Material Safety Data Sheet

Section 1 – Product Identification

Product Name:	Inventus Power U1LiFE Battery
Model Number:	U1 40
Manufacturer's Name:	Inventus Power
Emergency Telephone Number inside USA:	1-800-424-9300
Emergency Telephone Number outside USA:	001-352-3233500
Address:	1200 Internationale Parkway Woodridge, IL 60517
Telephone Number for Information:	1-630-410-7900
Date Prepared:	09/24/2013

Section 2 – Composition and Ingredient Information

Common Chemical Name	CAS #	Percent of Content (%)	Classification and Hazard Labeling
Lithium Iron Phosphate ($LiFePO_4$)	15365-14-7	25-35	Eye, Skin, Respiratory Irritant
Carbon, as Graphite	7440-44-0	12-18	Eye, Skin, Respiratory Irritant
Aluminum metal	7429-90-5	3-7	Inert
Copper metal	7440-50-8	5-9	Inert
Electrolyte: Ethylene carbonate Dimethyl carbonate Ethyl methyl carbonate Lithium Hexafluorophosphate	 96-49-1 616-38-6 623-53-0 21324-40-3	12-17	Mixture: Flammable; Reactive; Sensitizer Eye, Skin & Respiratory Irritant

Under normal use, this battery is not expected to expose user to hazardous ingredients.

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

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

Section 3 – Hazards Identification

Preparation Hazards and Classification: Not dangerous with normal use. The materials within the battery may only represent a hazard if the structural integrity of the battery is compromised. Do not expose the batteries to fire or open flame. Do not mix batteries of varying sizes, chemistries, or types. Do not short circuit, puncture, incinerate, crush, over–charge, over-discharge, or expose the batteries to temperatures above or below the declared limit. Damage to the batteries will result in the risk of fire or

explosion, which could release dangerous hydrogen fluoride gas and exposure to the ingredients contained within or their combustion products could be harmful.

Appearance, Color, and Odor: Solid object, no odor.

Primary Route(s) of Exposure: Risk of exposure will only occur if the battery cell is mechanically, thermally, or electrically damaged and the enclosure is compromised. If this occurs, exposure to electrolyte solutions contained within the battery cell may occur by inhalation, eye contact, skin contact and ingestion.

Potential Health Effects:

Inhalation: Inhalation of material from a sealed battery is not an expected route of exposure. Vapors or mists from a ruptured battery may cause respiratory irritation.
Ingestion: Swallowing of material from a sealed battery is not an expected route of exposure. Swallowing mists from a ruptured battery may cause respiratory irritation, chemical burns of the mouth and gastrointestinal tract irritation.
Skin: Contact between the battery and skin will not cause any harm. Skin contact with positive and negative terminals of high voltages may cause burns to the skin. Skin contact with a ruptured battery can cause skin irritation.
Eye: Eye contact with the contents of a ruptured battery can cause severe irritation to the eye.

Medical Conditions Aggravated by Exposure: Medical conditions related to potential exposure modalities may be exacerbated by exposure to the materials.

Section 4 – First Aid Measures

Skin Contact: Remove affected articles of clothing. Wash affected area with lukewarm water for at least 30 minutes. If irritation or pain persists, seek medical attention.

Eye Contact: Wash affected eye with lukewarm water for at least 30 minutes. Rinse with saline solution if possible. Seek medical attention.

Inhalation: Move victim to fresh air and remove source of contamination from area. Seek medical attention.

Ingestions: Drink plenty of water and induce vomiting. Seek medical attention immediately.

Caution: In all cases evacuate the contaminated area. If irritation persists, seek medical assistance at once.

Section 5 – Fire Fighting Measures

Extinguishing Media: Water, carbon dioxide, dry chemical powder and foam are most effective means to extinguish a battery fire

Fire Fighting Procedure: Put on fully protective gear, including self–contained positive pressure breathing apparatus, goggles, fireproofing jacket and gloves. Caution is advised during application of water because burning particles may be ejected from the fire.

Unusual Fire and Explosion Hazards: Exposing battery cell to excessive heat, fire or over voltage condition may cause a leak, fire, hazardous vapors and hazardous decomposition products. Damaged or opened cells or batteries can result in rapid heating and the release of flammable vapors and potentially dangerous gases that may be heavier than air and could travel along the ground or be moved by ventilation to an ignition source.

Section 6 – Accidental Release Measures

The material contained within the batteries cells is only expelled if the battery is damaged. Evacuate the area. Wear protective clothing and glasses. Use a shovel and cover battery with sand or vermiculite, place in an approved container and dispose in accordance with section 13.

Section 7 – Handling and Storage

Handling: Do not expose battery or cell to extreme temperatures or fire. Do not disassemble, crush or puncture battery. Do not over-charge or over-discharge the battery. Do not mix batteries of varying types or sizes. Do not connect positive and negative terminals or place the batteries on conductive metal.

Storage: Insulate positive and negative terminals to avoid short circuit and ensure sufficient clearance between batteries and other surfaces. Store in a dry, cool (below 30℃ and above -10℃) and well-ventilated area and avoid fire, heat. Elevated temperatures can result in reduced battery life and venting of flammable liquid and gases. Keep batteries away from strong oxidizers and acids.

Section 8 – Exposure Controls and Personal Protection

Respiratory Protection: Not necessary under normal use. In case of battery or cell rupture, use a self-contained full face respiratory mask.

Eye Protection: Not necessary under normal use. Wear safety goggles if handling a ruptured or leaking battery cell.

Hand Protection: Not necessary under normal use. Wear Viton rubber gloves if handling a ruptured or leaking battery cell.

Skin Protection: Not necessary under normal use. Wear rubber apron and Viton rubber gloves if handling a ruptured or leaking battery cell.

OSHA: Occupational Safety and Health Administration
PEL-TWA: Permissible Exposure Limits-Time Weighted Average Concentration
ACGIH: American Council of Government Industrial Hygienists
TLV-TWA: Threshold Limit Value-Time Weighted Average Concentration

Common Chemical Name / General Name	OSHA PEL-TWA	ACGIH (2010) TLV-TWA
Lithium Iron Phosphate	10.0 mg/m3 (as iron fume)	5.0 mg/m3 (as iron fume)
Electrolyte	Not established	Not established
Carbon, as Graphite	5.0 mg/m3 (respirable fraction)	2.0 mg/m3 (respirable fraction)

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Section 9 – Physical and Chemical Properties

Physical State:	Solid	Odor Type:	Odorless
Appearance:	Battery	Odor Threshold:	Not applicable
pH:	Not applicable	Evaporative Rate (n-Butyl Acetate = 1):	Not applicable
Relative Density	Not applicable	Auto Ignition Temperature (C):	Not applicable
Boiling Point:	Not applicable	Flammability Limits (%):	Not applicable
Melting Point:	Not applicable	Vapor Pressure (mmHg @ 20 C):	Not applicable
Viscosity:	Not applicable	Vapor Density (Air = 1)	Not applicable
Oxidizing Properties	Not applicable	Solubility in Water:	Insoluble
Flash Point and Method (C)	Not applicable	Water/Oil Distribution Coefficient:	Not applicable

Section 10 – Stability and Reactivity

Stability: Stable

Conditions to Avoid: Avoid exposing battery to high temperatures. Do not incinerate, deform, mutilate, crush, pierce, short circuit or disassemble.

Materials to Avoid: Not Applicable

Hazardous Decomposition Products: Combustible vapors may be released if exposed to fire.

Possibility of Hazardous Reactions: Hydrogen fluoride gas may be produced in reaction with water.

Section 11 – Toxicological Information

Irritation: Risk of irritation only occurs if battery cells are mechanically, thermally or electrically damaged and the enclosure is compromised.

Neurological Effects: No information is available at this time.

Sensitization: The nervous system and organs may be sensitized by exposure.

Teratogenicity: No information is available at this time. **Reproductive**

Toxicity: No information is available at this time. **Mutagenicity (Genetic**

Effects): No information is available at this time.

Toxicologically Synergistic Materials: No information is available at this time.

Section 12 – Ecological Information

Bioaccumulative potential: Not available.

Persistence and degradability: Not available.

Mobility: Not available.

Ecotoxicity: Not available.

Other adverse effects: Not available.

Section 13 – Disposal Considerations

Waste Disposal Method: Recycling is encouraged. Discharge batteries fully and cap terminals before disposal. Dispose of in accordance with local, state and federal laws and regulations.

USA: Dispose of in accordance with local, state and federal laws and regulations.

Canada: Dispose of in accordance with local, state and federal laws and regulations.

EC: Dispose of in accordance with relevant EC Directives.

Section 14 – Transport Information

Hazardous Classifications: Based on lithium content:

Small quantities of single lithium ion battery cells are exempted from Class 9. No class 9 marking, specification packaging, or Class 9 labels are required.

Use lithium ion battery labels for transport of lithium ion batteries which are not assigned Class 9. Use Class 9 Miscellaneous Dangerous Goods and UN Identification labels for transportation of lithium ion batteries which are assigned Class 9. Refer to relevant transportation documents. Lithium and lithium ion cells and batteries are regulated in the U.S. in accordance with Part 49 of the Code of Federal Regulations, (49 CFR Sections 105–180) of the U.S. Hazardous Materials Regulations.

Section 15 – Regulatory Information

USA

TSCA Status:

All ingredients in the product are listed on the TSCA inventory.

SARA Title III:

Sec. 302/304: None
Sec. 311/312: None
Sec. 313: None
CERCLA RQ: None

California Prop 65

This product does not contain chemicals known to the State of California to cause cancer or reproductive toxicity.

Canada

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contain all the information required by the Controlled Products Regulations.

WHMIS Classification: Not Controlled

New Substance Notification Regulations: All ingredients in the product are listed, as required, on Canada's Domestic Substance List.

NPRI Substances (National Pollutant Release Inventory): This product does not contain any NPRI chemicals.

EC Classification for the Substance/ Preparation:

Symbol: This product is not classified as dangerous according to Directive 1999/45/EC and it's amendments.

Risk Phrases: None

Safety Phrases: S2: Keep out of the reach of children.

Section 16 – Other Information

Preparation Date:	March 01, 2013
Revision Date:	March 01, 2013
Revision Summary:	A - Released.
Prepared by:	Inventus Power 1200 Internationale Parkway Woodridge, IL 60517
Phone:	(630) 410-7900

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