ENERGIZING A NEW WORLD

EXIDE TECHNOLOGIES

SAFETY DATA SHEET

LITHIUM ION BATTERIES UN3480

1. Identification of Product and Company

Product Name:	**LITHIUM - ION BATTERY**
Other names:	LFP, $LiFePO_4$, NMC, NiMnCo, Lithium Ion Battery.
Trade names:	Sonnenschein Module Pro Sonnenschein Lithium, Sonnenschein Lithium Material Handling Batteries, Sonnenschein@home Lithium, Light Traction Block, Light Traction Block v2, , Equipment Li-Ion
Use:	Lithium Ion batteries for the Motive and Network Power markets including electric forklifts, mobility, rail, telecommunications, utilities, renewables, mining, remote area power and standby power applications.
Supplier:	GNB Industrial Power
ABN:	84 093 272 005
Street Address:	135 Nancy Ellis Leebold Drive Bankstown NSW 2200
Telephone Number:	(02) 9722 5700
Emergency Telephone Numbers:	Australia: 1800 033 111 (ALL HOURS) New Zealand: 0800 734 607 (ALL HOURS) Ixom Emergency Response Service

2. Hazards Identification

Lithium Ion batteries are classified as an article and are not hazardous when operated in accordance with the manufacturers recommendations. When used in accordance with recommendations, the electrode materials and liquid electrolyte are non-reactive provided that the cell enclosure and the seals remain intact. Battery cells are designed to withstand temperatures and pressures encountered during normal use. As a result, during normal use, there is no physical danger of ignition, explosion or hazardous material leakage. The potential for exposure should not exist unless the battery leaks, is exposed to high temperatures or is mechanically, electrically or physically abused or damaged.

2.1 Classification of the substance or mixture

Not classified as hazardous according to Safe Work Australia criteria.

2.2 Label elements

No signal word, pictograms, hazard or precautionary statements have been allocated.

2.3 Other Hazards

- When recharging batteries, never use chargers which are unsuitable for the battery type.
- Do not short-circuit batteries.
- Do not inflict mechanical damage (puncturing, deforming, disassembling etc.).
- Do expose to heat or incinerate them.
- Keep batteries away from small children.
- Always store batteries in a dry and cool place.
- Contact with leaking battery substances may pose a danger to personal health and the environment. For this reason, when coming into contact with batteries with a conspicuous appearance (leaking substances, deformed, discoloured, dented or the like), adequate PPE and breathing protection is required. Lithium

batteries can, for example, react very strongly in combination with fire. This can result in battery components being ejected with considerable force.

2.4 Handling and operational safety

Lithium batteries are always to be handled in accordance with the manufacturer's specifications. This is true particularly for complying with the limits for maximum current load, charging and end-point voltages, and mechanical and thermal loads.

Usually product packages are marketed that have already been matched. Such products are not to be modified or tampered with, since that could result in substantial safety hazards. Use only the charging process tailored to the respective cell type of a rechargeable battery.

2.5 Danger

As with other batteries, so also for lithium batteries it is true that even when thought to be discharged, they can still represent a source of danger. They can deliver a very high short-circuit current, however, even in the state of the minimum permitted end-point voltage lithium batteries with a high voltage (over 75 Volts) can pose a danger of a lethal electric shock.

For most products, deep discharge beyond the documented limits leads to permanent damage. Deep-discharged lithium batteries are no longer permitted to be re-charged or operated.

In all cases, avoid excessive charging voltages and overcharging. This can lead directly to critical situations, but also have a negative impact on battery life.

3. Composition and Information on the main Ingredients

3.1 Battery Cells

The following components are found inside the sealed Li-ion cell. Cells have been further combined as larger battery modules and systems using mechanical parts.

Component	Chemical name	CAS number
Cathode Lithium-Metal oxide	LFP: Lithium Iron Phosphate	15365-14-7
	NMC: Lithium Nickel Manganese Cobalt oxide	182442-95-1
Anode	Graphite	7782-42-5
Binder	Polyvinylidene difluoride	24937-79-9
Electrolyte	Ethyl acetate	141-78-6
	Ethylene carbonate	96-49-1
	Dimethyl carbonate	616-38-6
Cu	Copper	231-159-6
Al	Aluminum	231-072-3

3.2 Li-ion cell chemistry

The following Li-Ion cell chemistries are available from Exide:

LFP: $LiFePO_4$, Lithium Iron Phosphate
NMC: NiMnCo, Lithium Nickel Manganese Cobalt

Trade name	Cathode	
	LFP	NMC
Sonnenschein Lithium	X	
Sonnenschein Lithium Material Handling Batteries		X
Sonnenschein@home Lithium		X
Light Traction Block		X
Light Traction Block v2	X	
Equipment Li-Ion	X	
Sonnenschein Lithium Module Pro	X	

3.2 Battery Management System (BMS)

Electronic Components
Contactor

3.3 Battery Tray (where applicable)

Steel

4. First Aid measures

When handled and stored in accordance with the manufacturer's recommendations, lithium batteries are not hazardous The chemicals listed in item 3 are enclosed in a sealed housing so that they cannot escape during normal use. The following measures are only applicable if exposure has occurred to the components when a battery leaks, is exposed to high temperatures or is mechanically, electrically or physically abused or damaged.

INGESTION: If the contents have been ingested, rinse mouth out with water. If swallowed, Do NOT induce vomiting. Seek medical advice immediately as urgent hospital treatment is likely to be required. For advice, contact a Poisons Information Centre (Phone Australia 131 126; New Zealand 0800 764 766) or a doctor at once. If vomiting occurs, lean patient forward or place on left side (head-down position, if possible) to maintain open airway and prevent aspiration.

EYE: If the contents come into contact with the eyes, hold eyelids apart and flush the eye immediately with large amounts of running water. Continue flushing for at least 15 minutes or until advised to stop by a Doctor. Check for contact lenses. If there are contact lenses, these should be removed after several minutes of rinsing by the exposed person or medical personnel if it can be done easily. As the content is rated as Causes severe eye damage, after flushing, immediately call a Poisons Information Centre (Phone Australia 131 126; New Zealand 0800 764 766) or doctor/physician.

SKIN CONTACT: If skin or hair contact has occurred with the contents, remove any contaminated clothing and footwear, wash skin or hair thoroughly with soap and water. As the product is rated as a Corrosive that Causes severe skin burns, after flushing, immediately call a Poisons Information Centre (Phone Australia 131 126; New Zealand 0800 764 766) or doctor/physician.

INHALATION: If affected by content vapours, remove the patient from further exposure into fresh air, if safe to do so. If providing assistance, avoid exposure to yourself - only enter contaminated environments with adequate respiratory equipment. Once removed, lay patient down in a well-ventilated area and reassure them whilst waiting for medical assistance. If not breathing, provide artificial respiration and seek immediate medical assistance. If unconscious, place in a recovery position and seek immediate medical assistance. As the electrolyte is corrosive and decomposition may cause corrosive and toxic vapours, if the person has inhaled vapours and is having difficulty breathing, immediately call a Poisons Information Centre (Phone Australia 131 126; New Zealand 0800 764 766) or doctor/physician.

5. Firefighting measures

5.1 EXTINGUISHING MEDIA:

SUITABLE MEDIA: Use extinguishing media appropriate for surrounding fire. Use carbon dioxide, dry chemical or water fog. If batteries are involved in a fire and the hazard situation is unclear, only extinguish with dry chemical extinguishers.

UNSUITABLE MEDIA: Do not use water or foam extinguishers on ruptured batteries. Confining or smothering the fire is recommended as reaction of the materials with water may produce flammable and explosive hydrogen gas as well as corrosive hydrogen fluoride gas. Hydrofluoric acid can cause severe chemical burns, is extremely reactive and is toxic by all routes of exposure.

5.2 SPECIAL HAZARDS ARISING FROM THE SUBSTANCE OR MIXTURE:

COMBUSTION HAZARDS: Combustion and thermal degradation of the battery may produce hazardous fumes of lithium, cobalt and manganese, hydrofluoric acid, hydrogen and oxides of carbon as well as smoke and irritating vapours.

5.3 ADVICE FOR FIREFIGHTERS:

FIRE: Electrolyte leakage or battery container rupture is possible under the conditions experienced in a fire. Keep fire exposed surfaces, etc. cool with water spray.

HAZCHEM CODE: 4W.

EXPLOSION: Closed containers may explode, burst, rupture or vent when exposed to high temperatures

PROTECTIVE EQUIPMENT: In the event of a fire, wear full protective clothing and self-contained breathing equipment with full-face piece operated in the pressure demand or other positive pressure mode.

6. Measures to be taken in case of accidental release

If the battery housing is damaged, electrolyte can leak. For small spills seal batteries in an airtight plastic bag, having added dry sand, chalk powder (CaCO3) or vermiculite. Traces of electrolyte can be soaked up with dry paper towels. When doing so, prevent direct contact with skin by wearing PVC safety gloves. Thoroughly rinse with water.

If mists or vapours are generated, an approved inorganic vapours and gases/acid gases/particulate respirator is required. For large battery spill scenarios, or in confined spaces, a full chemically resistant body-suit with self-contained breathing apparatus is required. For an incident involving more than one or two modules, only trained personnel should deal with leaking battery incidents.

Ventilate area to dissipate vapours and extinguish and/or remove all sources of ignition. Never enter a spill area unless you know the vapours have dissipated to make the area safe. Stop the leak if safe to do so. Avoid contact with the spilled material.

In the event of a spill or accidental release, notify the relevant authorities in accordance with all applicable regulations. Do not allow batteries or electrolyte to enter drains, surface water, sewers or watercourses - inform local authorities if this occurs

7. Handling and Storage

7.1 Handling

Under normal operating conditions where the battery remains intact, it is not hazardous.

- Do not open the battery.
- Do not crush, disassemble, drop or solder.
- Incorrect handling can lead to explosion or fire.

- Protect the battery from rain
- Do not immerse in liquids or pressure wash
- Effectively prevent a short circuit of the battery poles by using suitable insulation. (e.g.: taping the terminals with insulation tape).
- Do NOT use, charge or discharge damaged, defective or deformed batteries.

7.2 Storage

Lithium batteries are preferably stored at room temperature and in a dry location (for details, refer to the manufacturer's specifications concerning the storage temperature range); large temperature fluctuations are to be avoided. (For example, do not store in the vicinity of heating elements, do not expose to sunshine for long periods). If substances leak out due to damage or improper handling, be sure to comply with the manufacturer's instructions. This particularly includes the use of personal safety equipment.

8. Exposure limits and personal protective equipment

Lithium batteries are articles from which no substance is released when operated, handled and stored in accordance with the manufacturers recommendations

Skin protection: Not necessary under normal conditions.
Hand Protection: Wear nitrile, neoprene, PVC or natural rubber gloves when handling an open or leaking battery.
Eye protection: Not necessary under normal conditions.
Respiratory protection: Not necessary under normal conditions. In the event battery case ruptured inside an enclosed space, use a self-contained breathing apparatus.
Ventilation: Not necessary under normal conditions

9. Physical and Chemical properties

Appearance: Manufactured sealed battery unit

Colour: Various.

Odour: n.a. If leaking smells of medical ether

pH: n.a.

Flash point: n.a.

Flammability: n.a.

Density: n.a.

Solubility in Water: n.a

Stability: stable

10. Stability and Reactivity

Chemical Stability: The product is stable when operated, handled and stored in accordance with the manufacturers recommendations.

Conditions to avoid:
- Do not open the battery.
- Do not crush, disassemble, drop or solder.
- Incorrect handling can lead to explosion or fire.
- Protect the battery from rain

• Do not immerse in liquids or pressure wash
• Effectively prevent a short circuit of the battery poles by using suitable insulation. (e.g.: taping the terminals with insulation tape).
• Do NOT use, charge or discharge damaged, defective or deformed batteries.
• Comply with the voltage limits defined for the battery during discharge and charge. If the limits are exceeded, the battery may burst or even explode

Hazardous decomposition Products: Exposure to fire may cause emission of flammable and highly toxic gases.

Reactivity: n.a

11. Toxicological Information

11.1 Acute toxicity
The product is stable when operated, handled and stored in accordance with the manufacturers recommendations. Unbroken cells or batteries do not represent toxicity hazard.

11.2 Irritation and corrosion
Risk of thermally or electrically abuse causing cells to rupture. Electrolyte is corrosive. It causes chemical burns on contact with skin. Inhalation of fine mist or vapors is irritating to the respiratory system. Prolonged contact with the skin or mucous membranes may cause irritation.
● Sensitization: No information is available at this time.
● Carcinogenicity: No information is available at this time.
● Reproductive toxicity: No information is available at this time.
● Teratogenicity: No information is available at this time.
● Mutagenicity: No information is available at this time

12. Ecological Information

12.1 Eco-toxicity
Not applicable for undamaged product.

12.2 Persistence and degradability
Not applicable

12.3 Bio-accumulative potential
Not applicable

12.4 Mobility in soil
Not applicable

12.5 Results from PBT –and vPvB assessment
Not applicable

12.6 Other adverse effects
In case of an accident emissions may be harmful to environment

13. Disposal Considerations

In accordance with EU Battery Directive and the respective national legislation, Lithium-Ion batteries are labelled with a crossed-oust dust bin together with the ISO return/recycling symbol.

The symbol reminds the end user that batteries are not permitted to be disposed of with household waste, but must be collected separately.

Do not incinerate.
Dispose of in accordance with appropriate local regulations
Recycle or reuse where possible. Contact your state EPA or the manufacturer for additional information.

14. Transport Information

Road and Rail Transport

Classified as Dangerous Goods by the criteria of the Australian Dangerous Goods Code (ADG Code) for Transport by Road and Rail; DANGEROUS GOODS.

UN No: 3480
Proper Shipping Name: LITHIUM ION BATTERIES (including lithium ion polymer
Class-primary 9
Packing Group:
Special Provisions: 188, 230 310 348 376 377 384 387 390
Hazchem Code: 4W

Marine Transport

Classified as Dangerous Goods by the criteria of the International Maritime Dangerous Goods Code (IMDG Code) for transport by sea; DANGEROUS GOODS.

UN No: 3480
Proper Shipping Name: LITHIUM ION BATTERIES (including lithium ion polymer batteries)
Class-primary 9
Packing Group:
Special Provisions: 188 230 310 348 376 377 384 387 390
Hazchem Code: 4W

Air Transport

Classified as Dangerous Goods by the criteria of the International Air Transport Association (IATA) Dangerous Goods Regulations for transport by air; DANGEROUS GOODS.

UN No: 3480
Proper Shipping Name: LITHIUM ION BATTERIES (including lithium ion polymer batteries)
Class-primary 9
Packing Group:
Special Provisions: A88, A99, A154, A164, A181, A182, A183, A185, A201, P965, P966, P967, P968, P969, P970
Hazchem Code: 4W

To assist shippers in understanding the complete requirements related to the transport of lithium batteries, including packing instructions, IATA has prepared the updated Lithium Battery Guidance Document https://www.iata.org/contentassets/05e6d8742b0047259bf3a700bc9d42b9/lithium-battery-guidance-document.pdf

15. Regulatory Information

Poison schedule: A poison schedule number has not been allocated to this product using the criteria in the Standard for the Uniform Scheduling of Medicines and Poisons (SUSMP).

Classifications: Safework Australia criteria is based on the Globally Harmonised System (GHS) of Classification and Labelling of Chemicals.
The classifications and phrases listed below are based on the Approved Criteria for Classifying Hazardous Substances [NOHSC: 1008(2004)].

Hazard codes: None allocated
Risk phrases: None allocated
Safety phrases: None allocated
Inventory Listings: AUSTRALIA: AICS (Australian Inventory of Chemical Substances)
All components are listed on AICS, or are exempt.

16. Other Information

16.1 Safety Data Sheet

The European Directive 91/155/EEC which described the requirements for Material Safety Data Sheets had been repealed by the Regulation concerning the Registration, Evaluation, Authorization and Restriction of Chemicals on June 1st, 2007 (REACH-Regulation 1907/2006/EC, Art. 31). The requirement to publish a Safety Data Sheet applies to all suppliers of substances and preparations.

As already defined under the former Directive there is no requirement to develop and maintain a Safety Data Sheet for products such as Batteries.

16.3 General

The information given above is provided in good faith based on existing knowledge and does not constitute an assurance of safety under all conditions. It is the user's responsibility to observe all laws and regulations applicable for storage, use, maintenance or disposal of the product. If there are any queries, the supplier should be consulted.

However, this shall not constitute a guarantee for any specific product features and shall not establish a legally valid contractual relationship.

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END OF SDS