



SAFETY DATA SHEET

Prepared to U.S. OSHA, CMA, ANSI, Canadian WHMIS 2015 (HPR-GHS), European Union CLP EC 1272/2008, REACH, Australian WorkSafe, the Japanese Industrial Standard JIS Z7253, the Korean ISHA (Notice 2009-68), SPRING Singapore, Mexican Workplace Regulations (NOM-018-STPS-2000), New Zealand HNSO and the Global Harmonization Standard

1. IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

PRODUCT IDENTIFIER

TRADE NAME (AS LABELED):

BRADY MODEL NUMBER:

CHEMICAL NAME/CLASS:

SYNONYMS:

PRODUCT USE:

UN NUMBER:

HAZCHEM CODE (Australia):

LITHIUM ION BATTERY PACK

BMP-UBP

Lithium Cobalt Dioxide Chemistry

Lithium Ion Cells

Universal Battery Pack

Battery: UN 3480; Battery Packed within Equipment: UN 3481

4W

SUPPLIER OF THE SAFETY DATA SHEET

U.S. SUPPLIER/MANUFACTURER'S NAME:

Entrusted by Brady Worldwide Inc.

Business Phone (414)358-6600 [8am - 5pm CT]

to:

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November 21, 2018

March 22, 2019

ADDRESS:

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EUROPEAN SUPPLIER/ DISTRIBUTOR'S NAME:

ADDRESS:

BUSINESS PHONE:

EMAIL:

DATE OF PREPARATION:

DATE OF REVISION:

NOTE: IATA and IMDG information given in Section 14 (Transportation Information) is based on regulations and standards that go into effect January 1, 2019 and are valid until December 31, 2019. Information on shipping regulations for each jurisdiction is given in Section 14, are the most current as of the date of revision of this SDS; specific version references are given in this section.

This product has been classified in accordance with the hazard criteria of U.S. OSHA, Canadian WHMIS 2015 [HPR-GHS], European Union REACH and CLP, Australian [NOHSC:2011 (2015)], Singapore SPRING and Japanese Industrial Standard (JIS Z7253) required information is included. It is located in appropriate sections based on the Global Harmonization Standard format.

NOTE: This product is defined as an "Article" under all jurisdictions. Refer to Section 15 (Regulatory Information) for specific regulatory citations. As an article, this product presents negligible health and physical hazards under reasonably anticipated circumstances of use. Subsequently, a Safety Data Sheet is not required under Standards cited above. This document is prepared to provide persons using this product with additional safety information.

2. HAZARD IDENTIFICATION

GLOBAL HARMONIZATION, U.S. OSHA HAZARD COMMUNICATION STANDARD, CANADIAN WHMIS HPR-GHS 2015, EU CLP REGULATION (EC) 1272/2008 LABELING AND CLASSIFICATION, JAPANESE JIS Z 7253: 2012 LABELING AND CLASSIFICATION, KOREAN ISHA (Notice 2009-68) LABELING AND CLASSIFICATION, NEW ZEALAND HAZARDOUS SUBSTANCES and NEW ORGANISMS ACT (HNSO) CHEMICAL CLASSIFICATION (COP 8-1 09-06), OR AUSTRALIAN NOHSC STANDARDS: This product is an article and is not required to be classified under any jurisdiction.

The lithium ion cell ingredients are contained in a hermetically sealed case, designed to withstand temperatures and pressures encountered during normal use. As a result, during normal use, hazardous materials are fully contained inside the battery. The battery should not be crushed, deformed, punctured, opened or exposed to heat because exposure to the ingredients contained within could be harmful under some circumstances. The following information is provided for the user's information only.

EMERGENCY OVERVIEW: Product Description: This product is a lithium ion battery. **Health Hazards:** This product is considered a manufactured article and presents negligible health, or reactivity hazards under typical use conditions. If exposure to the electrolyte solution occurs from puncture, heating or other destruction of the outer case, contact with the solution may be harmful by inhalation, skin or eye contact. Inhalation of fumes from burning electrolyte solution may cause burns to respiratory system. Skin or eye contact with the electrolyte solution may also produce burns, especially if contact is prolonged. Contact with the electrodes may result in electric shock under certain circumstances of contact. **Flammability Hazards:** Batteries can explode during a fire. If involved in a fire, this product can burn and produce toxic gases (e.g. carbon monoxide, carbon dioxide, hydrogen fluoride, phosphine, phosphorous oxides, lithium oxides, lithium hydroxide, nickel oxides, copper oxides and other metal oxides). During a fire involving this product care should be taken to avoid inhalation of fumes. During charging of this battery, a lithium graphite intercalation phase is formed (where lithium and graphite molecules are combined), which is highly flammable and corrosive, but is not released under normal circumstances. **Reactivity Hazards:** The electrolyte solution can react with water to form hydrofluoric acid. Contact with the anodes can produce hydrogen gas. **Environmental Hazards:** This product is not expected to cause harm if released to the environment. **Emergency Response Considerations:** Emergency responders must wear proper personal protective equipment (and have appropriate fire protection) suitable for the situation to which they are responding.

3. COMPOSITION and INFORMATION ON INGREDIENTS

| Chemical Name | CAS # | EU EINECS # | Japanese ENC # | Australian AICS | Korean ECL # | New Zealand HNSO | % w/w | LABEL ELEMENTS GHS under U.S. OSHA, Canadian WHMIS HPR-GHS & EU Classification (1272/2008), Japanese, Taiwan, Chinese and Korean Regulations Korean ISHA Classification Hazard Statement Codes |
|--|------------|---------------------|----------------|-----------------|--------------|---|-------------|---|
| The following materials are part of the case of the battery: | | | | | | | | |
| Aluminum (non-pyrophoric solid) | 7429-90-5 | 231-072-3 | Mineral-exempt | Listed | KE-00881 | HSR001263 (coated, PGII) HSR001471 (coated, PGIII) HSR001472 (uncoated, PGII) HSR001473 (coated, PGIII) | Proprietary | Classification under All Jurisdictions: Not Applicable for solid metal. |
| Copper | 7440-50-8 | 231-159-6 | Mineral-exempt | Listed | KE-08896 | HSR002948 | Proprietary | Classification under All Jurisdictions: Not Applicable for solid metal. |
| Plastic | Mixture | Mixture | Mixture | Mixture | Mixture | Mixture | Proprietary | Classification under All Jurisdictions: Not Applicable. |
| Polyvinylidene Fluoride (PVDF) | 24937-79-9 | Exempt as a Polymer | 6-933 | Listed | KE-10546 | May be used as a single component chemical under an appropriate group standard | Proprietary | Classification under All Jurisdictions: Not Applicable. |
| Steel | 7439-89-6 | 231-096-4 | Mineral-exempt | Listed | KE-21059 | | Proprietary | Classification under All Jurisdictions: Not Applicable for solid metal. |
| Nickel, inert polymers and other trace compounds: | | | | | | | Balance | Classification under All Jurisdictions: Not Applicable. |
| The following materials are in the electrolyte mixture in the battery: | | | | | | | | |
| Ethylene Carbonate | 96-49-1 | 202-510-0 | 5-523 | Listed | KE-12028 | HSR004476 | Proprietary | NOTIFIED EU ECHA CLASSIFICATION Classification under All Jurisdictions: Classification: Acute Oral Toxicity Cat. 4, Eye Irritation Cat. 2A, STOT (Ingestion-Kidneys) RE Cat. 3 Hazard Statement Codes: H302, H319, H373 |
| Dimethyl Carbonate | 616-38-6 | 210-478-4 | 2-2853 | Listed | KE-11278 | HSR001252 | Proprietary | HARMONISED EU CLP00 CLASSIFICATION Classification under All Jurisdictions: Classification: Flammable Liquid Cat. 2 Hazard Statement Code: H225 |
| Lithium Hexafluoro-phosphate (LiPF ₆) | 21324-40-3 | 244-334-7 | Unlisted | Listed | KE-22564 | Not Listed | Proprietary | NOTIFIED EU ECHA CLASSIFICATION Classification under All Jurisdictions: Classification: Acute Oral Toxicity Cat. 3, Skin Corrosion/Damage Cat. 2B, STOT (Bones, Teeth) RE Cat. 1 Hazard Statement Codes: H301, H314, H372 |
| Other Linear, Cyclic Organic Carbonate Solvents | Mixture | Mixture | Mixture | Mixture | Mixture | Mixture | Proprietary | Classification under All Jurisdictions: Not Applicable. |
| The following materials are for the battery cell electrodes: | | | | | | | | |
| Carbon (graphite, acetylene black) [negative electrode] | 7782-42-5 | 231-955-3 | Mineral-exempt | Listed | KE-18101 | May be used as a single component chemical under an appropriate group standard | Proprietary | Classification under All Jurisdictions: Not Applicable. |
| Lithium Cobaltite [positive electrode] | 12190-79-3 | 235-362-0 | 1-100, 1-132 | Listed | KE-06111 | | Proprietary | NOTIFIED EU ECHA CLASSIFICATION Classification under All Jurisdictions: Classification: Reproductive Toxicity Cat. 2 Hazard Statement Codes: H361fd ADDITIONAL SELF CLASSIFICATION Classification under All Jurisdictions: Classification: Carcinogenic Cat. 2, Skin Sensitization Cat. 1, STOT (Ingestion-Multiple Organs) RE Cat. 1 Hazard Statement Codes: H351, H317, H372 |

The specific chemical identity and/or exact percentage (concentration) of composition has been withheld as a trade secret is required.

See Section 16 for full text of classification.

4. FIRST-AID MEASURES

PROTECTION OF FIRST AID RESPONDERS: Rescuers should be taken for medical attention, if necessary. Only trained personnel should administer supplemental oxygen and/or cardio-pulmonary resuscitation, if necessary.

DESCRIPTION OF FIRST AID MEASURES: Persons using this product should consult a physician or other medical professional if an accident involving this product results in injury. Specific first-aid measures are as follows:

Eye or Skin Contact: If skin or eye contact occurs to electrolyte solution, flush for 20 minutes. Contact physician or other medical health professional.

Inhalation: If any adverse effect occurs as a result of inhalation of fumes from thermal decomposition of the electrolyte solution during fire or other heating of battery, remove individual to fresh air. Seek medical attention if adverse effect occurs after removal to fresh air.

Ingestion: Not a potential route of exposure.

IMPORTANT SYMPTOMS AND EFFECTS: Acute: See Section 11. Chronic: See Section 11.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: No medical conditions are known to be aggravated by this product.

IMMEDIATE MEDICAL ATTENTION AND SPECIAL TREATMENT NEEDED: Treat symptoms and eliminate exposure.

5. FIRE-FIGHTING MEASURES

FLASH POINT: Not applicable.

AUTOIGNITION TEMPERATURE: Not applicable.

FLAMMABLE LIMITS (in air by volume, %): Not applicable.

FIRE EXTINGUISHING MEDIA: Dry chemical powder, dry sand or dolomite or other metal fire extinction extinguishing material. Carbon dioxide should only be used on incipient fires.

5. FIRE-FIGHTING MEASURES (Continued)

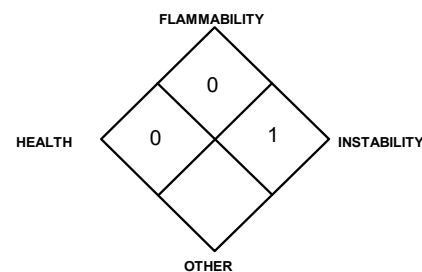
UNSUITABLE FIRE EXTINGUISHING MEDIA: Water.

SPECIAL FIRE AND EXPLOSION HAZARDS: Batteries can explode in a fire. Contact with the electrolyte solution and water can produce hydrofluoric acid. Contact with water and the charged anode will produce hydrogen gas. Products of thermal decomposition can include toxic gases (e.g. carbon monoxide, carbon dioxide, hydrogen fluoride, phosphine, phosphorous oxides, lithium oxides, lithium hydroxide, nickel oxides, copper oxides and other metal oxides). Damaged or opened cells or batteries can result in rapid heating and the release of flammable vapors. Vapors may be heavier than air and may travel along the ground or be moved by ventilation to an ignition source and flash back.

Explosion Sensitivity to Mechanical Impact or to Static Discharge: Not applicable.

SPECIAL PROTECTIVE ACTIONS FOR FIRE-FIGHTERS: Structural firefighters must wear Self-Contained Breathing Apparatus and full protective equipment.

NFPA RATING



Hazard Scale: 0 = Minimal 1 = Slight
2 = Moderate 3 = Serious 4 = Severe

6. ACCIDENTAL RELEASE MEASURES

PERSONAL PRECAUTIONS: Eliminate all sources of ignition before cleanup begins. Use non-sparking tools. The atmosphere must have levels of components lower than those listed in Section 8, (Exposure Controls and Personal Protective Equipment) if applicable, and have at least 19.5 percent oxygen before personnel can be allowed into the area without Self-Contained Breathing Apparatus (SCBA).

PERSONAL PROTECTIVE EQUIPMENT: For clean-up of leaking electrolyte solution, proper protective equipment should be used. In the event of a spill, clear the area and protect people.

Small Spills: Wear rubber gloves, splash goggles, and appropriate body protection.

Large Spills: Minimum Personal Protective Equipment should be rubber gloves, rubber boots, face shield, and Tyvek suit. Minimum level of personal protective equipment for releases in which the level of oxygen is less than 19.5% or is unknown must be **Level B: triple-gloves (rubber gloves and nitrile gloves over latex gloves), chemical resistant suit and boots, hard hat, and Self-Contained Breathing Apparatus.**

METHODS FOR CLEAN-UP AND CONTAINMENT: No special accidental release measures are required for non-damaged batteries. Damaged batteries that are not hot or burning should be placed in a sealed container and disposed of according to all disposal regulations. The following information is in the event that the electrolyte solution has somehow escaped the case of the battery.

Small Spills: Wipe up spilled liquid with polypads or other suitable absorbent materials. Wash contaminated area with soap and water, absorb with paper towels, and rinse with water.

Large Spills: Trained personnel following pre-planned procedures should handle non-incident releases. Absorb spilled liquid with dry sand or other suitable non-reactive absorbent materials. Prevent material from entering sewer or confined spaces, waterways, soil or public waters. Monitor area and confirm levels are below exposure limits given in Section 8 (Exposure Controls-Personal Protection), if applicable, before non-response personnel are allowed into the spill area.

All Spills: Place all spill residue in an appropriate container and seal. Decontaminate the area thoroughly. If necessary, discard all stained response equipment or rinse with soapy water before returning such equipment to service. Do not mix with wastes from other materials. Dispose of in accordance with applicable Federal, State, and local procedures (see Section 13, Disposal Considerations). For spills on water, contain, minimize dispersion and collect. Dispose of recovered material and report spill per regulatory requirements.

ENVIRONMENTAL PRECAUTIONS: Prevent any spill residue from entering sewer or confined spaces.

7. HANDLING and STORAGE

PRECAUTIONS FOR SAFE HANDLING: Never store different types of batteries or batteries with different chemistry together. Store away from acids, sources of heat or flame, or other incompatible materials as listed in Section 10 (Stability and Reactivity).

Should a battery unintentionally be crushed, thus releasing its contents, rubber gloves must be used to handle all battery components. Avoid inhalation of any vapors that may be emitted. In the event of skin or eye exposure to the electrolyte, refer to Section 4, First Aid Measures. Batteries should be separated from other materials and stored in a noncombustible, well ventilated, sprinkler-protected structure with sufficient clearance between walls and battery stacks.

The following information is from the Brady Lithium Battery Instructions and Precautions document:

LITHIUM-ION BATTERY HANDLING PRECAUTIONS

Before using the battery pack, read these important instructions. Failure to follow these instructions may result in electric shock, fire, and/or serious personal injury.

- 1. Do not disassemble, open, or modify the battery pack.** This may result in the risk of electric shock, fire or exposure to battery chemicals. If it is damaged, replace the battery.
- 2. Do not short circuit the battery pack.** A battery pack will short circuit if a metal object makes a connection between the positive and negative contacts on the battery. Do not transport or store the battery pack together with metal objects such as tools, hardware, etc. A short-circuited battery may cause fire and personal injury.
- 3. Do not expose the battery pack to heat or fire, avoid storage in direct sunlight.** Batteries may explode, causing personal injury or damage. Toxic fumes and materials are created when batteries are burned.
- 4. Do not expose the battery pack to water or rain, or allow it to get wet.** Otherwise, the protective features in the battery pack can be damaged; the pack can exhibit extremely high current and or voltage, abnormal chemical reactions may occur in the pack, possibly leading to overheating, smoke emission, bursting and/or ignition.
- 5. Do not crush, drop, or damage batteries.** Do not use the battery pack that has received a sharp blow, been dropped, run over, or damaged in any way (e.g., pierced with a nail, hit with a hammer, stepped on).
- 6. Observe the plus (+) and minus (-) marks on the battery pack and equipment and ensure correct use.** If you cannot easily connect the battery pack to the battery pack charger or other equipment, confirm that the correct AC charger adapter specifically designed for charging is used for charging, or terminals are correctly oriented for operation. Using the improper charger adapter could result in reverse-charging and abnormal chemical reaction may occur, then possibly leading to leakage, overheating, smoke emission, bursting and/or ignition of the battery pack.

7. HANDLING and STORAGE (Continued)

PRECAUTIONS FOR SAFE HANDLING (continued):

LITHIUM-ION BATTERY HANDLING PRECAUTIONS (continued)

- Recharge the battery pack outside the printer using the charger adapter specifically designed for that purpose and observe the recharging conditions specified by the manufacturer. A recharging operation under non-conforming recharging conditions (beyond the limits of temperature and larger voltage/current than specified) can cause the battery pack to be overcharged, or charged with extremely high current, abnormal chemical reaction can occur in it, possibly leading to overheating, smoke emission, bursting and/or ignition.
- Do not use the battery pack for a purpose other than those specified. Misuse of battery pack may damage the battery pack, shorten battery pack life, result in risk of fire, electric shock or personal injury.

CONDITIONS FOR SAFE STORAGE: Do not expose the battery pack or printer to water or rain, or allow them to get wet. This may damage the battery pack or printer. Do not use oil or solvents to clean or lubricate the battery. The plastic casing will become brittle and crack, causing a risk of injury. Store the battery pack in a cool, dry place. Do not store battery where temperatures may exceed 60°C (140°F) such as in direct sunlight, a vehicle or metal building during summer. Charger will charge the battery when the battery's internal temperature is between 0°C (32°F) and 45°C (113°F). When the battery pack temperature range is outside that range, charging will not occur. Dispose of Brady Lithium Ion Batteries according to federal, state and local regulations. Contact a recycling agency in your area for recycle locations.

SPECIFIC END USE(S): Universal battery pack.

8. EXPOSURE CONTROLS - PERSONAL PROTECTION

EXPOSURE LIMITS/CONTROL PARAMETERS:

Ventilation and Engineering Controls: No engineering controls are required for handling batteries that have not been damaged.

Exposure Limits/Control Parameters: The following limits are for the components of the electrolyte solution only. Only components that have exposure limits are given.

| CHEMICAL NAME | CAS # | EXPOSURE LIMITS IN AIR | | | | | | | |
|---|------------|------------------------|------------------|------------|---------------------------|------------|------------------------|----------------------|---|
| | | ACGIH-TLVs | | OSHA-PELs | | NIOSH-RELs | | NIOSH IDLH ppm | OTHER ppm |
| | | TWA ppm | STEL ppm | TWA ppm | STEL ppm | TWA ppm | STEL ppm | | |
| Lithium Hexafluorophosphate The exposure limits given are for lithium oxide and lithium hydroxide | 21324-40-3 | NE | NE | NE | NE | NE | NE | NE | AIHA: STEL = 1 mg/m ³ (ceiling) |
| Additional exposure limits are given for a potential decomposition product of the electrolyte solution | | | | | | | | | |
| Hydrogen Fluoride, as F | 7664-39-3 | 0.5 (skin) | 2 (ceiling) skin | 3 | Vacated 1989 PEL: 6 | 3 | 6 (ceiling) 15 min. | 30 | DFG MAKs TWA: |

Additional International Exposure Limits: Additional international limits are in place for components. The ones given are related to the Lithium Hexafluorophosphate component, which is part of the electrolyte component, and which poses the most likely compound to present an exposure hazard. Exposure limits can change or be added and should be checked for currency.

Fluorides, as F

| | Limit Value - Eight Hours | Limit Value - Short Term |
|----------------------------|---|--------------------------|
| Belgium | 2.5 mg/m ³ | |
| Canada (Ontario) | 2.5 mg/m ³ | |
| Canada (Québec) | 2.5 mg/m ³ | |
| Denmark | 2.5 mg/m ³ | |
| Finland | 2.5 mg/m ³ | |
| France | 2.5 mg/m ³ | |
| Germany (AGS) | 1 mg/m ³ Inhalable aerosol | |
| Ireland | 2.5 mg/m ³ | |
| New Zealand | 2.5 mg/m ³ (1) | |
| People's Republic of China | 2 mg/m ³ | |
| Poland | 2 mg/m ³ | |
| Romania | 2.5 mg/m ³ (1) | |
| Singapore | 2.5 mg/m ³ | |
| South Korea | 2.5 mg/m ³ | |
| Switzerland | 3.5 mg/m ³ | |
| Sweden | 1 mg/m ³ Inhalable aerosol | |
| Remarks | | |
| France | <i>Italics:</i> Indicative of statutory limit values | |
| Germany (AGS) | STV: 15 minutes average value | |
| New Zealand | (1) Exposure can also be estimated by biological monitoring | |
| Romania | (1) Inorganic | |

Hydrogen Fluoride, as F

| | Limit Value - Eight Hours | Limit Value - Short Term |
|------------------|--|--------------------------|
| Austria | 1.8 ppm; 1.5 mg/m ³ | 3 ppm |
| Belgium | 1.8 ppm; 1.5 mg/m ³ | 3 ppm |
| Canada (Ontario) | 0.5 ppm | 2 ppm (1) |
| Canada (Québec) | | 3 ppm (1) |
| Denmark | 1.8 ppm; 1.5 mg/m ³ | 3.6 ppm |
| European Union | 1.8 ppm (1); 1.5 mg/m ³ (1) | 3 ppm (1)(2) |
| France | 1.8 ppm; 1.5 mg/m ³ | 3 ppm |
| Germany (AGS) | 1 ppm; 0.83 mg/m ³ | 2 (1) |
| Hungary | 1.5 mg/m ³ | |
| Ireland | 1.8 ppm; 1.5 mg/m ³ | 3 ppm (1) |
| Italy | 1.8 ppm; 1.5 mg/m ³ | 3 ppm |
| Japan | 0.5 ppm | 3 ppm (1) |
| Latvia | 1.8 ppm; 1.5 mg/m ³ | |
| Poland | 0.5 mg/m ³ | |
| Romania | 2.5 mg/m ³ (1) | |
| Singapore | | 3 ppm |

8. EXPOSURE CONTROLS - PERSONAL PROTECTION (Continued)

EXPOSURE LIMITS/CONTROL PARAMETERS (continued):

Hydrogen Fluoride, as F (continued)

| | Limit Value - Eight Hours | Limit Value - Short Term |
|------------------|---|--------------------------|
| South Korea | 0.5 mg/m ³ | 3 ppm (1) |
| Spain | 1.8 ppm | 3 ppm |
| Sweden | 0.83 mg/m ³ | 2 ppm (1) |
| Switzerland | 1 ppm; 0.83 mg/m ³ | 2 ppm |
| The Netherlands | 2.5 mg/m ³ | 6 ppm (1) |
| | Remarks | |
| Canada (Ontario) | (1) Ceiling limit value | |
| Canada (Québec) | (1) Ceiling limit value | |
| European Union | Bold Type: Indicative of Occupational exposure limit Values and Limit values for Occupational Exposure Limit Values – BOELV ~ (1) Calculated as HF; (2) 15 minutes average value | |
| France | Bold Type: Restrictive statutory limit values valid for Hydrogen Fluoride | |
| Germany (AGS) | (1) 15 minutes average value | |
| Ireland | (1) 15 minutes average value | |
| Japan | (1) Calculated as HF | |
| Latvia | (1) 15 minutes average value | |
| South Korea | (1) Ceiling limit value | |
| Sweden | (1) 15 minutes average value | |

Lithium Hydroxide

| | Limit Value - Eight Hours | Limit Value - Short Term |
|------------------|---------------------------|--------------------------|
| Canada (Ontario) | 1 mg/m ³ | |
| Japan – JOSH | 1 mg/m ³ | |

Australian Hazardous Chemical Information System (HMIS) Exposure Standards:

| CHEMICAL NAME | CAS # | EXPOSURE LIMITS IN AIR | | |
|-------------------|----------------|--------------------------|---------------------------|---------------------|
| | | TWA mg/m ³ | STEL mg/m ³ | Notes |
| Fluorides, as F | Not Applicable | 2.5 | NE | Not Applicable |
| Hydrogen Fluoride | 7664-39-3 | NE | 3 ppm | Ceiling Limit Value |

NE = Not Established.

UK Minimum Exposure Limits:

| CHEMICAL NAME | CAS # | WORKPLACE EXPOSURE LIMIT | | | | |
|-------------------|------------|--|--------------------|---|--------------------|---|
| | | Long-Term Exposure Limit (8-Hrs TWA Reference Period) | | Short-Term Exposure Limit (15-minute Reference Period) | | Comments |
| | | | | | | |
| | | ppm | mg.m ⁻³ | ppm | mg.m ⁻³ | |
| Fluorides, as F | 16984-48-8 | NE | 2.5 | NE | NE | The Carcin, Sen and Skin notations are not exhaustive. Notations have been applied to substances identified in IOELV Directives |
| Hydrogen Fluoride | 7664-39-3 | 1.8 | 1.5 | 3 | 2.5 | |
| Lithium Hydroxide | 1310-65-2 | NE | NE | NE | 1 | |

NE = Not Established.

ACGIH Biological Exposure Indices (BEIs): Currently, the following Biological Exposure Indices (BEIs) have been established for fluorides, as F.

| CHEMICAL: DETERMINANT | SAMPLING TIME | BEI |
|--|------------------------------------|----------------------|
| Fluorides (as F) • Fluoride in Urine • Fluoride in Urine | • Prior to Shift • End of Shift | • 2 mg/L • 3 mg/L |

UK Biological Monitoring Guidance Values (BMGVs): Currently, no BMGVs have been established for the components of the electrolyte solution.

SAFE WORK AND HYGIENE PRACTICES: Do not short circuit, puncture, incinerate, crush, immerse, force discharge or expose to temperatures above the declared operating temperature range of the product. In event of release of electrolyte fluid, avoid contact by all routes of exposure.

PERSONAL PROTECTIVE EQUIPMENT: The following information on appropriate Personal Protective Equipment is provided to assist employers in complying with OSHA regulations found in 29 CFR Subpart I (beginning at 1910.132), equivalent standards of Canada (including CSA Standard Z94.4-02 and CSA Standard Z94.3-02, U.S. OSHA 29 CFR 1910.136 and the Canadian CSA Standard Z195-02, *Protective Footwear*), standards of EU member states (including EN 529:2005 for respiratory PPE, CEN/TR 15419:2006 for hand protection, and CR 13464:1999 for face/eye protection), or standards of Australia (including AS/NZS 1715:1994 for respiratory PPE, AS/NZS 4501.2:2006 for protective clothing, AS/NZS 2161.1:2000 for glove selection, and AS/NZS 1336:1997 for eye protection), Australian Standard 1337-Eye Protection for Industrial Applications and Australian Standard 1336-Recommended Practices for Eye Protection in the Industrial Environment, Australian Standard 2161-Industrial Safety Gloves and Mittens, or Japanese Standards JIS T 8147:2003, JIS T 8116:2005 as well as Korean and Singapore Standards. Please reference applicable regulations and standards for relevant details.

Respiratory Protection: No special respiratory protection is required for use of this product during normal use.

Eye Protection: No special eye protection is required for use of this product. If batteries are damaged or leaking use safety goggles when handling the batteries.

Hand Protection: No special hand protection is normally required for use of this product. If batteries are damaged or leaking use wear butyl rubber, polyvinyl alcohol gloves or other appropriate glove.

Body/Skin Protection: No special body or skin protection is normally required for use of this product. If a hazard of injury to the feet exists due to falling objects or rolling objects use foot protection, as described in U.S. OSHA 29 CFR 1910.136 and the Canadian CSA Standard Z195-02, *Protective Footwear*.

9. PHYSICAL and CHEMICAL PROPERTIES

FORM: Manufactured article containing electrolyte solution.

MOLECULAR FORMULA: Mixture.

ODOR: Not applicable.

RELATIVE VAPOR DENSITY (air = 1): Not applicable.

SPECIFIC GRAVITY (water = 1): Not available.

SOLUBILITY IN WATER: Insoluble.

VAPOR PRESSURE: Not applicable.

HEAT OF COMBUSTION: Not available.

OXIDIZING PROPERTIES: Not an oxidizer.

EXPLOSIVE PROPERTIES: Heating or water contact may cause overpressure of outside casing and possible explosive result.

COEFFICIENT OF OIL/WATER DISTRIBUTION (PARTITION COEFFICIENT): Not applicable.

COLOR: Various parts have different colors.

MOLECULAR WEIGHT: Mixture.

ODOR THRESHOLD: Not applicable.

EVAPORATION RATE: Not applicable.

MELTING/FREEZING POINT: Not available.

BOILING POINT: Not applicable.

pH: Not applicable.

THERMAL CONDUCTIVITY: Not available.

10. STABILITY and REACTIVITY

CHEMICAL STABILITY: Stable.

DECOMPOSITION PRODUCTS: Combustion: Carbon monoxide, carbon dioxide, hydrogen fluoride, phosphine, phosphorous oxides, lithium oxides, lithium hydroxide, nickel oxides, copper oxides and other metal oxides). Hydrolysis: Contact with the electrolyte solution and water can produce hydrofluoric acid. Contact with water and the charged anode will produce hydrogen gas.

MATERIALS WITH WHICH SUBSTANCE IS INCOMPATIBLE: The electrolyte solution is incompatible with potassium tert-butoxide, oxidizers, reducing agents, acids and alkalies.

POSSIBILITY OF HAZARDOUS REACTION/POLYMERIZATION: Intact batteries are not reactive. If the electrolyte solution inside the battery contacts water, a reaction generating heat may occur. Polymerization will not occur.

CONDITIONS TO AVOID: Avoid damaging batteries in any way that could release electrolyte solution. Avoid exposure to heat, flame, or other ignition source. Avoid contact with water. Avoid overcharging of batteries or other conditions as described in Section 7 (Handling or Storage).

11. TOXICOLOGICAL INFORMATION

SYMPTOMS OF EXPOSURE BY ROUTE OF EXPOSURE:

Inhalation: Under normal conditions of use and handling, no inhalation hazard is present. If battery is heated fumes from the electrolyte solution can cause moderate to severe irritation of the respiratory system.

Skin or Eye Contact: Under normal conditions of use and handling, no skin or eye hazard is present. If the battery case is punctured or otherwise damaged so that contact with the electrolyte solution occurs, contamination of the skin or eyes can be highly irritating or cause burns. Fumes from heated electrolyte solution will cause irritation of the eyes. Contact with the electrodes may result in electric shock under certain circumstances of contact.

Skin Absorption: Some components of the electrolyte solution may be absorbed via intact skin. Due to the small amount of solution in the battery, significant toxic effect by this route of exposure is not expected.

Ingestion: Ingestion is not a likely route of exposure to the electrolyte solution.

Injection: Injection is not a likely route of exposure to the electrolyte solution.

HEALTH EFFECTS OR RISKS FROM EXPOSURE:

Acute: There is no health hazard anticipated to occur during routine use of this product. If damage or heating of the battery occurs, contact with the electrolyte solution or fumes from heating of the solution may cause moderate to severe irritation of skin, eyes and respiratory system.

Chronic: None known.

TARGET ORGANS: ACUTE: Respiratory system, skin, eyes (fumes from thermal decomposition). CHRONIC: None.

TOXICITY DATA: The following toxicity data is presented for components of the electrolyte solution only.

DIMETHYL CARBONATE:

LD₅₀ (Oral-Rat) 13 gm/kg
LD₅₀ (Oral-Mouse) 6 gm/kg
LD₅₀ (Skin-Rabbit) > 5 gm/kg
LD₅₀ (Intraperitoneal-Rat) 1600 mg/kg
LD₅₀ (Intraperitoneal-Mouse) 800 mg/kg

ETHYLENE CARBONATE:

Open Irritation Test (Skin-Rabbit) 660 mg: Mild
LD₅₀ (Oral-Rat) 10 gm/kg
LD₅₀ (Skin-Rabbit) > 3 gm/kg
LDLo (Intraperitoneal-Mouse) 500 mg/kg

CARCINOGENICITY: No components of the electrolyte solution are listed by agencies tracking the carcinogenic effect of chemical compounds. Some components of the case material are listed. Due to the physical nature of this product, carcinogenicity is not a hazard for this product.

IRRITANCY OF PRODUCT: This product is not irritating under normal circumstances of use or handling. Fumes from thermal decomposition are irritating by inhalation, skin or eye contact.

SENSITIZATION TO THE PRODUCT: Contact with this product does not pose a hazard of sensitization.

REPRODUCTIVE TOXICITY INFORMATION: As an article, this product is not expected to cause mutagenic, embryotoxic, teratogenic, or reproductive effects in humans.

12. ECOLOGICAL INFORMATION

ALL WORK PRACTICES MUST BE AIMED AT ELIMINATING ENVIRONMENTAL CONTAMINATION.

MOBILITY IN SOIL: Due to the form of this product, it is unlikely that it will be mobile in the soil.

PERSISTENCE AND BIODEGRADABILITY: This product has not been tested for persistence or biodegradability. The case of this product will not biodegrade.

BIO-ACCUMULATION POTENTIAL: This product has not been tested for bio-accumulation potential. Some materials within the cell are bio-accumulative. Under normal conditions, these materials are contained and pose no risk to persons or the surrounding environment.

12. ECOLOGICAL INFORMATION (Continued)

ECOTOXICITY: This product is not expected to cause significant harm to plant and animal-life in its current form; however, all disposal should be according to current regulations. This product has not been tested for aquatic toxicity. All release of this product into an aquatic or terrestrial environment should be prevented.

RESULTS OF PBT and vPvB ASSESSMENT: No data available. PBT and vPvB assessments are part of the chemical safety report required for some substances in European Union Regulation (EC) 1907/2006, Article 14.

ENVIRONMENTAL EXPOSURE CONTROLS: Controls should be engineered to prevent release to the environment, including procedures to prevent spills, atmospheric release and release to waterways.

13. DISPOSAL CONSIDERATIONS

WASTE TREATMENT AND DISPOSAL METHODS: Dispose of in accordance with applicable International, Federal, State, and local procedures and standards. Batteries should be completely discharged prior to disposal and/ or the terminals taped or capped to prevent short circuit. When completely discharged it is not considered hazardous. Lithium ion batteries must be handled in accordance with all applicable state and federal laws and regulations.

In the U.S. Lithium ion batteries are recyclable in the U.S. through the Rechargeable Battery Recycling Corporation's (RBRC) **Charge Up to Recycle! Program**. For information call 1-800-8-BATTERY or see their website at www.rbrc.org.

In the EU manufacturing, handling and disposal of batteries is regulated under Directive 2006/66/EC. Specific information on disposal of batteries by country can be found at website of the European Portable Batteries Association (http://www.epbaeurope.net/legislation_national.html).

PRECAUTIONS TO BE FOLLOWED DURING WASTE HANDLING: Do not mix different types of batteries with different chemistries in the same containers for disposal. Electrodes of each battery should be covered to prevent contact with other batteries, if packed together, to prevent possible fire.

U.S. EPA WASTE NUMBER: Not applicable.

EWC WASTE CODE: 16 06 05: Other batteries and accumulators. 16 06 06: Electrolyte from batteries and accumulators. 17 04 07 Mixed metals.

14. TRANSPORTATION INFORMATION

The following is general information on requirements for U.S. DOT shipping requirements of lithium ion batteries, based on size and weights.

| Secondary Lithium Ion Cells and Batteries Equivalent Lithium ¹ Content Limits (Cell/Battery) | Battery Size ² | Shipping Classification | Special Packaging/Markings Required |
|---|---------------------------|-------------------------|-------------------------------------|
| ≤1.5 grams/≤8.0 grams | Small | Excepted | Yes ³ |
| Between 1.5g and 5g/ Between 8g and 25g | Medium | Class 9 ⁴ | Yes ⁴ |
| >5.0 g/ >25.0 g | Large | Class 9 | Yes ⁵ |

Notes:

1 – Equivalent Lithium Content (ELC) = 0.3 x rated capacity (Ah) x # of cells (for packs)

2 – The sizes noted here are based solely on U.S. DoT definitions in 49CFR. These are not the same as ICAO/IATA size definitions, or UN Manual of Tests size definitions.

3 – Packages containing more than 12 batteries or 24 cells must meet certain packaging, marking and shipping paper requirements.

4 – Must be shipped as Class 9 hazardous materials unless transported by motor vehicle or rail.

5 – Requires Class 9 markings, label, specified packaging and appropriate shipping papers.

International regulations vary over U.S. DOT shipping regulations and have only two size categories, as outlined in the following table.

| Secondary Lithium Ion Cells and Batteries Watt-hour ¹ Limits (Cell/Battery) | Shipping Classification | Special Packaging/Markings |
|--|-------------------------|----------------------------|
| 20Wh / 100Wh | Excepted | Yes |
| >20Wh / >100Wh | Class 9 | Yes |

Notes:

1 – Watt-hours = rated capacity (Ah) X nominal operating voltage (V).

14. TRANSPORTATION INFORMATION (Continued)

U.S. DEPARTMENT OF TRANSPORTATION 49 CFR 172.101: This product is classified as Dangerous Goods, per regulations of the DOT. All provisions of 40 CFR 173.185 must be met, including markings and labels.

The following classification is for lithium ion batteries:

| | |
|---|---|
| <u>UN Identification Number:</u> | UN 3480 |
| <u>Hazard Materials Description and Proper Shipping Name:</u> | Lithium Ion Batteries (including lithium ion, polymer batteries) |
| <u>Hazard Class or Division:</u> | 9 (Miscellaneous Lithium Battery) |
| <u>Packing Group:</u> | None |
| <u>Label Codes:</u> | Class 9 (Miscellaneous Lithium Battery) |
| <u>Special Provisions:</u> | 422, A51, A54 |
| <u>Packaging:</u> | Exceptions: 185; Bulk: 185; Non-Bulk: 185 |
| <u>Quantity Limitations:</u> | Passenger Aircraft: 5 kg; Cargo Aircraft Only: 35 kg |
| <u>Vessel Storage:</u> | Location: A; Other: None |
| <u>Emergency Response Guidebook Number (2016):</u> | 147 |
| <u>Marine Pollutant:</u> | The components of this product do not meet the criteria of a Marine Pollutant (as defined by 49 CFR 172.101, Appendix B). |

The following classification is for lithium ion batteries packed or contained within equipment:

| | |
|---|--|
| <u>UN Identification Number:</u> | UN 3481 |
| <u>Hazard Materials Description and Proper Shipping Name:</u> | Lithium ion batteries contained in equipment or lithium ion batteries packed within equipment (including lithium ion, polymer batteries) |
| <u>Hazard Class or Division:</u> | 9 (Miscellaneous Lithium Battery) |
| <u>Packing Group:</u> | II |
| <u>Label Codes:</u> | Class 9 (Miscellaneous Lithium Battery) |
| <u>Special Provisions:</u> | 181, 422, A54 |
| <u>Packaging:</u> | Exceptions: 185; Bulk: 185; Non-Bulk: 185 |
| <u>Quantity Limitations:</u> | Passenger Aircraft: 5 kg; Cargo Aircraft Only: 35 kg |
| <u>Vessel Storage:</u> | Location: A; Other: None |
| <u>Emergency Response Guidebook Number (2016):</u> | 147 |
| <u>Marine Pollutant:</u> | This product does not meet the criteria of a Marine Pollutant (as defined by 49 CFR 172.101, Appendix B). |

Under U.S. DOT Hazardous Material Regulations (HMR), Special Provisions 181 and 182 may be applicable.

SP181: When a package contains a combination of lithium batteries contained in equipment and lithium batteries packed with equipment, the following requirements apply:

- The shipper must ensure that all applicable requirements of §173.185 of this subchapter are met. The total mass of lithium batteries contained in any package must not exceed the quantity limits in columns (9A) and (9B) for passenger aircraft or cargo aircraft, as applicable;
- Except as provided in §173.185(c)(3) of this subchapter, the package must be marked “UN 3091 Lithium metal batteries packed with equipment”, or “UN 3481 Lithium ion batteries packed with equipment,” as appropriate. If a package contains both lithium metal batteries and lithium ion batteries packed with and contained in equipment, the package must be marked as required for both battery types. However, button cell batteries installed in equipment (including circuit boards) need not be considered; and
- The shipping paper must indicate “UN 3091 Lithium metal batteries packed with equipment” or “UN 3481 Lithium ion batteries packed with equipment,” as appropriate. If a package contains both lithium metal batteries and lithium ion batteries packed with and contained in equipment, then the shipping paper must indicate both “UN 3091 Lithium metal batteries packed with equipment” and “UN 3481 Lithium ion batteries packed with equipment.”

SP182 Equipment containing only lithium ion batteries must be classified as UN 3481.

As of 1 January 2017: a new hazard label came into effect with a 2-year transitional period during which time either the existing Class 9 Miscellaneous Dangerous Goods hazard label or the new Class 9 Lithium Battery hazard label may be applied to packages containing lithium batteries prepared in accordance with Section I, IA or IB of the lithium battery packing instructions. Also a new mark came into effect with a 2-year transition period during which time either the lithium battery mark or the lithium battery handling label may be applied to packages containing lithium batteries prepared in accordance with Section IB or Section II of the lithium battery packing instructions. The need for an additional document to accompany the consignments is no longer required.

TRANSPORT CANADA TRANSPORTATION OF DANGEROUS GOODS REGULATIONS: This product is classified as Dangerous Goods, per regulations of Transport Canada. The use of the above U.S. DOT information from the U.S. 49 CFR regulations is allowed for shipments that originate in the U.S. For shipments via ground vehicle or rail that originate in Canada, the following information is applicable.

The following classification is for lithium ion batteries:

| | |
|---|---|
| <u>UN Identification Number:</u> | UN 3480 (SOR/2017-137) |
| <u>Proper Shipping Name:</u> | Lithium Ion Batteries (including lithium ion, polymer batteries) |
| <u>Hazard Class Number and Description:</u> | 9 (Miscellaneous Lithium Battery) |
| <u>Packing Group:</u> | None |
| <u>Excepted Quantities:</u> | E0 |
| <u>Hazard Label(s) Required:</u> | Class 9 (Miscellaneous Lithium Battery) |
| <u>Special Provisions:</u> | 34, 123, 137, 138, 149, 159 |
| <u>Explosive Limit and Limited Quantity Index:</u> | None |
| <u>ERAP Index:</u> | None |
| <u>Passenger Carrying Ship Index:</u> | None |
| <u>Passenger Carrying Road or Rail Vehicle Index:</u> | 5 kg |
| <u>Marine Pollutant:</u> | This does not meet the criteria of a Marine Pollutant under Transport Canada regulations, as per TDG 2.7. |

14. TRANSPORTATION INFORMATION (Continued)

TRANSPORT CANADA TRANSPORTATION OF DANGEROUS GOODS REGULATIONS (continued):

The following classification is for lithium ion batteries packed or contained within equipment:

| | |
|---|--|
| <u>UN No.:</u> | 3481 (SOR/2017-137) |
| <u>Name and Description:</u> | Lithium ion batteries contained in equipment or lithium ion batteries packed within equipment (including lithium ion, polymer batteries) |
| <u>Hazard Class Number and Description:</u> | Class 9 (Miscellaneous Lithium Battery) |
| <u>Packing Group:</u> | None |
| <u>Hazard Label(s) Required:</u> | Class 9 (Miscellaneous Lithium Battery) |
| <u>Special Provisions:</u> | 34, 123, 137, 138, 159 |
| <u>Explosive Limit and Limited Quantity Index:</u> | 0 |
| <u>Excepted Quantities:</u> | E0 |
| <u>ERAP Index:</u> | None |
| <u>Passenger Carrying Ship Index:</u> | None |
| <u>Passenger Carrying Road or Rail Vehicle Index:</u> | 5 kg |
| <u>Marine Pollutant:</u> | This product does not meet the criteria of a Marine Pollutant under Transport Canada regulations, as per TDG 2.7. |

INTERNATIONAL AIR TRANSPORT ASSOCIATION SHIPPING INFORMATION (IATA) per the 60th Edition 2018-2019: This product is classified as dangerous goods, per the International Air Transport Association. Effective April 1, 2016, lithium ion cells and batteries must be offered for transport **at a state-of-charge (SoC) not exceeding 30% of their rated design capacity.**

The following classification is for lithium ion batteries:

| | |
|---|--|
| <u>UN Identification Number:</u> | UN 3480 |
| <u>Proper Shipping Name/Description:</u> | Lithium Ion Batteries (including lithium ion, polymer batteries) |
| <u>Hazard Class or Division:</u> | 9 (Miscellaneous) |
| <u>Hazard Label(s) Required:</u> | Class 9 (Miscellaneous) |
| <u>Packing Group:</u> | None |
| <u>Excepted Quantities:</u> | E0 |
| <u>Passenger and Cargo Aircraft Packing Instruction:</u> | Forbidden |
| <u>Passenger and Cargo Aircraft Packing Maximum Net Quantity per Pkg.:</u> | Forbidden12FZ |
| <u>Passenger and Cargo Aircraft Packing Limited Quantity Packing Instruction:</u> | Forbidden |
| <u>Passenger and Cargo Aircraft Packing Limited Quantity Maximum Net Quantity per Pkg.:</u> | Forbidden |
| <u>Cargo Aircraft Only Packing Instruction:</u> | See Instruction 965 |
| <u>Cargo Aircraft Only Maximum Net Quantity per Pkg.:</u> | See Instruction 965 |
| <u>Special Provisions:</u> | A88, A99, A154, A164, A183, A201, A206, A331, A334, A802 |
| <u>ERG Code:</u> | 12FZ |

The following classification is for lithium ion batteries contained in equipment:

| | |
|---|---|
| <u>UN Identification Number:</u> | UN 3481 |
| <u>Proper Shipping Name/Description:</u> | Lithium ion batteries contained in equipment (including lithium ion, polymer batteries) |
| <u>Hazard Class or Division:</u> | 9 (Miscellaneous Lithium Battery) |
| <u>Hazard Label(s) Required:</u> | Class 9 (Miscellaneous Lithium Battery) |
| <u>Packing Group:</u> | None |
| <u>Excepted Quantities:</u> | E0 |
| <u>Passenger and Cargo Aircraft Packing Instruction:</u> | Forbidden |
| <u>Passenger and Cargo Aircraft Packing Maximum Net Quantity per Pkg.:</u> | Forbidden |
| <u>Passenger and Cargo Aircraft Packing Limited Quantity Packing Instruction:</u> | 967 |
| <u>Passenger and Cargo Aircraft Packing Limited Quantity Maximum Net Quantity per Pkg.:</u> | 5 kg |
| <u>Cargo Aircraft Only Packing Instruction:</u> | 967 |
| <u>Cargo Aircraft Only Maximum Net Quantity per Pkg.:</u> | 35 kg |
| <u>Special Provisions:</u> | A48, A88, A99, A154, A164, A181, A185, A206, A213 |
| <u>ERG Code:</u> | 12FZ |

The following classification is for lithium ion batteries packed with equipment:

| | |
|---|--|
| <u>UN Identification Number:</u> | UN 3481 |
| <u>Proper Shipping Name/Description:</u> | Lithium ion batteries packed with equipment (including lithium ion, polymer batteries) |
| <u>Hazard Class or Division:</u> | 9 (Miscellaneous Lithium Battery) |
| <u>Hazard Label(s) Required:</u> | Class 9 (Miscellaneous Lithium Battery) |
| <u>Packing Group:</u> | None |
| <u>Excepted Quantities:</u> | E0 |
| <u>Passenger and Cargo Aircraft Packing Instruction:</u> | Forbidden |
| <u>Passenger and Cargo Aircraft Packing Maximum Net Quantity per Pkg.:</u> | Forbidden |
| <u>Passenger and Cargo Aircraft Packing Limited Quantity Packing Instruction:</u> | 966 |
| <u>Passenger and Cargo Aircraft Packing Limited Quantity Maximum Net Quantity per Pkg.:</u> | 5 kg |
| <u>Cargo Aircraft Only Packing Instruction:</u> | 966 |
| <u>Cargo Aircraft Only Maximum Net Quantity per Pkg.:</u> | 35 kg |
| <u>Special Provisions:</u> | A88, A99, A154, A164, A181, A185, A206, A213 |
| <u>ERG Code:</u> | 12FZ |

14. TRANSPORTATION INFORMATION (Continued)

INTERNATIONAL MARITIME ORGANIZATION SHIPPING INFORMATION (IMO) per Edition 39-DD (V14) 2018-2019: This product is classified as dangerous goods, per the International Maritime Organization.

The following classification is for lithium ion batteries:

| | |
|------------------------------|--|
| <u>UN No.:</u> | 3480 |
| <u>Proper Shipping Name:</u> | Lithium Ion Batteries (including lithium ion, polymer batteries) |
| <u>Hazard Class Number:</u> | 9 (Miscellaneous Lithium Battery) |
| <u>Hazard Label:</u> | Class 9 (Miscellaneous Lithium Battery) |
| <u>Packing Group:</u> | None |
| <u>Special Provisions:</u> | 188, 230, 310, 348, 376, 377, 384, 387 |
| <u>Limited Quantities:</u> | 0 |
| <u>Excepted Quantities:</u> | E0 |
| <u>Packing Instructions:</u> | Instructions: P903, P908, P909, P910, LP903, LP904, LP905, LP906; Provisions: None |
| <u>IBC Information:</u> | Instructions: None, Provisions: None |
| <u>Tanks:</u> | Instructions: None, Provisions: None |
| <u>EmS:</u> | F-A, S-I |
| <u>Stowage Category:</u> | Category A, SW19 |
| <u>Segregation:</u> | None |

Marine Pollutant: No component is a Marine Pollutant under UN criteria or is specifically listed in the MARPOL 73/78 Annex III.

The following classification is for lithium ion batteries packed or contained within equipment:

| | |
|------------------------------|--|
| <u>UN No.:</u> | 3481 |
| <u>Proper Shipping Name:</u> | Lithium ion batteries contained in equipment or lithium ion batteries packed within equipment (including lithium ion, polymer batteries) |
| <u>Hazard Class Number:</u> | 9 (Miscellaneous Lithium Battery) |
| <u>Hazard Label:</u> | Class 9 (Miscellaneous Lithium Battery) |
| <u>Packing Group:</u> | None |
| <u>Special Provisions:</u> | 188, 230, 310, 348, 360, 376, 377, 384, 387 |
| <u>Limited Quantities:</u> | 0 |
| <u>Excepted Quantities:</u> | E0 |
| <u>Packing Instructions:</u> | Instructions: P903, P908, P909, P910, P911, LP903, LP904, LP905, LP906; Provisions: None |
| <u>IBC Information:</u> | Instructions: None, Provisions: None |
| <u>Tanks:</u> | Instructions: None, Provisions: None |
| <u>EmS:</u> | F-A, S-I |
| <u>Stowage Category:</u> | Category A, SW19 |
| <u>Segregation:</u> | None |

Marine Pollutant: No component is a Marine Pollutant under UN criteria or is specifically listed in the MARPOL 73/78 Annex III.

EUROPEAN AGREEMENT CONCERNING THE INTERNATIONAL CARRIAGE OF DANGEROUS GOODS BY ROAD (ADR):

This compound is classified by the Economic Commission for Europe to be dangerous goods.

The following classification is for lithium ion batteries:

| | |
|--|--|
| <u>UN No.:</u> | 3480 |
| <u>Name and Description:</u> | Lithium Ion Batteries (including lithium ion, polymer batteries) |
| <u>Class:</u> | 9 (Miscellaneous Lithium Battery) |
| <u>Classification Code:</u> | M4 |
| <u>Packing Group:</u> | None |
| <u>Labels:</u> | Class 9A |
| <u>Special Provisions:</u> | 188, 230, 310, 348, 376, 377, 636 |
| <u>Limited Quantities:</u> | 0 |
| <u>Excepted Quantities:</u> | E0 |
| <u>Packing Instructions:</u> | Instructions: P903, P908, P909, P910, LP903, LP904 |
| <u>Special Packing Provisions:</u> | None |
| <u>Mixed Packing Provisions:</u> | None |
| <u>Portable Tanks and Bulk Containers:</u> | None |
| <u>Hazard Identification No.:</u> | None |

The following classification is for lithium ion batteries packed in or contained within equipment:

| | |
|--|--|
| <u>UN No.:</u> | 3481 |
| <u>Name and Description:</u> | Lithium ion batteries contained in equipment or lithium ion batteries packed within equipment (including lithium ion, polymer batteries) |
| <u>Class:</u> | Class 9 (Miscellaneous Lithium Battery) |
| <u>Classification Code:</u> | M4 |
| <u>Packing Group:</u> | None |
| <u>Labels:</u> | 9A |
| <u>Special Provisions:</u> | 188, 230, 310, 348, 360, 376, 377, 636 |
| <u>Limited Quantities:</u> | 0 |
| <u>Excepted Quantities:</u> | E0 |
| <u>Packing Instructions:</u> | Instructions: P903, P908, P909, P910, LP903, LP904 |
| <u>Special Packing Provisions:</u> | None |
| <u>Mixed Packing Provisions:</u> | None |
| <u>Portable Tanks and Bulk Containers:</u> | None |
| <u>Hazard Identification No.:</u> | None |

14. TRANSPORTATION INFORMATION (Continued)

AUSTRALIAN FEDERAL OFFICE OF ROAD SAFETY CODE FOR THE TRANSPORTATION OF DANGEROUS GOODS BY ROAD OR RAIL, Edition 7.6, 2018: This product is classified as dangerous goods under the Australian Dangerous Goods Code.

2.9.4 LITHIUM BATTERIES

Cells and batteries, cells and batteries contained in equipment, or cells and batteries packed with equipment, containing lithium in any form must be assigned to UN Nos. 3090, 3091, 3480 or 3481 as appropriate. They may be transported under these entries if they meet the following provisions:

- (a) Each cell or battery is of the type proved to meet the requirements of each test of the Manual of Tests and Criteria, Part III, sub-section 38.3; Cells and batteries manufactured according to a type meeting the requirements of sub-section 38.3 of the Manual of Tests and Criteria, Revision 3, Amendment 1 or any subsequent revision and amendment applicable at the date of the type testing may continue to be transported, unless otherwise provided in this Code. Cell and battery types only meeting the requirements of the Manual of Tests and Criteria, Revision 3, are no longer valid. However, cells and batteries manufactured in conformity with such types before 1 July 2003 may continue to be transported if all other applicable requirements are fulfilled.

NOTE: Batteries are to be of a type proved to meet the testing requirements of the Manual of Tests and Criteria, part III, sub-section 38.3, irrespective of whether the cells of which they are composed are of a tested type.

- (b) Each cell and battery incorporates a safety venting device or is designed to preclude a violent rupture under conditions normally incident to transport;
- (c) Each cell and battery is equipped with an effective means of preventing external short circuits;
- (d) Each battery containing cells or series of cells connected in parallel is equipped with effective means as necessary to prevent dangerous reverse current flow (e.g., diodes, fuses, etc.);
- (e) Cells and batteries must be manufactured under a quality management programme that includes:
- (i) A description of the organisational structure and responsibilities of personnel with regard to design and product quality;
 - (ii) The relevant inspection and test, quality control, quality assurance, and process operation instructions that will be used;
 - (iii) Process controls that should include relevant activities to prevent and detect internal short circuit failure during manufacture of cells;
 - (iv) Quality records, such as inspection reports, test data, calibration data and certificates. Test data must be kept and made available to the competent authority upon request;
 - (v) Management reviews to ensure the effective operation of the quality management programme;
 - (vi) A process for control of documents and their revision;
 - (vii) A means for control of cells or batteries that are not conforming to the type tested as mentioned in (a) above;
 - (viii) Training programmes and qualification procedures for relevant personnel; and
 - (ix) Procedures to ensure that there is no damage to the final product.

NOTE: In house quality management programmes may be accepted. Third party certification is not required, but the procedures listed in (i) to (ix) above must be properly recorded and traceable. A copy of the quality management programme must be made available to the competent authority upon request.

- (f) Lithium batteries, containing both primary lithium metal cells and rechargeable lithium ion cells, that are not designed to be externally charged (see special provision 387 of Chapter 3.3) shall meet the following conditions:
- (i) The rechargeable lithium ion cells can only be charged from the primary lithium metal cells;
 - (ii) Overcharge of the rechargeable lithium ion cells is precluded by design;
 - (iii) The battery has been tested as a lithium primary battery;
 - (iv) Component cells of the battery shall be of a type proved to meet the respective testing requirements of the Manual of Tests and Criteria, part III, sub-section 38.3.

The following classification is for lithium ion batteries:

| | |
|--|--|
| <u>UN No.:</u> | 3480 |
| <u>Name and Description:</u> | Lithium Ion Batteries (including lithium ion, polymer batteries) |
| <u>Class or Division:</u> | 9 (Miscellaneous Lithium Battery) |
| <u>Packing Group:</u> | None |
| <u>Labels:</u> | Class 9 (Miscellaneous Lithium Battery) |
| <u>Special Provisions:</u> | 188, 230, 310, 348, 376, 377, 384, 387 |
| <u>Limited Quantities:</u> | 0 |
| <u>Packing and IBCs:</u> | Instructions: P903, P908, P909, P910, LP903, LP904; Special Packing Provisions: None |
| <u>Portable Tanks and Bulk Containers:</u> | Instructions: None, Special Provisions: None |
| <u>Hazard Identification No.:</u> | None |
| <u>HazChem Code:</u> | 4W |
| <u>HIN Code:</u> | (1) |

The following classification is for lithium ion batteries contained or packed in equipment:

| | |
|--|--|
| <u>UN No.:</u> | 3481 |
| <u>Name and Description:</u> | Lithium ion batteries contained in equipment or lithium ion batteries packed within equipment (including lithium ion, polymer batteries) |
| <u>Class or Division:</u> | 9 (Miscellaneous Lithium Battery) |
| <u>Packing Group:</u> | None |
| <u>Labels:</u> | Class 9 (Miscellaneous Lithium Battery) |
| <u>Special Provisions:</u> | 188, 230, 310, 348, 360, 376, 377, 384, 387 |
| <u>Limited Quantities:</u> | 0 |
| <u>Packing and IBCs:</u> | Instructions: P903, P903, P909, P910, LP903, LP904; Special Packing Provisions: None |
| <u>Portable Tanks and Bulk Containers:</u> | Instructions: None, Special Provisions: None |
| <u>Hazard Identification No.:</u> | None |
| <u>HazChem Code:</u> | 4W |
| <u>HIN Code:</u> | (1) |

IN BULK ACCORDING TO THE IBC CODE: See the information under the individual jurisdiction listings for IBC information.

ENVIRONMENTAL HAZARDS: This product and its components do not meet the criteria of environmentally hazardous according to the criteria of the UN Model Regulations (as reflected in the IMDG Code, ADR, RID, and ADN);

14. TRANSPORTATION INFORMATION (Continued)

This lithium ion battery pack is shipped according to the applicable transportation regulations listed on this SDS:

- ❖ U.S. Department of Transportation (DOT) Subchapter C of the Hazardous Materials Regulations,
- ❖ UN Recommendations on the Transport of Dangerous Goods,
- ❖ International Civil Aviation Organization (ICAO) Technical Instruction for the Safe Transport of Dangerous Goods by Air,
- ❖ International Aviation Transportation Association (IATA) Dangerous Goods Regulations,
- ❖ International Maritime Organization (IMO),
- ❖ Transport Canada Transportation of Dangerous Goods Regulations (TDG),
- ❖ European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR),
- ❖ Singapore Standard 286: Part A, and
- ❖ Australian Federal Office of Road Safety Code for the Transportation of Dangerous Goods by Road or Rail.

This lithium ion battery pack may be shipped according to the special provisions, exceptions and exemptions specified in the regulations listed above. Always refer to the latest transportation regulations prior to shipping this product as regulations may have changed.

LITHIUM ION BATTERY PACK (Li-Ion BP) CHARACTERISTICS FOR TRANSPORTATION CLASSIFICATION:

Li-Ion BP is a Small Secondary Rechargeable Battery containing 3 Lithium ion cells:

1. Energy Rating
 - a. Nominal (Li-Ion BP) Amp Hour rating is 2.300Ahr
 - b. Nominal (Li-Ion BP) energy is 24.42 Wh.
 - c. Li-Ion BP Wh rating is marked on the outside of each individual battery case
2. Li-Ion BP Cell Chemistry is not Lithium Metal
 - a. Li-Ion BP cell chemistry is Lithium ion
 - b. Li-Ion BP is rechargeable
 - c. Li-Ion BP Equivalent Lithium Content (ELC) is 1.98 gram/battery
 - d. ELC of each cell within battery is 0.66 g.
3. Weight
 - a. Li-Ion BP weight is 205 grams without packaging or booklet
4. UN Manual of Tests and Criteria, Part III, Subsection 38.3
 - a. Li-Ion BP Assembly has passed Tests 1 through 8.
 - b. Li-Ion BP Cells have passed Tests 1 through 8
 - c. Documentation confirming the batteries have been so tested is available on Brady website.
5. Li-Ion BP has Built-In Safety Features
 - a. Li-Ion BP has internal short-circuit protection circuit
 - b. Li-Ion BP has internal circuitry designed to prevent reversed polarity current flow
6. Li-Ion BP has passed 1.2 M Drop Test
 - a. Individual batteries have passed 1.2 M Drop Test
 - b. Fully packed carton as shipped from manufacturer has passed 1.2 M Drop Test
7. Li-Ion BP is not considered a marine pollutant
8. Li-Ion BP has solid cathode.

15. REGULATORY INFORMATION

INTERNATIONAL CHEMICAL INVENTORIES: This product is considered an article under the chemical inventories listed below and consequently is exempt from listing on these inventories:

- U.S. EPA Toxic Substance Control Act (TSCA)
- Canadian DSL Inventory
- Canadian Chemical Registration Regulations (NDSL/DSL)
- European Inventory of Existing Chemical Substances (EINECS/ELINCS)
- Singapore Code of Practice on Pollution Control Requirements
- Australian Inventory of Chemical Substances (AICS)
- Japanese Existing and New Chemical Substance List (ENCS)
- Korean Existing Chemicals List (ECL)
- Chinese Inventory of Existing Chemicals List (IECSC)

However, based on the rules enforced with regards to the marketing and use of chemicals to manufacture this product, each chemical component of this finished product has been listed or exempt from the listed chemical inventories.

OTHER INTERNATIONAL REGULATIONS: As an article this product has no requirements under the following U.S. and International regulations:

- U.S. SARA Reporting & Threshold Planning Quantity (TPQ) Requirements
- U.S. CERCLA Reportable Quantity (RQ)
- California Safe Drinking Water and Toxic Enforcement Act (Proposition 65)
- Canadian WHMIS Regulations (Hazardous Products Act, 6&7, Part II (Sections 11 and 12)).
- Canadian Environmental Protection Agency (CEPA) Priorities Substances Lists
- European Union CLP EC 1272/2008: Labeling and Classification
- European Union REACH
- Australian Workplace Standard
- Australian Standard for the Uniform Scheduling of Drugs and Poisons
- Japanese Minister of International Trade and Industry (MITI).
- Japanese Poisonous and Deleterious Substances Control Law
- Singapore Code of Practice on Pollution Control Requirements
- New Zealand HNSO Regulations

15. REGULATORY INFORMATION (Continued)

EUROPEAN UNION REGULATIONS:

CHEMICAL SAFETY ASSESSMENT: No Data Available. The chemical safety assessment is required for some substances according to European Union Regulation (EC) 1907/2006, Article 14.

Substances of Very High Concern (SVHC) Status: Undetermined.

EU RoHS Directive 2011/65/EU: Internal circuitry of Li-ion BP is RoHS compliant.

16. OTHER INFORMATION

GLOBAL HARMONIZATION UNDER U.S. OSHA HAZARD COMMUNICATION STANDARD, CANADIAN WHMIS HPR-GHS 2015, EU CLP REGULATION (EC) 1272/2008 LABELING AND CLASSIFICATION, JAPANESE JIS Z 7253: 2015: LABELING AND CLASSIFICATION, KOREAN ISHA (Notice 2009-68) LABELING AND CLASSIFICATION, NEW ZEALAND HAZARDOUS SUBSTANCES and NEW ORGANISMS ACT (HNSO) CHEMICAL CLASSIFICATION (COP 8-1 09-06), OR AUSTRALIAN NOHSC STANDARDS: This product is an article and is not required to be classified under any jurisdiction.

The following classification is for the chemical components of the electrolyte solution.

Dimethyl Carbonate: The following is an official published Harmonized Classification under CLP 1272/2008.

Classification: Flammable Liquid Category 2

Hazard Statements: H225: Highly flammable liquid and vapour.

Ethylene Carbonate: The following is a notified EU ECHA classification.

Classification: Acute Oral Toxicity Category 4, Eye Irritation Category 2A, Specific Target Organ Toxicity (Ingestion-Kidneys) Repeated Exposure Category 3

Hazard Statements: H302: Harmful if swallowed. H319: Causes serious eye irritation. H319: Causes serious eye irritation. H373: May cause damage to kidneys through prolonged or repeated exposure by ingestion.

Lithium Hexafluorophosphate: The following is a notified EU ECHA classification.

Classification: Acute Oral Toxicity Cat. 3, Skin Damage/Corrosion Category 1B, Specific Target Organ Toxicity (Bones, Teeth) Repeated Exposure Category 1

Hazard Statements: H301: Toxic if swallowed. H314: Causes severe skin burns and eye damage. H372: Causes damages to organs through prolonged or repeated exposure.

Lithium Cobaltite: The following is a notified EU ECHA classification.

Classification: Reproductive Toxicity Category 2

Hazard Statements: H361fd: Suspected of damaging fertility. Suspected of damaging the unborn child.

Additional Self-Classification

Classification: Carcinogenic Category 2, Skin Sensitization Category 1, Specific Target Organ Toxicity (Ingestion-Multiple Organs) Repeated Exposure Category 1

Hazard Statements: H351: Suspected of causing cancer. H317: May cause an allergic skin reaction. H372: Causes damages to organs through prolonged or repeated exposure.

All Other Components: Not applicable.

REFERENCES AND DATA SOURCES: Contact the supplier for information.

METHODS OF EVALUATING INFORMATION FOR THE PURPOSE OF CLASSIFICATION: Bridging principles were used to classify this product.

REVISION DETAILS: September 2015: Up-date of SDS to current classification throughout SDS. Up-date of Section 14 due to change in shipping regulations for batteries. October 2015: Up-date to most current reference to EU RoHS Directive, Section 16. November 2016: Review and up-date entire SDS for new GHS classification, exposure limits and shipping classification. November 2017: Review of entire SDS for all current GHS classification, exposure limits and changes in shipping classification. November 2018: Review and up-date entire SDS as per current regulations, including shipping regulations, exposure limits and GHS classification. March 2019: Change of company address information in Section 1. Review of SDS for changes to GHS component classification and exposure limits. Up-date of international exposure limits.

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