

***MSDS – MATERIAL SAFETY DATA  
SHEET***


***ALIANNT EK SERIES*  
*LITHIUM TRACTION BATTERY*  
*LFP Technology***

Document Version	2.1
Issue Date	15/11/2021
Prepared by	Alex Conti
Approved by	Davide Dal Pozzo

**SECTION 1: Identification of the product and of the company**

Product Name	Rechargeable Lithium-Ion Battery
Product Models	All EK Series models
Manufacturer	ELSA Solutions srl
Uses of the product	Rechargeable electric battery for industrial uses
Address	Via Patarini, 15 Imola (BO), Italy Telephone Number +39 800132166
Emergency Telephone Numbers 24/7	Centro Antiveleni Milano Niguarda – 0266101029 Or else contact local Poison Centers.

**SECTION 2: Hazards identification**

<p>Lithium-Ion Batteries described in this Material Safety Data Sheet are sealed units, which are classified as an “article”.</p> <p>As stated by Article 7, paragraph 3 of the European Regulation 1907/2006, articles whose components are not meant to be released during normal usage<sup>1</sup>. Hence, producers are not asked to classify their articles as stated by Article 4, paragraph 2 by the European Regulation 1272/2008<sup>2</sup>. The hazards are associated with the internal components of the battery: under normal conditions of use, the solid electrode materials and Gel electrolyte are non-reactive. Keeping the battery and the seals intact will provide the internal components from spilling out: in case of leakage, the chemicals are classified as Hazardous.</p> <p>In case of unavailable or incomplete information, it is highly recommended to follow the precautionary principle.</p>	
Physical Hazards	A leakage of the chemicals inside might be inflammable or corrosive.
Health Hazards	A leakage of the chemicals inside might be irritating. Gasses produced by a Lithium-Ion battery fire might be toxic.
Environmental Hazards	A damaged battery might leak chemicals such as the electrolyte LiFP <sub>6</sub> and Copper (Cu) and Aluminum (Al) dust, which are harmful to the environment.
Specific Hazards	A leakage of the chemicals inside might cause burn to the skin, eyes and mucous membranes and may cause sensitization by skin contact.
Main Symptoms	Symptoms include itching, burning, redness and tearing.
Pictograms	
Signal Words	Danger
<b>Hazard Statements</b>	Below hazards refer to a leakage or a rupture of the battery.
	H203 Explosive; fire, blast or projection hazard.
	H228 Flammable solid.
	H261 In contact with water releases flammable gases.
	H270 May cause or intensify fire; oxidizer.

<sup>1</sup> European Regulation 1907/2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH)

<sup>2</sup> European Regulation 1278/2008 on classification, labelling and packaging of substances and mixtures, amending and repealing Directive 67/548/CEE and 1999/45/EC, and amending Regulation (EC) No 1907/2006

H302 Harmful if swallowed.	
H312 Harmful in contact with skin.	
H314 Causes severe skin burns and eye damage.	
H315 Causes skin irritation.	
H319 Causes serious eye irritation.	
H400 Very toxic to aquatic life.	
<b>Precautionary statements</b>	Precautionary statements below refer to a leakage or a rupture of the battery.
P102 Keep out of reach of children.	
P201 Obtain special instructions before use.	
P210 Keep away from heat, hot surface, sparks, open flames and other ignition sources. No smoking.	
P232 Protect from moisture.	
P250 Do not subject to grinding/shock/friction/...	
P251 Do not pierce or burn, even after use.	
P260 Do not breathe dust/fume/gas/mist/vapor.	
P262 Do not get in eyes, on skin, or on clothing.	
P273 Avoid release to the environment.	
P280 Wear protective gloves/protective clothing/eye protection/face protection.	
P313 Get medical advice/attention.	
P381 In case of leakage, eliminate all ignition sources.	
P301+P330+P331 IF SWALLOWED, rinse mouth. Do NOT induce vomiting.	
P303+P361+P353 IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse SKIN with water [or shower].	
P305+P351+P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses if present and easy to do – continue rinsing.	
P332+P313 IF SKIN irritation occurs: Get medical advice/attention.	
P370+P380+P375 In case of fire: Evacuate area. Fight fire remotely due to the risk of explosion.	
<b>Precautionary statements</b>	Below precautionary statements refer to an intact battery.
P401 Store in accordance with local legislation.	
P403+P223 Store in a well-ventilated place. Keep container tightly closed.	
P410+P403 Protect from sunlight. Store in a well-ventilated place.	
P410+P412 Protect from sunlight. Do not expose to temperatures exceeding 50 °C/122 °F.	

### SECTION 3: Composition/information on ingredients

A Lithium-Ion battery is 80% Lithium-Ion cells, 5% other internal components and 15% metallic case. As previously mentioned, Article 7 of REACH Regulation states that batteries do not require registration, this makes communicating the components' hazards optional in order to provide the customer with as much information as possible regarding the harms that might occur in case of wrong usage of the battery. An asterisk \* points out the chemicals listed in Annex VI, while the hazard classes were provided by ECHA<sup>3</sup>.

Chemical substances of cell, other components	%	CAS Number	ECHA Classification & Hazard labelling
---	---	------------	--

<sup>3</sup> <https://echa.europa.eu/it/substance-information>

and case			
Lithium Iron Phosphate LiFePO <sub>4</sub>	30-40%	15365-14-7	No hazard classified.
Graphite C	10-15%	7782-42-5	No hazard classified.
Steel	10-20%	12597-69-2	No hazard classified.
Electrolyte solvent	5-15%	Mixture of the following	See individual characteristics below.
Ethylene Carbonate C <sub>3</sub> H <sub>4</sub> O <sub>3</sub>		96-49-1	Harmful if swallowed. Causes serious eye irritation. May cause damage to organs through prolonged or repeated exposure.
*Dimethyl Carbonate C <sub>3</sub> H <sub>6</sub> O <sub>3</sub>		616-38-6	Flam. Liq. 2
Ethyl Methyl Carbonate C <sub>4</sub> H <sub>8</sub> O <sub>3</sub>		623-53-0	Highly flammable liquid and vapour.
Li-Exafluorophosphate LiPF <sub>6</sub>		21324-40-3	Toxic if swallowed. Causes severe skin burn and eye damage. Causes damage to organs through prolonged or repeated exposure. Causes serious eye damage.
Copper metal Cu	5-10%	7440-50-8	Very toxic to aquatic life. Very toxic to aquatic life with long lasting effects. Toxic if inhaled. Harmful if swallowed. Causes serious eye irritation.
*Aluminium metal Al	2-5%	7429-90-5	Water-react. 2 Pyr. Sol. 1
<b>Chemical substances of components external to cells</b>	<b>%</b>	<b>CAS Number</b>	<b>Classification &amp; Hazard labelling</b>
Polyamide C <sub>6</sub> H <sub>22</sub> N <sub>2</sub> O <sub>2</sub>	50%	25038-54-4	Causes serious eye irritation and causes skin irritation.
Silicone (C <sub>2</sub> H <sub>6</sub> OSi) <sub>n</sub>	50%	7440-21-3	No hazard classified.

#### SECTION 4: First Aid Measures

The hazardous components are contained within a sealed unit. The following measures refers in case the components leak from the battery following a mechanical, electrical damage or exposition to high temperature. Always get medical attention immediately in case of contact with any internal components.

<b>General Advice</b>	React immediately after getting in contact with the leakage, contact a doctor and show them this MSDS.
Eye contact	Rinse immediately with plenty of water, also under the eyelids. Get medical attention immediately.
Skin contact	Rinse immediately with plenty of water and soap for at least 15 minutes. Get medical attention, especially if irritation develops and persists.
Ingestion	Rinse mouth immediately and drink plenty of water, do not induce vomiting. Get medical attention immediately.
Inhalation	Remove to fresh air. Get medical attention immediately.

#### SECTION 5: Firefighting Measures

A Lithium-ion battery fire is a peculiar fire which requires specific firefighting measures<sup>4</sup>: it is recommended to provide the storage facility with early smoke detectors and fire extinguisher either being water mist, extinguish foam or inerting solutions.

Prevention methods are listed in section 7.

Immediately contact firefighters in case of temperature rising.

Suitable Extinguish media	Large quantities of cold water, inerting gas or foams, water mist.
Unsuitable extinguish media	Acids, Alkalis, sands or oxidizing agents.
Special Hazard Arising	During a fire, chemicals leaking from the Lithium-ion battery tend to react with water, forming Hydrofluoric acid (HF) and other acids such as PF <sub>6</sub> and POF <sub>3</sub> <sup>5</sup> . Carbon Monoxide (CO) and Carbon dioxide (CO <sub>2</sub> ) are produced too.
Advice for firefighters	Inform the firefighters about the quantity of batteries involved. Wear protection for toxic gases. Cool down the batteries.

#### SECTION 6: Accidental Release Measures

The hazardous components are contained within a sealed unit. An incorrect usage of the product might lead to a leakage of the internal components.

Inform local authorities immediately.

Personal precautions, protective equipment and emergency procedures	For non-emergency personnel: wear protective equipment as per Section 8, remove all ignition sources, evacuate the area in case of leakage of large quantities of chemicals.
	For emergency personnel: wear protective equipment for toxic gases.
Environmental precautions	Prevent from migrating into soil, natural waterways or sewers creating barriers. Inform local authorities in case this occurs.

<sup>4</sup> DNV GL, 2017, *Considerations for ESS Fire Safety*, Jan 2017

<sup>5</sup> Larsson F., 2018, *Thermal propagation in Lithium-Ion Batteries*, PhD in Safety and Transport Electronics, Research Institute of Sweden

Methods and material for containment and cleaning up	Do not directly touch the spilled materials. Train cleanup personnel. Use clay, dust, vermiculite or other non-reactive absorbent material to absorb spilled components. If not hot and if possible, cautiously place batteries in containers and/or outside. Do not use water for cleaning up.
Reference to other sections	See sections 8 and 13 for additional information.

### SECTION 7: Handling and Storage

See User Manual.

Adopt precautionary principle.

Handling	Usage: Use the battery according to the User Manual. Handle the battery with care. Do not expose the battery to excessive physical shock, vibration, fire or water sources. Do not allow battery terminals to contact each other or with other metals. Do not short-circuit a battery. A short-circuit will generally reduce the cell or battery service life and can lead to ignition of surrounding materials or materials within the cell or battery if the seal integrity is damaged. Extended short-circuits creates high temperature in the cell and at the terminals. Physical contact to high temperatures can cause skin burns. In addition, extended short-circuit may cause the cell or battery to flame. Keep out of reach of children.
	Charging: Use the battery charger provided by Aliant. Do not use cables, battery charger or other material not provided by Aliant.
	Disassembly: Do not disassembly the battery by own willing. Seek Aliant instructions. Do not reverse cell polarity within a battery assembly. Do not use old and new cells or cells of different sizes.
	Unauthorized components: Do not use unauthorized components. Contact Aliant for replacement assistance.
Storage	Do not store batteries in a manner that allows terminals to short circuit. Do not place batteries near heating sources, nor expose them to direct sunlight for long periods. In case of storage of high quantities of Lithium-Ion Batteries it is recommended, if possible, to store them in more containers rather than in just one.

### SECTION 8: Exposure controls/personal protection

Despite not all components being labelled as hazardous, some Threshold Limit Values (TLVs) available on ECHA or on CDC database<sup>6</sup> are provided. The following components are not listed on European Directives 2000/39/EC<sup>7</sup>, 2006/15/EC<sup>8</sup>, 2009/161/EU<sup>9</sup>, on the most recent Directive 2017/164/UE<sup>10</sup> and on its Italian

<sup>6</sup> <https://www.cdc.gov/niosh/idlh/intridl4.html>

<sup>7</sup> Commission Directive 2000/39/EC of 8 June 2000 establishing a first list of indicative occupational exposure limit values

<sup>8</sup> Commission Directive 2006/15/EC of 8 June 2000 establishing a second list of indicative occupational exposure limit values

<sup>9</sup> Commission Directive 2009/161/EU of 17 December 2009 establishing a third list of indicative occupational exposure limit values

<sup>10</sup> Commission Directive 2017/164/UE of 31 January 2017 establishing a fourth list of indicative occupational exposure limit values

transposition Decreto del Ministro del Lavoro e delle Politiche Sociali e del Ministro della Salute del 2 maggio 2020<sup>11</sup>.

Adopting the precautionary principle is highly recommended.

The following values refer to leakage caused by damaging or improper usage of a battery.

Control Parameters, Time Weighted Average (TWA)					
Chemical component	Threshold Value (TLV)	Limit	Occupational Exposure Limits (OEL)	Immediately Dangerous to Life or Health (IDLH)	Derived No Effect Level (DNEL)
Lithium Iron Phosphate LiFePO <sub>4</sub>	-	-	-	-	4.2 mg/ m <sup>3</sup> (inhalation) 1 mg/kg bw/day (dermal)
Graphite C	2 mg/m <sup>3</sup>	-	-	1250 mg/m <sup>3</sup>	1.2 mg/ m <sup>3</sup> (inhalation) 813 mg/kg bw/day (oral)
Steel	-	-	-	-	-
Ethylene Carbonate C <sub>3</sub> H <sub>4</sub> O <sub>3</sub>	-	-	-	-	15 mg/m <sup>3</sup> (inhalation) 4.3 mg/kg bw/day (dermal)
Dimethyl Carbonate C <sub>3</sub> H <sub>6</sub> O <sub>3</sub>	-	-	-	-	34.9 mg/m <sup>3</sup> (inhalation) 5 mg/kg bw/day (dermal)
Ethyl Methyl Carbonate C <sub>4</sub> H <sub>8</sub> O <sub>3</sub>	-	-	-	-	10.3 mg/m <sup>3</sup> (inhalation) 2.92 mg/kg bw/day (dermal)
Li-Exafluorophosphate LiPF <sub>6</sub>	2.5 mg/m <sup>3</sup>	-	-	-	0.931 mg/m <sup>3</sup> (inhalation) 133 µg/kg bw/day (dermal)
Copper metal Cu	0.2 mg/m <sup>3</sup> (fume) 1 mg/m <sup>3</sup> (dusts and mists)	-	0.1 mg/m <sup>3</sup> (fume) 1 mg/m <sup>3</sup> (dusts and mists)	100 mg/m <sup>3</sup>	137 mg/kg bw/day (dermal, long-term)

<sup>11</sup> Decreto del Ministro del Lavoro e delle Politiche Sociali e del Ministro della Salute del 2 maggio 2020, recepimento della Direttiva 2017/164/UE

				273 mg/kg bw/day (dermal, acute)
Aluminium metal Al	1 mg/m <sup>3</sup>	-	-	3.72 mg/m <sup>3</sup> (inhalation) 7.9 mg/kg bw/day (oral)
Polyamide C <sub>6</sub> H <sub>22</sub> N <sub>2</sub> O <sub>2</sub>	10 mg/m <sup>3</sup>	4 mg/m <sup>3</sup>	-	-
Silicone (C <sub>2</sub> H <sub>6</sub> OSi) <sub>n</sub>	5 mg/m <sup>3</sup>	5 mg/m <sup>3</sup>	-	-
Exposure Controls	There are not exposure scenarios for the aforementioned components since they are present in the environment only after a spillage and not under standard working settings. In case of leakage see Section 6.			
Appropriate engineering controls	Ventilation is recommended to avoid high concentrations of potential leaking gasses.			
Eye/face protection	During standard usage of the lithium-ion battery, no face protections are required. In case of leakage wear goggles or glasses with side shield.			
Skin protection	Hand: No gloves are required during standard usage of the Lithium-ion battery. In case of leakage wear liquid proof gloves such as PVC or Viton rubber ones (do not wear cloth gloves).			
	Other body protection: No skin protections are required. In case of leakage wear long sleeved clothing and rubber apron in order to prevent skin contact. Carefully wash soiled clothing before re-use.			
Respiratory protection	No respiratory protections are required during standard usage of Lithium-ion battery. In case of battery damage and gas leakage, wear a half-face inorganic vapor and gas/acid/particulate respirator.			
Thermal hazards	In case the battery overheats immediately call local authorities, isolate the battery and, if case isolation is not possible, evacuate the surrounding area or protect the surrounding goods with heat and fireproof barriers. An overheating episode means the battery had been damaged and might ignite, explode and/or release toxic gases.			
Environmental exposure controls	Do not release to the environment. For waste management and recycling, contact manufacturer or local authorities.			
Additional protection measures	Have an eye washing station or a safety shower readily available. Do not eat, drink or smoke next to the battery. Do not store food, drinks or tobacco nearby. Practice and maintain good housekeeping.			

### SECTION 9: Physical and Chemical Properties

Physical State	Solid.
Colour	According to model.
Odour	No odour detected during standard usage. If leaking a pungent odour is given off.
Chemical	No chemical properties are available if the battery is intact. In case of leakage the following



properties	properties, provided by ECHA, relate to the individual components. N/A properties are not available to Aliant.										
Component	Lithium Iron Phosphate LiFePO <sub>4</sub>	Graphite C	Steel	Ethylene Carbonate C <sub>3</sub> H <sub>4</sub> O <sub>3</sub>	Dimethyl Carbonate C <sub>3</sub> H <sub>6</sub> O <sub>3</sub>	Ethyl Methyl Carbonate C <sub>4</sub> H <sub>8</sub> O <sub>3</sub>	Li-Exafluorophosphate LiPF <sub>6</sub>	Copper metal Cu	Aluminum metal Al	Polyamide C <sub>6</sub> H <sub>22</sub> N <sub>2</sub> O <sub>2</sub>	Silicone (C <sub>2</sub> H <sub>5</sub> OSi) <sub>n</sub>
Melting point	> 400 °C	600 °C	1059 °C	36.32 °C	4.65 °C	-55 °C	>175 °C	1059 °C	660 °C	N/A	1414 °C
Boiling point	> 400 °C	N/A	N/A	248 °C	90.35 °C	102 °C	>175 °C	2580 °C	2460 °C	N/A	2355-3265 °C
Flash point	N/A	N/A	N/A	143 °C	N/A	N/A	N/A	-23 °C	400 °C	N/A	N/A
Auto-ignition temperature	N/A	N/A	N/A	N/A	16.7 °C	20.5 °C	N/A	>1059 °C	400 °C	N/A	N/A
Decomposition temperature	N/A	N/A	N/A	N/A	N/A	N/A	N/A	>1071 °C	N/A	N/A	N/A
pH	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Kinematic viscosity	N/A	N/A	N/A	N/A	N/A	0.69 mm <sup>2</sup> /s	N/A	N/A	N/A	N/A	N/A
Solubility	N/A	N/A	0	214 g/L	139 g/L	47.1 g/L	N/A	<1 mg/L	N/A	N/A	<5.2 µg/L
Partition coefficient	N/A	N/A	N/A	N/A	0.354	0.972	N/A	N/A	N/A	N/A	N/A
Vapour pressure	N/A	N/A	N/A	>1 mbar (20 °C)	75.70 hPa (20 °C)	43 hPa (25 °C)	N/A	N/A	N/A	N/A	N/A
Density	3.34 g/cm <sup>3</sup>	2.214 g/cm <sup>3</sup>	8.78 g/cm <sup>3</sup>	1.32 g/cm <sup>3</sup>	1.0633 g/cm <sup>3</sup>	1.013 g/cm <sup>3</sup>	2.83 g/cm <sup>3</sup>	8.940 g/cm <sup>3</sup>	1.321 g/cm <sup>3</sup>	N/A	2.33 g/cm <sup>3</sup>
Relative vapour density	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Particle characteristics	Battery dimensions vary between models.										
Other information											
Explosives	An incorrect use of the battery might lead to explosions.										

### SECTION 10: Stability and reactivity

Reactivity	Under standard usage the components do not react in a hazardous way. Hazardous reaction might occur only after an incorrect usage or a battery damage.
Chemical stability	Stable under normal conditions. Battery performance will decrease as time passes, even if the product is being stored without being used. Periodically check the battery's performance with BMS.
Possibility of hazardous reactions	Hazardous reactions might occur only after mechanical, chemical or physical abuse.
Conditions to avoid	Use accordingly to User Manual. Keep away from flames, hot surface or prolonged sunlight expositions. Do not use unauthorized components for charging.
Incompatible materials	Acids, corrosive, inflammable or explosive materials. Salt water.
Hazardous	In case of a leakage, the internal components might react releasing acids.

decomposition products	
------------------------	--

### SECTION 11: Toxicological information

The following information refers to the single components after a leakage or a fire caused by an incorrect usage of the battery. In case of a spillage of the components wear proper protection as stated in Section 8.

Acute toxicity	Components in the electrolyte are toxic if inhaled, causing severe irritation of the mouth and upper respiratory tract with burning sensations, pain and coughing. Toxicity if swallowed might occur with symptoms as nausea, vomiting, diarrhoea and pain in the digestive tract.
Skin corrosion/irritation	Electrolyte components are corrosive to skin and cause severe skin burn or severe irritation if not washed off immediately.
Serious eye damage/irritation	Components in the electrolyte cause eye damage irritation that can lead up to irreversible damage with a starting acute burn.
Respiratory or skin sensitisation	The electrolyte causes irritation of mouth and upper respiratory tract, with burning sensation, pain and coughing.
Germ cell mutagenicity	OECD Tests do not show correlation between the battery electrolyte and germ cell mutagenicity.
Carcinogenicity	Some components of the Lithium-ion batteries contain small percentages of metallic Nickel, classified as IARC 2B (possibly carcinogenic to humans). Total percentage of Nickel is approximately less than 1% of the total mass of the battery and might react only after a fire or a chemical abuse.
Reproductive toxicity	No single component shows effect on reproductive system.
Specific Target Organ Toxicity (STOT) - single exposure	Electrolyte components are corrosive and causes respiratory irritation if inhaled. Most common symptoms are coughing, burning sensation and pain.
Specific Target Organ Toxicity (STOT) - repeated exposure	No data available at the moment shows STOT for repeated exposure.
Aspiration hazard	In case of aspiration the electrolyte components cause irritation to the respiratory system with coughing, pain and burning sensation.

### SECTION 12: Ecological information

A sealed battery released to the environment does not show biodegradation behaviour. In case of leakage, single components ecotoxicity is considered. Follow precautionary principle.

Toxicity	Copper, LiFePo <sub>4</sub> <sup>12</sup> , Nickel, Ethylene Carbonate, Dimethyl Carbonate, Ethyl Methyl Carbonate and Li-Exafluorophosphate, sealed within the lithium-ion batteries, are harmful for freshwater and maritime environments. No data available for electrolyte components.
Persistence and degradability	No data available.
Bioaccumulative potential	No potentials for bioaccumulation are available for the electrolyte components.

<sup>12</sup> Shu et al., 2021, *Life-cycle assessment of the environmental impact of the batteries used in pure electric passenger cars*  
File: MSDS\_EK\_DG\_EN\_2.1.doc - Printed on February 25, 2022 @ 12:01 PM by DDD Pg. 10-14

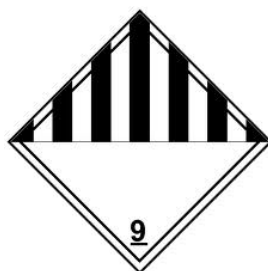
Mobility in soil	No data available.
Results of PBT and vPvB assessment	No data available.
Endocrine disrupting properties	No data available.
Other adverse effect	In case of fire the internal components react and spread toxic gasses such as HF.

### SECTION 13: Disposal considerations

Appropriate methods of waste treatment	Lithium-ion batteries are classified with the European Waste Catalogue with code 160605 (other batteries and accumulators) <sup>13</sup> . Consult manufacturer and local authorities for the most correct disposal. As required by European Directive 2006/66/EC <sup>14</sup> and its Italian transposition D. Lgs 188/08 <sup>15</sup> , ELSA Solutions is registered at the National register of producers of batteries and accumulators (CDCNPA).
Physical/chemical properties	Handle with care in order not to damage the battery, do not release to the environment.
Inappropriate procedures	Do not dispose in the sewage or to the environment.
Special precautions	Store in cool environment, protect from sunlight, weathering and heat sources and handle with care. In case of leakage, if not hot and if possible, cautiously isolate the battery and consult manufacturer and local authorities.

### SECTION 14: Transport information

Aliant Lithium-ion cells and batteries can be shipped as Fully Regulated Dangerous Goods with code **UN3480** and **UN3481** when packed with or in equipment, because they met the criteria referred for Lithium Batteries **over 100 Wh** in the UN Manual of Test and Criteria 7<sup>th</sup> revised edition, Part III, Subsection 38.3. In the US Lithium-Ion battery transportation is regulated by Part 49 of the Code of Federal Regulations (49 CFR Sections 105-180) of the US Hazardous Material Regulations.



#### ADR<sup>16</sup> and RID<sup>17</sup>

UN Number	UN3480
UN proper shipping name	Lithium-Ion batteries
Transport hazard class(es)	9

<sup>13</sup> EuRIC, 2021, *Reaction to the Proposed Batteries and Waste Batteries Regulation (Batteries – modernizing EU rules)*

<sup>14</sup> Directive 2006/66/EC of 6 September 2006 on batteries and accumulators and waste batteries and accumulators

<sup>15</sup> D. Lgs 188/08, attuazione della direttiva 2006/66/CE

<sup>16</sup> ADR, 2021, *International Agreement for the Transport of Dangerous Goods by Road*

<sup>17</sup> RID, 2021, *Regulation concerning the International Carriage of Dangerous Good by Rail*

Packing group	II
Packing instruction	P903.
Environmental hazards	-
<b>ADN<sup>18</sup></b>	
UN Number	UN3480
UN proper shipping name	Lithium-Ion batteries
Transport hazard class(es)	9
Packing group	II
Packing instruction	P903
Environmental hazards	-
<b>IMDG<sup>19</sup></b>	
UN Number	UN3480
UN proper shipping name	Lithium-Ion batteries
Transport hazard class(es)	9
Packing group	II
Packing instruction	P903
Environmental hazards	-
Watt-hour exceeds the standard, so it belongs to dangerous goods.	
<b>ICAO<sup>20</sup>/IATA<sup>21</sup></b>	
UN Number	UN3480
UN proper shipping name	Lithium-Ion batteries
Transport hazard class(es)	9
Packing group	II
Packing instruction	PI965 Sez.IA
Environmental hazards	-
Watt-hour exceeds the standard, so it belongs to dangerous goods. Cargo only. The goods are packaged according to the packing instructions 965 section I of DGR.	
UN Number	UN3481
UN proper shipping name	Lithium-Ion batteries packed with equipment Lithium-Ion batteries contained in equipment
Transport hazard class(es)	9
Packing group	II
Packing instruction	PI966. PI967.
Environmental hazards	-
Special precautions for user	Always inform the transport provider about the Lithium-Ion battery hazards.
Maritime transport in bulk according to IMO instruments	-

<sup>18</sup> ADN, 2015, *International Agreement for the Transport of Dangerous Goods by Inland Waterways*

<sup>19</sup> IMDG, 2018, *International Maritime Dangerous Goods*

<sup>20</sup> ICAO, 2016, *International Civil Aviation Organization*

<sup>21</sup> IATA, 2020, *International Air Transport Association*

SECTION 15: Regulatory information	
Canadian Federal Regulations	This product has been classified in accordance with the hazard criteria of the CPR and the MSDS contains all of the information required by the CPR.
US Federal and State Regulations	Lithium-Ion batteries are not considered “articles” by OSHA and are thus subject to HCS regulations, MSDS are required.
Chinese Regulations	General Rule for Classification and Hazard Communication of Chemicals (GB13690-2009).
REACH Regulations	ELSA Solutions imports into Europe only finished components (“Articles”) not intended to release substances during their use. The articles do not feature substances of very high concern or any restricted substance, thus ELSA Solutions does not need to register them.

SECTION 16: Other information	
Revision information	Version 2.1 adds information to the data provided by version 1, as requested by Commission Regulation (EU) 2020/878. Every section had been revisited and updated.
Legend to abbreviations and acronyms	ADN - International Agreement for the Transport of Dangerous Goods by Inland Waterways ADR – International Agreement for the Transport of Dangerous Goods by Road BMS - Battery Management System CDCNPA – Centro di Coordinamento Nazionale Pile e Accumulatori CPR – Controlled Products Regulations DNEL – Derived No Effect Level ECHA – European Chemical Agency HCS – Hazards Communication Standards IACA – International Air Carriers Association IARC – International Agency for Research on Cancer ICAO – International Civil Aviation Organization IDHL – Immediately Dangerous to Life od Health IMDG – International Maritime Dangerous Goods MSDS – Material Safety Data Sheet OECD – Organisation for Economic Co-operation and Development OEL – Occupational Exposure Limits OSHA – Occupational Safety and Health Administration RID – Regulation concerning the International carriage of Dangerous good by rail TLV – Threshold Limit Value TWA – Time Weighted Average
Literature references and sources for data	1 European Regulation 1907/2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH); 2 European Regulation 1278/2008 on classification, labelling and packaging of substances and mixtures, amending and repealing Directive 67/548/CEE and 1999/45/EC, and amending Regulation (EC) No 1907/2006;

- 3 <https://echa.europa.eu/it/substance-information>;
- 4 DNV GL, 2017, *Considerations for ESS Fire Safety*, Jan 2017;
- 5 Larsson F., 2018, *Thermal propagation in Lithium-Ion Batteries*, PhD in Safety and Transport Electronics, Research Institute of Sweden;
- 6 <https://www.cdc.gov/niosh/idlh/intridl4.html>;
- 7 Commission Directive 2000/39/EC of 8 June 2000 establishing a first list of indicative occupational exposure limit values;
- 8 Commission Directive 2006/15/EC of 8 June 2000 establishing a second list of indicative occupational exposure limit values;
- 9 Commission Directive 2009/161/EU of 17 December 2009 establishing a third list of indicative occupational exposure limit values;
- 10 Commission Directive 2017/164/UE of 31 January 2017 establishing a fourth list of indicative occupational exposure limit values;
- 11 Decreto del Ministro del Lavoro e delle Politiche Sociali e del Ministro della Salute del 2 maggio 2020, recepimento della Direttiva 2017/164/UE;
- 12 Shu et al., 2021, *Life-cycle assessment of the environmental impact of the batteries used in pure electric passenger cars*;
- 13 EuRIC, 2021, *Reaction to the Proposed Batteries and Waste Batteries Regulation (Batteries – modernizing EU rules)*;
- 14 Directive 2006/66/EC of 6 September 2006 on batteries and accumulators and waste batteries and accumulators;
- 15 D. Lgs 188/08, attuazione della direttiva 2006/66/CE;
- 16 ADR, 2021, *International Agreement for the Transport of Dangerous Goods by Road*;
- 17 RID, 2021, *Regulation concerning the International Carriage of Dangerous Good by Rail*;
- 18 ADN, 2015, *International Agreement for the Transport of Dangerous Goods by Inland Waterways*;
- 19 IMDG, 2018, *International Maritime Dangerous Goods*;
- 20 ICAO, 2016, *International Civil Aviation Organization*;
- 21 IATA, 2020, *International Air Transport Association*.