

**BATTERY NICKEL-METAL HYDRIDE INFORMATION SHEET**  
**MATERIAL SAFETY DATA SHEET**

**ARTS-Energy Part**

*Issue N on July 19, 2024*

According to REACH regulation (EC 1907/2006, Art 31) and to OSHA regulation (29 CFR 1910.1200), batteries are ARTICLES with no intended release. As such, they are not covered by legal requirements to generate and supply an SDS or an MSDS. This Battery Information Sheet is provided solely as an information document for the purpose of assisting our customers.

1. Product identification	
<b>Product</b>	Sealed secondary (or rechargeable) Cells Trade name and model : ARTS ENERGY, V... according to the model size and design. IEC designation : HR... according to the international standard IEC 61951-2 Electrochemical system : Nickel/Metal hydride, alkaline electrolyte Positive electrode : Nickel hydroxide Negative electrode : Metal Hydride Electrolyte : Potassium, Sodium and Lithium hydroxide in water solution. Nominal voltage : 1.2Volts
<b>Usage</b>	These sealed secondary (or rechargeable) Cells are being used in batteries for energy supply of electrical systems, in applications such as backup units or portable systems.
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2. Hazards identification
<p><b><u>HUMAN HAZARDS :</u></b> A sealed Nickel-Metal Hydride cell is not hazardous in normal use when the electrode materials and the electrolyte are content inside the cells. Do not open or burn the products – components or products ingestion could harm the user.</p> <p><b>Physical</b> Nickel plated steel cans do not present any risk if cells are used for its intended purpose and according to valid directions for use. Do not throw in fire or misuse, as a gas containing hydrogen and oxygen can be generated through the safety valve (explosion risk).</p> <p><b>Chemical</b> Nickel plated steel cans do not present chemical risk in normal use. In case of misuse (abusive over charge, reverse charge, external short circuit...) and in case of default, some electrolyte can leak from the cell through the safety vent. In these cases refer to the risk of the alkaline hydroxides. The toxic properties of the electrode materials are hazardous only if the materials are released by mechanical damaging the cell or if exposed to fire.</p> <p><b><u>ENVIRONNEMENTAL HAZARDS :</u></b> Metals used in a Ni-MH cell have to be collected and recycled through specialized organizations (list on <a href="http://www.rechargebatteries.org">www.rechargebatteries.org</a>).</p>

### 3. Composition & Information on components

Weight percentage of basic materials : Single cell with steel container

Metals	%	Plastics	%	Other	%
Iron – Fe	15 - 30	Polyamide – PA/PP	2,5 - 3,5	Alcalis – K / Na / Li	1,8 - 3,2
Nickel – Ni	30 - 45	EPDM	< 0,05	Water – H2O	4 - 9
Rare Earth – Mn / Al	7 - 15	Polyethylene – PE	0,2 - 0,4	Hydroxyde – OH-	8 - 14
Cobalt – Co	1 - 5	PVC	0,2 - 0,7		

Classification of dangerous substances contained into the cells.

Substances			Classification			
Name	N° EC N° CAS N° EINEC	Symbol	Previous regulations	Hazard identification	Special risk (1)	Precautionary Statement - Prevention (2)
Nickel		Ni	<i>Xn</i>		H317, H351, H372,	P201, P202, P260, P261, P264, P270, P272, P280, P281
Nickel Hydroxide	028-002-00-7 7440-02-0 231-111-4	Ni(OH) <sub>2</sub>	<i>Xn, N</i>		H302, H315, H317, H332, H334, H341, H372, H350i, H360D, H410	P201, P202, P261, P264, P270, P272, P280, P281, P285
Cobalt Hydroxide	028-008-00-X 12054-48-7 235-008-5	Co(OH) <sub>2</sub>	<i>Xn, N, T</i>		H302, H317, H319, H330, H334, H350, H360Fd, H410	P201, P202, P281, P261, P264, P270, P272, P273, P280, P281, P285,
Potassium hydroxide	- 21041-93-0 244-166-4	KOH	<i>C, Xi</i>		H302, H314	P260, P264, P270, P280
Sodium Hydroxide	019-002-00-8 1310-58-3 215-181-3	NaOH	<i>C</i>		H314	P260, P264, P280
Lithium Hydroxide	011-002-00-6 1310-73-2 215-185-5	LiOH	<i>C, F</i>		H260, H314	P223, P231 + P232, P280

**(1) Nature of special risk**

H260 - In contact with water releases flammable gases which may ignite spontaneously.  
 H302 - Harmful if swallowed.  
 H314 - Causes severe skin burns and eye damage  
 H315 - Causes skin irritation  
 H317 - May cause an allergic skin reaction  
 H319 - Causes serious eye irritation.  
 H330 - Fatal if inhaled.  
 H332 - Harmful if inhaled.  
 H334 - May cause allergy or asthma symptoms or breathing difficulties if inhaled.  
 H341 - Suspected of causing genetic defects  
 H350 - May cause cancer  
 H350i - May cause cancer by inhalation.  
 H351 - Suspected of causing cancer  
 H360D - May damage the unborn child.  
 H360Fd - May damage fertility. Suspected of damaging the unborn child.  
 H372 - Causes damage to organs through prolonged or repeated exposure  
 H410 - Very toxic to aquatic life with long lasting effects.

**(1) Precautionary Statement – Prevention**

P201 - Obtain special instructions before use.  
 P202 - Do not handle until all safety precautions have been read and understood.  
 P223 - Do not allow contact with water.  
 P231 + P232 - Handle and store contents under inert gas. Protect from moisture.  
 P260 - Do not breathe dust/fume/gas/mist/vapours/ spray.  
 P261 - Avoid breathing dust/fume/gas/mist/vapours/ spray.  
 P264 - Wash thoroughly after handling.  
 P270 - Do not eat, drink or smoke when using this product.  
 P272 - Contaminated work clothing should not be allowed out of the workplace.  
 P273 - Avoid release to the environment.  
 P280 - Wear protective gloves/protective clothing/eye protection/face protection/hearing protection  
 P281 - Use personal protective equipment as required  
 P285 - In case of inadequate ventilation wear respiratory protection.

**4. First aid measures**

In case of electrolyte solution spill (cell leakage) precautions must be taken to avoid any contact of human tissues. If it accidentally happens following must be done:

<b>Inhalation</b>	Fresh air. Rinse mouth and nose with water. Medical treatment
<b>Contact avec la peau</b>	Rinse immediately with plenty of water. Medical treatment.
<b>Contact avec les yeux</b>	Rinse immediately with plenty of water during at least 15-30 min. Immediate hospital treatment. Consult eye specialist.
<b>Ingestion</b>	If the injured is fully conscious: plenty of drink, preferably milk. Do not induce vomiting. Immediate Hospital treatment should be done.

## 5. Firefighting measures

### Extinguishing media

Suitable: Class D-Dry chemical, sand, CO<sub>2</sub>.

Not to be used: Water.

### Special exposure hazards





Cells can be overheated by an external source or by internal shorting and release alkaline electrolyte mist or liquid.

Electrolyte reacts with zinc, aluminum, tin and other active materials releasing flammable hydrogen gas.

In case of PVC sleeved products, the combustion releases chloride gas.

### Special protective equipment

Use self-contained breathing apparatus and full fire-fighting protective clothing.

	<b>Respiratory protection</b>	Fire fighters should wear self-contained apparatus.
	<b>Hand protection</b>	Use polypropylene, polyethylene, rubber or Viton gloves when handling leaking or ruptured cells.
	<b>Eye protection</b>	In case of incident or after an abusive use, in case of a leak or cell opening, wear safety glasses with protected side shields or a mask covering the whole face when handling leaking or ruptured cells.
	<b>Other</b>	In the event if leakage or ruptured cells, wear a rubber apron and protective clothes.

## 6. Spill management procedure

The sealed Ni-MH cells when sleeved are safe in case of spilling.

Non-sleeved cells may generate short-circuits, causing release of alkaline electrolyte mist or liquid. Electrolyte reacts with zinc, aluminum, tin and other active materials releasing flammable hydrogen gas.

### **Individual protections and equipment**

In such a case, use self-contained breathing apparatus and protective clothing.

### **Environmental precautions**

No urgency measure requested.

### **Cleaning**

Collect the cells for recycling respecting the local law, if necessary, use sawdust to absorb electrolyte leakages.

## 7. Handling and storage

	<b><i>Do not allow children to replace batteries without adult supervision.</i></b>
<b>Manipulation</b>	In normal use conditions, no safety rule is specified to handle the cells. Please apply ARTS ENERGY usage instructions.
<b>Stockage</b>	It is recommended to store following ARTS ENERGY specifications in order to ensure longer usage: +5 to +25°C in a 65 +- 5% relative humidity.

## 8. Exposure controls / Personal protection

Under normal condition of use and handling no special protection is required for sealed Ni-MH cells.  
Protection equipment: it is recommended to wear gloves, or to remove rings and metallic objects to avoid short-circuiting the cells.

## 9. Physical and Chemical properties

<b>Apparence</b>	Nickel plated steel cylindrical cell eventually sleeved. Dimensions and color according to specification.
<b>Temperature range</b>	Usage recommended between -40°C and +70°C. Risk of electrolyte leakage over 100°C
<b>Specific energy</b>	33 to 80 Wh/Kg
<b>Specific instant power</b>	Up to 1000 W/Kg during 1 second
<b>Mecanical resistance</b>	According to mechanical tests in IEC 61951-2 standard.

## 10. Stability and reactivity

<b>Conditions</b>	<p>Ni-MH cells are stable in storage.</p> <p>In case of storage in humid atmosphere, some rust may appear on the product.</p> <p>In case of storage in a charged state, cells progressively lose their energy, generating eventually a progressive temperature increase according to the thermal insulation efficiency of the packaging.</p> <p>In case of exposure to temperature over 100°C, a risk of release of alkaline electrolyte mist or liquid is created. At a higher temperature (160°C) the plastics used can melt or decompose (Polyamide gasket, rubber valve, PVC sleeve...).</p> <p>In case of mechanical deterioration of the cells, active materials contained as powder can be dispersed (Nickel, Cobalt, Zinc, Cadmium).</p>
<b>Hazardous decomposition products</b>	<p>Electrolyte solution is corrosive to all human tissues and will react violently with many organic chemicals.</p> <p>Electrolyte solution reacts with zinc, aluminum, tin and other materials releasing flammable hydrogen gas.</p>

## 11. Toxicological information

Substances			Hazards		
Name	N° EC N° CAS N° EINEC	Symbol	Effets	Time weighted average (INRS France)	Carcinogenicity Mutagenicity Reprotoxicity
Nickel	028-002-00-7 7440-02-0 231-111-4	Ni	<i>Unknown</i>	TWA 8h (mg/m <sup>3</sup> ) - 1	Carcinogenic category 2
Nickel Hydroxide	028-008-x* 12054-48-7 235-008-5	Ni(OH) <sub>2</sub>	LD50/oral/rat: 1515 mg/kg	TWA 8h (mg/m <sup>3</sup> ) - 1	Carcinogenic category 1A Mutagen category 2 Toxic for reproduction category 1B
Cobalt Hydroxide	- 21041-93-0 244-166-4	Co(OH) <sub>2</sub>	LD50/oral/rat: 1060 mg/kg	TWA USA : 8h (mg/m <sup>3</sup> ) - 0,02 Recommandation France : 0,0025 mg/m <sup>3</sup> (mention peau)	<i>Unknown</i>
Potassium hydroxide	019-002-00-8 1310-58-3 215-181-3	KOH NaOH LiOH	LD50/oral/rat: 333 mg/kg	TWA CT (mg/m <sup>3</sup> ) - 2	<i>Unknown</i>
Sodium Hydroxide	011-002-00-6 1310-73-2 215-185-5	NaOH	LD50/oral/rat: 140-340 mg/kg	TWA 8h (mg/m <sup>3</sup> ) - 2	<i>Unknown</i>
Lithium Hydroxide	- 1310-65-2 215-183-4	LiOH	LD50/oral/rat: 330 mg/kg	TWA CT (mg/m <sup>3</sup> ) - 0,02	<i>Unknown</i>

## 12. Information éco toxicologique

The sealed Ni-MH cells as a product are not presenting Eco toxicological hazards. In case of product destruction or opening, the substances described in paragraph 10 can come in contact of the environment. The metals content in a Ni-MH battery are toxics for the environment.

If not recycled, it must be disposed of in accordance with all state and local regulations.

## 13. Disposal considerations

### Incineration

Never incinerate Ni-MH batteries.

### Landfill

Never dispose Ni-MH batteries as landfill.

### Recycling

Nickel Cadmium batteries can be fully recyclable. They are submitted to the European community directive 91-157/CE. ARTS Energy recommends proper recycling of these batteries whenever possible.

You can also contact ARTS Energy.



## 14. Transport information

Sealed Ni-MH batteries with sleeve are considered as “dry batteries” are not defined as dangerous goods under the IATA Dangerous Goods Regulations (65<sup>th</sup> edition IATA DGR 2024), ICAO Technical Instructions and the US hazardous materials regulations (49 CFR). Nickel metal hydride batteries are defined as dangerous goods under the IMDG code.

NiMH cells or batteries shall be securely packed and protected from short circuit. They are not subject to other provisions of this code if they are loaded in a cargo transport unit in a total quantity of less than 100 kg gross mass.

For air and ground transportation, these batteries are not subject to the dangerous goods regulations as they are compliant with the requirements contained in the following special provisions.

Regulation Body	Special provisions
ADR	Not Regulated
IMDG	UN3496 SP 963 (>100kg)
UN	Not Regulated
US DOT	49 CFR 172.102 Provision 130
IATA	UN 3496 SP A123 and A199 (>100kg)
ICAO	Not Regulated

## 15. Regulatory Information

Nickel-Cadmium batteries are submitted to the European community directive 91-157/CE for recycling. Substances contained are submitted to the REACH 06-1907/CE regulation.

## 16. Other information

Consult ARTS ENERGY specifications and precautions of use for optimized use. The information has been gathered from sources considered reliable and was the extent of our knowledge, accurate and reliable at the date of issue of this document. However, they cannot be considered completely comprehensive. This information does not imply an implicit or specific guarantee.

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