



The Battery Pack Selection Checklist for Construction Off-Highway EV

What really counts in battery pack selection?



Use this checklist to methodically evaluate and compare battery packs, focusing on long-term benefits and strategic partnership potential.

Contents

01

Evaluate Basic Specifications [↗](#)

02

Advanced Application Considerations [↗](#)

03

Operational Requirements [↗](#)

04

Data-Driven Selection [↗](#)

05

Longevity and Sustainability [↗](#)

06

Regulation [↗](#)

07

Scalability and Flexibility [↗](#)

08

Pricing and Timeline [↗](#)

09

Partnership and Support [↗](#)

01

Evaluate Basic Specifications

Form

Confirm the physical compatibility (including dimensions and weight), and investigate the changes needed on the vehicle to accommodate the battery. Also, assess the amount of extra space needed for cable and hose routing and any additional components like converters, onboard chargers, and junction boxes.

Weight is less of a concern in construction compared to other industries, but space might still be an issue - especially when the machinery is being retrofitted. In a lot of cases there is a limited amount of space available which directly impacts the amount of capacity that can be stored. Optimize the available space to maintain enough capacity.

Fit

Check if the kWh capacity aligns with operational energy demands, and ensure it meets the operational and charging power demands.

Function

Ensure the software and hardware functions of the battery pack meet your requirements.

Construction equipment often requires a high amount of power for shorter durations. Therefore, power requirements play a bigger role in selecting the right battery pack. Look at the battery's fast discharge capabilities. For example, will the 'peak discharge value (<30sec)' be sufficient to cover my current spikes?



Important to take into account

When determining the necessary battery capacity for your equipment, it's crucial to think beyond simply having enough power to last an entire day. Consider the broader context of charging availability and operational patterns.

Construction sites are often in remote areas with limited or no access to the electricity grid. In such cases, evaluate whether the typical user requires a battery with enough capacity to operate the machine continuously throughout the day, or if alternative charging solutions—such as an energy storage system or a portable generator can be utilized during scheduled breaks like lunch or coffee. By factoring in the potential for time to do additional charging, you might optimize battery size and weight, reduce costs, and increase operational flexibility. This approach ensures the equipment remains functional while also enabling a more adaptable and efficient energy strategy tailored to the average user.

By integrating these considerations into your planning, you can move beyond the conservative approach of simply sizing batteries for all-day use, and instead, develop a more efficient and versatile power management strategy.

Advanced Application Considerations

Operational Durability

Test for resilience against vibrations and shocks specific to off-highway environments and applications.

Construction machinery operates in environments where vibration levels are significantly higher than levels seen in other sectors. This is due to the nature of tasks like drilling and digging. So, determine what PSD values are typical for the application and compare with the vibration tests performed by the battery supplier. Assess if the battery handles these PSD values.

Certified Safety

Validate compliance with the latest safety standards suitable for off-highway use and appropriate for the application. This includes advanced Battery Management Systems (BMS) features and physical safety tests. Additionally, assess any safety requirements needed for the specific application separate from certifications. Align and agree on this with the battery manufacturer.

Understand how the battery copes with the flammable materials that might be present on construction sites. Check with the battery supplier what fire exposure tests were performed.

Integration Compatibility

Make sure that the other powertrain components in the vehicle are compatible with the battery.

Operational Requirements

Thermal Management Needs

Assess the thermal properties of the battery pack and compare them with its use (both charge and discharge). Consider both operational requirements and the intensity of use.

For construction equipment, it's essential to consider the demanding environment. An excavator for example, might experience power peaks that occur during operation. These power peaks generate substantial heat, if not managed effectively, can lead to reduced performance, faster battery aging and even damage. Determine how much power is consumed during normal and heavy operation and verify with the battery supplier if active liquid thermal management is advised.

Certifications Compliance

Ensure the battery meets key impact standards and regulations.

Ingress Protection

Confirm how well the battery pack needs to be protected against water and dust. Typically expressed in IP rating.

04

Data-Driven Selection

Real-World Performance Data

Utilize telemetry to monitor real-world performance and optimize selection criteria based on actual usage data.

Serviceability

Understand how you'll be able to service and diagnose problems around the world, and see where you can leverage your suppliers network.

Usage and Efficiency Analysis

Study usage patterns and efficiency under typical and extreme conditions.

05

Longevity and Sustainability

Maintenance Requirements

Investigate requirements on periodic maintenance, and ensure operators and dealers are equipped with the right tools.

Sustainability Measures

Evaluate the battery's end-of-life recyclability and manufacturer's sustainability practices.

Aging

Consider how your specific use-case could impact cyclic aging of your battery pack.



06

Regulation

Compatibility with Standards

Assess whether the battery packs comply with all relevant norms and standards, ensuring regulatory fit for the market.

Compliance

Ensure the battery packs meet all necessary regulatory requirements relevant to the geographic areas where the vehicles will operate. This could include local environmental regulations and import/export restrictions.

07

Scalability and Flexibility

Modularity

Check if the battery pack design supports modular adjustments or adaptations for various vehicle types.

Production Scalability

Ensure the way of integration the battery in the vehicle is ready for mass-production, and can be scaled up efficiently to meet production demands without significant performance compromises.



08

Pricing and Timeline

Total Cost of Ownership

Consider the battery pack manufacturer's part pricing, its impact on the Total Cost of Ownership, and the manufacturer's development and delivery timeline relative to your development and production schedule.

Look beyond just cost or power output, as not all batteries provide the same features with regards to thermal management needs, charging compatibility, and junction box/power distribution unit requirements. Evaluate on system/machine level.

09

Partnership and Support

Integration Support

Look for partners with comprehensive integration support and a strong track record in the off-highway sector.

Aftersales

Confirm the availability of long-term technical support to minimize downtime and enhance lifecycle value. Look for vendors who can provide products and value-added services such as custom engineering support, training for your teams, and joint development opportunities. Also, consider the geographic location.

Long-Term Support

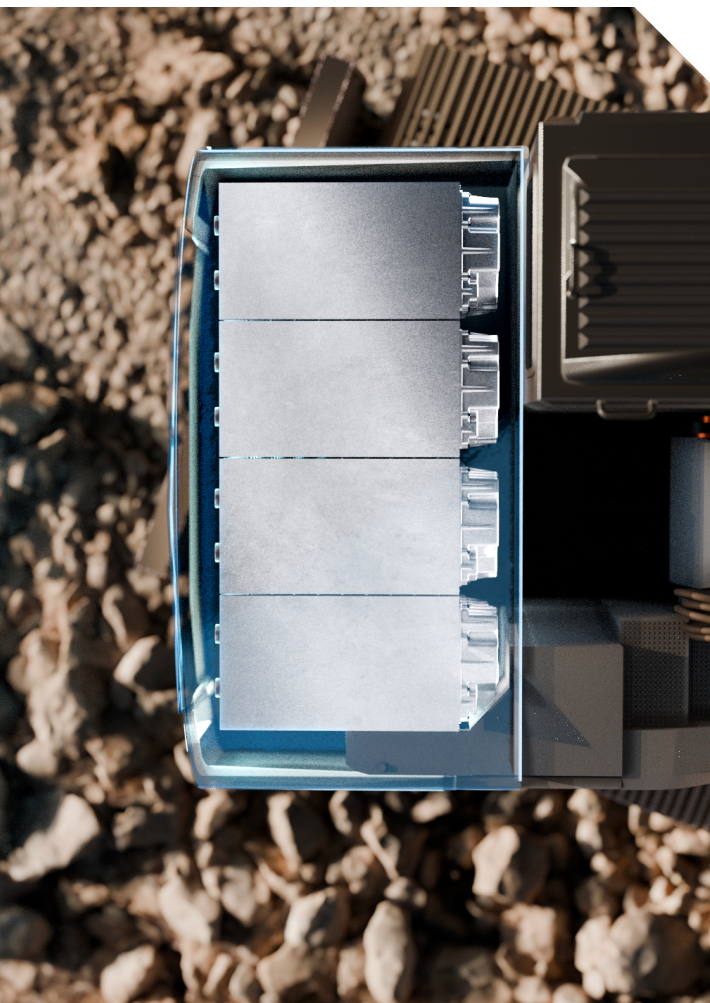
Consider how the supplier intends to remain competitive in the long-term, considering the quick introduction of new technologies into the market.

Vendor Stability and Reputation

Consider the financial health of the battery supplier, which can impact long-term supply chain stability and reliability.

Battery Lifecycle

Discuss how the supplier plans to provide the same or replacement battery for many years to come, evaluate your suppliers future product roadmap and their commitments to supplying a state of the art battery in the years to come.





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