IEC 62902

Edition 2.0 2025-02

INTERNATIONAL STANDARD

NORME INTERNATIONALE

colour inside

Secondary cells and batteries – Marking symbols for identification of their chemistry

Batteries d'accumulateurs – Symboles de marquage pour l'identification de leur caractéristique chimique

IEC 62902:2025-02(en-fr)

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SECONDARY CELLS AND BATTERIES – MARKING SYMBOLS FOR IDENTIFICATION OF THEIR CHEMISTRY

FOREWORD

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IEC 62902 has been prepared by IEC technical committee 21: Secondary cells and batteries. It is an International Standard.

This second edition cancels and replaces the first edition published in 2019. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

a) Addition of an Introduction;
b) Addition of exemptions and clarifications for the marking background colour requirement;
c) Addition of a calculation method for the battery volume;
d) Addition of a new note to the Scope;
e) Addition of a term and definition for the principal display panel;
f) Addition of further chemistry information for Li-ion batteries;

g) Addition of a new subclause on adaptive size;

h) Clarification of the test methods for durability and permanence of the marking.

The text of this International Standard is based on the following documents:

Draft	Report on voting
21/1195/CDV	21/1208/RVC

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

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- withdrawn, or
- revised.

IMPORTANT – The "colour inside" logo on the cover page of this document indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

INTRODUCTION

This document introduces uniform marking symbols for the identification of the secondary battery chemistries prevailing on the market. A primary reason is that lead smelters around the world are reporting increasing numbers of lithium ion batteries finding their way into the lead-acid battery waste stream. Because the shape and design of these batteries sometimes is very similar, it can be difficult for sorting facilities and battery smelters to distinguish one technology from the other if there is no clear identification of the battery chemistry by marking symbols.

Processing lithium ion batteries within a lead smelter, e-waste facility, or municipal waste sorting facility, can result in fire or explosions, with numerous accidents or near-accidents already reported in European and US recycling facilities.

Besides lead-acid and lithium ion batteries, the labelling scheme should also apply to other battery chemistries with a significant market share, such as nickel metal hydride and nickel cadmium. Other batteries, such as sodium ion batteries, should be included in the marking scheme when their market share becomes significant.

A clear identification of the battery chemistry would be helpful throughout the entire battery lifetime, i.e. from the selection and purchase of a new battery (e.g. by economic operators as well as end users), to transportation, installation and use of the battery and then to waste battery collection, sorting, storage and treatment.

The following standards and recommendations were considered during the development of this document.

The Battery Association of Japan (BAJ) has issued "Guidelines for Recycle Mark on rechargeable cells and batteries for portable applications" which include an optional colour code system for identifying major (rechargeable) battery chemistries: Pb, Ni-Cd, Ni-MH, and Li-ion. These guidelines also distinguish different cathode materials as well as important impurities (mostly from the anode material)[1].

Call2Recycle has introduced in Canada and the United States of America a licensed labelling program for batteries. It is a non-profit organization that collects and recycles batteries on behalf of companies that pay a fee to license the label.

The recycling symbol required on batteries within the scope of this document is the general symbol for recovery/recyclable as standardised in ISO 7000-1135:2004-01, see item 1 in Table 1. It is worth noting the information that ISO provides for this symbol: Function/description: to indicate that the marked item or its material is part of a recovery or recycling process. Additional information: the symbol is applicable only to those products or materials for which at the end of life there is a well-established collection route and recycling process, and which does not significantly impair the effectiveness of other recycling schemes.

Battery marking can also be subject to regional legislation. One example being the crossed-out wheeled bin used in the European Union (EU) and in some other countries to make consumers aware of their obligation to make their batteries available for separate collection. Some other regulations, e.g. Regulation (EU) 2023/1542 on batteries and waste batteries, can require the use of additional symbols for substances of very high concern (SVHC), namely cadmium (Cd) and lead (Pb) exceeding certain concentration levels[2].

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1 For more information see the document referred to under "Source reference" for item 5 in Table 1.

2 Regulation EU 2023/1542 does not require the addition of the Hg symbol to the separate collection symbol. However, there is a requirement for max. 0,0005 % Hg for all batteries in Annex I *Restriction on substances* of the Batteries Regulation.

In a comment submitted by Battery Council International (BCI) on a request by the Environmental Protection Agency (USA) for information regarding the development of best practices for the collection of batteries to be recycled and voluntary battery labelling guidelines, it was suggested that battery labels should have a consistent and simple marking (e.g. a colour code) across all battery chemistries to encourage and aid appropriate handling which should, at a minimum, address three primary goals – in descending order of priority:

1) inform and educate consumers to keep batteries out of the trash and curbside recycling, and direct batteries to dedicated battery recycling networks where available;
2) provide consumers and recycling network employees with human-readable information to enable sorting of used batteries among major chemistry families (e.g. Pb, Li-ion, Ni-Cd, Ni-MH, and Li-metal);
3) if appropriate within a chemistry family, inform recyclers of the unique features, components or constituents or both, for recovery (e.g. cathode material).

Table 1 contains a list of recycling and ecolabels that can be expected on batteries.

Table 1 – Recycling and ecolabels regarding batteries

No.	Symbol	Official name	Alternative information	Purpose	Source reference
1		General symbol for recovery/recyclable	Möbius loop, three curved arrows	To indicate that the marked item or its material is part of a recovery or recycling process.	ISO 7000-1135:2004-01 www.iso.org/obp
2		4 in 1 symbol	The white interior shows 4 arrows pointing outwards		Environmental Protection Administration of Taiwan (Province of China)
3		Crossed-out wheeled bin		To indicate "separate collection" for all batteries and accumulators	Regulation (EU) 2023/1542
4		Call 2 Recycle battery seal		Private recycling program in the USA and Canada	Battery recycling Seal usage standards
5		Recycling symbol and chemistry for batteries[a]	Guidelines for recycle mark on batteries	Compliance with the Japanese Law for the Promotion of Effective Utilization of Resources	Tecchio, P. el al., Analysis of material efficiency aspects of personal computers product group, JRC Report EUR 28394 EN (2018), page 60
6		U.S. Mercury-Containing and Rechargeable Battery Recycling Act symbol (Battery Council International model)	See footnote[b]	See footnote[c]	42 U.S.C. § 14322(b)

[a] The symbol has two placeholders after "Li-ion" where codes for details of the chemistry are entered.

[b] Three chasing arrows or a comparable recycling symbol. For nickel-cadmium batteries, the symbol must also state "Ni-Cd" and the phrase "BATTERY MUST BE RECYCLED OR DISPOSED OF PROPERLY." For lead acid batteries, the symbol must also state "Pb" or the words "LEAD", "RETURN", and "RECYCLE" and if the regulated battery is sealed, the phrase "BATTERY MUST BE RECYCLED."

[c] Model symbol developed by Battery Council International for Small Sealed Lead Acid (SSLA) batteries in compliance with the U.S. Mercury-Containing and Rechargeable Battery Recycling Act. Variations allowed.

During the preparation of the second edition, the Scope of this document was subject to intensive discussions. One of the subjects that were discussed, was the inclusion of a battery's energy content. Some experts thought that a limit like the 100 Wh limit used in dangerous goods transportation regulations to distinguish between "fully regulated" and "exempted" when offering batteries for transport under UN numbers 3480 and 3481 could be suitable to distinguish between the different levels of labelling requirements. However, these thoughts were not pursued as they applied only to lithium ion batteries and could hardly be translated into a technology agnostic language. No generally acceptable calculation method was found that would enable the transfer of the energy limit from lithium ion batteries to other chemistries.

A limit of 100 Wh for lithium ion spare batteries in the Federal Aviation Administration (FAA) (of the United States) and International Air Transport Association (IATA) regulations for carry-on baggage on board of passenger aircraft was not considered to be suitable for consideration for similar reasons. The same applied even more to a mass limit of 500 g applicable during the collection of lithium batteries according to UNECE, Special Provision 636 of the Agreement for the carriage of Dangerous goods by Road (ADR).

Other suggestions were made to limit the Scope to batteries with one or more dimension(s) exceeding 5 cm or, in a different proposal, 100 mm. However, it could not be shown how these limits would correlate with each other and with the volume limit of 900 cm^3 and why they would be more suitable than the volume limit.

It was also discussed to add the following recommendation: "In addition, the markings may be used also on secondary battery packaging and in accompanying documents when secondary batteries are placed on the market".

SECONDARY CELLS AND BATTERIES – MARKING SYMBOLS FOR IDENTIFICATION OF THEIR CHEMISTRY

1 Scope

This document specifies methods for the clear identification of secondary cells, batteries, battery modules and monoblocs according to their chemistry (electrochemical storage technology).

The markings described in this document are applicable to

– secondary cells,
– batteries,
– battery modules, and
– monoblocs,

when they are placed on the market for end use and when their battery volume exceeds 900 cm^3.

The chemistry marking is useful for the installation, operation and decommissioning phases in the battery's life cycle.

Many recycling processes are chemistry specific, thus undesired events can occur when a battery which is not of the appropriate chemistry enters a given recycling process. Therefore, the battery is marked so as to identify its chemistry to ensure safe handling during sorting and recycling processes.

This document defines the conditions of use of the markings indicating the chemistry of these secondary batteries.

The details of markings and their application are defined in this document.

NOTE The 900 cm^3 limit has been chosen because it is a reasonable compromise between larger format batteries and small batteries. On small batteries, the space for additional labels is limited which can result in a readability conflict.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60896-21:2004, *Stationary lead-acid batteries – Part 21: Valve regulated types – Methods of test*

IEC 60896-22:2004, *Stationary lead-acid batteries – Part 22: Valve regulated types – Requirements*

IEC 61960-3:2017, *Secondary cells and batteries containing alkaline or other non-acid electrolytes – Secondary lithium cells and batteries for portable applications – Part 3: Prismatic and cylindrical lithium secondary cells and batteries made from them*

ISO 7000*, Graphical symbols for use on equipment* (available at http://www.graphical-symbols.info/equipment)

3 Terms and definitions

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at http://www.electropedia.org/
- ISO Online browsing platform: available at http://www.iso.org/obp

3.1
cell
basic functional unit, consisting of an assembly of electrodes, electrolyte, container, terminals and usually separators that is a source of electric energy obtained by direct conversion of chemical energy

[SOURCE: IEC 60050-482:2004, 482-01-01, modified – The Note to entry has been deleted.]

3.2
secondary cell
cell which is designated to be electrically recharged

[SOURCE: IEC 60050-482:2004, 482-01-03, modified – The Note to entry has been deleted.]

3.3
battery
one or more cells fitted with devices necessary for use, for example case, terminals, marking and protective devices

[SOURCE: IEC 60050-482:2004, 482-01-04]

3.4
battery volume
displacement of the battery

Note 1 to entry: Refer to Annex B for a method for the calculation of the displacement of a battery.

3.5
battery module
group of cells connected together either in a series and/or parallel configuration with or without protective devices (e.g. fuse or positive temperature coefficient, PTC) and monitoring circuitry

[SOURCE: IEC 62620:2023, 3.8, modified – The word "battery" has been added to the term, and "positive temperature coefficient" to the definition.]

3.6
monobloc battery
battery, with multiple separate but electrically connected cell compartments each of which is designed to house an assembly of electrodes, electrolyte, terminals or intercell connections and possible separators

[SOURCE: IEC 60050-482:2004, 482-02-17, modified –The word "interconnections" has been replaced with "intercell connections" in the definition and the Note to entry has been deleted.]

3.7
lead acid battery
secondary battery with aqueous electrolyte based on dilute sulfuric acid, a positive electrode of lead dioxide and a negative electrode of lead

[SOURCE: IEC 60050-482:2004, 482-05-01, modified – The term has been changed from "lead dioxide lead battery" to "lead acid battery", and the Note to entry has been deleted.]

3.8
valve regulated lead acid battery
VRLA battery
secondary battery in which cells are closed but have a valve which allows the escape of gas if the internal pressure exceeds a predetermined value

Note 1 to entry: The cell or battery cannot normally receive additions to the electrolyte.

Note 2 to entry: This note only applies to the French language.

[SOURCE: IEC 60050-482:2004, 482-05-15, modified – Note 2 to entry has been added.]

3.9
lithium ion battery
secondary battery with an organic solvent electrolyte and positive and negative electrodes which utilize an intercalation compound in which lithium is stored

Note 1 to entry: A lithium ion battery does not contain lithium metal.

[SOURCE: IEC 60050-482:2004, 482-05-07]

3.10
lithium metal battery
battery which incorporates one or more lithium cells with an organic solvent electrolyte or a solid electrolyte, a positive electrode and a negative electrode composed of lithium metal

3.11
nickel cadmium battery
secondary battery with an alkaline electrolyte, a positive electrode containing nickel oxide and a negative electrode of cadmium

[SOURCE: IEC 60050-482:2004, 482-05-02, modified – The first preferred term "nickel oxide cadmium battery" has been deleted.]

3.12
nickel metal hydride battery
secondary battery with an electrolyte of aqueous potassium hydroxide, a positive electrode containing nickel as nickel hydroxide and a negative electrode of hydrogen in the form of a metal hydride

[SOURCE: IEC 60050-482:2004, 482-05-08]

3.13
marking
line, shape, pattern, letter or symbol on the surface, which helps to identify features of the marked product or material

3.14
symbol
written character or mark used to represent information

EXAMPLE The recycling symbol represents the information that the battery is to be recycled.

3.15
label
sheet with an adhesive layer containing information for application on products

3.16
principal display panel
portion of a battery's surface bearing the markings designed to be most prominently displayed, shown, presented, or examined under conditions of retail sale, handling, sorting, and inspection

4 Application of markings

4.1 General

Markings defined in Clause 5 are applicable to all products according to their size and configuration as defined in the scope of this document.

Each end product in accordance with this document shall be marked before being placed on the market. For the purposes of this document, cells made available on the market for end use, are designated as batteries.

In case of dismantling the batteries into monoblocs and modules for the purpose of reuse of the monoblocs and modules, additional marking of these monoblocs or batteries shall be carried out in accordance with this document.

Single cells should not be marked if they are fitted into batteries or modules.

4.2 Marking of electrochemical battery systems

This marking is only applicable to secondary cells and batteries of the following chemistries:

a) lead acid (Pb),
b) nickel cadmium (Ni-Cd),
c) nickel metal hydride (Ni-MH),
d) lithium ion (Li-ion),
e) lithium metal (Li-metal).

Batteries or modules applying more than one of these chemistries shall be marked for all applied chemistries.

This marking is not applicable for batteries of other chemistries and technologies such as:

f) flow batteries,
g) Na-NiCl high temperature batteries, and
h) all other chemistries not listed here.

ISO/IEC Guide 71:2014, *Guide for addressing accessibility in standards*, should be consulted when additional colours are standardized for marking of more electrochemical systems.

4.3 Marking requirements for additional chemistry information of Li-ion batteries

If applicable, for lithium ion batteries, codes A1 and A2 designating the basic materials of the negative and positive electrodes as specified in IEC 61960-3:2017, 5.1 shall be applied on the battery. These codes shall follow after "Li-ion", separated by a space.

EXAMPLE The required text of the marking for a Lithium ion battery with a negative electrode based on carbon and a positive electrode based on cobalt is: Li-ion IC.

4.4 Application of the markings on the battery

The markings can be fixed on the battery either by:

a) printing, or

b) labelling, or

c) other methods.

The markings shall be visible, legible and indelible over the expected life of the batteries.

The markings with the design described in Clause 5 may be integrated into existing printings or labels.

The marking shall be placed on the principal display panel to achieve good visibility.

If, for design reasons or because of customer requirements, the marking cannot be placed on the principal display panel, the size of the marking shall nevertheless be as defined in 5.4.

5 Markings

5.1 Markings without recycling symbol

5.1.1 General

Markings shown in Figure 1 to Figure 5 shall be used if the recycling symbol is applied in other markings or if it is not necessary or if it is not possible to declare a recycling symbol.

5.1.2 Lead acid batteries

Figure 1 – Example of marking for lead acid batteries

5.1.3 Nickel cadmium batteries

Figure 2 – Example of marking for nickel cadmium batteries