



Implementing **BESS**ential in your BESS procurement contract

A Sinovoltaics and volytica diagnostics white paper add-on

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BESSential, a collaboration between Sinovoltaics and volytica diagnostics, introduces a comprehensive solution that combines advanced battery diagnostics with traditional testing methods. This partnership addresses critical challenges by implementing thorough diagnostics and real-time monitoring during the FAT phase, enabling early detection of potential failures and reducing the risk of costly downtime and repairs.

This add-on to the *"BESSential - Modernizing Traditional BESS Factory Acceptance Testing with Advanced Battery Diagnostics"* white paper provides additional insights on how to implement contractual language to ensure the implementation of quality assurance for Battery Energy Storage Systems (BESS).

The white paper can be downloaded here:

<https://sinovoltaics.com/bessential-white-paper/>

BESS procurement contract language

Your BESS integrator or manufacturer might not see extra quality control favorably. As such, it is important that your procurement contract covers the critical quality control steps you would like to implement with your manufacturer.

The permission process is the same for any QA/QC work Sinovoltaics performs for BESS, PV modules, inverters, transformers, mounting structures or cables. In all cases, **the manufacturer has the right to refuse what is not included in the contract**. As such, it is critical to add the following points to your BESS manufacturing contract.

*Note: The following clauses cover many key points. However, contracts and standards vary by manufacturer. In our experience it is still crucial to have contracts reviewed and edited by **BESS QAQC experts**.*

Right to perform Factory Audit and Inspections

To make sure you can use third party inspection services to perform Factory Audit and Inspections, you will need to add the following clause to your BESS procurement contract:

SELLER'S FACTORY INSPECTION AND AUDIT BY BUYER'S APPOINTED INDEPENDENT THIRD-PARTY INSPECTION COMPANY. Seller shall provide Buyer's agent, namely an independent third-party inspector (**Sinovoltaics Group Limited**), with full and immediate access to Seller's factory and warehouse (including primary materials) including inbound, storage and outbound documentations as well as standard operating procedures and climate control records. For the workshops and production lines, all standard operating procedures (SOPs) for production equipment shall be made available to Buyer and/or its agents (including Buyer's third-party inspector namely **Sinovoltaics Group Limited**) during any pre-shipping on-site inspection. Moreover, documentations shall be made available to Buyer and/or its agents (including Buyer's third-party inspector namely **Sinovoltaics Group Limited**) for inspection and quality control during the production of the BESS.

In line with **(FACTORY ACCEPTANCE TESTING PROCEDURE APPENDIX)** and **(BESS QUALITY STANDARDS APPENDIX)** the Buyer and Sinovoltaics Group Limited may inspect all manufacturing facilities, factory locations, processes, materials, production data and quality management systems used to manufacture and ship the BESS under this Agreement (provided that any such inspection shall not materially interfere with the manufacturing process or cause any material delay to the supply of BESS).

Seller shall arrange such inspection, upon request of Buyer or Sinovoltaics Group Limited, at any location where manufacturing and/or shipping procedures are being or were performed and at any location where BESS or components of are being or were built or at any location where BESS are being stored.

Copies of all test certificates, performance curves, calibration documents and data sheets (including excel sheets raw data for each battery unit) requested by Buyer or Sinovoltaics Group Limited during production stage and until shipment (in order for Buyer or Sinovoltaics Group Limited to be able to fully and thoroughly identify and inspect BESS), shall be provided by Seller to Buyer or Sinovoltaics Group Limited in electronic format.

The Buyer may require from Seller to replace all BESS which fail to meet quality levels and standards as outlined under the **(BESS QUALITY STANDARDS APPENDIX)**. This includes all BESS which (i) do not meet the agreed FAT checklist and all BESS, and (ii) were rejected based on BESSential Quality Control by the Third Party Inspection company (**(Sinovoltaics Group Limited)**).

Unfortunately, without this clause, the manufacturer has the right to refuse any inspection.

Clarify the Factory Acceptance Testing conditions

This wording is corresponding to the **FACTORY ACCEPTANCE TESTING PROCEDURE APPENDIX** mentioned above:

The Buyer appointed third party inspection company (Sinovoltaics Group Limited) to conduct for and on behalf of Buyer a series of BESS acceptance tests at the Seller's factory for each batch including:

- a. Factory Acceptance Testing (FAT)*
- b. BESSential Quality Control*
- c. Container Shipping preparation and Loading*

Inspection procedure details:

Sinovoltaics Group Limited will perform the aforementioned 3 on-site tests as per following procedure:

a. Factory Acceptance Testing (FAT)

As per agreed Factory Acceptance Testing standard, the following tests will be performed

- visual inspection of containers*
- safety tests*
- performance tests*

b. BESSential Quality Control

*BESSential Quality Control service process is covered in **BESSENTIAL QUALITY CONTROL PROCESS APPENDIX***

- Sample Raw Data of the rack must be communicated to Sinovoltaics Group Limited 30 days before the start of the FAT*
- During the FAT, Raw Data of each rack must be communicated to Sinovoltaics Group Limited within 24 hours.*
- Failure to do so will result in shipment delays at the Seller cost*

c. Container Shipping preparation and Loading

According to the manufacturer Standard Operating Procedures

Quality standards

The following standards will by default be applied during on-site tests at the factory on each batch of BESS. Quality standards are outlined under Appendix D.

On-site test	Inspection standard
<i>Factory Acceptance Testing (FAT)</i>	Name and version to be clarified in BESS QUALITY STANDARDS APPENDIX
<i>Container Shipping preparation and Loading</i>	Name and version to be clarified in BESS QUALITY STANDARDS APPENDIX

As advanced above, all shipments to Buyer are to pass 3rd party pre-shipment testing and inspection managed by the Auditor. 3rd party inspector is also allowed to witness BESS loading process to ensure all containers are not damaged by loading activities. The Auditor can also verify that BESS is built according to the CDF (engineering BOM).

All containers will be inspected (No sampling)

For all on-site tests at factory, Acceptance Quality Limits (AQL) are applied per each container in following configuration:

- Critical: 0
- Major: 0
- Minor: 0

Ensure we can perform BESSential service

This portion corresponds to the **BESSENTIAL QUALITY CONTROL PROCESS APPENDIX** mentioned above.

It is explaining the different steps as in the “How does BESSential work” chapter of this white paper that we didn’t detail here. It should also include a clause regarding data ownership, which is critical. You can find the wording below:

Data Ownership and Usage Rights:

Data Ownership: The Buyer owns all operational data generated by the BESS during its lifecycle. The Seller shall provide the Buyer with full and unrestricted access to this data, as required for monitoring, analysis, and troubleshooting.

Third-Party Data Usage: The Buyer is authorized to share operational data with third-party service providers, such as volytica diagnostics GmbH, for the purpose of performance analysis and predictive maintenance. All data sharing and usage will comply with European data protection regulations, including GDPR.

Data Security and Privacy: All data must be handled in compliance with applicable data security and privacy standards. The Seller agrees to cooperate with the Buyer and volytica diagnostics GmbH to ensure secure data transmission and storage, including encryption and anonymization if necessary.

Confirm the monitoring data

To maintain optimal performance and reliability of your BESS assets throughout their lifecycle, it is essential to include provisions for continuous monitoring in your procurement contract. Below is recommended language to ensure third-party monitoring is supported:

Continuous Battery Monitoring:

The Seller/Supplier authorizes the Buyer/Customer to implement a third-party monitoring solution, such as volytica diagnostics GmbH, for continuous monitoring of battery diagnostic data for this Project. The Seller agrees to provide access to the following battery signals and parameters as listed in the table below to be monitored. This also includes the right to extend this data access to any third party nominated by the Customer.

Signal	Signal Resolution	Time Resolution	Priority	Comment
Timestamp	-	-	MUST HAVE	see general requirements below
Battery voltage	0.1 V	1 second	MUST HAVE	at the terminals; on the battery side of any connector/shutter towards the DC link
Battery current	0.1 A	1 second	MUST HAVE	signal must include all currents flowing in/out of the battery
Subsystem-/ Cell temperature average	0.1 °C	10 seconds	MUST HAVE	or any other representative temperature signal
State of Charge (SOC)	0.1 %	10 seconds	MUST HAVE	'true' and unhampered SoC
Accumulated charge throughput	0.1 As	10 seconds	MUST HAVE	only necessary if current signal quality is insufficient
Subsystem/Cell voltage high/low/avg.	0.001 V	1 second	IMPORTANT	necessary for anomaly/safety detection
Subsystem/Cell temperature high/low	0.1 °C	10 seconds	IMPORTANT	necessary for anomaly/safety detection
Accumulated energy throughput	1 kWh	10 seconds	GOOD TO HAVE	
Accumulated FCE	-	10 seconds	GOOD TO HAVE	norming value must be given (nominal capacity)
Voltage of each cell	0.001 V	1 second	GOOD TO HAVE	necessary only in explicitly agreed cases
IDs of the hi/lo/avg voltage cells	-	1 second	GOOD TO HAVE	enables finding source after problem has been identified
IDs of the hi/lo/avg temperature cells	-	10 seconds	GOOD TO HAVE	enables finding source after problem has been identified
System power	0.1 kW	1 second	GOOD TO HAVE	
Available residual energy	0.1 kWh	1 second	GOOD TO HAVE	

General Requirement:

- *For optimal results, the provided signal timestamp must be close to the actual timestamp of the measurement; depending on application, a maximum delay of up to 100ms might be considered close enough. This rule applies to each and every signal.*
- *All voltage and current signals should be time synchronous.*
- *All signals must be available permanently; should certain signals be turned off intermittently (e.g., to save bandwidth if the signal does not/only slightly change, or exceeds a certain threshold, ...) then information on those systematics/mechanisms must be given.*
- *For a system with a capacity > 500 kWh, it might be necessary to split the asset into subsystems.*
- *Signals must be provided at the hierarchical level for which results are to be provided. (E.g., in the case of BESS, if SoH is to be determined at rack level, then signals must be provided at rack level.)*
- *The SoC signal should be the real underlying SoC which is derived (and used) by the BMS itself. It should not be limited/scaled to a smaller allowed usage range or hampered in any other way.*

There are many more points to consider before signing a BESS procurement contract. Do not hesitate to review our [**BEES Contract Optimization service**](#) to learn more about it.

If your contract is already signed, but you still would like to perform the BESSential service, please do not hesitate to reach out to Sinovoltaics or volytica diagnostics so we can find a solution.





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