

# Material Safety Data Sheet (MSDS)

**Fluke BP290, Lithium-ion battery pack**

partnumber 4025762

**Fluke BP291, Lithium-ion battery pack**

partnumber 3894688

**Chemical System: Lithium-ion** (this is: NO Lithium-metal).

Each battery pack stores less than 100 Wh of energy ( <100 Wh).

Packs contain 0% Cd, 0%Hg, 0%Pb.

Each battery pack contains less than 8g of equivalent Lithium.

Of each of the above models of battery pack, two versions have been made and distributed. These can easily be distinguished e.g. using the number found near the barcode on the battery pack:

Battery details	BP290	BP291
Barcode number text	0040 244 0144 <u>1</u>	0040 244 0143 <u>1</u>
Chemistry	Li-ion (secondary battery, rechargeable)	
Cell or battery?	Battery pack	
Nominal voltage	10.8V	
Number of cells	3	6
Capacity of pack	2.4 Ah / 26 Wh	4.8 Ah / 52 Wh
Country of origin	Assembled in USA	
	LCD charge status indicator	
These battery packs are built on cells manufactured by either Molicel or Panasonic.		

Battery details	BP290	BP291
Barcode number text	0040 244 0144 <u>2</u>	0040 244 0143 <u>2</u>
Chemistry	Li-ion (secondary battery, rechargeable)	
Cell or battery?	Battery pack	
Nominal voltage	10.8V	
Number of cells	3	6
Capacity of pack	2.5 Ah / 54 Wh	5.0 Ah / 54 Wh
Country of origin	Made in China	
	'Test' button and LED charge status indicator	
These battery packs are built on cells manufactured by LG Chemical Ltd.		

**Cells used in this battery**

Cells used in these battery packs are manufactured by either Molicel, Panasonic or LG Chemical Ltd (see above). The MSDS information as provided by these three manufacturers for their cells is included with this document.

**Contact information:** Fluke Corporation, 6920 Seaway Blvd, Everett, WA 98203, USA

**Conformance information:**

These battery packs have been tested and were found to comply with the criteria of "UN Model Regulations, Manual of Test and Criteria, Part III, subsection 38.3, 5<sup>th</sup> edition, Amendment 1", also known as "ST/SG/AC.10/11/Rev.5", or "UN38.3 – 2014".

**Precautions for handling and use:**

- Do not disassemble or deform the battery
- Do not expose to fire, or dispose of in fire
- Avoid excessive physical shock or vibration
- Avoid short circuit the battery
- Do not immerse in water
- Never use a modified or damaged charger
- Use for the specified application only
- Store in a cool, dry, well-ventilated area
- Never use a battery that shows signs of damage
- Each battery pack stores < 100 Wh of energy
- Contains 0% Cd, 0%Hg, 0%Pb
- Only charge the battery in an approved charger; either use a Fluke testtool that lists compatibility with the BP290 or BP291, or use external charger EBC290.
- Refer to instruction sheet of associated testtool for operating instructions
- Keep the battery pack out of reach of children.

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The information contained within this document is provided for your information only.  
This battery is an article pursuant to 29 CFR 1910.1200 and, as such, is not subject to the OSHA Hazard Communication standard requirement for preparation of a material safety data sheet.  
This document at hand is therefore provided as a service to our customers only.

**Packing Instructions (P.I.)**

When battery is packaged separately (e.g. a replacement battery pack):	IATA P.I. 965 applies
When battery is packaged with a testtool, not contained in it (e.g. Fluke-190-series-II):	IATA P.I. 966 applies
When battery is contained within a testtool, then packaged (e.g. Fluke-430-series-II):	IATA P.I. 967 applies

Ensure that any shipment packaging that contains these batteries is properly marked on the outside of the package for containing Li-ion batteries, using the label as described in the 'Additional Requirements Section' of Packing Instructions 965...970. Minimum size of the label is 120 x 110 mm (4.75 x 4.33 inches).

**This document comprises 19 pages (including this page).**

Follow-on pages are:

- Panasonic Batteries, Product Information Sheet, January 1, 2014 (2 pages)
- Molicel<sup>®</sup> - E-One Moli Energy, Safety Data Sheet, February 2014 (7 pages)
- LG Chemical Ltd – MSDS for Model 18650 B4 cells, January 2014 (8 pages)

# Product Information Sheet

## Panasonic Batteries

Panasonic Industrial Company  
 A Division of Panasonic Corporation of North America  
 5201 Tollview Drive, 1F-3  
 Rolling Meadows, IL 60008  
 Toll Free: 877-726-2228  
 Fax: 847-468-5750  
 Internet: [www.panasonic.com/industrial/batteries-oem](http://www.panasonic.com/industrial/batteries-oem)  
 e-mail: [oembatteries@us.panasonic.com](mailto:oembatteries@us.panasonic.com)

**Product:** Lithium-ion Batteries

**(Li-ion)**

**Applicable models/sizes:** All Cylindrical and Prismatic Lithium-ion batteries

**Revision:** – January 1, 2014

**The batteries referenced herein are exempt articles and are not subject to the OSHA Hazard Communication Standard requirement. This sheet is provided as a service to our customers.**

### MSDS

Material Safety Data Sheets (MSDS) are a sub-requirement of the Occupational Safety and Health Administration (OSHA) Hazard Communication Standard, 29 CFR Subpart 1910.1200. This Hazard Communication Standard does not apply to various subcategories including anything defined by OSHA as an "article". OSHA has defined "article" as a manufactured item other than a fluid or particle; (i) which is formed to a specific shape or design during manufacture; (ii) which has end use function(s) dependent in whole or in part upon its shape or design during end use; and (iii) which under normal conditions of use does not release more than very small quantities, e.g. minute or trace amounts of a hazardous chemical, and does not pose a physical hazard or health risk to employees.

*Because all of our batteries are defined as "articles", they are exempt from the requirements of the Hazard Communication Standard, hence a MSDS is not required.*

The following components are found in a Panasonic Lithium Ion battery:

#### Nickel Manganese Cobalt Type

Component	Material	Formula / CAS
Positive Electrode	Lithium Nickel Manganese Cobalt Oxide	LiMnCoO <sub>2</sub> 346417-97-8
Negative Electrode	Graphite	C 7440-44-0
Electrolyte	Ethylene Carbonate – Solvent	C <sub>3</sub> H <sub>4</sub> O <sub>3</sub> 96-49-1
	Diethyl Carbonate – Solvent	C <sub>5</sub> H <sub>10</sub> O <sub>3</sub> 105-58-8
	Lithium Hexafluorophosphate – Salt	LiPF <sub>6</sub> 21324-40-3

#### Cobalt Type

Component	Material	Formula / CAS
Positive Electrode	Lithium Cobalt Oxide	LiCoO <sub>2</sub> 12190-79-3
Negative Electrode	Graphite	C 7440-44-0
Electrolyte	Ethylene Carbonate – Solvent	C <sub>3</sub> H <sub>4</sub> O <sub>3</sub> 96-49-1
	Diethyl Carbonate – Solvent	C <sub>5</sub> H <sub>10</sub> O <sub>3</sub> 105-58-8
	Lithium Hexafluorophosphate – Salt	LiPF <sub>6</sub> 21324-40-3

#### Nickel Cobalt Aluminum Type

Component	Material	Formula / CAS
Positive Electrode	Lithium Cobalt Nickel Aluminum Oxide	LiCoNiAlO <sub>2</sub> 193214-24-3
Negative Electrode	Graphite	C 7440-44-0
Electrolyte	Ethylene Carbonate – Solvent	C <sub>3</sub> H <sub>4</sub> O <sub>3</sub> 96-49-1
	Diethyl Carbonate – Solvent	C <sub>5</sub> H <sub>10</sub> O <sub>3</sub> 105-58-8
	Lithium Hexafluorophosphate – Salt	LiPF <sub>6</sub> 21324-40-3

**Notice:** The information and recommendations set forth are made in good faith and are believed to be accurate at the date of preparation. Panasonic Industrial Company makes no warranty expressed or implied.



### **DISPOSAL**

All Panasonic Lithium ion batteries are classified by the federal government as non-hazardous waste and are safe for disposal in the normal municipal waste stream. These batteries, however, do contain recyclable materials. Panasonic is a Licensee of the Call2Recycle Battery Recycling Program. If you build our cells into a battery pack, please call 1-800-8-BATTERY or go to the Call2Recycle website at [www.call2recycle.org](http://www.call2recycle.org) for additional information on how your branded product can also participate in the program.

### **TRANSPORTATION**

All Panasonic lithium ion batteries are not subject to the other requirements of the US Department of Transportation (DOT) Subchapter C, Hazardous Materials Regulations if shipped in compliance with 49 CFR 173.185 and Special Provision 188.

Effective January 1, 2014 all Panasonic lithium ion batteries can be shipped by air in accordance with International Civil Aviation Organization (ICAO) 2013-2014 edition, Section II or Section 1B or International Air Transport Association (IATA), 55th edition, Section II or 1B, Packing Instructions (PI) 965 (Batteries), PI 966 (Batteries, packed with equipment) and PI 967 (Batteries, contained in equipment) as appropriate.

Currently all Panasonic lithium ion batteries are regulated by the International Maritime Organization (IMO), 2012 edition, 36<sup>th</sup> amendment, under Special Provisions 188 and 230.

All Panasonic lithium ion cells are tested and comply with the UN Model Regulations, Manual of Test and Criteria, Part III, subsection 38.3.

If you build any of our lithium ion cells into a battery pack, you must also assure that they are tested in accordance with the UN Model Regulations, Manual of Test and Criteria, Part III, subsection 38.3, 5<sup>th</sup> revised edition, Amendment 1.

If you plan on transporting any untested prototype battery packs contact your Panasonic Sales Representative for regulatory information.

### **FIRST AID**

If you get electrolyte in your eyes, flush with water for 15 minutes without rubbing and immediately contact a physician. If you get electrolyte on your skin wash the area immediately with soap and water. If irritation continues, contact a physician. If the battery is ingested, call the National Capital Poison Center (NCPC) at 202-625-3333 (Collect) or your local poison center immediately.

### **GENERAL RECOMMENDATIONS**

CAUTION: Risk of fire, explosion and burns. Do not short-circuit, crush, incinerate or disassemble battery.

### **FIRE SAFETY**

In case of fire, you can use dry chemical, alcohol resistant foam or carbon dioxide fire extinguishers. Cooling the exterior of the batteries will help prevent rupturing. Burning of these batteries will generate toxic fumes. Fire fighters should use self-contained breathing apparatus. Detailed information on fighting a lithium ion battery fire can be found in Guide 147 (Lithium Ion Batteries) of the US DOT Emergency Response Guide.

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## SAFETY DATA SHEET

*This Safety Data Sheet meets or exceeds the requirements of the Canadian Controlled Product Regulations (WHMIS), the United States Occupational Safety and Health Administration (OSHA) hazard communication standard, and the applicable European Union Commission Directives.*

### 1. Product and Supplier Identification

**Products:**

ICR18650H Cells (2.2Ah)	IBR18650BB Cells (1.5Ah)
ICR18650J Cells (2.4Ah)	IBR18650BC Cells (1.5Ah)
ICR18650K Cells (2.6Ah)	IBR26700A Cells (2.8Ah)
ICR18650M Cells (2.8Ah)	IMR18650E Cells (1.4Ah)
IHR18650A Cells (2.0Ah)	IMR18650F Cells (1.2Ah)
IHR18650AG Cells (2.2Ah)	IMR26700A Cells (2.9Ah)
IHR18650B Cells (2.2Ah)	ICP1003450B Cells (1.8Ah)
IHR18650BL Cells (2.0Ah)	ICP1003450B with PTC Cells (1.8Ah)
IHR18650BN Cells (2.2Ah)	ICP103450CA Cells (2.0Ah)
IHR18650C Cells (2.0Ah)	ICP103450DA Cells (2.2Ah)
IBR18650A Cells (1.5Ah)	
IBR18650B Cells (1.5Ah)	

**Supplier:** E-One Moli Energy (Canada) Ltd,  
20000 Stewart Crescent,  
Maple Ridge, BC, Canada, V2X 9E7  
Telephone: (604) 466-6654  
Facsimile: (604) 466-6600  
24-hour number +1 (613) 996-6666 (Transport Emergencies Only)

### 2. Composition

Canada: This is not a controlled product under WHMIS. This product meets the definition of a "manufactured article" and is not subject to the regulations of the Hazardous Products Act.

USA: This battery is an article pursuant to 29 CFR 1910.1200 and, as such, is not subject to the OSHA Hazard Communication Standard requirement. The information contained in this Material Safety Data Sheet contains valuable information critical to the safe handling and proper use of the product. This MSDS should be retained and available for employees and other users of this product.

EU: Not classified as a dangerous preparation.

### 3. Hazards Identification

#### Routes of Entry:

<b>Skin Contact:</b>	No
<b>Skin Absorption:</b>	No
<b>Eye Contact:</b>	No
<b>Inhalation:</b>	No
<b>Ingestion:</b>	No

#### Overview:

##### Notice to reader:

*These cells have passed the quality, performance and manufacturing tests outlined in the United Nations Manual of Tests and Criteria, Part 38.3. Since these cells meet the highest standards they are unlikely to vent causing injury.*

When cells are handled as recommended by the manufacturer, there is no risk of injury. Risk of exposure exists only if the battery is mechanically or electrically abused. Cells must not be crushed, punctured, incinerated, immersed in water, or heated over 100°C. If, perchance, accidental exposure occurs, wash affected area with copious amounts of water for at least 15 minutes and seek medical attention. Fires involving batteries should be extinguished by use of CO<sub>2</sub>, dry chemical powder, or foam.

### 4. First Aid Measures

**EYE CONTACT:** If eye contact with contents of an open cell occurs, immediately flush eyes with large volumes of water for at least 15 minutes, holding eyelids open while flushing. Care must be taken not to cross contaminate the eyes. In all cases of eye contact seek immediate medical attention. Continue to flush during transport to a medical facility.

**SKIN CONTACT:** If skin contact with contents of an open cell occurs, immediately wash skin with soap and copious amounts of water for at least 15 minutes. Remove contaminated clothing and administer a safety shower if contamination of the torso or legs above the knee has occurred. Relief from pain and swelling may be obtained by applying topical ointments after washing. Seek immediate medical advice if significant areas of the body have been affected, or if a severe skin reaction occurs. Treatment must be immediate due to the formation of hydrofluoric acid on moist skin. Launder clothing before reuse and discard any contaminated leather footwear, gloves or clothing. Soak permeable belongings in benzalkonium chloride after washing.

**INHALATION:** If contents of an opened cell are inhaled remove victim to fresh air. If breathing is difficult a trained person may administer oxygen at a rate of 10 to 15 litres per minute. If breathing has stopped administer artificial respiration by use of a pocket mask or bag valve mask. Do NOT give mouth-to-mouth artificial respiration. Get medical attention immediately.

**INGESTION:** If ingestion of contents of an open cell occurs, do not give anything by mouth to a victim who is either unconscious or is losing consciousness. If swallowed, wash mouth with water and have victim spit the wash water out. Repeat. Give one to two glasses of water to wash the throat. Do NOT induce vomiting. If vomiting occurs naturally, have victim lean forward to avoid aspiration. Seek medical attention.

## 5. Fire Fighting Measures

**Incompatibility:** Water, strong oxidizing agents, strong reducing agents, strong acids and strong alkalis. Despite water incompatibility, it is the most effective fire fighting tool to control the spread of fire to other batteries and combustibles.

**Hazardous Combustion Products:** Hydrogen fluoride, phosphorus oxides, sulphur oxides, lithium hydroxide and oxides of carbon.

**Extinguishing Media:** Dry chemical, carbon dioxide, and foam. Water acts as a cooling agent.

**Fire Fighting Instructions:** In case of fire where lithium ion batteries are present, flood the area with water. If any batteries are burning, water may not extinguish them, but will cool the adjacent batteries and control the spread of fire. CO<sub>2</sub>, dry chemical, and foam extinguishers may be preferred for small fires, but also may not extinguish burning lithium ion batteries. Burning batteries will burn themselves out. Virtually all fires involving lithium ion batteries can be controlled with water. When water is used, however, hydrogen gas may be evolved which can form an explosive mixture with air. LITH-X (powdered graphite) or copper powder fire extinguishers, sand, dry ground dolomite or soda ash may also be used. These materials act as smothering agents.

In the case of a fire and the release of hydrogen fluoride, it is critical to protect the skin from any contact. Fire fighters should wear a self-contained breathing apparatus. Burning lithium ion batteries can produce toxic fumes including HF, oxides of carbon, aluminum, lithium, copper, and cobalt. Volatile phosphorus penta fluoride may form at a temperature above 230° Fahrenheit.

## 6. Accidental Release Measures

**Overview:** Evacuate area if fire is present or likely. Spills of this electrolyte from cells pose a risk to the safety of responders if water is present. Contact with water causes the production of extremely toxic and corrosive hydrofluoric acid. Remove all sources of ignition. Electrolyte will remove or soften painted surfaces causing slipperiness to be a hazard.

**Personal Protection:** Restrict access to area until completion of clean-up. For all spills, protect skin and eyes from contact with electrolyte. In all cases, wear self-contained breathing apparatus.

**Environmental Precautions:** Prevent from migration into soil and natural waterways. Absorb spilled material with non-reactive absorbent such as vermiculite, clay or earth.

**Cleanup Procedures:** Evacuate spill area immediately and remove sources of ignition. Do NOT touch spilled material. Cleanup personnel must be trained in the safe handling of this product. If possible ventilate area by means of non-sparking, grounded ventilation system. Spills may be absorbed on non-reactive absorbents such as vermiculite. Place cells into individual plastic bags and then place into appropriate containers and close tightly for disposal. Ensure that cleanup procedures do not expose spilled material to any moisture. Immediately transport closed containers outside.

Lined steel drums are suitable for storage of damaged cells until proper disposal can be arranged.

## 7. Handling and Storage

**Handling Procedures:** Do not short-circuit, open, disassemble, crush or burn cell. Do not expose cell to extreme heat or fire.

**Storage:** Store in a cool, dry, well-ventilated area, out of direct sunlight and away from heat and ignition sources.

## 8. Exposure Controls, Personal Protection

**Engineering Controls:** Use local exhaust ventilation or other engineering controls to control sources of dust, mist, fume and vapour.

**Respiratory Protection:** Not necessary under normal conditions of use.

**Skin Protection:** Not necessary under normal conditions of use.

**Eye and Face Protection:** Not necessary under normal conditions of use.

**Other:** Have a safety shower and eye wash station readily available.

## 9. Physical and Chemical Properties

<b>Appearance:</b>	Cylinder	<b>Vapour Density:</b>	Not applicable
<b>Odour:</b>	None, unless leaking then medium sweet and fruity odour	<b>Melting Point:</b>	Not applicable
<b>pH:</b>	Not applicable	<b>Boiling Point:</b>	Not applicable
<b>Vapour Pressure:</b>	Not applicable	<b>Relative Density:</b>	Not applicable
<b>Solubility:</b>	Not applicable	<b>Partition Coefficient:</b>	Not applicable
		<b>Evaporation Rate:</b>	Not applicable
		<b>Percent Volatiles:</b>	Not applicable

## 10. Stability and Reactivity

**Chemical Stability:** Stable.

**Incompatibility:** Not available.

**Hazardous Decomposition Products:** May decompose to produce hydrogen fluoride, phosphorus oxides, sulphur oxides, sulphuric acid, lithium hydroxide, carbon monoxide and carbon dioxide.

**Hazardous Polymerization:** Hazardous polymerization will not occur.



## 11. Toxicological Information

<b>Acute Exposure:</b>	See Section 3
<b>Chronic Exposure:</b>	See Section 3.
<b>Exposure Limits:</b>	See Section 2.
<b>Irritancy:</b>	Risk of irritation occurs only if the cell is mechanically, thermally or electrically abused to the point of compromising the enclosure. If this occurs, irritation to the skin, eyes and respiratory tract may occur.
<b>Sensitization:</b>	Not applicable.
<b>Carcinogenicity:</b>	Not applicable under normal use, however electrolyte contains a suspected cancer hazard.
<b>Teratogenicity:</b>	Not applicable.
<b>Reproductive toxicity:</b>	Not applicable.
<b>Mutagenicity:</b>	Not applicable.
<b>Synergistic Products:</b>	None reported.

## 12. Ecological Information

**Environmental toxicity:** No data available.

**Biodegradability:** No data available.

## 13. Disposal Considerations

**Canadian Environmental Protection Act:** Spent cells are not considered hazardous waste. Cells involved in a fire may be considered to be hazardous waste. Comply with all provincial and local regulations.

**Resource Conservation and Recovery Act (RCRA):** Spent cells are not considered hazardous waste. Cells involved in a fire may be considered to be hazardous waste. Comply with all state and local regulations.

## 14. Transport Information

**Canadian Transportation of Dangerous Goods Regulations:** These cells have passed the tests listed in the United Nations Manual of Tests and Criteria, Part 38.3. Not regulated for transport under Special Provision 34 of the Canadian Transport of Dangerous Goods Regulations

**United States Hazardous Materials Regulations (49 CFR):** These cells have passed the tests listed in the United Nations Manual of Tests and Criteria, Part 38.3. Not regulated for transport by Special Provision 188 of the United States Code of Federal Regulations Title 49.

**International Air Transport Association (IATA):** These cells have passed the tests listed in the United Nations Manual of Tests and Criteria, Part 38.3. Quantities of lithium-ion cells and batteries that exceed the "per package" limits described in Section II of the packing instruction 965 to 967 must be assigned to class 9 and shipped as "Section IB". Packages must bear the Class 9 Hazard label in addition to the lithium battery handling label.

Lithium-ion batteries larger than those permitted by Section II of the applicable packing instruction must be assigned to Class 9 and offered for consignment as UN 3480 (Lithium-ion batteries) or UN3481 (Lithium-ion Batteries contained in Equipment or Lithium-ion Batteries packed with Equipment). All applicable requirements contained in the IATA Dangerous Goods Regulations

relating to these commodities must be complied with, including the training requirements; a "Shipper's Declaration of Dangerous Goods" must be issued and packages must bear the class 9 hazard label.

These cells must be packaged in accordance with Packing instruction 965-967 and Special Provisions A88, A99, A154, A164 or A183, as applicable.

**International Maritime Organization (IMO):** These cells have passed the tests listed in the United Nations Manual of Tests and Criteria, Part 38.3. Not regulated for transport under Special Provision 188 of the International Maritime Dangerous Goods Code (IMDG).

**Any Lithium-ion cells or batteries subsequently repackaged or reshipped are required to meet all of the requirements specified above. Any cells that have subsequently been manufactured into batteries must be re-tested to pass the tests in the United Nations Manual of Tests and Criteria, Part 38.3 and any other applicable safety certifications.**

## 15. Regulatory Information

### Canadian Federal Regulations:

**Canadian Environmental Protection Act:** All ingredients in the electrolyte are on the Domestic Substances List.

**WHMIS Classification:** Not controlled, manufactured article

### United States Federal Regulations:

**Toxic Substances Control Act:** All ingredients are listed in the inventory.

**OSHA:** Does not meet criteria as per Part 1910.1200, manufactured article.

**CERCLA:** Does not meet criteria

**SARA 313:** Does not meet criteria

**SARA 311/312 EPA Hazard Categories:** Does not meet criteria

### EU Regulations

**EINECS:** Not applicable

**EU Classification:** Not classifiable

**Labels:** None

## 16. Other Information

**Preparation Date:** October 30, 2013

**Prepared by:** E-One Moli Energy Canada Limited. 20000 Stewart Crescent, Maple Ridge, British Columbia, Canada V2X 9E7

**Disclaimer:** This Material Safety Data Sheet was prepared in accordance with criteria and requirements of the Hazardous Products Act and the Controlled Products Regulations, European Union Commission Directives and the Occupational Safety and Health Administration using information provided by the manufacturer and other sources including CCINFO (Chemical Information published by the Canadian Centre for Occupational Health and Safety). The

information in the Material Safety Data Sheet is offered for your consideration and guidance when exposed to this product. E-One Moli Energy (Canada) Ltd. expressly disclaims all expressed or implied warranties and assumes no responsibilities for the accuracy or completeness of the data contained herein. The data in this MSDS does not apply to use with any other product or in any other process.

*This Material Safety Data Sheet may not be changed, or altered in any way without the expressed knowledge and permission of E-One Moli Energy (Canada) Ltd.*

**MATERIAL SAFETY DATA SHEET****Model LG18650 B4 Lithium Ion Rechargeable Battery****LG CHEMICAL LTD****1. Chemical Product and Company Identification****Product Identification**

LG CHEM, 18650 B4 Lithium-Ion Battery

**Manufacturer**

LG Chemical Ltd.

Twin Tower

Youido-Dong 120, Youngdeungpo-Ku

Seoul, Korea

**Emergency Telephone Number**

82-2-3773-7618

**2. Composition Information**

<b>Hazardous Ingredients</b>	<b>%</b>	<b>CAS Number</b>
Aluminum Foil	2-10	7429-90-5
Metal Oxide (Lithium Cobalt Oxide)	20-50	12190-79-3
Polyvinylidene Fluoride (PVDF)	<5	24937-79-9
Styrene-Butadiene-Rubber	<1	27288-99-9
Copper Foil	2-10	7440-50-8
Carbon (proprietary)	10-30	7440-44-0
Electrolyte (Methyl propionate)	10-20	554-12-1

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Ethylene carbonate	96-49-1
Lithium hexafluorophosphate	21324-40-3
Stainless steel, Nickel and inert materials	Remainder
	N/A

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### 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

## 4. First Aid Measures

### **Inhalation**

Not a health hazard.

### **Eye contact**

Not a health hazard.

### **Skin contact**

Not a health hazard.

### **Ingestion**

If swallowed, obtain medical attention immediately.

**IF EXPOSURE TO INTERNAL MATERIALS WITHIN CELL DUE TO DAMAGED OUTER CASING, THE FOLLOWING ACTIONS ARE RECOMMENDED :**

### **Inhalation**

Leave area immediately and seek medical attention.

### **Eye contact**

Rinse eyes with water for 15 minutes and seek medical attention.

### **Skin contact**

Wash area thoroughly with soap and water and seek medical attention.

### **Ingestion**

Drink milk/water and induce vomiting; seek medical attention.

## 5. Fire Fighting Measures

### General Hazard

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 fire fighting area. If heated above 125°C, cell(s) may explode/vent.

### Firefighting Equipment

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

## 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 cells.

### Storage

Store in a cool, dry place.

## 8. Exposure Controls / Personal Protection

### Engineering controls

Keep away from heat and open flame. Store in a cool dry place.

### Personal Protection

#### Respirator

Not required during normal operations. SCBA required in the event of a fire.

#### Eye/face protection

Not required beyond safety practices of employer.

#### Gloves

Not required for handling of cells.

#### Foot protection

Steel toed shoes recommended for large container handling.

## 9. Physical and Chemical Properties

State	Solid
Odor	N/A
PH	N/A
Vapor pressure	N/A
Vapor density	N/A
Boiling point	N/A
Solubility in water	Insoluble
Specific gravity	N/A
Density	N/A



## 10. Stability and Reactivity

### Reactivity

None

### Incompatibilities

None during normal operation. Avoid exposure to heat, open flame, and corrosives.

### Hazardous Decomposition Products

None during normal operating conditions. If cells are opened, hydrogen fluoride and carbon monoxide may be released.

### Conditions To Avoid

Avoid exposure to heat and open flame. Do not puncture, crush or incinerate.

## 11. Toxicological Information

This product does not elicit toxicological properties during routine handling and use.

Sensitization	Teratogenicity	Reproductive toxicity	Acute toxicity
NO	NO	NO	NO

If the cells are opened through misuse or damage, discard immediately. Internal components of cell are irritants and sensitizers.

## 12. Ecological Information

Some materials within the cell are bioaccumulative. Under normal conditions, these materials are contained and pose no risk to persons or the surrounding environment.

### 13. Disposal Considerations

California regulated debris

RCRA Waste Code : Nonregulated

Dispose of according to all federal, state, and local regulations.

### 14. Transport Information

Lithium Ion batteries are considered to be "Rechargeable batteries" and meet the requirements of transportation by the U.S. Department of Transportation(DOT), the International Civil Aviation Administration(ICAO), the International Maritime Dangerous Goods (IMDG) Code.

1. Even classified as lithium ion batteries (UN3480), 2014 IATA Dangerous Goods Regulations 55<sup>th</sup> edition Packing Instruction 965 Section IB or II is applied. The general and additional requirements apply to all lithium ion cells and batteries prepared for transport according to this packing instruction:

1) Section IB applies to lithium ion cells with a Watt-hour rating not exceeding 20 Wh and lithium ion batteries with a Watt-hour rating not exceeding 100 Wh packed in quantities that exceed the allowance permitted in Section II, Table 965-II; and

2) Section II applies to lithium ion cells with a Watt-hour rating not exceeding 20 Wh and lithium ion batteries with a Watt-hour rating not exceeding 100 Wh packed in quantities not exceeding the allowance permitted in Section II, Table 965-II.

TABLE 965-II

Contents	Lithium ion cells and/or batteries with a Watt-hour rating of 2.7 Wh or less	Lithium ion cells with a Watt-hour rating of more than 2.7 Wh but not more than 20 Wh	Lithium ion batteries with a Watt-hour rating of more than 2.7 Wh but not more than 100 Wh
1	2	3	4
Maximum number of cells/batteries per package	No limit	8 cells	2 Batteries
Maximum net quantity per package	2.5 kg	N/A	N/A

Cells and/or batteries specified in columns 2, 3 and 4 of Table 965-II must not be combined in the same package.

Each cell or battery is of the type proven to meet the requirements of each test in the UN Manual of Tests and Criteria Part 3 subsection 38.3.

The product has been evaluated according to the UN Manual of Tests and Criteria.

No.	Test Item	Criteria	Result
Test 1	Altitude simulation	-No leakage, venting, disassembly, rupture and no fire. -Measuring mass before/after each test. (If M>5g, less than 0.1%) -Measuring voltage before/after each test. (more than 90%)	Pass
Test 2	Thermal test		Pass
Test 3	Vibration		Pass
Test 4	Shock		Pass
Test 5	External short circuit	-No disassembly, rupture and fire within six hours of this test.	Pass
Test 6	Impact	-Max. temperature should not exceed 170 °C.	Pass
Test 7	Overcharge	-No disassembly and fire within seven days of the test.	Pass

## 15. Regulatory Information

OSHA hazard communication standard (29 CFR 1910.1200)

Hazardous       Non-hazardous