Instructions for the safe handling of Lithium-Ion accumulators
(Based on Lithium Iron Phosphate Cells)

1. Identification of the article and the company

Data on the product: Low Voltage Li-Ion Battery
Trade name: VARTA Professional Li-Ion Deep Cycle

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2. Hazard identification:

No hazards in case of an intact battery and observation of the instructions for use.

Restrictions of use:

1. Do not dismantle, open or shred secondary cells or batteries.
2. Do not expose cells or batteries to heat or tire. Avoid storage in direct sunlight.
3. Do not short-circuit a cell or battery. Do not store cells or batteries haphazardly in a box or drawer where they may short-circuit each other or be short-circuited by other metal objects.
4. Do not remove a cell or battery from its original packaging until required far use.
5. Do not subject cells or batteries to mechanical shock.
6. In the event of a cell leaking, do not allow the liquid to come in contact with the skin or eyes. If contact has been made, wash the affected area with copious amounts of water and seek medica! advice.
7. Do not use any charger other than that specifically provided for use with the equipment.
8. Observe the plus (+) and minus (-) marks on the cell, battery and equipment and ensure correct use.
9. Do not use any cell or battery which is not designed for use with the equipment.
10. Do not mix cells of different manufacture, capacity, size or type within a device.
11. Battery usage by children should be supervised.
12. Seek medical advice immediately if a cell or battery has been swallowed.
13. Always purchase the battery recommended by the device manufacturer far the equipment.
14. Keep cells and batteries clean and dry.
15. Wipe the cell or battery terminals with a clean dry cloth if they become dirty.
16. Secondary cells and batteries need to be charged before use. Always use the correct charger and refer to the manufacturer's instructions or equipment manual far proper charging instructions.
17. Do not leave a battery on prolonged charge when not in use.
18. After extended periods of storage, it may be necessary to charge and discharge the cells or batteries several times to obtain maximum performance.
19. Retain the original product literature far future reference.
20. Use only the cell or battery in the application far which it was intended.
21. When possible, remove the battery from the equipment when not in use.
22. Dispose of properly.

Classification
No harm at the normal use. If contact the electrolyte in the Lithium-Ion battery, reference as follows:

Classification of the substance or mixture

Acute Toxicity, Oral
Acute Toxicity, Dermal
Skin, Irritate
Eye, Irritate

	GHS02
	GHS05:
	GHS03

Signal word: Warning
Hazard statements(s):
H242: Heating may cause a fire;
H311: Toxic in contact with skin;
H314: Cuse severe skin burns and eye damage;
H302: Harmful if swallowed;
H319: Cause serious eye irritation
H351: Suspected of causing cancer
H317: May cause an allergic skin reaction

Precautionary statements:
P264: Wash thoroughly after handling
P270: Do not eat, drink or smoke when using this product
P280: Wear protective gloves/protective clothing/eye protection/face protection
P201: Obtain special instructions before use
P202: Do not handle until all safety precautions have been read and understood
P261: Avoid breathing dust/fume/gas/mist/vapors/spray

Response:
P312: Call a poison center or doctor/physician if you feel unwell
P302+P350: IF ON SKIN: Gently wash with plenty of soap and water
P301+P330+P331: IF SWALLOWED: rise mouth. Do not induce vomiting
P305+P351+P338: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rising
P337+P313: If eye irritation persists: Get medical advice/attention
P308+P313: If exposed or concerned: Get medical advice/attention
P362+P364: Take off contaminated clothing and wash it before reuse

Storage:
P405: Store locked up

Disposal:
P501: Dispose of contents/container in accordance with local/national regulations

Hazards not otherwise classified (HNOC): Not applicable

Other Information: Not available

3. Composition / Information on Ingredients:

Chemical Name	Concentration[1]	CAS No.	EC No.
Lithium Iron Phosphate	23.97	15365-14-7	/
Iron	15.31	7439-89-6	231-096-4
Graphite	12.00	7782-42-5	231-955-3
Styrene polymers	8.02	66070-58-4	/
Dimethyl carbonate	7.37	616-38-6	210-478-4
Acrylonitrile	5.9	107-13-1	203-466-5
Copper	5.78	7440-50-8	231-159-6
1, 3-Butadiene	5.67	106-99-0	203-450-8
Aluminum	3.05	7429-90-5	231-072-3
Propylene carbonate	2.905	108-32-7	203-572-1
Lithium hexafluorophosphate	1.69	21324-40-3	244-334-7
Polyethylene	1.55	9002-88-4	618-339-3
Ethyl methyl carbonate	1.43	623-53-0	613-014-2
Acrylonitrile - butadiene - styrene polymer	1.245	9003-56-9	618-371-8
Polyethylene Terephthalate	1.19	25038-59-9	607-507-1
Ethylene carbonate	0.77	96-49-1	202-510-0
Garban	0.65	7440-44-0	231-153-3
Polyvinylidene fluoride	0.63	24937-79-9	200-867-7
Nickel	0.35	7440-02-0	231-111-4
Styrene Butadiene Rubber	0.25	9003-55-8	618-370-2
Carboxymethyl cellulose sodium	0.17	9004-32-4	618-378-6
Garban nanotubes	0.13	68647-86-9	271-974-4

[1] Content may vary

4. First aid measures:

Precautionary statements:
P264: Wash thoroughly after handling
P270: Do not eat, drink or smoke when using this product
P280: Wear protective gloves/protective clothing/eye protection/face protection
P201: Obtain special instructions before use
P202: Do not handle until all safety precautions have been read and understood
P261: Avoid breathing dust/fume/gas/mist/vapors/spray

Response:
P312: Call a poison center or doctor/physician if you feel unwell
P302+P350: IF ON SKIN: Gently wash with plenty of soap and water
P301+P330+P331: IF SWALLOWED: rise mouth. Do not induce vomiting
P305+P351+P338: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rising
P337+P313: If eye irritation persists: Get medical advice/attention
P308+P313: If exposed or concerned: Get medical advice/attention
P362+P364: Take off contaminated clothing and wash it before reuse

5. Fire-fighting measures:

Suitable extinguishing agents:

When the scale of the fire is small, use a HFG (hydrofluorocarbon) clean-agent fire extinguisher or alcohol resistant foam fire extinguishers. (In case of battery overheating, wear protective gear and immerse heated battery in water) In case of large fire, use large amount of water to extinguish.

Specific Hazards Arising from the Chemical

Formation of toxic gases is possible during heating or in case of fire.
In case of fire, the following can be released:

- Carbon monoxide (GO)
- Carbon dioxide
- Other irritating and toxic gases.

Hazardous Combustion Products
Carbon oxides

Explosion Data
Sensitivity to mechanical impact: No
Sensitivity to static discharge: No

Protective Equipment and Precautions for Firefighters
As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear. For example: Wear self-contained respiratory protective device. Wear suitable protective clothing and eye/face protection.

Special hazards arising from the substance or mixture:
Battery may burst and release hazardous decomposition products when exposed to a fire situation. Lithium-ion batteries contain flammable electrolyte that may vent, ignite and produce sparks when subjected to high temperature (>150ºC), when damaged or abused (e.g. mechanical damage or electrical overcharging); may burn rapidly with flare-burning effect; may ignite other batteries in clothes proximity.

6. Accidental release measures:

Personal precautions, protective equipment and emergency procedures
Personal Precautions: Avoid contact with eyes.
Refer to section 8 far personal protective equipment. Ensure adequate ventilation. Remove all sources of ignition.
Evacuate personnel to safe areas.

Environmental precautions
Environmental precautions refer to protective measures listed in Sections 7 and 8.
Absorb with liquid-binding material (sand, diatomite, acid binders, universal binders, sawdust).
Dispose contaminated material as waste according to item 13.

Methods and material for containment and cleaning up
Methods for containment: Prevent further leakage or spillage if safe to do so.
Methods for Cleaning up: Use personal protective equipment. Dam up. Cover liquid spill with sand, earth or other non-combustible absorbent material. Pick up and transfer to properly labeled containers. Glean contaminated surface thoroughly.

7. Handling and storage:

Precautions far safe handling
Handling handle in accordance with good industrial hygiene and safety practice. Avoid contact with skin, eyes and clothing. Wear personal protective equipment.
Wash thoroughly after handling. Use this material with adequate ventilation. The product is not explosive.

Conditions for safe storage, including any incompatibilities
If the Lithium-ion Battery is subject to storage for such a long term as more than 3 months, it is recommended to recharge the Lithium-ion Polymer Battery periodically.
3 months: -10°C~+40°C, 45 to 85%RH
And recommended at 0°C~+35°C for long period storage.
The capacity recovery rate in the delivery state (50% capacity of fully charged) after storage is assumed to be 80% or more.
The voltage for a long-time storage shall be 3.7V~4.2V(cell) range.
Do not storage Lithium-ion Battery haphazardly in a box or drawer where they may short-circuit each other or be short-circuited by other metal objects.
Keep out of reach of children.
Do not expose Lithium-ion Polymer Battery to heat or fire. Avoid storage in direct sunlight. Do not store together with oxidizing and acidic materials.
Keep ignition sources away - Do not smoke.
Store in cool, dry and well-ventilated place.

Incompatible Products: None known.

8. Exposure Controls/Personal Protection

Control parameters

ingredients with limit values that require monitoring at the workplace:	
15365-14-7 Lithium Iron Phosphate	
TLV (USA)	**N/A**
MAK (Germany)	**N/A**

Other Exposure Guidelines Vacated limits revoked by the Court of Appeals decision in AFL-CIO v. OSHA, 965 F.2d 962(11th Cir., 1992).

Appropriate engineering controls
Engineering Measures
- Showers
- Eyewash stations
- Ventilation systems

Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits. Ensure adequate ventilation.

Individual protection measures, such as personal protective equipment

Eye/Face Protection		Tightly sealed goggles
Body protection		Protective work clothing
Skin protection		Protective gloves

Material of gloves:
The selection of the suitable gloves does not only depend on the material, but also on further marks of quality and varies from manufacturer to manufacturer. As the product is a preparation of several substances, the resistance of the glove material cannot be calculated in advance and has therefore to be checked prior to the application.

Penetration time of glove material:
The exact break through time has to be found out by the manufacturer of the protective gloves and has to be observed.

Respiratory Protection
No protective equipment is needed under normal use conditions. If exposure limits are exceeded or irritation is experienced, ventilation and evacuation may be required.

Hygiene Measures
Handle in accordance with good industrial hygiene and safety practice.

9. Physical and chemical properties:

Physical State	Form: Prismatic
	Oduor: Odorless
	Odor Threshold: No information available
Change in condition:	
pH, with indication of the concentration	Not determined.
Melting point/freezing point	Not determined.
Initial boiling point and Boiling range:	Not determined.
Flash Point	Not determined.
Evaporation rate	Not determined.
Flammability (solid, gas)	Not determined.
Upper/lower flammability or explosive limits	Not determined.
Vapor Pressure:	Not determined.
Vapor Density:	Not determined.
relative density:	Not determined.
Solubility in Water:	Not determined.
Solubility in other solvents	Not determined.
n-octanol/water partition coefficient	Not determined.
Auto-ignition temperature	Product is not self-igniting.
Decomposition temperature	Not determined.
Oduor threshold	Not determined.
Evaporation rate	Not determined.
Viscosity	Not determined.
Other information	No further relevant information available.

10. Stability and reactivity:

Reactivity: Stable under recommended storage and handling conditions (see section 7, Handling and storage).
Chemical stability: Stable under normal conditions of use, storage and transport.
Thermal decomposition/conditions to be avoided: No decomposition if used according to specifications.
Possibility of Hazardous Reactions: None under normal processing.
Hazardous Polymerization: Hazardous polymerization does not occur.
Conditions to avoid: Strong heating, fire, Incompatible materials.
Incompatible materials: Strong oxidizing agents. Strong acids. Base metals.
Hazardous Decomposition Products: Carbon oxides, other irritating and toxic gases.

11. Toxicological information:

No harm at the normal use and correct disposal

NOTE: Under normal conditions of use, this product does not present a health hazard. The following information is provided for organic electrolyte and the mixed metal oxide exposure that may occur due to container breakage or under extreme conditions such as fire.
Organic electrolyte – reacts with moisture/water to produce hydrofluoric acid in trace quantities. Hydrofluoric acid is extremely corrosive and toxic. In severe exposures it acts as a systemic poison and causes severe burns. The reaction may be delayed. Any contact with this material, even minor, requires immediate medical attention.

ROUTES AND METHODS OF ENTRY

Inhalation	**EXPOSURE IS NOT EXPECTED FOR PRODUCT UNDER NORMAL CONDITIONS OF USE.** In the event of overcharging or damage to the unit, exposure to organic electrolyte solution/mist is possible. Extreme exposures to the organic electrolyte can be severely corrosive to the respiratory tract and may cause sore throat, coughing, labored breathing and lung congestion/inflammation. Overcharging or seepage of electrolyte from broken batteries may present inhalation exposure in a confined area.
Skin Contact	**EXPOSURE IS NOT EXPECTED FOR PRODUCT UNDER NORMAL CONDITIONS OF USE.** In the event of overcharging or damage to the unit, exposure to organic electrolyte solution/mist is possible. Extreme exposures to the organic electrolyte can be corrosive to the skin. Skin contact can cause serious skin burns which may not be immediately apparent or painful. Symptoms may be delayed 8 hours or longer. The fluoride ion readily penetrates the skin causing destruction of deep tissue layers and even bone.
Skin Absorption	**EXPOSURE IS NOT EXPECTED FOR PRODUCT UNDER NORMAL CONDITIONS OF USE.** In the event of overcharging or damage to the unit, exposure to organic electrolyte solution/mist is possible. Extreme exposures to the organic electrolyte can be absorbed through the skin.
Eye Contact	**EXPOSURE IS NOT EXPECTED FOR PRODUCT UNDER NORMAL CONDITIONS OF USE.** In the event of overcharging or damage to the unit, exposure to organic electrolyte solution/mist is possible. Extreme exposures to the organic electrolyte can be corrosive to the eyes and can cause severe irritation, burns, and cornea damage. Symptoms of redness, pain, blurred vision, and permanent eye damage may occur.
Ingestion	**EXPOSURE IS NOT EXPECTED FOR PRODUCT UNDER NORMAL CONDITIONS OF USE.** In the event of overcharging or damage to the unit, exposure to organic electrolyte solution/mist is possible. Extreme exposures to the organic electrolyte can be corrosive and may cause sore throat, abdominal pain, diarrhea, vomiting, severe burns of the digestive tract, and kidney dysfunction. Hands contaminated by contact with internal components of a battery can also cause ingestion of mixed metal oxides and carbon solids. Hands should be washed thoroughly prior to eating, drinking, or smoking.

SIGNS AND SYMPTONS OF OVEREXPOSURE

Acute Effects **EXPOSURE IS NOT EXPECTED FOR PRODUCT UNDER NORMAL CONDITIONS OF USE.**
In the event of overcharging or damage to the unit, exposure to organic electrolyte solution/mist is possible. Exposure and/or contact with organic electrolyte solution/mist may lead to acute irritation of the skin, corneal damage of the eyes and irritation of the mucous membranes of the eyes and upper respiratory system, including lungs.

Chronic Effects **EXPOSURE IS NOT EXPECTED FOR PRODUCT UNDER NORMAL CONDITIONS OF USE.**
In the event of overcharging or damage to the unit, exposure to organic electrolyte solution/mist is possible. Contact with the organic electrolyte may lead to skin burns/ulceration, scarring of the cornea, and chronic respiratory conditions. Extreme exposures – intake of more than 6 mg of fluorine per day may result in fluorosis, bone and joint damage. Hypocalcemia and hypomagnesemia can occur from absorption of fluoride ion into blood stream.

POTENTIAL TO CAUSE CANCER

Carbon black has been identified by the International Agency for Research on Cancer (IARC) as possible carcinogenic to humans (Group 2B).
California Proposition 65: This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require warning under the statute –Carbon Black

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE

Contact with or exposure to the organic electrolyte may aggravate skin diseases such as eczema and contact dermatitis, respiratory disorders such as lung injuries and asthma, and kidney function.

Toxicological Data

Constituents	**Species**	**Test Results**
Carbon Solids (CAS 7782-42-5)		
Acute		
Inhalation		
LC50	Rat	> 2000 mg/m3, 4 hours
Oral		
LD50	Rat	> 1000 mg/kg

12. Ecological information:

No harm at the normal use and correct disposal

Mammalian effects	None known if used/disposed of correctly.
Eco-toxicity	None known if used/disposed of correctly.
Bioaccumulation potential	None known if used/disposed of correctly.
Environmental fate	None known if used/disposed of correctly.
Mobility in Soil	None known if used/disposed of correctly.

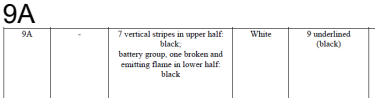
13. Disposal considerations:

Disposal should be in accordance with applicable regional, national and local laws and regulations. Local regulations may be more stringent than regional or national requirements.
Product disposal recommendation: Observe local, state and federal laws and regulations.
Packaging disposal recommendation: Be aware discarded batteries may cause fire, tape the battery terminals to insulate them. Don't disassembly the battery. Completely discharge containers (no tear drops, no powder rest, scraped carefully). Containers may be recycled or re-used. Observe local, state and federal laws and regulations. The potential effects on the environment and human health of the substances used in batteries and accumulators.
the desirability of not disposing of waste batteries and accumulators as unsorted municipal waste and of participating in their separate collection so as to facilitate treatment and recycling.

Spent batteries (EWC 16 06 05) are subject to the regulation of EU (Battery Directive) and its adoptions into national legislation on the composition and end-of-life management of batteries. They are marked with the recycling / return symbol and with a crossed-out roller container. This battery chemistries has to be separated from lead-acid batteries to avoid any risks during collection, transport and recycling.

By no means the battery to be opened or electrolyte be emptied in an unexpected manner. This process is to be carried out by processing companies.

14. Transport information:

Land Transport	Land Transport (ADR/RID 2019)	
	UN N°:	UN3480
	Classification ADR/RID:	Class 9
	Proper Shipping Name:	LITHIUM ION BATTERIES
	Packing Group ADR:	Packagings shall conform to the Packing group II performance level
	Packaging instructions:	P903 Batteries shall be packed in packagings so that the batteries are protected against damage that may be caused by the movement or placement of the batteries within the packaging. Batteries shall be protected against short circuit.
	Label required:	9A  

Sea Transport	Sea Transport (IMDG Code 2019)	
	UN N°:	UN 3480
	Classification:	Class 9
	Proper Shipping Name:	LITHIUM ION BATTERIES
	Packing Group IMDG:	Packagings shall conform to the Packing group II performance level
	Packaging instructions:	P903 Batteries shall be packed in packagings so that the batteries are protected against damage that may be caused by the movement or placement of the batteries within the packaging. Batteries shall be protected against short circuit. F-A, S-I
	EmS:	
Air Transport	Air Transport (IATA-DGR 2018)	
	UN N°:	UN 3480
	Classification:	Class 9
	Proper Shipping Name	LITHIUM ION BATTERIES
	Packing Group:	Packing group II
	Packaging instructions:	PI965, Section IA
	IMP:	RBI
	Label required:	
	Restrictions / Conditions:	Batteries >100Wh Max SoC = 30% Pax A/C = Forbidden CAO = 35kg (limit per package)

15. Regulatory information:

In accordance with Battery Directive and national laws lithium-ion batteries have to be marked by a crossed out refuse bin, together with the return/ recycling symbol, clearly marked as Li-Ion according IEC 62902.

The manufacturer, respectively the importer of the batteries shall be responsible for labelling batteries with the symbols. In addition, a consumer / user information on the significance of the symbols has to be attached.

16. Other information:

Key or legend to abbreviations and acronyms:

- AF - Assessment factor
- CLP - Regulation (EC) No 1272/2008 of the European Parliament and of the Council of 16 December 2008 on classification, labelling and packaging of substances and mixtures.
- DNEL - Derived no-effect level
- DSD - Council Directive 67/548/EEC (Dangerous Substances Directive)
- EC50 - Concentration of the substance that causes 50 % reduction of a certain effect on test organisms
- EWC - European Waste Catalogue
- LC50 -Concentration of the substance that causes 50 % mortality of the test population
- NOAEC - No observed adverse effect concentration
- NOAEL- No observed adverse effect level
- OECD - Organisation for Economic Co-operation and Development
- PBT/vPvB - Persistent, bioaccumulative and toxic/ very persistent and very bioaccumulative
- PNEC - Predicted no-effect concentration
- REACH - Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals
- STOT RE - Specific Target Organ Toxicity, Repeated Exposure
- STOT SE - Specific Target Organ Toxicity, Single Exposure
- STP - Sewage treatment plant

16.2 **Emergency telephone numbers:**

Europe-wide emergency number: 112
Contact a poison control centre. List of phone numbers:

AUSTRIA (Vienna Wien) +43 1 406 43 43; **BELGIUM** (Brussels Bruxelles) +32 70 245 245; **BULGARIA** (Sofia) +359 2 9154 409; **CZECH REPUBLIC** (Prague Praha) +420 224 919 293; **DENMARK** (Copenhagen) 82 12 12 12; ESTONIA (Tallinn) 112; **FINLAND** (Helsinki) +358 9 471 977; **FRANCE** (Paris) +33 1 40 0548 48; **GERMANY** (Berlin) +49 30 19240; **GREECE** (Athens Athinai) +30 10 779 3777; **HUNGARY** (Budapest) 06 80 20 11 99; **ICELAND** (Reykjavik) +354 525 111, +354 543 2222; **IRELAND** (Dublin) +353 1 8379964; **ITALY** (Rome) +3906 305 4343; **LATVIA** (Riga) +371 704 2468; **LITHUANIA** (Vilnius) +370 5 236 20 52 or +370 687 53378; **MALTA** (Valletta) 2425 0000; **NETHERLANDS** (Bilthoven) +31 30 274 88 88; **NORWAY** (Oslo) 22 591300; **POLAND** (Gdansk) +48 58301 65 16 or +48 58 349 2831; **PORTUGAL** (Lisbon Lisboa) 808 250 143; **ROMANIA** (Bucharest) +40 21 3183606; **SLOVAKIA** (Bratislava) +421 2 54 77 4166; **SLOVENIA** (Ljubljana) + 386 41 650500; **SPAIN** (Barcelona) +34 93 227 98 33 or +34 93 227 54 00 bleep 190; **SWEDEN** (Stockholm) 112 or +46 833 12 31 (mon-fri 9.00-17.00); **UNITED KINGDOM** (London) 112 or 0845 4647 (NHS Direct).

16.3 **Disclaimer of Liability:**

The information in this data sheet for safe handling of lithium-ion batteries is provided in good faith based on existing knowledge. However, the information is provided without any warranty, express or implied, regarding its correctness. The conditions or methods of handling, storage, use or disposal of the article are beyond our control and may be beyond our knowledge. For this and other reasons, we do not assume responsibility and expressly disclaim liability for loss, damage or expense arising out of or in any way connected with the handling, storage, use or disposal of the article. This data sheet was prepared and is to be used only for this article.

Articles such as batteries are not in the scope of any regulation which requires the publication of a Safety Data Sheet according (EC) No. 1907/2006 (REACH), as amended by Annex I to Commission Regulation (EU) No. 453/2010.

More information is available:

http://www.clarios.com/