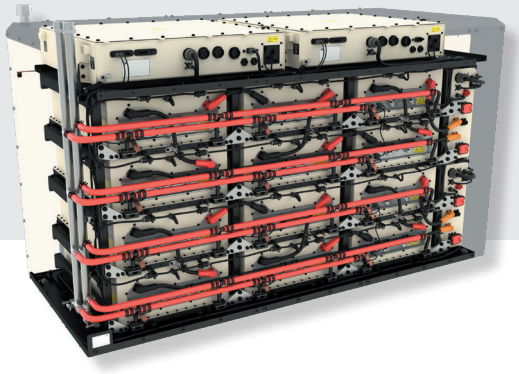
CMB-1 CAT MARINE BATTERY

MODULE TECHNICAL SPECIFICATIONS



CATEGORY	REQUIREMENTS	UNITS	MAIN BATTERY
Critical	Energy (Nameplate)	kWh	28.7
Performance	Discharge Rate (Continuous)	C	1
	Charge Rate (Continuous)	C	1
	Pulse C rate (30 seconds)	C	1.5
	Cell Chemistry		LFP
	Cell Type		Prismatic
	Recommended State of Charge Range	%	10% ~ 90%
	Targeted Life	Yrs	*10 years at 20°C
	Battery Module Voltage (min)	Volts DC	109
	Battery Module Voltage (nom)	Volts DC	125
	Battery Module Voltage (max)	Volts DC	142
	Energy Density	Wh/l	219
		Wh/kg	131.8
Environmental	Operating Ambient Temperature	°C	0 to +40
	Relative Humidity	%	0-50
Dimensions	W x H x D	mm	588 x 251 x 888
Certification	Maritime Classification Societies		ABS & DNV (Pending)
	Cybersecurity (MCS)		(Pending)
Packaging	IP Rating		IP65
	Cooling (Air or Liquid)		Liquid
	Coolant type	WEG	50/50 or 30/70
	Coolant flow (Per module)	l/min	3.6
	Coolant Temperature	°C	20 +/-5
	Maintenance (Front clearance)	mm	900
	Interface connections (Location)		Front

*Life based on typical vessel use

Specifications provided are preliminary and subject to change.

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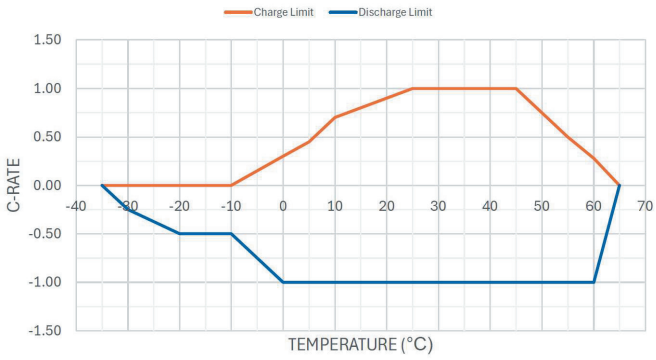
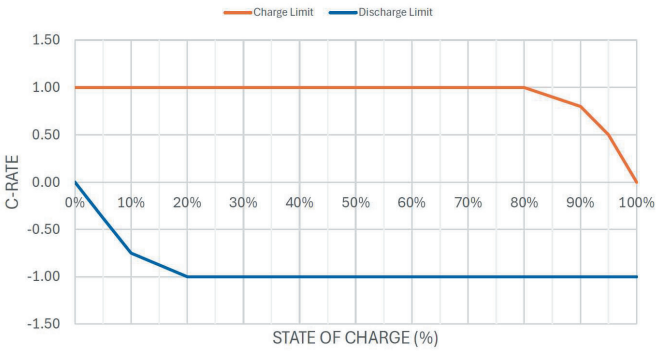
PACK TECHNICAL SPECIFICATIONS

CATEGORY	REQUIREMENTS	UNITS	MAIN BATTERY
Battery System	Battery Management System (BMS)		Included
	DC Pre-charge Circuit		Included
	Control Power	Volts DC	24
	Emergency Stop		Included
	Communication		Modbus
System Voltage	(6 modules)	Volts DC	654-852
	(7 modules)	Volts DC	763-994
	(8 modules)	Volts DC	872-1136
	(9 modules)	Volts DC	981-1278
	(10 modules)	Volts DC	1090-1420

ABSOLUTE MAXIMUM C-RATE BASED ON CELL TEMPERATURE IN BATTERY RACK



SOC-BASED CURRENT LIMIT AT 25 °C



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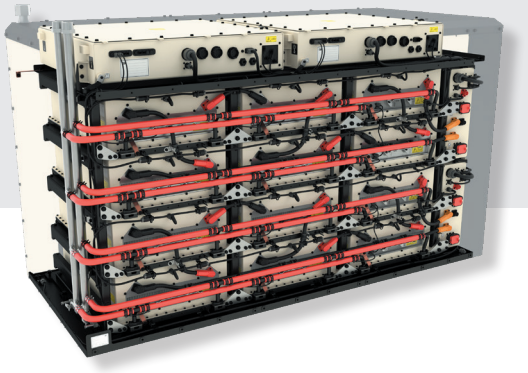

Image shown may not reflect actual configuration.

Functionality

The CMB-1 Cat® Marine Battery delivers a highly adaptable energy storage solution engineered to meet demands for a wide range of marine industry segments. With 39 configurable rack options and support for multiple DC voltage operating ranges, the CMB-1 offers flexibility and scalability required to integrate seamlessly across platforms.

Safety

The CMB-1 features a multi-layer safety concept as follows: The battery uses lithium iron phosphate (LFP) cells, recognized for their high thermal runaway and ignition temperature thresholds, improvig overall safety. Thermal protection is provided through, a Linear Heat Detection (LHD) wire which disconnects a battery string if internal module temperatures exceed safe limits. Cat Battery Management System (BMS) provides reliable and safe operation. Caterpillar's proprietary battery technology maintains system stability. Cell and module temperatures are constantly monitored through the BMS, and the system will automatically disconnect a battery string if any abnormal conditions are detected. module temperatures exceed safe limits. Cat Battery Management System (BMS) provides reliable and safe operation. Caterpillar's proprietary battery technology maintains system stability. Cell and module temperatures are constantly monitored through the BMS, and the system will automatically disconnect a battery string if any abnormal conditions are detected.

System Integration

The CMB-1 battery system features Ethernet RJ45 communication interfaces, configurable in both ring and star topologies, enabling seamless and efficient integration into a wide range of marine systems. Additionally, it supports a flexible DC bus voltage range from 654 to 1420 volts, accommodating various vessel power requirements and system architectures.

Certification

CMB-1 is ABS and DNV certified for marine use and compliant with cybersecurity standards. Furthermore, the CMB-1 Battery is CE certified and IEC compliant. Additional MCS approvals to be provided based on customer requests.

Cooling

Liquid cooling system provides optimal operating temperatures for the battery modules and cells. Coolant leak detection is provided at the pack level. The modules are IP65 rated, ensuring that no liquid from other modules can enter and contact the internal battery cells. The BMS will issue a leak detection alert in the event of a coolant leak. Continuous temperature monitoring and control will ensure the system remains within safe operating limits.

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