



VDE Battery Passport Readiness & Excellence Framework

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Executive Summary

The European Battery Passport will become mandatory for electric-vehicle (EV) batteries, light means of transport (LMT) batteries and industrial batteries with a capacity greater than 2 kWh placed on the EU market from 18 February 2027. To support industry preparation, the European Commission has published Battery Passport data-point guidance¹ and Digital Product Passport (DPP) Registry guidance² addressing Battery Passport information requirements and operational interaction with the DPP Registry. These developments demonstrate that Battery Passport readiness is not solely a data or IT challenge. Economic operators³ must establish sustainable organizational governance, trustworthy lifecycle data management, and secure and reliable digital infrastructure capabilities needed to maintain the Battery Passport throughout the relevant battery lifecycle.

Successful implementation therefore depends on three interdependent capability dimensions:

- **Organization:** Clear governance, defined responsibilities, lifecycle processes, compliance management and operational accountability for Battery Passport implementation.
- **Data:** Availability, quality, provenance, integrity and lifecycle management of the required Battery Passport information, including data originating from suppliers and operational use.
- **System:** Digital architecture, interoperability, interaction with the DPP Registry, access control, cybersecurity and long-term availability of Battery Passport information.

Weakness in any one of these dimensions can undermine overall readiness. Strong data cannot compensate for missing governance, sophisticated IT systems cannot compensate for incomplete or unreliable information, and well-defined organizational processes cannot ensure readiness if the required data cannot be reliably maintained and made accessible throughout the relevant product lifecycle.

VDE SIS supports economic operators in understanding the applicable regulatory requirements and European Commission implementation guidance, translating requirements into practical operating capabilities, and assessing their level of preparedness. This support may include DPP Registry integration readiness, mapping of company information to applicable Battery Passport data attributes, review of identifier and data-carrier concepts, Unique Product Identifier (UPI) strategy, and technical implementation planning. Building on its established five-level readiness methodology, VDE SIS has developed the **Battery Passport Readiness and Excellence Framework**, enabling organizations to assess their current readiness, identify areas of strength and improvement, and evaluate operational maturity across the dimensions of **Organization, Data and System**.

The framework provides a structured approach to translating regulatory and implementation requirements into sustainable operating capability and progressing from initial implementation toward operational excellence. Where appropriate, the framework can also support targeted supplier and value-chain data readiness reviews and pre-conformity assessment against applicable technical specifications, including DIN DKE SPEC 99100. It does not introduce additional regulatory requirements, replace applicable legal obligations or constitute a certification scheme. Instead, it provides an independent and practical approach for assessing and strengthening Battery Passport readiness and operational excellence.

¹ https://single-market-economy.ec.europa.eu/single-market/digital-product-passport/batteries_en

² https://single-market-economy.ec.europa.eu/single-market/digital-product-passport/dpp-registry_en

³ Economic operator: As defined in Article 3(1)(22) of Regulation (EU) 2023/1542, the term includes the manufacturer, authorized representative, importer, distributor, fulfilment service provider, or another natural or legal person subject to obligations relating to the manufacture, placing on the market, making available or putting into service of batteries, as well as specified reuse, repurposing and remanufacturing activities.

1. Compliance to Operational Readiness

The Battery Passport introduces a regulatory information obligation, but its implementation is operational rather than purely documentary. The regulatory framework defines what information must be associated with relevant batteries and assigns responsibility for the passport, while operational readiness determines whether the economic operator can repeatedly obtain, substantiate, maintain and provide that information in practice.

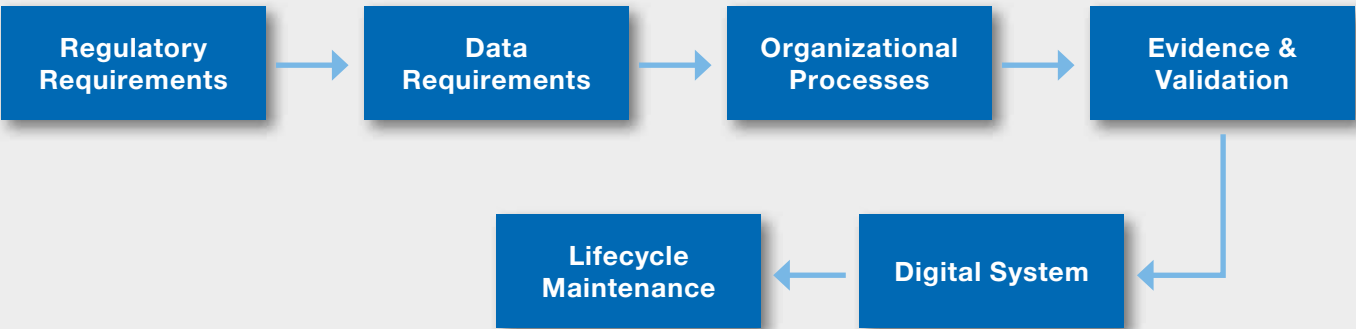
From 18 February 2027, Regulation (EU) 2023/1542 requires a battery passport for each LMT battery, each industrial battery with a capacity greater than 2 kWh, and each EV battery placed on the market or put into service. The Battery Passport must contain both model-level information and information specific to the individual battery, including information resulting from its use. Article 78 further establishes requirements concerning interoperability and provides for passport data to be stored by the responsible economic operator or by an authorized operator acting on its behalf.

This creates an important distinction between regulatory mapping and operational readiness. An organization may understand which information is required and still lack the capability to operate the Battery Passport reliably. Weaknesses may arise in supplier-data collection, evidence and provenance control, lifecycle updates, system integration, identity and access management, or simply from unclear accountability between organizational functions.

Regulatory mapping should therefore be treated as the starting point rather than the end state. For each relevant information element to remain reliable throughout the lifecycle, the organization should be able to determine who owns it, where it originates, what evidence or methodology supports it, to which battery or product configuration it applies, how company data are mapped to the applicable Battery Passport attributes and transferred into the Battery Passport environment, and which events require it to be reviewed or updated.

A Battery Passport may be complete as a dataset at a particular point in time and still be immature as an operating capability. Sustained readiness depends on effective governance, trustworthy lifecycle information and a reliable digital environment capable of supporting DPP Registry interaction, Battery Passport system integration and lifecycle maintenance.

Figure 1.1:
Operational readiness depends on continuity across the full chain



2. The 2026 Battery Passport Implementation Landscape

With additional guidance recently provided from Brussels, the Battery Passport is moving from regulatory design into operational implementation. The European Commission Battery Passport data-point guidance (Battery Passport data-point guidance)¹ and the European Commission DPP Registry guidance (DPP Registry guidance)² provide increasingly detailed information on data applicability, registration processes and the technical architecture required to support implementation. The Battery Passport data-point guidance addresses the preparation and applicability of Battery Passport information, while the DPP Registry guidance addresses economic operator enrolment, verification and operational interaction with the DPP Registry. These implementation documents should be considered together while remaining distinct from the underlying legislation.

Battery Passport data requirements vary by battery category, applicability condition and implementation timing. The Battery Passport data-point guidance distinguishes between information that is mandatory, optional, applicable only in certain cases, or subject to later implementation. Economic operators therefore need to determine which requirements apply to their products and when, rather than treating the Battery Passport as a static data checklist. This also requires

company data to be mapped consistently to the applicable Battery Passport attributes and associated legal or implementation requirements.

The DPP Registry and the complete Battery Passport perform different functions within the decentralized DPP architecture. The DPP Registry supports identification and access to the passport, while the complete Battery Passport information remains hosted and maintained outside the DPP Registry by the economic operator or a service provider acting on its behalf. Readiness therefore also depends on a coherent approach to identifier and data-carrier concepts, UPI strategy and the technical interfaces connecting information registered in the DPP Registry with the hosted Battery Passport environment.

Interaction with the DPP Registry also introduces organizational and digital-identity requirements for economic operators, including organization verification, authorized administration and the use of qualified electronic trust services. Battery Passport readiness therefore extends beyond data and technology to the organizational capability required to establish, manage and maintain trusted access to the DPP Registry and the wider Battery Passport environment.

Table 2.1
Regulatory and Implementation Sources.

Source	Primary Role	Readiness Implication
Regulation (EU) 2023/1542 ⁴	Establishes the Battery Passport requirements, including applicable battery categories, information requirements and lifecycle obligations	Defines the obligation, categories, information and technical operating requirements.
Regulation (EU) 2024/1781 and applicable DPP implementing legislation ⁵	Establishes the common DPP framework and supports DPP Registry arrangements	Provides the wider technical and interoperability context for DPP registration, identification and access.
Battery Passport data-point guidance ¹	Provides implementation guidance on Battery Passport data points, legal sources, applicability conditions and relevant implementation timing.	Supports structured applicability mapping, data-attribute mapping and preparation of the organizational, data and system capabilities required for implementation.
DPP Registry guidance ²	Provides operational guidance for economic-operator enrolment, verification and DPP registration	Highlights practical dependencies relating to organizational identity, trust services, identifier and data-carrier concepts, UPI strategy and DPP Registry interaction

4 <https://eur-lex.europa.eu/eli/reg/2023/1542/oj/eng>

5 <https://eur-lex.europa.eu/eli/reg/2024/1781/oj/eng>

3. From Requirements to Battery Passport Readiness

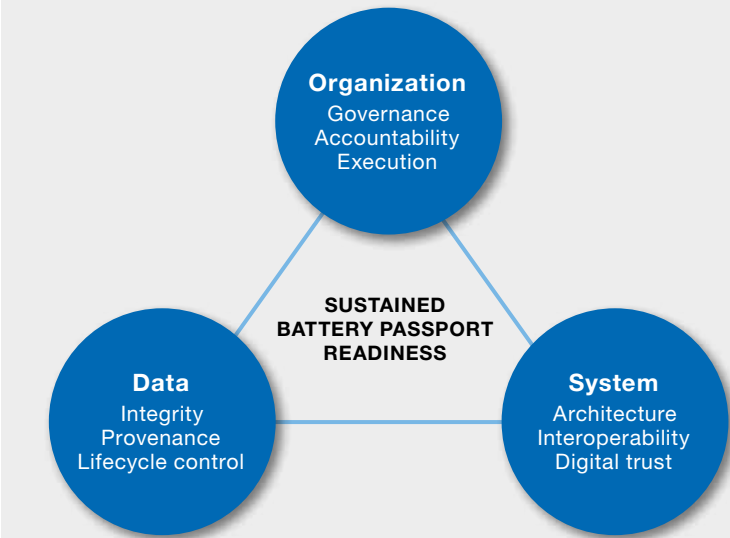
An effective Battery Passport implementation extends beyond populating required data fields. Applicable requirements must be translated into organizational responsibilities, trustworthy information and reliable digital processes that can be maintained throughout the relevant battery lifecycle.

VDE SIS structures this challenge around three interdependent dimensions: **Organization, Data and System**. Organizational capability provides governance, accountability and repeatable execution. Data capability ensures that required information is complete, credible, traceable and maintainable. System capability provides the digital environment needed to reliably provide, access and maintain Battery Passport information, including interaction with the DPP Registry and the associated identification and access architecture.

Weakness in any one dimension can undermine overall readiness. Strong digital systems cannot compensate for unreliable data, while complete information cannot ensure readiness if governance is unclear or the digital environment cannot reliably maintain and provide the passport.

Building on the established VDE SIS five-level readiness methodology, the Battery Passport Readiness and Excellence Framework provides a structured approach for assessing these three dimensions and identifying areas of strength and improvement. The framework complements applicable regulatory requirements but does not replace them or constitute a certification scheme.

Figure 3.1:
Three Interdependent Dimensions



The framework also distinguishes between regulatory conformity, operational readiness and operational excellence. Regulatory conformity concerns whether applicable legal requirements are satisfied. Operational readiness considers whether those requirements can be sustained in practice, while operational excellence reflects the degree to which the supporting capabilities are integrated, controlled, resilient and continuously improved. Maturity assessment should therefore support readiness improvement without being interpreted as proof of legal conformity.

Table 3.1
Core Readiness Dimensions and Assessment Questions.

Dimension	Fundamental Questions	Capability Objective
Organization	Who owns, governs and continuously manages the Battery Passport obligation?	Clear accountability, controlled interfaces and repeatable lifecycle execution.
Data	Is the required information complete, credible, traceable, controlled and maintainable, and can company and value-chain data be consistently mapped to the applicable Battery Passport attributes?	Trustworthy data with preserved provenance, evidence and update control across internal and external data sources.
System	Can the digital environment reliably and interoperably provide and maintain the information and support DPP Registry interaction, identifier and data-carrier requirements and applicable UPI strategy?	Resilient hosting, resolution, integration, access and digital trust supported by appropriate DPP Registry and Battery Passport system integration.

4. Readiness to Excellence – Assessment and Implementation

Excellence Level	Organization Capability
1- Initial / Reactive	Capability is primarily individual-dependent and reactive, with only a basic organizational structure and information foundation in place.
2- Developing	Core controls, responsibilities and supporting structures are being established.
3- Defined	Processes are documented, controlled and repeatable, with a good level of information completeness and consistency.
4- Integrated and Assured	Controls operate as an integrated system, with required information and processes in place and their effectiveness demonstrated through objective evidence.
5- Continuously Optimized / Ecosystem-Ready	Performance is measured, adapted and continuously improved across the organization and relevant external interfaces, supported by a mature and sustainable operating ecosystem.

Table 4.1.1
Five-level Battery Passport readiness and excellence model

Once the Organization, Data and System dimensions are established, the next question is how consistently and systematically they are managed. Battery Passport readiness should not be viewed as a one-time implementation exercise. It requires an operating model in which responsibilities, data controls, digital-system controls and lifecycle processes are defined, integrated, evidenced and maintained over time.

A maturity perspective provides a structured way to distinguish between organizations that remain dependent on individual actions and fragmented processes and those that operate an integrated, controlled and continuously improving Battery Passport capability. Maturity should nevertheless remain distinct from regulatory conformity and certification. A maturity level describes the strength and effectiveness of the operating capability. It does not, by itself, constitute evidence of regulatory conformity.

4.1 Five-Level Battery Passport Readiness and Excellence Model

VDE SIS applies a five-level Battery Passport readiness model to evaluate the development of organizational, data and system capabilities. The model provides a common maturity structure across the three readiness dimensions while allowing strengths, improvement opportunities and material gaps within individual dimensions or their interfaces to remain visible.

Readiness is evaluated across the Organization, Data and System dimensions using a transparent five-level assessment model. The resulting readiness profile highlights established areas of capability, identifies opportunities for improvement and provides a structured basis for prioritizing further action. Dimension-level evaluation is important because a single aggregated score can conceal material weaknesses. The assessment therefore provides visibility of both areas of strength and specific capability gaps that may affect sustained Battery Passport readiness.

4.2 Independent Readiness Assessment

Independent readiness assessment provides an objective view of whether the organizational, data and system capabilities supporting the Battery Passport are sufficiently established and effective in practice. The assessment considers not only how relevant processes and controls are defined, but also whether their implementation and effectiveness can be demonstrated through appropriate evidence.

VDE SIS evaluates the **Organization, Data and System** dimensions together with the interfaces between them and translates the results into a structured readiness profile. The assessment highlights established capabilities, identifies priority improvement areas and provides a practical basis for further implementation and maturity development. Depending on the assessment scope and organizational maturity, this

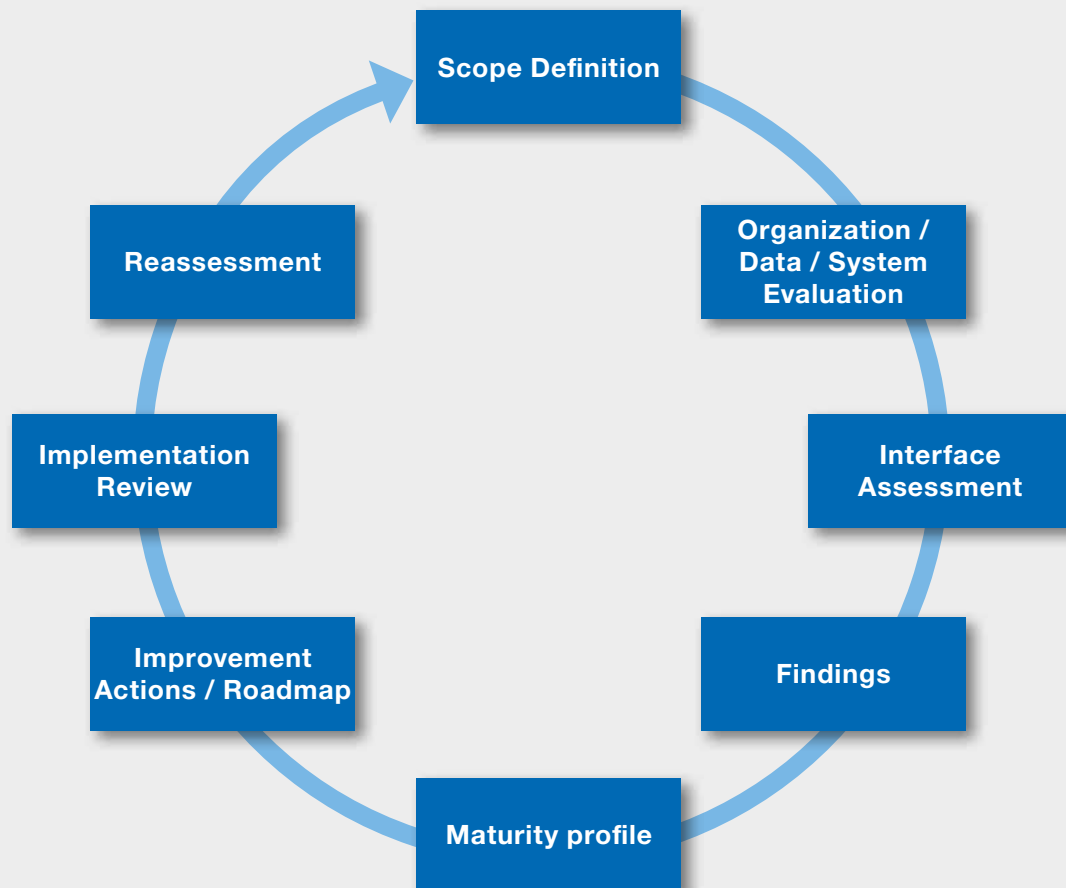


Figure 4.2.1:
Independent Battery Passport Readiness Assessment Cycle

may also include specific implementation topics such as DPP Registry integration, mapping of company information to Battery Passport data attributes, identifier and data-carrier concepts, UPI strategy, system and data-model dependencies, and supplier or value-chain data readiness.

The assessment follows a closed improvement cycle as shown in Figure 4.2.1, progressing from scope definition and readiness evaluation through findings, maturity profiling, improvement planning and reassessment.

Independent assessment does not transfer legal responsibility away from the economic operator and should not be interpreted as a guarantee of regulatory conformity. Its purpose is to provide independent technical challenge, evidence-based evaluation and

a transparent view of the organization's ability to sustain Battery Passport readiness over time. Where appropriate, the readiness assessment can be complemented by a pre-conformity assessment against applicable technical specifications, including DIN DKE SPEC 99100, to support preparation for subsequent conformity-assessment activities.

4.3 Implementation Roadmap

The VDE SIS readiness framework can also support organizations in progressing from initial regulatory understanding toward sustained Battery Passport capability. The implementation pathway is typically iterative and should reflect the organization's existing maturity, product portfolio, supplier dependencies and digital environment. The support can be tailored

Table 4.3.1.
Battery Passport implementation roadmap

Phase	Primary Objective	Typical Timeframe*	Typical Output
1. Understand & Assess	Establish regulatory scope and determine the current level of Battery Passport readiness.	1–3 month	Battery Passport Data Attribute Gap Analysis, readiness baseline and prioritized gaps
2. Design & Prepare	Define the organizational, data and system improvements needed to achieve the target readiness level.	2–6 months	Technical Implementation Roadmap for DPP Registry and Battery Passport system integration, including relevant identifier and data-carrier concepts, UPI strategy and data-integration considerations
3. Implement & Validate	Support implementation and independently evaluate whether the required capabilities have been established.	Project-dependent	Updated readiness assessment and, where applicable, pre-conformity assessment against DIN DKE SPEC 99100
4. Operate & Excel	Maintain readiness and progressively improve capability as products, regulations and systems evolve.	Ongoing / periodic	Periodic reassessment and targeted reviews of supplier and value-chain data readiness, recycled-content readiness and other evolving requirements

* Indicative durations depend on organizational scope, existing maturity, battery portfolio, supplier complexity and digital-system readiness

to the organization's starting point and may include data-attribute gap analysis, technical implementation planning, pre-conformity assessment and targeted supplier and value-chain readiness reviews.

Battery Passport implementation should not be considered complete merely because a passport can be

generated or successfully registered. Sustained readiness depends on the organization's ability to maintain the supporting capabilities as regulatory requirements, products, suppliers, lifecycle information and digital systems evolve.

5. Conclusion

Battery Passport implementation extends beyond regulatory data population or software deployment. Sustainable readiness requires economic operators to establish the organizational, data and digital capabilities needed to maintain reliable Battery Passport information throughout the relevant lifecycle.

The VDE SIS Battery Passport Readiness and Excellence Framework provides an independent and structured means of evaluating these capabilities across **Organization, Data and System**. The five-level readiness model highlights established strengths, identifies priority improvement areas and provides a transparent basis for progressing from initial implementation toward sustained operational readiness and excellence. Depending on the organization's starting point, the framework can also support

targeted readiness activities such as data-attribute gap analysis, DPP Registry and Battery Passport system implementation planning, pre-conformity assessment and supplier and value-chain readiness reviews.

The framework does not prescribe a specific organizational model or technology platform, nor does it replace applicable regulatory requirements. Its purpose is to provide economic operators with an independent view of their current readiness and a practical pathway to strengthen and sustain their Battery Passport capability.

Preparing for Battery Passport Implementation?



- ▶ VDE SIS provides independent support for Battery Passport readiness, including data-attribute gap analysis, DPP Registry and Battery Passport system implementation planning, pre-conformity assessment, and supplier and value-chain readiness reviews.
- ▶ Contact our experts to discuss your Battery Passport implementation needs.
Mail: service@vde.com
Web: <https://www.vde-sis.de/de/technical-advisory/>



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