



VDE information paper on the Battery Regulation (EU) 2023/1542 on batteries and waste batteries

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What is the Battery Regulation?

In December 2020, the EU Commission presented an initial proposal for a battery regulation, called “Regulation of the European Parliament and the Council concerning batteries and waste batteries”¹, which is intended to replace the existing Battery Directive (Directive 2006/66/EC) and regulate the battery market much more comprehensively. Following negotiations with the European Council and the European Parliament, the regulation came into force in August 2023 and will apply starting February 2024. This is the first regulation to come into effect following the European Commission's Green Deal and therefore takes intensive account of climate protection and the circular economy. In addition to strengthening the European battery market, the primary aim is to reduce the environmental, social and ethical impact of batteries. In addition, the growing market for batteries, particularly in electromobility, shall be considered.

What's new?

For the first time, the Battery Regulation addresses the battery life cycle entirely, from raw material extraction to recycling. This involves the inclusion of all economic players participating in the battery life cycle. It applies to all battery categories: Portable batteries, starter batteries (SLI), light means of transport batteries (LMT), electric vehicle batteries (EV) and industrial batteries. The regulation applies to batteries regardless of shape, volume, weight, design, composition and use, regardless of whether being installed in products or merely designed for this purpose. The overarching aim is to implement and strengthen the R strategies² for all battery categories. This involves numerous requirements, depending on the respective battery category, which must be met to be allowed to place batteries on the EU market.

Overview of the relevant requirements of the Battery Regulation

Supply chain due diligence

Economic operators with a net turnover of EUR 40 million or more in the financial year before the last who place new, not batteries that were prepared for re-use, repurpose or remanufacturing, on the market are subject to special due diligence obligations. This also applies if the economic operators belong to parent or subordinate companies. The due diligence obligations include the maintenance of a management system for the control and risk assessment of the value chain and relate to specific raw materials as well as categories of social and environmental risks. Independent, notified bodies shall audit the measures for compliance with the due diligence obligations and confirm their effectiveness.

CE labelling and conformity assessment

With the mandatory CE marking, the economic operator validates the conformity of the batteries with the requirements prescribed in Articles 6 to 14. The Battery Regulation provides several conformity assessment procedures. In addition to the option of self-declaration, assessments by an independent notified body for the carbon footprint and recycled content are mandatory.

¹ REGULATION (EU) 2023/1542 - EUR-Lex (europa.eu)

² German Standardization Roadmap Circular Economy (dke.de)

The requirements relevant to CE labelling cover the following subject areas.

Article	Topic
Article 6	Restrictions on substances
Article 7	Carbon footprint
Article 8	Recycled content
Article 9 / 10	Performance and durability requirements
Article 12	Safety of stationary battery energy storage systems
Article 13	Labelling
Article 14	State of health and expected lifetime

- **Article 6 - New substance limit value for lead (Pb)**

Within the new Battery Regulation, substance limits have been added. Previously, there were already restrictions for the elements cadmium (Cd) and mercury (Hg), where cadmium was prohibited above a content of 0.002 % and mercury above a content of 0.0005 % in relation to the battery total weight. The element lead (Pb) was newly included in the substance restrictions with a limit value of 0.01% in relation to the total weight of the battery. Furthermore, the substance requirements according to REACH³ and ELV⁴ apply in the automotive sector.

- **Article 7 - Carbon footprint: information and maximum limits**

For electric vehicle batteries, rechargeable industrial batteries with a capacity of more than 2 kWh and light means of transport batteries, each battery model per manufacturing plant requires a declaration on the carbon footprint. Both upstream processes, such as the extraction of raw materials and battery production itself, and downstream processes, such as the actual utilization phase and recycling, must be considered. Currently, there are two methodology drafts for calculating the carbon footprint. The IEC 63369-1 ED1⁵ project deals with the methodology for the carbon footprint calculation for industrial lithium-ion batteries, whereas the IEC 63372 ED1⁶ project deals more generally with the quantification and communication of the CO₂ footprint and the reduction/avoidance of greenhouse gas emissions from electrical and electronic products and systems.

As this is a new topic in battery standardization, a new working group called "CO₂-Fußabdruck von Batterien" (Carbon footprint of batteries) was set up under DKE/K 371 to pool the expertise.

- **Article 8 - Recycled content: information and increasing minimum requirements**

To strengthen the circular economy and increase the sustainability of batteries, economic operators must provide information on the recycled content of the active materials contained in the batteries placed on the market. Based on this, minimum requirements for recycled content will become mandatory and increase in the following years.

³ Regulation (EC) No 1907/2006

⁴ Directive 2000/53/EC

⁵ [Environmental impact of batteries \(dke.de\)](https://www.dke.de/en/Environmental-impact-of-batteries)

⁶ [Standards for quantifying greenhouse gas emissions \(dke.de\)](https://www.dke.de/en/Standards-for-quantifying-greenhouse-gas-emissions)

- [Article 9 / 10 - Performance and durability](#)

In summary, Articles 9 and 10 set out requirements for the performance and durability of portable batteries, rechargeable industrial batteries, batteries for light means of transport and electric vehicle batteries. Starting August 2024, batteries must meet certain electrochemical parameters in accordance with Annex IV Part A. There are time limits for achieving minimum values, depending on the type of battery. Delegated acts until 2027 specify when certain battery types must achieve these minimum values. These requirements do not apply to reused or repurposed batteries if the economic operator can prove that they were placed on the market before the specified deadlines.

The European standardization organizations CEN/CLC were assigned by the EU Commission via the standardization request M/579 to develop standards for the various battery categories with performance and durability parameters. The German national committee DKE/K 371 is playing a leading role in this work.

- [Article 11 - Removability of portable batteries and batteries for light means of transport](#)

The Battery Regulation demands the removability and replaceability of batteries in small devices and in light means of transport such as e-bikes and e-scooters. This is associated with requirements for economic operators regarding product design and the enclosed documentation. Depending on the type of product, it shall be possible for trained personnel as well as consumers to remove the batteries without special tools.

- [Article 12 - Safety of stationary storage systems](#)

Stationary battery energy storage systems must be safe during normal operation and when used as intended. To ensure this, the Battery Regulation demands successful testing according to defined safety parameters. As standards do not yet exist in their entirety, test plans are currently being drawn up in collaboration with DKE and VDE using gap analysis and standard gap closure. A selection of tests from existing and practice-relevant standards is used as a basis and, after expanding the pass criteria to fulfil the requirements, merged into test plans and the application rule AR E 2510-50⁷.

- [Article 14 - State of health \(SoH\) and expected lifetime](#)

Article 14 of the Battery Regulation lists requirements for battery parameters that are used to determine the battery's state of health and expected lifetime. These parameters are used e.g. to determine the residual value of a battery and its potential for use in a second-life application. A longer lifetime beyond usage in the initial application also leads to an effectively better carbon footprint of the battery.

Management of recyclable material flows

Manufacturers bear extended producer responsibility for batteries placed in the EU market for the first time. This also applies to repurposed and reused batteries. Used batteries must therefore be collected separately and taken back free of charge. Requirements for collection quotas and recycling efficiencies specified by the battery category apply. This is particularly intended to improve the availability of recycled material for the production of new batteries.

⁷ [Stationary energy storage systems with lithium batteries \(vde-verlag.de\)](#)

Digital battery passport

Light means of transport batteries, industrial batteries with a capacity of more than 2 kWh and electric vehicle batteries require a digital battery passport. This is a dataset that summarizes information about the product and makes it easily accessible. The battery passport contains information about the battery model and specific information for the individual battery. The information is divided into three categories: information that is publicly accessible⁸, information that is only accessible to notified bodies, market surveillance authorities and the Commission⁹ and information that is only accessible to natural or legal persons who have a legitimate interest in accessing and processing this information¹⁰. Delegated acts are set out in the Battery Regulation for a precise implementation.

VDE Renewables is part of the "Battery Pass" project consortium to support the implementation of the battery passport. Additionally, a (standardization) working group has been established within the DKE under DKE/K 371 to pool expertise and to prepare normative work. A DIN DKE SPEC with the title "Battery passport content to fulfill requirements of EU-Battery regulation and to complement voluntary data" is currently being developed.

The digital battery passport is an important basis for reliable stakeholder information and enables sustainable consumption decisions.

Challenges and needs

The adoption of the new Battery Regulation in 2023, which has come into force in February 2024, poses significant challenges for the industry in implementing the associated requirements. In particular, the development of harmonized standards, which additionally must be newly created for important topics, is proving to be a complex task. Considering the implementation deadlines from the Battery Regulation, this is generating immense time pressure in standardization committees as well as in companies. Initial requirements on performance and durability (Article 10), safety of stationary storage systems (Article 12) and state of health and expected lifetime (Article 14) must be met by companies by August 2024. The challenges in dealing with the standardization request SReq M/579 include incomplete regulations that are provided with delegated acts, uncertainties in definitions and the lack of testing standards. Particular attention must be paid to the testing standards to ensure that the tests do not consume too much time from an economic point of view (solutions for lifetime tests) and that a solution is found for testing batteries that are already in use. Existing test standards for batteries include type tests that also include destructive tests. This means that used batteries cannot currently be tested using the same procedures as new batteries.

Uncertainties exist across the industry regarding the interpretation of requirements, concepts for implementation and responsibilities along the battery life cycle. The required reporting obligations of companies must be individually reviewed for specific cases and assessed for documentation obligations. The transferability of responsibilities during user transitions within the battery life cycle poses a further challenge.

Considering the significant amount of work necessity to develop harmonized standards and the demand for new expertise from market participants, additional technical experts are urgently needed for an active participation in the DKE's standardization processes. In particular, technical experts are being sought on topics such as the reparability of batteries, carbon footprint, deep discharge of lithium-ion batteries in the recycling process and state of health, both of lithium batteries and other battery chemistries, to ensure that the standards developed are practical, future-oriented and meet the requirements of the Battery Regulation. The collaboration of experts remains crucial to ensure the successful implementation of the Battery Regulation and to promote the sustainable development of battery technology.

⁸ Regulation (EU) 2023/1542 Annex XIII (1)

⁹ Regulation (EU) 2023/1542 Annex XIII (2) and (3)

¹⁰ Regulation (EU) 2023/1542 Annex XIII (2) and (4)

Role of the VDE - how we can provide support

The VDE, one of the largest technology organizations in Europe, stands for innovation and technological progress for more than 130 years. The VDE is the only organization in the world to unite science, standardization, testing, certification and application consulting under a single roof. For 100 years, the VDE mark has been synonymous with the highest safety standards and consumer protection. The VDE can look back on decades of experience. As a competence center, the VDE cooperates with all units of the VDE Group and is in possession of an international network of partners.

Here you will find all services and types of audits that we offer you as a reliable partner.

■ Standardization

The DKE (German Commission for Electrical, Electronic & Information Technologies), carried by the VDE, is the platform for around 9,000 experts from industry, science and administration for the development of norms, standards and safety regulations for electrical engineering, electronics and information technology. Standards support global trade and serve, among other things, the safety, interoperability and functionality of products, services and systems. As a competence center for electrotechnical standardization, the DKE represents the interests of the German economy in European (CENELEC, ETSI) and international (IEC) standards organizations. These activities include, for example, the work of the [DKE/K 371 "Akkumulatoren"](#) (accumulators) committee, as a mirror committee to CLC/TC 21X "Secondary cells and batteries" and IEC/TC 21 and IEC/SC 21A. DKE/K 372 "Primärbatterien" (primary batteries) works on standards in the field of primary cells and batteries as a mirror committee to IEC/TC35.

Our current Call for Experts - and your chance to work with us! Find them here.



■ Testing and certification

The VDE operates the globally active VDE Prüf- und Zertifizierungsinstitut GmbH (Testing and Certification Institute), which has a 100-year testing tradition and is accredited by several organizations worldwide. The institute is divided into various areas of expertise, one of which is the chemical laboratory. Here we perform material tests regarding environmental regulation and sustainability aspects of electronic and electrical products. We are happy to advise you on the regulatory requirements of the Battery Regulation and support you with our testing services.

This includes checking the substance limit values for Cd, Hg and Pb in accordance with the Battery Regulation and the requirements of REACH¹¹, SVHC and ELV¹².

In addition, we are able to determine the actual content of the elements cobalt, lithium, nickel and lead in the active materials of the battery for you.

The laboratory-based calculation of the life cycle assessment (LCA) and the carbon footprint is another service we provide with many years of experience. This involves dismantling the products and analyzing the materials to prepare the data for the LCA calculation. A unique aspect of the VDE is the detailed performance of the material testing, as this allows a more precise calculation of the LCA and carbon footprint. This analysis can also be carried out for batteries.

¹¹ Regulation (EC) No 1907/2006

¹² Directive 2000/53/EC

Please contact us if you are interested in one of our expert discussions. We can provide you with comprehensive consultation and clarify any open questions about the Battery Regulation. Our experts will be happy to help you with your concerns.

- **Battery Test Center**

VDE is a globally recognized and trusted brand that is committed to the highest quality and stands for independence. VDE has been active in the battery testing and certification business for decades and, in addition to the Battery Test Center in Offenbach am Main, operates its own state-of-the-art ISO IEC 17025 accredited test laboratories worldwide. Our services cover the entire battery development process: we have in-depth experience in the qualification of cells (performance, lifetime, abuse), can cover all tests accompanying the development of modules as well as the validation of battery units in accordance with national and international standards and have our own in-house certification center.

Our industry-experienced experts provide you with comprehensive consultation on the development of your own test specifications and offer guidance on all applicable battery standards.

- **Personalized technical consultation**

VDE Renewables supports companies in the realization of projects in the renewable energy sector and covers the entire battery value chain. Our service portfolio includes the evaluation of company-specific solutions and their implementation in projects regarding their safety and cost-effectiveness. The focus here is on the development and implementation of technical criteria based on standards and pre-standards with the aim of improving solutions while maintaining the highest quality standards. In addition to our service portfolio, we offer customized training courses on the various storage technologies, allowing you to benefit from first-hand knowledge of our battery experts and use it for your own needs. In application-related training courses, we teach the necessary expertise and best-practice solutions to make the individual implementation of the regulation easier for you. We develop the consulting concept in close cooperation with you according to your requirements.

VDE Renewables offers public series of seminars and customized training concepts on the Battery Regulation. Please feel free to contact us!



We provide you with customized consultation on the interpretation of the Battery Regulation requirements and accompany you step by step on the way to the CE declaration of conformity. In addition, we support in the "Battery Pass" project by providing technical guidelines, particularly in the field of industrial batteries. Our current focus is on the detailed characterization and evaluation of recyclability and key performance indicators along the value chain. Within the consortium, we are defining possible technical solutions, considering all stakeholders involved, with the goal of making the metrics and relevant processes auditable.

Bibliography

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