

**BATTERY NICKEL-CADMIUM INFORMATION SHEET**  
**MATERIAL SAFETY DATA SHEET**  
**ARTS-Energy Part**  
*Issue M 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 Ni-Cd cells and modules or battery systems composed of these cells                                                                    |
| <b>Supplier</b>           | ARTS Energy<br>10 rue Ampère - Zone Industrielle<br>16440 Nersac<br>FRANCE<br>Tel. No. +33 (0)5 45 90 35 50<br>Fax No. +33 (0)5 45 90 37 65  |
| <b>Emergency contacts</b> | Chemtrec US Service within the USA : +800 424 93 00 / outside : +1-202-483-7616 for English<br>INRS Orfila : +33(0) 1 45 42 59 59 for French |

## 2. Hazards identification

### **HUMAN HAZARDS :**

A sealed Nickel-Cadmium 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.

### **Physical**

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).

### **Chemical**

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.

### **ENVIRONNEMENTAL HAZARDS :**

Metals used in a Ni-Cd cell have to be collected and recycled through specialized organizations (list on [www.rechargebatteries.org](http://www.rechargebatteries.org)).

### 3. Composition & Information on components

Weight percentage of basic materials : Single cell with steel container

| Component                      | Content (%) <sup>*</sup> | N° CAS     | N° EINEC / ELINC |
|--------------------------------|--------------------------|------------|------------------|
| Active nickel **               | 10-25                    | 12054-48-7 | 235-008-5        |
| Active cadmium ***             | 10-19                    | 21041-95-2 | 244-168-5        |
| Cobalt                         | 0-2                      | 21041-93-0 | 244-166-4        |
| Alkaline electrolyte (pH = 14) | 14-27                    | NA         | NA               |
| Plastics                       | 3-6                      | NA         | NA               |
| Steel                          | 25-45                    | NA         | NA               |

\* Quantities may vary with cell model

\*\* Active nickel present as Ni(OH)<sub>2</sub> and NiOOH

\*\*\* Active cadmium present as Cd(OH)<sub>2</sub> and Cd

Classification of dangerous substances contained into the cells.

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

|                   |                                        |      |          |                                                                                                                                                                                                                                                          |                                              |                                                   |
|-------------------|----------------------------------------|------|----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|---------------------------------------------------|
| Lithium Hydroxide | 011-002-00-6<br>1310-73-2<br>215-185-5 | LiOH | C, F     |                                                                                       | H260, H314                                   | P223,<br>P231 + P232,<br>P280                     |
| Cadmium           | 048-002-00-0<br>7440-43-9<br>231-152-8 | Cd   | N, Xn, T |    | H330, H341<br>H350,<br>H361fd,<br>H372, H410 | P201, P202,<br>P260, P264,<br>P270, P273,<br>P281 |

#### (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.  
H361fd - Suspected of damaging 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-Cd 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.

### **Environnemental 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>Manipulation</b> | <b><i>Do not allow children to replace batteries without adult supervision.</i></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-Cd 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>        | 30 to 60 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 61951-1 standard.                                                    |

## 10. Stability and reactivity

|                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|-----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Conditions</b>                       | <p>Ni-Cd 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<br>N° CAS<br>N° EINEC            | Symbol              | Effets                          | Time weighted average<br>(INRS France)                                                                | Carcinogenicity<br>Mutagenicity<br>Reprotoxicity                                        |
| Nickel              | 028-002-00-7<br>7440-02-0<br>231-111-4 | Ni                  | Unknown                         | TWA 8h (mg/m3) – 1                                                                                    | Carcinogenic category 2                                                                 |
| Nickel Hydroxide    | 028-008-x*<br>12054-48-7<br>235-008-5  | Ni(OH) <sub>2</sub> | LD50/oral/rat:<br>1515 mg/kg    | TWA 8h (mg/m3) - 1                                                                                    | Carcinogenic category 1A<br>Mutagen category 2<br>Toxic<br>for reproduction category 1B |
| Cobalt Hydroxide    | -<br>21041-93-0<br>244-166-4           | Co(OH) <sub>2</sub> | LD50/oral/rat:<br>1060 mg/kg    | TWA USA : 8h (mg/m3) - 0,02<br><br>Recommandation France :<br>0,0025 mg/m <sup>3</sup> (mention peau) |                                                                                         |
| Potassium hydroxide | 019-002-00-8<br>1310-58-3<br>215-181-3 | KOH<br>NaOH<br>LiOH | LD50/oral/rat:<br>333 mg/kg     | TWA CT (mg/m3) - 2                                                                                    |                                                                                         |
| Sodium Hydroxide    | 011-002-00-6<br>1310-73-2<br>215-185-5 | NaOH                | LD50/oral/rat:<br>140-340 mg/kg | TWA 8h (mg/m3) - 2                                                                                    |                                                                                         |
| Cadmium             | 048-002-00-0<br>7440-43-9<br>231-152-8 | Cd                  | LD50/oral/rat:<br>2330 mg/kg    | TWA 8h (mg/m3) – 0,001                                                                                | Carcinogenic category 1B<br>Mutagen category 2<br>Toxic<br>for reproduction category 2  |

## 12. Information éco toxicologique

The sealed Ni-CD 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-CD 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-Cd batteries.

### Landfill

Never dispose Ni-Cd batteries as landfill.

### Recycling

Nickel Cadmium batteries can be fully recyclable. They are submitted to the European community directive 2006/66/CE. ARTS Energy recommends proper recycling of these batteries whenever possible. You may refer to the following web page for further information and guidance : <https://web.archive.oecd.org/2012-06-14/82214-locationswhereusednickel-cadmiumbatteriescanbedroppedoffforrecyclingbycountry.htm> (1).

You can also contact ARTS Energy.

- (1) This page provides links to different National Battery Associations and National Collection & Recycling Organizations that can provide you with the latest update on collection & recycling in their respective Countries.



## 14. Transport information

Sealed Nickel Cadmium batteries are considered to be "dry cell" batteries and are not assigned to dangerous goods regulation for the purpose of transportation by the International Air Transport Association (IATA). International air transport is not restricted provided that, as stated in IATA special provision A164, batteries and battery powered devices/equipment being transported by air are protected from short-circuits.

Our packaging is specially designed to avoid any contact between batteries poles. Furthermore, our cells' cans can bear falls from more than 1.80 m, keeping a good aspect (no electrolyte leakage, no cracks in conformance with the special provision A67 and packing Instructions 872 tests requirements).

Our products are also compliant with the requirement of 55 ° C high temperature test: no electrolyte escapes the batteries in case of shock because their container (nickel-plated steel bucket) is designed to resist to such stress. Finally, our batteries are designed to withstand the vibration and differential pressure variations described in Packing Instruction 872.

ARTS Energy Ni-Cd batteries are classified UN 2800. Road transport in Europe of new or used cells and batteries with classification UN2800 (Class 8) is not restricted according to ADR special provision 598, providing that requirements of this special provision are met.

In order to be able to send our batteries by ship, they comply with the DS238 of the IMDG code.

## 15. Regulatory Information

Nickel-Cadmium batteries are submitted to the European community directive 2006/66/CE for recycling.

Substances contained are submitted to the REACH (CE) n°1907/2006 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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