

## **Material Safety Data Sheet**

### **Lithium Ion Line Cells and Batteries (LO Series)**

#### **Section I – Information of Manufacturer**

Manufacturer's Name: DYNAMIS Batterien GmbH  
Address: Brühlstr. 15 D-78465 Dettingen / Konstanz  
Tel. +49 7533 93669-0

#### **Section II – Composition/Materials**

| Description:                 | CAS#       | wt-%  |
|------------------------------|------------|-------|
| 1. Lithium Cobalt Oxide      | 12190-79-3 | 20-40 |
| 2. Aluminium (various forms) | 7429-90-5  | 5-15  |
| 3. Carbon (various forms)    | 7740-44-0  | 10-30 |
| 4. Copper                    | 7440-50-8  | 5-15  |
| 5. Lithium Salts             | 21324-40-3 | 1-5   |
| 6. Nickel                    | 7440-02-0  | 0.5-5 |
| 7. Organic Carbonate         | 102-09-0   | 10-25 |
| 8. Polymer                   | 9002-88-4  | 3-10  |

#### **Section III – Physical / Chemical Characteristics**

|                                        |                                                                                          |
|----------------------------------------|------------------------------------------------------------------------------------------|
| Boiling Point:                         | N/A                                                                                      |
| Vapour Pressure (mm Hg):               | N/A                                                                                      |
| Vapour Density (AIR=1):                | N/A                                                                                      |
| Solubility in Water:                   | N/A                                                                                      |
| Appearance and Odour:                  | Sealed round cell metal can, with pos./neg. terminals and over-pressure safety vent, PTC |
| Specific Gravity (H <sub>2</sub> O=1): | N/A                                                                                      |
| Melting Point:                         | N/A                                                                                      |
| Evaporation Rate (Butyl Acetate):      | N/A                                                                                      |

Use properties: Secondary (rechargeable) power supply, nominal voltage 3.7V

|              |                     |                  |
|--------------|---------------------|------------------|
| Temperature: | Storage, continuous | max. +35 °C      |
|              | Storage, occasional | -20 °C to +50 °C |
|              | Discharge, cont.    | max. +60 °C      |
|              | Discharge, occ.     | -20 °C to +60 °C |
|              | Charge, cont./occ.  | 0 °C to +45 °C   |

Energy content, specific: 135 Wh/kg

### Section IV – Hazard Classification

All chemicals are sealed into the cell box. Risk of exposure only possible if the integrity of the cell box is mechanically or electrically damaged (by abuse). In these cases contact of Lithium components or electrolyte with skin or eyes shall be avoided.

A ruptured or shorted battery box cause thermal or chemical burns upon contact with skin. This may be a reproductive hazard.

Hazardous Identification: The LO rechargeable batteries are sealed units which are not hazardous when used according to the specifications and recommendations of the manufacturer.

The components which form inside the battery depend on the state of charge (SOC).

In general, the positive electrode contains composite materials, e.g.  $\text{LiCoO}_2$  mainly; the negative electrode e.g. Graphite (Carbon). The electrolyte is a solution of  $\text{LiPF}_6$  or similar in organic solvents.

Classification acc. 67/548/EEC:

| CAS No           | Chemical         | MeltP<br>/[°C] | BoilP<br>/[°C] | Expos.<br>Limit               | Risk                       | Safety Advices                                       |
|------------------|------------------|----------------|----------------|-------------------------------|----------------------------|------------------------------------------------------|
| 12190-79-3       | $\text{LiCoO}_2$ | >1000          | N/A            | 0.1 mg/m <sup>3</sup><br>OSHA | R22<br>R43                 | S2, S22, S24, S26,<br>S36, S37, S43, S45             |
| 21324-40-3       | $\text{LiPF}_6$  | 160decomp      |                | None<br>Established<br>(OSHA) | R14, R21,<br>R22, R41, R43 | S2, S8, S22, S24, S26,<br>S36, S37, S45              |
| Organic Solvents |                  |                |                |                               |                            |                                                      |
| 96-49-1          | EC               |                | 38             |                               | Inflammable                |                                                      |
| 616-38-6         | DMC              | 4              | 90             |                               | Inflammable                | R21, R22, S2, S24, S26,<br>R41, R42/43 S36, S37, S45 |
| 105-58-8         | DEC              | -43            | 127            |                               |                            |                                                      |

#### Risk Definitions:

|        |                                                        |
|--------|--------------------------------------------------------|
| R14    | Reacts with Water                                      |
| R21    | Harmful in contact with skin                           |
| R22    | Harmful if swallowed                                   |
| R41    | Risk of serious damage to eye                          |
| R42/43 | May cause sensitization by inhalation and skin contact |
| R43    | May cause sensitization by skin contact                |

#### Safety Advices:

|     |                                                                                                |
|-----|------------------------------------------------------------------------------------------------|
| S2  | Keep out of reach from children                                                                |
| S8  | Keep away from moisture                                                                        |
| S22 | Do not breathe dust                                                                            |
| S24 | Avoid skin contact                                                                             |
| S26 | In case of contact with eye: Rinse immediately with plenty of water and seek medical attention |
| S36 | Wear suitable gloves                                                                           |
| S45 | In case of incident - seek medical attention                                                   |

### Section V – Reactivity Data

Stability: Stable Status

Conditions to Avoid: Fire/Heating above specified range (+85 °C), short circuiting tools or solvents, mechanical/electrical abuse.

Incompatibility (Materials to Avoid): Acids, Water, Metal corroding/Oxidizing materials.

Hazardous Decomposition of By-products: Reaction of water with free electrolyte generates HF.  
HF is corrosive and irritant, and can be very harmful in contact with skin/eyes or when inhaled. Immediate medical attention necessary.

Hazardous Polymerization: Will not occur

In case of leakages: Do not inhale vapors or gases from the cell. See to proper ventilation with air.

### Section VI – Health Hazard Data

Routes of Entry - Normal use

Inhalation: N/A

Skin: N/A

Ingestion: N/A

Health Hazard (Acute and Chronic) / Toxicological information: N/A

### Section VII – First Aid Measures

First Aid Procedures (in case of leakages):

In case of battery case rupture, fume or fire evacuate personnel from contaminated area and provide maximum ventilation with air to clean out fumes and gases. Then spray water onto battery or put battery into basin with water.

Medical attention is strongly advised in such cases.

Eyes:

Flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eye lids. See to medical aid.

Skin:

Remove contaminated clothes and rinse skin with plenty of water or shower immediately and continue for 15 minutes. Use only soap. Never apply greases or ointments. See to medical aid.

Inhalation:

Remove from exposure and move to fresh air, oxygen if available. Seek medical attention. Ventilate the contaminated area.

Ingestion:

Drink immediately plenty of water and seek for medical help. Assure that the victim does not aspirate vomited material by use of personal drainage. Assure that mucus does not obstruct the airway. Do not give anything by mouth to an unconscious person.

### Section VIII – Fire and Explosion Hazard Data

Flash Point (Method Used): N/A

Ignition Temp.: N/A

Flammable Limits: N/A

LEL: N/A

UEL: N/A

Extinguishing Media: Water (Spray or basin), Type D, Carbon Dioxide, Dry Chemical or Foam

Special Fire Fighting Procedures: Self-contained breathing apparatus required

Unusual Fire and Explosion Hazards: Cell may vent if exposed to excessive heat

Do not dispose of battery in fire – may explode.

Do not short – circuit battery – may cause burns.

Hazardous combustion products: CO, CO<sub>2</sub>, Li Oxide fumes, Phosphorous Oxide, HF, PF<sub>3</sub>/PF<sub>5</sub>

### Section IX – Accidental Release or Spillage

Steps to Be Taken in Case Material is Released or Spilled:

If the battery material is released, remove personnel from area until fumes dissipate. Provide maximum ventilation to clear out hazardous gases. Wipe it up with a cloth, and dispose of it in a plastic bag and put into a steel can. The preferred response is to leave the area and allow the battery to cool and vapors to dissipate while maximum ventilation is provided. Avoid skin and eye contact or inhalation of vapors. Remove spilled liquid with absorbent and incinerate.

Batteries that are leakage should be handled with rubber gloves.

Avoid direct contact with electrolyte.

Wear protective clothing and a positive pressure Self – Contained Breathing Apparatus (SCBA).

Waste Disposal:

It is recommended to discharge the battery to the end, handing in the abandoned batteries to related department unified, dispose of the batteries in accordance with approved local, state, and federal requirements.

### Section X – Handling and Storage

Safe handling and storage advice:

The battery should not be opened, destroyed or incinerated, since they may leak or rupture and release to the environment the ingredients that they contain in the hermetically sealed container.

Do not short circuit terminals or overcharge the battery, force over-discharge, throw into fire or reverse-charge. Do not crush or puncture the battery, or immerse in liquids.

Store the batteries in dry and cool area (below 30 °C). Store batteries in adequate distance from walls.

#### Precautions to be taken in Handling and Storing

Avoid mechanical or electrical abuse. Storage preferably in cool, dry and ventilated area, which is subject to little temperature change. Storage at high temperatures should be avoided.

Do not place the battery near heating equipment, nor expose to direct sunlight for long periods.

#### Other Precautions

The battery may explode or cause burns, if disassembled, crushed or exposed to fire or high temperatures.

Do not short or install with incorrect polarity.

Apply only suitable equipment for charging and discharging. Do not mix cells and batteries of differing age or use history, nor different types or sizes within one assembly

### Section XI – Exposure Control / Person Protection

Respiratory Protection (Specify Type): In case of battery venting, provide as much ventilation as possible. Avoid confined areas with venting cells. Respiratory protection is not necessary during normal (specified) use.

Ventilation: N/A during specified use

Local Exhausts: N/A during spec. use.

Special: N/A

Mechanical (General): N/A during spec. use.

Special: N/A

Other: N/A

Eye Protection: N/A during spec. use.

Protective Gloves: N/A during specified use

Other Protective Clothing or Equipment: N/A

Work / Hygienic Practices: N/A

### **Section XII – Ecological Information**

When properly used or disposed of the battery does not present an environmental hazard. When disposed avoid water, rain and snowy conditions for long-term storage.

### **Section XIII – Disposal Method**

General: Dispose of batteries according to government regulations.

If batteries are still fully charged or only partially discharged, they can be considered a reactive hazardous waste because of significant amount of unconsumed energy remaining in the spent battery. The battery must be neutralized through an approved secondary treatment facility prior to disposal as a hazardous waste (or discharged appropriately). Recycling of battery can be done in authorized facility, by a licensed waste carrier.

### **Section XIV – Transportation Information**

Proper shipping name: Lithium-Ion Batteries, UN No. 3480  
IATA DGR 64th Edition (2023), Packing Instruction 965 – 967

Air Freight: Small Li Ion Batteries (< 20Wh or packs <100 Wh) w/ UN3480/IATA  
ICAO Packing Instr. 965 Sec.II  
Large Cells and Packs: Considered Class 9, PI 965 Sec.I  
Furthermore new restrictions apply since April 1, 2016, which forbid transport of Lithium batteries on passenger aircraft at all and strengthen limits even for small numbers and cells on cargo aircraft.

Sea Freight: Sealed Lithium Batteries - Not restricted, when requirements of IMDG Dangerous Goods Regulations are met (UN3480).

### **Section XV – Regulatory Information**

International Civil Aviation Organization (ICAO) – Technical Instructions (2023-2025 Ed.)

International Air Transport Association (IATA) – Dangerous Goods Regulations (64th Ed., 2023)

International Maritime Dangerous Goods (IMDG) AMdt Code 40-20

US Hazardous Materials regulations 49 CFR (Code of Federal Reg.), Sec. 173-185

### **Section XVI – Other Information**

The above information is based on the data of which we are aware and is believed to be correct as of the data hereof. Since this information may be applied under conditions beyond our control and with which may be unfamiliar and since data made available subsequent to the data hereof may suggest modifications of the information, we do not assume any responsibility for the results of its use. This information is furnished upon condition that the person receiving it shall make his own determination of the suitability of the material for his particular purpose.