

Waste Stream Li-ion Battery Sorting Issues

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1. Background of the waste stream issue

2. Development of IEC standard 62902 ('Marking symbols for secondary batteries for the identification of their chemistry')

Contaminants in ULAB

- › Lead Acid Battery collection and recycling is well established with a 99% collection and recycling rate
- › Since 2013, the secondary lead smelters report a growing number of Li-ion batteries mixed into the deliveries
- › ILA Survey discovered that 26 out of 27 secondary smelters reported incidents from Li-Ion batteries in the feedstock
- › There is a serious risk of fire and explosions if lithium batteries enter the lead battery collection and recycling process
- › All industry working group established (ILA, EUROBAT, BCI, Recharge, ABR, EBRA)

Contaminants in ULAB – Contributors to the problem

- › Some Li-Ion batteries appear similar as Lead-Acid Batteries
- › No identification of battery chemistry in mandatory labelling schemes of the Directive
- › “Impurities” emerge into a safety problem !
- › Lack of education on the level of reverse logistics about their responsibilities & battery chemistry
- › Li-Ion recycling is costs – Lead-Acid Batteries recycling is benefit.

Contaminants in ULAB – Contributors to the Solution

- › Proposal of color coding standard to facilitate identification
- › Investigation on additional sorting technologies and definition of additional sorting steps
- › Education of the reverse logistics chain (translation of a safety flyer into all languages to be finalised)
- › Contracting to sanction wrong deliveries
- › Information exchange on incidents

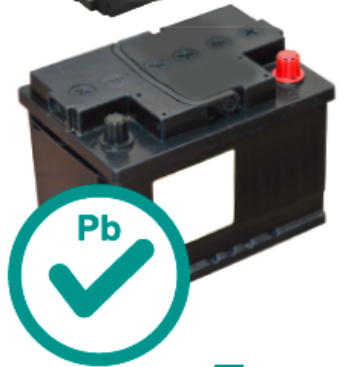
Important Safety Notice

Warning to all battery collectors, handlers and sorters



DO NOT send lithium batteries to lead recyclers

Use an approved facility for treatment and recycling.



There is a serious **RISK OF FIRE** and **EXPLOSIONS** if lithium batteries enter the lead battery collection and recycling process



Batteries can appear similar so make sure lead and lithium batteries are **IDENTIFIED** and **SORTED**

Tips to identify battery types

Read the label - Look out for the **Pb** symbol on lead batteries or the **Li** symbol on lithium batteries. You may also be able to identify them by their manufacturer.

Notice the weight difference - Although they have similar dimensions lithium are much lighter than lead batteries.

Color Coding

- › Color code will facilitate sorting at point of sales / point of return / point of arrival in recycling facility
- › Proposed color coding principles to follow existing standards & recommendations
- › Color Code
 - › SAE recommendation
 - › BAJ collection scheme
 - › IEC standard (work in progress)

Change the principle of the labelling scheme

- › Current labeling requirements of the Batteries Directive are to identify the **heavy metal content**; new labelling methodology focuses on **electrochemical system** and automatically includes identification of the heavy metal content;
- › EUROBAT proposal for the future: the color symbols for the electrochemical systems are to replace the letters that indicate the heavy metal content (Hg, Cd or Pb). The crossed out dust bin as the symbol to indicate separate collection is to be maintained.
- › Labelling for the electrochemical system will help to improve the entire end-of-life management.
- › Battery Directive already takes benefit from IEC reference (CCA labeling).

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Timeline

IEC standard development, TC 21 WG9

Date	Action
April 2015	New Work Item Proposal
November 2015	1st IEC Working Group meeting
	Result: Committee Draft 1
April 2016	2 nd Working Group meeting
May 2016	3rd Working Group meeting
	Result: Committee Draft 2
11/2/16	4th Working Group meeting
	Committee Draft 2 or Committee Draft for Voting?

IEC 62902 – Key chapters

Title : IEC 62902 - Marking symbols for secondary batteries for the identification of their chemistry

Content	Chapter
Scope	Chapter 1
Terms & Definitions	Chapter 3
Application	Chapter 4
Marking Symbols	
✓ Label specification	chapter 5.1 – 5.3
✓ Label colour	chapter 5.4
✓ Label size	chapter 5.5 – 5.6
Durability tests	Chapter 6

Application of marking symbols

Applicable for the following battery configurations:

- batteries or
- monobloc batteries or
- battery modules or
- single cells

Single cells have not to be marked in case that they are fitted in batteries or modules.

Application of marking symbols

Applicable for secondary cell and batteries of following chemistries only :

- lead acid (Pb)
- nickel cadmium (Ni-Cd)
- nickel metal-hydride (Ni-MH)
- lithium (Li) including Lithium-ion and secondary Li-metal

Note : in batteries or modules applying multiple of these chemistries all implemented chemistries have to be marked

Not applicable for batteries of other chemistries such as flow batteries, sodium-sulfur, NaNiCl, all other not listed chemistries

Option 1 – Without recycling symbol

Ni-Cd

Ni-MH

Li-ion

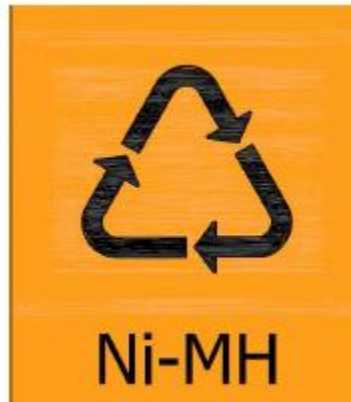
Li-metal

Pb

Option 2 – with recycling symbol



Alternative with integrated recycling symbol



Colors for background – Option 1

Ni-Cd light green similar to Pantone 367 or 389

Ni-MH orange similar to Pantone 151 or 1375

Li-ion blue similar to Pantone 312

Li-metal blue similar to Pantone 312

Pb silver grey or grey similar to Pantone 421

These colors shall be applied in case of colored background and may be applied to the label and/or to the casing or sleeve on blocks, modules or cells. The text and recycling symbol shall be black.

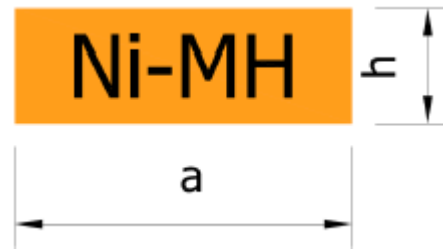
Black/white background – Option 2



Li-ion

Li-ion

Design of labels in acc. to 5.1.



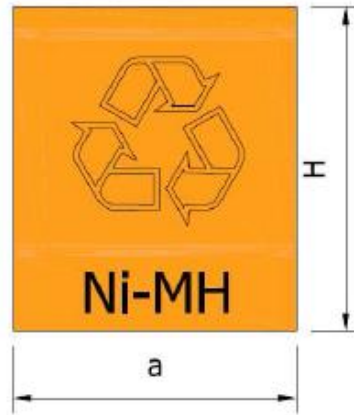
Relative sizes of the label in acc. to 5.9 are:

width a: min. approximately 24 mm - max. 60 mm

height $h = 0,33 \times a$ - min. approximately 8 mm - max. 20 mm

Surface of the label min. approximately 2 cm² - max. 12 cm²

Design of labels in acc. to 5.2. and 5.3.



Relative sizes of the label in acc. to 5.9 are:

width a - min. approximately 15 mm - max. 36 mm

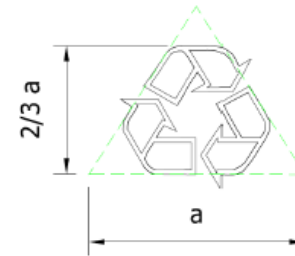
height $h = 0,33 \times a$ - min. approximately 5 mm - max. 12 mm

Height= $H = a + h = 1,33 a$ – min. approximately 20 mm – max. 48mm

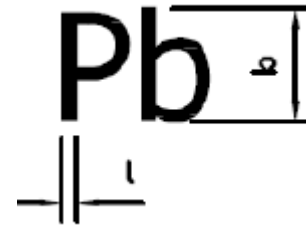
Surface of the label min. approximately 3 cm² - max. 17 cm²

Design of recycling symbol/ size of the letters

Design of the recycling symbol



Size of the letters



b - Height of letters = $0,8 \times h$ - min. approximately 6,4 mm
-max.16 mm

l - Thickness of line - min. 0,2 mm

Size and position of the labels

- The labels without recycling symbol defined in chapter 5.5 shall cover at least 2 % of the area of the largest side of a prismatic battery or battery pack up to a maximum label surface of 12 cm².
- The labels with recycling symbol defined in chapter 5.6 shall cover at least 3 % of the area of the largest side of a prismatic battery or battery pack up to a maximum label surface of 17 cm².
 - Note : in case of a cube shaped battery with a volume of 900 cm³, as defined in the scope, the largest side would have a surface of appr. 93 cm². This leads to the minimum sizes of the labels defined in chapter 5.5 and 5.6
- For non-prismatic shaped batteries or battery packs the labels without recycling symbol should cover at least 1 % and the labels with recycling symbol should cover at least 1,5 % of the surface area.

Comments on Committee Draft 2

To be discussed at IEC WG mtg, 11/02/16

Countries with comments: 10 countries (of 25 P-members),
AT, FR, DE, IT, JP, NL, ZA, SE, UK, US

Number of comments (total: 158)

- Editorial: 87; technical & general: 71
- Issues: General & scope, definitions, application, label specification, label size, durability
- Main discussion point: background color
- Preference acc. Color:
 - Color: 7 countries : AT, DE, IT, JP, NL, ZA, US
 - Black / white: 2 countries : SE, UK,
 - No preference: 1 country : FR

Summary

- › No single solution can solve the issue
- › Improved identification tools will help to make it right from the beginning
- › Urgent: Color coding needs to be implemented as soon as possible and should be considered in the battery directive revision
- › ULAB reverse logistic has to extend sorting efforts
- › Reverse logistic need to train their employees -> Information sheet soon available in all EU languages
- › Incidents need to be evaluated and communicated
- › Sanctions for the misuse need to be enforced