

Product name; Nickel-metal Hydride Battery

Ref.No.PMH-PSDS13E2  
Establishment/ Revision; December 20, 2013

Date of Submitted: January 21, 2014

This product is a consumer product which is used in a hermetically sealed state. So, it is not an object of the SDS system.

This document is provided to customers as reference information for the safe handling of the product. The information and recommendations set forth are made in good faith and are believed to be accurate at the date of preparation.

Panasonic Corporation makes no warranty expressed or implied.

## PRODUCT SAFETY DATA SHEET

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### 1. Name of product and manufacture

Name of product	: Nickel-Metal Hydride Battery :(Model name) The models described such as HHR-***** or BK-*****
Name of Company	: Panasonic Corporation Automotive & Industrial Systems Company
Department	:Energy device Business Division, Product Engineering Group
Address	: 1-1, Matsushita-cho, Moriguchi, Osaka 570-8511 Japan
Telephone number	:+81-6-6994-4560

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### 2. Hazardous and Toxicity Class

GHS Classification	: Not applicable
Toxicity	: When the leaked liquid adheres to the skin, it may cause the damage of the skin. When it is gotten in eye, it may cause the damage of eye such as losing sight.
Hazard	: There is the risk of abnormal heat generation and explosion if batteries are crushed, caused external short circuits, heated above 100 degree C and disposed in fire.

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### 3. Composition and ingredient information

Common Chemical name	CAS number	Concentration/ Percentage Range
Nickel Hydroxide	12054-48-7	15-25%
Cobalt Hydroxide	21041-93-0	1-5%
Hydrogen absorbing alloy	7440-02-0(Ni) 7440-48-4(Co) 7439-96-5(Mn) 7429-90-5(Al)	} 20-35%
Nickel	7440-02-0	3-10%
Iron	7439-89-6	10-25%
Potassium Hydroxide	1310-58-3	} 0-15%
Sodium Hydroxide	1310-73-2	
Lithium Hydroxide	1310-65-2	

### 4. First Aid Measures

In case of electrolyte leakage from the battery, necessary actions to be taken are described as follows.

- Skin contact : Wash the contact skin area off immediately with plenty of clean water such as tap water using a mild soap, otherwise it might cause sore on the skin.  
Get medical attention if irritation develops or persists.
- Eye contact : Flush the eyes with plenty of clean water such as tap water for more than 15 minutes without rubbing and immediately take a medical treatment.  
If appropriate procedures are not taken, it may cause a loss of sight.
- Inhalation : Move the exposed person to fresh air area immediately.  
And take a medical treatment immediately.

### 5. Fire Fighting Measures

1. Suitable fire extinguishing media are dry sand and chemical powder fire extinguisher.
2. When in firefighting, the air respiratory protection should be used because acrid or harmful gas might be generated when fire is extinguished.
3. Remove combustibles at once from a firefighting area.
4. Remove the batteries to safe area at once from firefighting place.

### 6. Accidental release measures (in case of electrolyte leakage from the battery)

- Personal precautions : Wear proper protective equipment.
- Environmental Precautions : Prevent spills from entering sewers, watercourses.
- Spill Clean-Up Procedures : Collect material to minimize dust generation ; use wet mop, damp sponge. Place collected material into a suitable container for disposal.

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## 7. Handling and Storage

### Handling

- Technical measures : Not necessary under normal use.  
Precaution : The terminals of the battery should be protected in the packing form to be able to prevent them from external short circuit.  
They are packed by the material with enough strength to prevent them from destroyed by vibrates, impact, fall and accumulation, etc. while transporting them.

### Storage

- Storage Condition : Keep batteries out of water and wet when in storage and transported.  
Keep batteries out of fire and avoid the high temperature atmosphere  
: when in storage and transported.  
:An example of the high temperature: The high temperature storage like in the car exposed to blazing sun should be avoided.

Safe Packaging materials: Carton boxes, wooden boxes.

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## 8. Exposure control

- Acceptable concentration : Not necessary under normal use .  
Facilities : Nothing in particular.  
Protective Equipments (in case of electrolyte leakage from the battery)  
Respiratory Protection : Safety mask.  
Hand Protection : Safety gloves.  
Eye Protection : Safety glasses designed to protect against liquid splashes  
Skin and Body Protection : To prevent any contact, wear impervious clothing such as boots or whole body suits as appropriate.

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## 9. Physical and Chemical Properties

### Physical Style

- Appearance : The nickel hydrogen battery is stored in the plastic resin case or tube.  
Color : Depend on the design.  
Odor : No odor  
Voltage : The voltage value depends on the number of built-in batteries used in battery pack.
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## 10. Stability and Reactivity

Reactivity	: Stable under normal use.
Chemical Stability	: Stable under normal use.
Conditions to be avoided	: External Short, crushed and heated or disposed in fire cause abnormal heat generation, leakage or explosion.
Hazardous decomposition products	: Acrid or harmful fume is emitted during fire

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## 11. Toxicological information

There is no data available on the product itself.

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## 12. Ecological Information

### Persistence/degradability

In case of the worn out battery was disposed in land, the battery case may be corroded, and leak electrolyte. But, we have no ecological information.

Heavy metal quantity in a cell

Mercury (Hg), Cadmium (Cd) and Lead (Pb) are not used in cell.

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## 13. Disposal Considerations

When the battery is worn out, dispose of it under the regulations of each local government or the law issued by relating government.

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## 14. Transport Information

- IATA Dangerous Goods Regulations 55<sup>th</sup> Edition (2014)
- ICAO Technical Instructions for the safe transport of dangerous goods by air
- The product is handled as Non-Dangerous Goods by based on IATA (A123) for air shipment .
- The product is handled as following by basted on UN3496 (SP963) for sea shipment.
  1. Nickel-metal hydride button cell or nickel-metal hydride cells or batteries packed with or contained in equipment are Non-Dangerous Goods.
  2. All other nickel-metal hydride cells or batteries shall be securely packed and protected from short circuit. They are Non-Dangerous Goods provided they are loaded in a cargo transport unit in a total quantity of less than 100Kg gross mass.
  3. When loaded in cargo transport unit in a total quantity of 100kg gross mass or more, they are Dangerous Goods (Class 9).

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Prior to transportation,

1. During the transportation of a large amount of batteries by ship, trailer or railway, do not leave them in the places of high temperatures and do not allow them to be exposed to dew condensation.
2. Avoid transportation with the possibility of the collapse of cargo piles and the packing damage.
3. Protect the terminals of batteries and prevent them from short circuit so as not to cause dangerous heat generation.

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## 15. Regulatory Information

Commission Directive 2006/66/EU (EU)

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## 16. Others

Note for this document : This PSDS is provided to customers as reference information in order to handle batteries safely.  
It is necessary for the customer to take appropriate measures depending on the actual situation such as the individual handling based on this information.

## References

1. The Globally Harmonized System of Classification and Labeling of Chemicals ) (GHS)  
ST/SG/AC.10/30 Rev.4,2011
  2. Chemical substances information: Japan Advanced Information center of Safety and Health
  3. Recommendations on the TRANSPORT OF DANGEROUS GOODS Model Regulations  
Volume 1. 17<sup>th</sup> revised edition.
  4. IATA Dangerous Goods Regulations 55<sup>th</sup> Edition (2014)
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# Product Safety Data Sheet

This product (a battery) is an "Article" pursuant to 29 CFR 1910.1200 and, as such, is not subject to the OSHA Hazard Communication Standard requirements for preparation of a Material Safety Data Sheets, (MSDS). This Product Safety Data Sheet is prepared only to provide information to our customers.

## 1. PRODUCT AND COMPANY IDENTIFICATION

1.1	Product name	Nickel Metal Hydride Battery (Module)
1.2	Applicable models	EV-MH type EV-MP095R15A (EV-95) EV-MP6R5R01 (GEN I ) EV-MP6R5R02 (GEN II ) EV-MP6R5R03 (GEN 2.5 8cells module type) EV-MP6R5R27 (GEN 2.5 12cells module type) EV-MP6R5R47 (GEN 2.5L 12cells module type)
1.3	Product use	Hybrid Vehicle Battery
1.4	Name of manufacturer	Primearth EV Energy Co., Ltd.
1.5	Address of manufacturer	20,Okasaki,Kosai-City,Shizuoka, 431-0422 Japan
1.6	Phone number of manufacturer	+81-53-577-3592 (Japan)
1.7	Post in charge	Enginnering Dept.
1.8	Name of person in charge	Osamu Takahashi
1.9	Issue number	P0251

## 2. HAZARD IDENTIFICATION

This product is not dangerous as long as it is used for prescribed purposes and in accordance with its designated usage. As the product is a storage device for electricity, it may give the user an electric shock. It has no adverse effect on human health or the environment unless the pack and cell casings are breached.

2.1	Physical and chemical hazard	This product does not constitute a physical and chemical hazard as long as it is used for prescribed purposes and in accordance with its designated usage. The alkaline electrolyte or materials in the battery may be dangerous if they leak out of the casing due to dismantling or breaching of the battery. This product may cause electric shock, fire, or injury if it is used for purposes other than those prescribed or without following the designated usage.
2.2	Hazard to human health	This product is not hazardous to human health in normal use. However, if the product dismantle or is breached, the alkaline electrolyte or materials that may leak out of the outer casing may adversely affect human health. This product contains both nickel compounds and cobalt, which are classified as carcinogens by IARC and NTP.
2.3	Hazard to environment	This product is not hazardous to the environment as long as it is used for prescribed purposes and in accordance with its designated usage. However, the contents of the product may have an adverse effect on the environment in the event of their leakage from the casing due to dismantling or

## 3. COMPOSITION & INGREDIENT INFORMATION

Chemical name	Chemical symbol	CAS. No.	Exposure limits in air	
			ACGIH	OSHA
Positive electrode, composed of:				
•Nickel hydroxide	Ni(OH) <sub>2</sub>	12054-48-7	0.2mg/m <sup>3</sup>	1mg/m <sup>3</sup>
•Nickel	Ni	7440-02-0	0.2mg/m <sup>3</sup>	1mg/m <sup>3</sup>
•Cobalt	Co	7440-48-4	0.02mg/m <sup>3</sup>	0.1mg/m <sup>3</sup>
Negative electrode, composed of:				
•Hydrogen absorbing alloy	*1			
•Iron	Fe	7439-89-6	NA	NA
Alkaline electrolyte	*2			

\*1: Main contents contained in hydrogen absorbing alloy  
 Nickel(Ni)-CAS#7440-02-0, Cobalt(Co)-CAS#7440-48-4, Manganese (Mn)-CAS#7439-96-5,  
 Aluminum (Al)-CAS#7429-90-5, Rare earths [ Lanthanum (La)-CAS#7439-91-0, Cerium (Ce)-CAS#7440-45-1,  
 Neodymium (Nd)-CAS#7440-00-8, Praseodymium (Pr)-CAS#7440-10-0 ]

\*2: Main contents contained in alkaline electrolyte  
 Potassium hydroxide (KOH)-CAS#1310-58-3, Sodium hydroxide (NaOH)-CAS#1310-73-2,  
 Lithium hydroxide (LiOH)-CAS#1310-65-2

**4. FIRST AID MEASURES**

In the event of the leakage of electrolyte or gassing of the battery, take the appropriate first aid measures from the following.

4.1	Eye contact	Contact may cause corneal injury and blindness. Wash eyes with large amounts of running water for at least 15 minutes. Seek medical treatment immediately. If appropriate actions are not taken, eye disorders may result.
4.2	Skin contact	Wash the contact area with plenty of water. Seek medical treatment immediately. Clothing, shoes, and socks, etc. which have come into contact with alkaline electrolyte should be taken off immediately. If appropriate actions are not taken, skin inflammation may occur.
4.3	Inhalation	Move the exposed person to fresh air area immediately. Cover up the affected person with a blanket. Seek medical treatment immediately.
4.4	Ingestion	Do not induce vomiting . Seek medical treatment immediately.

**5. FIREFIGHTING MEASURES**

In the event of a battery fire, take the following measures.

5.1	Extinguishing media and method	(1) Use a dry powder acrylonitrile butadiene styrene (ABS) fire extinguisher for fire-fighting. (2)Extinguishing a fire with a large amount of water may be an effective method . However, this should be considered as a supplementary means If there are no readily available large amounts of water, use dry sand instead; as the application of only a small amount of water may temporarily act as an accelerant and affect the fire adversely while the hydrogen storage alloy is burning.
5.2	Exposure controls and personal protection for fire-fighting	Use air-breathing apparatus as noxious fumes may be produced.
5.3	Fire spread prevention	(1) In the case of fire, remove surrounding inflammables immediately. (2) In the case of fire in peripheral devices, move the battery to a safe place immediately.

**6. ACCIDENTAL RELEASE MEASURES**

Take the following measures if the alkaline electrolyte has leaked out of the battery.

6.1		Wipe up the alkaline electrolyte with a cloth. Dispose of the cloth used to wipe up the electrolyte in accordance with applicable laws and regulations.
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**7. HANDLING & STORAGE INFORMATION**

Observe the following cautions and prohibited items. Handle the battery carefully.

7.1	Prohibited items	(1) Short-circuiting Short-circuiting may cause burn injury due to ignition or heating effect. (2) Dismantle or modification Alkaline electrolyte leaks when the battery (cell) is disassembled. (3) Overcharging or over-discharging Oxygen or hydrogen may be produced when the battery is overcharged or over-discharged. (4) Use in an airtight container The container may explode due to the gas produced from the battery.
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7.2	Cautions	(1) Do not stack a battery on another battery. (2) Do not store batteries on electrically conductive surfaces such as metals. (3) Wear protective glasses and rubber gloves while handling batteries.
<b>8. EXPOSURE CONTROLS &amp; PERSONAL PROTECTION</b>		
Take the following measures in the event of leakage of the alkaline electrolyte or alkaline mixed gas from the battery.		
8.1	Facilities	(1) Store the product in a depository with local exhaust systems for ventilation. (2) Install an exhaust system or exhaust port when the product is used in a container.
8.2	Protective equipment	Wear protective glasses, protective gloves, and simple filter mask.
<b>9. PHYSICAL &amp; CHEMICAL PROPERTIES</b>		
9.1	Physical state	Solid
9.2	Order	No order
9.3	pH	Not applicable ( ELECTROLYTE : >12 )
9.4	Freezing point	Not applicable
9.5	Boiling point	Not applicable ( ELECTROLYTE : 100°C; Water)
9.6	Evaporation rate	Not applicable
9.7	Vapor pressure	Not applicable
9.8	Vapor density	Not applicable
9.9	Solubility (Water)	Not applicable ( Electrolyte is soluble.)
<b>10. STABILITY &amp; REACTIVITY</b>		
This product is stable as long as it is used for prescribed purposes and in accordance with its designated usage. However, short-circuiting, overcharging/over-discharging, and long-term storage in a high-temperature environment may lead to the ignition or explosion of the battery.		
10.1	Possible causes of fire	Sparks due to short-circuit. A large current is applied to a module or a cell.
10.2	Possible causes of explosion	The battery will not explode by itself unless the safety valve is frequently activated and the battery is kept in an airtight container, in which case the oxygen and hydrogen produced from the battery may trigger an explosion.
10.3	Possible causes of fire and explosion	(1) Overcharging or over-discharging (2) The temperature of the battery at 100°C or higher (3) Overcharging or over-discharging of the battery in an airtight container located close to a heat source
<b>11. TOXICOLOGICAL INFORMATION</b>		
This product is not hazardous as long as it is used for prescribed purposes and in accordance with its designated usage. If the battery disintegrates or is breached, the alkaline electrolyte or contents that have leaked out of the casing may adversely affect human health.		
11.1	Carcinogenicity	The nickel-plated iron of this product is not harmful as long as it is used for prescribed purposes and in accordance with its designated usage. This product contains both nickel compounds and cobalt, which are classified as carcinogens by the International Agency for Research on Cancer (IARC) and the National Toxicology Program (NTP).
<b>12. ECOLOGICAL INFORMATION</b>		
12.1		This product is not dangerous as long as it is used for prescribed purposes and in accordance with its designated usage. This product is not hazardous to the environment as long as it is used for prescribed purposes and in accordance with its designated usage. However, the contents of the product may have an adverse effect on the environment in the event of their leakage from the casing due to dismantling or breaching of the battery.
<b>13. DISPOSAL CONSIDERATIONS</b>		
13.1		Batteries should be disposed in accordance with designated provisions by vehicle manufacturers or dealers.

14. NOTES IN TRANSPORTATION		
Refer to "15. REGULATORY INFORMATION" for applicable laws and regulations.		
14.1	Label of contents	The indication of surface of the casing are not subjected any regulations. Refer to "14. REGULATORY INFORMATION" for applicable laws and regulations.
14.2	No short-circuit	The battery terminals should be designed so that external short-circuiting can be avoided. Make sure the batteries are not short-circuited during the packaging process.
14.3	No damage and overturn	Use sufficiently strong materials for packaging boxes so that the product is not damaged due to vibration, shocks, falls, stacking, and so on. Pack the product so that the battery does not fall sideways, and is not inverted during transportation.
14.4	Protection from rain water	Avoid contact with rain or other water during storage and transportation.
14.5	Protection from fire and high temperatures	Do not place the product close to fire during storage and transportation. Avoid storage in a high-temperature environment. Example: Avoid leaving batteries for disposal in a parked vehicle under the scorching sun. Take sufficient care to avoid prolonged exposure to high temperature.
15. REGULATORY INFORMATION		
15.1	Hazardous materials of transportation	(1) United Nations (Transport of Dangerous Goods) •UN Number 3496 Classes 9 •Special Provision 117 Subjected to these Regulations only when transport by sea.
		(2) International Air Transport Association (IATA) •Not Registered •Special Provision A123 This entry applies to Batteries, electric storage, not otherwise listed in Subsection 4.2 - List of Dangerous Goods. Examples of such batteries are: alkali-manganese, zinc-carbon, nickel-metal hydride and nickel-cadmium batteries. Any electrical battery or battery powered device, equipment or vehicle having the potential of a dangerous evolution of heat must be prepared for transport so as to prevent (a) a short-circuit (e.g. in the case of batteries, by the effective insulation of exposed terminals; or, in the case of equipment, by disconnection of the battery and protection of exposed terminals); and (b) accidental activation. The words "Not Restricted" and the Special Provision number must be included in the description of the substance on the Air Waybill as required by 8.2.6, when an Air Waybill is issued.
		(3) International Maritime Dangerous Goods Code (IMDG-Code) •UN Number 3496 Classes 9 •Special Provision 117 Only regulated when transported by sea. 963 Nickel-metal hydride button cells or nickel-metal hydride cells or batteries packed with or contained in equipment are not subjected to the provisions of this code. All other nickel-metal hydride cells or batteries shall be securely packed and protected from short circuit. They are subjected to other provisions of this Code provided that they are loaded in a cargo transport unit in a total quantity of less than 100 kg gross mass. When loaded in a cargo transport unit in a total quantity of 100 kg gross mass or more, they are not subjected to other provisions of this Code except those of 5.4.1, 5.4.3 and column (16) of the Dangerous Goods List in chapter 3.2.
	New Regulations: United Nations, IMDG-Code Enforcement on Jan. 1, 2012	

		<p>(4) US DOT(Department of Transportation)Title 49 CFR Parts 100-185 Subpart B—Table of Hazardous Materials and Special Provisions § 172.101 Purpose and use of hazardous materials table. Hazardous materials descriptions and proper shipping names * Batteries, nickel-metal hydride see Batteries, dry, sealed, n.o.s. for nickel-metal hydride batteries transported by modes other than vessel * Batteries, dry, sealed, n.o.s. § 172.102 Special provisions. * Transport by modes other than vessel : Special provision 130 * Transport by vessel : Special provision 340</p> <p>(5) Japan MLIT (Ministry of Land, Infrastructure, Transport and Tourism) Bulletin 1530 Notice 272 (Dec.22,2010 ) •UN Number 3496 Classes 9 •Dangerous Goods List Coluum 6(5) SP963 1 Shall be securely packed and protected from short circuit. 2 Tag plate or the name of goods are not required to be displayed. •Dangerous Goods List Coluum 10 SP963 1 Nickel-metal hydride button cells or nickel-metal hydride cells or batteries packed with or contained in equipment are not subjected to the provisions of this notice. 2 All other nickel-metal hydride cells or batteries shall be securely packed and protected from short circuit. They are subjected to other provisions of this notice provided that they are loaded in a cargo transport unit in a total quantity of less than 100 kg gross mass.</p>
<b>16. OTHER INFORMATION</b>		
16.1	Cautions	<p>(1)Cautions and prohibited items in this Data Sheet relate to only normal use. Take appropriate safety measures suited for the environment when the product is used for special purposes. (2)This Data Sheet provides only the information of the product, and is not to be taken as a warranty. (3)It is intended for use by persons with technical skills and at their own discretion and risk. (4)The user is responsible for determining that any usage of the data or information in this Data Sheet is in accordance with associated federal, state, and local laws and regulations.</p>
16.2	Date of creation/revision	November 10, 2011