



## Technical Data Sheet

Ryobi Lithium-Ion Battery Pack  
Battery Voltage: 40V  
Battery Capacity: 5Ah / 180Wh

### SECTION 1: PRODUCT AND COMPANY IDENTIFICATION

**Product Name:** Lithium-Ion Battery — Rechargeable

**Model Number:** OP4050  
**Issue Date:** May 2016

Techtronic Industries Power Equipment  
1428 Pearman Dairy Road  
Anderson, SC 29625

**Company Phone Number:** 1-800-860-4050

**Emergency Contact Number:**  
**Chemtrec (United States only):** 1-800-424-9300  
**(International):** +1-703-741-5970

### SECTION 2: HAZARDS IDENTIFICATION

Refer to battery cell SDS for more information.

No exposure to hazards during routine handling of product.

#### ▲ WARNING:

- To reduce the risk of injury, user must read operator's manual.
- Risk of fire and burns.
- Do not open, crush, heat above 50°C, incinerate, or short terminals.
- Follow manufacturer's instructions.
- Use only with charger listed in operator's manual.
- Remove battery from tool when storing, changing attachments, or making adjustments.
- To reduce the risk of explosion and possible injury, do not place battery near fire or heat.
- Do not crush, drop, or damage battery pack.
- Do not use a battery pack that has been dropped or received a sharp blow. A damaged battery is subject to explosion. Properly dispose of a dropped or damaged battery immediately.
- Under extreme usage or temperature conditions, battery leakage may occur. If fluid comes in contact with your skin, wash immediately with soap and water. If fluid gets into your eyes, flush them with clean water for at least 10 minutes, then seek immediate medical attention. Following this rule will reduce the risk of serious personal injury.
- Battery cells and battery pack assembly will burn if incinerated.

### SECTION 3: COMPOSITION/INFORMATION OF INGREDIENTS

Refer to battery cell SDS for more information.

## SECTION 4: FIRST AID MEASURES

Refer to battery cell SDS for more information.

No exposure to hazards during routine handling of product.

### ▲ WARNING:

- To reduce the risk of injury, user must read operator's manual.
- Risk of fire and burns.
- Do not open, crush, heat above 50°C, incinerate, or short terminals.
- Follow manufacturer's instructions.
- Use only with charger listed in operator's manual.
- Remove battery from tool when storing, changing attachments, or making adjustments.
- To reduce the risk of explosion and possible injury, do not place battery near fire or heat.
- Do not crush, drop, or damage battery pack.
- Do not use a battery pack that has been dropped or received a sharp blow. A damaged battery is subject to explosion. Properly dispose of a dropped or damaged battery immediately.
- Under extreme usage or temperature conditions, battery leakage may occur. If fluid comes in contact with your skin, wash immediately with soap and water. If fluid gets into your eyes, flush them with clean water for at least 10 minutes, then seek immediate medical attention. Following this rule will reduce the risk of serious personal injury.
- Battery cells and battery pack assembly will burn if incinerated.
- No exposure during routine handling of product. Risk of exposure occurs only if the battery is mechanically or electrically abused.
- No effect under routine handling and use to eyes, skin, or if inhaled. Ingestion is not likely, given the physical size and state of the cell. If swallowed, seek medical attention immediately.
- If exposure to internal materials within cell due to damaged outer casing, the following actions are recommended:

#### EYE CONTACT:

Flush with water for 10 minutes without rubbing and immediately seek medical attention.

#### SKIN CONTACT:

Wash area immediately with soap and water. If irritation continues, seek medical attention.

#### INHALATION:

Leave area immediately, move to fresh air, and seek medical attention.

#### INGESTION:

If swallowed, contact POISON CONTROL CENTER immediately.

## SECTION 5: FIRE FIGHTING MEASURES

Refer to battery cell SDS for more information.

## SECTION 6: ACCIDENTAL RELEASE MEASURES

### PERSONAL PRECAUTIONS:

- Use standard industrial clothing in normal use.
- If handling large containers of cells, wear steel-toed footwear.

### ENVIRONMENTAL PRECAUTIONS:

No special precautions necessary.

### METHODS FOR CONTAINMENT:

- Transport container outdoors.
- Always consult and obey all international, federal, and local environmental laws.

### METHODS FOR CLEANUP:

No data available

### OTHER INFORMATION:

No data available

## SECTION 7: HANDLING AND STORAGE

### HANDLING:

- Use only approved charging equipment.
- Do not disassemble battery or battery pack.
- Do not puncture, crush, or dispose of in fire.

### STORAGE:

To obtain the longest possible battery life, we suggest the following:

- Remove the battery pack from the charger once it is fully charged and ready for use.

For battery pack storage longer than 30 days:

- Store the battery pack where the temperature is below 80°F and away from moisture.
- Store battery packs in a 30%-50% charged condition.
- Every six months of storage, charge the pack as normal.

## SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

Refer to battery cell SDS for more information.

## SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

Battery pack consists of battery cells assembled in resin enclosure and is a solid odorless product that will burn if incinerated.

## SECTION 10: STABILITY AND REACTIVITY

Refer to battery cell SDS for more information.

No exposure to hazards during routine handling of product.

### ▲ WARNING:

- To reduce the risk of injury, user must read operator's manual.
- Risk of fire and burns.
- Do not open, crush, heat above 50°C, incinerate, or short terminals.
- Follow manufacturer's instructions.
- Use only with charger listed in operator's manual.
- Remove battery from tool when storing, changing attachments, or making adjustments.
- To reduce the risk of explosion and possible injury, do not place battery near fire or heat.
- Do not crush, drop, or damage battery pack.
- Do not use a battery pack that has been dropped or received a sharp blow. A damaged battery is subject to explosion. Properly dispose of a dropped or damaged battery immediately.
- Under extreme usage or temperature conditions, battery leakage may occur. If fluid comes in contact with your skin, wash immediately with soap and water. If fluid gets into your eyes, flush them with clean water for at least 10 minutes, then seek immediate medical attention. Following this rule will reduce the risk of serious personal injury.
- Battery cells and battery pack assembly will burn if incinerated.

## SECTION 11: TOXICOLOGY INFORMATION

Refer to battery cell SDS for more information.

No exposure to hazards during routine handling of product.

### ▲ WARNING:

- To reduce the risk of injury, user must read operator's manual.
- Risk of fire and burns.
- Do not open, crush, heat above 50°C, incinerate, or short terminals.
- Follow manufacturer's instructions.
- Use only with charger listed in operator's manual.
- Remove battery from tool when storing, changing attachments, or making adjustments.
- To reduce the risk of explosion and possible injury, do not place battery near fire or heat.
- Do not crush, drop, or damage battery pack.
- Do not use a battery pack that has been dropped or received a sharp blow. A damaged battery is subject to explosion. Properly dispose of a dropped or damaged battery immediately.
- Under extreme usage or temperature conditions, battery leakage may occur. If fluid comes in contact with your skin, wash immediately with soap and water. If fluid gets into your eyes, flush them with clean water for at least 10 minutes, then seek immediate medical attention. Following this rule will reduce the risk of serious personal injury.
- Battery cells and battery pack assembly will burn if incinerated.

## SECTION 12: ECOLOGICAL INFORMATION

### ECOTOXICOLOGICAL INFORMATION:

None in routine handling of product.

### TOXICITY:

No data available

### PERSISTENCE AND DEGRADABILITY (BIOPERSISTENCY & BIODEGRADABILITY):

None in routine handling of product.

### POTENTIAL OF BIOACCUMULATION:

None in routine handling of product.

### MOBILITY IN SOIL:

None in routine handling of product.

### OTHER ADVERSE EFFECTS:

No data available

### DISPOSAL:

Follow guidelines in Section 13.

## SECTION 13: DISPOSAL CONSIDERATIONS

This product contains Lithium-ion batteries. Local, state or federal laws may prohibit disposal of batteries in ordinary trash. Consult your local waste authority for information regarding available recycling and/or disposal options.

### DISPOSAL:

- Dispose in accordance with appropriate regulations.
- Always consult and obey all international, federal, provincial/state, and local hazardous waste disposal laws. Some jurisdictions require recycling of this spent product. Battery recycling is encouraged.
- 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, Lithium-ion batteries are recyclable.
- To preserve natural resources, please recycle or dispose of batteries properly.

### ▲ WARNING:

- Upon removal, cover the battery pack's terminals with heavy-duty adhesive tape.
- Do not attempt to destroy or disassemble battery pack or remove any of its components.
- Batteries must be recycled or disposed of properly.
- Also, never touch both terminals with metal objects and/or body parts as short circuit may result.
- Keep away from children. Failure to comply with these warnings could result in fire and/or serious injury.
- This product does not contain mercury, cadmium or Lithium (metal).
- DO NOT INCINERATE battery cells.

## SECTION 14: TRANSPORTATION INFORMATION

### U.S. DOT Hazardous Material Regulations (Re: Ground Transport)

UN3480 Lithium-ion batteries over 101 watt hours or UN3481 Lithium-ion batteries packed with equipment over 101 watt hours when packaged correctly can travel under 49 CFR 173.185 when traveling by ground in the continental U.S.

### Canada Transport Dangerous Goods (Re: Ground Transport)

UN3480 Lithium-ion batteries over 101 watt hours or UN3481 Lithium-ion batteries packed with equipment over 101 watt hours when traveling by ground in Canada must be declared as Dangerous Goods. The batteries must be packaged according to Packing Instruction 965. The following labels must be on the package: DG9 diamond, Red Bordered Lithium-ion warning label (ICAO). The package must also include a UN3480 Lithium-ion batteries label or a UN3481 Lithium-ion batteries with equipment label with the net weight of the batteries in kgs. The BOL must also state UN3480, Lithium-ion batteries,9,PGII or UN3481 Lithium-ion batteries packed with equipment,9,PGII.

### International Dangerous Goods Regulations (Re: Air, Sea, Ground Transport)

UN3480 Lithium-ion batteries over 101 watt hours or UN3481 Lithium-ion batteries over 101 watt hours packed with equipment when shipped by sea will be considered Class 9 Dangerous Goods must be packaged according to Packing Instruction 965, and contain the following labels: DG9 diamond, Red Bordered Lithium-ion warning label (ICAO), Forbidden for Transport by Water or Air.

UN3480 Lithium-ion batteries over 101 watt hours or UN3481 Lithium-ion batteries over 101 watt hours packed with equipment when shipped by air will be considered Class 9 Dangerous Goods must be packaged according to Packing Instruction 965, and contain the following labels: DG9 diamond, Red Bordered Lithium-ion warning label (ICAO), Cargo Aircraft Only, and Forbidden for Transport by Water or Air.

This rechargeable Lithium-ion battery has passed the relevant transportation test requirements as described in the UN Manual of Tests and Criteria, Part III, section 38.3. UN 38.3 Test Reports are maintained by the company.

## SECTION 15: REGULATORY INFORMATION

Compliant with, relevant transportation test requirements as described in the UN Manual of Tests & Criteria, Part III, Sub section 38.3.

### CALIFORNIA PROPOSITION 65

#### ▲ WARNING:

This product may contain chemicals, including lead, known to the State of California to cause cancer, birth defects or other reproductive harm. Wash hands after handling.

## SECTION 16: OTHER INFORMATION

The information contained within this document is provided for your information only. In case of any discrepancy, the information provided in the battery cell Safety Data Sheet takes precedence over the information provided in the battery pack Technical Data Sheet.

Prepared by: Techtronic Industries Power Equipment

The batteries referenced herein are considered exempt articles and are not subject to the OSHA Hazard Communication Standard; therefore an SDS is not required. This sheet is being provided as a service to our customers.

The information and recommendations set forth are made in good faith and believed to be accurate as of the date of preparation. TECHTRONIC INDUSTRIES POWER EQUIPMENT makes no warranty, expressed or implied, regarding the accuracy of this data or the results to be obtained from the use thereto.

# Safety Data Sheet

## 1. Product and Company Identification

**Important Note:** As a solid, manufactured article, exposure to hazardous ingredients is not expected with normal use. 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.

### Commercial product name

See Further Information below for Model Names

### Use of the substance/preparation

Lithium-Ion battery

### Manufacturer

LG Chemical Ltd.

### Address

LG Twin Towers, 128, Yeoui-daero, Yeongdeungpo-gu, Seoul, Korea

### Company/undertaking identification

Emergency Contact (LG Chemical Ltd.)  
82-2-3773-7618

Emergency Contact (Chemtrec)  
1-800-424-9300 : US and Canada  
1-703-527-3887 : International

### Further Information

Model Name	Nominal Voltage	Rated Capacity	Wh Rating
LG18650HE2	3.6 V	2.45 Ah	8.82 Wh



Anode (negative electrode): based on intercalation graphite

Cathode (positive electrode): based on lithiated metal oxide (Cobalt, Nickel, Manganese)

### **Remark:**

The information and recommendations set forth are made in good faith and believed to be accurate as of the date of preparation. LG Chemical Ltd. makes no warranty, expressed or implied, with respect to this information and disclaims all liabilities from reliance on it.

## 2. Hazards Identification

Protective Clothing	NFPA Rating (USA)	EC Classification	WHMIS (Canada)	SafeWork (Australia)
Not required with normal use.		Not classified as hazardous	Not applicable with normal use.	Not classified as hazardous
GHS Hazard Symbol	IATA	JIS (Japan)	Taiwan	China
Not applicable with normal use.		Not classified as hazardous	Not classified as hazardous	Not classified as hazardous

### 2.1. Classification of the substance or mixture.

**2.1.1. Preparation Hazards and Classification:** The product is a Lithium ion cell or battery and is therefore classified as an article and is not hazardous when used according to the recommendations of the manufacturer. The hazard is associated with the contents of the cell or battery. Under recommended use conditions, the electrode materials and liquid electrolyte are non-reactive provided that the cell or battery integrity remains and the seals remain intact. The potential for exposure should not exist unless the cell or battery leaks, is exposed to high temperatures or is mechanically, electrically or physically abused/damaged. If the cell or battery is compromised and starts to leak, based upon the battery ingredients, the contents are classified as Hazardous.

#### 2.1.2. Hazard Summary

**Physical hazards:** Not classified for physical hazards.

**Health hazards:** Not classified for health hazards.

**Environmental hazards:** Not classified for hazards to the environment.

**Specific hazards:** Exposure to contents of an open or damaged cell or battery: contact with this material will cause burns to the skin, eyes and mucous membranes.

May cause sensitization by skin contact.

**Main Symptoms:** Symptoms include itching, burning, redness and tearing.

### 2.2. Other Hazards.

**2.2.1. Appearance, Color and Odor:** Solid object with no odor.

**2.2.2. Primary Routes(s) of Exposure:** These chemicals are contained in a sealed enclosure. Risk of exposure occurs only if the cell or pack is mechanically, thermally, electrically or physically abused to the point of compromising the enclosure.

If this occurs, exposure to the electrolyte solution contained within can occur by inhalation, ingestion, eye contact and skin contact.

#### 2.2.3. Potential Health Effect(s):

**2.2.3.1. Acute (short term):** see Section 8 for exposure controls.

In the event that this cell or pack has been ruptured, the electrolyte solution contained within the cell would be corrosive and can cause burns to skin and eyes.

**Inhalation:** Inhalation of materials from a sealed cell is not an expected route of exposure. Vapors or mists from a ruptured cell may cause respiratory irritation.

**Ingestion:** Swallowing of materials from a sealed cell is not an expected route of exposure. Swallowing the contents of an open cell can cause serious chemical burns to mouth, esophagus, and gastrointestinal tract.

**Skin:** Contact between the cell and skin will not cause any harm. Skin contact with the contents of an open cell can cause severe irritation or burns to the skin.

**Eye:** Contact between the cell and the eye will not cause any harm. Eye contact with the contents of an open cell can cause severe irritation or burns to the eye.



**2.2.3.2. CHRONIC (long term):** see Section 11 for additional toxicological data.

**2.2.4. Medical Conditions Aggravated by Exposure:** Not Available.

**2.2.5. Interactions with other chemicals:** Immersion in high conductivity liquids may cause corrosion and breaching of the cell or battery enclosure. The electrolyte solution inside of the cells may react with alkaline (basic) materials and present a flammability hazard.

**2.2.6. Potential Environmental Effects:** Not Available.

### 2.3. GHS precautionary statements

Precautionary Statement(s) Prevention	P102: Keep out of reach of children. P103: Read label prior to use. P202: Do not handle until all safety precautions have been read and understood. P210: Keep away from heat/sparks/open flames/hot surfaces – No smoking. P234: Keep only in original container. P254: Wash hands thoroughly after handling.
Response (If cell/battery leaks)	P260: Do not breathe vapor or spray. P280: Wear protective gloves/protective clothing/eye protection/face protection. P301/330/331: IF SWALLOWED: Rinse mouth. DO NOT induce vomiting. P303/361/353: IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower. P304/340: If INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. P305/351/338: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. P310: Immediately call a POISON CENTER or doctor/physician. P363: Wash contaminated clothing before reuse. P370: In case of fire: Use carbon dioxide, dry chemical or water extinguisher.
Storage (Store as indicated in Section 7)	P402: Store in a dry place. P405: Store locked up. P410: Protect from sunlight.
Disposal	P406: Store any spilled/leaking electrolyte material in a corrosive resistant container with a resistant inner liner. P501: Dispose of batteries in accordance with applicable hazardous waste regulations.

### 3. Composition/information on ingredients

#### Hazardous components

	Chemical Name	CAS No.	*Mass range in cell (g/g %)
Electrolyte	Contains Electrolyte salt and solvents.		5-20
Electrolyte salt	Lithium hexafluorophosphate	21324-40-3	0.05-5
Electrolyte solvent	Includes one or more of the following; Ethylene Carbonate Propylene Carbonate Dimethyl Carbonate Diethyl Carbonate Carbonic acid diethyl ester 1,3-Dioxolan-2-one 4-Methyl-1,3-dioxolan-2-one	96-49-1 96-49-4 108-32-7 616-38-6 105-58-8 105-58-8 96-49-1 108-32-7	5-20
PVDF	Polyvinylidene fluoride	24937-79-9	<5

Copper	Cu	7440-50-8	2-10
Aluminum	Al	7429-90-5	2-10
Cathode	Lithium Nickel Manganese Cobalt Oxide	182442-95-1	20-50
Anode	Graphite	7440-44-0	10-30
Steel, Nickel, and inert components		Various	Balance

Because of the cell structure the dangerous ingredients will not be available if used properly. During charge process a lithium graphite intercalation phase is formed.

#### **4. First Aid Measures**

##### **4.1. Description of first aid measures**

The hazardous components of this cell or battery are contained within a sealed unit. The following measures are only applicable if exposure has occurred to components when a cell or battery leaks, is exposed to high temperatures or is mechanically, electrically or physically abused/damaged. The hazardous contents are caustic alkaline electrolytes contained in cells with lithium metal oxide cathodes, graphite and carbon anodes and Polyvinylidene fluoride binders.

**Ingestion:** Have victim rinse mouth thoroughly with water. DO NOT INDUCE VOMITING. Quickly transport victim to an emergency care facility.

**EYE:** If eye contact with contents of an open cell occurs, immediately flush the contaminated eye(s) with water. Quickly transport victim to an emergency care facility.

**Skin Contact:** Immediately flush with water. If irritation or pain persists, seek medical attention.

**Inhalation:** Remove the patient from exposure into fresh air, seek medical attention.

##### **4.2. PROTECTION FOR FIRST**

**AIDERS:** Do not enter corrosive vapor contaminated areas without a respirator or Self Contained Breathing Apparatus. Wear adequate personal protective equipment as indicated in Section 8.

**FIRST AID FACILITIES:** Eye wash bottle, fountain, safety showers or at least a source of running water are required in the area where the product is used.

##### **4.3 Most important symptoms & effects, acute & delayed, caused by exposure:**

**ACUTE:** The contents of the battery are rated as corrosive. Ingestion of the electrolyte could lead to severe gastrointestinal tract irritation with nausea, vomiting and potentially burns. Inhalation of vapors may lead to severe irritation of the mouth and upper respiratory tract with a burning sensation, pain, burns and inflammation in the nose and throat; there may also be coughing or difficulty breathing. Eye contact may lead to severe eye irritation or in worst case scenario irreversible damage and possible eye burns. Skin contact may lead to irritation and possible skin burns.

**CHRONIC:** Skin contact may aggravate/exacerbate existing skin conditions, such as dermatitis. Chronic inhalation may lead to the same symptoms as listed for acute inhalation above.

##### **4.4 Indication of any immediate medical attention and special treatment needed**

**ADVICE TO DOCTOR:** Treat symptomatically if the person comes into contact with the corrosive electrolyte liquid contents of a damaged battery.

#### **5. Fire Fighting Measures**

##### **Suitable extinguishing media**

Cold water and dry powder in large amount are applicable.

Use metal fire extinction powder or dry sand if only few cells are involved.

### **Special hazards arising from the chemical**

May form hydrofluoric acid if electrolyte comes into contact with water.

In case of fire, the formation of the following flue gases cannot be excluded:

Hydrogen fluoride (HF), Carbon monoxide and carbon dioxide.

### **Protective equipment and precautions for firefighters**

Wear self-contained breathing apparatus and protective suit.

Additional information

If possible, remove cell(s) from fire fighting area. If heated above 125°C, cell(s) can explode/vent. Cell is not flammable but internal organic material will burn if the cell is incinerated.

## **6. Accidental Release Measures**

### **6.1. Personal precautions, protective equipment and emergency procedures:**

As an immediate precautionary measure, isolate spill or leak area for at least 25 meters (75 feet) in all directions.

Keep unauthorized personnel away. Stay upwind. Keep out of low areas. Ventilate closed areas before entering.

Wear adequate personal protective equipment as indicated in Section 8.

### **6.2. Environmental precautions**

Absorb spilled material with non-reactive absorbent such as vermiculite, clay or earth. Prevent from migration into soil, sewers and natural waterways – inform local authorities if this occurs.

### **6.3. Methods and material for containment and cleaning up**

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. Spills may be absorbed on non-reactive absorbents such as vermiculite. Place cells or batteries 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 or batteries until proper disposal can be arranged.

## **7. Handling and Storage**

### **Precaution for Handling**

#### **Advice on safe handling**

Avoid short circuiting the cell. Avoid mechanical damage of the cell. Do not open or disassemble.

Advice on protection against fire and explosion

Keep away from open flames, hot surfaces and sources of ignition.

### **Condition for storage**

#### **Requirements for storage rooms and vessels**

Storage at room temperature (approx. 20°C) at approx. 20~60% of the nominal capacity (OCV approx. 3.6 - 3.9 V/cell).

Keep in closed original container.

## **8. Exposure controls/personal protection Exposure limit values Exposure limits**

### **8.1. Exposure Control Measures**

**8.1.1. Exposure Limit Values:** Airborne exposures to hazardous substances are not expected when the cells or

batteries are used for their intended purposes. Exposure standards are not applicable to the sealed articles.

**8.1.2. Biological Monitoring:** Not applicable.

**8.1.3. Control Banding:** Not applicable.

**8.1.4. Recommended monitoring procedures:** Follow standard monitoring procedures.

**8.1.5. Derived no-effect level (DNEL):** Not applicable.

**8.1.6. Derived minimal effect level (DMEL):** Not applicable.

**8.1.7. Predicted no-effect concentrations (PNECs):** Not applicable.

**8.2. Engineering Controls**

**8.2.1. Engineering Controls:** Special ventilation is not required when using these products in normal use scenarios. Ventilation is required if there is leakage from the cell or battery.

**8.2.2. Individual Protection Measures**

**8.2.2.1. Eye and Face protection:** Eye protection is not required when handling cells or batteries during normal use. Wear safety glasses/goggles if handling a leaking or ruptured cell or battery.

**8.2.2.2. Skin (Hand) protection:** Hand protection is not required when handling the cell or battery during normal use. PVC gloves are recommended when dealing with a leaking or ruptured cell or battery.

**8.2.2.3. Skin (clothing) protection:** Skin protection is not required when handling the cell or battery during normal use. Wear long sleeved clothing to avoid skin contact if handling a leaking or ruptured cell or battery. Soiled clothing should be washed with detergent prior to re-use.





**8.2.2.4. Respiratory protection:** During routine operation, a respirator is not required. However, if dealing with an electrolyte leakage and irritating vapors are generated, an approved half face inorganic vapor and gas/acid/particulate respirator is required.

**8.2.2.5. Thermal Protection:** Not applicable.

**8.2.2.6. Other Protective Equipment:** Have a safety shower or eye wash station readily available

**8.2.3. Hygiene Measures:** Do not eat, drink or smoke in work areas. Avoid storing food, drink or tobacco near the product. Practice and maintain good housekeeping.

**8.2.4. Environmental exposure controls:** Avoid release to the environment.

Respiratory Protection	Hand Protection	Eye Protection	Other
			
In all fire situations, use self-contained breathing apparatus.	In the event of leaking or ruptured cells or batteries, wear gloves.	Safety glasses are recommended in case of leaking or ruptured cells or batteries.	In the event of leaking or ruptured cells or batteries, wear protective clothing.

**9. Physical and Chemical Properties**

**Appearance**

Form: Solid  
 Color: Various  
 Odor: Odorless

**Important health, safety and environmental information**

Test method

pHValue: n.a.  
 Flash point: n.a.  
 Lower explosion limits: n.a.  
 Vapour pressure: n.a.

Density:	n.a.
Water solubility:	Insoluble
Ignition temperature:	n.a.

## **10. Stability and Reactivity USA, EU**

### **Stability**

Stable

### **Conditions to avoid**

Keep away from open flames, hot surfaces and sources of ignition. Do not puncture, crush or incinerate.

### **Materials to avoid**

No materials to be especially mentioned.

### **Hazardous decomposition products**

In case of open cells, there is the possibility of hydrofluoric acid and carbon monoxide release.

### **Possibility of Hazardous Reactions**

Will not occur

### **Additional information**

No decomposition if stored and applied as directed.

## **11. Toxicological Information**

### **11.1. Information on toxicological effects:**

The hazardous components of the cell or battery are contained within a sealed unit. Under recommended use conditions, the electrode materials and liquid electrolyte are non-reactive provided that the cell or battery integrity remains and the seals remain intact. The potential for exposure should not exist unless the battery leaks, is exposed to high temperature or is mechanically, electrically or physically abused/damaged. **The following toxicology data is in respect to if a person comes into contact with the electrolyte.**

### **11.2. Acute Toxicity:**

**11.2.1. Swallowed:** The electrolyte contained within the cell or battery is a corrosive liquid. Ingestion of this electrolyte

would be harmful. Swallowing may result in nausea, vomiting, diarrhea, abdominal pain and chemical burns to the gastrointestinal tract. During normal usage ingestion should not be a means of exposure.

**11.2.2. Eye:** The electrolyte contained within the cell or battery is a corrosive liquid and it is expected that it would cause irreversible damage to the eyes. Contact may cause corneal burns. Effects may be slow to heal after eye contact. Correct handling procedures incorporating appropriate eye protection should minimize the risk of eye irritation.

**11.2.3. Skin:** The electrolyte contained within the cell or battery is a corrosive liquid and it is expected that it would cause skin burns or severe irritation to the skin if not washed off immediately. Correct handling procedures should minimize the risk of skin irritation. People with pre-existing skin conditions, such as dermatitis, should take extreme care so as not to exacerbate the condition.

**11.2.4. Inhaled:** Inhalation of vapors from a leaking cell or battery is expected to cause severe irritation of the mouth and upper respiratory tract with a burning sensation, pain, burns and inflammation in the nose and throat; there may also be coughing or difficulty breathing.

**11.3. Skin Corrosion/Irritation:** The electrolyte contained within the cell or battery is classified as a corrosive liquid and is expected to exhibit Dermal Corrosivity/Irritation.

**11.4. Serious Eye Damage/Irritation:** The electrolyte contained within the cell or battery is classified as a corrosive liquid and is expected to exhibit serious Damage/Corrosivity.

**11.5. Respiratory or Skin Sensitization:** The electrolyte contained within the cell or battery is not expected to be a skin sensitizer according to OECD test 406, based on the available data and the known hazards of the components. The electrolyte contained within the battery is not expected to be a respiratory tract sensitizer, based on the available data and the known hazards of the components.

**11.6. Germ Cell Mutagenicity:** The electrolyte contained within the cell or battery is not expected to be mutagenic according to test such as OECD tests 471, 475, 476, 478 and 479, based on the available data and the known hazards of the components.

**11.7. Carcinogenicity:** The electrolyte contained within the cell or battery is not expected to be a carcinogen. The cathode contains Cobalt and Nickel components. These components are classified as IARC 2B – possibly carcinogenic to humans, however they do not pose a threat when contained in the cell or battery sealed unit.

**11.8. Reproductive Toxicity:** The electrolyte contained within the cell or battery is not expected to be a reproductive hazard according to test such as OECD tests 414 and 421, based on the available data and the known hazards of the components.

**11.9. Specific Target Organ Toxicity (STOT) – Single Exposure:** The electrolyte contained within the cell or battery is corrosive and is expect to cause respiratory irritation by inhalation. Inhalation of vapors may lead to severe irritation of the mouth and upper respiratory tract with a burning sensation, pain, burns and inflammation in the nose and throat; there may also be coughing or difficulty breathing.

**11.10. Specific Target Organ Toxicity (STOT) – Repeated Exposure:** The cells or batteries are not expected to cause organ damage from prolonged or repeated exposure according to tests such as OECD tests 410 and 412, based on the available data and the known hazards of the components.

**11.11. Aspiration Hazard:** The cells or batteries are not classified as an aspiration hazard, based on the available data and the known hazards of the components. However, due to the corrosive nature of the product if swallowed, do NOT induce vomiting. If vomiting has occurred after ingestion the person should be observed to ensure that aspiration into the lungs has not occurred and assessed for chemical burns to the gastrointestinal and respiratory tracts.

## **12. Ecological Information**

### **Further information**

Ecological injuries are not known or expected under normal use. Do not flush into surface water or sanitary sewer system.

## **13. Disposal Considerations**

### **Advice on disposal**

For recycling consult manufacturer.

### **Contaminated packaging**

Disposal in accordance with 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.

Even classified as lithium ion batteries (UN3480), 2016 IATA Dangerous Goods Regulations 57<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:

**14.1.** 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

**TABLE 965-IB**

	Net quantity per package Passenger aircraft	Net quantity per package Cargo Aircraft Only
Lithium ion cells and batteries	10 kg	10 kg

OUTER PACKAGINGS			
Type	Drums	Jerricans	Boxes

**14.2.** 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	- After OCV (%) $\geq$ 90%  - No leakage, no venting, no disassembly,  no rupture, no fire	Pass
Test 2	Thermal test		Pass
Test 3	Vibration		Pass

Test 4	Shock	- Mass loss limit (leakage) 1) If $M < 1g$ , less than 0.5%, 2) If $1g \leq M \leq 75g$ , less than 0.2%, 3) If $M > 75g$ , less than 0.1%)	Pass
Test 5	External short circuit	- No disassembly, no rupture, no fire within 6 hours after the test  - Max. Temp $\leq 170^\circ C$	Pass
Test 6	Impact or Crush	- No disassembly, no fire within 6 hours after the test  - Max. Temp $\leq 170^\circ C$	Pass
Test 7	Overcharge	- No disassembly, no fire within 7 days after the test	Pass
Test 8	Forced discharge	- No disassembly, no fire within 7 days after the test	Pass

## 15. Regulatory Information

### **Canadian Federal Regulations:**

These products have been classified in accordance with the hazard criteria of the Controlled Products Regulations and the SDS contains all the information required by the Controlled Products Regulations.

**WHMIS Classification:** Not Controlled, manufactured article.

**New Substance Notification Regulations:** Lithium hexafluorophosphate is listed on the Non-Domestic Substance List (NDSL). All other ingredients in the product are listed, as required, on Canada's Domestic Substances List (DSL).

**National Pollutant Release Inventory (NPRI) Substances:** These products do not contain any NPRI chemicals.

### **United States Federal and State Regulations:**

**TSCA Status:** All ingredients in these products are listed on the TSCA inventory.

**OSHA:** These products do not meet criteria as per Part 1910.1200, manufactured article.

**SARA EPA Title III:** None.

**Sec. 302/304:** None.

**Sec. 311/312:** None.

**Sec. 313:** None.

**CERCLA RQ:** None.

### **Australia and New Zealand**

**SUSMP:** Not applicable

**AICS:** All ingredients are on the AICS list.

**HSNO Approval number:** Not applicable

**HSNO Group Title:** Not applicable

**NOHSC:10008 Risk Phrases:** R34 - Causes Burns.



**NOHSC:1008 Safety Phrases:**

S1 – Keep locked up.

S2 – Keep out of reach of children.

S23 – Do not breathe vapor.

S24/25 – Avoid contact with skin and eyes.

S26 – In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.

S27/28 – After contact with skin, take off immediately all contaminated clothing and wash immediately with plenty of water.

S36/37/39 – Wear suitable protective clothing, gloves and eye/face protection.

S56 – Dispose of this material and its container at hazardous waste or special waste collection point.

S62 – If swallowed, DO NOT induce vomiting: seek medical advice immediately and show this container or label.

S64 – If swallowed, rinse mouth with water (Only if the person is conscious).

**EC Classification for the Substance/Preparation:**

These products are not classified as hazardous according to Regulation (EC) No. 1272/2008.

Keep out of the reach of children.

**EU Restrictions on use:**

Regulation (EC) No. 1907/2006, REACH Annex XVII Substances subject to restriction on marketing and use as amended: Aluminum (CAS 7429-90-5)

**Other EU Regulations**

This Safety Data Sheet complies with the requirements of Regulation (EC) No. 1907/2006.

**Japanese Regulations**

Japanese Industrial Standards (JIS) JIS Z 7253:2012

Waste disposal and public cleaning law

Law for Promotion of Effective Utilization of Resources

**Taiwanese Regulations**

Regulation of Labelling and Hazard Communication of Dangerous and Harmful Materials: Labeling requirements and other relevant provision of chemicals, this product is not classified as dangerous goods.

Toxic Chemicals Substance Control Law: Not Listed.

CNS 1030016 Safety of primary and secondary lithium cells and batteries during transport.

**Chinese Regulations**

General Rule for Classification and Hazard Communication of Chemicals (GB 13690-2009): Specifies the classification, labeling and hazard communication of chemicals in compliance with the GHS standard for chemical production sites and labeling of consumer goods.

General Rule for Preparation of Precautionary Labels for Chemicals (GB 15258-2009): Specifies the relevant application methods of precautionary labels for chemicals.

Safety Data Sheet for Chemical Products Content and Order of Sections (GB/T 16483-2008)

**16. Other Information****Hazardous Materials Information Label (HMIS)**

Health: 0

Flammability: 1

Physical Hazard: 0

**NFPA Hazard Ratings**

Health: 0

Flammability: 1

Reactivity: 0

Unique Hazard:

**Further Information**

Data of sections 4 to 8, as well as 10 to 12, do not necessarily refer to the use and the regular handling of

the product (in this sense consult package leaflet and expert information), but to release of major amounts in case of accidents and irregularities. The information describes exclusively the safety requirements for the product (s) and is based on the present level of our knowledge. This data does not constitute a guarantee for the characteristics of the product(s) as defined by the legal warranty regulations. "(n.a. = not applicable; n.d. = not determined)"

The data for the hazardous ingredients were taken respectively from the last version of the sub-contractor's safety data sheet.