

Safety Data Sheet Nickel Cadmium Batteries

1. Identification

1.1 Product Nickel Cadmium Battery (Rechargeable Alkaline Batteries)

Trade Name: KPL, KBL, KPM, KBM, KPH, KBH, VRPP, HVM, HVL, KRX, KRM, KRH, KFL, KFM, KFH, KFX, KSH, FH, FRX, and FRM cells with Polypropylene containers

IEC Designation: KL, KM, KH, KX, KGM, KGL according to IEC 60623/ IEC 62259

Relevant Identified Uses: Re-chargeable Nickel Cadmium batteries for UPS back up, switch gear applications etc.

1.2 Supplier

Exponential Power, Inc.

N56W16665 Ridgewood Drive Menomonee Falls, WI 53051

Phone: 262.708.5800 / 800.554.2243

Person responsible for preparation: Mike Hagen – Senior Vice President, Operations

Date: February 20, 2021

1.3 Emergency Contact

INFOTRAC: 800.535.5053 / 1.352.323.3500

2. Hazards

No risk if batteries are used for its intended purpose and according to valid directions for use.

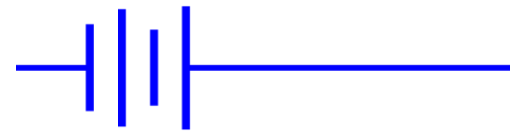
Under normal circumstances, positive, negative electrodes and alkaline electrolyte are inside the cell. Precautions required to be taken while handling cells, electrolyte during leakages, filling, and emptying. See also safety data sheet for electrolyte. Electrolyte is harmful if swallowed and causes severe burns.

Eye Effects: Contact with electrolyte extremely corrosive to eye tissues. May result in permanent blindness.

Skin Effects: Contact with electrolyte solution inside battery may cause serious burns to skin tissues.

Ingestion: Ingestion of electrolyte solution causes tissue damage to throat area. Ingestion of cadmium and nickel compounds is carcinogenic.





Inhalation: Mists generated during activation procedures may cause varying degrees of irritation to the nasal mucous membranes and respiratory tract issues.

3. Composition

Positive Electrode	Nickel hydroxide and Cobalt hydroxide on Nickel Plated substrate
Negative Electrode	Cadmium hydroxide and iron oxide on Nickel plated substrate
Electrolyte	Potassium Hydroxide + water
Nominal Voltage	1.2 V

3.1 (Weight as % of basic materials for a typical medium sized cell)

Metals %		Plastic %	Other (%)		
Steel (Fe)	10-25	Polypropylene	8-11	Potassium hydroxide	5.5-6.2
Nickel (Ni)	3-25			Lithium Hydroxide	0.5-1.0
Cadmium (Cd)	3-17			Carbon	0.1-4.0
				Water	28-35

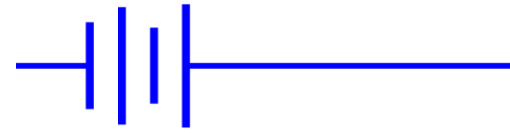
3.2 Chemical

Classification of Dangerous Substances Contained in the Product (In charged condition)

SUBSTANCES					CLASSIFICATION		
Name	Chemical	EINECS Number	CAS Number	Letter	Identification of Danger	Special Risk (1)	Safety Advise-2
Nickel Oxy Hydroxide	Ni OOH		86676-91-7	C	Not classified		
Cadmium	Cd	231-152-8	7440-43-9	Xn	Harmful	R45/26 R48/23/25 R50/53 R62/63/68	S2, S60, S61
Potassium Hydroxide	KOH	215-181-3	1310-58-3	C	Corrosive	R35, R22	S ^{1/2} , S26, S36/37/39, S45
Lithium Hydroxide	LiOH	215-183-4	1310-65-2	C	Not classified	R35	Not classified

For the wording of the listed risk phrases, please refer to section 16





4. First Aid Measures

When handling electrolyte, precautions must be taken to avoid personal to get in direct contact with it. If this accidentally happens the following must be exercised:

Inhalation: Supply fresh air OR Oxygen. Rinse mouth and nose with water. Call for doctor for medical treatment.

Skin Contact: Instantly wash with plenty of running water thoroughly. If skin irritation persists call for physician.

Eye Contact: Important: Rinse immediately with plenty of water during at least 15-30 minutes and consult a physician.

Ingestion: Rinse out mouth and then drink plenty of water (preferably milk). Do not induce vomiting. Immediately call for medical help.

5. Fire Fighting Measures

Extinguishing Media: Suitable Class D-Dry chemical, Carbon dioxide (CO₂), Carbon dioxide blanket, Sand, foam.

Not to be used: Water *

*Water sprinklers can be used for fire safety for the cells stored without connecting the inter cell connectors (As individual cells) in plywood boxes.

Special Exposure Hazards: Cells can be overheated by an external source or by internal shorting and develop potassium hydroxide mist and/or hydrogen gas. In fire situations fumes containing Cadmium, Nickel and Iron may be evolved.

Special Protective Equipment: Use self-contained breathing apparatus and full fire-fighting protective clothing. Use personal protective equipment. Ensure adequate ventilation. Remove all sources of ignition.

6. Accidental Release Measures

Personal Precautions, Protective Equipment & Emergency Procedures:

- Wear protective equipment
- Keep un-protected persons away
- Keep away from ignition sources
- Flush electrolyte spillage with plenty of water
- Beware risk of slipping

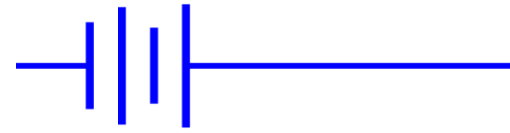
Environmental Precautions:

- Do not allow electrolyte to enter the ground/ soil

Methods and Materials for Containment and Cleaning:

- Collect mechanically
- Dilute with much water and neutralize





7. Handling and Storage

- Handle and store/ transport cells filled with electrolyte always with vents upwards
- Avoid direct sunlight, high temperature and high humidity
- Store in a cool and dry place (Between 10 to 30°C & humidity of 45 to 85%)
- Do not connect positive terminal to negative terminal with electrically conductive material
- Do not store/operate the Nickel Cadmium batteries in the same room where the lead acid batteries are stored / operated
- Keep away from water
- Do not use the tools used for lead acid batteries for use in Nickel Cadmium batteries (Ex: hydrometer and thermometer etc.)
- Do not store any other material on top of the batteries
- Batteries shall be stored in adequately ventilated areas

8. Exposure Controls/ Personal Protection

- Under normal condition of use no special personnel protection is required
- When emptying or filling cells with electrolyte, eye protection goggles and protection gloves, aprons must be used (Alkali resistant material)
- While carrying out preventive and routine maintenance, use only insulated tools
- Use self-contained breathing apparatus and full fire-fighting protective clothing.
- Ensure adequate ventilation
- Ensure availability of emergency eye wash facility in the battery room

9. Physical & Chemical Properties

Appearance: Batteries supplied in prismatic polypropylene plastic containers

Temperature Range: (ambient °C)

Cell Type	Continuous	Occasional
Plastic container	-40 +50	-50 +70

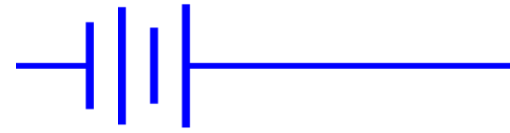
9.1 Specific Energy: 13-22 Wh/kg

Note: Wh: Normal voltage x Rated Ah
kg: Average battery weight in kg

9.2 Specific Instant Power: 53-106 W/Kg

Note: $W = 0.5 \times \text{Nominal voltage} \times I_p / \text{weight}$
 I_p = current in Amperes delivered by a fully charged battery for half the nominal voltage at one second
 kg = Average battery weight in kg





9.3

Melting point: Not applicable
Boiling point: Not applicable
Flash point: Not applicable

10. Stability and Reactivity

10.1 Chemical Stability

Thermal decomposition and conditions to be avoided:

- No decomposition if used according to specifications
- Temperatures over 85°C, short-circuit of electrode connections, deformation of cells
- Do not connect the positive terminal to the negative terminal with electrically conductive material
- Protect from heat and direct sunlight, protect from humidity and keep away from water, incompatible materials: conductive materials, water, seawater, strong oxidizers and strong acids

10.2 Material to Avoid

Do not fill cells with lead-acid battery electrolyte.

10.3 Possibility of Hazardous Decomposition Products

In the event of misuse of a battery gases like, oxygen or hydrogen accumulates in the cell and these gases may be emitted through the gas release vent. These gases may ignite if in the proximity of a naked flame or source of ignition.

Hazardous decomposition products: Acid or harmful gas is emitted during fire.

11. Toxicological Information

Nickel Hydroxide	LD ₅₀ / oral / rat: 1600 mg / kg*
Cadmium Hydroxide	No data available
Potassium Hydroxide	LD ₅₀ / oral / rat: 365 mg / kg* Lithium
Hydroxide	No data available
Cadmium oxide	LD ₅₀ / oral / rat: 1.3 mg / m ³ (30 minutes)
Cadmium oxide	LD ₅₀ / oral / mouse: 0.7 mg / m ³ (30 minutes)

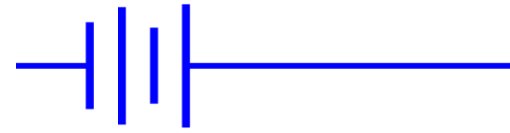
*(INRS data)

12. Ecological Information

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

Spilled/released electrolyte: The sharp pH rise may cause harmful impact on fish, plankton and stationary organisms.





13. Disposal Considerations

As with all battery systems, Ni-Cd cells must be collected separately from other waste and recycled.

13.1 Incineration

Never incinerate Nickel Cadmium batteries.

13.2 Landfill

Never dispose Ni-Cd cells as landfill.

13.3 Recycling

Nickel Cadmium batteries must be recycled. Contact Exponential Power, Inc. for information.

14. Transport Information

14.1 United Nations

UN No.: 2795

14.2 International Conventions

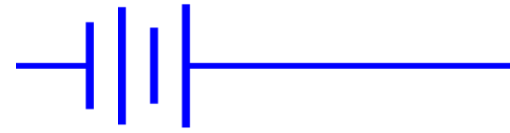
Air: IATA

Sea: IMDG

Land: ADR (road) or RID (rail) Batteries exempt according to special Paragraph No. 598.

UN No.	PROPER SHIPPING NAME	RAIL & ROAD (ADR)				SEA (IMDG)					AIR (IATA)			
		CL	Code	Packing group	Labeling	CL	Risk	EmS	Packing group	Labeling	CL	Risk	Packing group	Labeling
2795	BATTERIES, WET, FILLED WITH ALKALI Electric Storage	8	C 11	***	None	8	***	F-A, S-B	II	8	8	***	***	8

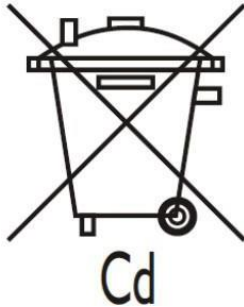




15. Regulatory Information

According to item 14.2.

15.1 Product Marking



16. Other Information

Marine Pollutant: none

Risk Phrases

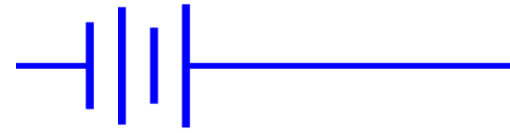
(1) Nature of Special Risk

- R22: Harmful if swallowed
- R26: Very toxic by inhalation
- R35: Causes severe burns
- R36/37: Irritating to eyes and respiratory system
- R48/23/25: May cause sensitization by skin contact
- R50/53: Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment
- R62: Possible risk of impaired fertility
- R63: Possible risk to the unborn child
- R68: Possible risk of irreversible effects

(2) Safety Advice

- S^{1/2}: Keep locked up and out of reach of children
- S2: Keep out of reach of children
- S26: In case of contact with eyes, rinse immediately with plenty of water and seek medical advice
- S36/37/39: Wear suitable protective clothing, gloves and eyes/face protection
- S45: In case of accident or if you feel unwell, seek medical advice immediately
- S60: Must be disposed of as hazardous waste
- S61: Avoid release to the environment





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