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# MATERIAL SAFETY DATA SHEET

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**Narada Lithium Batteries**

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Date of Preparation: 31 Mar 2011

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## Section I – Product Identification

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Product Name: Polymer Lithium Ion Battery

Model: Prismatic Type Cells

Nominal Voltage: (n×3.7)V

Chemical System: Polymer Lithium Ion

Designated for Recharge:

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## Section II – Hazardous Ingredients

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IMPORTANT NOTE: The battery cell should not be opened or exposed to heat because exposure to the following ingredients contained within could be harmful under some circumstances.

| Chemical Name                                   | CAS No.    | PEL                                | TLV                                |
|-------------------------------------------------|------------|------------------------------------|------------------------------------|
| Lithium cobalt oxide (LiCoO <sub>2</sub> )      | 12190-79-3 | None Established                   | None Established                   |
| Graphite (C)                                    | 7782-42-5  | 2.5 mg/m <sup>3</sup><br>(as dust) | 2.5 mg/m <sup>3</sup><br>(as dust) |
| Organic Solvent                                 | Mixture    | None Established                   | None Established                   |
| lithium hexafluorophosphate(LiPF <sub>6</sub> ) | 21324-40-3 | None Established                   | None Established                   |
| Polyvinylidene difluoride (PVdF)                | 24937-79-9 | None Established                   | None Established                   |

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## Section III – Physical Data

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Specific Gravity: (H<sub>2</sub>O=1):LiCoO<sub>2</sub>:4.92, Graphite:2.09~2.23

Melting Point: (°C):

LiCoO<sub>2</sub> about 1130°C

Graphite about 3625°C

Appearance and Odor:

LiCoO<sub>2</sub> is a black, odorless powder.

C is a black, odorless powder.

Organic solvent is a colorless or light yellow liquid.

LiPF<sub>6</sub> is a white, crystalline and odorless powder.

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## Section IV — Fire and Explosion Hazard Data

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|                                  |                                                                                                                                                                                                                                                                                                             |
|----------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Extinguishing Media:             | Water                                                                                                                                                                                                                                                                                                       |
| Flammable Limits:                | Not available                                                                                                                                                                                                                                                                                               |
| Special Fire Fighting Procedure: | In case of fire in an adjacent area, use water, CO <sub>2</sub> or dry chemical extinguishers if cells are packed in their original containers since the fuel of the fire is basically paper products. For bulk quantities of unpackaged cells, use LITH-X (Graphite Base). In this case, do not use water. |

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## Section V - Reactivity Data

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|                                          |                                          |
|------------------------------------------|------------------------------------------|
| Stability:                               | Stable                                   |
| Conditions to Avoid:                     | Do not heat, disassemble or over charge. |
| Hazardous Decomposition or By-products:  | N/A                                      |
| Hazardous polymerization will not occur. |                                          |

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## Section VI - Health Hazard Data

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|                  |            |     |
|------------------|------------|-----|
| Routes of Entry: | Inhalation | Yes |
|                  | Skin       | Yes |
|                  | Ingestion  | Yes |

### Health Hazards (Acute and Chronic):

These chemicals are contained in a sealed can. Risk of exposure occurs only if the battery is mechanically or electrically abused. The most likely risk is an acute exposure when the gas release vent works. Organic solvent has slight toxicity and can irritate skin and eyes. Lithium salt is irritating to skin, eyes and mucous membranes and should be avoided.

### Carcinogenicity:

NTP: None      IARC Monograph: None      OSHA Regulated: None

### Medical Conditions Generally Aggravated by Exposure:

An acute exposure will not generally aggravate any medical condition.

### Emergency and First Aid Procedures:

In case of skin contact with contents of battery, flush immediately with water. For eye contact, flush with copious amounts of water for 15 minutes. Do not inhale leaked material. If irritation persists, get medical help.

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## Section VII - Precautions for Safe Handling and Use

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### Steps to be Taken in Case Material is Released or Spilled:

The preferred response is to leave the area and allow the batteries to cool and the vapors to dissipate. Avoid skin and eye contact or inhalation of vapors. Remove spilled liquid with absorbent and incinerate.

### Waste Disposal Method:

Dispose in accordance with appropriate regulations. Open cells should be treated as hazardous waste.

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Precautions to be Taken in Handling and Storing:

Avoid mechanical or electrical abuse.

Other Precautions:

Batteries may explode or cause burns, if disassembled, crushed or exposed to fire or high temperatures. Do not short or install with incorrect polarity.

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## Section VIII - Control Measure

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|                                         |                                               |
|-----------------------------------------|-----------------------------------------------|
| Respiratory Protection (Specify Type):  | Not necessary under conditions of normal use. |
| Ventilation:                            | Not necessary under conditions of normal use. |
| Protective Gloves:                      | Not necessary under conditions of normal use. |
| Eye Protection:                         | Not necessary under conditions of normal use. |
| Other Protective Clothing or Equipment: | Not necessary under conditions of normal use. |

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## Section IX - Recycling and Disposal

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Narada encourages battery recycling. Polymer Lithium ion batteries are safe for disposal in the normal municipal waste stream since they are not defined by the federal government as hazardous waste. However, Polymer lithium ion batteries are recyclable.

DO NOT INCINERATE or subject battery cells to temperatures in excess of 212°F. Such treatment can cause cell rupture.

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## Section X – Transportation

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Narada brand Lithium ion battery packs are of a type that is eligible for exemption from requirements for transport as Class 9 hazardous materials or dangerous goods under most national and international regulations. The batteries have a lithium-equivalent content of less than 1.5grams per cell and less than 8.0 grams per battery or battery pack, as well as a Watt-hour rating of no more than 20Wh per cells and no more than 100Wh per battery or battery pack. In addition, the batteries are of a type that has been demonstrated to pass each applicable test (T.1 through T.8) under the UN manual of Tests and Criteria (ST/SG/AC.10/11/Rev.4), Part III, Subsection 38.3.

To qualify for exemption, the batteries may be subject to certain requirements. For example, under the Dangerous Goods Regulations (52th Edition, 2011) of the International Air Transport Association (IATA), exempt batteries must be transported in accordance with Section II of Packing Instruction 965, 966, or 967(dependent upon whether they are shipped alone, or with or in equipment). See also, e.g., Special Provision 188 of the International Maritime Dangerous Goods (IMDG) Code (2008 Edition) and of the U.S. Department of Transportation (DOT) regulations at 49 C.F.R. §172.102.

In certain limited circumstances, such as if the batteries have been damaged such that they have the potential of producing a dangerous evolution of heat, fire, or short circuit, they are forbidden from transport by air. See IATA Dangerous Goods Regulations (52th Edition, 2011), General Requirements of Packaging Instructions 965, 966, and 967. Waste lithium batteries and lithium batteries being shipped for recycling or disposal are also prohibited from air transport unless approved by the appropriate national authority of the State of origin and the State of the operator. See IATA Dangerous Goods Regulations (52th Edition, 2011), General Requirements of Packaging Instructions 965.

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