Collection and Recycling of Portable Rechargeable Batteries handled by JBRC

Japan Portable Rechargeable Battery Recycling Center (JBRC)

Battery Association of Japan

Sept 1, 2010
Battery Classifications & Recycling Roots

Primary Batteries
- Carbon-Zinc Dry Batteries
- Alkaline-Manganese Dry Batteries
- Lithium Batteries
- Silver-Oxide Batteries, Zinc-Air Batteries, Alkaline-Manganese Batteries (Button Type)

Secondary Batteries
- Nickel Cadmium Batteries
- Ni-MH Batteries
- Lithium Ion Batteries
- Lead Acid Batteries
  - Automotive Use Types
  - Industrial Use Types
  - Valve Regulated Types

Collection and Recycling obligated by the Law
- Municipalities
- Recyclers or Disposal
- Button Cell Recycling Center
- Recyclers
- JBRC
- Recyclers
- Mobile Recycle Network
- Recyclers
- SBRA
- Individual Manufacturer
- Recyclers
- Independent Collectors

Recyclers or Disposal

(only for Cordless telephone, Handy cleaner, Headphone stereo and Camcorder)

Only for Cellular Phones

Only for Cordless telephone, Handy cleaner, Headphone stereo and Camcorder

Only for Cellular Phones

SBRA

Individual Manufacturer

Independent Collectors

Recyclers

Recyclers

Recyclers

Recyclers
Legislative Process of Battery Recycling and Regulated 4 Batteries

* Recycling Law  Started in 1991
* Regulation of Ni–Cd batteries started in 1993
  - Indication of recycling mark
  - Easy Removability of Ni–Cd batteries from appliances

* Reformed Recycling Law started in April, 2001
  - Regulation of 4 portable rechargeable batteries—
    1. Sealed Ni-Cd batteries
    2. Sealed Ni-MH batteries
    3. Lithium secondary batteries (Li-ion batteries)
    4. Sealed lead acid batteries (not more than 234kC)
  - Requirements to 4 batteries—
    - Markings
    - Easy Removability of Batteries from Appliances
    - Collection and recycling/Information supply
Recycling Marks of Portable Rechargeable Batteries

Ni-Cd  | Ni-MH  | Li-ion  | Sealed Pb

Ni-Cd | Ni-MH | Li-ion | Pb
# Requirements for Specific Appliances to Manufacturers

## 1. Idea for Battery Package Design
- Apply no soldering when equipped to appliances
- Apply easy removability from appliances

## 2. Markings
- Battery package design for appliance should be marked to appliance itself, instruction manual and others as much as possible.

## 3. Information
- The battery package design for appliance and easy removable method for battery should be informed.

## 4. Others
- Safety, technical update, evaluation, etc.
Company concerned of Collection and Recycling

● MANUFACTURES of portable rechargeable batteries & specific portable rechargeable battery appliances

● IMPORTERS of portable rechargeable batteries & specific portable rechargeable battery appliances
# Legal Benchmark of Recycle Rate

<table>
<thead>
<tr>
<th>Batteries</th>
<th>Legal benchmark (Minimum)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sealed Ni–Cd battery</td>
<td>60%</td>
</tr>
<tr>
<td>Sealed Ni–MH battery</td>
<td>55%</td>
</tr>
<tr>
<td>Lithium secondary battery</td>
<td>30%</td>
</tr>
<tr>
<td>Sealed lead acid battery</td>
<td>50%</td>
</tr>
</tbody>
</table>

**Definition of recycle rate**

\[
\text{Recycle rate} = \left( \frac{\text{Total weight of reusable elements (Fe, Pb, Ni, Co, Cd, etc)}}{\text{Weight of used rechargeable batteries}} \right) \times 100
\]
<table>
<thead>
<tr>
<th><strong>Corporate Name</strong></th>
<th>JBRC</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Full name</strong></td>
<td>Japan Portable Rechargeable Battery Recycling Center</td>
</tr>
<tr>
<td><strong>Address</strong></td>
<td>3-5-8, shibakoen, minatoku, Tokyo, Japan</td>
</tr>
<tr>
<td><strong>Foundation</strong></td>
<td>April 1, 2004 (April 2001 Non-corporate in BAJ)</td>
</tr>
<tr>
<td><strong>Work</strong></td>
<td>Collection and recycling of portable rechargeable batteries</td>
</tr>
<tr>
<td><strong>Membership</strong></td>
<td>286 companies (June 30, 2010)</td>
</tr>
</tbody>
</table>
Collection System of JBRC

Collection points (registration with JBRC)
- Municipalities
- Retailers
- Businesses

1. Collection Request
   (through JBRC HP or telephone)

3. Collection (Free delivery)

4. Delivery

5. Report of collection and delivery

2. Instruction for collection

6. Payment of delivery charge

7. Instruction of disposal

8. Report of disposal

9. Payment of disposal charge

Recycler

Transporters

JBRC
<table>
<thead>
<tr>
<th>Collection Points</th>
<th>Electric appliance stores</th>
<th>Large electric appliance stores</th>
<th>Camera Stores</th>
<th>Super Markets</th>
<th>DIY stores</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cellular phone stores</td>
<td>Power tool stores</td>
<td>Bicycle stores</td>
<td>- Businesses</td>
<td>- Municipalities</td>
<td>- Others</td>
</tr>
</tbody>
</table>
Battery Quantities Collected by JBRC

- Ni-Cd
- Ni-MH
- Li-ion
- Sealed Pb
Collection Quantities by Appliances

Ni-Cd
Ni-MH
Li-ion

Others
Bicycle assisted by electricity
Handy cleaner
Radio-controlled appliance
Power tool
Personal computer
Headphone stereo
Camcorder
Cellular telephone
Radio-communication tool
Cordless telephone
Other emergency appliances
Emergency power supply
Fire alarm
Emergency lighting & escape lighting
Furnaces for Treatment of Portable Rechargeable Batteries

Vacuum Furnace
(Nippon Recycle Center, Corp)

Rotary Kiln
(Toho Zinc, Co. Ltd)
Materials from Ni–Cd by Heat Treatment

Cadmium Metal Ingot

Residue including Ni, Fe, etc.
Safety aspects for collection of spent batteries by JBRC
How to keep the safety in collection?

- **Request from JBRC to keep safety**
  - Insulation of lead wire / terminal
  - Not to disassemble the battery pack
  - Packing method ~ Limitation of weight per carton (20-25kg, Battery must be fixed in carton) etc.

- **The way of promotion**
  - Send “Handbook for collection” to all of the collection points (total 30000 points)
  - Send “Warning statement” to the collection points who release the batteries without any safety treatments
  - Send the information magazine which explain the safety treatment issues to the collection points twice a year.
How batteries arrived?
Investigation of product code (Further Research)
OUTCOME OF JBRC’S SCHEME FOR
USED LITHIUM-ION BATTERIES
TRANSPORTATION
IN JAPAN

NO INCIDENTS
DURING
TRANSPORTATION !!
Thank you for listening!!
Appendix
How to keep the safety in collection?

Other than Lithium Ion batteries
Example of safety treatment ~ case 1

<Safety treatment>

Insulating coating of positive/negative terminal of lead wire by adhesive tape
Example of safety treatment ~ case 2

<Safety treatment>

1st step
Separate the Non-fixed connected cell

Before treatment

2nd step
Insulating coating of positive/negative terminal of each cell

After treatment
Example of safety treatment ~ case 3

<Safety treatment>
Pack the connected cells all in one with adhesive tape
<Safety treatment>

*Insulating coating of positive/negative terminal of each cell (both top and bottom) of battery pack by adhesive tape*
Appendix 2
## Outline of Rechargeable Battery Regulation in Japan

<table>
<thead>
<tr>
<th>Markings</th>
<th>Indication of recycling marks to batteries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Removability</td>
<td>Easy removability of batteries from appliances</td>
</tr>
<tr>
<td>Collection and Recycling</td>
<td>Collection</td>
</tr>
<tr>
<td></td>
<td>Recycling</td>
</tr>
<tr>
<td></td>
<td>Enlightenment / Information supply</td>
</tr>
<tr>
<td></td>
<td>Corporation with municipalities</td>
</tr>
</tbody>
</table>
1. Sealed Ni–Cd batteries

2. Sealed Ni–MH batteries

3. Lithium secondary batteries (Li–ion batteries)

4. Sealed lead acid batteries (not more than 234kC) only for Cordless telephone, Handy cleaner, Headphone stereo, Camcorder
Membership

Requirements

- Manufacturers of portable rechargeable batteries & portable rechargeable battery appliances in Japan

- Importers of portable rechargeable batteries & portable rechargeable battery appliances in Japan

- Corporate companies and corporate bodies understanding JBRC activities in Japan

Procedure

- Application for admission and approval of JBRC board of Directors
Requirements for Manufacturers & Distributors

Requirements for Collection

- Method (Collection points, Collection box, etc)
- Disclosure of information for collection promoting
- Official announcement of collection results every year

Requirements for Recycling

- Recycling of rechargeable batteries
- Establishment of target of recycle rate
- Official announcement of recycling results every year
Recycling Treatment Process

Batteries

Sorting

Ni-Cd

Plastic case removal

Heat treatment

Crude Cd

Ni-MH

Plastic case removal

Heat treatment

Residue (Fe・Ni mixture)

Refining

Pure Cd

Fe・Ni alloy

Li-ion

(Plastic case removal)

Heat treatment

Residue (Co・Fe・Al・Cu mixture)

Refining

Alloy included Co, etc
Calculation of Recycle Rate

Metal contents of recycle substances

\[ \frac{\text{Battery quantity}}{\text{Metal component}} \times 100 \]

Main metal components of rechargeable batteries

<table>
<thead>
<tr>
<th>Battery Type</th>
<th>Metal Component</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ni–Cd</td>
<td>Ni, Fe, Cd, Co</td>
</tr>
<tr>
<td>Ni–MH</td>
<td>Ni, Fe, Co, Others</td>
</tr>
<tr>
<td>Li–ion</td>
<td>Co, Al, Fe, Cu, Others</td>
</tr>
<tr>
<td>Sealed Pb</td>
<td>Pb</td>
</tr>
</tbody>
</table>