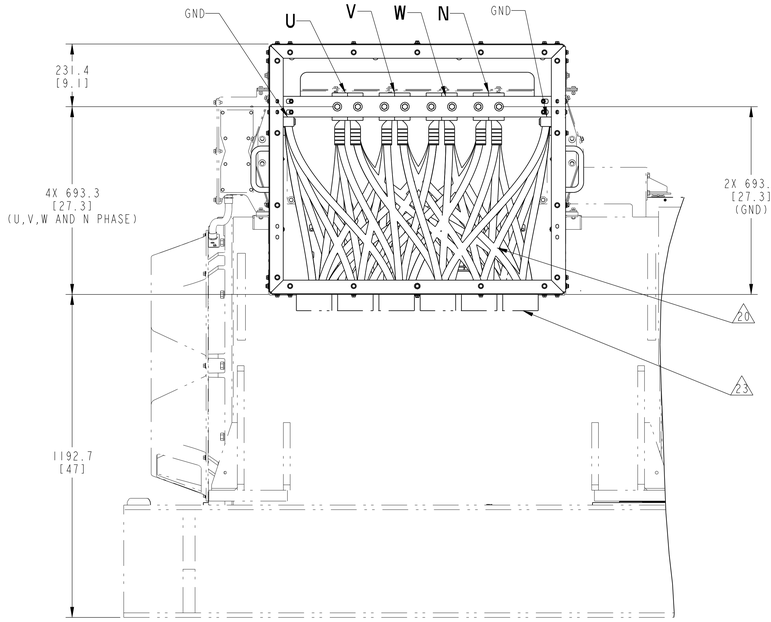


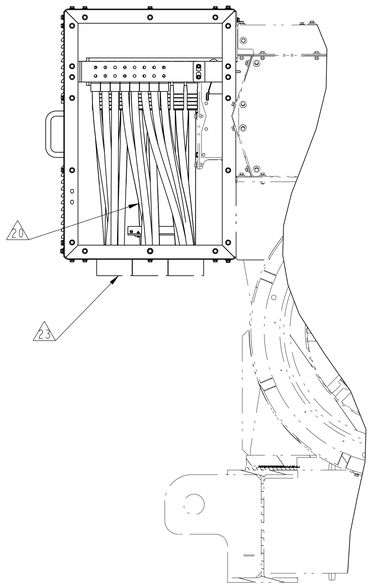


TYPICAL CUSTOMER CONNECTION
(GROUND)

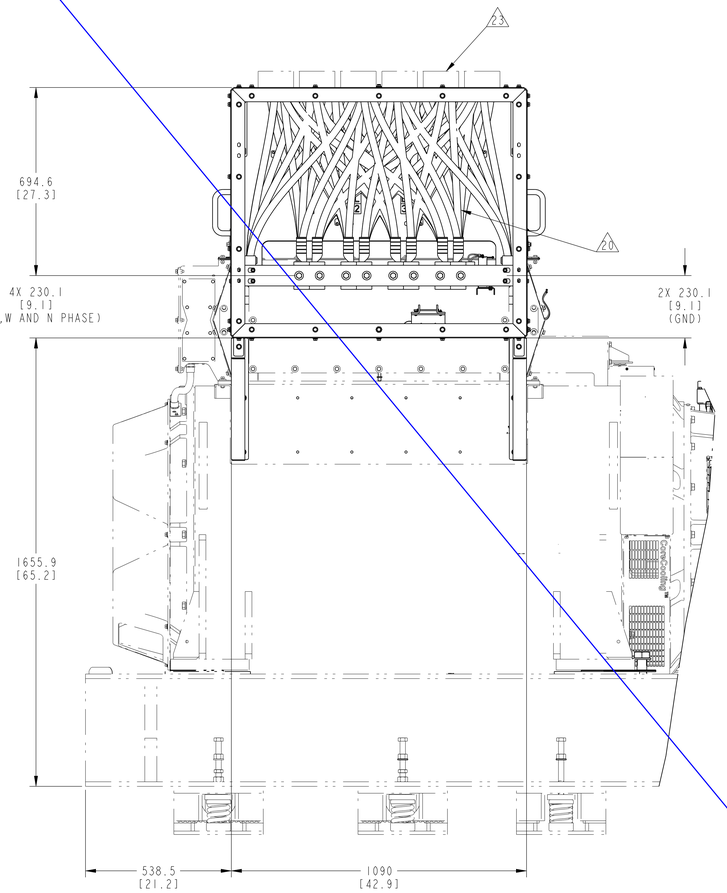


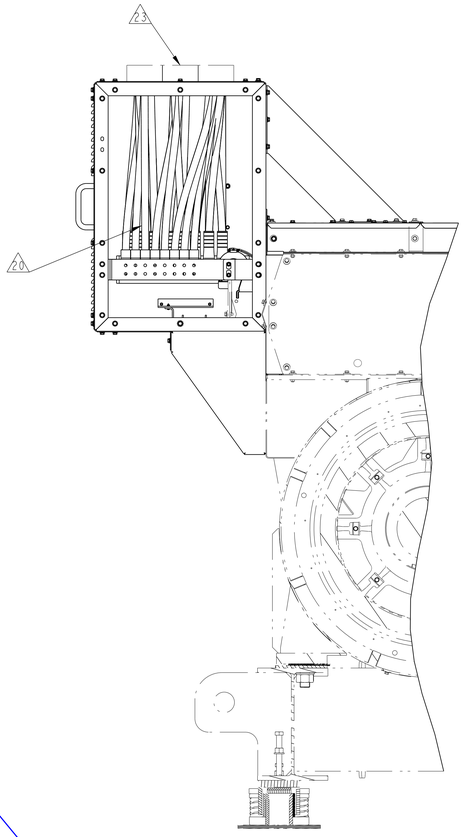
TYPICAL CUSTOMER CONNECTION
(U, V, W, N PHASE)

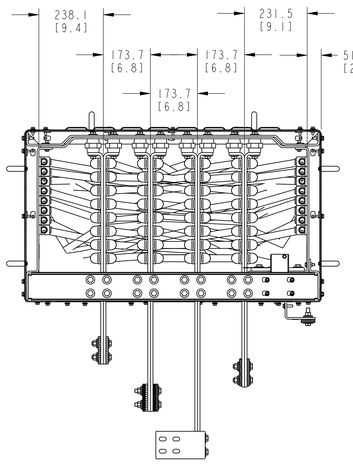




LV TOP ENTRY ALTERNATOR TERMINAL (ENTRANCE) BOX DETAILS







PART NUMBER: A073W614	PART REVISION: B
PART NAME: OUTLINE,GENSET	
DRAWING CATEGORY: OUTLINE (TABULATION)	
STATE: RELEASED	SHEET: 9 OF 13
CUMMINS DATA CLASSIFICATION: CUMMINS CONFIDENTIAL	

Cummins Inc.

DIMENSIONS ARE IN: MILLIMETERS
[ ] ARE IN: INCHES

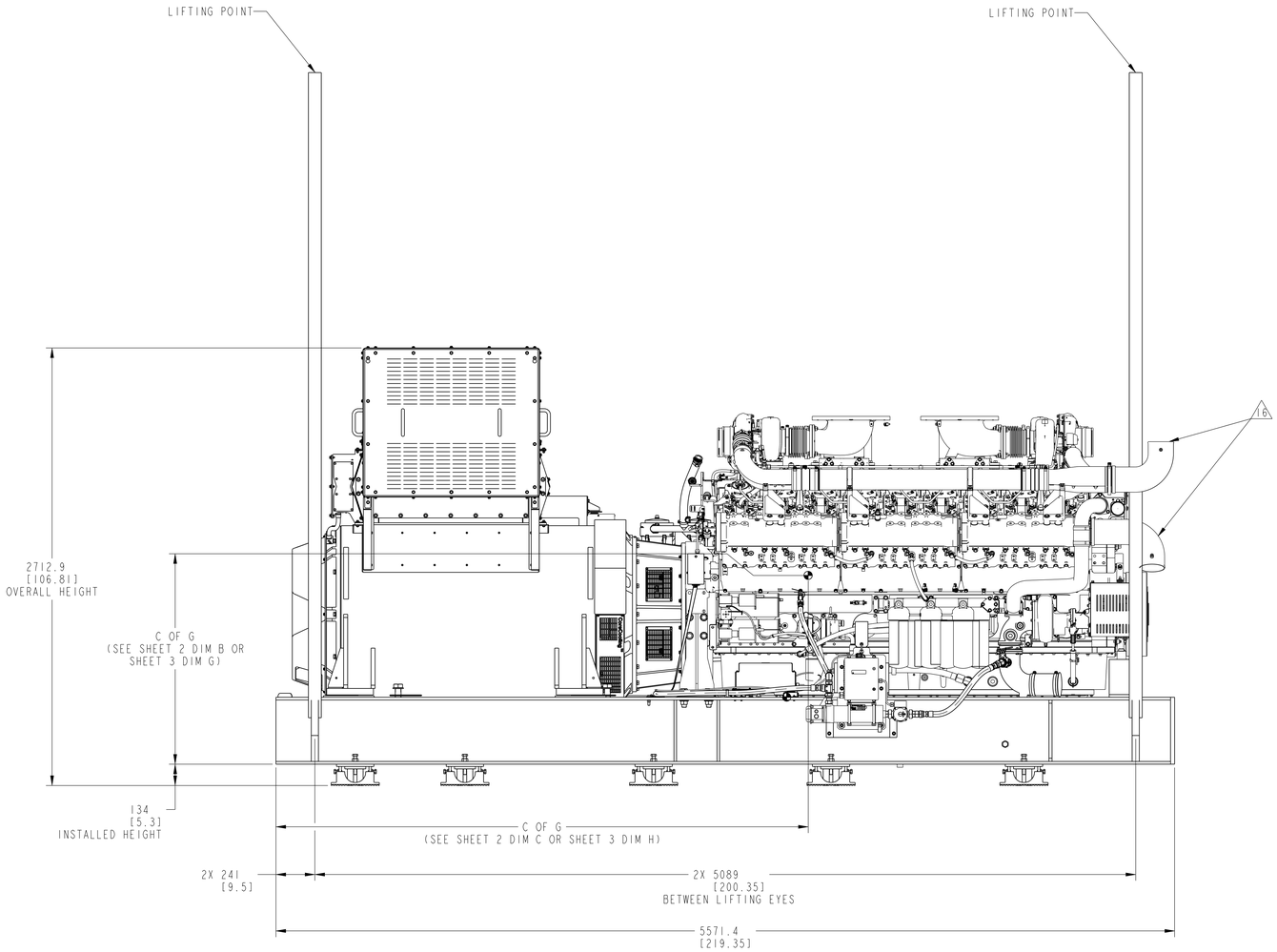
SIZE: A0 SCALE: 0.078

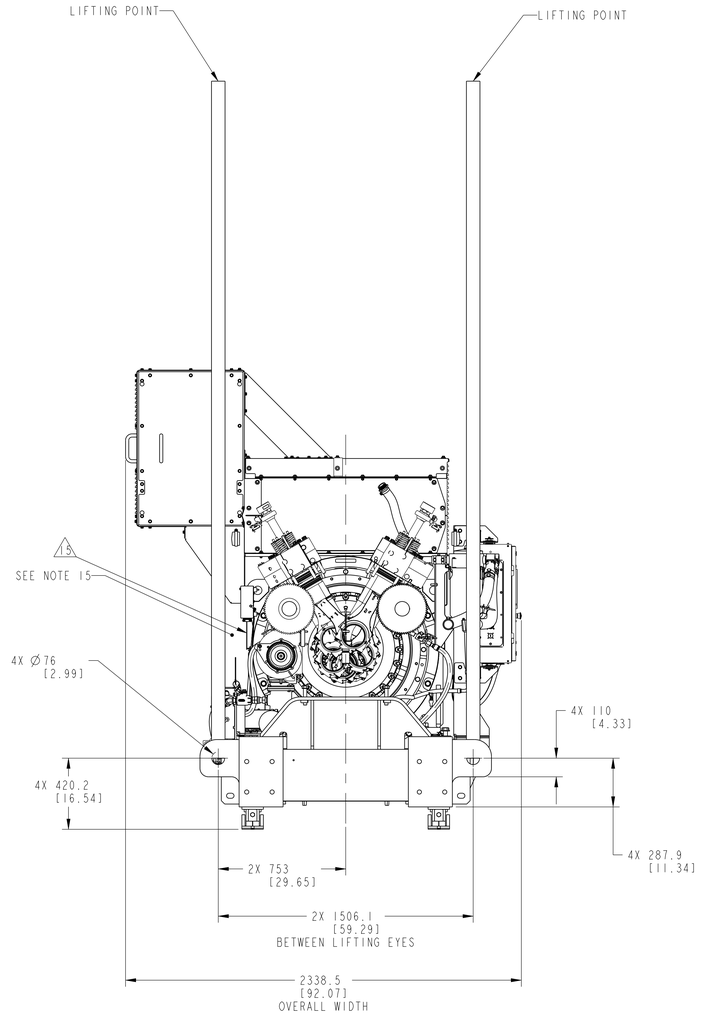
DIMENSIONING AND TOLERANCING PER: ASME Y14.5-2009

THIRD ANGLE PROJECTION

CAD SYSTEM
PTC® Creo® Parametric

BASE UNIT LIFTING DETAIL - OPTION 1
WITH 4 POINT INDEPENDENT PARALLEL CRANE LIFT
"AS SHIPPED" CONFIGURATION SEE SHEET 2, 3 FOR MASS AND CENTER OF GRAVITY
SEE NOTE 11



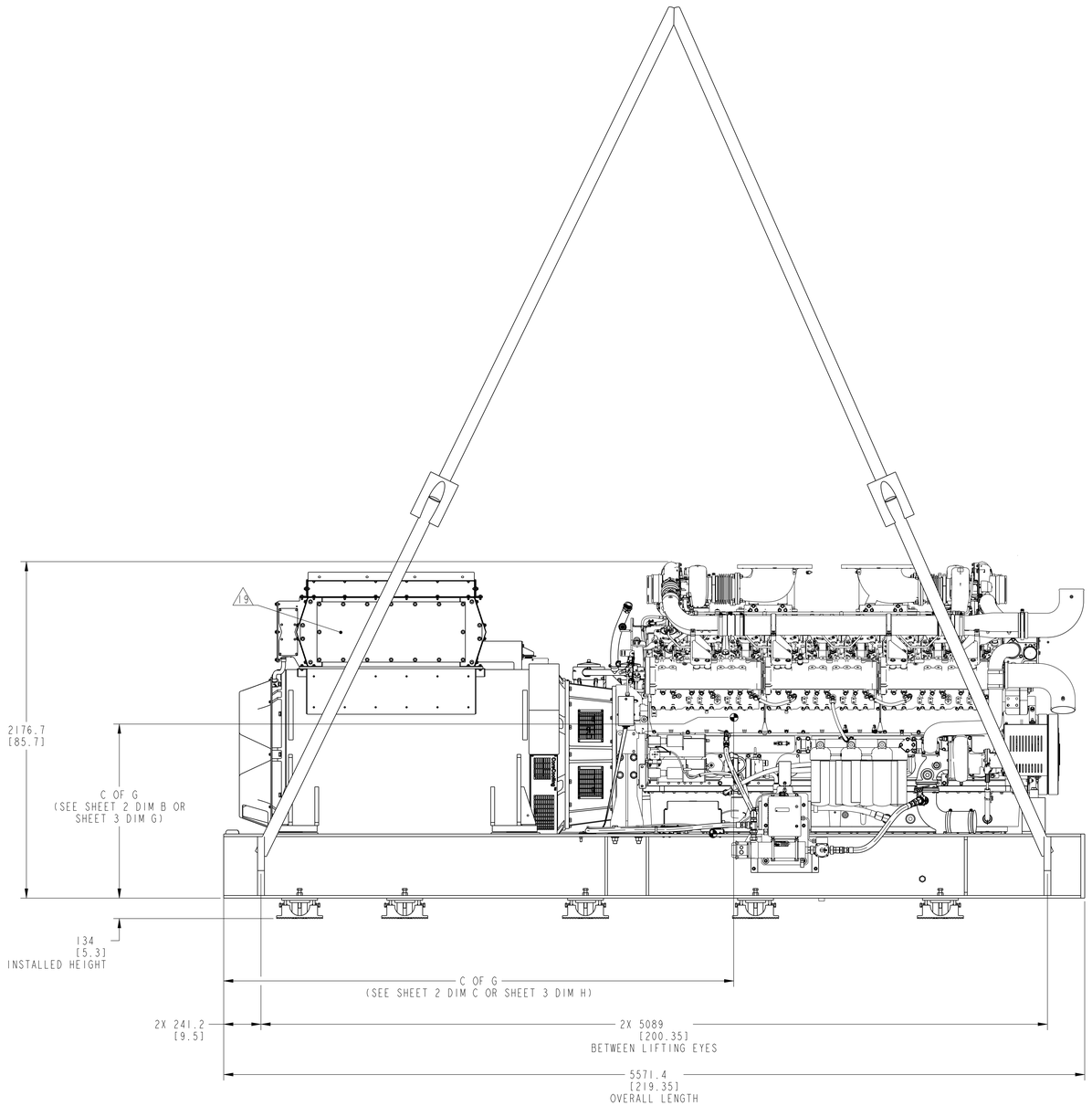


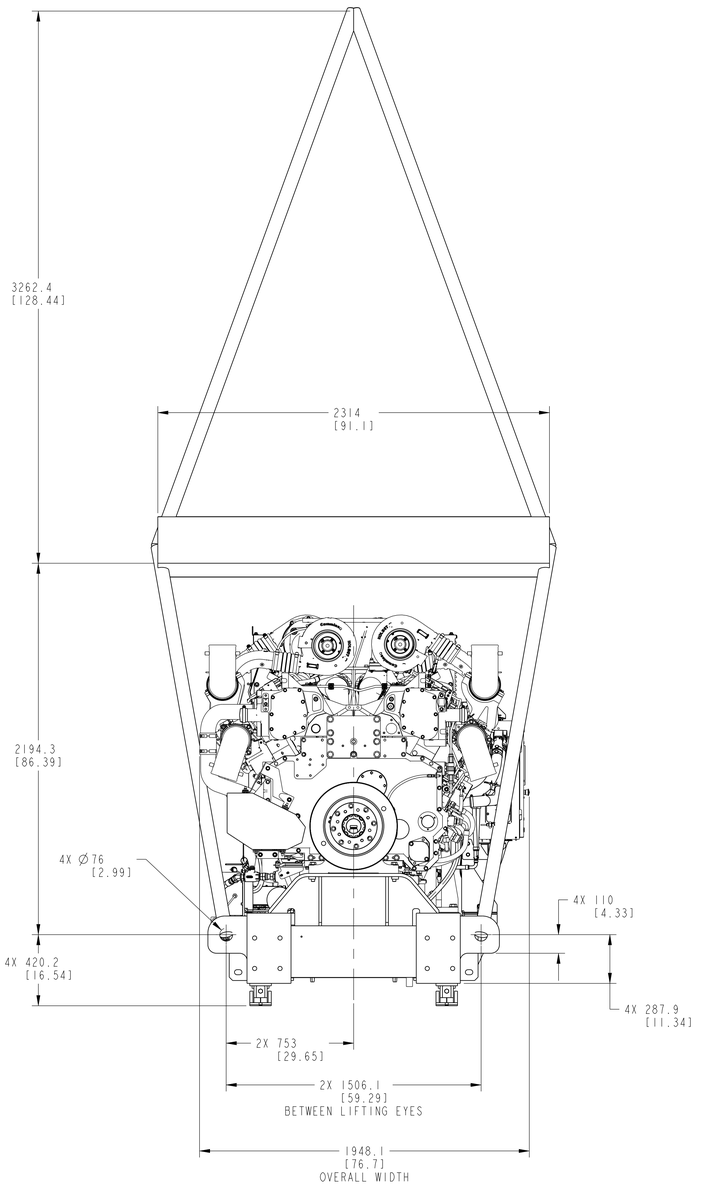
PART NUMBER: A073W614	PART REVISION: B
PART NAME: OUTLINE,GENSET	
DRAWING CATEGORY: OUTLINE (TABULATION)	
STATE: RELEASED	SHEET: 10 OF 13
CUMMINS DATA CLASSIFICATION: CUMMINS CONFIDENTIAL	

Cummins Inc.

DIMENSIONS ARE IN: MILLIMETERS
[ ] ARE IN: INCHES
SIZE: A0 SCALE: 0.078
DIMENSIONING AND TOLERANCING PER: ASME Y14.5-2009
THIRD ANGLE PROJECTION
CAD SYSTEM
PTC® Creo® Parametric

BASE UNIT LIFTING DETAILS - OPTION 2
BIRD-CAGE LIFT WITH SPREADER BEAMS
"AS SHIPPED" CONFIGURATION SEE SHEET 2, 3 FOR MASS AND CENTER OF GRAVITY
SEE NOTE 11





PART NUMBER: A073W614	PART REVISION: B
PART NAME: OUTLINE,GENSET	
DRAWING CATEGORY: OUTLINE (TABULATION)	
STATE: RELEASED	SHEET: 11 OF 13
CUMMINS DATA CLASSIFICATION: CUMMINS CONFIDENTIAL	

Cummins Inc.

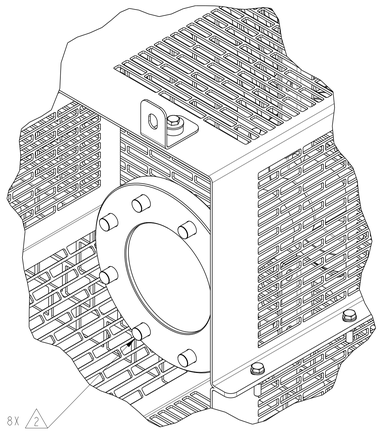
DIMENSIONS ARE IN: MILLIMETERS
[ ] ARE IN: INCHES
SIZE: A0 SCALE: 0.078

DIMENSIONING AND TOLERANCING PER:
ASME Y14.5-2009
THIRD ANGLE PROJECTION

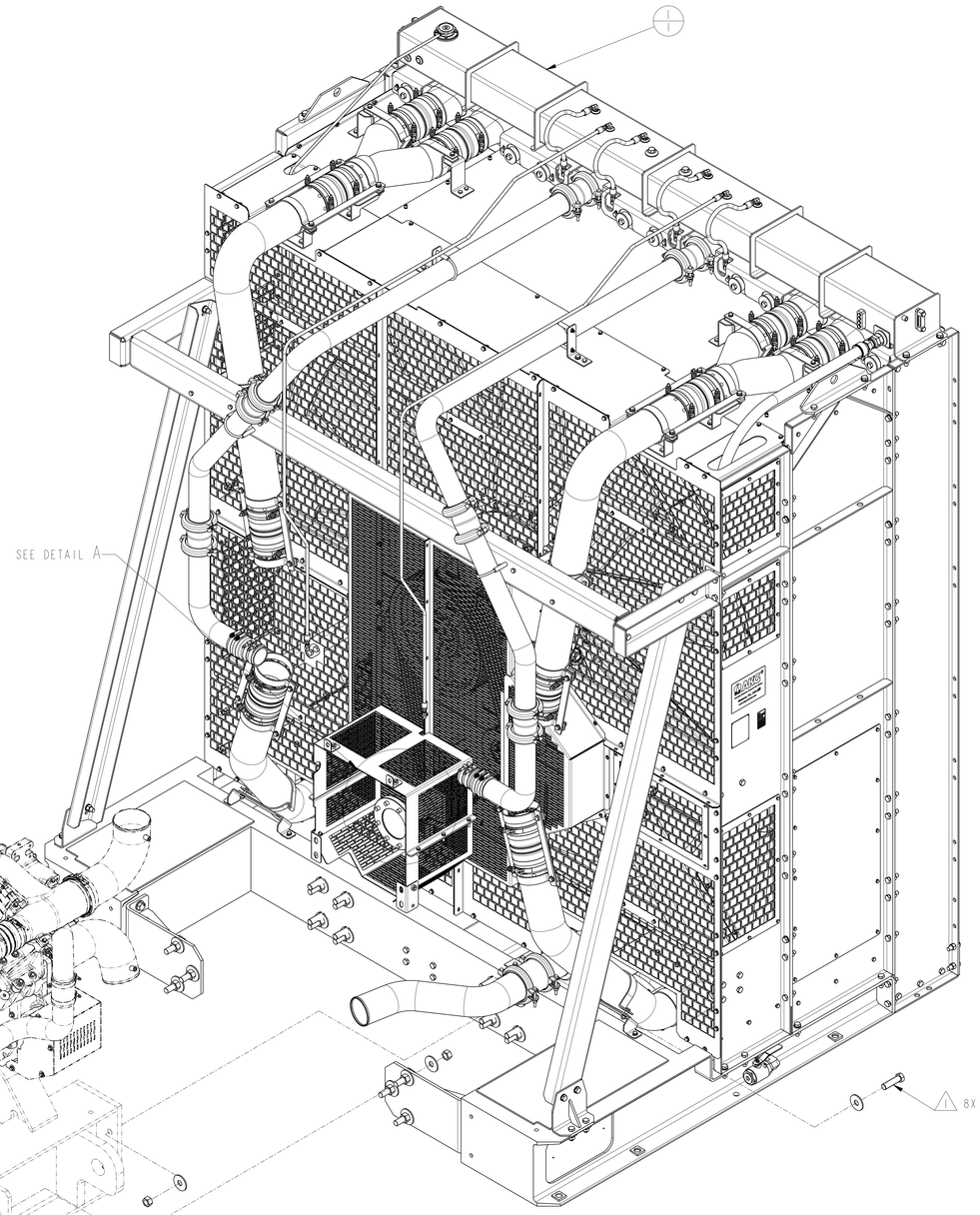
CAD SYSTEM
PTC® Creo® Parametric

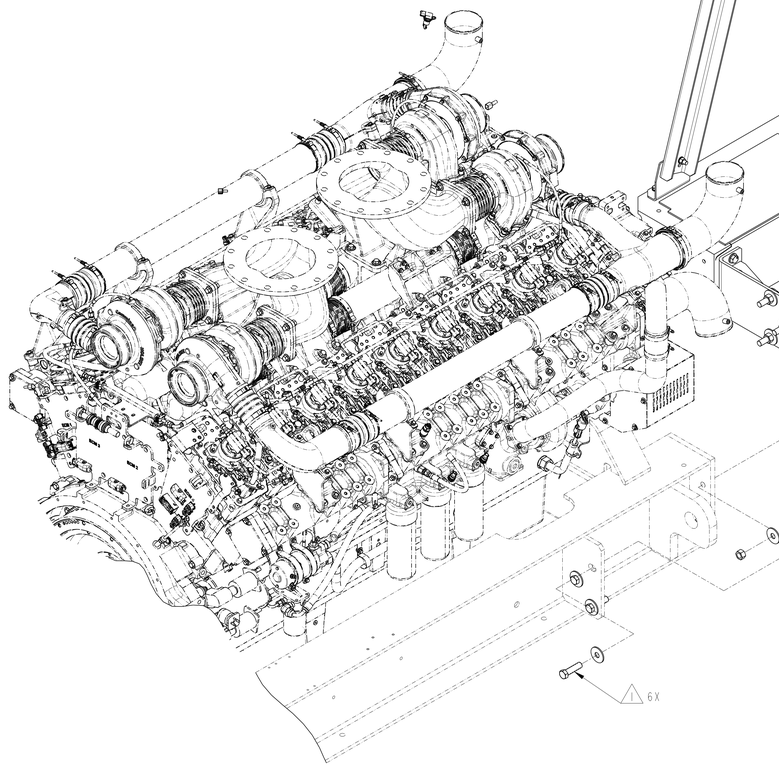
NOTES:

1. HARDWARE (M24 CLASS 10.9) PROVIDED WITH RADIATOR. TORQUE TO 678-828 Nm.
2. HARDWARE (M16 CLASS 8.8) PROVIDED WITH RADIATOR, TORQUE TO 143-175 Nm.



DETAIL A
SCALE 0.4





TABULATION	
PART NUMBER	TEMPERATURE
A072A360	40 C
A072A391	50 C

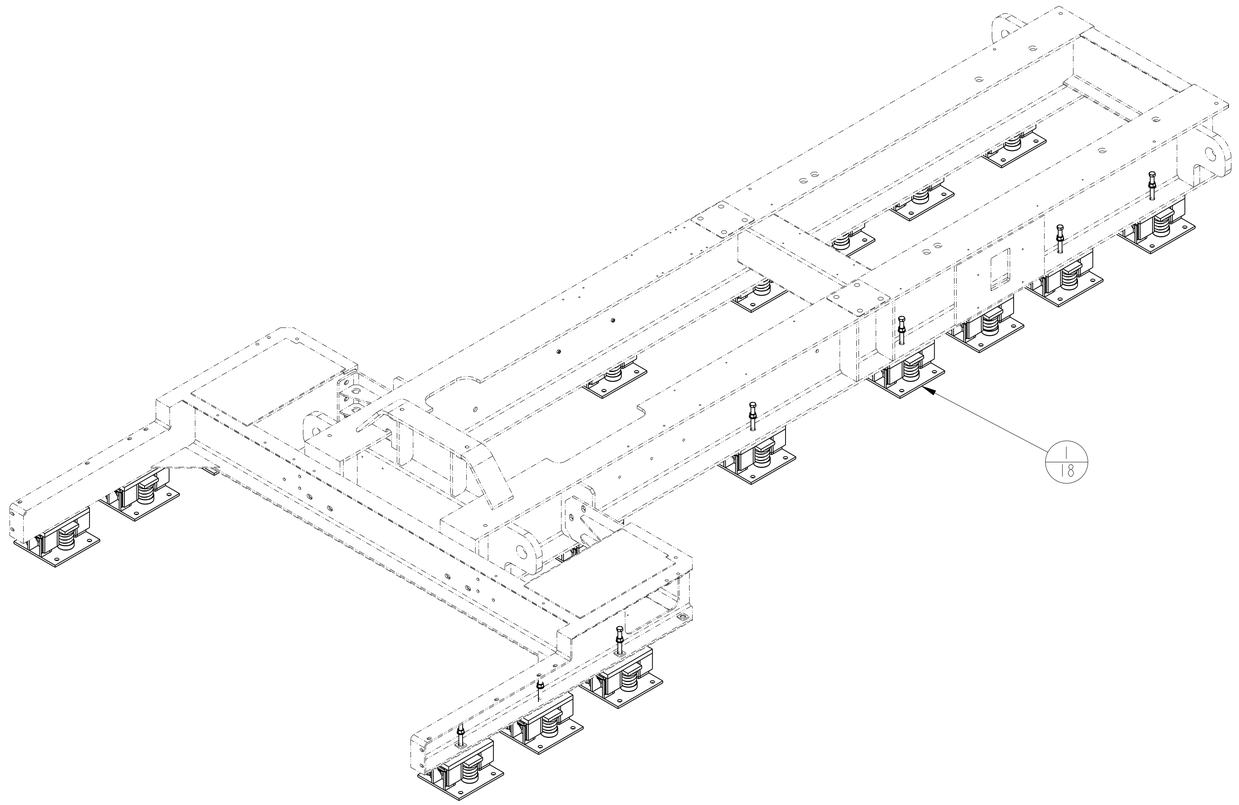
PART NUMBER: A072A360	PART REVISION: C
PART NAME: INSTALLATION,RADIATOR	
DRAWING CATEGORY: DETAIL (TABULATION)	
STATE: RELEASED	SHEET: 1 OF 2
CUMMINS DATA CLASSIFICATION: CUMMINS CONFIDENTIAL	

Cummins Inc.

DIMENSIONS ARE IN: MILLIMETERS [ ] ARE IN: -
SIZE A0 SCALE: 0.11
DIMENSIONING AND TOLERANCING PER: ASME Y14.5-2009
THIRD ANGLE PROJECTION
CAD SYSTEM PTC® Creo® Parametric

NOTES:

1. USING 18 OFF (9 PAIRS) OF A053L607 SPRING MOUNT AVM'S.
2. THIS WILL BE THE SAME FOR ALL GENSET CONFIGURATION WITH SEISMIC AVM'S.
3. AVM'S ARE SUITABLE FOR GROUND AND ROOF INSTALLATION.
4. FOR STANDARD AVM INSTALLATION SEE A071Z521.
5. AVM'S WILL BE SHIPPED LOOSE WITH GENSET.
6. FOR INSTALLATION AND ADJUSTMENT INSTRUCTIONS SEE GENSET INSTALLATION OR SERVICE MANUALS.



VIEWS SHOWING- 60 Hz CHASSIS FRIDLEY

PART NUMBER: A071Y896	PART REVISION: E
PART NAME: INSTALLATION,VIBRATION MOUNTS	
DRAWING CATEGORY: DETAIL	
STATE: RELEASED	SHEET: 1 OF 3
CUMMINS DATA CLASSIFICATION: CUMMINS CONFIDENTIAL	

LAST DATUM LETTER USED: -	LAST REFERENCE LETTER USED: -
MODEL/PLATFORM: GENERAL	THIS PART IS SIMILAR TO: -

Cummins Inc.

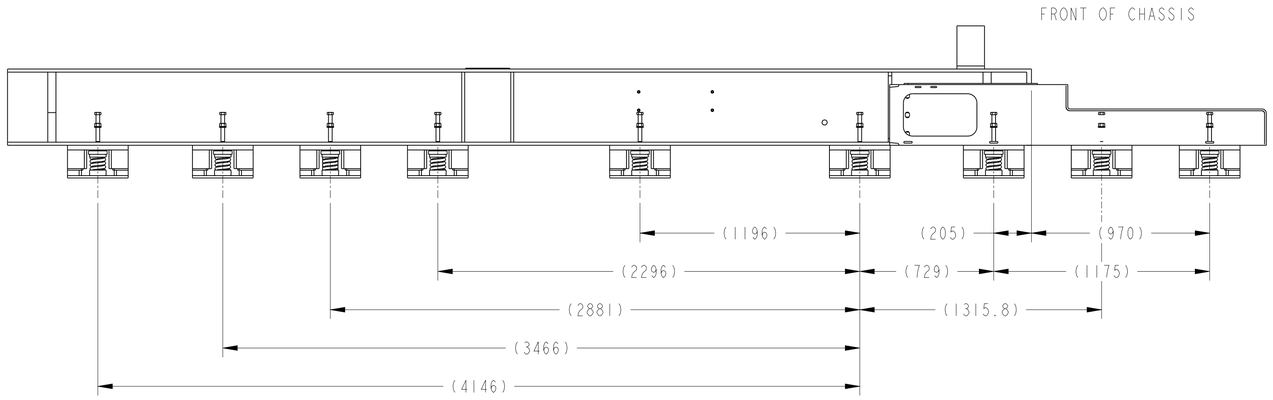
DIMENSIONS ARE IN: MILLIMETERS
[ ] ARE IN: -

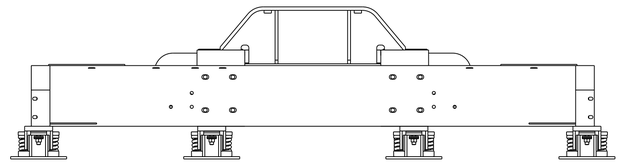
SIZE: A1 SCALE:1/32

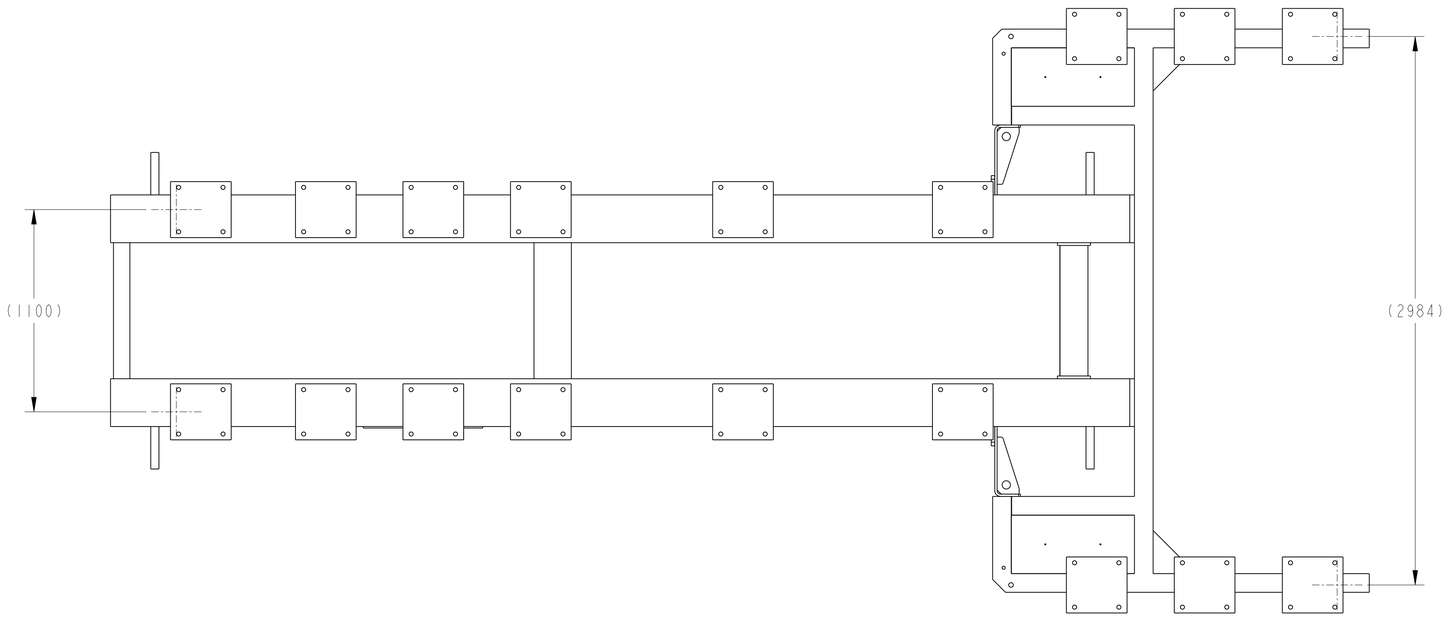
DIMENSIONING AND TOLERANCING PER: ASME Y14.5-2009

THIRD ANGLE PROJECTION

CAD SYSTEM
PTC® Creo® Parametric







VIEWS SHOWING- 60 Hz CHASSIS FRIDLEY

PART NUMBER: A071Y896	PART REVISION: E
PART NAME: INSTALLATION,VIBRATION MOUNTS	
DRAWING CATEGORY: DETAIL	
STATE: RELEASED	SHEET: 2 OF 3
CUMMINS DATA CLASSIFICATION: CUMMINS CONFIDENTIAL	

LAST DATUM LETTER USED: -	LAST REFERENCE LETTER USED: -
MODEL/PLATFORM: GENERAL	THIS PART IS SIMILAR TO: -

Cummins Inc.

DIMENSIONS ARE IN: MILLIMETERS
[ ] ARE IN: -

SIZE: A1 SCALE:1/32

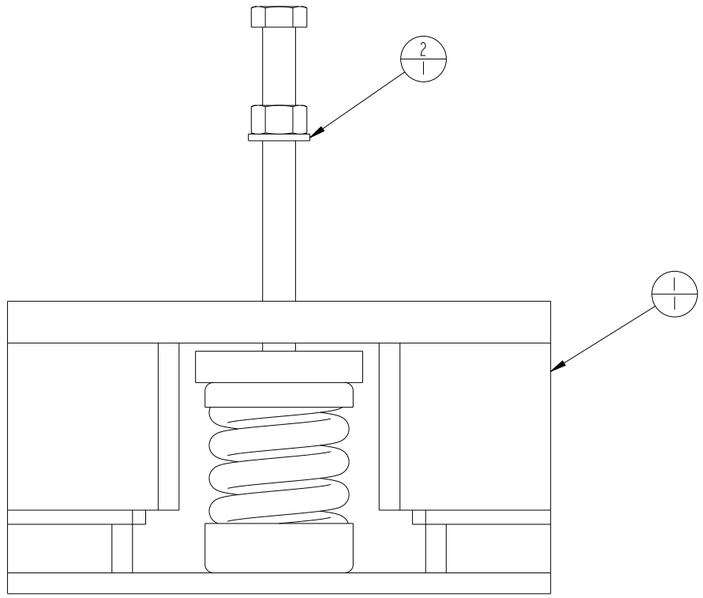
DIMENSIONING AND TOLERANCING PER: ASME Y14.5-2009

THIRD ANGLE PROJECTION

CAD SYSTEM
PTC® Creo® Parametric

PTC® Creo® Parametric

REL NO	LTR	NO	REVISION	DWN	CKD	APVD	DATE
ECO-154551	A	1	PRODUCTION_RELEASE	MP	SR	C_KNEALING	11AUG15



UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN MILLIMETERS

DIM		HOLE	
X	± 1	0.00- 4.99	+0.15/-0.08
.X	± 0.8	5.00- 9.99	+0.20/-0.10
.XX	± 0.38	10.00-17.49	+0.25/-0.13
		17.50-24.99	+0.30/-0.13

ANG TOL: ± 1.0°

SCALE: 1/2

SIM TO NONE

DO NOT SCALE PRINT

- CONFIDENTIAL -
PROPERTY OF CUMMINS POWER GENERATION GROUP

DWN M_PARVEZ
CKD S_RAJAN
APVD C_KNEALING
DATE 11AUG15

FOR INTERPRETATION OF DIMENSIONING AND TOLERANCING, SEE ASME Y14.5M-1994

FIRST USED ON C3250D6

SITE CODE PGF

CUMMINS POWER GENERATION

KIT,GENSET ACCESSORIES
SEISMIC

DWG SIZE C | A053L607 | SHEET 1 of 1 | DWG REV A

Drawing Name: A053L608 Revision: A
Part Name: A053L607 Revision: A
Sheet 1 of 2

SPRING-ISOLATED GENERATOR SETS: GROUND LEVEL INSTALLATIONS

CUMMINS GENSET MODEL	CONFIGURATION	SEISMIC ISOLATOR		ATTACHMENT TO STEEL		ATTACHMENT TO CONCRETE					
		MODEL	QTY	SEISMIC LEVEL	ISOLATOR ATTACHMENT TO STEEL	SEISMIC LEVEL	ISOLATOR ATTACHMENT TO CONCRETE	MINIMUM ANCHOR EMBEDMENT	MINIMUM EDGE DISTANCE (FROM ANCHOR LOCATION)	CONCRETE COMPRESSIVE STRENGTH	MINIMUM SLAB THICKNESS
C2750D6E C3000D6EB	SET-MOUNTED COOLING	A053L607	18	SDS<=2.2 Z/H=0.0	4 PER ISOLATOR (72 TOTAL) Ø3/4" HEX HEAD STEEL BOLT (ASTM A325, GRADE 5)	SDS<=2.2 Z/H=0.0	4 PER ISOLATOR (72 TOTAL) HILTI HIT-RE 500 V3 +HAS-E-55, Ø3/4"	12.8"	18"	5000 PSI	18"

SPRING-ISOLATED GENERATOR SETS: ROOF LEVEL INSTALLATIONS

CUMMINS GENSET MODEL	CONFIGURATION	SEISMIC ISOLATOR		ATTACHMENT TO STEEL		ATTACHMENT TO CONCRETE					
		MODEL	QTY	SEISMIC LEVEL	ISOLATOR ATTACHMENT TO STEEL	SEISMIC LEVEL	ISOLATOR ATTACHMENT TO CONCRETE	MINIMUM ANCHOR EMBEDMENT	MINIMUM EDGE DISTANCE (FROM ANCHOR LOCATION)	CONCRETE COMPRESSIVE STRENGTH	MINIMUM SLAB THICKNESS
C2750D6E C3000D6EB	SET-MOUNTED COOLING	A053L607	18	SDS<=1.9 Z/H=1.0	4 PER ISOLATOR (72 TOTAL) Ø3/4" HEX HEAD STEEL BOLT (ASTM A325, GRADE 5)	SDS<=1.5 Z/H=1.0	4 PER ISOLATOR (72 TOTAL) HEAVY HEX HEAD, ASTM F1554 Gr105, Ø3/4"	12"	24"	10000 PSI	18"

PART NUMBER: A046G657	PART REVISION: G
PART NAME: INSTALLATION,GENSET	
DRAWING CATEGORY: DETAIL	
STATE: RELEASED	SHEET: 8 OF 10
CUMMINS DATA CLASSIFICATION: CUMMINS CONFIDENTIAL	

MODEL/PLATFORM: DQFAA			THIS PART IS SIMILAR TO: -
UNLESS OTHERWISE SPECIFIED THE FOLLOWING SHALL APPLY			ANG. TOL.: ± 1.0°
DIMENSIONAL TOLERANCES:	X ± 1	.X ± 0.8	.XX ± 0.38
HOLE SIZE 0.00-4.99 TOL. +0.15/-0.08	HOLE SIZE 5.00-9.99 TOL. +0.20/-0.10	HOLE SIZE 10.00-17.49 TOL. +0.25/-0.13	HOLE SIZE 17.50-24.99 TOL. +0.30/-0.13

Cummins Inc.			
DIMENSIONS ARE IN: MILLIMETERS [ ] ARE IN: -	SIZE: D	SCALE: 1/1	
DIMENSIONING AND TOLERANCING PER: ASME Y14.5-2009	THIRD ANGLE PROJECTION		CAD SYSTEM PTC® Creo® Parametric

SEISMIC INSTALLATIONS NOTES:

1. THE INSTALLATION GUIDELINES IN THIS DRAWING ARE RECOMMENDATIONS FROM THE ISOLATOR SUPPLIER AND SHOULD BE CONTACTED IF IN DOUBT.

2. THE DESIGN OF POST-INSTALLED ANCHORS IN CONCRETE USED FOR THE COMPONENT ANCHORAGE IS PRE-QUALIFIED FOR SEISMIC APPLICATIONS IN ACCORDANCE WITH "ACI 355.2" AND DOCUMENTED IN A REPORT BY A REPUTABLE TESTING AGENCY.
(EX. THE EVALUATION SERVICE REPORT ISSUED BY THE INTERNATIONAL CODE COUNCIL)

3. EQUIPMENT ANCHORAGE MUST BE INSTALLED PER THE MANUFACTURER'S INSTRUCTIONS.

4. ANCHORS MUST BE INSTALLED IN MINIMUM 4000 PSI COMPRESSIVE STRENGTH NORMAL WEIGHT CONCRETE EXCEPT WHERE OTHERWISE INDICATED.
CONCRETE AGGREGATE MUST COMPLY WITH "ASTM C33".
INSTALLATION IN STRUCTURAL LIGHTWEIGHT CONCRETE IS NOT PERMITTED UNLESS OTHERWISE APPROVED BY THE STRUCTURAL ENGINEER OF RECORD.

5. ANCHORS MUST BE INSTALLED TO THE TORQUE SPECIFICATION AS RECOMMENDED BY THE ANCHOR MANUFACTURER TO OBTAIN MAXIMUM LOADING.

6. ANCHORS MUST BE INSTALLED IN LOCATIONS SPECIFIED ON THIS INSTALLATION DRAWING.

7. WIDE WASHERS MUST BE INSTALLED AT EACH ANCHOR LOCATION BETWEEN THE ANCHOR HEAD AND EQUIPMENT FOR TENSION LOAD DISTRIBUTION.
WIDE WASHERS MUST BE SERIES "W" OF AMERICAN NATIONAL STANDARD TYPE "A" PLAIN WASHERS (ANSI B18.22.1-1965, R1975) WITH THE NOMINAL WASHER SIZE SELECTED TO MATCH THE SPECIFIED NOMINAL ANCHOR DIAMETER.

8. CONCRETE FLOOR SLAB AND CONCRETE HOUSEKEEPING PADS MUST BE DESIGNED AND REBAR REINFORCED FOR SEISMIC APPLICATIONS IN ACCORDANCE WITH "ACI 318".

9. ALL HOUSEKEEPING PAD THICKNESSES MUST BE DESIGNED IN ACCORDANCE WITH THE PRE-QUALIFICATION TEST REPORT AS DEFINED IN NOTE 1 OR A MINIMUM OF 1.5X THE ANCHOR EMBEDMENT DEPTH, WHICHEVER IS LARGEST.

10. ALL HOUSEKEEPING PADS MUST BE DOWELLED OR CAST INTO THE BUILDING STRUCTURAL FLOOR SLAB AND DESIGNED FOR SEISMIC APPLICATION PER "ACI 318" AND AS APPROVED BY THE STRUCTURAL ENGINEER OF RECORD.

11. FLOOR MOUNTED EQUIPMENT (WITH OR WITHOUT A HOUSEKEEPING PAD) MUST BE INSTALLED TO A REBAR REINFORCED STRUCTURAL CONCRETE FLOOR THAT IS SEISMICALLY DESIGNED AND APPROVED BY THE ENGINEER OF RECORD TO RESIST THE ADDED SEISMIC LOADS FROM COMPONENTS BEING ANCHORED TO THE FLOOR.

12. WHEN INSTALLING TO A FLOOR, REBAR INTERFERENCE MUST BE CONSIDERED.

13. ATTACHING SEISMIC CERTIFIED EQUIPMENT TO ANY FLOOR OR WALL OTHER THAN THOSE CONSTRUCTED OF STRUCTURAL CONCRETE AND DESIGNED TO ACCEPT THE SEISMIC LOADS FROM SAID EQUIPMENT IS NOT PERMITTED BY THIS SPECIFICATION AND BEYOND THE SCOPE OF THIS CERTIFICATION.

14. ATTACHING SEISMIC CERTIFIED EQUIPMENT TO ANY FLOOR CONSTRUCTED OF LIGHT WEIGHT CONCRETE OVER STEEL DECKING IS NOT PERMITTED BY THIS SPECIFICATION AND BEYOND THE SCOPE OF THIS CERTIFICATION.

15. ATTACHING SEISMIC CERTIFIED EQUIPMENT TO ANY CONCRETE BLOCK WALLS OR CINDER BLOCK WALLS IS NOT PERMITTED BY THIS SPECIFICATION AND BEYOND THE SCOPE OF THIS CERTIFICATION.

16. INSTALLATION UPON ANY STEEL DUNNAGE SHALL BE COORDINATED WITH THE STRUCTURAL ENGINEER OF RECORD. STEEL DUNNAGE MUST BE CERTIFIED BY OTHERS AS IS BEYOND THE SCOPE OF THIS REPORT.

17. INSTALLATION UPON ANY ROOFTOP CURB SHALL BE COORDINATED WITH THE CURB MANUFACTURER AND THE STRUCTURAL ENGINEER OF RECORD. ANY CURB OR CONCRETE PAD THAT SUPPORTS THE GENSET UNIT IS BEYOND THE SCOPE OF THIS CERTIFICATION.

18. ALL ACCESSORY ATTACHMENTS (PIPE, CONDUIT, ETC.) TO THE EQUIPMENT SHALL BE ATTACHED IN A MANNER THAT ALLOWS RELATIVE MOTION (FLEX, SWING, JOIN/ELBOW, ETC.) TO PREVENT FAILURE DUE TO DIFFERENTIAL MOVEMENT BETWEEN THE EQUIPMENT AND ATTACHED ACCESSORY CAUSED BY SEISMIC LOADING ON THE SYSTEM.

19. REFER TO THE MANUFACTURER'S INSTALLATION INSTRUCTIONS FOR ANCHOR REQUIREMENTS AND MOUNTING CONSIDERATIONS FOR SEISMIC APPLICATIONS. MOUNTING REQUIREMENT DETAILS SUCH AS BRAND, TYPE, EMBEDMENT DEPTH, EDGE SPACING, ANCHOR SPACING, CONCRETE STRENGTH, WALL BRACING, AND SPECIAL INSPECTION MUST BE OUTLINED AND APPROVED BY THE PROJECT STRUCTURAL ENGINEER OF RECORD. THE INSTALLING CONTRACTOR IS RESPONSIBLE FOR THE PROPER INSTALLATION OF ALL ANCHORS AND MOUNTING HARDWARE, OBSERVING THE MOUNTING REQUIREMENT DETAILS OUTLINED BY THE ENGINEER OF RECORD. CONTACT THE MANUFACTURE'S REPRESENTATIVE IF A DETAILED SEISMIC INSTALLATION CALCULATION PACKAGE IS REQUIRED.

MODEL/PLATFORM: DQFAA	THIS PART IS SIMILAR TO: -
UNLESS OTHERWISE SPECIFIED THE FOLLOWING SHALL APPLY	ANG. TOL.: ± 1.0°
DIMENSIONAL TOLERANCES: X ± 1	.X ± 0.8 .XX ± 0.38
HOLE SIZE 0.00-4.99 TOL. +0.15/-0.08	HOLE SIZE 5.00-9.99 TOL. +0.20/-0.10
HOLE SIZE 10.00-17.49 TOL. +0.25/-0.13	HOLE SIZE 17.50-24.99 TOL. +0.30/-0.13

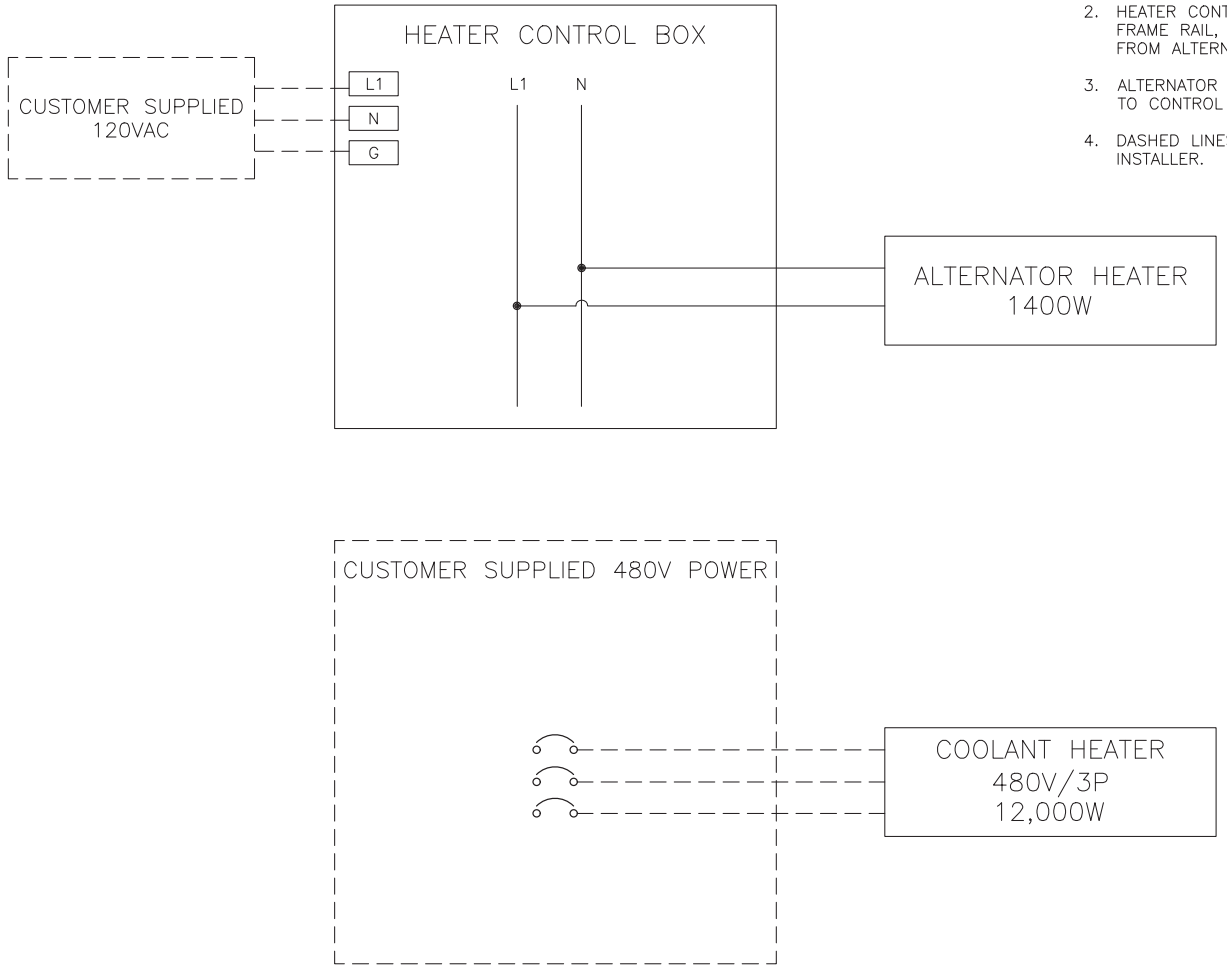
PART NUMBER: A046G657	PART REVISION: G
PART NAME: INSTALLATION,GENSET	
DRAWING CATEGORY: DETAIL	
STATE: RELEASED	SHEET: 9 OF 10
CUMMINS DATA CLASSIFICATION: CUMMINS CONFIDENTIAL	

Cummins Inc.

DIMENSIONS ARE IN: MILLIMETERS [ ] ARE IN: -	SIZE: D	SCALE: 1/1
DIMENSIONING AND TOLERANCING PER: ASME Y14.5-2009	THIRD ANGLE PROJECTION	CAD SYSTEM PTC® Creo® Parametric

UNLESS OTHERWISE SPECIFIED,
ALL DIMENSIONS ARE IN INCHES

NOTES:
1. FOLLOW REGIONAL REGULATIONS AND APPLICABLE ELECTRICAL CODES FOR INSTALLATION.
2. HEATER CONTROL BOX IS LOCATED ON GENSET FRAME RAIL, LEFT SIDE OF UNIT WHEN VIEWED FROM ALTERNATOR END.
3. ALTERNATOR & CONTROL HEATERS PRE-WIRED TO CONTROL BOX.
4. DASHED LINES ARE THE RESPONSIBILITY OF THE INSTALLER.



PREP. BY:	JPK
	5/3/2024

CSSNA POWER GEN

TITLE: CENTUM AC HEATER TABLE

SIZE: B | DWG NO: – | REV 0

SCALE: | DO NOT SCALE PRINT | SHEET 1 OF 1

SECTION 4

WARRANTY

Power Generation

Warranty Statement

CENTUM™ Series Generator Set

C1250D6E, C1500D6E, C1750D6E,
C2000D6E, C2750D6E, C3000D6EB

English
Original Instructions

4-2024

A072R157 (Issue 2)

Limited Warranty

CENTUM™ Series Generator Set

This limited warranty applies to all Cummins Inc. branded CENTUM™ Series generator sets including C1250D6E, C1500D6E, C1750D6E, C2000D6E, C2750D6E, and C3000D6EB and associated accessories (hereinafter referred to as "Product").

This warranty covers any failures of the Product, under normal use and service, which result from a defect in material or factory workmanship.

Warranty Period:

The warranty start date† is the date of initial start up, first rental, demonstration or 18 months after factory ship date, whichever is sooner. See table for details.

Continuous Power (COP) is defined as being the maximum power which the generating set is capable of delivering continuously whilst supplying a constant electrical load when operated for an unlimited number of hours per year. No overload capability is available for this rating.

Prime Power (PRP) is defined as being the maximum power which a generating set is capable of delivering continuously whilst supplying a variable electrical load when operated for an unlimited number of hours per year. The permissible average power output over 24 hours of operation shall not exceed 70% of the PRP. For applications requiring permissible average output higher than stated, a COP rating should be used.

Limited-Time Running Power (LTP) is defined as the maximum power available, under the agreed operating conditions, for which the generating set is capable of delivering for up to 500 hours of operation per year.

Emergency Standby Power (ESP) is defined as the maximum power available during a variable electrical power sequence, under the stated operating conditions, for which a generating set is capable of delivering in the event of a utility power outage or under test conditions for up to 3 years or 1,000 hours, whichever occurs first. The permissible average power output over 24 hours of operation shall not exceed 70% of the ESP.

Environmental Protection Agency – Stationary Emergency (EPA-SE) is defined as being the maximum power available during a variable electrical power sequence, under the stated operating conditions, for which a generator set is capable of delivering in the event of a utility power outage or under test conditions and used in strict accordance with the EPA NSPS for stationary engines, 40 CFR part 60, subparts IIII and JJJJ, where a reliable utility must be present. The permissible average power output over 24 hours of operation shall not exceed 70% of the EPA-SE.

Data Center Continuous (DCC) is defined as the maximum power which the generator is capable of delivering continuously to a constant or varying electrical load for unlimited hours in a data center application.

Base Warranty Coverage Duration
(Whichever occurs first)

Rating	Months	Max. Hours
COP	12	Unlimited
PRP	12	Unlimited
LTP	12	500 hrs
ESP	36	1000 hrs
EPA-SE	24	Unlimited
DCC	24	Unlimited

† Warranty start date for designated rental and oil and gas model Products is determined to be date of receipt of Product by the end customer.

Cummins Inc. Responsibilities:

In the event of a failure of the Product during the warranty period due to defects in material or workmanship, Cummins Inc. will only be responsible for the following costs:

- All parts and labor required to repair the Product.
- Reasonable travel expenses to and from the Product site location.
- Maintenance items that are contaminated or damaged by a warrantable failure.

Owner Responsibilities:

The owner will be responsible for the following:

- Notifying Cummins Inc., its distributors or dealers within 30 days of the discovery of failure.
- Installing, operating, commissioning and maintaining the Product in accordance with Cummins Inc.'s published policies and guidelines.
- Providing evidence for date of commissioning.
- Providing sufficient access to and reasonable ability to remove the Product from the

installation in the event of a warrantable failure.
- Incremental costs and expenses associated with Product removal and reinstallation resulting from non-standard installations.
- Costs associated with rental of generating sets used to replace the Product being repaired.
- Costs associated with labor overtime and premium shipping requested by the owner.
- All downtime expenses, fines, all applicable taxes, and other losses resulting from a warrantable failure.

Limitations:

This limited warranty does not cover Product failures resulting from:

- Inappropriate use relative to designated power rating.
- Inappropriate use relative to application guidelines.
- Inappropriate use of an EPA-SE application generator set relative to EPA's standards.
- Normal wear and tear.
- Improper and/or unauthorized installation.
- Negligence, accidents or misuse.
- Lack of maintenance or unauthorized repair.
- Noncompliance with any Cummins Inc. published guideline or policy.
- Use of improper or contaminated fuels, coolants or lubricants.
- Improper storage before and after commissioning.
- Owner's delay in making Product available after notification of potential Product problem.
- Replacement parts and accessories not authorized by Cummins Inc.
- Use of Battle Short Mode.
- Owner or operator abuse or neglect such as: operation without adequate coolant or lubricants; overfueling; overspeeding; lack of maintenance to lubricating, cooling or air intake systems; late servicing and maintenance; improper storage, starting, warm-up, run-in or shutdown practices, or for progressive damage resulting from a defective shutdown or warning device.
- Damage to parts, fixtures, housings, attachments and accessory items that are not part of the generating set.

This limited warranty does not cover costs resulting from:

- Difficulty in gaining access to the Product.
- Damage to customer property.

A "Data center" is defined as a dedicated facility that house computers and associated equipment for data storage and data handling.

Reliable utility is defined as utility power without routine or regularly scheduled black-outs.

Please contact your local Cummins Inc. Distributor for clarification concerning these limitations.

CUMMINS INC. RIGHT TO FAILED COMPONENTS:

Failed components claimed under warranty remain the property of Cummins Inc. Cummins Inc. has the right to reclaim any failed component that has been replaced under warranty.

Extended Warranty:

Cummins Inc. offers several levels of Extended Warranty Coverage. Please contact your local Cummins Inc. Distributor for details.

power.cummins.com

THE WARRANTIES SET FORTH HEREIN ARE THE SOLE WARRANTIES MADE BY CUMMINS INC. IN REGARD TO THE PRODUCT. CUMMINS INC. MAKES NO OTHER WARRANTIES, EXPRESS OR IMPLIED, OR OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

IN NO EVENT IS CUMMINS INC. LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES.

This limited warranty shall be enforced to the maximum extent permitted by applicable law. In the United States, some states do not allow limitations on how long an implied warranty lasts or the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you. This warranty gives you specific legal rights, and you may have other rights which vary from state to state or jurisdiction to jurisdiction.

Product Model Number:_____
Product Serial Number:_____
Date in Service:_____

power.cummins.com