Material Safety Data Sheet
May be used to comply with
OSHA's Hazard Communication Standard 29 CFR 1910.1200.
This standard must be consulted for specific requirements

IDENTITY (*As used on label and list*)

Note: Blank spaces are not permitted. If any item is not applicable, or no information is available, the space must be marked to indicate that.

Lithium-ion Batteries (Rechargeable)

Section I

Manufacturer's Name Milwaukee Electric Tool Corporation	Emergency Telephone Number 1-800-424-9300 (U.S.) or 1-703-527-3887 (International)
Address *(Number, Street)* 13135 West Lisbon Road	Contact Telephone Number for Technical Information 262-781-3600 or 1-800-729-3878 (1-800-SAWDUST)
(City, State, and Zip Code) Brookfield, Wisconsin 53005	Date Prepared October, 2006

Section II - Hazardous Ingredients/Identity Information

Hazardous Components [Specific Chemical Identity, Common name (s)]

Ingredient	% by Weight	OSHA Reg. Y/N	CAS #	OSHA PEL	ACGIH TLV	California Prop 65 Reg. Y/N	IARC/NTP Y/N
Aluminum Foil	0.1 – 1w/w	N	7429-90-5	N/A	N/A	N	N
Biphenyl (BP)	0.1-0.3 w/w	Y	92-52-4	1.0 mg/m3	1.0 mg/m3	N	Y
Copper Foil	0.1- 1 w/w	N	740-50-8	N/A	N/A	N	N
Linear & Cyclic Carbonate solvents (See 'Other Information")	5-17w/w	N	N/A	N/A	N/A	N	N
Graphite Powder	10-30 w/w	Y	7440-44-0	2.0 mg/m3 (as dust)	2.0 mg/m3 (as dust)	N	Y
Lithium Manganite (Spinel) ($LiMn_2O_4$)	10-30 w/w	N	12057-17-9	5.0 mg/m3 (as dust)	0.2 mg/m3 (as dust)	N	N
Lithium Hexaflurophosphate ($LiPF_6$)	1-5 w/w	N	21324-40-3	2.5 mg/m3 (as dust)	2.5 mg/m3 (as dust)	N	N
Polyvynilidene (PVDF)	0.1-1 w/w	N	24937-79-9	Non Established	Non Established	N	N
Steel, Nickel and inert Polymer	Balance	N	N/A	N/A	N/A	N	N

DOT Hazard Classification: Lithium-ion batteries containing not more than 8.0 grams of equivalent lithium content (ELC) are excepted from full UN3090 Class 9 regulation per HMR 49 CFR 173.185(b) "Exceptions". Lithium-ion batteries containing not more than 25.0 grams ELC are excepted from full UN3090 Class 9 regulation per HMR 49 CFR 173.185(c) "Additional exceptions".

SARA Title III Section 313: This product does not contain regulated levels of any toxic chemical subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA) and 40 CFR part 372.

HMIS® Rating Numbers	Health	Flammability	Reactivity	Personal Protection
	N/A	N/A	N/A	X

Hazard Ratings:	0 = Minimum hazard	1 = Slight hazard	2 = Moderate hazard	3 = Serious hazard	4 = Severe hazard
	A = Goggles	B = Goggles + Gloves	C = Face Shield, Gloves + Apron	X = Special, See sections VII & VIII of this sheet	

Section III - Physical/Chemical Characteristics

Boiling Point	Specific Gravity (H_2O=1)
N/A	1.5 – 2.0
Vapor Pressure (mm/Hg.)	Melting Point
N/A	N/A
Vapor Density (Air=1)	Evaporation Rate
N/A	N/A
Solubility in Water	
Insoluble	
Appearance and Odor	
Solid article, odorless	

Legend:
Y - Yes
N - No
N/A - Not Applicable

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Section IV - Fire and Explosion Hazard Data

Flash Point (Method Used)	Flammable Limits	LEL	UEL
None	Organic components will burn if cell is incinerated. Combustion of cell contents will cause evolution of Hydrogen Fluoride.	None	None

Extinguishing Media

Water spray, carbon dioxide, dry chemical powder or appropriate foam. Use agent appropriate for surrounding materials.

Special Fire Fighting Procedures

Organic components will burn if incinerated. Combustion of cell contents will cause evolution of Hydrogen Fluoride. In case of fire in an adjacent area, use water, CO2, or dry chemical extinguishers if cells are packed in their original containers since the fuel of the fire is basically paper products.

Unusual Fire and Explosion Hazards

Hydrofluoric Acid Exposure During Fire Fighting: This information is given for the use of professional fire fighters responding to a warehouse fire where fire from other materials may incinerate batteries. This section is provided solely in case of exposure, during fire fighting, to the combustion by-products.

Hydrofluoric acid is extremely corrosive. Contact with hydrogen fluoride fumes is to be avoided. Permissible exposure limit is 3ppm. In case of contact with hydrogen fluoride fumes, immediately leave the area and seek first aid **and** emergency medical attention. Symptoms may have delayed onset. Fluoride ions penetrate skin readily causing destruction of deep tissue layers even bone. Fluoride interferes with nerve impulse conduction causing severe pain or absence of sensations. Immediately flush eyes or skin with water for at least 20 minutes to neutralize the acidity and remove some fluoride. Remove and destroy all contaminated clothing and permeable personal possessions. Before re-use, impermeable possessions should be soaked in benzalkonium chloride after washing. Following flushing of the affected areas, an iced aqueous solution of benzalkonium chloride or 2.5% calcium gluconate gel should be applied to react with the fluoride ion. Compresses and wraps may be used for areas where immersion is not practical. Medicated dressing should be changed every 2 minutes. Exposure to hydrofluoric acid fumes sufficient to cause pain requires immediate hospitalization for monitoring for pulmonary edema.

Section V - Reactivity Data

Stability	Unstable		Conditions to avoid:
	Stable	X	Do not crush, puncture, incinerate, immerse in water or heat over 100°C. Steel casing slowly dissolves in strong mineral acids.

Incompatibility *(Material to avoid)*:

Water, heat and strong acids

Hazardous Decomposition or Byproducts

Hydrogen Fluoride, Phosphorus Oxides, Carbon Monoxide, Carbon Dioxide, Lithium Hydroxide, Manganese Oxides, Aluminum Oxide, possible fluoro-compounds, Carbon soot

Hazardous	May Occur		Conditions to avoid: Hazardous polymerization will not occur. Spontaneous decomposition will not occur at normal temperature.
Polymerization	Stable	X	

Section VI - Health Hazard Data

Route(s) of Entry:	Inhalation?	Skin?	Ingestion?
During normal use	No	No	No

Health Hazards *(Acute and Chronic)*

No effect noticed in routine handling of product. Risk of exposure occurs only if the battery is mechanically or electrically abused can irritate skin and eyes.

Signs and Symptoms of Exposure:

No effect noticed in routine handling of product. If battery is mechanically or electrically abused, exposure to skin may cause irritation; may irritate eyes.

Medical Conditions Generally Aggravated by Exposure:

No effect noticed in routine handling of product. An acute exposure will not generally aggravate any medical condition. Ingestion is not likely, given the physical size and state of the cell.

Emergency and First Aid Procedures

In case of skin contact with contents of battery, flush immediately with water. For eye contact, flush with copious amounts of water for 15 minutes. If irritation persists, get medical help.

Section VII - Precautions for Safe Handling and Use

Steps to Be Taken in Case Material is Released If Spilled

Transport container outdoors. Hold burned cells and fire cleanup solids for disposal as potential hazardous waste.

Legend:
Y - Yes
N - No
N/A - Not Applicable

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Unburned cells are not hazardous waste. A fire with over 100 kg of cells burnt will likely require reporting to environmental officials. Always consult and obey all international, federal and local environmental laws.

Waste Disposal Method

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.

Precautions to Be Taken in Handling and Storing

Store in a cool, dry place away from sparks and flame. Keep below 125°C. Keep above -60°C. Charge between 0°C and 45°C. Use only approved charging equipment. Do not disassemble battery or battery pack. Do not puncture, crush or dispose of in fire.

Other Precautions

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

Section VIII - Control Measures

Respiratory Protection *(Specify Type)*

Not necessary under conditions of normal use

	Mechanical	Other
	Not necessary under conditions of normal use	Not necessary under conditions of normal use

Protective Gloves	Eye Protection
Not necessary under conditions of normal use	Not necessary under conditions of normal use

Other Protective Clothing or Equipment:

Not necessary under conditions of normal use. If handling large containers of cells wear steel-toed footwear.

Work/Hygienic Practices

Use standard industrial clothing in normal use.

Section IX – Recycling and Disposal

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.

DO NOT INCINERATE or subject battery cells to temperatures in excess of 212°F.

Section X – Transportation

Milwaukee rechargeable Lithium-ion batteries and component cells have been tested to, and are compliant with, transportation test requirements as described in the UN Manual of Tests & Criteria, Part III, Sub-section 38.3.

All Lithium-ion batteries must be packaged and transported in accordance with relevant requirements of the following U.S. and international regulations:

- U.S. DOT HMR: 49 CFR 173.185;
- Canada TDG: Schedule 2, Special Provision 34;
- Mexican NOM-002-SCT: Special Provision 188, 230, or 310, as applicable;
- ICAO Technical Instructions: Special Provision A45, A88, or A99, as applicable;
- IATA Dangerous Goods Regulations: Special Provision A45, A88, or A99, as applicable;
- IMDG Code: Special Provision 188, 230, or 310, as applicable;
- European ADR: Special Provision 188, 230, or 310, as applicable;
- UN Model Regulations on the Transport of Dangerous Goods: Special Provision 188, 230, or 310, as applicable.

Equivalent Lithium Content (ELC) calculations for Lithium-ion cells and batteries:

1. ELC of a component cell, in grams, is equal to the rated Amp-hours multiplied by 0.3.
   Example: 3.0 Ah x 0.3 = 0.9 g ELC per cell
2. ELC of a battery, in grams, is equal to cell ELC multiplied by the total number of cells contained within the battery.
   Example: 0.9 g ELC x 5 cells = 4.5 g ELC per (5-cell) battery

The information and recommendations set forth are made in good faith and believed to be accurate as of the date of preparation. MILWAUKEE ELECTRIC TOOL CORPORATION makes no warranty, expressed or implied, regarding the accuracy of this data or the results to be obtained from the use thereof.

Legend:
Y - Yes
N - No
N/A - Not Applicable

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