

# Step-by-step Installation of High-voltage DC BESS for Coastal Salt-spray Environments

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## Installing a BESS by the Sea? Your Corrosion Plan Isn't Optional

Let's be honest. If you're looking at deploying a Battery Energy Storage System (BESS) near the coast, you're probably focused on the big picture: stabilizing the grid, capturing excess solar, or providing backup power. The last thing you want is a hidden, silent enemy eating away at your multi-million dollar investment. I've seen this firsthand on site - a project in Florida where accelerated corrosion on non-critical brackets led to a costly, unplanned shutdown for remediation. Salt spray doesn't care about your ROI. It's a relentless force that demands a specific, disciplined approach from day one.

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### The Real Cost of Salt in the Air

Here's a sobering data point. A study by the [National Renewable Energy Laboratory \(NREL\)](#) highlighted that environmental factors, including corrosion, can impact system availability and increase maintenance costs by up to 30% over the lifetime of a BESS in aggressive environments. That's not just a maintenance line item; that's a direct hit on your Levelized Cost of Storage (LCOS). The problem isn't the battery chemistry itself - it's everything around it: electrical connections, cooling system components, structural steel, and cabinet enclosures. A standard UL 9540 or IEC 62933 compliant system meets fantastic safety and performance benchmarks, but coastal sites require an extra layer of environmental defense.

### It's More Than Just a "Marine-Grade" Box

I recall a project with a partner in Northern Germany, near the North Sea. The initial specification called for a standard containerized BESS. Our team pushed back, insisting on a full review. The challenge wasn't just salt, but the combination of salt-laden moisture with constant, high winds - a perfect storm for driving corrosive particles into every nook and cranny. The solution involved a multi-pronged approach we now consider standard for coastal deployments: specifying stainless steel for all external hardware, using conformal coating on critical PCBs, and designing a pressurized air system for the battery compartment to keep the salty air out. This wasn't an off-the-shelf product; it was a tailored solution built on a proven platform.





## The Highjoule Field Guide: Step-by-Step Installation for Coastal Resilience

Based on two decades of global deployments, here's the on-the-ground process we follow. It's a mindset as much as a checklist.

### Phase 1: Pre-Site & Foundation Work (The Critical 20%)

**Site Assessment Beyond the Geotech Report:** We map prevailing wind direction relative to the sea. Positioning the BESS air intakes and HVAC units is crucial - you want them facing away from the salt spray source, if possible. Drainage is also key; pooling saltwater is a disaster.

**Foundation & Bonding:** The concrete pad needs a proper slope for runoff. More importantly, the grounding and bonding system must be designed for a corrosive environment. We specify hot-dip galvanized or even copper-bonded ground rods here. It's a small cost adder that prevents a massive fault current safety issue later.

### Phase 2: Receiving & Pre-Assembly

**Inspect Before You Accept:** When that container arrives on site, the first check is for transport damage, specifically to the paint or coating system. A scratch on the exterior paint is a future corrosion hotspot. Have touch-up paint that matches the original specification's salt-spray rating (like an ASTM B117 tested coating) ready in your kit.

**Internal Connection Check:** Before energizing, every high-voltage DC busbar connection is torqued to spec and then treated with an anti-corrosive inhibitor paste. This is a step often missed in rushed projects.

### Phase 3: Commissioning & Environmental Seal

The final step is to "button up" the system under positive pressure. Once internal systems are verified, we activate the filtered air intake system. This maintains a slight positive pressure inside the battery compartment, ensuring that any air leakage is outward, not inward. It's the final defensive barrier.



## The Silent Guardian: Thermal Management in Humid Climates

Let's talk about C-rate and thermal management. A high C-rate (the speed at which you charge/discharge the battery) generates heat. In a coastal environment, your cooling system is working overtime not just against heat, but against high ambient humidity. If your cooling coils aren't coated for corrosion resistance, their efficiency plummets over time. The system then works harder, using more energy (hurting your LCOS), and risk thermal runaway if it can't maintain temperature. Our approach uses corrosion-resistant materials in the HVAC loop and often recommends a slightly de-rated C-rate for peak continuous operation in these environments. It's a trade-off that maximizes longevity and safety over absolute peak power - a decision most asset managers appreciate after year five.



## Beyond Installation: The Long Game on LCOE

The real value of a meticulous, step-by-step installation for salt-spray environments isn't just felt in year one. It's realized in years 10 through 15. By virtually eliminating unplanned maintenance for corrosion, you drastically reduce operational expenditures (OPEX). You maintain higher system availability, which means more revenue cycles for frequency regulation or energy arbitrage. This is how you truly optimize the Levelized Cost of Energy (LCOE) for the asset. At Highjoule, our service teams use data from the BEMS (Battery Energy Management System) to monitor for early signs of environmental stress, like rising internal humidity or atypical fan speeds, allowing for predictive, not reactive, maintenance.

So, what's the first question you're asking your BESS provider about their coastal deployment experience?

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