DATA CENTER MODULE 3 MW TIER 2 CERTIFIED C175-16 GENSET WITH ACERT® TECHNOLOGY SOUND ATTENUATED DOUBLE ISO 40 FT STACKED CONTAINERS CSC CERTIFIED

Standby	**3000 eKW**	**60 Hz**
Prime Power	**2725 eKW**	**60 Hz**
Continuous	**2500 ekW**	**60 Hz**

FEATURES

COMPLETE SOLUTION WITH OPTIONS

- Wide range of rugged features and flexible system attachments.
- **Modular Design** allows small footprint with rapid installation and commissioning on site.
- **Fully Prototype Tested** with certified torsional vibration analysis and actual noise measurements. The prototype test report is certified by the German TUV, an independent certification agency.
- **Every Module Factory Tested** including steady state and transient electrical performance and operation of all auxiliaries.
- **CSC Certification of Modules** is provided for low cost convenient transport and stackable storage of the modules.

EMISSIONS AND NOISE

- Meets EPA 2008 Tier 2 emissions requirements without after treatment. Achieves a noise pressure of only **85 dB(A) at 1 meter**.

ENGINE

- Features the reliable, durable Caterpillar C175-16 Diesel ACERT ® engine.
- V16, 4 stroke diesel engine combines superior performance with excellent fuel economy
- Common Rail fuel delivery
- Advanced electronic engine control
- Low installation and operating costs

GENERATOR

- Exclusive Caterpillar SR5® generator, performance and design matched to Caterpillar C175 engine.
- Standard version 480 V, two bearings, form wound, 1868 Frame, 6 leads.
- Permanent magnet excitation with Caterpillar digital voltage regulator (CDVR).
- 2/3 pitch with winding temperature detectors.

WORLDWIDE PRODUCT SUPPORT

- Worldwide parts availability through your Caterpillar dealer, with over 1800 dealers branch stores operating in 166 countries.
- Caterpillar® dealer services technicians are trained to service every aspect of your electric power generation system.
- Customer Support Agreements offer back-to-back services from scheduled inspections and preventive maintenance to total maintenance and repair contracts.

3 MW DATA CENTER MODULE
EPA TIER 2 CERTIFIED

CATERPILLAR®

GENERATOR SET & CONTAINER

- Cooling system 110°F ambient operating & vertical discharge radiator during continuous operation.
- One genset ISO high cube (2.896 m) container, 40 feet long (12 m), 2.438 m wide container. Interior walls and ceiling are insulated with 80 mm of rock wool and covered with perforated metal sheet for a durable interior wall surface.
- Two (2) lockable personnel doors are provided with sound attenuation and double sealed. Each door is located on each side of the generator for service and equipped with emergency stop buttons. Allows access to auxiliary connections for external power source feeding (jacket water heater, battery charger, and space heater in generator, A/C lighting and sockets.)
- Two (2) double doors are located on the container side to ease access the engine block and perform maintenance operation.
- Genset container is bunded to contain spills.
- One additional ISO high cube (2.896 m) container, 40 feet long (12 m), 2.438 m wide container. Provided with complete installation of radiator, muffler, and outlet ventilation.
- Additional door at rear end of top container for service access to equipment.
- Convenient external connections for fuel. (Fuel transfer system by others).
- Four lamps provided in the generator set container, fluorescent type 2x36 Watt with timer.
- Includes 5000A IEC rated, 3 poles, electrically operated circuit breaker installed on the rear of generator. Cables are routed to the side.
- Includes 400A IEC rated, 4 poles, manually operated circuit breaker to feed the auxiliaries.
- Delivered fully tested at 60 Hz, ready to operate. Test includes load and parallel operation.
- Lloyds CSC (Convention for Safe Containers) certified for convenient transport. Stackable, up to three high for transport and storage.
- Meets or exceeds specifications: ISO 3046, IEC 34, ISO 8528, EGSA101P, NEMA MG1-22
- Meets EU directives 2006/ 95 / EC Low voltage safety device, 98/37 / EC (Machinery safety directive), IEC standard, 2000 / 14 / EC for the sound testing.

CONTROL SYSTEM

- Utility paralleling switchgear intended for automatic or manual synchronizing with a utility power source as a load management system, with provisions for standby operation feeding an isolated load network. Modes of operation are field configurable and include:
  - Single Unit Island Mode.
  - Multiple Unit Island Mode.
    - Includes Load Sense / Load Demand control, ramp loading, bumpless transfer
    - Load sharing (kW and kVAR) capability is provided via network communication.
  - Single Unit Utility Parallel Mode.
    - Automatic paralleling.
    - Selectable for Import / Export control. (Requires 4-20 mA customer input.)
    - This product is intended for unmanned operation Automatic paralleling.
- Convenient operator interface
  - Color touch screen
  - Graphical one-line diagrams with LED status indicators.
- Communication with EMCP®3 enables to display engine parameters on display, and enables to change some set points, alarm levels or reset.
- Modules can operate in groups up to 18 without the need for a master control. All communications synchronizing and load sharing between units are provided by datalink for quick and convenient setup. (Max cumulative distance 450 m)
- Protection includes 5000A motorized, 3 poles circuit breaker with 100kA interrupt capability, extensive protective relays and internal power distribution. Factory mounted and compliant with IEC947-2
- Convenient customer connections for power are routed to the side of the module
- Request to run / stop signal (customer input)
- Can also be paralleled to Woodward compatible legacy modules in island operation.
- Languages available: English.

FACTORY INSTALLED STANDARD EQUIPMENT

FEATURE	UTILITY POWER MODULE CONFIGURATION
Air Inlet	- 4 x single element canister with service indicator
Exhaust	- Dry Manifold exhaust - Bolted flange with bellow for each turbo - Exhaust collectors with quick connection to container roof - 2 x exhaust silencers
Fuel	- Common rail system - Primary fuel filter with water separator - Secondary/ tertiary fuel filters (engine mounted) - Fuel cooler sized for 50C ambient - Convenient fuel connection located on side
Generator	- SR5 generator 1868 frame - 3 phases brushless, salient pole - Form wound, permanent magnet excitation - IEC platinum stator RTDs - Cat Digital Voltage Regulator (CDVR) - Space heater kits
Governor	- ADEM® A4
Lubrication	- Oil filter, filler and dipstick - Oil drain line with valves connected via flex hose to container side - 24V DC Electrical prelube pump - Integral lube oil cooler - Gear type lube oil pump
Mounting	- Rails support on engine / generator - Installed on anti-vibration mounts
Starting / Charging	- 24volt electric starting motors - Batteries with rack and cables - Disconnect switch
Crankcase Systems	- Open crankcase ventilation
Circuit Breakers	- Insulated case circuit breaker, IEC rated 5000A, 3 poles with shunt trip, electrically operated, 100 kA interrupt capability, at rear of generator - Molded case circuit breaker, IEC rated 400A, 4 poles, manually operated, on side of generator
General	- Right hand service (except oil) - SAE standard rotation - Caterpillar yellow with high gloss black rails - Container painted white with CAT decals - Barring group manual - Factory test report
Control Panel	- EMCP®3.3 Control Panel installed on rear face - RTDs for bearing & winding temperatures monitoring and protection - Modbus communication with Terberg
Cooling	- SCAC cooling - Jacket water heater - 4 x fans table cooler installed on roof container - Flexible piping (PN10) routed in containers to allow for quick connection of cooling circuit - Expansion tanks with sight glasses

FACTORY INSTALLED STANDARD EQUIPMENT (Continued)

FEATURE	BENEFITS
CAT C175 Engine	Robust, durable CAT engine based on the new ACERT® with common rail technology to comply with emission regulation and optimize fuel efficiency ! Equipped with required accessories (barring, jacket water heater, etc.) for optimum operation and protection of unit. The engine is equipped with ADEM® A4 governing system which is an integral part of the innovative ACERT® Technology that provides higher degree of control over a large number of combustion variables than ever before ! The ADEM® A4 engine system is composed of the ADEM® A4 ECM, control software, sensors, actuators, fuel injectors and interface to the generator system. The prime benefit of an ADEM® A4 engine system is to better control and maintain the particulate emissions, both steady state and transient, improving engine performance.
	ADVANCED FEATURES - Isochronous or droop speed control - Enhanced performance from fuel injection timing and limiting - Adjustable monitoring of vital engine parameters - Idle / rated speed setting - Programmable speed acceleration ramp rate - Adjustable cooldown duration SIMPLE SERVICING - Each ADEM® A4 system works in combination with the Caterpillar - ET service tool software to keep the engine operating at peak performance. - Displays measured parameters - Retrieves active and logged event codes documenting abnormal system operation - Performs calibrations and diagnostic tests. - Supports flash programming of new software into the ADEM® A4 ECM SELF DIAGNOSTICS - Each ADEM® A4 ECM has a full compliment of self diagnostics. - The ECM can detect faults in the electrical system and report those faults to the service technician for quick repair.

FACTORY INSTALLED STANDARD EQUIPMENT (Continued)

FEATURE	BENEFITS
SR5 Generator	Meets Standards: meets the requirements of NEMA,IEC, ISO, IEEE, BS, AS High motor starting capability Proven mechanical and electrical design 480 Volt SR4B brushless, 1868 frame, form wound Permanent magnet excited, three-phase with digital voltage regulator, Class H insulation with 125 temperature rise Two bearing, 6 leads, star connected, 2/3 winding pitch IP 23 drip proof enclosure design 125% of synchronous speed capability Standard NEMA hole pattern Space heater kit Bearings and winding resistive temperature detectors
CDVR	Microprocessor based control providing choice of three control modes, Automatic Voltage Regulation, Power Factor Regulation, Reactive Power Regulation Dual Slope Under frequency (volts/hertz) regulation Three phases voltage sensing Ten generator protective functions. Generator Overvoltage Generator Under voltage Loss of Excitation Instantaneous Field Over current Over Excitation Loss of Sensing Diode Fault Monitor Internal Watchdog Failure Internal Memory Failure Fault Reset Closed Too Long
Generator Set EMCP®3	Generator mounted EMCP®3.3 local panel Convenient service access for Caterpillar service tools (not included) The Caterpillar EMCP®3.3 places fully featured power metering, protective relaying and engine and generator control and monitoring at your fingertips. Integration with the CDVR provides enhanced system performance. Fully featured power metering, protective relaying, engine and generator parameter viewing, and expanded AC metering are all integrated into this controller. Real-time clock allows for date and time stamping of diagnostics and events. Langauages: French, English, German, Dutch, Spanish
	OPERATOR INTERFACE - Graphical display with positive image, transflective LCD, adjustable white Backlight/contrast. - Two LED status indicators (1 red, 1 amber). - Three Engine Control Keys and Status Indicators (Run/Auto/Stop). - Lamp Test Key. - Alarm Acknowledgement Key. - Display Navigation Keys - Two Shortcut Keys: Engine Operating Parameters and Generator Operating Parameters.

FACTORY INSTALLED STANDARD EQUIPMENT (Continued)

FEATURE	BENEFITS
Switchgear & Controls	MODES of OPERATION Utility paralleling switchgear is included for automatic paralleling with a utility power source as a load management system, with provisions for standby operation feeding in an isolated load network. Modes of operation are field configurable and include: - Single Unit Island Mode - Multiple Unit Island Mode (up to 18 modules per site) with ramp loading - Includes Load Sense / Load Demand control Each module displays system summary power level and summary alarms. Load sharing capability is provided via CAN network communication - Single Unit Utility Parallel Mode. - Automatic paralleling - Selectable for Import / Export control - If Import control is selected a 4-20mA or 0 - 10 V signal is required and will be provided by others that is scalable to the utility contribution. - Provision for Manual Paralleling - Communication with EMCP®3
	AUTOMATIC LOAD DEMAND: Load demand operation includes sequencing of multiple units, with configurable start stops levels and timers. Although the modules are intended for prime power rental applications, they can also be configured for various stand-by scenarios as well. This includes strategies where the first module up to speed becomes the master and can close on a dead bus with the remaining packaging automatically paralleling to it.
	AUTOMATIC SYNCHRONIZING: The control system provides soft loading and unloading for bumpless transfer in parallel operation. The control system also works together with EMCP® 3.3 to provide automatic cooldown feature. The control system provides data communication for 1 to 18 modules in a network. Communication is provided with a robust high speed CAN network. The CAN data link was selected for robust high speed deterministic data transfer. Modules are connected in series with a 15 m long high speed CAN cables (provided with each module). Parallel operation includes both real kW and reactive KVAR load sharing and control.
Battery Charger	60A / 24V DC BATTERY CHARGER The battery charger is included in the panel and ensures that your genset batteries are always quickly and completely charged. A unique three-step charging method guarantees optimum efficiency, meaning your batteries will perform better and last much longer. The high-frequency switch-mode technology, in which advanced microprocessors combine a myriad of functions, causes an extremely accurate charge characteristic. Furthermore, this battery charger has a unique memory function that prevents the charger starting a new three-stage charge cycle if the supply voltage is interrupted. The model is equipped with an LED status indicator displaying the stage of the three-stage charge cycle.
Panel	The panel is sized specifically for the power module design and to fit in control system based on TEC and the LV auxiliary motor starters.

FACTORY INSTALLED STANDARD EQUIPMENT (Continued)

FEATURE	BENEFITS
Switchgear & Monitoring	The monitoring system includes a mimic one line that shows the generator with it's respective circuit breaker in a one-line representation of the system. The graphic COLOR LED indicators display the following information: - Generator circuit breaker open/closed/tripped - Engine running - System summary alarm The monitoring system also includes an additional display conveniently monted in the EMCP® 3.3 panel. This display is a 1/4 VGA color touchscreen with pushbuttons for controls. This display provides quick module set up with all parameters stored in non-volatile memory. In addition to individual module information, each module also provides overall plant information including: - overall power production; and alarm / shutdown status of each MODULE. The control system monitors and manages various module functions. The 1868 frame generator is provided with winding temperature sensors as standard. The control system monitors and displays these values, providing alarm and shutdown. Various diagnostic features are provided including breaker synchronizing time out and reclose alarms, circuit breaker position feedback, - Phase rotation mismatch, network communication error alarms, - Sensor diagnostics, and multiple unit configuration checks.
Switchgear Protection	MONITOR AND PROTECTION FUNCTIONS - Generator over current — ANSI 50 / 51 - Generator current imbalance — ANSI 46G - Generator under voltage — ANSI 27G - Generator over voltage — ANSI 59 G - Generator voltage imbalance — ANSI 18 G - Generator leading power factor - Generator lagging power factor - Generator under frequency — ANSI 81 U/G - Generator over frequency — ANSI 81 O/G - Generator reverse power — ANSI 32 G - Generator overload — ANSI 32 O / G - Busbar under voltage — ANSI 27G - Busbar over voltage — ANSI 59 G - Busbar voltage imbalance — ANSI 18 - Busbar under frequency — ANSI 81 U - Busbar over frequency — ANSI 81 O - Loss of mains — Vector shift, Rate Of Change Of Frequency

FACTORY INSTALLED STANDARD EQUIPMENT (Continued)

LV Auxiliary	The diesel generator set requires remote cooling, ventilation, and other consumers. The auxiliary panel is included with the control and appropriate for those installations. It is a low voltage distribution board and a generator set dedicated Motor Control Center designed for use in combination with the diesel generator set control panel. Each motor starter consists of a Direct on Line (DOL) starting contactor and a motor protection Circuit Breaker. The generator set control panel automatically controls each motor starter. Manual operation is achieved via the panel mounted touch screen operator's interface. The control system monitors the motor starters and feeders status and trip conditions via auxiliary dry contacts. The auxiliary panel is designed with front access, in accordance with IEC standards. It is located in the container next to the auxiliary load but can also be installed next to its generator control panel. The form 1 construction provides excellent accessibility, serviceability, ease of maintenance and commissioning. The IP54 panel is for indoors use. The panel has inlet and outlet ventilation ducts. Each panel is fully tested before shipment. Cable entry is from bottom. The panel door is equipped with a locking handle.

Consist of the auxilary panel			
1 x	Incoming supply isolator switch	Installed on Genset	
1 x	Feeder + contactor, 20A	2P	Space heater
1 x	Feeder, 40A	2P	JW heater
1 x	Feeder, 25A	3P	Fuel transfer
2 x	Feeder, 16A	1P+N	Internal use
4 x	Motor starter combination	5.5 kW-DOL	Room ventilation
4 x	Motor starter combination	11 kW-DOL	Remote cooler fans
I/O cards controlled from the Generator Set Panel via CAN Datalink			

For more technical information or details on optional equipment consult the file "C175 Standing Combi Control System Diesel v1.pdf"

AVAILABLE OPTIONAL MECHANICAL EQUIPMENT

Chain hoist for engine maintenance	This option includes beams over the cylinder heads from the engine and as well one manually operated chain hoist. The beams are sliding to allow the exhaust collector to be installed during operation.
Motorized louvers	To avoid airflow through the container during the genset standstill, this position provides louvers, which are located after the air inlet weather protection grid and before the air outlet sound baffles. The louvers are operated via the engine start / stop and will be controlled via the EMCP®3 panel.
Cold Climate Version	Includes motorized louvers, electrical and diesel fueled space heaters and additional ventilation system suitable for operation down to – 40 F.
Lube oil make up tank	One lube oil make up system (300 L) is provided and feeds by gravity, via an Murphy level controller, the engine oil sump. It is equipped with a 1 ½ ” manual fill point from the interior. To enable a min oil tank level alarm there is a min level switch at 30 % lube oil level. To protect the engine against high oil level there is also included an engine max max oil level switch. The level switches are wired to a common terminal stripe inside the control panel according the electrical schematics and they will be also included inside the program logic from the plc. To observe the oil level inside the oil tank he is equipped with a sight glass. To drain the tank, a 1”valve is included at the tank bottom. The drain from the engine oil sump will be routed to the exterior of the container / power module.

SPECIFICATIONS for 60 Hz- 2825 ekW (3531 kVA), 480 V

CATERPILLAR SR5 GENERATOR (3111150)

PARAMETER	VALUE
Voltage level adjustment	± 5.0%
Voltage regulation	± 0.5%
Waveform deviation line-line	Less than 3%
TIF	Less than 50
Enclosure	IP23
Amperage	4247.1 A
Insulation class	H
Winding type	Form

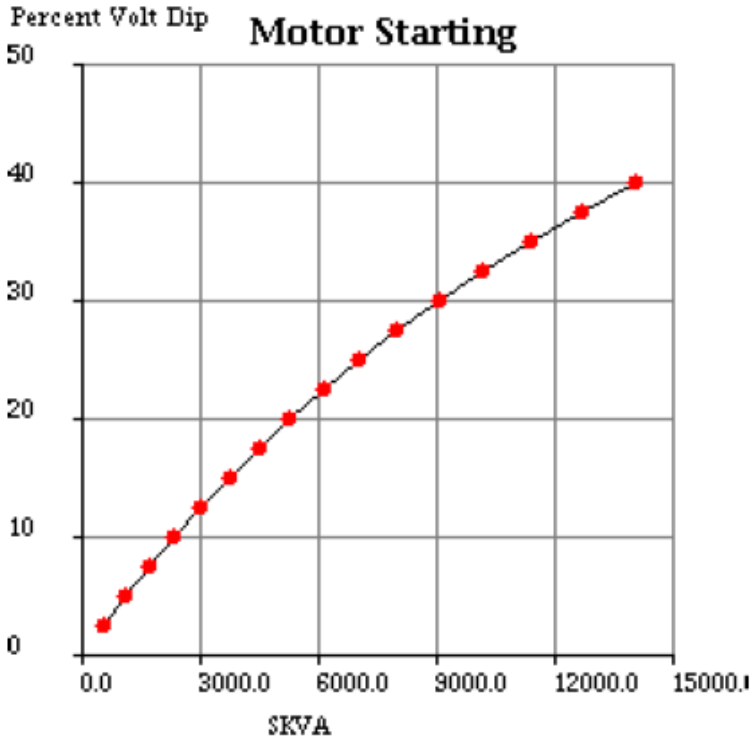
TIME CONSTANTS	VALUE [s]
T'do	5.595
T'd	0.3618
T"do	0.0087
T"d	0.0073
T"qo	0.008
T"q	0.0068
Te	0.223
Ta	0.0463

REACTANCE DATA	PER UNIT	OHMS
X"d	0.1195	0.0078
X"q	0.1165	0.0076
X'd	0.1747	0.0114
Xd	2.6959	0.1759
Xq	1.2001	0.0783
X2	0.118	0.0077
X0	0.0077	0.0005

GENERATOR EFFICIENCY		
PER UNIT LOAD	kW	EFFICIENCY %
0.25	706.3	92.8
0.5	1412.5	95.4
0.75	2118.8	96.1
1.0	2825.0	96.2
1.1	3107.5	96.1

MOTOR STARTING (0.4pf)	
skVA	% Volt Dip
1111	5.0
2345	10.0
3725	15.0
5277	20.0
7036	25.0
9046	30.0

MOTOR STARTING GRAPH



3 MW DATA CENTER MODULE
EPA TIER 2 CERTIFIED

CATERPILLAR®

CATERPILLAR C175 ENGINE (DM8448)

V-16, 4-stroke-cycle Diesel

Bore – mm	175 mm
Stroke – mm	220 mm
Displacement – L	84.67 L
Aspiration	Turbocharged – SCAC

FUEL CONSUMPTION

@100 % - 3000 ekW	807 L/h
@ 75 % - 2250 eKW	616 L/h
@ 50 % - 1412.5	489 L/h

Please consult TMI for latest information or product update

DIMENSIONS & WEIGHTS

CONTAINERS SHIPPING DIMENSIONS (ISO 40FT High Cube)

Length	12’192 mm
Width	2’438 mm
Height	2’896 mm

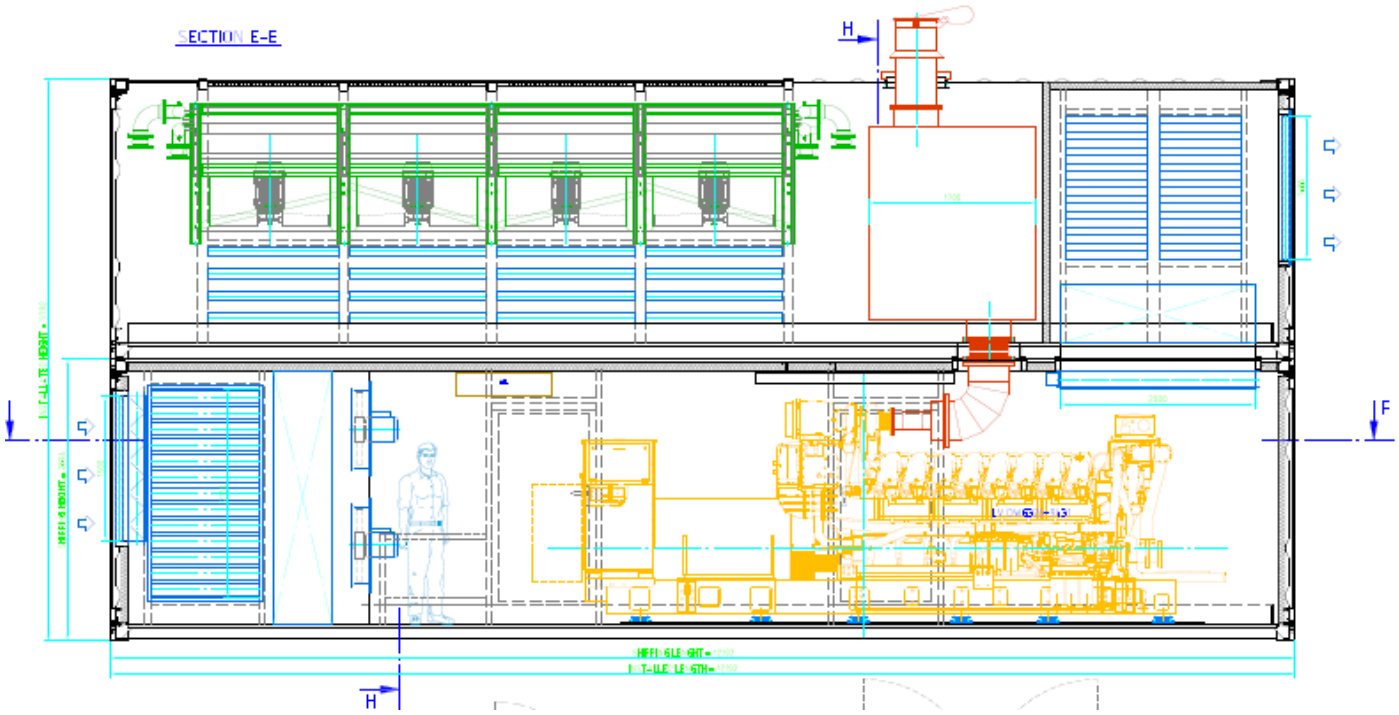
CONTAINERS INSTALLED DIMENSIONS

Length	12’192 mm
Width	2’438 mm
Height	6’560 mm

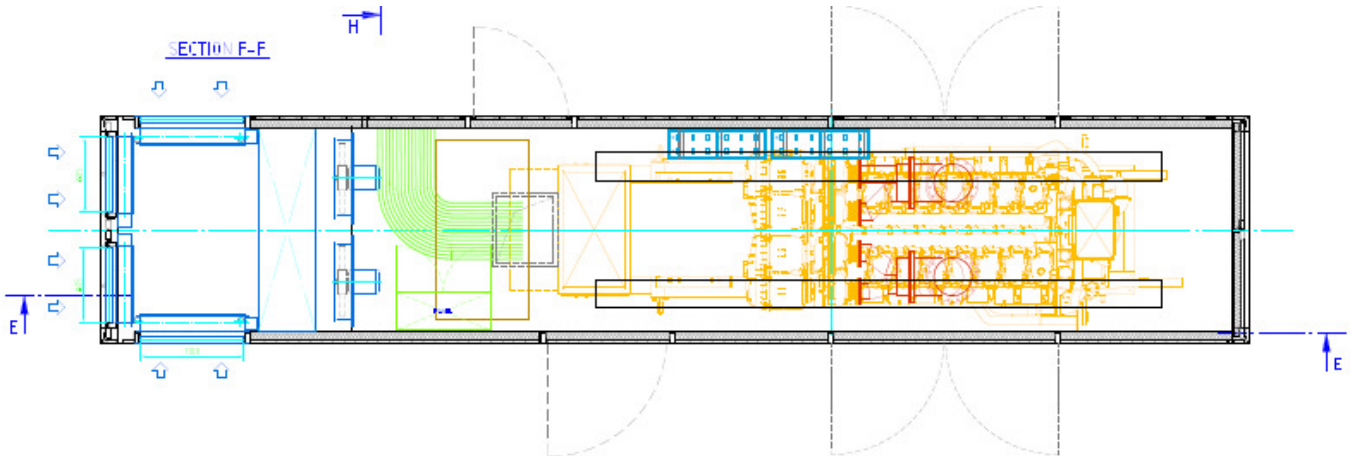
CONTAINER WEIGHT

Genset Container	31’000 kg
Upper Container	12’000 kg

CONTAINER VIEWS:



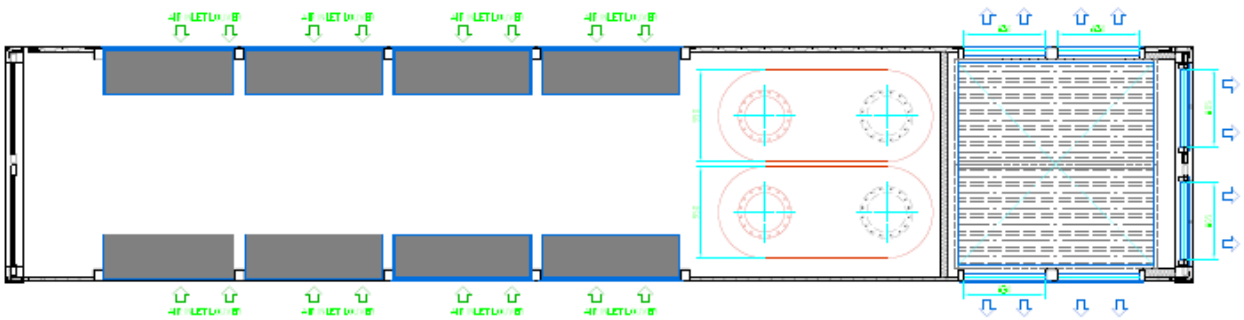
Left Side View
(Left side wall removed to show interior components)



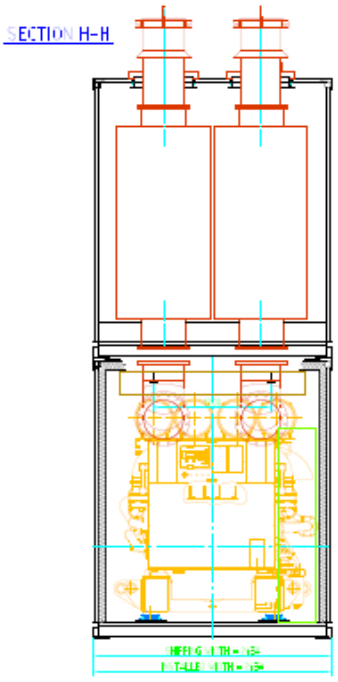
Top View Genset Container

3 MW DATA CENTER MODULE
EPA TIER 2 CERTIFIED

CATERPILLAR®



Top View Upper Container



Rear View