BESS procurement. Quality under control

A buyer's guide to requirements, supplier verification, production evidence and release decisions.

P1	P2	P3	P4	P5	P6	P7
Define	Screen	Verify	Validate	Agree	Control	Improve

Make the next decision with evidence.

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Independent BESS procurement and quality support.

AT A GLANCE / THREE PROCUREMENT QUESTIONS

BESS procurement with greater confidence.

This guide helps you choose a better-fit supplier, control quality risks early and make decisions based on evidence.

01 Multiple quotations: which supplier best fits your project?

Compare usable energy, efficiency test conditions, key components and scope of supply alongside the price. Clarify what each quotation includes to judge whether the price difference is justified and which procurement option best meets your project needs.

02 Quality control can start before you pay.

Before payment, verify supplier capability and agree critical processes, inspection rights, acceptance criteria and corrective responsibilities in the contract. Link later payments to the relevant inspection, correction and release conditions, so quality requirements guide execution and problems can be addressed before they grow.

03 You can see whether issues are resolved without mastering every process.

A clear quality record connects each issue with its affected scope, corrective action and retest results. This evidence shows what has been confirmed, what remains open and whether it affects the next production step, payment or factory release.

01 / WHY THIS FRAMEWORK EXISTS

Make the requirements clear before money moves.

The procurement gap begins when the buyer and the factory are working to different definitions of quality.

After more than a decade in new energy, I have repeatedly seen the same difficulty: finding a supplier is only the beginning. Product configuration, manufacturing controls, test methods and acceptance conditions often remain scattered across quotations, conversations and internal factory rules.

Those differences can emerge during installation or operation, after much of the equipment price has been paid. The buyer then has to manage correction, delay and after-sales discussions from a distance.

> **THE PURPOSE**
>
> Turn your project needs into one agreed set of technical and quality requirements, then carry that baseline through supplier selection, production, FAT and delivery feedback.

How the method is built

The framework draws on risk-based process auditing associated with VDA 6.3, APQP planning, ISO 9001 process management, and 8D / 5 Why problem solving. Inspection and test plans (ITPs) connect these methods to practical hold, witness and review points. [1, 5]

02 / WHAT YOU GAIN

Five key controls for BESS procurement.

From requirements to factory release, each stage addresses a different procurement risk. Defining requirements early, verifying supplier capability and checking production help reduce later changes, rework and delivery disputes.

01 Requirements confirmation: reduce selection errors and change costs

Unclear requirements can lead to choosing the wrong factory. Configuration, component or process gaps may only emerge during design or production, causing repeated discussions, changes and rework.
Define technical parameters, operating conditions and acceptance criteria upfront so supplier selection, quotations and production follow one agreed baseline.

02 Supplier audit: verify the ability to deliver consistently

Quotations and samples do not prove that a factory can deliver consistently at scale. Its supply chain, capacity or processes may fall short of project needs.
Check component sources, in-house and outsourced work, manufacturing and testing capabilities against the agreed requirements. Identify capability gaps before selection to reduce delivery risk.

03 Contract customisation: define quality controls and inspection rights

Without clear process requirements, inspection rights and acceptance criteria in the contract, suppliers may refuse production inspections or treat quality requirements as extras.
Agree critical processes, third-party access, data submission, change approvals and corrective responsibilities upfront. This gives inspection, correction and release a clear basis and reduces disputes.

04 Production checks: correct defects before assembly conceals them

Technical standards and contract requirements only work when applied to specific production steps. Assembly can conceal internal process defects that pass unnoticed through FAT and emerge after delivery.
Set risk-based H (hold) and W (witness) points. Check critical materials, process parameters and records, and correct deviations promptly to reduce the risk of defects spreading across the batch.

05 FAT and follow-up: reduce disputes and support release decisions

Agree FAT procedures, parameters, acceptance criteria and retest requirements in advance to limit on-site negotiation, repeat testing and extra time and cost. Base release decisions on test results, raw data and corrective-action records, and use delivery feedback to improve future orders.
FAT is the final verification before factory release. It cannot replace production quality control; some process defects become harder to rework after assembly.

03 / THE ROADMAP

Follow the service from first brief to feedback.

This white paper follows the service schedule. The detailed pages explain the problem, execution and deliverable behind each line.

B0 / FREE PROJECT QUALITY ASSURANCE KIT

Free BESS Project Quality Assurance Kit

01 Understand the approach before you commit

You may already have a supplier, quotation or procurement plan, but still be unsure which requirements to define, where to inspect and what evidence to request.
The kit explains P1–P7: the risks each stage addresses, how it is carried out, the records it produces and how the stages connect.

02 What can you do with the materials?

Compare the kit with your current quality arrangements. Identify requirements, checks and records to add, then discuss with your team or partners which controls to adopt and which need project-specific detail.

03 What does the free kit include?

Framework presentation (PPT): Understand the procurement process, key controls and the purpose of each stage.

Standard quality assurance plan (Word): See what a complete procurement quality plan should cover, and use it as a reference for project discussions.

Diagrams and usage guide: Learn how the materials connect and how to use them in your project.

04 Explain your quality approach to customers after adoption

Once your project adopts the relevant controls, use the agreed plan to explain the intended quality arrangements to your customers.
After the work is completed, combine audit, inspection and FAT records to show what was actually done and how issues were resolved.

P1 / PROCUREMENT REQUIREMENTS

Define requirements suppliers can respond to.

Identical power and energy ratings can conceal differences in configuration, actual performance and supply scope. Define these five areas before procurement so supplier selection, quotation comparison and acceptance follow one agreed basis.

01 Application and operating profile

Define whether the system will serve peak shaving, backup power or another purpose. Confirm load requirements, charge and discharge schedules, required supply duration and expected cycling frequency. Specify response time, grid-connected or off-grid operation and changeover requirements where relevant, so the configuration fits actual use.

02 System configuration and scope of supply

Specify the battery, PCS, BMS, EMS, thermal management and fire protection systems. State whether transformers, distribution equipment, installation and commissioning are included. Define key component requirements, communication interfaces and responsibilities to reduce omissions, extra purchases and integration problems.

03 Performance, service life and verification conditions

Specify continuous charge and discharge power, usable energy and round-trip efficiency, including the measurement point, temperature, charge/discharge power, state-of-charge (SOC) range and treatment of auxiliary consumption. Define service life alongside cycle or energy-throughput conditions and the corresponding capacity-retention requirement, so performance commitments can be compared and verified.

04 Site compatibility and safety requirements

Define temperature, altitude, humidity, salt exposure, enclosure protection and noise limits, together with grid voltage and frequency, installation space and maintenance access. Identify certification, testing and fire safety requirements for the destination and project, and check which models and configurations the supporting documents cover.

05 Manufacturing quality and inspection requirements

Identify relevant controls for cell consistency, batch traceability, welded or bolted connections, insulation and liquid-cooling leak tightness. Define production inspection access, required records and factory acceptance test (FAT) requirements to guide process audits, inspection planning and acceptance.

Also confirm the budget, delivery schedule, mandatory conditions and unacceptable deviations to assess whether the technical solution fits the procurement plan.

The P1 BESS Project Requirements Confirmation Sheet records agreed requirements, open items and the evidence suppliers must provide. It becomes the common starting point for supplier selection, contract preparation and quality checks.

P2A + P3 / YOU ALREADY HAVE A SUPPLIER

Verify the nominated supplier before commitment.

A document review and a site audit answer different questions. This route combines both.

01 **Review the supplier evidence remotely**

Meet the commercial, technical and quality teams. Review configuration, certificates, key components, technical parameters, manufacturing capability, test evidence and project experience.

02 **Verify capability at one factory**

Once the remote review meets the agreed site-entry conditions, examine materials, equipment, process controls, inspection records, test capability, traceability and corrective action on site.

03 **Connect findings to your next decision**

Report discrepancies, nonconformities and required corrections. Explain whether the evidence supports qualification, contract discussions or entry into P4 / P5.

> One P2 Supplier Remote Review Report and one P3 Factory Audit Report, with findings, evidence references and corrective-action requirements.

P2B + P3 / YOU NEED A NEW SUPPLIER

Still looking for a suitable BESS supplier?

A reliable supplier search starts with confirmed project requirements and a broad candidate pool. A growing database of more than 370 BESS suppliers provides a starting point for matching needs; document review and factory audits establish which candidates can meet them.

3
Candidates shortlisted
for detailed review

2
Factories audited
Both suppliers compared

1
Buyer selects one supplier
Based on both audits

Shortlist up to three candidates against P1 requirements for configuration, performance, market, order size and delivery. Review the company and actual manufacturer, component sources, in-house and outsourced work, certification, project experience, and manufacturing and testing capability. Identify requirement fit, capability gaps and issues to verify.

> **VERIFY TWO FACTORIES ON SITE**
>
> Audit two factories that meet the agreed site-entry conditions. Check raw materials and incoming inspection, critical processes, equipment and staff capability, quality records, testing facilities and traceability. Compare submitted documents and commitments with actual factory conditions to assess reliable production and delivery.

Compare both factories against the same standards, considering requirement fit, manufacturing capability, quality control, delivery conditions and unresolved risks. Review the evidence and corrective-action status for each supplier. The buyer makes the final selection from the two audited options.

Two reports to support the supplier decision

The P2 Supplier Pre-screening and Evidence Comparison Report shows requirement fit, supporting documents, capability gaps and questions for site verification.
The P3 Factory Audit Report records both factories' manufacturing and quality-control capability, evidence, nonconformities, corrective-action status and remaining risks.

P4 / SAMPLE AND TECHNICAL VALIDATION

Validate the sample. Reduce costly changes later.

A mismatch found in a sample can be corrected before it affects a larger order. Testing against agreed project requirements helps reveal configuration, performance and interface issues early, reducing later redesign, repeated coordination and on-site troubleshooting. The results also establish a technical reference for the contract, production checks and FAT.

01 Catch costly mismatches before a larger order

Use P1 requirements to test key functions, performance and interfaces under agreed operating conditions. Record the sample configuration, methods, instruments and acceptance criteria. Identify gaps while changes are still limited to the sample, giving the buyer evidence to proceed, request changes or reconsider the solution.

02 Reduce waiting and avoidable repeat testing

Agree the test plan, responsibilities, sample readiness, equipment and data requirements before testing. Check methods, original data and deviations against the plan at the factory or laboratory. This reduces waiting, repeated clarification and avoidable retests caused by incomplete preparation.

03 Make production and acceptance easier to manage

Correct and retest identified issues, then carry the verified configuration, acceptance criteria and remaining risks into P5, production checks and FAT. This gives engineering, purchasing and quality teams one reference to work from, reducing repeated explanations, inconsistent expectations and acceptance disputes.

> The P4 Sample Validation and Technical Conclusion Report brings together test methods, acceptance criteria, original data, results, deviations and retest requirements. It shows what was verified, what still needs correction and the conditions for proceeding to contract and production. Sample approval provides a reference; production checks and FAT remain necessary.

P5 / CONTRACT TECHNICAL AND QUALITY CONTROLS

Protect your interests with clear contract terms.

The contract is the backbone of BESS procurement quality control. Its agreed terms and incorporated technical annexes define the supplier's obligations: what must be built, how it is checked and accepted, and what happens if requirements are not met. Clear, specific clauses protect the buyer's position throughout production, FAT, payment and after-sales disputes, giving each party a common basis for action and accountability.

Bring P1 requirements, P2 commitments, P3 findings and applicable P4 results into a version-controlled annex incorporated into the signed agreement. The six areas below make requirements, evidence, responsibilities and remedies explicit.

Key contract terms	What must be agreed in writing
Product requirements	Configuration, performance, key BOM, software versions and precedence of contract documents.
Change approval	Written approval for material, design, software or process changes, including revalidation.
Inspection and records	Hold / witness (H/W) points, buyer / third-party factory access, notice periods, stop / release authority, records and raw-data submission.
Production and FAT	Critical process limits, FAT procedures, test conditions, pass/fail criteria and sign-off authority.
Defects and remedies	Correction deadlines, retest and closure requirements, cost allocation and agreed remedies.
Release and support	Payment / shipment conditions, warranty duties, response times, governing law and dispute resolution.

P5 DETAIL / INSPECTION AND TEST PLAN

Catch defects before assembly hides them.

Process checks help stop mismatched cells, weak welds and hidden assembly defects from becoming batch failures or site repairs. Agree the following controls in the project ITP before production, with methods and limits matched to the design.

H

Hold: stop at the named gate. The next step requires inspection, accepted evidence and signed release by the authorised party.

W

Witness: give agreed notice for the process or test. Record conditions and results. Follow the agreed absence rules; testing is still required.

R

Review: check source records, test conditions, sample IDs, coverage and results. An H gate still requires a separate signed release.

Six controls to specify in the project ITP

Control point / type	Records, checks and release conditions
Cells before PACK **R review / H release**	Approved source/model and purchase-to-lot traceability. Review every cell's ID, OCV, resistance and capacity-grading records against matching limits; resolve gaps before PACK release.
First weld / process change **W checks / H release**	Approved joint design, cleaning, fit-up and weld parameters. Witness first-piece strength, resistance and cross-section checks; release before series welding or restart after a process change.
Production weld checks **W testing / R records**	Agree sample counts and frequency by lot/shift; retain IDs, results and images. Specify pull/shear, resistance, sections or suitable X-ray/CT checks and defect limits. After failure, hold affected lots and define expanded testing.
Electrical assembly **W tests / H release**	Before enclosure/integration: polarity, connection torque, module/rack insulation and withstand tests, grounding and BMS wiring. Retain serial-linked results and close blocking defects.
Cooling and fire systems **W tests / H release**	For applicable systems: cooling pressure/leak/flow results, fire-pipe leak tests, sensor positions and alarm/interlock checks. Record test conditions and close blocking defects.
FAT and shipment **W tests / R review / H release**	Approve FAT limits and data capture. Witness capacity/RTE, temperature rise, communications and safe protection/interlock simulations. Review raw data and NCR/retests before shipment release.

P6A / PRODUCTION PROCESS CONTROL

Resolve defects in production. Reduce rework after delivery.

P6A uses on-site checkpoints and corrective action to address quality problems while materials, assemblies and processes are still accessible. Containing defects and correcting their causes helps reduce repeated failures across a batch, late FAT rework and repairs after delivery.

Apply the P5 annex and ITP at material receipt, first-off production and critical assembly stages. Use the same cycle at each checkpoint, from inspection to verified release.

Execution step	How to act on site
Inspect and contain	Check materials, process settings and test results against the ITP. Record the nonconformity, identify and isolate affected units/lots, and block the next step where required.
Find and verify the cause	Use 5 Whys or a fishbone diagram to examine material, equipment, method and operator factors. Verify causes with records and measurements; use 8D for significant or recurring issues.
Correct the process	The supplier's engineering team implements approved changes to parameters, tooling, process steps and work instructions, then updates inspection controls and operator training.
Verify, release and prevent	Retest affected units and check subsequent production for recurrence. Close issues with evidence, update the ITP and retain signed H-point release. Keep blocking issues on hold.

Contain → Cause & action → Verification → Release

> The P6A Production Quality Monitoring Report Pack and Issue Closure Tracker link each finding to affected units, the verified cause, corrective action and retest evidence. They show what is closed, what remains on hold and whether production is ready for FAT.

Inspection coverage follows the agreed ITP, sample sizes and visit schedule. Factory-wide checks and continuous on-site coverage must be specified separately.

P6B / FAT WITNESSING AND RELEASE

Turn the FAT result into a release record.

Factory acceptance testing is a key decision point before final payment and shipment under the agreed project terms.

01 **Before FAT**

Review the test plan, equipment readiness, sampling / coverage, instrument calibration and closure of earlier findings.

02 **During FAT**

Witness the agreed tests on site, independently record observations and examine the original data. Resolve discrepancies against P1 and the P5 acceptance criteria.

03 **Before recommending release**

Track clarification, correction and retesting. Identify the verified configuration, test scope, exceptions and remaining actions.

Release	Conditional release	Hold
Evidence supports the agreed release conditions.	Only where the contract and buyer permit it, with explicit actions and responsibilities.	Required conformity or evidence remains unresolved.

P6 FAT Witnessing and Release Recommendation Report: test process, raw data, results, deviations, open issues, retest requirements and a reasoned recommendation.

P7 / DELIVERY AND QUALITY FEEDBACK

Make the next order better informed.

Delivery feedback should improve the requirements and controls used in future procurement.

After shipment, we stay in contact with the project team and supplier to track issues arising in transport, installation, commissioning, operation, warranty and after-sales support within the agreed scope.

01 **Connect the site issue to the factory record**

Record the affected equipment, symptoms, operating context and relevant original evidence. Review the supplier response and proposed corrective action.

02 **Follow responsibility and closure**

Assess the handling plan, verify the available closure evidence and identify unresolved risks and next actions.

03 **Update the procurement baseline**

Determine which requirements, contract terms, production checkpoints or FAT tests should change for the next purchase.

> P7 Delivery Quality Closure and Improvement Report: delivery issues, supplier responses, corrective evidence, remaining risks and reusable controls for later orders.

Site feedback → Cause & correction → Updated controls

Yaming Zhang · Independent BESS procurement and quality support

YZ

Engineering experience, applied to the buyer's side.

I have worked in new energy for more than a decade. I built this framework to connect the buyer's requirements with what can be verified in supplier documents, manufacturing processes, test data and corrective-action records.

My role is to clarify the facts, organise the checks and follow issues to evidence-based conclusions, while you retain the project decisions.

START HERE

Get the free BESS Quality Assurance Kit.

Use the kit to review your procurement plan and identify gaps in quality control.

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One short email is enough: “Please send me the free kit.”