



The Global Language of Business

Identification and labelling of industrial and electrical vehicle batteries

Driving the Battery Passport with GS1 Standards

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REGULATION (EU) 2023/1542 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 12 July 2023 concerning batteries and waste batteries, amending Directive 2008/98/EC and Regulation (EU) 2019/1020 and repealing Directive 2006/66/EC.

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1. Introduction

1.1. Executive Summary

Battery development and production are strategic imperatives for Europe in the context of the clean energy transition. They are also key components of Europe's automotive sector.

According to the European Commission, global demand for batteries is set to increase 14-fold by 2030 and the EU could account for 17% of that demand. In addition, the exponential global growth in the demand for batteries will lead to an equivalent increase in demand for raw materials, notably cobalt, lithium, nickel and manganese, which will have a significant environmental impact. The growing use of batteries will also lead to surging amounts of waste. The number of lithium batteries ready for recycling is expected to increase 700 times between 2020 and 2040¹.

According to the EU battery regulation (Regulation (EU) 2023/1542 of the European Parliament and of the Council of 12 July 2023 concerning batteries and waste batteries), each Light Means of Transport (LMT) battery, each industrial battery with a capacity above 2 kWh and each electric vehicle battery placed on the market or put into service shall have an electronic record ("battery passport")². The battery passport is the digital product passport for batteries and shall be unique for each individual battery referred to in paragraph above and shall be identified through a unique identifier³ that the economic operator placing the battery on the market shall attribute to it and which shall be printed or engraved on it.⁴

The battery regulation emphasises the importance of international standards and promotes the use of existing standards in particular IEC and ISO/IEC. In terms of identification and data carrier, the standards defined in the Regulation are ISO/IEC Standard 18004 for the QR Code and ISO/IEC 15459:2015 for unique identification. The GS1 standards for unique identification are part of ISO/IEC 15459:2015 and GS1 uses the QR Code as standardised in ISO/IEC Standard 18004. The Regulation further defines a unique identifier as a unique string of characters for the identification of batteries that also enables a web link to the battery passport. GS1 has developed the GS1 Digital Link URI syntax which integrates a product identifier and a web address which can be linked to all types of information for authorities, business and consumers.

The Digital Product Passport relies upon a product identifier carried by an automatic identification and data capture (AIDC) technology like QR Code. Furthermore, the product identifier must be carried in a syntax that can locate a web resource for the product passport itself. In 1996, ISO/IEC Joint Technical Committee 1 (JTC1) established Subcommittee 31 (SC31) to develop international standards for AIDC. These standards, which focus on the special constraints of AIDC technology, include areas such as identification, data carrier, interface, and syntax. Within the identification standards, ISO/IEC 15459-2 establishes a Registrar of Issuing Agencies and allocates a unique Issuing Agency Code (IAC) to each one. GS1 is one of many ISO/IEC 15459-2 Issuing Agencies which obliges conformity to ISO/IEC 15459-3 General Rules. These rules ensure that GS1 identifiers and those of other Issuing Agencies are unique to one another when used in messages or stored in systems. For example, any identifier that begins with a numeric value, when carried within an AIDC carrier, is allocated by GS1 as GS1's Issuing Agency Codes are 0, 1, 2, 3, 4, 5, 6, 7, 8, and 9. Other Issuing Agencies have IACs that begin with a numeric value. For a full list of ISO/IEC Issuing Agencies please visit this [link](#). ISO/IEC 15459-3 rules and the full suite of standards developed under the auspices of ISO/IEC JTC1 SC31 ensure interoperability in the approaches utilised when encoding ISO/IEC 15459 unique identifiers within AIDC data carriers (e.g., QR Code, RFID). The GS1 Digital Link URI approach to encoding GS1 identifiers in a web-friendly syntax is now progressing, alongside another approach utilised by other Issuing Agencies within a new ISO/IEC standard, DIS 18975. The requirements related to DPP will differ by product types. In some, the use of GS1 identifiers and AIDC standards are pervasive (e.g., items sold in a retail), in others may be supported by other Issuing Agencies, and in others there may be more

¹ https://ec.europa.eu/commission/presscorner/detail/en/qanda_20_2311

² Battery Regulation, Chapter IX, Article 77, paragraph 1.

³ Battery Regulation, Chapter IX, Article 77, paragraph 3.

⁴ Battery Regulation, Chapter III, Article 13, paragraph 7.

than one utilised. In a non-DPP example, some medical devices are combined with human tissue, where GS1 may identify the device and ICCBBA identifies the component(s) of the Medical Products of Human Origin. For this reason, GS1 and ICCBBA have collaborated for many years to ensure interoperability and patient safety. It can be expected that the novel requirements for DPP will require such collaboration between GS1 and other Issuing Agencies. For example, a product may be identified with a manufacturer part number by one Issuing Agency then when the part is sold online or in an aftermarket retail shop, it may be identified by GS1.

It is important to note that this document provides an outline for GS1 technical standards (e.g., identifiers, AIDC data carriers) that may be used to support industry. This document does not establish application standards which establish normative standards for implementation. This work is underway within a GS1 Global Standards Management Process (GSMP) Mission Specific Work Group (MSWG). For more information on the GSMP, please visit this link. Any GS1 member who has an interest in following or participating directly in this work should contact their local GS1 Member Organisation for more information.

The document consists of two main parts:

- Interpretation of the EU sustainable battery regulation covered in sections 4 to 6, explaining the main business needs and challenges and the way these will be addressed.
- Chapter 7 explains how the GS1 System addresses the business needs: how the identification keys, data attributes and data capture standards can be applied to enable Battery Passport.

1.2. EU regulation on sustainable batteries⁵

The objectives of the Regulation are to contribute to the efficient functioning of the EU internal market, also while preventing and reducing the adverse impacts of batteries on the environment, and to protect the environment and human health by preventing or reducing the adverse impacts of the generation and management of waste batteries.

The Regulation establishes requirements on sustainability, safety and labelling to allow the placing on the market and putting into service of batteries, as well as minimum requirements for the extended producer responsibility, collection, treatment and recycling of waste batteries and reporting.

The Commission proposes a single Regulation covering the entire life cycle of batteries.

1.3. EU regulation requires open standards

From 18 February 2027 each LMT battery, each industrial battery with a capacity greater than 2 kWh and each electric vehicle battery placed on the market or put into service shall have an electronic record ('battery passport').

The economic operator placing the battery on the market shall ensure that the information in the battery passport is accurate, complete and up to date. It may give written authorisation to any other operator to act on its behalf.

All information included in the battery passport shall be based on open standards and be in an interoperable format, transferable through an open interoperable data exchange network without vendor lock-in, machine-readable, structured and searchable, in accordance with the essential requirements laid down in Article 78.⁶

1.4. Audience

This document is intended to be used by all parties involved in declaration, monitoring, evaluation and reporting arrangements of batteries. These include:

- Producers (manufacturers, importers or distributors),
- Independent operators involved in the repair, maintenance, preparing for reuse, or repurposing of batteries, and include waste management operators, repairers, manufacturers or distributors of repair equipment, tools or spare parts, as well as publishers of technical information, operators offering inspection and testing services, operators offering training for installers, manufacturers and repairers of equipment for alternative-fuel vehicles,
- Waste management operators (natural or legal person dealing on a professional basis with the separate collection, sorting, or treatment of waste batteries),
- National authorities (market surveillance, market surveillance authority), and
- Industry representatives
- Solution providers active in this environment.

⁵ This text will be checked against the final version of the EU regulation 2020/0353. All text in yellow is directly copied from regulation.

⁶ Battery regulation, Chapter IX, Article 77, paragraph 5.

1.5. Scope

1.5.1. In scope

All batteries (packs, modules, etc.) that will have to be accompanied by a Battery Passport according to the sustainable battery regulation – as described above – as well as materials needed in upstream processes to produce these batteries.

1.5.1.1. First steps

- Describing how GS1 standards can be used for the identification and serialisation of batteries, including raw material, modules, semi-finished products, final and second-hand products and components/substances
- Describing how the identifiers are captured in QR Code and shown on labels
- The identification of locations / entities / partners / sellers and re-sellers where batteries are produced, disposed, recycled, etc.
- Performing a gap analysis on identification and labelling aspects covered by the GS1 standards and the current use within the sector

1.5.2. Not in scope for this preliminary document

Identification and marking are important elements of the digital battery passport and a good starting point, but the information has also to be shared between the actors involved in the process from mining to recycling including:

- static data such as master data, compliance / certification data, green data etc.
- traceability data such as source, usage data etc.
- quality information and processes to ensure that the information provided is accurate and can be trusted.

GS1 guidance on how to share that information will be developed in other documents and finally reconciled in a single guideline at the end of the process. An important element at this regard will be the pilots conducted by industry.

1.5.3. Out of scope

The document will not focus on:

- Other product categories as Textile, Consumer Electronics, Construction or Food, Feed and Medicine (because as the latter are excluded from the regulation itself)
- The development of third-party verification procedures
- Calculations on data elements of the battery passport, such as CO2 footprint
- Data demanded by Regulation (EU) 2023/1542 for batteries not falling under battery passport requirement such as portable batteries.

2. References

2.1. Standards references

References to documents, websites etc. are indicated as follows [REFERENCE, paragraph number (optional)]. The list of references with full details is included in section 3.

Table 2.1-1 Normative references

REF ID	Document	Author / Year
GENSPECS	GS1 General Specifications https://www.gs1.org/docs/gsmf/barcodes/GS1_General_Specifications.pdf	GS1, latest
GTS	GS1 Global Traceability Standard https://www.gs1.org/standards/traceability/traceability/2-0	GS1, latest
EPCIS	GS1 EPCIS https://www.gs1.org/docs/epcis/epcis_2-0_launch.pdf	GS1, latest
GS1 DL	GS1 Digital Link https://www.gs1.org/standards/gs1-digital-link	GS1, latest

2.2. Regulatory references

The battery passport is connected to several regulations that are available or being drafted by the European Commission. As of today, these regulations are:

Table 2.2-1 Safety legislation and regulations for battery

Regulation	Description
Regulation (EU) 2023/1542	Regulation of the European Parliament and of the Council concerning batteries and waste batteries, repealing Directive 2006/66/EC and amending Regulation (EU) No 2019/1020, COM/2020/798 final
Regulation (EU) 2022/142 (COD)	Proposal for a Regulation on eco-design for sustainable products, amending regulation (EU) 2019/1020 and repealing directive 2009/125/EC (ESPR)
COM (2019) 640 final European Green Deal	Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee and the Committee of the Regions,
COM (2020) 98 final	A new Circular Economy Action Plan – For a cleaner and more competitive Europe.
COM (2018) 293 final	Sustainable Mobility for Europe: safe, connected and clean
COM (2020) 667 final	Chemical Strategy for sustainability to develop safe and sustainable-by-design criteria for chemical substances and assess how to best introduce information requirements under Regulation (EC) No 1907/2006 on the overall environmental footprint of chemicals, including on emissions of greenhouse gases
COM (2020) 767 proposal	Proposal for a Regulation of the European Parliament and the Council on European data governance (Data Governance Act)
Regulation (EC) No 1907/2006	of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), establishing a European Chemicals Agency, amending Directive 1999/45/EC and repealing Council Regulation (EEC) No 793/93 and Commission Regulation (EC) No 1488/94 as well as Council Directive 76/769/EEC and Commission Directives 91/155/EEC, 93/67/EEC, 93/105/EC and 2000/21/EC

Regulation (EC) No 765/2008	of 9 July 2008 setting out the requirements for accreditation and market surveillance relating to the marketing of products and repealing Regulation (EEC) No 339/93
Regulation (EU) No 1025/2012 of the European Parliament and of the Council	of 25 October 2012 on European standardisation, amending Council Directives 89/686/EEC and 93/15/EEC and Directives 94/9/EC, 94/25/EC, 95/16/EC, 97/23/EC, 98/34/EC, 2004/22/EC, 2007/23/EC, 2009/23/EC and 2009/105/EC of the European Parliament and of the Council and repealing Council Decision 87/95/EEC and Decision No 1673/2006/EC of the European Parliament and of the Council
Regulation (EU) 2019/1020	Market surveillance and compliance of products
Directive 2000/53/EC	of 18 September 2000 on end-of-life vehicles
Directive 2006/66/EC	on batteries and accumulators and waste batteries and accumulators and repealing Directive 91/157/EEC
Directive 2009/33/EC	of 23 April 2009 on the promotion of clean and energy-efficient road transport vehicles
Directive 2009/125/EC	of 21 October 2009 establishing a framework for the setting of eco-design requirements for energy-related products
Directive (EU) 2019/944	of 5 June 2019 on common rules for the internal market for electricity and amending Directive 2012/27/EU

3. Managing batteries in a circular economy

3.1. Introduction

Global consumption of materials such as biomass, fossil fuels, metals and minerals are expected to double in the next forty years, while annual waste generation is projected to increase by 70% by 2050. As half of total greenhouse gas emissions and more than 90% of biodiversity loss and water stress come from resource extraction and processing, the European Green Deal launched a concerted strategy for a climate-neutral, resource-efficient and competitive economy.

This Deal is Europe's growth strategy that aims to transform the Union into a fair and prosperous society, with a modern, resource-efficient and competitive economy where there are no net emissions of greenhouse gases in 2050 and where economic growth is decoupled from resource use. A shift from the use of fossil fuels in vehicles to electro mobility is one of the prerequisites for reaching the climate neutrality goal in 2050. For the Union's product policies to contribute to lowering carbon emissions on a global level, it needs to be ensured that products marketed and sold in the Union are sourced and manufactured in a sustainable manner.

The Sustainable Product Initiative from the European Union will be a big push towards this. And the digital product passport (DPP) will be part of this. Before introducing the digital product passport, the information about their components and recyclability was not always easily available.

Batteries are an important source of energy and one of the key enablers for sustainable development, green mobility, clean energy and climate neutrality. It is expected that the demand for batteries will grow rapidly in the coming years, notably for electric road transport vehicles using batteries for traction, making this market an increasingly strategic one at the global level. Significant scientific and technical progress in the field of battery technology will continue. In view of the strategic importance of batteries, and to provide legal certainty to all operators involved and to avoid discrimination, barriers to trade and distortions on the market for batteries, it is necessary to set out rules on sustainability parameters, performance, safety, collection, recycling and second life of batteries as well as on information about batteries.

On 20 May 2021 GS1 and GS1 in Europe signed an MoU with the Global Battery Alliance to start assessing the impact of the product passport on the GS1 system and standards. *GBA collaborated in the development of the standard and acknowledges the importance of UID but that the GBA remains standard agnostic and doesn't endorse the proposed or any other standard to date.*

The battery passport will aim to set up a standardised, international collection of product data with a predefined scope (by regulators) and agreed data ownership and access rights. It will be conveyed through global unique identifiers, based on data models and data attributes mandated by law. It will contain product data related to sustainability and circularity (both for master data and dynamic data).

3.2. Need for transition towards circular economy

Introducing circular economy will contribute to achieve climate neutrality by 2050 and decoupling economic growth from resource use, while ensuring the long-term competitiveness of the EU and leaving no one behind.

To fulfil this ambition, the EU needs a transition towards a regenerative growth model that gives back to the planet more than it takes, and therefore strive to reduce its consumption footprint and double its circular material use rate in the coming decade.

Circularity is an essential part of a wider transformation of industry towards climate-neutrality and long-term competitiveness. It can deliver substantial material savings throughout value chains and production processes, generate extra value and unlock economic opportunities, i.e.:

- facilitating industrial symbiosis by developing an industry-led reporting and certification system, and enabling the implementation of industrial symbiosis;
- supporting the sustainable and circular bio-based sector through the implementation of the Bio economy Action Plan;
- promoting the use of digital technologies for tracking, tracing and mapping of resources;

3.3. Scope of regulation regarding type of batteries

Within the broad scope of the Regulation, it is appropriate to distinguish between different categories of batteries in accordance with their design and use, independently of their battery chemistry. The classification into portable batteries, on the one hand, and industrial batteries and automotive batteries on the other hand under Directive 2006/66/EC should be further developed to better reflect new developments in the use of batteries. Batteries that are used for traction in electric vehicles and which, under Directive 2006/66/EC, fall under the category of industrial batteries, constitute a large and growing part of the market due to the quick growth of electric road transport vehicles. It is therefore appropriate to classify those batteries that are used for traction in road vehicles as a new separate category of electric vehicle batteries:

- Batteries used for traction in light means of transport, such as e-bikes and e-scooters, were not classified as a separate category of battery under Directive 2006/66/EC. However, such batteries constitute a significant part of the market due to their growing use in urban sustainable mobility. It is therefore appropriate to classify those batteries as a new separate category of batteries, namely light means of transport batteries (LMT batteries).
- Batteries used for traction in other transport vehicles including rail, waterborne and aviation transport or off-road machinery, continue to fall under the category of industrial batteries under this Regulation.
- Any battery that weighs more than 5 kg that does not fall under any other categories under this Regulation should be considered to be an industrial battery.
- Batteries used for energy storage in private or domestic environments, should be considered to be industrial batteries for the purposes of this Regulation.
- Batteries used for traction in wheeled vehicles considered to be toys within the meaning of Directive 2009/48/EC of the European Parliament and of the Council, should not be considered to be LMT batteries, but to be portable batteries.

Batteries in scope of the battery passport

Each Light Means of Transport (LMT) battery, each industrial battery with a capacity above 2 kWh and each electric vehicle battery placed on the market or put into service shall have an electronic record ("battery passport").⁷ It is a means to support circularity and contains information about the makeup of goods, components and materials. The passport is designed to provide consistent information about products across the value chain and across borders, to business, customers and authorities.

⁷ Battery Regulation, Chapter IX, Article 77, paragraph 1.

- Manufacturers shall ensure that batteries which they place on the market bear a model identification and batch or serial number, or product number or another element allowing their identification.⁸
- Economic operators that carry out preparing for re-use, preparing for repurpose or repurposing, or remanufacturing, and place on the market or put into service a battery that has undergone any of these operations, shall be considered as manufacturer for the purpose of the Battery Regulation.⁹
- Identification and visibility requirements are driven by safety aspects and by the economic or operational relevance of a battery (e.g., impacting environmental issues, repurpose and recycling).

Therefore, batteries shall be marked with a label containing the general information about the manufacturer’s identification, the battery category and its identification, manufacturing place (geographical location of a battery manufacturing facility), manufacturing date (month and year) and further information.¹⁰

3.4. Battery Value Chain and Lifecycle Overview

The diagram below illustrates the structure of the battery supply chain. It is a generic picture that reflects the entire supply chain including re-use and recycling of batteries.

Figure 3.2-1 Connection to Battery Passport, courtesy of GBA

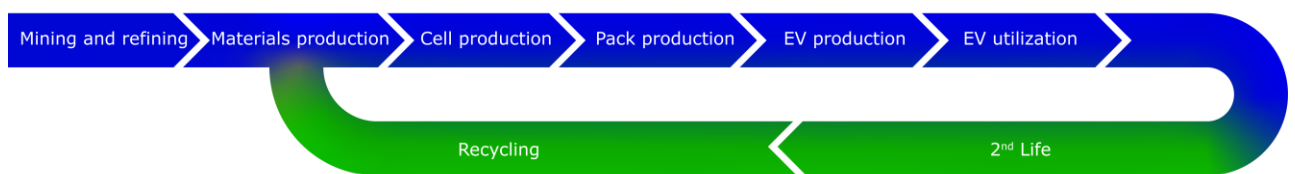
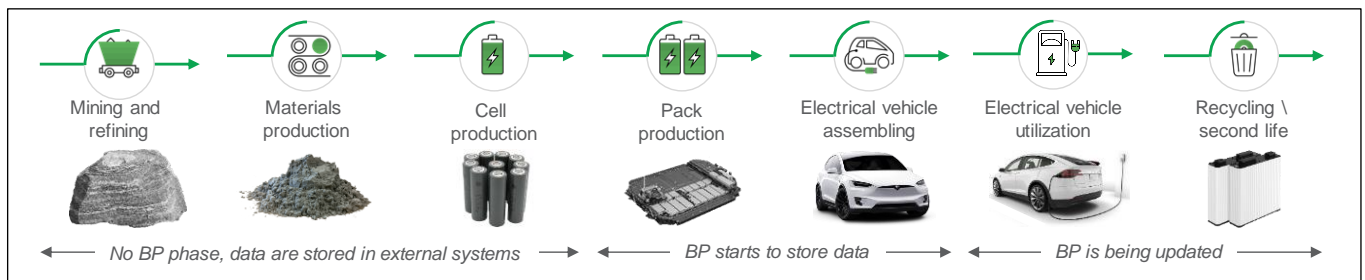


Figure 3.2-2 Circular Economy, courtesy of GBA

⁸ Battery Regulation, Chapter VI, Article 38, paragraph 6.

⁹ Battery Regulation, Chapter VI, Article 38, paragraph 11.

¹⁰ Battery Regulation, Annex VI.

3.5. Value chain roles and data sharing

Table 3.3-1 Battery Product Passport ecosystem, courtesy of GBA

Stakeholder	Assumption on their needs	Data points for access																																								
1 End-user (EV buyer, repurposing or recycling company)	<ul style="list-style-type: none"> Make a conscious purchase decision Access a specific battery-related information Complement BP with end-user data 	<table border="1"> <tr> <th></th> <th>1</th> <th>2</th> <th>3</th> <th>4</th> <th>5</th> <th>6</th> <th>7</th> </tr> <tr> <td>Labeling Data</td> <td>●</td> <td>●</td> <td>●</td> <td>●</td> <td>○</td> <td>●</td> <td>○</td> </tr> <tr> <td>Technical Data</td> <td>●</td> <td>●</td> <td>●</td> <td>●</td> <td>●</td> <td>●</td> <td>●</td> </tr> <tr> <td>Material Data</td> <td>●</td> <td>●</td> <td>●</td> <td>●</td> <td>●</td> <td>●</td> <td>●</td> </tr> <tr> <td>ESG Data</td> <td>●</td> <td>●</td> <td>●</td> <td>●</td> <td>●</td> <td>●</td> <td>●</td> </tr> </table>		1	2	3	4	5	6	7	Labeling Data	●	●	●	●	○	●	○	Technical Data	●	●	●	●	●	●	●	Material Data	●	●	●	●	●	●	●	ESG Data	●	●	●	●	●	●	●
	1	2	3	4	5	6	7																																			
Labeling Data	●	●	●	●	○	●	○																																			
Technical Data	●	●	●	●	●	●	●																																			
Material Data	●	●	●	●	●	●	●																																			
ESG Data	●	●	●	●	●	●	●																																			
2 Industry member (one of the end-to-end value chain companies)	<ul style="list-style-type: none"> Benchmark itself against peers Support supply chain optimization decisions (e.g. managing risk, rising prices, etc.) 																																									
3 Industry others (other value chains or not from battery business)	<ul style="list-style-type: none"> Benchmark industry performance Support business decisions making process (e.g. entry or market) 																																									
4 IT providers (complementing services, partner organizations)	<ul style="list-style-type: none"> Withdraw data through established interfaces for external needs Complement passport with external data 																																									
5 Public members (public organizations, regulators, NGOs, academia)	<ul style="list-style-type: none"> Identify, shape and quantify issues across the battery value chains Supervise implementation of regulations 																																									
6 Auditors (content reporting auditors, data integration verifiers)	<ul style="list-style-type: none"> Ensure correct and honest reporting of intra-company data Assure data flow correctness 																																									
7 GBA (content reporting auditors, data integration verifiers)	<ul style="list-style-type: none"> Control roll out of the BP as a tool by identifying strategic gaps and incentivizing businesses to unlock them 																																									

Individual battery data

- No access
- ◐ If granted only
- Full access

Aggregated battery data

- No access
- ◐ If granted only
- Full access

e.g. all batteries of:

- Same model
- Same battery producer

3.6. Identification and link to information

To comply with the regulation, there is a need to identify a product and access the information about the products so that all parties in the supply chain can access and enrich the data during processes such as repair, recycle etc.

Batteries should be labelled in order to provide end-users with transparent, reliable and clear information about batteries and waste batteries. That information would enable end-users to make informed decisions when buying and discarding batteries and waste operators to appropriately treat waste batteries.

To ensure the availability of information over time, that information should also be made available by means of QR Codes which are printed or engraved on batteries or are affixed to the packaging and to the documents accompanying the battery and should respect the guidelines of ISO/IEC Standard 18004:2015. The QR Code should give access to a battery’s product passport.

Following requirements relating to identification and QR Code need to be fulfilled according to the Battery Regulation:

A ‘*unique identifier*’ which is defined in the regulation as “a unique string of characters for the identification of batteries that also enables a web link to the battery passport”¹¹

¹¹ Battery Regulation, paragraph 66.

A *QR Code* - The battery passport shall be accessible through the QR Code which links to a unique identifier that the economic operator placing the battery on the market shall attribute to it.¹²

The QR Code and the unique identifier shall comply with the ISO/IEC standards 15459-1:2014, 15459-2:2015, 15459- 3:2014, 15459-4:2014, 15459-5:2014 and 15459-6:2014 or their equivalent.¹³ The QR Code should respect the guidelines of ISO/IEC Standard 18004:2015¹⁴

Use of QR Code solutions gives economic operators an opportunity to provide authorities, consumers or recycling companies with richer product data such as list of material and sustainability information, repair information, disassemble videos, traceability data and more. For this to be possible the data needs to be structured in a standardised way.

GS1 has developed the GS1 digital link URI syntax which acts as both: it integrates a product identifier and a web address which can be linked to all types of information for authorities, business and consumers. Utilising GS1 identifiers encoded in according to the GS1 Digital Link URI in a QR Code would allow simple rules to be applied to help apps, websites and registers enable multiple experiences, including to provide different granularity of information (with access rights).

By including the product identifier in the web address, the same QR Code can be used for other business operations such as sale processes. "Web-enabled" codes (i.e., GS1 Digital Link) provide a simple, standards-based structure for the data that is encoded in them, connecting consumers, authorities, business partners and others to online information about a battery. Information such as expiration dates, chemical substances and product component data, warranty registration, repair instruction, troubleshooting instructions – even social media links. The GS1 Digital Link standard makes this all possible. Connections to other sources of information are enabled through a lookup tool. Imagine a physical phone book or a list of contacts on your phone. When you look up a company (or person's) name, it is connected – or "resolved" – to a phone number and to other relevant information, such as a physical address, email address, job title, etc.

¹² Battery Regulation, Chapter IX, Article 77, paragraph 3.

¹³ Battery Regulation, Chapter IX, Article 77, paragraph 3.

¹⁴ Battery Regulation, paragraph 44.

4. How the GS1 system of standards helps

According to the regulation the battery passport shall be accessible through the QR Code and a unique identifier that the economic operator placing the battery on the market shall attribute to it. The QR Code and the unique identifier shall comply with standard ISO/IEC 15459:2015. This is the necessity to guarantee interoperability of identification (in databases, registries, barcodes, RFID tags, labels, and on the web). ISO/IEC 15459 is the umbrella scheme for all global identification schemes and serves all industries. Thus, compliance with ISO/IEC 15459 ensures that identification is globally interoperable in any sector that will leverage battery passport. Compliance to ISO/IEC 15459 also guarantees that global uniqueness is persistent over time. In other words, global uniqueness cannot rely on components that may have uncontrolled change of ownership and meaning over time.

GS1 is one of the Issuing agencies mentioned in the ISO/IEC 15459-2. GS1¹⁵ is allocated a block of Issuing Agencies Codes (IACs) ranging from 0 to 9, and no other organisation shall be allocated a block of numeric characters.

GS1 is an international not-for-profit association with Member Organisations in 116 countries. GS1 is dedicated to the design and implementation of global standards and solutions to improve the efficiency and visibility of supply and demand chains globally and across sectors. The GS1 System of standards is the most widely used supply chain standards system in the world.

4.1. GS1 as a partner

Automatic identification and visibility systems based on global standards:

- Make implementation faster and more effective.
- Help users focus on the business requirements instead of developing their own standards for identification and data communication.
- Make it easier to buy hardware, software and equipment reducing the costs of implementation, integration and maintenance.
- Facilitate collaboration between trading partners making it quicker and easier to identify objects and share information (according to basics of the battery regulation).
- Make it possible to build a scalable solution / system as they are interoperable with other systems and can easily connect to off-the-shelf systems and applications.
- Increase the longevity of the system as components that are standards-based can be sourced from different suppliers.
- Connect your products with the digital world in an easy and standardized way

GS1 creates and manages exactly these types of proper and well-designed systems of standards. For over 45 years it has provided “community management” for the adoption of barcoding/RFID, EDI and data synchronisation solutions in many sectors. GS1’s financial model is completely based on cost recovery.

In Europe, GS1 has offices in every country meaning that users can get support from their local offices. GS1 Standards are built and maintained by experienced staff from different companies across the world and different sectors. It has strong links with standards organization such as ISO and cooperates with NATO, WCO, UPU, and the FDA to name a few. The GS1 System of standards is well known and widely used in many sectors.

¹⁵ According to ISO/IEC 15459-2

4.2. The GS1 system overview

The GS1 system is defined as “the sum of all the artefacts created by the GS1 community through GS1’s community development processes, including GS1 standards, GS1 guidelines, GS1 solutions, and GS1 data services.” The foundation of this system begins by providing GS1 identification keys which are defined as “a unique identifier for a class of objects (e.g., a trade item) or an instance of an object (e.g., a single instance of a trade item, a logistic unit, legal entity, location).” These identifiers are constructed in a distributed manner utilising GS1 Company Prefixes and reference numbers specific to the entity they identify.

4.2.1. GS1 Company Prefix (GCP)

The GS1 Company Prefix (GCP) provides a way for GS1 users to uniquely and globally identify things like batteries, battery cells, cases, containers, logistic units, locations, components, etc. The GS1 System has a number of identifiers that are used for the different purposes. The GCP is of variable length and the basis to create any of the GS1 Identification Keys. GCPs are allocated to companies/organizations that need to identify their business objects, in the case of battery applications: economic operators, manufacturers, batteries, battery cells, modules, etc. GCPs are allocated by GS1 Member Organisations in each country. This document covers two of the GS1 Identification Keys – the Global Location Number (GLN) and the Global Trade Item Number (GTIN).

The GS1 Company Prefix is included at the beginning of the GS1 identification keys and so establishes global uniqueness. The GS1 Company Prefix is a unique string of four to twelve digits used to issue GS1 identification keys.

The GS1 Company Prefix is used to issue GS1 Identification Keys by or on behalf of the company that is the licensee of the GS1 Company Prefix. When the ownership or legal structure of the company that assigned the key changes, for example due to a merger, acquisition, split or spin-off, the responsibility for the GS1 Company Prefixes SHOULD be re-arranged¹⁶.

4.2.2. GS1 identification keys

- GS1 identification keys work in any business sector. Having a unique identifier for a battery allows businesses to identify, track and manage these.
- The GS1 key itself is non-significant and has no meaning. This allows the product to be looked-up in databases and its associated information retrieved at any point or location.
- Allocation of numbers is simple, and their uniqueness guaranteed as it is based on the GS1 System using a GS1 Company Prefix, the item reference with check digit and a serial number.
- The GTIN is the GS1 Identification Key that identifies each battery model uniquely thus ensuring that it is always identified correctly anywhere. (In the case of GTIN, a compound identification key, called Serialized GTIN, is created by adding a serial number.)
- Each individual battery is allocated a unique serialised item number to ensure that it can be identified separately.

¹⁶ GS1 General Specifications, Chapter 1

4.3. Global Trade Item Number (GTIN)

The Global Trade Item Number (GTIN) is the GS1 identification key used to identify trade items on class level. The key comprises a GS1 Company Prefix, an item reference and check digit.

The GTIN is the GS1 standard for the unique identification of all trade items (consumer units and trade units). The GTIN supports trade item identification for Business to Business (B2B) and Business to Consumer (B2C) processes to retrieve information during the lifecycle of the product. The GTIN is a GS1 key with a specific structure and allocation rules to assure global uniqueness.

Figure 4.3-1 GTIN formats

GTIN Formats	
← ----- →	
(GTIN-12)	N ₁ N ₂ N ₃ N ₄ N ₅ N ₆ N ₇ N ₈ N ₉ N ₁₀ N ₁₁ N ₁₂
(GTIN-13)	N ₁ N ₂ N ₃ N ₄ N ₅ N ₆ N ₇ N ₈ N ₉ N ₁₀ N ₁₁ N ₁₂ N ₁₃
(GTIN-14)	N ₁ N ₂ N ₃ N ₄ N ₅ N ₆ N ₇ N ₈ N ₉ N ₁₀ N ₁₁ N ₁₂ N ₁₃ N ₁₄

Figure 4.3-2 GTIN-14 data structures

Global Trade Item Number (GTIN)		
Indicator	GTIN of contained trade items (without check digit)	Check digit
GTIN-12 based	0 N ₃ N ₄ N ₅ N ₆ N ₇ N ₈ N ₉ N ₁₀ N ₁₁ N ₁₂ N ₁₃	N ₁₄
GTIN-13 based	N ₂ N ₃ N ₄ N ₅ N ₆ N ₇ N ₈ N ₉ N ₁₀ N ₁₁ N ₁₂ N ₁₃	N ₁₄

4.4. Global Location Number (GLN)

The Global Location Number (GLN) is a globally unique and unambiguous GS1 identification key that can identify any type of party or location used in business processes. The use of GLNs is driven by the exact role of each party and/or location within a given business process.

A GLN identifying a party answers the question of “who” is involved within the use case. This may be a legal entity or function that defines who is transacting in a business scenario:

- Legal entity – Any business, government body, department, charity, individual or institution that has standing in the eyes of the law and has the capacity to enter into agreements or contracts.
- Function – An organisational subdivision or department based on the specific tasks being performed, as defined by the organisation.

A GLN identifying a location is used to answer the question of “where” something has been, is, or will be. A location can be either physical or digital in nature.

- Physical location - A site (an area, a structure or group of structures) or an area within the site where something was, is, or will be located.
 - The identification of physical locations is an essential element for supply chain visibility. A GLN assigned to a physical location always has identifiable geographical location reference (e.g., address, geo-coordinates) regardless of any business process roles conducted at the site. A physical location may be permanent and remain in a fixed position or mobile where the position can change over time (i.e., mobile blood donation van).
- Digital location - An electronic (non-physical) address that is used for communication between computer systems.
 - Just as the exchange of physical goods is a transaction between companies, the exchange of data is a transaction between systems, for example the delivery of an invoice can be mapped to an EDI gateway identified by a GLN.

Figure 4.4-1 Format of the Global Location Number

GS1 Company Prefix →	← Location reference	Check digit
N ₁ N ₂ N ₃ N ₄ N ₅ N ₆ N ₇ N ₈ N ₉ N ₁₀ N ₁₁ N ₁₂		N ₁₃

4.5. GS1 Application Identifier

The purpose of entering data transmitted from a reading device into a system is to record a transaction. In the GS1 system, a transaction is an Electronic Message to be processed according to the meaning and content of the data fields contained in the message. This should be possible without requiring any human intervention to determine the data’s meaning and content.

First, an item needs to be physically present in order to produce a data carrier reader message about the item. Only the data present in the data carrier on the item, and therefore relevant to it, can be recorded.

The standardised element strings of the GS1 system are the basis for the identification of items of every kind. They identify a particular item in an unambiguous manner and supply relevant attribute information.

When these element strings are printed on items, the scanned and transmitted data refers to that item and identifies its physical presence at a given location. When the message read from the scanned data carrier is coupled with an internally assigned designation of the type of item movement (e.g., warehouse entry, stock taking, sales), it is possible to automatically record data related to each movement of items.

In the GS1 system, an element string is the combination of a GS1 Application Identifier and a GS1 Application Identifier data field. The GS1 Application Identifier is defined as the field of two or more digits at the beginning of an element string that uniquely defines its format and meaning.

The GS1 System defines the meaning, structure and function of the GS1 system element strings so they can be correctly processed in users' application programmes. The allowable character set to be used for GS1 Application Identifier element strings is defined. There are AIs that have additional syntax restrictions, e.g., numerical only.

Figure 4.5--1 Examples of GS1 Application Identifiers

AI	Data Content	Format ⁽¹⁾	Data title ⁽²⁾
01	<i>Global Trade Item Number AI (01)</i>	N2+N14	GTIN
10	<i>Batch or Lot Number AI (10)</i>	N2+X..20	BATCH/LOT
11	<i>Production Date AI (11)</i>	N2+N6	PROD DATE
13	<i>Packaging Date AI (13)</i>	N2+N6	PACK DATE
16	<i>Sell by Date AI (16)</i>	N2+N6	SELL BY
17	<i>Expiration Date AI (17)</i>	N2+N6	USE BY OR EXPIRY
21	<i>Serial Number AI (21)</i>	N2+X..20	SERIAL
414	<i>Identification of a physical Location – Global Location Number AI (414)</i>	N3+N13	GLN
7020	<i>Refurbishment lot ID</i>	N4+X..20	REFURB LOT
8008	<i>Date and Time of Production AI (8008)</i>	N4+N8+N..4	PROD TIME

QR Codes carrying GS1 keys and attributes use element strings for the structuring of the encoded data. For more information see **Error! Reference source not found.4.8**

(1) Format of element strings

The following conventions apply to indicate the format of GS1 Application Identifiers and data fields.

To indicate the allowed characters:

- N numeric digit
- X any character, see [GENSPECS, figure 7.11 – 1] for the allowed characters.

To indicate the length:

- Nn exact number of digits
- N..n maximum number of digits
- Xn exact number of characters
- X..n maximum number of characters

Examples:

- X3 exactly 3 characters
- N..18 up to 18 numeric digits

To indicate digit / character position:

- Xn
- Nn

(2) Data titles

Data titles are the abbreviated descriptions of element strings which are used to support manual interpretation of barcodes.

4.6. Other important terms

GS1 Digital Link

The expression of the GS1 System of Identifiers on the World Wide Web as defined in the GS1 Digital Link standard.

GS1 Digital Link provides a method of encoding GS1 identifiers in a Uniform Resource Identifier (URI) that can be followed without any specialist software. Notably, this includes a consumer scan of a QR Code just using a smartphone camera. Using the concept of link types, it is possible to query an item for a particular type of required information or to ask for the full set of links to data about the item. This is possible using a GS1 Digital Link-conformant resolver.

Resolvers can operate as a network which increases the value of each resolver through the network effect. That is, like a telephone, a resolver in a network is made more useful by the existence of connections between different resolvers. This means that, wherever a query begins in the network, it can be routed to the correct link.

Human readable interpretation (HRI)

Human readable interpretation (HRI) refers to text printed exactly as it is encoded in the barcode. Characters, such as letters and numbers, which can be read by persons and are encoded in 2D symbols as a kind of backup, if the symbol is not able to be read. In the GS1 system the characters have to be confined to a GS1 standard structure and format. The human readable interpretation is a one-to-one illustration of the encoded identifier and other data elements excluding control data. Start, stop, shift and function characters, as well as the symbol check character, are not shown in the human readable interpretation.

When designing a 2D barcode and labelling graphics, it is important to consider what data needs to be included in a human-readable format and how that data should be represented. Human readable text allows manual key entry of data and makes the information accessible.

By providing the data in a standard location near the barcode, information can be found more easily by economic operators and supply chain partners.

Non-HRI text

Characters such as letters and numbers that can be read by persons and may or may not be encoded in GS1 AIDC data carriers and are not confined to a structure and format based on GS1 standards (e.g., a date code expressed in a national format that could be used to encode a date field in a GS1 AIDC data carrier, brand owner name, consumer declarations).

Automatic Identification and Data Capture (AIDC)

A technology used to automatically capture data. AIDC technologies include barcodes, smart cards, biometrics and RFID.

4.7. Management of GS1 identification keys¹⁷

A key is an attribute (or group of attributes) of an entity that serves to uniquely identify that entity, within some specified domain of entities. Often a single attribute is usable as a key, but sometimes a group of attributes is required. In data modelling terminology these are called simple keys and compound keys, respectively.

Table 4.7-1 Overview of identification keys References

key attribute(s)	key type	level of identification
GTIN	simple key	class level
GTIN + lot ID	compound key	lot level
GTIN + GLN + refurbishment lot number	compound key	lot level
GTIN + serial ID	compound key	instance level
GLN	simple key	instance level

4.7.1. GTIN management rules

GS1 have general rules for managing GTINs. These management rules explain the way GTINs need to be assigned to batteries.

The GTIN SHALL be assigned by the party that has the responsibility and/or is responsible for regulatory acceptance, when placing a battery, the first time on the market or putting into service.

4.7.2. GTIN + lot ID

The lot ID is unique in combination with the GTIN.

The lot ID SHALL be assigned by the manufacturer/producer.

The attributes identified with the GTIN + lot number SHALL correspond to a group of instances that were produced as part of the same production batch.

4.7.3. GTIN + serial ID

The serial ID SHALL be unique in combination with the GTIN, and this combination shall never be reused.

The serial ID SHALL be assigned by the producer or authorised manufacturer on their behalf.

¹⁷ All following subsections are referring to the GS1 General Specifications

4.7.4. GLN Management Rules

The GLN Allocation Rules Standard and contained GLN Management Rules is designed to help industry make consistent decisions about the unique identification of parties and locations in open supply chains. Unique identification is critical to maintaining operational efficiencies that business partners rely on to exchange information in consistent ways, as well as ensuring the smooth operations of global supply and value chains. More specifically, the unique identification of parties and locations is critical for efficient logistic operations, traceability programs, recall readiness, and more. It is essential that accurate and up-to-date information on parties and locations is able to be readily shared between business partners to allow the “who” and “where” of business to be reliably answered no matter the use case.

4.7.4.1. Minimum Requirements for GLN – Regulatory compliance

The GLN Management Rules represents a minimum requirement. Please be advised that there may be regulation(s) in your market area that are more stringent and SHALL be adhered to. All local legal and regulatory requirements supersede the GLN Management Standard and further consideration may be required based on partner agreements, record retention, and other business requirements.

4.8. QR Code

The Battery will be identified with a unique identifier encoded in a QR Code. With regards to the Battery Regulation the DPP shall be available through this QR Code.

Even if different information is necessary to be preserved during lifetime of a battery, GS1 recommends to just attach one QR Code to a battery and additional information should be stored in a database to be accessed via serialised identification or a weblink. Best practice shows that affixing one QR Code on a battery at the beginning of its lifetime. This reduces confusion about the topic when more symbols need to be scanned to gather the correct necessary information.

QR Code encoding GS1 Digital Link URI

The regulation defines unique identifiers as a unique string of characters for the identification of batteries that also enables a web link to the battery passport. The GS1 Digital Link standard is both a product identifier and a web link enabling access to more information such as the battery product passport.

The GS1 Digital Link standard (DL) provides a solution that can lead to manufacturer or importer authorised information. It uses a Web URI syntax to encode GS1 data, (e.g., GTIN and attribute data) in QR Code (GS1 Digital Link URI). For example, GTIN 09506000134369 can be encoded in a QR Code to form a GS1 DL URI:

<https://example.com/01/09506000134369>



Note: The example.com domain name (reserved in RFC 2606) is used in the example as a place holder for any domain name.

5. Identification and marking principles

5.1. Identification levels

Depending on the scope / context the term unique identification may be used to refer to a globally unique identification key for a class, an instance group or an instance of a product.

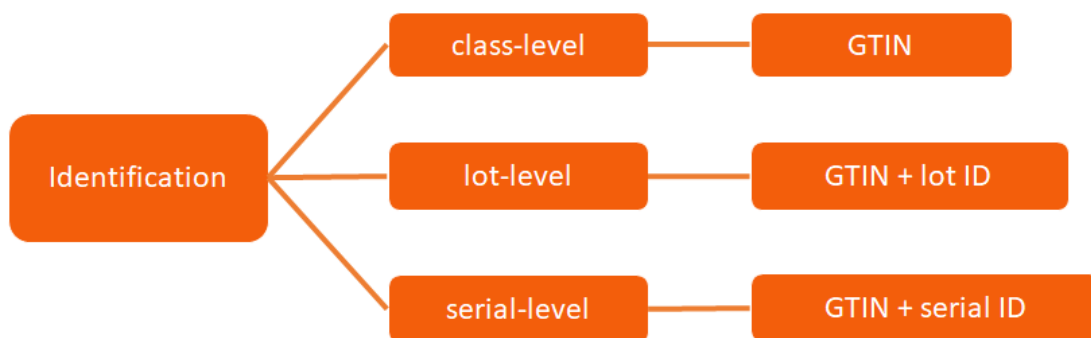
- When referring to the class key, the term class-level ID is used (i.e. GTIN).
- When referring to the instance group key the term lot-level ID is used. (i.e. GTIN + Batch/Lot Number).
- When referring to the instance key, the term serialised ID is used. (i.e. GTIN + Serial Number).

! Important: Manufacturers shall ensure that batteries which they place on the market bear a model identification and batch or serial number, or product number or another element allowing their identification. Where the size or nature of the battery does not allow it, the required information shall be provided on the packaging or in a document accompanying the battery.¹⁸

5.1.1. Mapping identification levels to GS1 identification keys

The diagram below lists the various identification options and the way these are implemented using the GS1 standards.

Figure 5.1.1-1 Identification levels and GS1 identification keys



5.1.2. Class-level identification (GTIN)

The class-level ID is the primary ID used items, as spare parts, battery models, cases or assembling parts. It also will be the main level at which battery master data will be exchanged. Also ordering can be done with a GTIN only.

In some situations, for example carbon footprint, it is sufficient to identify batteries at the level of a trade item (=class level, GTIN). The class-level ID is important to i.e., order a battery or battery model with a specific technical description. This type of information will not provide a way to access the manufacturing, life cycle and recycling history of an instance or lot.

¹⁸ Battery Regulation, Chapter VI, Article 38, paragraph 6.

A class designates a battery model which means a version of a battery of which all units share the same technical characteristics relevant for:

- sustainability and safety requirements
- labelling, marking and information requirements pursuant to the regulation
- the same model identifier (GTIN)

According to the GS1 system, products or services of the same class are defined as same trade items. An item (Trade item) is defined as: any item (product or service) upon which there is a need to retrieve pre-defined information and that may be priced, or ordered, or invoiced at any point in any supply chain.

According to GS1, a GTIN is assigned to a battery model. Each version of a battery, of which all units share the same technical characteristics relevant for sustainability and safety requirements and labelling, marking and information requirements pursuant to this Regulation, has the same identifier;

! Important: It is important to note that the master data related to the class-level ID will no longer apply when the instance has been recycled, repurposed causing a change of the functional/technical/recycled/carbon footprint material specification.

5.1.3. Lot-level (batch) identification (LGTIN)

The lot-level ID associates an item with information the manufacturer considers relevant for traceability of the trade item. The number may be, for example related to a production lot number, a shift number, a machine number, a time, or an internal production code. As an example, according to the Regulation the carbon footprint declaration is specific to a battery model produced in a defined production site.¹⁹

Lot-level identification allows to distinguish narrower groupings, such as all instances from a given manufacturing batch or recycled batch. For identification of individual instances, serialised identification is needed.

When the producer marks the item with its lot ID, a more precise link to the history is enabled. If the associated data have been recorded properly this will for example allow to locate and recall all instances with a specific production type.

Similarly, marking the lot ID of waste batteries in treatment, will allow a link to the recycling data of a group of batteries.

! Important: Batch (lot) numbers are unique to one class-level identifier in the GS1 system.

5.1.4. Serialised identification (SGTIN)

A serialized identification (instance) designates an individual manufactured object belonging to a class. The instance has all the attributes of the object class and also has additional attributes.

Serialised identification, in which each battery has a globally unique identifier that is different from every other battery, is the most precise and allows to link to data about the individual production instance, as the information on the state of health of the battery. In other words, one battery used in one electronic vehicle has an identifier unique to every other battery in the world.

A serialised ID provides the highest level of traceability. Furthermore, serialised identification eliminates the need for marking upgraded or reused batteries, since such data can be linked to the serialised ID.

¹⁹ Battery Regulation, Chapter II, Article 7, paragraph 1.

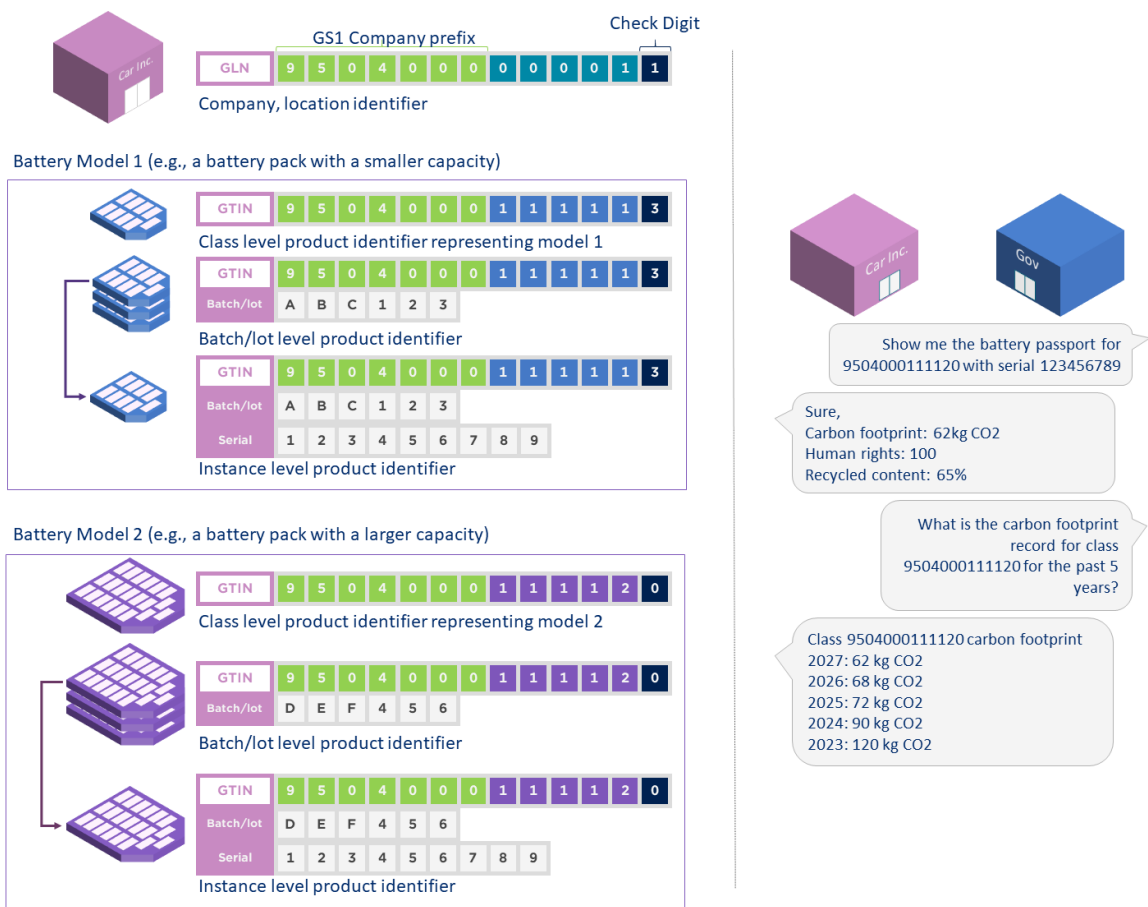
Two types of serial identification exist:

1. Class dependent serialised ID (containing the class-level ID): The type of part can be recognised by reading the ID (GTIN + Serial Number). GTIN gives access to the type of battery and the serial number to the specific instance.
2. Class independent serialised ID: The type of part cannot be recognised by reading the ID (Serial Number).

Ideally the serialised ID is allocated and marked by the producer at time of production. In absence of a manufacturing assigned ID, the economic operator or importer need to assign a serialised ID, to enable recording of the maintenance and usage history.

! Important: Serial numbers are unique to one class-level identifier in the GS1 system.

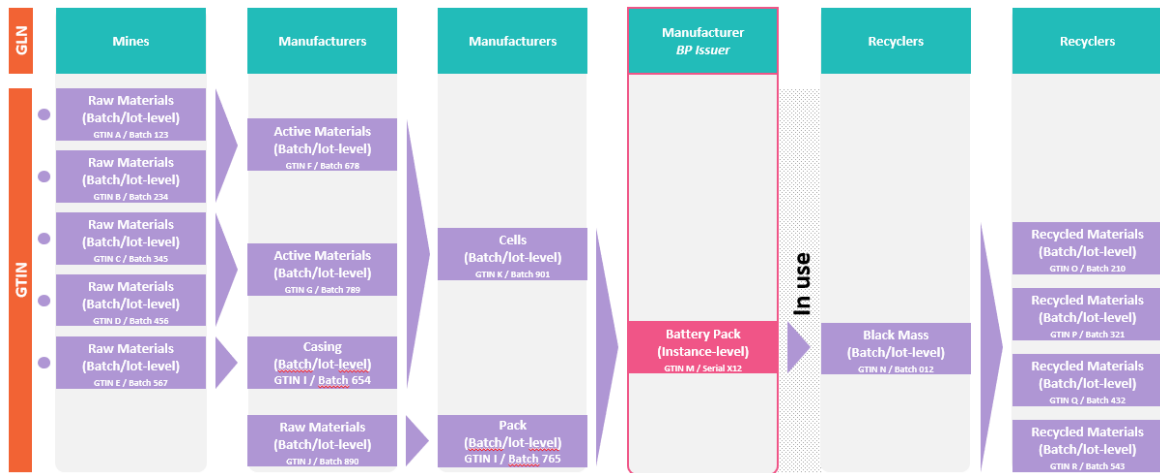
A serialized identification stays as long with the item, as long form, fit and function of this item are not changed. In GS1 specific rules when to assign a new GTIN + Serial Number to a battery and when to keep it are clearly defined in the GTIN Management Rules. If rules need to be adapted GS1 established a process (GSMP – Global Standards Management Process) if rules need to be better clarified or new rules are necessary. If Regulations are in place for a specific item these always overrule the GS1 GTIN Management Rules.



Different battery models take different GTINs

5.1.5. Identification in the supply chain

Figure 5.1.5-1 Identification levels in the supply chain



Important: Lot-based product identification may be used for batteries to support various business processes where instance level product identification is not required. However for the purpose of this regulation a serialised product identifier is required to isolate one instance of a battery from all other instances. The scenario to be used will depend on the most stringent scenario. For example: When a producer applies serial level identification, based on the most stringent customer requirements, other customers will in principle not be allowed to require a less granular identification (such as lot level or even class level identification). This does not mean, other customer requirements (recycling by batch or number of products by factory) preclude the use of serial and lot numbers together. It is up to the barcode scanning system to parse these data elements and present the required identification level to the application.

5.2. Direct marking of QR Codes

According to the regulation, a battery needs to be uniquely identified. This identification shall be used to retrieve information of the battery via an electronic record (battery passport)²⁰ and shall be printed or engraved by means of a QR Code on the battery.²¹ There are various regulatory requirements for displaying data in text or signs on the label. This section does not pertain to these requirements. This section pertains to marking of the QR Code and text corresponding to the unique identifier encoded in the QR Code as a back-up and a link to the electronic record (Battery Passport). Marking for the purpose of identification may occur at the time of different processes, i.e., manufacturing, remanufacturing, repurposing or recycling.

As described the production process will occur only once during the lifetime of the battery packs, while the other procedures may occur multiple times, depending on the type of object.

²⁰ Battery Regulation, Chapter I, Article 3, paragraph 66.

²¹ Battery Regulation, paragraph 44.

! **Important:** All the regulatory requirements per the previous sections and the adjacent regulations are mandatory. Best practice in the GS1 system is to limit the number of data carriers to a minimum and maintain persistent identification, then to rely on digital data exchange to the maximum extent possible to communicate changes of state to the battery.

5.2.1. Marking at the time of production vs. downstream marking

Marking at time of production

At the time of production, the battery should be marked with the Unique Identifier by the manufacturer. Depending on the battery type also the status and remanufacturing status may need to be marked.

Marking at time of repurposing

Operators carrying out repurposing or remanufacturing operations of batteries shall ensure that the examination, performance testing, packing and shipment of batteries and their components is done.²² Is it necessary to allocate a new identifier at the point of repurposing, the original identifier has to be removed from the physical item to not lead to wrong data and the relationship between the two identifiers has to be maintained at the data exchange level.²³

²² Battery Regulation, Chapter VI, Article 45, paragraph 1.

²³ Battery Regulation, paragraph 16 & Chapter III, Article 13, paragraph 9.

6. GS1 Glossary of business terms

See www.gs1.org/glossary for existing defined terms

6.1. List of GS1 Abbreviations

Abbreviation	Full term
AI	GS1 Application Identifier
AIDC	Automatic Identification and Data Capture
BOM	Bill Of Material
DPM	Direct Part Marking
DPP	Digital Product Passport (ESPR)
DEPC	Electronic Product Code
GCP	GS1 Company Prefix
GLN	Global Location Number
GTIN	Global Trade Item Number
GSMP	Global Standard Management Process
HRI	Human Readable Interpretation
RFID	Radio Frequency identification
SKU	Stock Keeping Unit

7. Terms and definitions as written in the regulation

For the purposes of this document the following terms and definitions apply.

7.1. Physical objects

Battery

means any device delivering electrical energy generated by direct conversion of chemical energy, having internal or external storage, and consisting of one or more non-rechargeable or rechargeable battery cells, modules or of packs of them, including a battery that has been subject to preparing for re-use, preparing for repurpose or repurposing, or remanufacturing;

Battery model

means a version of a battery all units of which share the same technical characteristics relevant for the requirements of this Regulation on sustainability, safety, labelling, marking and information, and the same model identifier;

Battery pack

means any set of battery cells or modules that are connected together or encapsulated within an outer casing, so as to form a complete unit that the end-user is not intended to split up or open;

Battery module

means a set of battery cells that are connected together or encapsulated within an outer casing to protect the cells against external impact, and which is meant to be used either alone or in combination with other modules.

Battery cell

means the basic functional unit in a battery, composed of electrodes, electrolyte, container, terminals and, if applicable, separators, and containing the active materials the reaction of which generates electrical energy;

Light means of transport battery or LMT battery

means a battery that is sealed, weighs 25 kg or less and is specifically designed to provide electric power for the traction of wheeled vehicles that can be powered by an electric motor alone or by a combination of motor and human power, including type-approved vehicles of category L within the meaning of Regulation (EU) No 168/2013 of the European Parliament and of the Council, and that is not an electric vehicle battery;

Starting, lighting and ignition battery or SLI battery

means a battery that is specifically designed to supply electric power for starting, lighting, or ignition and that can also be used for auxiliary or backup purposes in vehicles, other means of transport or machinery;

Industrial Battery

means a battery that is specifically designed for industrial uses, intended for industrial uses after having been subject to preparation for repurposing or repurposing, or any other battery that weighs more than 5 kg and that is neither an electric vehicle battery, an LMT battery, nor an SLI battery;

Electric Vehicle Battery or EV battery

means any battery that is specifically designed to provide electric power for traction in hybrid or electric vehicles of category L as provided for in Regulation (EU) No 168/2013, that weighs more than 25 kg, or a battery that is specifically designed to provide electric power for traction in hybrid or electric vehicles of categories M, N or O as provided for in Regulation (EU) 2018/858;

QR Code

means a machine-readable matrix code that links to information as required by this regulation.

Unique identifier

means a unique string of characters for the identification of batteries that also enables a web link to the battery passport;

7.2. Repair, remanufacturing, preparing for re-use, treatment and recycling activities

State of charge

means the available energy in a battery expressed as a percentage of its rated capacity as declared by the manufacturer.

State of health

means a measure of the general condition of a rechargeable battery and its ability to deliver the specified performance compared with its initial condition.

Preparing for repurposing

means any operation, by which a waste battery, or parts thereof, is prepared so that it can be used for a different purpose or application than that for which it was originally designed;

Repurposing

means any operation that results in a battery, that is not a waste battery, or parts thereof being used for a purpose or application other than that for which the battery was originally designed;

Remanufacturing

means any technical operation on a used battery that includes the disassembly and evaluation of all its battery cells and modules and the use of a certain number of battery cells and modules that are new, used or recovered from waste, or other battery components, to restore the battery capacity to at least 90 % of the original rated capacity, and where the state of health of all individual battery cells does not differ more than 3 % between cells, and results in the battery being used for the same purpose or application as the one for which the battery was originally designed;

Treatment

means any activity carried out on waste batteries after they have been handed over to a facility for sorting, preparing for re-use, preparing for repurpose, preparation for recycling, or recycling;

Preparation for recycling

means the treatment of waste batteries prior to any recycling process, including, inter alia, the storage, handling and dismantling of battery packs or the separation of fractions that are not part of the battery itself;

Lifetime

of a battery means the period of time that starts when the battery is manufactured, and ends when the battery becomes waste;

Recycling efficiency

means the ratio, expressed as a percentage, obtained by dividing the mass of output fractions accounting for recycling by the mass of the waste batteries' input fraction, in relation to a recycling process;

Waste Battery

means any battery which is waste as defined in Article 3(1) of Directive 2008/98/EC;

7.3. Value Chain Participants

Economic Operator

means the manufacturer, the authorised representative, the importer, the distributor or the fulfilment service provider or any other natural or legal person who is subject to obligations in relation to the manufacture, preparation for re-use, preparation for repurposing, repurposing or remanufacturing of batteries, the making available or the placing of batteries on the market, including online, or the putting of batteries into service in accordance with this Regulation;

Independent Operator

means a natural or legal person who is independent from the manufacturer and the producer and is directly or indirectly involved in the repair, maintenance or repurposing of batteries, and include waste management operators, repairers, manufacturers or distributors of repair equipment, tools or spare parts, as well as publishers of technical information, operators offering inspection and testing services, operators offering training for installers, manufacturers and repairers of equipment for alternative-fuel vehicles;

Manufacturer

means any natural or legal person who manufactures a battery or has a battery designed or manufactured, and markets that battery under its own name or trademark or puts it into service for its own purposes;

National Accreditation Body

means a national accreditation body as defined in Article 2(11) of Regulation (EC) No 765/2008;

Producer

means any manufacturer, importer or distributor or other natural or legal person that, irrespective of the selling technique used, including by means of distance contracts, either:

- a) is established in a Member State and manufactures batteries under its own name or trademark, or has batteries designed or manufactured and supplies them for the first time under its own name or trademark, including those incorporated in appliances, light means of transport or other vehicles, within the territory of that Member State;
- b) is established in a Member State and resells within the territory of that Member State, under its own name or trademark, batteries, including those incorporated in appliances, light means of transport or other vehicles, manufactured by others, on which the name or trademark of those other manufacturers does not appear.
- c) is established in a Member State and supplies for the first time in this Member State on a professional basis, batteries, including those incorporated in appliances, light means of transport or other vehicles, from another Member State or from a third country; or
- d) sells batteries, including those incorporated in appliances, light means of transport or other vehicles, by means of distance contracts directly to end-users, whether or not they are private households, in a Member State, and is established in another Member State or in a third country.

Waste Management Operator

means any natural or legal person dealing on a professional basis with the separate collection or treatment of waste batteries;

Recycler

means any natural or legal person who carries out recycling in a permitted facility;

National Authority

means an approval authority or any other authority involved in and responsible for market surveillance in a Member State in respect of batteries;

Importer

means any natural or legal person established within the Union who places on the market a battery from a third country;

Distributor

Means any natural or legal person in the supply chain, other than the manufacturer or the importer, who makes a battery available on the market;

7.4. Related articles from the regulation (direct excerpts from regulation)

Paragraph 44

Batteries should be labelled in order to provide end-users with transparent, reliable and clear information about batteries and waste batteries. That information would enable end-users to make informed decisions when buying and discarding batteries and waste operators to appropriately treat waste batteries. Batteries should be labelled with all the necessary information concerning their main characteristics, including their capacity and the amount of certain hazardous substances present. To ensure the availability of information over time, that information should also be made available by means of QR Codes which are printed or engraved on batteries or are affixed to the packaging and to the documents accompanying the battery and should respect the guidelines of ISO/IEC Standard 18004:2015. The QR Code should give access to a battery's product passport. Labels and QR Codes should be accessible to persons with disabilities, in accordance with Directive (EU) 2019/882 of the European Parliament and of the Council.

Paragraph 119

Producers and distributors should be actively involved in providing information to end-users concerning the mandatory separate collection of waste batteries and the availability of collection schemes. They should also inform end-users about the important role end-users have in ensuring the environmentally optimal management of waste batteries. Producers and distributors should make use of up-to-date information technology for the purposes of communicating information to all end-users as well as reporting on batteries. The information should be provided either by classical means, such as outdoor advertising, posters, through social media campaigns, or by more innovative means, such as electronic access to websites provided by QR Codes affixed to the battery. Such information should be accessible for persons with disabilities in accordance with Directive (EU) 2019/882.

Paragraph 123

In order to enhance transparency along supply and value chains for all stakeholders, it is necessary to provide for a battery passport that maximises the exchange of information, enables tracking and tracing of batteries and provides information about the carbon intensity of their manufacturing processes as well as the origin of the materials used and whether renewable material, such as material produced from lignin to substitute graphite, is used, about composition of batteries, including raw materials and hazardous chemicals, about repair, repurposing and dismantling operations and possibilities, and about the treatment, recycling and recovery processes to which the batteries could be subject to at the end of their lifetime. The battery passport should provide the public with information about batteries placed on the market and their sustainability requirements. It should provide remanufacturers, second-life operators and recyclers with up-to-date information for the handling of batteries and specific actors with tailored information such as on the state of health of batteries. It should be possible for the battery passport to support market surveillance authorities in carrying out their tasks under this Regulation, but it should not replace or modify the responsibilities of market surveillance authorities, which should, in line with Regulation (EU) 2019/1020, check the information provided in battery passports.

Chapter III

Labelling, marking and information requirements

Article 13

Labelling and marking of batteries

6. From 18 February 2027, all batteries shall be marked with a QR Code as described in Part C of Annex VI. The QR Code shall provide access to the following:

(a) for LMT batteries, industrial batteries with a capacity greater than 2kWh and electric vehicles batteries, the battery passport in accordance with Article 77;

(b) for other batteries, the applicable information referred to in paragraphs 1 to 5 of this Article, the declaration of conformity referred to in Article 18, the report referred to in Article 52(3) and the information regarding the prevention and management of waste batteries laid down in Article 74(1), points (a) to (f);

(c) for SLI batteries, the amount of cobalt, lead, lithium or nickel recovered from waste and present in active materials in the battery, calculated in accordance with Article 8.

This information shall be complete, up-to-date and accurate.

7. The labels and the QR Code referred to in paragraphs 1 to 6 shall be printed or engraved visibly, legibly and indelibly on the battery. Where this is not possible or not warranted on account of the nature and size of the battery, the labels and the QR Code shall be affixed to the packaging and to the documents accompanying the battery.

8. The Commission is empowered to adopt delegated acts in accordance with Article 89 to amend this Regulation to provide for alternative types of smart labels for use instead of or in addition to the QR Code, in view of technical and scientific progress.

9. Batteries that have been subject to preparation for re-use, preparation for repurposing, repurposing or remanufacturing shall bear new labels or shall be marked with markings in accordance with this Article and containing information on their change of status in accordance with point 4 of Annex XIII, which shall be accessible through the QR Code.

Chapter VI

Obligations of economic operators other than the obligations in Chapters VII and VIII

Article 38

Obligations of manufacturers

7. Manufacturers shall ensure that batteries which they place on the market bear a model identification and batch or serial number, or product number or another element allowing their identification. Where the size or nature of the battery does not allow it, the required information shall be provided on the packaging or in a document accompanying the battery.

11. Economic operators that carry out preparing for re-use, preparing for repurpose or repurposing, or remanufacturing, and place on the market or put into service a battery that has undergone any of these operations, shall be considered as manufacturer for the purpose of this Regulation.

Article 46

Identification of economic operators

1. Economic operators shall, upon a request of a national authority, provide information on the following to the market surveillance authorities:

(a) the identity of any economic operator that has supplied them with a battery;

(b) the identity of any economic operator to which they have supplied a battery, as well as the quantity and exact models.

Chapter IX

Digital Battery Passport

Article 38

Battery Passport

1. From 18 February 2027 each LMT battery, each industrial battery with a capacity greater than 2 kWh and each electric vehicle battery placed on the market or put into service shall have an electronic record ('battery passport').

2. The battery passport shall contain information relating to the battery model and information specific to the individual battery, including resulting from the use of that battery, as set out in Annex XIII.

3. The battery passport shall be accessible through the QR Code referred to in Article 13(6) which links to a unique identifier that the economic operator placing the battery on the market shall attribute to it.

The QR Code and the unique identifier shall comply with the ISO/IEC standards 15459-1:2014, 15459-2:2015, 15459-3:2014, 15459-4:2014, 15459-5:2014 and 15459-6:2014 or their equivalent.

The Commission is empowered to adopt delegated acts in accordance with Article 89 to amend the second subparagraph of this paragraph in light of technical and scientific progress by replacing the standards referred to in that subparagraph or adding other European or international standards with which the QR Code and the unique identifier shall comply.

4. The economic operator placing the battery on the market shall ensure that the information in the battery passport is accurate, complete and up to date. It may give written authorisation to any other operator to act on its behalf.

5. All information included in the battery passport shall be based on open standards and be in an interoperable format, transferable through an open interoperable data exchange network without vendor lock-in, machine-readable, structured and searchable, in accordance with the essential requirements laid down in Article 78.

6. The access to information included in the battery passport shall be regulated in accordance with the essential requirements laid down in Article 78.

7. For a battery that has been subject to preparation for re-use, preparation for repurposing, repurposing or remanufacturing, the responsibility for the fulfilment of the obligations under paragraph 4 of this Article shall be transferred to the economic operator that has placed that battery on the market or has put it into service. Such battery shall have a new battery passport linked to the battery passport or passports of the original battery or batteries.

Where the status of a battery changes to that of a waste battery, the responsibility for the fulfilment of the obligations under paragraph 4 of this Article shall be transferred either to the producer or, where appointed in accordance with Article 57(1), the producer responsibility organisation, or the waste management operator selected in accordance with Article 57(8).

8. A battery passport shall cease to exist after the battery has been recycled.

ANNEX VI

Labelling, marking and information requirements

Part A: General information about batteries

Information on the label of a battery shall comprise the following information regarding the battery:

1. information identifying the manufacturer in accordance with Article 38(7);
2. the battery category and information identifying the battery in accordance with Article 38(6);
3. the place of manufacture (geographical location of a battery manufacturing plant);
4. the date of manufacture (month and year);
5. the weight;
6. the capacity;
7. the chemistry;
8. the hazardous substances present in the battery, other than mercury, cadmium or lead;
9. usable extinguishing agent;
10. critical raw materials present in the battery in a concentration of more than 0,1 % weight by weight.

Part C: QR Code

The QR Code shall be in high contrast to the background colour and of a size that is easily readable by a commonly available QR reader, such as those integrated in hand-held communication devices. QR Code

Annex XIII

Information to be included in the battery passport

1. PUBLICLY ACCESSIBLE INFORMATION RELATING TO THE BATTERY MODEL

A battery passport shall include the following information relating to the battery model which shall be accessible to the public:

- (a) Information specified in Part A of Annex VI;
- (b) Material composition of the battery, including its chemistry, hazardous substances contained in the battery other than mercury, cadmium or lead, and critical raw materials contained in the battery;