# BATTERY INFORMATION SHEET

## Sealed Nickel-Cadmium cells, modules and battery systems

*Issue A on May 07th, 2015*

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. IDENTIFICATION

### 1.1 Product

Sealed Ni-Cd cells and modules or battery systems composed of these cells

### 1.2 Supplier

| | |
|---|---|
| Headquarters: | ARTS Energy S.A.S. |
| Address: | 10 Rue Ampère – Zone industrielle – 16440 Nersac - France |
| Phone/Fax: | +33 (0)5 45 90 35 50 /+33 (0)5 45 90 37 65 |

### 1.3 Emergency contact

Chemtrec US Service within the USA: +800 424 93 00/outside : +1-202-483-7616 for English

INRS Orfila : +33(0) 1 45 42 59 59 for French

## 2. HAZARD IDENTIFICATION

Not chemically dangerous with normal use, where the electrode materials and the electrolyte are enclosed within the cell. In particular, the battery should not be opened or burned. Exposure to /Ingestion of the ingredients contained within could be harmful.

**EYE CONTACT:** contents of an opened cell (electrolyte) within a battery can cause severe burns.

**SKIN CONTACT:** Electrolyte solution inside cells can cause severe burns

**TEMPERATURE:** Do not place the batteries on or near fires or other high-temperature locations (> 70°C).

## 3. COMPOSITION, INFORMATION OR INGREDIENTS

| Component | CAS Number | EINECS/ELINCS | Content (wt. %)* |
|---|---|---|---|
| Active nickel** | 12054-48-7 | 235-008-5 | 10-25 |
| Active cadmium*** | 21041-95-2 | 244-168-5 | 10-19 |
| Cobalt | 21041-93-0 | 244-166-4 | 0-2 |
| Alkaline electrolyte (pH=14) | N/A | N/A | 14-27 |
| Plastics | N/A | N/A | 3-6 |
| Steel | N/A | N/A | 25-45 |

* Quantities may vary with cell model

** Active nickel present as $Ni(OH)_2$ and NiOOH

***Active cadmium present as $Cd(OH)_2$ and Cd

## 4. HANDLING AND STORAGE

**STORAGE:** Store in a dry place. Since short circuit can cause burn hazard, keep batteries in original packaging until use and do not jumble them.

**HANDLING:**

→ Do not short (+) or (-) terminal with conductors/conductive materials.

→ Do not reverse the polarity

→ Do not open the battery system or modules

→ Do not submit to excessive mechanical stress.

**CHARGING/DISCHARGING:** Refer to ARTS Energy Instructions.

## 5. PHYSICAL AND CHEMICAL PROPERTIES

The Nickel-Cadmium cell or battery described by this Battery Information Sheet is a manufactured "article" and does not expose the user to hazardous chemicals when used in accordance with manufacturer specifications.

| | |
|---|---|
| Boiling Point – Not applicable | Melting Point – Not applicable |
| Vapor Pressure – Not applicable | Vapor Density – Not applicable |
| Specific Gravity – Not applicable | Physical shape and colour as supplied |

## 6. STABILITY AND REACTIVITY

**The battery system is stable when handled and stored according to section 4**

**CONDITIONS TO AVOID:** Avoid exposing battery to fire or temperature over 85°C. Do not disassemble, crush or short-circuit the electrode connections or install with incorrect polarity. Avoid deformation/crushing of cells

## 7. TOXICOLOGICAL INFORMATION

If the cell is mechanically, thermally or electrically abused to the point of compromising the enclosure, toxic and hazardous internal components may be exposed.

**- ACUTE TOXICITY**

The electrolyte:

| | |
|---|---|
| Potassium hydroxide | LD50/oral/rat: 365 mg/kg |
| Sodium hydroxide | LD50/oral/rat: 4090 mg/kg |
| Lithium hydroxide | No data available |

Fumes containing cadmium compounds:

| | |
|---|---|
| Cadmium oxide | LD50/oral/rat: 1,3 mg/m3 (30 minutes) |
| Cadmium oxide | LD50/oral/mouse: 0,7 mg/m3 (30 minutes) |

**- HEALTH HAZARD**

Skin contact can cause severe injury.

Eye contact rapidly causes severe damage. Risk of permanent damage.

Ingestion usually results in severe injury. Risk of permanent injuries.

## 8. ECOLOGICAL INFORMATION

There is no ecological harm when batteries are used correctly and recycled after use has ended.

## 9. DISPOSAL CONSIDERATIONS

As with all battery systems, Ni-Cd cells must be collected separately from other waste and recycled – contact your local ARTS Energy dealer for information

Never incinerate Ni-Cd cells

Never dispose of Ni-Cd cells in landfills

Europe: End-of-life management must be performed according to directive 2006/66/EC on batteries and accumulators and waste batteries, accumulators and their transposition into each European Union's Member State national legislation. Check with ARTS Energy or with your national or local environment authority for details.

ARTS Energy has implemented a network of collection and recycling partners for waste industrial Ni-Cd batteries, See:

http://www.arts-energy.com

## 10. TRANSPORT INFORMATION

Sealed Nickel Cadmium batteries are considered to be "dry cell" batteries and are not subjected to dangerous goods regulation for the purpose of transportation by the U.S. Department of Transportation (DOT), the International Civil Aviation Administration (ICAO), the International Air Transport Association (IATA) or the International Maritime Dangerous Good regulations (IMDG).

International air transport is not restricted provided that, as stated in IATA special provision A123, batteries and battery powered devices/equipment being transported by air are protected from short-circuiting.

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.

More information concerning shipping, testing, marking and packaging can be obtained from your ARTS Energy sales representative.

## 11. REGULATORY INFORMATION

### 11.1 PRODUCT MARKING (EU)

**Cd**

### 11.2 PRODUCT MARKING (US)

Regulated marking includes the three pointed chasing arrows symbol, the abbreviation Ni-Cd, and the phrase: "**BATTERY MUST BE RECYCLED OR DISPOSED OF PROPERLY**".

## 12. FIRST AID MEASURES (not anticipated under normal use)

For contact with electrolyte:

**EYE CONTACT:** Rinse immediately with plenty of water during at least 15-30 minutes, seek immediate medical attention/treatment

**SKIN CONTACT:** Rinse immediately with plenty of water and seek medical attention/treatment

**INHALATION:** Remove to fresh air, rinse mouth and nose with water and seek immediate medical attention/treatment.

**INGESTION:** If the injured is fully conscious, clear mouth with water and afterwards drink plenty of water. Do not induce vomiting. Send immediately to hospital for medical attention/treatment.

## 13. FIRE FIGHTING MEASURES (not anticipated under normal use)

**ESTINGUISHING MEDIA:**

Use Class D-Dry chemical and/or sand

Do not use water

**SPECIAL FIRE FIGHTING PROCEDURES:**

Fire fighters should wear self-contained breathing apparatus and full fire-fighting protective clothing.

If overheated by an external source or by internal shorting, the cell may give off potassium hydroxide mist and/or hydrogen gas.

In fire situations, fumes containing cadmium and nickel compounds may develop; danger of serious acute damage to health by inhalation of fumes.

## 14. EXPOSURE CONTROLS AND PERSONAL PROTECTION* (not necessary under normal use)

Handle an opened battery only in a well-ventilated place.

| | | |
|---|---|---|
|  | **Respiratory protection** | Fire fighters should wear self-contained breathing apparatus. |
|  | **Hand protection** | Use polypropylene, polyethylene, rubber or Viton gloves when handling leaking or ruptured cells. |
|  | **Eye protection** | 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 |
|  | **Other** | In the event of leakage or ruptured cells, wear a rubber apron and protective clothes. |

**AFNOR pictograms*

## 15. ACCIDENTAL RELEASE MEASURES (not anticipated under normal use)

**INDIVIDUAL PRECAUTIONS:**

In case of fire, evacuate the employees from the area until fumes dispersal.

In case of electrolyte leakage, flush electrolyte spillage with plenty of water and beware risk of slipping/ falling.

In case of skin or eye contact, inhalation or ingestion, follow the measures described in section 12.

**ENVIRONMENTAL PRECAUTION:**

Avoid sewage, surface water and underground water contamination. Avoid ground and atmosphere contamination.

**WAYS OF CLEANING:**

Using protective glasses and gloves, use absorbent material (sand, earth or vermiculite) to absorb any exuded material. Seal leaking battery (unless hot) and contaminated absorbent material in plastic bag or suitable leak proff container and send for recycling in accordance with local regulations.

## 16. OTHER INFORMATION

This information has been compiled from sources considered to be dependable and is, to the best of our knowledge and belief, accurate and reliable as of the date compiled. However, neither exhaustively nor perfect reliability can be granted. Information does not imply implicit or specific warranty of it.

This information relates to the specific products designated and may not be valid for such products used in combination with any other materials or in any process. It is the user's responsibility to satisfy himself as to the suitability and completeness of this information for his particular use.

ARTS Energy does not accept liability for any loss or damage that may occur, whether direct, indirect, incidental or consequential, from the use of this battery information sheet provided as a service to our customers. ARTS Energy does not offer warranty against patent infringement.

**BATTERY INFORMATION SHEET**

**Sealed Nickel-Metal Hydride cells, modules and battery systems**

*Creation on January 10th, 2014*

The information contained within is provided as a service to our customers and for their information only. The information and recommendations set forth herein are made in good faith and are believed to be accurate at the date compiled. ARTS Energy makes no warranty expressed or implied.

## 1. PRODUCT IDENTIFICATION

### 1.1 Product

Sealed secondary (or rechargeable) Cells

| | |
|---|---|
| Trade name and model: | ARTS ENERGY, V… according to the model size and design. |
| IEC designation: | KR… 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 |

### 1.2 Usage

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.

### 1.3 Supplier

| | |
|---|---|
| Headquarters: | ARTS Energy |
| Address: | 10 rue Ampère - Zone Industrielle – 16440 NERSAC - FRANCE |
| Tel/Fax: | +33 (0)5 45 90 35 50 / +33 (0)5 45 90 37 65 |

### 1.4 Contact in case of emergency

Emergency contact: Tel +33 (0)5 45 90 12 19

Internet: www.arts-energy.com section “contact”

## 2. HAZARDS IDENTIFICATION

### A- Human hazards

A sealed Nickel-Metal Hydride cell is not hazardous in normal use.

2.1 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).

3.2 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.

### B- Environmental hazards

Metals used in a Ni-MH cell have to be collected and recycled through specialised organisations (list on www.rechargebatteries.org).

## 3. COMPOSITION

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 | Hydroxyle | 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<br>**N° CAS**<br>*N° EINEC* | Symbol | Letter | Identification of danger | Special risk (1) | Safety advice (2) |
| Nickel | 028-002-00-7<br>**7440-02-0**<br>*231-111-4* | Ni | Xn | Nocif | R 40-43<br>R 17 | S2, 22, 36 |
| Nickel Hydroxyde | 028-008-x*<br>**12054-48-7**<br>*235-008-5* | Ni(OH)2 | Xn; N | Carc. cat 3<br>Harmful | R 20/22, 43, 40<br>R 50/53 | S2<br>S 22 ,36, 60, 61 |
| Cobalt Hydroxyde | -<br>**21041-93-0**<br>*244-166-4* | Co(OH)2 | Xn; N | Harmful | R22-43-50/53 | S2-24-37; 60,61 |
| Potassium Hydroxyde | 019-002-00-8<br>**1310-58-3**<br>*215-181-3* | KOH | C, Xi | Corrosive , Irritant | R 35, 22<br>R36-37 | S 26-37/39 -45 |
| Sodium Hydroxyde | 011-002-00-6<br>**1310-73-2**<br>*215-185-5* | NaOH | C | Corrosive | R35 | S 26-37/39 -45 |
| Lithium Hydroxyde | -<br>**1310-65-2**<br>*215-183-4* | LiOH | C | Corrosive | R 35 | S 26-37/39 -45 |

(1) Nature of special risk

R 17: Spontaneously flammable in air

R 20/21/22: Harmful by inhalation, skin contact or if swallowed.

R 20/22: Harmful by inhalation or ingestion.

R 22: Harmful by ingestion.

R 35: Causes serious burns.

R 36/37: Sensitising for eyes and respiratory system.

R 40: Carcinogenic effect suspected. Possible risk of irreversible effects.

R 43: May cause sensitising by skin contact.

R42/43: May cause sensitising by inhalation and skin contact.

R50/53: Very toxic for aquatics organisms, possible harmful long term effect on aqueous environment.

(2) Safety advice

S 2: Keep out of reach of children.

S 7/8: Keep the container close

S 22: Do not breathe dust.

S 24: Avoid contact with skin

S 26: In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.

S 36: Wear suitable protection clothing.

S 37: Wear suitable gloves.

S 37/39: Wear suitable gloves and eyes/face protection.

S 45: In case of accident or if you feel unwell, seek medical advice immediately.

S 60: Eliminate as a dangerous product.

S 61: Avoid disposal in the environment. Consult the information about recycling.

## 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:

### 4.1: Inhalation

Fresh air. Rinse mouth and nose with water. Medical treatment.

### 4.2: Skin contact

Rinse immediately with plenty of water. Medical treatment.

### 4.3: Eyes contact

Rinse immediately with plenty of water during at least 15-30 min. Immediate hospital treatment. Consult eye specialist.

### 4.4: Ingestion

If the injured is fully conscious: plenty of drink, preferably milk. Do not induce vomiting.

Immediate Hospital treatment should be done.

## 5. FIRE FIGHTING MEASURES

### 5.1: Extinguishing media

Suitable: Class D-Dry chemical, sand, $CO_2$.

Not to be used: Water.

5.2: 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.

5.3: Special protective equipment

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

## 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.

6.1: Individual protections and equipment

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

6.2: Environmental precautions

No urgency measure requested.

6.3: cleaning

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

## 7. HANDLING USAGE AND STORAGE PRECAUTIONS

In normal use conditions, no safety rule is specified to handle the cells. Please apply ARTS ENERGY usage instructions.

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 PROPERTIES

9.1: Appearance

Nickel plated steel cylindrical cell, eventually sleeved. Dimensions and colour according specification.

9.2: Temperature range

Usage recommended between -40°C and +70°C.

Risk of electrolyte leakage over 100°C

9.3: Specific energy

33 to 80 Wh/Kg

9.4: Specific instant power

Up to 1000 W/Kg during 1 second

9.5: Mechanical resistance

According mechanical tests in IEC 61951-2 standard.

## 10 STABILITY AND REACTIVITY

10.1: Conditions

Ni-MH cells are stable in storage.

In case of storage in humid atmosphere, some rust may appear on the product.

In case of storage in a charged state, cells progressively lose their energy, generating eventually a progressive temperature increase according the thermal insulation efficiency of the packaging.

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… ).

In case of mechanical deterioration of the cells, active materials contained as powder can be dispersed (Nickel, Cobalt, Zinc, Metal hydride).

10.2: Hazardous decomposition products

Electrolyte solution is corrosive to all human tissues and will react violently with many organic chemicals.

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

## 10 TOXICOLOGICAL INFORMATION

The sealed Ni-MH cells as a product are not presenting toxicological hazards.

In case of can opening or destruction, the following substances can be released:

| SUBSTANCES | | | HAZARDS | | |
|---|---|---|---|---|---|
| Name | N° EC<br>**N° CAS**<br>*N° EINEC* | Symbol | effects | Dust exposure limits | Carcinogenicity/ mutagenicity/ reprotoxicity |
| Nickel | 028-002-00-7<br>**7440-02-0**<br>*231-111-4* | Ni | Xn | Nocif | R 40-43<br>R 17 |
| Nickel Hydroxyde | 028-008-x*<br>**12054-48-7**<br>*235-008-5* | Ni(OH)2 | LD50/oral/rat: 1600 mg/Kg | VME : 1000 µg/m3<br>VLE : / | Occupational |
| Cobalt Hydroxyde | -<br>**21041-93-0**<br>*244-166-4* | Co(OH)2 | LD50/oral/rat: 795 mg/Kg | VME : 100 µg/m3<br>VLE : / | / |
| alkaline Hydroxydes | 019-002-00-8<br>1310-58-3 | KOH<br>NaOH<br>LiOH | LD50/oral/rat: 365mg/Kg | KOH VME: 2mg/m3<br>NaOH VME:2mg/m3<br>LiOH VME : 25µg/m3 | / |

## 11 ECOLOGICAL INFORMATION

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 11 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.

## 12 DISPOSAL CONSIDERATIONS

12.1: Incineration

Never incinerate Ni-MH batteries.

12.2: Landfill

Never dispose Ni-MH batteries as landfill.

12.3: Recycling

Nickel Metal hydride 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 may refer to the following web page for further information and guidance: www.oecd.org/document/44/0,3343,en_2649_34371_1944748_1_1_1_1,00.html (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 Ni-MH batteries with sleeve are considered as "dry batteries" which transport is not checked. They are not submitted to specific transport obligations for land, maritime (IMDG) or air (IATA) transport, as they are protected against short-circuits.

Sealed Ni-MH cells or batteries without sleeve are submitted to ADR prescription under UNO code 3496, except in case of qualified packaging use (IATA group 2 type).

UNO code 3496:

NiMH cells or batteries packed with or contained in equipment are not subject to the provisions of this code.

All other 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. When the loaded gross mass is equal or higher than 100 kg they are subject to other provisions of this code described in the 3.2 chapter: they have to be kept away from heating sources (Category A).

## 15. REGULATORY INFORMATION

Nickel Metal hydride 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.

**BATTERY LITHIUM-ION INFORMATION SHEET**

**ARTS –Energy Part**

*Issue D on March 30th, 2016*

| 1. Identification of the Company | |
|---|---|
| **Batteries production sites** | 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 |
| **Emergency contacts** | ARTS Energy local dealer |

## 2. Composition & Information on Ingredients

Each cell consists of a hermetically sealed metallic container containing a number of chemicals and materials of construction of which the following could potentially be hazardous upon release.

| Ingredient | Content (%) | CAS No. | CHIP Classification | | |
|---|---|---|---|---|---|
| Aluminum Foil | 2-10 | 7429-90-5 | | | |
| Metal Oxide (proprietary) | 20-50 | | | | |
| Electrolyte (proprietary) | 10-20 | |  |  | |
| Polyvinylidene Fluoride (PVDF) | <5 | 24937-79-9 | | | |
| Carbon ($C_n$) | 10 to 30% | 7440-44-0 | | | NONE KNOWN |
| Copper Foil | 2-10 | 7440-50-8 | | | NONE KNOWN |
| Stainless steel, Nickel and inert materials | Reminder | N/A | | | NONE KNOWN |

*Amount varies depending on cell size*

## 3. Hazards Identification

**Emergency Overview**
May explode in a fire, which could release hydrogen fluoride gas.
Use extinguishing media suitable for materials burning in fire.
**Primary routes of entry**
Skin contact : NO
Skin absorption : NO
Eye contact : NO
Inhalation : NO
Ingestion : NO
**Symptoms of exposure**
Skin contact
No effect under routine handling and use.
Skin absorption
No effect under routine handling and use.
**Eye contact**
No effect under routine handling and use.
**Inhalation**
No effect under routine handling and use.
Reported as carcinogen

**Not applicable**
Risk of exposure only in case of abuse (mechanical, thermal, electrical) which leads to the activation of safety valves and/or the rupture of the battery container. Electrolyte leakage, electrode materials reaction with moisture/water or battery vent/explosion/fire may follow, depending upon the circumstances.

## 4. First Aid Measures

| ***THE CELL OR BATTERY ITSELF*** | |
|---|---|
| Inhalation | Not a health hazard. |
| Skin contact | Not a health hazard. |
| Eye contact | Not a health hazard. |
| Ingestion | If the product is swallowed, obtain medical attention immediately. |
| ***IF EXPOSURE TO INTERNAL MATERIALS*** | |
| Inhalation | Leave area immediately and seek medical attention. |
| Skin contact | Wash area thoroughly with soap and water and seek medical attention. |
| Eye contact | Rinse eyes with water for 15 minutes and seek medical attention. |
| Ingestion | Drink milk/water and induce vomiting; seek medical attention. |
| Further treatment | All cases of eye contamination, persistent skin irritation and casualties who have swallowed this substance or been affected by breathing its vapours should be seen by a Doctor. |

## 5. Firefighting Measures

Cell is not flammable. Combustion products include, but are not limited to hydrogen fluoride, carbon monoxide and carbon dioxide.

**Extinguishing Media**
Use extinguishing media suitable for the materials that are burning.

**Special Firefighting Instructions**
If possible, remove cell(s) from firefighting area. If heated above 160°C, cell(s) may explode/vent.

**Firefighting Equipment**
Use NIOSH/MSHA approved full-face self-contained breathing apparatus (SCBA) with full protective gear.

| | |
|---|---|
| **Extinguishing media** | Use water or $CO_2$ on burning Li-ion cells or batteries |

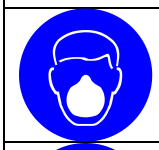
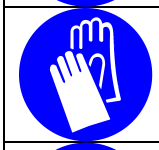
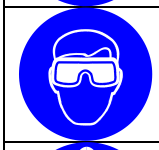
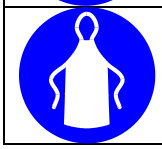
## 6. Accidental Release Measures

**On Land**
Place material into suitable containers and call local fire/police department.

**In Water**
If possible, remove from water and call local fire/police department.

## 7. Handling and Storage

| | |
|---|---|
| **Handling** | No special protective clothing required for handling individual intact cells<br>Do not crush, pierce, short (+) and (-) battery terminals with conductive (i.e. metal) goods.<br>Do not directly heat or solder.<br>Do not throw into fire.<br>Do not mix batteries of different types and brands.<br>Do not mix new and used batteries. Keep batteries in non-conductive (i.e. plastic) trays. |
| **Storage** | Store in a cool (preferably below 30°C) and ventilated area, away from moisture, sources of heat, open flames, food and drink. Keep adequate clearance between walls and batteries.<br>Temperature above 70°C may result in battery leakage and rupture. Since short circuit can cause burn, leakage and rupture hazard, keep batteries in original packaging until use and do not jumble them. |
| **Other** | Follow Manufacturers recommendations regarding maximum recommended currents and operating temperature range.<br>Applying pressure on deforming the battery may lead to disassembly followed by eye, skin and throat irritation. |

| 8. Exposure Controls & Personal Protection | | |
|---|---|---|
| **Occupational exposure standard** | | Compound:<br>$LiCoO_2$ 0.1 $mg/m^3$ max. (OSHA)<br>EC, EA, DMC N/A<br>$LiPF_6$ N/A |
|  | **Respiratory protection** | In all fire situations, use self-contained breathing apparatus. |
|  | **Hand & Feet protection** | In the event of leakage wear gloves.<br>Steel toed shoes recommended for large container handling. |
|  | **Eye protection** | Safety glasses are recommended during damaged batteries handling. |
|  | **Other** | In the event of leakage, wear chemical apron. |

| 9. Physical and Chemical Properties | |
|---|---|
| **Appearance** | Cylindrical or Prismatic Pack, with or without external wires and connector – casings can be added for specific applications |
| **Odour** | N/A |
| **pH** | Not Applicable |
| **Flash point** | Not applicable unless individual components exposed |
| **Flammability** | Not applicable unless individual components exposed |
| **Relative density** | Not applicable unless individual components exposed |
| **Solubility (water)** | Not applicable unless individual components exposed |
| **Solubility (other)** | Not applicable unless individual components exposed |

| 10. Stability and Reactivity | |
|---|---|
| Product is stable under conditions described in Section 7. | |
| **Conditions to avoid** | Heat above 100°C or incinerate. Deform. Mutilate. Crush. Pierce.<br>Disassemble Short circuit. Expose over a long period to humid conditions. |
| **Materials to avoid** | |
| **Hazardous decomposition Products** | None during normal operating conditions. If cells are opened, hydrogen fluoride and carbon monoxide may be released. |

| 11. Toxicological Information | |
|---|---|
| **Signs & symptoms** | None, unless battery ruptures. In the event of exposure to internal contents, corrosive fumes will be very irritating to skin, eyes and mucous membranes. Overexposure can cause symptoms of non-fibrotic lung injury and membrane irritation.<br>Organic Electrolyte : Acute toxicity : LD50 oral – Rat 2,000mg/kg or more |
| **Inhalation** | Lung irritant. |
| **Skin contact** | Skin irritant |
| **Eye contact** | Eye irritant. |
| **Ingestion** | Tissue damage to throat and gastro-respiratory tract if swallowed. |
| **Medical conditions generally aggravated by exposure** | In the event of exposure to internal contents, eczema, skin allergies, lung injuries, asthma and other respiratory disorders may occur. |

| 12. Ecological Information | |
|---|---|
| **Mammalian effects** | None known if used/disposed of correctly. |
| **Eco-toxicity** | None known if used/disposed of correctly. |
| **Bioaccumulation potential** | Some materials within the cell are bio accumulative. Under normal conditions, these materials are contained and pose no risk to persons or the surrounding environment. |
| **Environmental fate** | None known if used/disposed of correctly. |

| 13. Disposal Considerations |
|---|
| Do not incinerate, or subject cells to temperatures in excess of 70°C. Such abuse can result in loss of seal, leakage, and/or cell explosion.<br>California regulated debris<br>RCRA Waste Code : Non-regulated<br>Dispose of according to all federal, state, and local regulations. |

| 14. Transport Information | |
|---|---|
| **Restrictions & Label for conveyance** | **The requirements of the UN manual of Test and Criteria, Part III, sub-section 38.3 are fulfilled by ARTS Energy Li-Ion batteries.**<br><br>Air transportation:<br><br>If Part is a Li-ion cell (>2.7Wh and ≤ 20 Wh) : Transport by air is possible, in quantities of less than or equal to 8 per package and packed in accordance with ICAO/IATA Packing instruction 965 Section II.<br>A 'Caution - Li-ion batteries inside' label should be affixed to the package.<br>If Part is a multicell Li-ion battery pack (>2.7Wh and ≤ 100 Wh) : Transport by air is possible, in quantities of less than or equal to 2 per package and packed in accordance with ICAO/IATA Packing instruction 965 Section II.<br>A 'Caution - Li-ion batteries inside' label should be affixed to the package.<br>If part is a multicell Li-ion battery pack (>2.7Wh and ≤ 100 Wh) that when packed in quantities greater than 2, is restricted for transport by air. In this case, it must be packed in accordance with ICAO/IATA Packing instruction 965 Section IB and restricted to 10Kg per package for both PAX & CAO aircraft.<br>A 'Class 9 Hazardous Goods' label should be affixed to the package and, in compliance with ICAO/IATA Packing instruction 965 Section IB, a 'Caution - Li-ion batteries inside' label should be affixed to the package and a detailed consignment should be attached.<br>If Part is a multicell Li-ion battery pack (≤ 100 Wh), Transportation by air is possible that is non-restricted for transport by air when installed in equipment in quantities of less than or equal to 2 per piece of equipment and packed in accordance with ICAO/IATA Packing instruction 967 Section II.<br>Under these conditions, a 'Li-ion batteries inside' label is not required to be affixed to the package. However the maximum mass of batteries contained within each package is 5kg for PAX aircraft & CAO aircraft.<br>A detailed consignment should be attached (only if « LI-ION batteries inside »label is affixed to the package = more than 2 batteries/equipment).<br>In all other cases refer to the IATA Dangerous Goods Regulations (DGR) 56th Edition (January 2015).<br>**Damaged batteries Air Transportation is not allowed**<br><br>Sea transportation :<br>If Part is a multicell Li-ion battery pack (>2.7Wh and ≤ 100 Wh) : UN34.80, packing instruction SP188. The gross weight won't exceed 30 kg per package.<br>A 'Caution - Li-ion batteries inside' label should be affixed to the package. "Lithium-ion batteries subject to this provision shall be marked with the watt-hour rating on the outside case, except those manufactured before 1 January 2009" and the ADS 188 instructions have to be followed. The same information has to be visible on the attached papers.<br>If Part is a multicell Li-ion battery pack > 100 Wh) : The P903 procedure has to be respected with a group II packing mode.<br>A 'Class 9 Hazardous Goods – UN34.80' label should be affixed to the package (it should resist to 3 month in sea water) with « LITHIUM ION BATTERIES » printed on its side.<br>The multi modal document should be attached (IMDG, UN, Class 9 and other should be mentioned) including a phone number for additional information and the people responsible for the shipment have to be trained officially to IMDG. The power should be clearly visible and the ADS 188 instructions have to be followed. The same information has to be visible on the attached papers.<br>**For any Damaged batteries sea transportation, please contact us to set up the best packaging to fulfil the legal requirements.**<br><br>ROAD transportation (ADR):<br>**SP 188 « exemption »**<br>Lithium ion batteries, listed as UN No 3480, can be exempted from the regulations if the |

following conditions are given:

- The batteries have no more than 100 Wh nominal energy, each cell no more than 20 Wh nominal energy.
- The batteries have passed the UN tests.
- The batteries shall be packed in inner packagings that completely enclose them. They shall be protected so as to prevent short circuits.
- The package and the shipping documents are marked with a notice indicating that it contains lithium batteries (a « Caution - Li-ion batteries inside » label should be affixed to the package):
- an indication that the package contains "lithium ion" cells or batteries, as appropriate;
- an indication that the package shall be handled with care and that a flammability hazard exists if the package is damaged;
- an indication that special procedures shall be followed in the event the package is damaged, to include inspection and repacking if necessary;
- a phone number for additional information.
- Except when batteries are installed in or packed with equipment, packages shall not exceed 30 kg gross mass.
- The packaging shall be strong and capable of withstanding a 1.2 m drop test.

SP 310 « prototypes"
The testing requirements in sub-section 38.3 of the UN Manual of Tests and Criteria do not apply to production runs consisting of no more than 100 cells and batteries, or to pre-production prototypes of cells and batteries when these prototypes are carried for testing, if:

- the cells and batteries are carried in an outer packaging that is a metal, plastics or plywood drum or a metal, plastics or wooden box and that meets the criteria for packing group I; and
- each cell and battery is individually packed in an inner packaging inside an outer packaging and is surrounded by cushioning material that is non-combustible, and non-conductive.

SP 636 « contained in equipment »
Cells contained in equipment shall not be capable of being discharged during carriage to the extent that the open circuit voltage falls below 2 volts or two thirds of the voltage of the undischarged cell, whichever is the lower.
Up to the intermediate processing facility, used lithium cells and batteries with a gross mass of not more than 500g each, whether or not contained in equipment, collected and handed over for carriage for disposal together with or without other non-lithium cells or batteries are not subject to the other provisions of ADR if they meet the following conditions:

- The provisions of packing instruction P903b are complied with;
- A quality insurance system is in place to ensure that the total amount of lithium cells or batteries per transport unit doesn't exceed 333 kg;
- Packages shall bear the inscription: "USED LITHIUM CELLS ».

SP 661 « damaged lithium batteries"
Carriage of damaged lithium batteries if not collected and presented for carriage for disposal according to SP 636 is allowed only under additional conditions defined by the competent authority of any Contracting Party to ADR who may also recognize an approval granted by the competent authority of a country which is not a Contracting Party to ADR, provided that this approval has been granted in accordance with the procedures applicable according to ADR.
Only packing methods which are approved for these goods by the competent authority may be used.
The competent authority may define a more restrictive transport category or tunnel restriction code, which shall be included in the competent authority approval.
A copy of the competent authority approval shall be linked to each consignment or the transport document shall include a reference to the competent authority approval.
The competent authority of the Contracting Party to ADR granting an approval in

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|---|---|
| | accordance with this special provision shall notify the secretariat of the UNECE for the purpose of circulation of this information through its website.<br>**For any Damaged batteries road transportation, please contact us to set up the best packaging to fulfil the legal requirements**<br><br>NOTE: Any recommendations made by the UN for technical requirements for the carriage of damaged lithium batteries shall be considered when granting the approval.<br>Damaged lithium batteries means in particular:<br>- Batteries identified by the manufacturer as being defective for safety reasons;<br>- Batteries with damaged or considerably deformed cases;<br>- Leaking or venting batteries; or<br>- Batteries with faults that cannot be diagnosed prior to carriage to a place of analysis |
| **Applicable UN numbers** | UN 3480 (Primary and Li-Ion batteries transported in bulk).<br>UN 3481 (Primary and Li-Ion batteries contained in equipment or packed with it). |
| **Shipping name** | Lithium Batteries |
| **Packing group** | II |
| **Tunnel code** | (E) |
| **EmS No.** | F-A, S-I (last change in 2000) |
| **Marine pollutant** | No |
| **ONU Class** | Class 9 when restricted |

## 15. Regulatory Information

OSHA hazard communication standard (29 CFR 1910.1200)

| | |
|---|---|
| **Risk phrases** | Non hazardous. |
| **UK regulatory references** | Classified under CHIP |

## 16. Other information

This information has been compiled from sources considered to be dependable and is, to the best of our knowledge and belief, accurate and reliable as of the date compiled. However, no representation, warranty (either expressed or implied) or guarantee is made to the accuracy, reliability or completeness of the information contained herein.
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