

## Material Safety Data Sheet

### 1. Product & Company Identification

|                          |                                       |
|--------------------------|---------------------------------------|
| <b>Product:</b>          | NiMH rechargeable battery (AA ZLF)    |
| <b>Manufacturer:</b>     | Conrad Electronic SE                  |
| <b>Nominal voltage:</b>  | 1,2 V                                 |
| <b>Nominal capacity:</b> | 850 mAh                               |
| <b>Address:</b>          | Klaus-Conrad-Str. 1, D-92240 Hirschau |
| <b>Telephone:</b>        | +49 (0) 9604 / 40 - 8988              |
| <b>Date of issue:</b>    | 27.10.2016                            |

### 2. Hazardous Ingredients

**IMPORTANT NOTE:**

The battery should not be opened or burned. Exposure to the ingredients contained within or their combustion products could be harmful.

A) The content of elements are based on homogeneous materials level of NiMH battery:

| Element | Lead   | Cadmium | Hexavalent Chromium (Cr <sup>6+</sup> ) | Mercury | Polybrominated Biphenyls (PBBs) | Polybrominated Diphenyls Ethers (PBDEs) |
|---------|--------|---------|---|---------|---------------------------------|---|
| % W. t. | <0.004 | <0.002  | <0.1                                    | <0.0005 | <0.1                            | <0.1                                    |

B) The content of elements are based on total weight of NiMH battery:

| Material Or Ingredients                                      | % W. t.    |
|--|------------|
| Nickel (as nickel hydroxide, nickel oxide, nickel powder)    | 30 - 50    |
| Potassium Hydroxide  | < 5        |
| Cobalt (as cobalt metal, cobalt oxide, cobalt hydroxide)     | 2.5 - 6.0  |
| Sodium Hydroxide   | < 3        |
| Zinc (as zinc metal, zinc oxide, zinc hydroxide)             | < 3        |
| Mercury  | 0 - 0.0005 |
| Lead (as lead metal, lead oxide)                             | 0 - 0.004  |
| Cadmium (as cadmium metal, cadmium oxide, cadmium hydroxide) | < 0.002    |
| Hexavalent Chromium (Cr <sup>6+</sup> )                      | 0 - 0.0005 |
| Polybrominated Biphenyls (PBBs)                              | Nil        |
| Polybrominated Diphenyls Ethers (PBDEs)                      | Nil        |

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### 3. Physical/Chemical Characteristics

|  |                             |
|--|-----------------------------|
| Boiling Point:                           | N.A.                        |
| Specific Gravity (H <sub>2</sub> O = 1): | N.A.                        |
| Vapor Pressure (mmHg):                   | N.A.                        |
| Vapor Density (Air = 1):                 | N.A.                        |
| Melting Point:                           | N.A.                        |
| Evaporation Rate (Butyl Acetate):        | N.A.                        |
| Solubility in Water:                     | N.A.                        |
| Appearance and Odor:                     | Cylindrical Shape, odorless |

### 4. Reactivity Data

|  |                |
|--|----------------|
| Stability:                             | Stable         |
| Conditions to avoid:                   | N.A.           |
| Hazardous Decomposition or Byproducts: | N.A.           |
| Incompatibility (Material to Avoid):   | N.A.           |
| Hazardous Polymerization:              | Will not occur |

### 5. Fire and Explosion Hazard Data

If fire or explosion occurs when batteries are on charge, shut off power to charger.

In case of fire where nickel metal hydride batteries are present, apply a smothering agent such as METL-X, sand, dry ground dolomite, or soda ash, or flood the area with water. A smothering agent will extinguish burning nickel metal hydride batteries.

Water may not extinguish burning batteries but will cool the adjacent batteries and control the spread of fire. Burning batteries will burn themselves out. Virtually all fires involving nickel metal hydride batteries can be controlled with water. When water is used, however, hydrogen gas may evolve. In a confined space, hydrogen gas can form an explosive mixture. In this situation, smothering agents are recommended.

Fire fighters should wear self-contained breathing apparatus. Burning nickel metal hydride batteries can produce toxic fumes including oxides of nickel, cobalt, aluminum, manganese, lanthanum, cerium, neodymium, and praseodymium.

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### 6. Health Hazard Data

Under normal conditions of use, the battery is hermetically sealed.

**Ingestion:**

Swallowing a battery can be harmful.

Contents of an open battery can cause serious chemical burns of mouth, esophagus, and gastrointestinal tract.

**Inhalation:**

Contents of an open battery can cause respiratory irritation. Hypersensitivity to nickel can cause allergic pulmonary asthma. Provide fresh air and seek medical attention.

**Skin Contact:**

Contents of an open battery can cause skin irritation and/or chemical burns. Nickel, nickel compounds, cobalt, and cobalt compounds can cause skin sensitization and an allergic contact dermatitis. Remove contaminated clothing and wash skin with soap and water. If a chemical burn occurs or if irritation persists, seek medical attention.

**Eye Contact:**

Contents of an open battery can cause severe irritation and chemical burns. Immediately flush eyes thoroughly with water for at least 15 minutes, lifting upper and lower lids, until no evidence of the chemical remains. See medical attention.

### 7. Precautions For Safe Handling And Use

**Storage:**

Store in a cool, well ventilated area. Elevated temperatures can result in shortened battery life.

**Mechanical Containment:**

Never seal or encapsulate nickel metal hydride batteries.

Do not obstruct safety release vents on batteries. Encapsulation (potting) of batteries will not allow cell venting and can cause high pressure rupture.

**Handling:**

Accidental short circuit for a few seconds will not seriously affect the battery. However, this battery is capable of delivering very high short circuit currents. Prolonged short circuits will cause high cell temperatures which can cause skin burns. Sources of short circuits include jumbled batteries in bulk containers, metal jewelry, and metal covered tables or metal belts used for assembly of batteries into devices.

Do not open battery. The negative electrode material may be pyrophoric. Should an individual cell from a battery become disassembled, spontaneous combustion of the negative electrode is possible. This is much more likely to happen if the electrode is removed from its metal container. There can be a delay between exposure to air and spontaneous combustion.

Charging: This battery is made to be charged many times. Because it gradually loses its charge over a few months, it is good practice to charge battery before use. Use recommended charger. Improper charging can cause heat damage or even high pressure rupture. Observe proper charging polarity.

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### 8. Accidental Release or Spillage

**Steps to Be Taken in Case Material is Released or Spilled:**

Batteries that are leakage should be handled with rubber gloves. Avoid direct contact with electrolyte.

Wear protective clothing and a positive pressure Self-Contained Breathing Apparatus (SCBA).

### 9. Special Protection Information

**Ventilation Requirements:**

Not necessary under normal conditions.

**Respiratory Protection:**

Not necessary under normal conditions.

**Eye Protection:**

Not necessary under normal conditions. Wear safety glasses with side shields if handling an open or leaking battery.

**Gloves:**

Not necessary under normal conditions. Use neoprene or natural rubber gloves if handling an open or leaking battery.

**Open Battery Storage:**

Battery should not be opened. Should a cell become disassembled, the electrode should be stored in a fireproof cabinet, away from combustibles. Keep batteries between -20 °C and 35 °C for prolong storage.

When the cells are closed to fully charged, the storage temperature should be between -20 °C and +30 °C and should be controlled at 10 – 20 °C during transportation and packed with efficient air ventilation.

### 10. Exposure Controls / Person Protection

|  |                |      |
|--|----------------|------|
| Occupational Exposure Limits:          | LTEP           | N.A. |
|  | STEP           | N.A. |
| Respiratory Protection (Specify Type)  | N.A.           |      |
| Ventilation                            | Local Exhausts | N.A. |
|  | Special        | N.A. |
| Mechanical (General)                   | N.A.           |      |
| Other                                  | N.A.           |      |
| Protective Gloves                      | N.A.           |      |
| Eye Protection                         | N.A.           |      |
| Other Protective Clothing or Equipment | N.A.           |      |
| Work / Hygienic Practices              | N.A.           |      |

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### 11. Ecological Information

N.A.

### 12. Disposal Method

Dispose of batteries according to government regulations.

### 13. Transportation Information

#### A)

In general, all batteries in all forms of transportation (ground, air, or ocean) must be packed in a safe and responsible manner. Regulatory concerns from all agencies for safe packaging require that batteries be packaged in a manner that prevents short circuits and contained in "strong outer packaging" that prevents spillage of contents. All original packaging for our nickel hydride batteries has been designed to be compliant with these regulatory concerns.

Our nickel metal hydride batteries (sometimes referred to as "Dry cell" batteries) are not defined as dangerous goods under the IATA Dangerous Goods Regulations 57th edition 2016 ICAO Technical Instructions and the U.S hazardous materials regulations (49 CFR).

These batteries are not subject to be the dangerous goods regulations as they are compliant with the requirements contained in the following special provisions:

| Regulatory Body | Special Provisions            |
|-----------------|-------------------------------|
| ADR             | 295-304,598                   |
| IMO             | UN3496 SP117 and SP963        |
| UN              | UN3496                        |
| US DOT          | 49 CFR 172, 102 Provision 130 |
| IATA            | A199                          |

In addition, the IATA Dangerous Goods Regulations and ICAO Technical Instructions require the words "not restricted" and the Special Provision number A199 be provided on the air waybill, when an air waybill is issued.

#### B)

International Maritime Organization (IMO) IMDD code regulated these products as UN3496 BATTERIES, NICKEL METAL HYDRIDE, class 9 dangerous goods with Special Provision 117 and 963 assigned.

SP117

Only regulated when transported by sea.

SP963

Nickel-metal hydride button cells or nickel-metal hydride cells or batteries packed with or contained in equipment are not subject 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 not subject 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 cargos transport unit in a total quantity of 100 kg gross mass or more, they are subject to other provisions of this Code except those of 5.4.1, 5.4.3 and column (16) of the dangerous good list in Chapter 3.2.

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The requirements of these sections are:

- (1) dangerous goods transport documentation to accompany the shipment,
- (2) the shipment must be described as "UN3496, BATTERIES, NICKEL-METAL HYDRIDE, CLASS 9" on the shipper's declaration of dangerous goods.
- (3) the dangerous goods description must also be entered on the Dangerous Cargo Manifest and /or the detailed stowage plan in compliance with IMDG Code requirements of shipboard documentation.

### 14. Regulatory Information

Special requirement be according to the local regulatoryies.

### 15. Other Information

The data in this Material Safety Data Sheet relates only to the specific material designated herein.

### 16. Measures for Fire Extinction

In case of fire, it is permissible to use any class of extinguishing medium on these batteries or their packing material. Cool exterior of batteries if exposed to fire to prevent rupture.

Fire fighters should wear self-contained breathing apparatus.