



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.

SECTION 1: PRODUCT AND COMPANY IDENTIFICATION

Product Name: Lithium-ion Battery - Rechargeable
Product Numbers: #48-11-0490; V4B: Rated 4 volts, 0.8g ELC, 10 Watt-hours (Wh) maximum.
#48-11-1815; C18B; M18B; 982-2 (Albion); Li18 (OEM):
18v, 2.3g ELC, 27 Wh max.
#48-11-1828; C18B; M18BX; Li18 (OEM): 18v, 4.5g ELC, 54 Wh max.
#48-11-1830; V18B: 18v, 4.5g ELC, 54 Wh max.
#48-11-2401; C12B; M12B; 0700913615 (Wurth); Li12B (OEM): 12v, 1.4g ELC, 16 Wh max.
#48-11-2402; C12BX; M12BX; 0700913630 (Wurth); Li12BX (OEM): 12v, 2.7g ELC, 32 Wh max.
#48-11-2830; V28B; M28BX; Li28V (Wurth); Li-2-28V (Wurth); Li28M (OEM): 28v, 6.3g ELC, 76 Wh max

Drawing Number: 58-97-0500
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Company Phone Number: 1-262-781-3600 or
1-800-729-3878
Emergency Contact Number: 1-800-424-9300
(United States Only) (Chemtrec)
For International: 1-703-527-3887

SECTION 2: HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

- **Appearance/Odor:** Solid article, odorless
- **WARNING:** No exposure during routine handling of product. 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 firefighting, to the combustion by-products.
- **Flammable:** Organic components will burn if cell is incinerated. Combustion of cell contents may cause evolution of Hydrogen Fluoride.
- **Potential Health Effects:** Fluoride interferes with nerve impulse conduction causing severe pain or absence of sensations
- **Likely Routes of Exposure:** Eye contact, skin contact, skin absorption, inhalation. 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 3: COMPOSITION / INFORMATION OF INGREDIENTS

Ingredient	% by Weight	CAS #
Aluminum Foil	0.1 - 10	7429-90-5
Biphenyl (BP)	0.1 - 0.3	92-52-4
Copper Foil	0.1 - 10	7440-50-8
Linear & Cyclic Carbonate solvents	0 - 17	N/A
Graphite Powder/Carbon	10 - 30	7440-44-0
Metal Oxide or other Electrolyte (proprietary)	10 - 50	Confidential
Lithium Hexafluorophosphate (LiPF ₆)	0 - 5	21324-40-3
Polyvinylidene Fluoride (PVDF)	0.1 - 5	24937-79-9
Styrene Butadiene Rubber (SBR)	<5	N/A
Aluminum, Steel, Nickel and other inert materials	Remainder	N/A

SECTION 4: FIRST AID MEASURES

No exposure during routine handling of product. Risk of exposure occurs only if the battery is mechanically or electrically abused.

- Eye Contact:** Immediately flush with water for at least 15 minutes.
Skin Contact: Immediately flush with water for at least 15 minutes. Wash with soap and water
Inhalation: N/A
Ingestion: Ingestion is not likely, given the physical size and state of the cell.

SECTION 5: FIRE FIGHTING MEASURES

Suitable Extinguishing Media:

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

Unsuitable Extinguishing Media:

None.

Products of Combustion:

Organic components will burn if incinerated. Combustion of cell contents may 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.

Protection of Firefighters:

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 firefighting, to the combustion by-products.

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

Methods for Clean-Up:

Other Information:

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:

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.

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

Exposure Guidelines:

Not necessary under conditions of normal use

Engineering Controls:

Not necessary under conditions of normal use

Eye/Face Protection:	Not necessary under conditions of normal use
Skin Protection:	Not necessary under conditions of normal use
Respiratory Protection:	Not necessary under conditions of normal use
General Hygiene Considerations:	Not necessary under conditions of normal use

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

Color:	N/A
Odor:	None
Odor Threshold:	None
Physical State:	Solid
pH:	N/A
Freezing Point:	N/A
Boiling Point:	N/A
Flash Point:	N/A
Evaporation Rate:	N/A
Flammability (solid,gas)	Organic components will burn if cell is incinerated.
Upper Flammability Limit:	N/A
Lower Flammability Limit:	N/A
Vapor Pressure:	N/A
Vapor Density:	N/A
Specific Gravity:	N/A
Solubilibty (water):	N/A
Partition Coefficient (n-octanol/water):	N/A
Auto-ignition Temperature:	N/A
Percent Volatile, wt. %:	N/A
Volatile Organic Compound (VOC) content, wt. %:	N/A

SECTION 10: STABILITY AND REACTIVITY

Stability:	Stable
Conditions to Avoid:	Do not crush, puncture, incinerate, immerse in water or heat over 212°F (100°C). Steel casing slowly dissolves in strong mineral acids.
Incompatible Materials:	Water, heat and strong acids
Hazardous Decomposition:	Hydrogen Fluoride, Phosphorus Oxides, Carbon Monoxide, Carbon Dioxide, Lithium Hydroxide, Manganese Oxides, Aluminum Oxide, possible fluoro-compounds, Carbon soot
Possibility of Hazardous Reactions:	Hazardous polymerization will not occur. Spontaneous decomposition will not occur at normal temperature.

SECTION 11: TOXICOLOGY INFORMATION

ACUTE EFFECTS:

Oral LD ₅₀ :	None in routine handling of product.
Dermal LD50:	None in routine handling of product.
Inhalation:	None in routine handling of product.
Eye Irritation:	None in routine handling of product.
Skin Irritation:	None in routine handling of product.
Sensitization:	None in routine handling of product.

CHRONIC EFFECT

Carcinogenicity:	None in routine handling of product.
Mutagenicity:	None in routine handling of product.
Reproductive Effects:	None in routine handling of product.
Developmental Effects:	None in routine handling of product.

SECTION 12: ECOLOGICAL INFORMATION

Ecotoxicity:	None in routine handling of product.
Persistence/Degradability:	None in routine handling of product.
Bioaccumulation/Accumulation:	None in routine handling of product.
Mobility in Environment:	None in routine handling of product.

SECTION 13: DISPOSAL CONSIDERATIONS:

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.

This product does not contain mercury, cadmium or Lithium (metal).

DO NOT INCINERATE or subject battery cells to temperatures in excess of 212°F (100°C).

SECTION 14: TRANSPORTATION INFORMATION

U.S. DOT HMR (re: ground transport)

Proper Shipping Description:

UN3090 Lithium batteries/UN3091 Lithium batteries packed with or contained in equipment; Class 9; PG II.

Milwaukee rechargeable Lithium-ion type batteries are “excepted” from full hazardous material regulation based on ELC content and/or Watt-hour (Wh)rating, and compliant packaging per 49 CFR 172.102, Special Provision 188.

Canada TDG (re: ground transport)

Proper Shipping Description:

UN3480 Lithium-ion batteries/UN3481 Lithium-ion batteries packed with or contained in equipment; Class 9; PG II.

Milwaukee rechargeable Lithium-ion batteries are “excepted” from full dangerous goods regulation based on Watt-hour (Wh) rating, and compliant packaging per TDG Schedule 2, Special Provision 34.

International DGR (re: air, sea, ground transport)

Proper Shipping Description:

UN3480 Lithium-ion batteries/UN3481 Lithium-ion batteries packed with or contained in equipment; Class 9; PG II.

Milwaukee rechargeable Lithium-ion batteries are “excepted” from full dangerous goods regulation based on Watt-hour (Wh) rating, and compliant packaging as described in the following international Dangerous Good Regulations:

- ICAO Technical Instructions: Packing Instructions 965; 966; 967.
- IATA Dangerous Goods Regulations: Packing Instructions 965; 966; 967.
- IMDG Code: Special Provision 188.
- UN Model Regulations on the Transport of Dangerous Goods: Special Provision 188.
- UN European Agreements (ADR/RID/ADN): Special Provision 188.
- Australian Dangerous Goods (ADG): Special Provision 188.

UN Battery Testing:

Milwaukee rechargeable Lithium-ion batteries listed in Section 1 have passed the relevant transportation test requirements as described in the *UN Manual of Tests and Criteria*, Part III, section 38.3, “Lithium batteries”.

UN section 38.3 test reports are maintained on file at the corporate headquarters of Milwaukee Electric Tool Corporation located at 13135 W. Lisbon Rd., Brookfield, WI, USA 53005-2550.

SECTION 15: REGULATORY INFORMATION

Global Inventories

TSCA: United States

See Sec. 14. Compliant with, relevant transportation test requirements as described in the UN Manual of Tests & Criteria, Part III, Sub-section 38.3.

DSL: Canada

See Sec. 14. Compliant with, relevant transportation test requirements as described in the UN Manual of Tests & Criteria, Part III, Sub-section 38.3.

ECL: Korea	Compliant with, relevant transportation test requirements as described in the UN Manual of Tests & Criteria, Part III, Sub-section 38.3.
PICCS: Philippines	Compliant with, relevant transportation test requirements as described in the UN Manual of Tests & Criteria, Part III, Sub-section 38.3.
ENCS: Japan	Compliant with, relevant transportation test requirements as described in the UN Manual of Tests & Criteria, Part III, Sub-section 38.3.
AICS: Australia	Compliant with, relevant transportation test requirements as described in the UN Manual of Tests & Criteria, Part III, Sub-section 38.3.
IECS: China	Compliant with, relevant transportation test requirements as described in the UN Manual of Tests & Criteria, Part III, Sub-section 38.3.
EINECS: European Union	Compliant with, relevant transportation test requirements as described in the UN Manual of Tests & Criteria, Part III, Sub-section 38.3.

SARA 313 Information:

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.

California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65)

This product does not contain regulated levels of any toxic chemical subject to the reporting requirements of California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65)

WHMIS: Canadian Workplace

This product does not contain regulated levels of any toxic chemical subject to the reporting requirements

SECTION 16: OTHER INFORMATION

NFPA 704: National Fire Protection Association

Health – N/A Fire – N/A Reactivity - N/A

0 = Minimal hazard, 1 = slight hazardous, 2 = moderate hazard, 3 = severe hazard

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 thereto.