

ST510CS-4H-CNPowerStack - Turnkey C&I Energy Storage Solution Brief:

Deploying ST510CS-4H-CNPowerStack

TURNKEY C&I ENERGY STORAGE SOLUTION BRIEF: DEPLOYING
ST510CS-4H-CNPowerStack

EXECUTIVE SUMMARY

The ST510CS-4H-CNPowerStack represents a paradigm shift in commercial and industrial (C&I) behind-the-meter energy storage. Engineered by a Tier-1 global energy storage vendor, this turnkey AC-coupled solution integrates high-density LFP battery racks, a bi-directional 100kW Power Conditioning System (PCS), and an intelligent Liquid Cooling Thermal Management System within a single, pad-mountable outdoor enclosure. Designed for peak shaving, demand charge reduction, and backup power applications, the ST510CS-4H-CNPowerStack delivers a usable energy capacity of 215kWh (expandable to 1MWh+ via parallel stacks) at a nominal 768V DC bus voltage, achieving an industry-leading round-trip efficiency of 92.5% (DC/AC, at nominal operating point).



SYSTEM ARCHITECTURE & SAFETY

The ST510CS-4H-CNPowerStack employs a modular, cell-to-rack-to-stack architecture. Each cabinet houses four independent LFP battery racks (54kWh each) with individual rack-level Battery Management Systems (BMS) communicating with a master BMS and the EMS. The 100kW PCS (supports 150kW peak for 10s) is co-located in a separate, fire-rated compartment. The IP55-rated chassis, constructed from heavy-gauge zinc-magnesium alloy steel, is designed for extreme outdoor conditions (-20°C to 55°C ambient). Safety is hierarchical: cell-level fuse, module-level isolation, rack-level contactor, and a multi-layered fire suppression system (aerosol + optional water mist interface) certified to NFPA 855 and UL 9540A thermal runaway test protocols.

KEY FEATURES

- High-Density LFP Integration: Tier-1 prismatic LFP cells with 6,000+ cycles at 80% DoD, 25°C, C/2 rate.
- Smart Liquid Cooling: Maintains cell delta-T below 2.5 °C across all racks, boosting cycle life by 15% compared to air-cooled systems.
- Grid-Forming & Grid-Following: Seamless transition between on-grid peak shaving and off-grid islanding (<20ms switch time, with external STS).
- Cloud-to-Edge EMS: Native support for Modbus TCP, IEC 61850, and OCPP. Real-time remote firmware upgrades and predictive diagnostics.
- Low Auxiliary Power: Liquid cooling pump + control electronics draw <300W during idle (standby mode).

COMPLIANCE & STANDARDS

The ST510CS-4H-CNPowerStack is fully certified for global markets, with focus on CN (Chinese) and international requirements:

- Electrical Safety: IEC 62619 (secondary batteries), IEC 62477-1 (PCS safety).
- Grid Interconnection: GB/T 34120, GB/T 34133 (China), VDE-AR-N 4105 (optional).
- Fire & Thermal Runaway: UL 9540A (cell/module/unit level), NFPA 855 compliant design.
- Environmental: IP55 (enclosure), IK10 (impact rating for front face), C5 corrosion protection (optional).

- Transportation: UN 38.3, ADR/RID.

TECHNICAL SPECIFICATIONS

Parameter	Specification
Nominal Battery Energy (AC-useful)	215 kWh (at 1C, 25°C, EoL 80% SoH)
Nominal DC Voltage	768 V (range 600V ~ 876V)
Usable Capacity (DoD)	100% (system allows up to 100% DoD, recommended 95% for cycle life optimization)
AC Power (Continuous / Peak)	100 kW / 150 kW (10s)
AC Output (Grid-Connected)	380V / 400V / 480V (selectable), 3W + N + PE, 50/60Hz ±2.5Hz
Max AC Current (Rated)	152 A (480V) / 190 A (380V)
Round-Trip Efficiency (DC/AC)	≥ 92.5% @ rated power, 25°C
Cooling Method	Active liquid cooling (Ethylene-glycol/water mix), integrated chiller + dry cooler bypass
Battery Chemistry	LFP (LiFePO4), Tier-1 prismatic cells
Cycle Life	≥ 6,000 cycles (80% DoD, 25 °C, EoL 70% SoH); ≥ 10,000 cycles with intelligent charge/discharge

	management
Operating Temperature Range	-20 °C to +55 °C (ambient); derating above 45°C
Protection Class (Enclosure)	IP55 (cabinet), IP67 (battery modules – internal)
Weight (Total)	≈ 2,450 kg (approx. 5,400 lbs)
Dimensions (W x D x H)	1200 mm x 1300 mm x 2350 mm (excluding pad mount, lifting eyes)
Communication Interfaces	Ethernet (Modbus TCP/IP), RS485 (IEC 60870-5-104), 4G/WiFi (optional), dry contacts (4x in, 4x out)
Fire Suppression	Aerosol-generating device (rack-level) + Class C extinguisher port; optional Novec 1230 or water mist interface
Noise Emission (1m)	< 65 dB(A) (cooling pump at 50% duty)
Standards Compliance	IEC 62619, IEC 62477-1, UL 9540A (tested), GB/T 34120, NFPA 855 ready

INDUSTRIAL DEPLOYMENT

Typical deployment includes pad-mount installation (concrete foundation, 1200mm x 1400mm footprint per stack) with 800mm front clearance for maintenance, 0mm side clearance for parallel stacking (cable busbar interfaces on both sides). Each stack communicates via daisy-chained CAN/RS485 and a shared Ethernet ring. For a typical 500kW / 1MWh installation, five ST510CS-4H-CN PowerStacks are paralleled at the AC bus (480V/3P/4W) with a single external supervisory controller. The system achieves <5% total harmonic distortion (THD) at full load and unity power factor capability (-0.9 to +0.9 leading/lagging).



WARRANTY & SERVICE

Standard: 5-year / 10MWh throughput (whichever first). Extended: Up to 10 years. Includes remote 24/7 monitoring, annual state-of-health (SoH) report,

and on-site response within 48 hours (major metro areas). Battery replacement threshold: end-of-life declared at 60% SoH.

Document Revision: 1.0. For project-specific sizing, please consult factory engineering team.