SAMSUNG SDI

Safety Data Sheet

Regulation : In accordance with Regulation (EU) 2020/878 (REACH), Annex II, and OSHA 29 CFR 1910.1200

Section I – IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

Important Note: As a solid, manufactured article, exposure to hazardous ingredients is not expected with normal use. This battery is an article pursuant to 29 CFR 1910.1200 and, as such, is not subject to the OSHA Hazard Communication Standard requirement. The information contained in this Safety Data Sheet contains valuable information critical to the safe handling and proper use of the product. This SDS should be retained and available for employees and other users of this product.

1.1 Product identifier

Model name EB-BS938ABY, EB-BS938ABE

Substance name : Lithium-ion batteries

Synonyms :

Lithium-ion Cell, Lithium-ion Pack, Lithium-ion Battery, Li-Ion Cell, Li-Ion Pack, Li-Ion Battery

REACH Registration No. : Not available

UFI Code : Not available

1.2 Relevant identified uses of the substance or mixture and uses advised against

Relevant identified uses : Lithium-ion batteries

Uses advised against : Use for recommended use only

Further Information : Not available

1.3 Details of the supplier of the safety data sheet

Supplier : SAMSUNG SDI Co., Ltd.

Street address/P.O. Box : 150-20, Gongse-ro, Giheung-gu, Yongin-si, Gyeonggi-do, Korea

Country ID/Postcode/Place :

Telephone number : 1-800-424-9300: US and Canada / 1-703-527-3887: International

Responsible Department: Quality team

e-mail address of competent person responsible for the SDS : Not available

National contact : 1-800-424-9300: US and Canada / 1-703-527-3887: International

1.4 Emergency Telephone

: 1-800-424-9300: US and Canada / 1-703-527-3887: International

Opening hours : Not available

Other comments : Not available

1.5 Further Information

Battery-System: Lithium-ion (Li-ion)

Nominal Voltage: 3.88 V

Rated Capacity: 4.855 Ah

Wh rating: 18.84 Wh

Anode (negative electrode): based on intercalation graphite

Cathode (positive electrode): based on lithiated metal oxide (Cobalt)

Remark:

The information and recommendations set forth are made in good faith and believed to be accurate as of the date of preparation. SAMSUNG SDI Co., Ltd. makes no warranty, expressed or implied, with respect to this information and disclaims all liabilities from reliance on it.

Section II – HAZARDS IDENTIFICATION

※ This is a product that fulfills a certain function in solid state with specific shape without discharging any chemical substance in its use and has no obligation to write (M)SDS. Since this document contains the precautions for safe handling related to its materials or chemical substances consisting of this product, please note that these overall information is irrelevant to this product.

2.1 Classification of the substance or mixture

2.1.1 Classification according to Regulation (EC) No. 1272/2008 [CLP] and OSHA 29 CFR 1910.1200 : Not classified

2.1.2 Additional information:

Classification of the substance or mixture.

Preparation Hazards and Classification: The product is a Lithium ion cell or battery and is therefore classified as an article and is not hazardous when used according to the recommendations of the manufacturer. The hazard is associated with the contents of the cell or battery. Under recommended use conditions, the electrode materials and liquid electrolyte are non-reactive provided that the cell or battery integrity remains and the seals remain intact. The potential for exposure should not exist unless the cell or battery leaks, is exposed to high temperatures or is mechanically, electrically or physically abused/damaged. If the cell or battery is compromised and starts to leak, based upon the battery ingredients, the contents are classified as Hazardous.

Hazardous Materials Information Label (HMIS)
Health: Not available
Flammability: Not available
Physical Hazard: Not available

NFPA Hazard Ratings
Health: Not available
Flammability: Not available
Reactivity: Not available

2.2 Label elements

Hazard pictograms : Not applicable

Signal word : Not applicable

Hazard statement : Not applicable

Precautionary statements: Not applicable

Supplemental Hazard information (EU) : Not applicable

2.3 Other hazards :

Appearance, Color and Odor: Solid object with no odor.

Primary Routes(s) of Exposure: These chemicals are contained in a sealed enclosure. Risk of exposure occurs only if the cell or pack is mechanically, thermally, electrically or physically abused to the point of compromising the enclosure.
If this occurs, exposure to the electrolyte solution contained within can occur by inhalation, ingestion, eye contact and skin contact.

Potential Health Effect(s):

Acute (short term): see Section 8 for exposure controls.
In the event that this cell or pack has been ruptured, the electrolyte solution contained within the cell would be corrosive and can cause burns to skin and eyes.
Inhalation: Inhalation of materials from a sealed cell is not an expected route of exposure. Vapors or mists from a ruptured cell may cause respiratory irritation.
Ingestion: Swallowing of materials from a sealed cell is not an expected route of exposure. Swallowing the contents of an open cell can cause serious chemical burns to mouth, esophagus, and gastrointestinal tract.
Skin: Contact between the cell and skin will not cause any harm. Skin contact with the contents of an open cell can cause severe irritation or burns to the skin.
Eye: Contact between the cell and the eye will not cause any harm. Eye contact with the contents of an open cell can cause severe irritation or burns to the eye.
CHRONIC (long term): see Section 11 for additional toxicological data.

Interactions with other chemicals: Immersion in high conductivity liquids may cause corrosion and breaching of the cell or battery enclosure. The electrolyte solution inside of the cells may react with alkaline (basic) materials and present a flammability hazard.

Potential Environmental Effects: Not Available.

Endocrine Disruptors Effects :

List of Substances identified as endocrine disruptors at EU level : Not listed

List of Substances under evaluation for endocrine disruption under an EU legislation : Not listed

List of Substances considered, by the evaluating National Authority, to have endocrine disrupting properties : Not listed

Section III – COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Mixture

CAS No.	EC No.	REACH Registration No.	%[weight]	Name	Common Name (Synonyms)	Classification according to Regulation(EC) No 1278/2008(CLP)

12190-79-3	235-362-0	-	40~50	cobalt lithium dioxide	Not available	Not classified
7782-42-5	231-955-3	-	15~25	Graphite	Not available	Not classified
7440-50-8	231-159-6	-	5~15	Copper	Not available	Aquatic Chronic 2, H411
7429-90-5	231-072-3	-	1~10	Aluminium	Not available	Flam. Sol. 1, H228 Water-react. 2, H261
106-36-5	203-389-7	-	1~5	PP (Propyl Propionate)	Not available	Flam. Liq. 3, H226 Acute Tox. 4, H332
9002-88-4	Not available	-	1~5	Polyethylene	Not available	Not classified
105-37-3	203-291-4	-	1~5	EP (Ethyl Propionate)	Not available	Flam. Liq. 2, H225
96-49-1	202-510-0	-	1~5	EC (Ethylene Carbonate)	Not available	Not classified
1344-28-1	215-691-6	-	1~5	Aluminium Oxide	Not available	Not classified
21324-40-3	244-334-7	-	1~5	LiPF6 (Lithium hexaflurophosphate)	Not available	Not classified
108-32-7	203-572-1	-	1~5	PC (Propylene Carbonate)	Not available	Eye Irrit. 2, H319
1333-86-4	215-609-9	-	0.1~1	Carbon black	Not available	Not classified
110-61-2	203-783-9	-	0.1~1	SN (Succinonitrile)	Not available	Not classified
1120-71-4	214-317-9	-	0.1~1	1,3-propanesultone	Not available	Acute Tox. 4 *, H302 Acute Tox. 4 *, H312 Carc. 1B, H350

Further Information
Because of the cell structure the dangerous ingredients will not be available if used properly.
During charge process a lithium graphite intercalation phase is formed.

Section IV – FIRST-AID MEASURES

4.1 Description of first aid measures

Following eye contact :

- Rinse eyes with plenty of water for at least 15 minutes and seek medical attention.

Following skin contact :

- Remove contaminated clothing and wash before reuse.
- Immediately rinse contact area with plenty of clean water.
- Provide first aid to contacted area to prevent infection.
- Get medical attention.

Following inhalation :

- In case of inhalation of organic electrolyte mist, move from exposure to fresh air.
- If necessary give oxygen. Get medical attention.

Following ingestion :

- In case of ingestion of electrolyte don't induce vomiting.
- If patient is conscious and alert give 2~4 cupfuls of milk or water.
- Never give anything by mouth to an unconscious person.
- Get medical attention immediately.

Further Information :

- The following first aid measures are required only in case of exposure to interior battery components after damage of the external battery casing.
- Undamaged, closed cells do not represent a danger to the health.

4.2 Most important symptoms and effects, both acute and delayed

Acute effects : Not available

Delayed effects : Not available

4.3 Indication of immediate medical attention and special treatment needed

- Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves.

Section V – FIRE-FIGHTING MEASURES

5.1 Extinguishing media

- When the scale of the fire is small, use a HFC (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.

5.2 Special hazards arising from the substance or mixture

- Flammable gas leaks before ignition and then the product ignites.

5.3 Advice for firefighters

- The ignited battery has a high temperature, so there is a risk of additional ignition even if the fire is extinguished at early stage. Sprinkle a large amount of water until the battery temperature drops to normal temperature.
- If the battery is ignited in multi-stacked condition, multi-stack should be disassembled and then extinguished so that heat is not transferred between batteries

- In the event of a battery fire, cool it by spraying water directly on the battery.
- When handling a overheated battery, wear heat-resistant protective equipment.

Section VI – ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures

For non-emergency personnel

Protective equipment : Use personal protective equipment, see Section 8

Emergency procedures :

- In case of cell damage, possible release of dangerous substances and a flammable gas mixture.
- Eliminate all ignition sources.
- Please note that materials and conditions to avoid.
- Battery may emit electrolyte if charging or discharging rates exceed manufacturer's recommendations or if pack has been breached.
- Move battery to well ventilated area to prevent gas accumulation.

For emergency responders

- Eliminate all ignition sources.
- Please note that materials and conditions to avoid.
- Move battery to well ventilated area to prevent gas accumulation.

6.2 Environmental precautions :

- Avoid release to the environment.
- Prevent entry into waterways, sewers, basements or confined areas.

6.3 Methods and material for containment and cleaning up

For containment : Not available

For cleaning up :

- Cover with Dry earth, DRY sand or other non-combustible material and put on the plastic sheet to minimize spreading or contact with rain.
- Move battery to well ventilated area to prevent gas accumulation.
- Dispose in accordance with applicable local, state and federal regulations.

Other information: Not available

6.4 Reference to other sections

- See also sections 8 and 13 of the Safety Data Sheet.

Section VII – HANDLING AND STORAGE

7.1 Precautions for safe handling

- In case of cell damage, possible release of dangerous substances and a flammable gas mixture.

- The battery stores electrical energy and is capable of rapid energy discharge.
- Battery cell contents are under pressure.
- Handle battery carefully to avoid puncturing case or electrically shorting terminals.

7.2 Conditions for safe storage, including any incompatibilities

Technical measures and storage conditions : Not available

Packaging materials : Not available

Requirements for storage rooms and vessels :

- Storage at room temperature (approx. 20℃) at approx. 40% of the nominal capacity
- Keep in closed original container.

7.3 Specific end use(s)

Recommendations : Not available

Industrial sector specific solutions : Not available

Section VIII – EXPOSURE CONTROLS / PERSONAL PROTECTION

8.1 Control parameters

Occupational Exposure limits

Name	ACGIH regulation	Biological exposure index	OSHA regulation	NIOSH regulation	EU regulation
cobalt lithium dioxide	Not applicable	Not available	Not applicable	Not applicable	Not applicable
Graphite	TWA = 2mg/m³ (all forms except graphite fibers, respirable particulate matter)	Not available	TWA = 15 mppcf	TWA = 2.5 mg/m3 (resp)	Not applicable
Copper	TWA = 0.2 mg/m³ (fume)	Not available	TWA = 0.1 mg/m³ (Fume) TWA = 1 mg/m³ (Dusts and mists, Cotton dust)	TWA = 1 mg/m³	Not applicable
Aluminium	TWA = 1 mg/m³ (respirable particulate matter)	Not available	TWA = 15 mg/m³ (Aluminum Metal (as Al) Total dust) TWA = 5 mg/m³ (Aluminum Metal (as Al)	TWA = 10 mg/m3 (total) TWA = 5 mg/m3 (resp)	Not applicable

			Respirable fraction)		
PP (Propyl Propionate)	Not applicable	Not available	Not applicable	Not applicable	Not applicable
Polyethylene	Not applicable	Not available	Not applicable	Not applicable	Not applicable
EP (Ethyl Propionate)	Not applicable	Not available	Not applicable	Not applicable	Not applicable
EC (Ethylene Carbonate)	Not applicable	Not available	Not applicable	Not applicable	Not applicable
Aluminium Oxide	TWA = 1 mg/m³ (respirable particulate matter)	Not available	TWA = 15 mg/m³ (Aluminum Metal (as Al) Total dust) TWA = 5 mg/m³ (Aluminum Metal (as Al) Respirable fraction)	TWA = 10 mg/m3 (total) TWA = 5 mg/m3 (resp)	Not applicable
LiPF6 (Lithium hexaflurophosphate)	Not applicable	Not available	Not applicable	Not applicable	Not applicable
PC (Propylene Carbonate)	Not applicable	Not available	Not applicable	Not applicable	Not applicable
Carbon black	TWA = 3mg/m³ (inhalable particulate matter)	Not available	TWA = 3.5 mg/m³	TWA = 3.5 mg/m³ Ca TWA = 0.1 mg PAHs/m³ [Carbon black in presence of polycyclic aromatic hydrocarbons (PAHs)]	Not applicable
SN (Succinonitrile)	Not applicable	Not available	Not applicable	Not applicable	Not applicable
1,3-propanesultone	Not applicable	Not available	Not applicable	Not applicable	Not applicable

8.2 Exposure controls

8.2.1 Appropriate engineering controls :

Substance/mixture related measures to prevent exposure during identified uses:

- Avoid charging batteries in areas where hydrogen gas accumulate.
- Use local exhaust ventilation to maintain concentrations of hydrogen below the Lower Explosive collect and transport flammable gases in ventilation systems.
- Insure proper ventilation is present and electrolyte mist and vapours.

Structural measures to prevent exposure:

- Avoid charging batteries in areas where hydrogen gas accumulate.
- Use local exhaust ventilation to maintain concentrations of hydrogen below the Lower Explosive collect and transport flammable gases in ventilation systems.
- Insure proper ventilation is present and electrolyte mist and vapours.

Organisational measures to prevent exposure: Not available

Technical measures to prevent exposure:

- Insure proper ventilation is present and electrolyte mist and vapours.

8.2.2 Individual protection measures, such as personal protective equipment :

Eye and face protection

- Wear ANSI approved safety glasses with side shield during normal use.
- Wear NIOSH approved face shield with safety glasses and H.V protection during intentional disassembly.

Skin protection

Hand protection

- Wear nitrile butyl rubber, neoprene, or PVC glove during battery component disassembly.
- Discard contaminated work clothing after one work day.

Other skin protection

- Wear protective clothing during battery component disassembly.
- Discard contaminated work clothing after one work day.

Respiratory protection :

- None required during normal use.
- Wear NIOSH or European Standard EN 149 approved full or half face piece (with goggles) respiratory protective equipment when necessary.
- In lack of oxygen(< 19.5%), wear the supplied-air respirator or self-contained oxygen breathing apparatus.
- In case exposed to particulate material, the respiratory protective equipments as follow are recommended; facepiece filtering respirator or air-purifying respirator, high-efficiency particulate air(HEPA) filter media or respirator equipped with powered fan, filter media of use (dust, mist, fume)

8.2.3 Environmental exposure controls

Substance/mixture related measures to prevent exposure: Not available

Instruction measures to prevent exposure: Not available

Organisational measures to prevent exposure: Not available

Technical measures to prevent exposure: Not available

Section IX – PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

Appearance

Description : Solid

Color : Not available
Odor : Odorless
Odor threshold : Not available
pH : Not available
Melting point/freezing point : Not available
Initial boiling point and boiling range : Not available
Flash point : Not available
Evaporation rate : Not available
Flammability (solid, gas) : Not available
Upper/lower flammability or explosive limits : Not available
Vapor pressure : Not available
Solubility (ies) : insoluble.
Vapor density : Not available
Relative density : Not available
Partition coefficient: n-octanol/water : Not available
Auto ignition temperature : Not available
Decomposition temperature : Not available
Viscosity : Not available
Explosive properties : Not available
Oxidizing properties : Not available
Molecular weight : Not available

9.2 Other information

Not available

Section X – STABILITY AND REACTIVITY

10.1 Reactivity

- Stable at ambient temperature.

10.2 Chemical stability

- There is no hazard when the measures for handling and storage are followed.
- Stable under normal temperatures and pressures.

10.3 Possibility of hazardous reactions

- Will not occur under normal conditions.
- In case of cell damage, possible release of dangerous substances and a flammable gas mixture.
- Containers may explode when heated.
- Fire may produce irritating and/or toxic gases.
- Some liquids produce vapors that may cause dizziness or suffocation.
- Inhalation of material may be harmful.

10.4 Conditions to avoid

- Keep away from heat/sparks/open flames/hot surfaces. No smoking.
- Friction, heat, sparks or flames
- Dusts or shavings from borings, turnings, cuttings, etc.
- Do not exceed manufacturer's recommendation for charging or use battery for an application for which it was not specifically designed.
- Do not electrically short.

10.5 Incompatible materials

- Avoid contact with acids and oxidizers.
- Keep away from any possible contact with water, because of violent reaction and possible flash fire.
- Handle under inert gas. Protect from moisture.
- Combustibles, reducing agents

10.6 Hazardous decomposition products

- None under normal conditions.
- Corrosive and/or toxic fume
- Material may produce irritating and highly toxic gases from decomposition by heat and combustion during burning.
- Irritating and/or toxic gases

Section XI – TOXICOLOGICAL INFORMATION

※ This is a product that fulfills a certain function in solid state with specific shape without discharging any chemical substance in its use and has no obligation to write (M)SDS. Since this document contains the precautions for safe handling related to its materials or chemical substances consisting of this product, please note that these overall information is irrelevant to this product.

11.1 Information on toxicological effects

Acute toxicity

Oral : Category 3 (ATEmix = 95 ~ 568 mg/kg bw)

- Graphite : Rat LD_{50} > 2,000 mg/kg (female)(OECD Guideline 401)
- Copper : Rat LD_{50} > 2,500 mg/kg (Cupric oxide; read across)(OECD TG 423, GLP)
- Aluminum : Rat LD_{50} > 15,900 mg/kg (OECD TG 401)(Fumed alumina; read across)
- Propyl propionate : Rat LD_{50} = 11.7 mg/kg (OECD Guideline 401)
- Polyethylene : Rat LD_{50} > 2,000 mg/kg
- Ethyl propionate : Rat LD_{50} > 5,000 mg/kg (OECD Guideline 423, GLP)
- EC (Ethylene Carbonate) : Rat LD_{50} = 10,400 mg/kg (male) (OECD Guideline 401)
- aluminium oxide : Rat LD_{50} > 15,900 mg/kg (OECD Guideline 401)
- Lithium hexafluorophosphate(1-) : Rat LD_{50} = 50 ~ 300 mg/kg (Female)(OECD Guideline 423, GLP)
- Propylene carbonate : Rat LD_{50} > 5,000 mg/kg (OECD TG 401, GLP)
- Carbon black : Rat LD_{50} > 8,000 mg/kg (male/female) (OECD Guideline 401)
- SN (Succinonitrile) : Rat LD_{50} = 300 ~ 2,000 mg/kg (female) (OECD Guideline 423, GLP)
- 1,3-propanesultone : Rat LD_{50} > 2000 mg/kg (OECD Guideline 401, GLP)

Dermal : Category 4 (ATEmix = 654 ~ 1596 mg/kg bw)
- Copper : Rat LD_{50} > 2,000 mg/kg (OECD TG 402, GLP)
- Propyl propionate : LD_{50} = 16 mg/kg (OECD Guideline 402)
- Ethyl propionate : Rat LD_{50} > 2,000 mg/kg (OECD Guideline 402, GLP)
- EC (Ethylene Carbonate) : Rat LD_{50} > 2,000 mg/kg (male/female) (OECD Guideline 402)
- Propylene carbonate : Rabbit LD_{50} > 20,000 mg/kg
- Carbon black : Rabbit LD_{50} > 3,000 mg/kg
- SN (Succinonitrile) : Rat LD_{50} > 2,000 mg/kg (male/female) (OECD Guideline 402, GLP)
- 1,3-propanesultone : Guinea pig LD_{50} = 700~1400 mg/kg

Inhalation : Not classified (ATEmix = 138 ~ 459 mg/L)
- Graphite : Rat LD_{50} > 2 mg/L/4hr (male/female) (OECD Guideline 403)
- Aluminum : Rat LC_{50} > 0.888 mg/L/4hr (analytical) (OECD TG 403)
- Propyl propionate : Rat LT_{50} = 14031.58 ppm/6hr(OECD Guideline 403)
- EC (Ethylene Carbonate) : Rat LC_0 = 730 mg/m³ /8hr
- aluminium oxide : Rat LD_{50} > 0.888 mg/L/4hr (OECD Guideline 403)
- Carbon black : Rat LD_{50} > 4.6 mg/m³/4hr
- SN (Succinonitrile) : Rat LC_{50} ≥ 2.67 mg/L/4hr (male/female) (OECD Guideline 403)
- 1,3-propanesultone : Rat LC_0 > 1.3 mg/L/6hr (OECD Guideline 403)

Skin corrosion/ irritation : Not classified
- Graphite : In the skin irritation test using rabbits, the test material was not irritating. (OECD Guideline 404, GLP)
- Copper : In test on skin irritation with rabbits, skin irritations were not observed. (OECD TG 404, GLP)
- Aluminum : Aluminium oxide caused slight erythema in 2/12 rabbits. The observed effects do not lead to a classification. Aluminium oxide is, therefore, not considered to be a primary skin irritant.(OECD TG 404)(Read across; aluminium oxide)
- Propyl propionate : In the skin irritation test using rabbits, the test material was not irritating.(OECD Guideline 404)
- Polyethylene : No irritation was observed at the other two treated sites and no corrosive effects were noted during the study using rabbits. The primary irritation index was calculated as 0.2 and polyethylene was classified as a mild irritant.
- Ethyl propionate : In the skin irritation test using rabbits, the test material was irritating.(OECD Guideline 439, GLP)
- EC (Ethylene Carbonate) : In the skin irritation test using rabbits, the test material was not classified. (OECD Guideline 404, GLP)
- aluminium oxide : In the skin irritation test using rabbit, skin irritation was not observed.(OECD Guideline 404)
- Lithium hexafluorophosphate(1-) : In the skin irritation test using human, the test material was corrosive. (EU Method B.40, GLP)
- Propylene carbonate : In skin irritation test with rabbits, skin irritations were not observed. (OECD TG 404, GLP)
- Carbon black : In test on skin irritation with rabbits, skin irritations were not observed. (OECD Guideline 404)
- SN (Succinonitrile) : In the skin irritation test using rabbits, the test material was not irritating. (OECD Guideline 404)
- 1,3-propanesultone : In the skin irritation test using guinea pigs, the test material was corrosive. (TOXICITY STUDIES OF 1,2-OXATHIOLANE,2,2-DIOXIDE WITH COVER LETTER DATED 09/01/92)

Serious eye damage/ irritation : Not classified
- Graphite : In the eye irritation test using rabbit, the test material was not irritating. (OECD Guideline 405, GLP)

- Copper : In test on skin irritation with rabbits, skin irritations were not observed. (OECD TG 405, GLP)
- Aluminum : An eye irritation study of the aluminium oxide was performed in rabbits. No eye irritation/ corrosion effects were observed. (Read across; aluminium oxide)
- Propyl propionate : In the eyes irritation test using rabbits, the test material was not irritating.(OECD Guideline 405)
- Polyethylene : Mild irritants were observed in eye irritation test with rabbits. (Score 11.7/110)
- Ethyl propionate : In the eyes irritation test using cattle, the test material was not irritating.(OECD Guideline 437, GLP)
- EC (Ethylene Carbonate) : In the eye irritation test using rabbit, the test material was moderately irritating. (OECD Guideline 405, GLP)
- aluminium oxide : The slight erythema was reversible, resolving by 48 hours post administration of the test substance. The scores observed for cunjunctival erythema would not lead to a classification under EU-CLP (Regulation (EC) 1272/2008)(OECD Guideline 405).
- Lithium hexafluorophosphate(1-) : In the eye irritation test using fertilised brown leghorn chicken eggs, the test material was severely irritating. (GLP)
- Propylene carbonate : In eye irritation test with rabbits, eye irritations were observed. (OECD TG 405, GLP)
- Carbon black : In test on eyes irritation with rabbits, eyes irritations were snot observed. (OECD Guideline 405)
- SN (Succinonitrile) : In the eye irritation test using rabbit, the test material was not irritating. (OECD Guideline 405)
- 1,3-propanesultone : In the eye irritation test using rabbits, the test material was corrosive. (TOXICITY STUDIES OF 1,2-OXATHIOLANE,2,2-DIOXIDE WITH COVER LETTER DATED 09/01/92)

Respiratory sensitization : Not classified
- Aluminum : Al2O3 was the least inflammatory material tested and led to only weak effects on the mouse lung. (Read across; Aluminium oxide)
- aluminium oxide : In the respiratory sensitisation test using mouse, this material was not respiratory sensitising.
- Carbon black : In respiratory sensitization test with mice(female), it did not induce respiratory sensitization.

Skin sensitization : Not classified
- Graphite : In the skin sensitization test using mice, the test material was not skin sensitization. (OECD Guideline 429, GLP)
- Copper : In maximization test on skin sensitization with guinea pig, skin sensitization was not observed. (OECD TG 406, GLP)
- Aluminum : In test with guinea pigs, it can be concluded that aluminium oxide has no sensitisation potential under the experimental conditions. (Read across; Aluminium oxide)
- Propyl propionate : In the skin sensitization test using mouse, this material was not skin sensitizing.(OECD Guideline 429, GLP)
- Polyethylene : No reactions were observed in skin sensitization test with guinea pigs.
- Ethyl propionate : In the skin sensitization test, this material was not skin sensitizing.(OECD Guideline 442D, GLP)
- EC (Ethylene Carbonate) : In the skin sensitization test using guinea pig, this material was not classified. (OECD Guideline 406, GLP)
- aluminium oxide : In the skin sensitisation test using guinea pig, skin sensitisation was not observed.
- Lithium hexafluorophosphate(1-) : In the skin sensitization test using mice, the test material was not skin sensitization. (OECD Guideline 429, GLP)
- Propylene carbonate : In patch-test with human, skin sensitizations were not observed.
- Carbon black : In skin sensitization test with guinea pig(female), it did not induce skin sensitization. (OECD Guideline 406, GLP)

- SN (Succinonitrile) : In the skin sensitization test using mice, the test material was not classified. (OECD Guideline 429, GLP)
- 1,3-propanesultone : In the skin sensitization test using guinea pigs, the test material was not skin sensitizing. (OECD Guideline 406)

Carcinogenicity : Category 1B

IARC
- Cobalt and inorganic compounds : Group 2B
- Polyethylene : Group 3
- Carbon black : Group 2B
- 1,3-propanesultone : Group 2A

OSHA
- Carbon black : Present
- 1,3-propanesultone : Present

NTP
- 1,3-propanesultone : Present

ACGIH
- Cobalt and inorganic compounds : A3
- Aluminum : A4
- Carbon black : A3
- 1,3-propanesultone : A3

KOREA-ISHL
- Cobalt and inorganic compounds : 2
- Carbon black : 2
- 1,3-propanesultone : 1B

EU
- 1,3-propanesultone : Carc. 1B

Mutagenicity : Not classified

- Graphite : Negative reactions were observed in vitro (Bacterial Reverse Mutation Assay(OECD Guideline 471, GLP)).
- Copper : Negative reactions were observed in both in vitro(Ames test) and in vivo(DNA damage and/or repair; unscheduled DNA synthesis, micronucleus assay). (GLP)
- Aluminum : Negative reactions were observed in vitro (mammalian cell gene mutation assay with mouse lymphoma L5178Y cells(OECD TG 476, GLP)) and in vivo (micronucleus assay with rats (OECD TG 474, GLP)). (Aluminium hydroxide, aluminium chloride, aluminum oxide; read across)
- Propyl propionate : Negative reactions were observed in vitro Bacterial Reverse Mutation Assay(OECD Guideline 471, GLP).
- Polyethylene : Negative reactions were observed in Ames test using Salmonella typhimurium and Escherichia coli.
- Ethyl propionate : Negative reactions were observed in vitro Bacterial Reverse Mutation Assay(OECD Guideline 471, GLP).
- EC (Ethylene Carbonate) : Negative reactions were observed in vitro (mammalian cell gene mutation assay (OECD Guideline 476, GLP)).
- aluminium oxide : In the mammalian erythrocyte micronucleus test, the results were positive for the nano-sized materials(below 40nm) with evidence of a positive dose-response relationship for MN(OECD Guideline 75). Positive reactions were observed in Mammalian Erythrocyte Micronucleus Test(OECD Guideline 474, GLP).
- Lithium hexafluorophosphate(1-) : Negative reactions were observed in both in vivo (Mammalian Erythrocyte Micronucleus test(OECD Guideline 474)) and in vitro (Bacterial Reverse Mutation Assay(OECD Guideline 471, GLP)).
- Propylene carbonate : Negative reactions were observed both in vitro(DNA damage and repair assay(OECD TG 482, GLP), bacterial reverse mutation assay(OECD TG 471, GLP)) and in vivo(micronucleus assay(OECD TG 474, GLP)) .

- Carbon black : Negative reactions were observed in both in vitro(Bacterial Reverse Mutation Assay test(OECD Guideline 471, GLP)and in vivo(DNA damage and/or repair test).
- SN (Succinonitrile) : Negative reactions were observed in both in vivo (Mammalian Erythrocyte Micronucleus test(OECD Guideline 474, GLP)) and in vitro (Bacterial Reverse Mutation Assay(OECD Guideline 471, GLP)).
- 1,3-propanesultone : Positive reactions were observed in in vivo test (Mammalian Erythrocyte Micronucleus Test(OECD Guideline 474, GLP)

Reproductive toxicity : Not classified

- Copper : In reproductive toxicity with rats, there were no effects considered (up to 1500 ppm). (OECD TG 416, GLP)
- Aluminum : No reproduction, breeding and early post-natal developmental toxicity was observed in rats at 1000 mg/kg bw for males and females. (OECD TG 422, GLP)(Aluminium chloride; read across)
- Propyl propionate : In the reproduction toxicity test using rat, no effects were observed.(OECD Guideline 422)
- Ethyl propionate : No test item-related adverse effects for general toxicity effects and reproductive/developmental effects were observed up to 1000 mg/kg.(OECD Guideline 422, GLP)
- aluminium oxide : In summary, clinical observations that were found associated with treatment, either directly or secondary to renal failure, were poor coat, weight loss, diarrhea, and haematuria. However, reproductive effects observed were not specified.(OECD Guideline 426 and OECD Guideline 452, GLP)
- Lithium hexafluorophosphate(1-) : In the two-generation reproductive toxicity with rats, no effects observed on reproductive toxicity. (male/female)(OECD Guideline 416, GLP)(OECD Guideline 414)(Information on major hydrolysis product of the registered substance (released rapidly on contact with water/moisture))
- Propylene carbonate : In reproduction/developmental toxicity test with rats, no treatment-related effects on reproduction were observed. (OECD TG 414, GLP)
- Carbon black : No adverse effects on the reproductive function are expected.(OECD Guideline 414)

Specific target organ toxicity (single exposure) : Not classified

- Copper : All animals showed expected gains in bodyweight over the study period and there were no abnormalities noted at necropsy. (OECD TG 423, GLP)
- Aluminum : In test using rats, Clinical signs of depression, laboured respiration, piloerection and hunched appearance was noted at the highest dose 15900 mg/kg. Macroscopic examination at the end of the observation period did not reveal any aluminium-related changes of the internal organs of the aluminium treated animals compared to the control group. (OECD TG 401)(Fumed alumina; read across)
- Polyethylene : No test substance-related toxic effects were observed in an acute oral toxicity study with rats.
- aluminium oxide : Inhalation of aluminium oxide at a concentration of 0.38 mg/L (380 mg/cu m) for 3, 7 or 15 minutes produced a time-dependent lung dilatory effect.
- Lithium hexafluorophosphate(1-) : Clinical signs observed during the study period were lethargy, hunched posture, uncoordinated movements, piloerection at 300 mg/kg, hunched posture, piloerection at 50 mg/kg. The surviving animals had recovered from the symptoms by Day 3.(OECD Guideline 423, GLP)
- Propylene carbonate : In acute oral toxicity with rats, acute toxicity were not observed. (OECD TG 401, GLP)
- Carbon black : No effect on endothelins or blood pressure was observed after exposure to carbon black. There were also no effects on body temperature and activity of the animals.
- 1,3-propanesultone : In the acute oral toxicity test with rats, during days 4 and 13, dehydration, decreased respiratory rate, gasping, laboured and noisy respiration were observed. (OECD Guideline 401, GLP)

Specific target organ toxicity (repeat exposure) : Not classified

- Copper : In test with rats for 92 days, there were no mortalities or signs of clinical toxicity observed in any of the test species during the duration of the study. Opthalmoscopic examinations revealed no abnormalities at any dose level tested. At gross pathology, significant decreases in heart and kidney weight were noted in the high dose males in the thymus and kidneys of high dose females. (GLP)
- Aluminum : On occasion workers chronically exposed to aluminum-containing dusts or fumes have developed severe pulmonary reactions including fibrosis, emphysema and pneumothorax.
- Polyethylene : No significant adverse effects were observed in subchronic (90-day) oral toxicity study with rats and dogs.
- Ethyl propionate : no test item-related adverse effects for general toxicity effects and reproductive/developmental effects were observed.(OECD Guideline 422, GLP)
- aluminium oxide : In the repeated exposure of aluminium oxide, it is occurred to asbestosis to human lung.
- Lithium hexafluorophosphate(1-) : According to expert review of fluoride intake and effects on human health, fluoride intake in drinking water at levels close to or above 4 mg/l is associated with dental fluorosis and perhaps also bone fluorosis and/or weakening.; Damage to dental enamel recorded: especially notable in young animals, which also showed atrophy of respiratory organs/tissues with local oedema of bronchial mucosa. Older animals showed peribronchial hyperplasia. Animals around 1 year in age showed cavity formation in their bones.(Information on major hydrolysis product of the registered substance (released rapidly on contact with water/moisture))(OECD Guideline 412)
- Propylene carbonate : In oral repeated-dose toxicity study with rats for 90 days, no treatment related adverse effects were observed. (OECD TG 408, GLP)
- Carbon black : Mice were continuously fed various types of carbon black in massive quantities (10% in diet) for 12 to 18 months. This led to no detectable changes from the normal in the organs and tissues of the mice fed.

Aspiration Hazard : Not available

11.2 Other Information

Endocrine disruptors property : The components of the product are not included in the list of substances identified as having endocrine disruptors properties.

Section XII – ECOLOGICAL INFORMATION

※ This is a product that fulfills a certain function in solid state with specific shape without discharging any chemical substance in its use and has no obligation to write (M)SDS. Since this document contains the precautions for safe handling related to its materials or chemical substances consisting of this product, please note that these overall information is irrelevant to this product.

12.1 Ecological toxicity

- Acute toxicity : Category 1 (ATEmix = 0.2 ~ 1.01 mg/L)
- Chronic toxicity : Category 3

Acute toxicity

Fish (ATEmix = 19.27 ~ 33.35 mg/L)

- Cobalt lithium dioxide : 96hr-LC_{50} (other) = 54.1 mg/L (Read across; cobalt (II) chloride hexahydrate)
- Graphite : 96hr-LC_{50} > 100 mg/L
- Aluminum : 96hr-LC_{50} > 218.64 mg/L (GLP)(Read across; aluminium chloride hexahydrate)
- Propyl propionate : 96hr-LC_{50} = 10.8 mg/L (OECD Guideline 203, GLP)
- Ethyl propionate : 96hr-LC_{50} = 6.74 mg/L (OECD Guideline 203, GLP)

- EC (Ethylene Carbonate) : 96hr-LC_{50} > 100 mg/L (OECD Guideline 203, GLP)
- Aluminium oxide : 96hr-LC_{50} = 1.16 mg/L (WoE, USEPA 1985)
- Lithium hexafluorophosphate(1-) : 96hr-LC_{50} = 51 ~ 193 mg/L Information on major hydrolysis product of the registered substance (released rapidly on contact with water/moisture)
- Propylene carbonate : 96hr-LC_{50} > 1000 mg/L (GLP)
- Carbon black : 96hr-LC_0 = 1000 mg/L (OECD Guideline 203, GLP)
- 1,3-propanesultone : 96hr-LC_{50}(*Leuciscus idus*) = 420 mg/L (OECD Guideline 203, GLP)

Crustacean (ATEmix = 0.44 ~ 0.71 mg/L)

- Cobalt lithium dioxide : 48hr-EC_{50} (other) = 2.618 mg/L (GLP)(Read across; cobalt (II) chloride hexahydrate)
- Graphite : 48hr-EC_{50} > 100 mg/L
- Aluminum : 48hr-LC_{50} = 0.071 mg/L (Read across; CAS 13473-90-0)
- Propyl propionate : 24hr-EC_{50} = 59.6 mg/L (OECD Guideline 202, GLP)
- Ethyl propionate : 48hr-EC_{50} = 25.5 mg/L (OECD Guideline 202, GLP)
- EC (Ethylene Carbonate) : 48hr-EC_{50} > 100 mg/L (OECD Guideline 202, GLP)
- Aluminium oxide : 48hr-EC_{50} = 1.9 mg/L
- Lithium hexafluorophosphate(1-) : 48hr-LC_{50} > 100 mg/L (OECD Guideline 202, GLP)
- Propylene carbonate : 48hr-EC_{50} > 1000 mg/L (OECD TG 202, GLP)
- Carbon black : 24hr-EC_{50} > 5600 mg/L (OECD Guideline 202, GLP)
- 1,3-propanesultone : 48hr-EC_{50}(*Daphnia magna*) = 16 mg/L (OECD Guideline 202, GLP)

Algae (ATEmix = 0.2 ~ 1.01 mg/L)

- Cobalt lithium dioxide : 96hr-EC_{50} (other) = 71.314 mg/L (Read across; cobalt (II) chloride hexahydrate)
- Graphite : 72hr-EC_{50} > 100 mg/L
- Aluminum : 72hr-EC_{50} = 0.0169 mg/L (OECD TG 201), (Read across; CAS 13473-90-0)
- Propyl propionate : 96hr-EC_{50} > 1004 mg/L
- Ethyl propionate : 72hr-EC_{50} = 130 mg/L (*Pseudokirchneriella subcapitata*) (OECD Guideline 201, GLP)
- EC (Ethylene Carbonate) : 72hr-EC_{50} > 100 mg/L (OECD Guideline 201, GLP)
- Lithium hexafluorophosphate(1-) : 96hr-EC_{50} > 100 mg/L (OECD Guideline 201, GLP)
- Propylene carbonate : 72hr-EC_{50} > 900 mg/L (OECD TG 201, GLP)
- Carbon black : 72hr-EC_{50} > 10000 mg/L (OECD Guideline 201, GLP)
- 1,3-propanesultone : 72hr-EC_{50}(*Desmodesmus subspicatus*) > 320 mg/L (OECD Guideline 201, GLP)

Chronic toxicity

Fish

- Cobalt lithium dioxide : 34d-NOEC (*Pimephales promelas*) = 0.21 mg/L
- Aluminum : 28d-NOEC (*Pimephales promelas*) = 4.7 mg/L (Read across; aluminium sulphate)
- Aluminium oxide : 7d-NOEC(*Pimephales promelas*) = 0.16 mg/L
- Lithium hexafluorophosphate(1-) : 21d-NOEC = 4 mg F-/L

Crustacean

- Cobalt lithium dioxide : 42d-NOEC (*Neanthes arenaceodentata*) = 0.713 mg/L (ASTM Method E1562, GLP)
- Aluminum : 8d-NOEC (*Ceriodaphnia dubia*) = 4.9 mg/L (Read across; CAS 7784-13-6)
- Ethyl propionate : 21d-NOEC=1.3mg/L(OECD Guideline 211)
- Aluminium oxide : 21d-NOEC(*Daphnia magna*)= 0.076 mg/L(OECD Guideline 211, GLP)
- Lithium hexafluorophosphate(1-) : 21d-NOEC(*Daphnia magna*) = 10 mg/L (Information on major hydrolysis product of the registered substance (released rapidly on contact with water/moisture)) (OECD guideline 202, GLP)

Algae

- Cobalt lithium dioxide : 96hr-NOEC (*Dunaliella tertiolecta*) = 4.672 mg/L
- Propyl propionate : 96h-NOEC=245mg/l(OECD Guideline 201, GLP)
- EC (Ethylene Carbonate) : 72hr-NOEC(*Selenastrum capricornutum*) = 100mg/L (OECD Guideline 201, GLP)
- Lithium hexafluorophosphate(1-) : 96h-NOEC = 22 mg/L (OECD Guideline 201, GLP)
- Aluminium oxide : 72h-NOEC(*Pseudokirchneriella subcapitata*) >= 0.044 mg/L (OECD Guideline 201, GLP)
- Carbon black : 72hr-NOEC > 10,000mg/L (OECD Guideline 201, GLP)

B. Persistence and degradability

Persistence

- Graphite : Low persistency (log Kow is less than 4 estimated.) (Log Kow = 0.78)
- Aluminum : Low persistency (log Kow is less than 4 estimated.) (Log Kow = 0.33) (estimated)
- EC (Ethylene Carbonate) : Low persistency (log Kow is less than 4 estimated.) (Log Kow = 0.11) (20 °C, pH> 5.33 - < 5.79)(EU Method A.8, GLP)
- aluminium oxide : Low persistency (log Kow is less than 4 estimated.) (Log Kow = -0.83) (estimated)
- Lithium hexafluorophosphate(1-) : Low persistency (log Kow is less than 4 estimated.) (Log Kow = 0.354) (20 °C, pH > 6.5 - < 7.5)(OECD Guideline 107, GLP)
- Propylene carbonate : Low persistency (log Kow is less than 4 estimated.) (Log Kow = 0.0788)
- SN (Succinonitrile) : Low persistency (log Kow is less than 4 estimated.) (Log Kow = -0.99)
- 1,3-propanesultone : Low persistency (log Kow is less than 4 estimated.) (log Kow = -2.86) (QSAR)

Degradability : Not available

C. Bioaccumulative potential

Bioaccumulation

- cobalt lithium dioxide : Bioaccumulation is expected to be low according to the BCF < 500 (BCF = 23) (Read across; 57CoCl)
- Graphite : Bioaccumulation is expected to be low according to the BCF < 500 (BCF = 2.433)
- Copper : Bioaccumulation is expected to be low according to the BCF < 500 (BCF = 0.02 ~ 20)
- Aluminum : Bioaccumulation is expected to be low according to the BCF < 500 (BCF = 3.162) (estimated)
- EC (Ethylene Carbonate) : Bioaccumulation is expected to be low according to the BCF < 500 (BCF = 3.162) (estimated)
- aluminium oxide : Bioaccumulation is expected to be low according to the BCF < 500 (BCF = 3.162) (estimated)
- Lithium hexafluorophosphate(1-) : Bioaccumulation is expected to be low according to the BCF < 500 (BCF < 31)
- Propylene carbonate : Bioaccumulation is expected to be low according to the BCF < 500 (BCF = 3) (Estimated)
- SN (Succinonitrile) : Bioaccumulation is expected to be low according to the BCF < 500 (BCF = 3) (estimated)
- 1,3-propanesultone : Bioaccumulation is expected to be low according to the BCF < 500 (BCF = 3.162) (estimated)

Biodegradation

- Propyl propionate : The test material is readily biodegradable.
- Polyethylene : As not well-biodegraded, it is expected to have high accumulation potential in living organisms (= 0% biodegradation was observed after 28 days)
- Ethyl propionate : As well-biodegraded, it is expected to have low accumulation potential in living organisms (66% ~ 68% biodegradation was observed after 28 days) Readily biodegradable: 66 - 68% within 28 days (OECD 301 D, GLP)
- EC (Ethylene Carbonate) : As well-biodegraded, it is expected to have low accumulation potential in living organisms (70% ~ 80% biodegradation was observed after 10 days) (OECD Guideline 301 A, GLP)
- aluminium oxide : Not readily biodegradable(estimated)

- Lithium hexafluorophosphate(1-) : As well-biodegraded, it is expected to have low accumulation potential in living organisms (= 86% biodegradation was observed after 28 days) (OECD Guideline 301 C, GLP)
- Propylene carbonate : As well-biodegraded, it is expected to have low accumulation potential in living organisms (= 87.7% biodegradation was observed after 29 days) (OECD TG 301B, GLP)
- Carbon black : carbon black is an inorganic substance and will not biodegraded by microorganisms.
- SN (Succinonitrile) : As not well-biodegraded, it is expected to have high accumulation potential in living organisms (= 45.1% biodegradation was observed after 4 days)
- 1,3-propanesultone : As well-biodegraded, it is expected to have low accumulation potential in living organisms (89% biodegradation was observed after 28 days) (OECD Guideline 301E, GLP)

12.4 Mobility in soil

- EC (Ethylene Carbonate) : Low potency of mobility to soil. (Koc = 3.219) (estimated)
- aluminium oxide : Low potency of mobility to soil. (Koc = 0.1902) (estimated)
- Propylene carbonate : Low potency of mobility to soil. (Koc = 14) (estimated)
- SN (Succinonitrile) : Low potency of mobility to soil. (Koc = 28) (estimated)
- 1,3-propanesultone : No potency of mobility to soil. (Koc = 16.8) (estimated)

12.5 Results of PBT and vPvB assessment : Most of the components of the product are metals, and PBT asessments are not relevant to metals

12.6 Other adverse effects : Not available

Section XIII – DISPOSAL CONSIDERATION

13.1 Waste treatment methods

Product/Packaging disposal

- Consider the required attentions in accordance with waste treatment management regulation.

Waste codes / Waste designation according to LoW(2015) : 16-06-05

Waste treatment-relevant information

- Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Sewage disposal-relevant information: Not available

Other disposal recommendations: Not available

Section XIV – TRANSPORTATION INFORMATION

※ If those lithium-ion batteries are packed with or contained in an equipment, then it is the responsibility of the shipper to ensure that the consignment are packed in compliance to the latest edition of the IATA Dangerous Goods Regulations section Ⅱ of either Packing Instruction 966 or 967 in order for that consignment to be declared as NOT RESTRICTED (non-hazardous/non-Dangerous). If those lithium-ion batteries are packed with or contained in an equipment, UN No. is UN3481.

14.1 UN Number : 3480

14.2 UN Proper shipping name : LITHIUM ION BATTERIES

14.3 Transport Hazard class : 9 (applicable for air transport)

14.4 Packing group : -

14.5 Special provisions : 188, 230, 384

14.6 Packing instructions : P903

14.7 Environmental hazards : No

14.8 Special precautions for user

in case of fire : F-A

in case of leakage : S-I

14.9 Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code : Not Available

14.10 IATA Transport : PI 965-Section IB

14.11 Package labels

IMDG

IATA

- The International Civil Aviation Organization (ICAO) Technical Instructions (2021-2022Edition),

- The International Air Transport Association (IATA) Dangerous Goods Regulations (63rd Edition, 2022)

- The International Maritime Dangerous Goods (IMDG) Code (2020 Edition),

- The UN Manual of Tests and Criteria 38.3 Lithium batteries, Revision 3, Amendment 1 or subsequent revision and amendment applicable at the date of the type (latest version is Revision 7 amd 1)

Section XV – REGULATORY INFORMATION

15.1 Safety, health and environmental regulation/legislation specific for the substance or mixture

EU regulations

Authorisations and/or restrictions on use: Not regulated

Authorisations: Not regulated

Restrictions on use: Not regulated

Other EU regulations:

Candidate List of substances of very high concern for Authorisation

- 1,3-propanesultone : Regulated

Foreign Regulatory Information

External information :

U.S.A management information (OSHA Regulation) : Not regulated

U.S.A management information (CERCLA Regulation) :

- Copper : 5,000 lb
- 1,3-propanesultone : 10 lb

U.S.A management information (EPCRA 302 Regulation) : Not regulated

U.S.A management information (EPCRA 304 Regulation) : Not regulated

U.S.A management information (EPCRA 313 Regulation) :

- Cobalt, Co : Regulated
- Aluminium (metal) : Regulated
- Copper : Regulated
- Aluminium Oxide : Regulated
- 1,3-propanesultone : Regulated

Substance of Roterdame Protocol : Not regulated

Substance of Stockholme Protocol : Not regulated

Substance of Montreal Protocol : Not regulated

15.2 Chemical safety assessment :

- No chemical safety assessment has been carried out for this product by the supplier.

Section XVI – OTHER INFORMATION EU

Product safety data sheet for PA0001N0006A/PA0001N0007A/PA001N0008A prepared in accordance with Regulation (EU) 2020/878 (REACH), Annex II, and OSHA 29 CFR 1910.1200

16.1 Indication of changes

Date Updated : 27 May 2022

Version : Rev. 01

16.2 Abbreviations and acronyms

ACGIH = American Conference of Government Industrial Hygienists

CLP = Classification Labelling Packaging Regulation ; Regulation (EC) No 1272/2008

CAS No. = Chemical Abstracts Service number

DMEL = Derived Minimal Effect Levels

DNEL = Derived No Effect Level

EC Number = EINECS and ELINCS Number (see also EINECS and ELINCS)

EU = European Union

IARC = International Agency for Research on Cancer

ISHL = Industrial Safety & Health Law
NIOSH = National Institute for Occupational Safety & Health
NTP = National Toxicology Program
OSHA = European Agency for Safety and Health at work
PBT = Persistent, Bioaccumulative and Toxic substance
PNEC(s) = Predicted No Effect Concentration(s)
REACH = Registration, Evaluation, Authorisation and Restriction of Chemicals Regulation (EC) No 453/2010
STP = Sewage Treatment Plant
SVHC = Substances of Very High Concern
vPvB = Very Persistent and Very Bioaccumulative
UN = United Nations
MARPOL = International Convention for the Prevention of Pollution from Ships (IMO)
IBC = Intermediate Bulk Container
CERCLA = Comprehensive Environmental Response, Compensation & Liability Act (US)
EPCRA = Emergency Planning and Community Right-to-Know Act (US)
EINECS = European Inventory of Existing Commercial chemical Substances
ELINCS = European List of Notified Chemical Substances

16.3 Key literature reference and sources for data :

U.S. National library of Medicine (NLM) Hazardous Substances Data Bank (HSDB)
LookChem; http://www.lookchem.com/
IUCLID: http://ecb.jrc.ec.europa.eu/IUCLID-DataSheets/7631905.pdf
CHRIP(Chemical Risk Information Platform)
EPISUITE v4.11; http://www.epa.gov/opt/exposure/pubs/episuitedl.html
The Chemical Database -The Department of Chemistry at the University of Akron; http://ull.chemistry.uakron.edu/erd/
ECOTOX: http://cfpub.epa.gov/ecotox/
International Chemical Safety Cards (ICSC): http://www.nihs.go.jp/ICSC/
National Chemical Information System (http://ncis.nier.go.kr)
Korea Dangerous Material Inventory Management System (http://hazmat.nema.go.kr)
REACH information on registered substances; https://echa.europa.eu/information-on-chemicals/registered-substances
EU CLP; https://echa.europa.eu/information-on-chemicals/cl-inventory-database
NIOSH Pocket Guide; http://www.cdc.gov/niosh/npg/npgdcas.html
IARC Monographs on the Evaluation of Carcinogenic Risks to Humans; http://monographs.iarc.fr
National Toxicology Program; http://ntp.niehs.nih.gov/results/dbsearch/
TOMES-LOLI®; http://www.rightanswerknowledge.com/loginRA.asp
UN Recommendations on the transport of dangerous goods
American Conference of Governmental Industrial Hygienists TLVs and BEIs.
Endocrine disruptor lists; https://edlists.org/the-ed-lists

16.4 Classification and procedure used to derive the classification for mixtures according to Regulation(EC) 1272/2008(CLP) :

Classification according to Regulation (EC) 1272/2008	Classification procedure
Not classified	Not applicable

16.5 Relevant H-statements : Not applicable

16.6 Training advice :

- Do not handle until all safety precautions have been read and understood.

16.7 Further information :

Data of sections 4 to 8, as well as 10 to 12, do not necessarily refer to the use and the regular handling of the product (in this sense consult package leaflet and expert information), but to release of major amounts in case of accidents and irregularities. The information describes exclusively the safety requirements for the product (s) and is based on the present level of our knowledge. This data does not constitute a uarantee for the characteristics of the product(s) as defined by the legal warranty regulations. "(n.a. = not applicable; n.d. = not determined)"
The data for the hazardous ingredients were taken respectively from the last version of the sub-contractor's safety data sheet.

Amperex Technology Limited
新能源科技有限公司
3503,Wharf Cable TV Tower, 9 Hoi Shing Road,Tsuen Wan,N.T, HongKong China
香港新界荃湾海盛路 9 号有线电视大楼 35 楼 3 号单元
Tel：852-2498-0908 Fax：852-2498-1101 http://www.ATLbattery.com

SAFETY DATA SHEET

1 Product & Company Identification

Product Identification

Chinese Name	锂离子电池
English Name	Lithium Ion Battery
Proper Shipping Name	Lithium Ion Battery
Product Description	Rechargeable lithium ion battery(1 Cell)
ATL Model Name	556276
Customer Model Name	EB-BS938ABY/EB-BS938ABE
ATL PN	GB-S10-556276-010H/310H
UN No.	UN3480
Capacity	4.855Ah
Nominal voltage	3.88V
Watt-hour	18.84Wh
Equivalent lithium content	1.46g
Approximate Weight	65.00g

Safety Data Sheet Provider Information

Manufacturer	Amperex Technology Limited
Address	3503,Wharf Cable TV Tower, 9 Hoi Shing Road,Tsuen Wan,N.T, HongKong China
Postcodes	999077
Telephone	852-2498-0908
Fax	852-2498-1101
E-mail Address	ND-EHS-M@ATLBattery.com

Emergency call

Emergency call	+86 5932582999

2 Hazardous Identification

As a whole, the battery is not dangerous in the correct use.	
Explosive risk	This article does not belong to the explosion dangerous goods
Flammable risk	This article does not belong to the flammable material
Oxidation risk	This article does not belong to the oxidation of dangerous goods

Toxic risk	This article does not belong to the toxic dangerous goods
Radioactive risk	This article does not belong to the radiation of dangerous goods
Mordant risk	This article does not belong to the corrosion of dangerous goods

3 Composition /Information on Ingredients

Important note: The battery should not be opened or burned. Exposure to the ingredients contained within or their combustion products could be harmful.

Component	CAS No.	EC No.	%/wt.
Cobalt lithium dioxide	12190-79-3	235-362-0	15-40
Ethyl propionate	105-37-3	203-291-4	15-40
Copper foil	7440-50-8	231-159-6	10-30
Aluminum foil	7429-90-5	231-072-3	10-30
Graphite	7782-42-5	231-955-3	7-25
Ethylene Carbonate	96-49-1	202-510-0	0-15
Propylene Carbonate	108-32-7	203-572-1	0-15
Lithium Hexafluorophosphate(1-)	21324-40-3	244-334-7	0-15
1,3-propanesultone	1120-71-4	214-317-9	0-1
Separator	9002-88-4	618-339-3	0-5

4 First Aid Measures

First Aid Measures

Under normal conditions of use, the battery is hermetically sealed.

Eye Contact	The ingredients in the battery can cause severe allergies and chemical burns. Open the upper and lower eyelids immediately and rinse the eyes with water for more than 15 minutes until no chemical remains. Then seek medical attention immediately.
Skin Contact	The ingredients in the battery may cause skin irritation or chemical burns. Remove contaminated clothing and wash skin with soap and water. Seek medical attention if chemical burns or irritation persists.
Ingestion	Ingesting the battery is harmful. The composition of the battery can cause severe chemical burns in the mouth, esophagus, and gastrointestinal tract. Do not induce vomiting or food or drink if you ingest the battery or disassemble the battery. Seek medical attention immediately.

Inhalation	Ingredients in the battery may cause respiratory allergies, and inhalation of vapor may cause upper respiratory tract and lung allergies. Breathe fresh air and seek medical attention immediately.

5 Fire Fighting Measures

Extinguishing media

Suitable fire extinguishing medium	Water or water mist, sand, fire blanket, dry powder or carbon dioxide fire extinguisher
Inappropriate extinguishing medium	None

Special hazards arising from this substance or mixture

1	In transportation and test engineering, risk factors such as electric box drop, extrusion, puncture, metal short circuit, liquid immersion may occur, and electric shock and fire risk may occur;
2	If in a confined space, there may be a risk of gas explosion.
3	Liquids leaking from accidents, including improper handling of fire water, pose a risk of environmental pollution.

Material prepare & training

Material prepare	
1	Water-based fire extinguishers: use 1 9-liter water-based fire extinguishers or 2 6-liter water-based fire extinguishers per 500KWH, which can extinguish ABCE fire (solid, non-flammable liquid, gas, electrical fire under 36KV). Or carry electric sprayer and manual sprayer as water mist fire extinguisher. Suspended water-based fire extinguishers can be hung on vehicles and goods.
2	Waterproof supplies: raincoat, rain boots, rubber gloves; Plastic wrap. Rags.
3	PPE: mask, high temperature gloves, safety glasses, half mask.
4	Smoke exhaust tools: The storage place should be well ventilated. It is recommended to set up a wall smoke exhaust fan every 20 meters or move the smoke exhaust fan.
Training skills	
1	Turn on or move fan to exhaust smoke
2	After fire control disposal, the product quality department will confirm whether it is necessary to scrap.
3	Use emergency materials to dispose of leaked electrolyte

Fire extinguishing precautions and protective measures

1	Alarm immediately when battery smoke or combustion is detected

2	Wear protective equipment, including respirators and masks. If water is used, PPE should include raincoats, rain boots, insulated gloves, etc.
3	Cut off the power supply
4	Using solid fire extinguishers, it is recommended to use fire extinguishers in the following order: water or mist, sand, fire blanket, dry powder, carbon dioxide fire extinguishers;
5	Exhaust smoke through fans or air circulation.

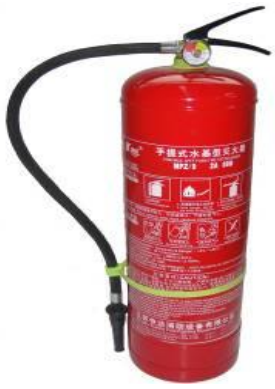


Figure1water based fire extinguisher (Could be used for 36KV electrical fire)

Figure2 waters prayers to fire extinguisher (Wear PPE to avoid electrical shock)

6 Accidental Release Measures

On-site: Place the material a suitable container and alert the local police.

In water: When the battery pack is in water, there is a risk of slight electric shock; when electrolyzing water, hydrogen will be generated. Ventilation must be maintained to prevent hydrogen accumulation and explosion in closed space. If possible, remove the batteries or modules from the water and alert the local police.

7 Handling & Storage

One of the most important risks in the transportation of batteries and battery power equipment is the short circuit of batteries caused by contact between the two poles of batteries with other batteries, metal objects or other conductors. Therefore, packaged batteries and battery cells must be separated in an appropriate way to prevent short circuit and electrode damage. In addition, batteries and battery cells must be packaged in strong external packaging or installed in equipment.

丨 Handling

1	Do not make excessive physical impact or vibration on batteries.

2	Short circuit should be avoided, although a few seconds of short circuit will not have a serious impact on the battery. A long short circuit can cause the battery to lose energy quickly and generate enough heat to burn the shell.
3	The sources of short circuit include the random placement of batteries in bulk containers or various metal objects used in battery assembly on equipment. In order to minimize the risk of short circuit of batteries, the protection measures of batteries should be provided when the batteries are transported and stored.
4	Batteries cannot be disassembled or deformed.
5	Do not expose the battery to water when it breaks. Operators need insulation protection when handling battery packs that exceed 50V.

Storage

1	When lithium-ion batteries are stored for a long time, their charging capacity should be between 25% and 75%.
2	Store in a cool, dry and well ventilated area.
3	Excessive temperature can lead to a series of battery problems, such as leakage or rust.
4	Do not put batteries in open fire.

8 Exposure Control/Personal Protection

Important note: The lithium battery is normally sealed and the powder has no fluidity and will not pose a danger to the contact person. It is strictly forbidden for non-professionals to dismantle batteries or cores without permission. Do not touch the leaked electrolyte if it is not necessary. If you need to actively contact the electrolyte, you need to wear chemical-resistant gloves and masks.

Engineering Control

Keep away from heat sources and fires and store in dry and cool areas.

9 Physical/Chemical Properties

Physical/Chemical Properties

Physical state	Solid
Color	Not Applicable
Odor	No Odor
Flash point	Not Applicable
Solubility in ethanol soluble	Not Applicable

Boiling Point	Not Applicable
Solubility in water:	Not Applicable
Vapor pressure	Not Applicable
Explosion limit	Not Applicable
Auto flammability	Not Applicable
Melting Point	Not Applicable
Freezing Point	Not Applicable

10 Stability & Reactivity

Stability & Reactivity

Stability	Good stability at standard temperature.
Reactivity	None
Notice	Do not touch water or acidic substances. Products after decomposition: If the aluminum foil packaging of the battery is damaged, then do not contact strong oxidants, acidic substances and high temperature environment, and the electrolyte may volatilize to form hydrogen fluoride.

11 Toxicological information

No toxic substances will be produced during routine operation and use.

Caution: according to the harmonized classification and labelling (CLP00) approved by the European Union, 1,3 Propanesultone may cause cancer, is harmful if swallowed and is harmful in contact with skin. This substances meeting the criteria for classification in the hazard class reproductive toxicity category 1A or 1B, adverse effects on sexual function and fertility or on development in accordance with section 3.7 of Annex I to Regulation(EC) No 1272/2008.

12 Ecological information

If batteries are to be scrapped, they should be selected and disposed of by professional companies.

13 Disposal considerations

Batteries cannot be discarded directly into sewers or directly discharged into the environment. They should be recycled and treated in accordance with local laws and regulations.

14 Transport Information

Air transportation

The lithium battery should accord with the International Air Transport Association (IATA DGR 65th Edition) requirements for transportation. The battery or cell should be packed and signed as following table.

UN NO.	Proper Shipping Name	Power	Package requirements	Label which need to paste
UN3480	lithium ion batteries	Cells＞20Wh Batteries＞100Wh	PI965 Section IA **Limit per package:** Pax A/C=Forbidden CAO ≤35 kg	Class9 lithium battery hazard label Cargo Aircraft Only label 
		Cells≤20Wh Batteries≤100Wh	PI965 Section IB **Limit per package:** Pax A/C=Forbidden CAO ≤10 kg	Class9 lithium battery hazard label, Battery sign, Cargo Aircraft Only label 
UN3481	Lithium ion batteries contained in equipment	Cells＞20Wh Batteries＞100Wh	PI967 Section I **Limit per package:** Pax A/C ≤5 kg CAO ≤35 kg	Class9 lithium battery hazard label 
		Cells≤20Wh Batteries≤100Wh	PI967 Section II **Limit per package:** ≤2 batteries or ≤4 cells，and≤2 packages per consignment Pax A/C ≤ 5 kg CAO ≤5 kg	\
			PI967 Section II **Limit per package:** ＞2 batteries or ＞4 cells，or ＞2 packages per consignment Pax A/C ≤ 5 kg CAO ≤5 kg	Battery mark 

UN3481	lithium ion batteries packed with equipment	Cells＞20Wh Batteries＞100Wh	PI966 Section I **Limit per package:** Pax A/C ≤5 kg CAO ≤35 kg	Class9 lithium battery hazard label 
		Cells≤20Wh Batteries≤100Wh	PI966 Section II **Limit per package:** Pax A/C ≤5 kg CAO ≤5 kg	Battery mark 

Notes

1	Cells and/or batteries at a SOC of greater than 30% of their rated capacity may only be shipped with the approval of the State of Origin and the State of the Operator under the written conditions established by those authorities.
2	After receiving the lithium battery, if the mark is lost, fallen off or difficult to identify, the operator must replace the label according to the information provided in the "shipper's dangerous goods declaration form".
3	The lithium core and battery goods required by the packaging specification PI965 shall not be packed in the same outer package as other dangerous goods.
4	Ban lithium ion battery (UN 3480, PI965 Section IA or IB) with category 1 explosive material (except ammunition) 1.4, 2.1 flammable gas, flammable liquid, 4.1 3 flammable solid, 5.1 class antioxidant and other dangerous goods packaging in the same package.
5	Ensure that the equipment cannot be moved in the outer packing; If there are more than one piece of equipment in the package, it must be packed tightly together to prevent damage caused by contact with other equipment in the package.
6	Do not damage or mishandle this package. If package is damaged, batteries must be quarantined, inspected, and repacked.
7	Cells and batteries identified by the manufacturer as being defective for safety reasons, or that have been damaged, that have the potential of producing a dangerous evolution of heat, fire or short circuit are forbidden for transport.
8	Waste lithium batteries and lithium batteries being shipped for recycling or disposal are prohibited from air transport unless approved by the appropriate national authority of the State of origin and the State of the operator.
9	The lithium battery should pass the UN38.3 test, if the battery cannot pass the testing, it cannot transport, should redesign.
10	The new lithium battery operating mark allows to be 100mm x 100mm square, the minimum mark size is 100mm x70mm.
11	PI 966 and PI 969—Have been revised to clarify the packing options for Section I, which are:

	● the lithium cells or batteries are packed in a UN specification packaging, then placed with the equipment in a strong rigid outer packaging; or ● the cells or batteries are packed with the equipment in a UN specification packaging. The packing options in Section II have been deleted, as there is only one option available given that there is no requirement for UN specification packaging.
12	Lithium ion battery UN3480 PI965 Section IB, each package must withstand 3m stacking test.
13	In UN3481 PI 966 Section II, 967 Section II, when the package is put into the overpack, the package must be fixed in the overpack, and the overpack shall not affect the expected function of each package.

Ocean shipping

- Transportation refers to the IMDG CODE 41-22 Edition, which are managed according to UN NO 3480/3481 and packaged in the second category. Firm installation, isolation from each other, short circuit prevention, packages with more than 24 lithium cells or 12 lithium batteries: special procedures to be followed when damaged must be marked; special procedures document to be followed when damaged is available on board.
- The clause 188 of IMDG CODE 41-22 Edition required:

(1) The watt-hour rating of lithium ion cell is less than 20 Wh and the watt-hour rating of lithium-ion battery is less than 100 Wh is not classified as dangerous cargo,but each package shall be marked with below lithium battery mark.

(2) For cells and battery or those packed with equipment (except those contained in equipment)，the cells and battery must be packed in inner packagings，which shall completely enclose the cell and battery. The cells and battery pack shall be prevented from short circuit, including short circuit caused by contact with conductive materials in the same container. The inner packagings (and equipment (if any))shall be packed in strong outer packagings that in accordance with <Model Regulation>4.1.1.1、4.1.1.2、4.1.1.5.

- The clause 230 of IMDG CODE 41-22 Edition required:

(1) The model of each lithium ion cell and battery should meets all testing requirements under Part III, subsection 38.3 of <UN Manual of Tests and Criteria>.

(2) Shall be equipped with safe exhaust equipment, prevent violent rupture under normal transportation conditions.

(3) Shall be equipped with effective devices to prevent external short circuit.

- The LP906 of IMDG CODE 41-22 Edition required:

（1） The specific instructions for use of the package should be made available by the packaging manufacturers and subsequent distributors to the consignor.

Land transportation requirements

Transport shall be carried out in accordance with the relevant provisions of the List of Dangerous Goods (GB12268-2012), the European regulations concerning the international transport of dangerous goods by road (ADR), the Rules for the International Carriage of Dangerous Goods by Rail (RID), special provisions 188, and the Manual of Tests and Standards.

For more information, please contact : +86-769-88989338

15 Regulatory Information

Regulatory Information	See ACGIH exposure limits information as noted in Section3
US	This SDS meets/exceeds OSHA requirements.
International	This SDS conforms to European Union (UN), the International Standards Organization (ISO) and the International Labor Organization (ILO) and as documental in ANSI (American National Standards Institute) Standard Z400.1-2010.
Air transportation	According to Civil aviation industry standard MH/T1020-2018 Lithium Battery Air Transport Standard and IATA DGR and ICAO. The international transport and commodity inspection is used this standard at the moment (IMDG CODE),
Ocean shipping	According to International Maritime Dangerous Goods Code to transport and According to the requirements of UN NO 3480/3481 to management the goods.
Land transportation	According to List of Dangerous Goods (GB12268) , ADR, RID.
Avoid electrical shock	According to Standard for Electrical Safety in the Workplace, NFPA-70E.

16 Other Information

丨 Charging and labeling

Charging	The battery can be recharged repeatedly. Please use the original battery charger. Do not use modified or damaged battery chargers. When the charge exceeds the prescribed charging time, the charge can be stopped to prevent the battery from overcharging. Charging temperature should be between 0 and 45 (32° F and 113° F) (from the safety point of view, there is no experience value during fast charging). There is normal heating phenomenon in the process of battery charging.

Charging Voltages and Currents	When the voltage exceeds the specified value, it is limited by the internal protection circuit of the battery. If the protective circuit is damaged, please stop using it. Please charge and discharge under specified voltage and current. If the battery voltage drops below the specified minimum voltage, please stop using it.
Warning	Chargers provided by the equipment manufacturer shall be used and used in accordance with the operating guidelines. It is forbidden to open the battery, close to the source of fire, and short circuit, which may cause fire, explosion, leakage and personal injury.
Disposal	Disposal shall be carried out in accordance with the relevant regulations of the United Nations, the state and the local authorities.

丨 Declaration

The information contained here is completed without any authorization. This information is only a reference. Users should customize an independent system based on the complete and reliable information they actually collect, so as to ensure the proper use and handling of the safety and health of employees and customers.

安全技术说明书(SDS)

1 产品及企业标识

产品标识

产品中文名称	锂离子电池
产品英文名称	Lithium Ion Battery
运输名称	锂离子电池
产品类型	可充电锂离子电池(1 个电芯)
ATL 产品型号	556276
客户产品型号	EB-BS938ABY/ABE
ATL PN	GB-S10-556276-010H/310H
UN 号	UN3480
额定容量	4.855Ah
额定电压	3.88V
瓦时数	18.84Wh
当量锂含量	1.46g
约计重量	65.14g

安全技术说明书提供者信息

企业名称	新能源科技有限公司
企业地址	香港新界荃湾海盛路 9 号有线电视大楼 35 楼 3 号单元
邮编	999077
联系电话	852-2498-0908
传真	852-2498-1101
电子邮箱	ND-EHS-M@ATLBattery.com

企业应急电话

企业应急电话	+86 5932582999

2 危险性概述

电池作为一个整体，在正确的使用下是不具有危险性。	
爆炸危险性	该物品不属于爆炸危险品
易燃危险性	该物品不属于易燃危险品
氧化危险性	该物品不属于氧化危险品
毒害危险性	该物品不属于毒害危险品

放射危险性	该物品不属于放射危险品
腐蚀危险性	该物品不属于腐蚀危险品

3 成分/组成信息

重要提示：电池不能拆开或燃烧，暴露电池中所在成分或燃烧产物是有害的。

组分	CAS No.	EC No.	含量百分比
钴酸锂	12190-79-3	235-362-0	15-40
丙酸乙酯	105-37-3	203-291-4	15-40
铜箔	7440-50-8	231-159-6	10-30
铝箔	7429-90-5	231-072-3	10-30
石墨	7782-42-5	231-955-3	7-25
碳酸乙烯酯	96-49-1	202-510-0	0-15
碳酸丙烯酯	108-32-7	203-572-1	0-15
六氟磷酸锂	21324-40-3	244-334-7	0-15
1,3 丙烷磺酸内酯	1120-71-4	214-317-9	0-1
隔离膜	9002-88-4	618-339-3	0-5

4 急救措施

| 急救措施描述

在常规条件下使用，电池是密封的。

眼睛接触	电池里的成分可能会引起严重的过敏和化学烧伤。万一接触，立刻翻开上下眼睑，用清水冲洗眼睛 15 分钟以上，直到没有化学物质残留。然后立刻就医。
皮肤接触	电池里的成分可能会引起皮肤过敏或化学烧伤。万一接触，除去污染的衣物并用肥皂和水清洗皮肤，如果发生化学烧伤或持续刺激，立刻就医。
食入	摄入电池是有害的。电池的成分可以导致嘴、食道、胃肠道严重的化学烧伤，如果摄入电池或拆开的电池，不要诱导呕吐或吃食物或饮料。应立刻就医。
吸入	电池里的成分可能会引起呼吸道过敏，吸入蒸汽可能引起上呼吸道和肺过敏。应马上呼吸新鲜空气并就医。

5 消防措施

| 灭火介质

合适的灭火介质	水或水雾、沙、灭火毯、干粉或二氧化碳灭火器
不合适的灭火介质	无

源于此物质或混合物的特别危害

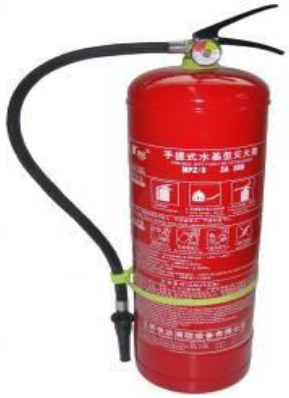
1	在运输和测试过程中，可能发生电池（芯）跌落、挤压、刺破、金属短路、液体浸泡等危险因子，可能发生触电、起火风险。
2	如果在密闭空间，可能有气体爆炸风险。
3	事故泄露的液体，包括消防水处理不当有污染环境的风险。

物资准备和人员训练

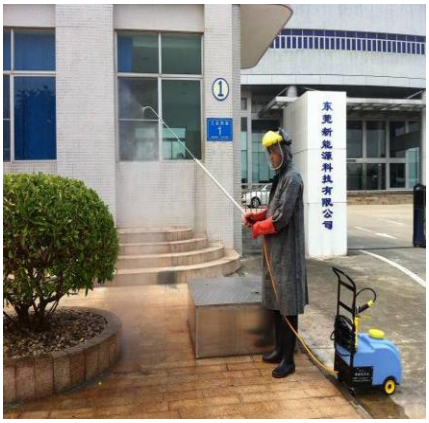
物资准备	
1	水基灭火器：每 500KWH 用 1 个 9 升的水基灭火器或者 2 个 6 升的水基灭火器，可扑灭 ABCE 类火灾（固体、非易燃液体、气体、低于 36KV 的电气火灾）。或者携带电动喷雾器、手动喷雾器当水雾灭火器。车辆、货物上方可悬挂悬挂式水基灭火器。
2	防水用品：雨衣、雨靴、橡胶手套；保鲜膜；抹布。
3	个人保护用品（PPE）：口罩、高温手套、安全眼镜、半面罩。
4	排烟工具：存储场所应保持良好的通风，建议每 20 米设置 1 个墙壁排烟风机，或移动排烟风机。
训练技能	
1	开启风机或者移动风机排烟。
2	消防处置后，由产品品质部门确认是否需要进行报废处理。
3	使用应急物资对泄漏的电解液进行处置

灭火流程

1	发现电池冒烟或燃烧时立即报警。
2	穿着防护用品，包括呼吸器、口罩，如果用水还应包括雨衣、雨鞋、绝缘手套等。
3	切断电源。
4	使用固体类灭火器材，推荐按以下顺序使用灭火器材：水或水雾、沙、灭火毯、干粉、二氧化碳灭火器。
5	通过风扇或空气流通排烟。



图片 1 水基灭火器
（可使用灭 36KV 下的电气火灾）



图片 2 水雾灭火器
（穿着 PPE 防止触电）

6 泄露应急处理

现场：将物质置于合适的容器中，然后向当地警方报警。

在水中：当电池组在水中时，有微弱电击的风险；在电解水时会产生氢气，必须保持通风以防止氢气集聚，防止氢气在密闭空间爆炸。如果可以，将电池或模组从水中拿出然后向当地警方报警。

7 操作处置与储存

电池和电池动力设备运输时，最主要的风险之一就是电池两极接触其他电池、金属物体或其他导电体而引起的电池短路。因此，必须将包装好的电池（芯）和电池使用适当的方式隔开，以防止发生短路和电极破损。此外，电池和电池（芯）还必须包装在坚固的外包装内，或者安装在设备中。

丨操作注意事项

1	请勿对电池进行过度的物理冲击或振动。
2	应避免短路，虽然几秒钟的短路不会对电池造成严重的影响。长时间的短路会导致电池迅速失去能量，可以产生足够的热量将外壳烧着。
3	短路的来源包括将电池胡乱放在散装容器中、或在设备上进行电池装配时使用的各种金属物品。为了将电池短路的风险降低到最小，在电池运输和存储时，应该提供电池的保护措施。
4	不能将电池拆解或使电池变形。
5	电芯破裂时，不要将其接触到水。操作处理超过 50V 的电池组时，操作人员需要绝缘防护。

丨储存注意事项

1	当锂离子电池长时间储存时，其充电容量应在 25%和 75%之间。
2	应储存在干燥凉爽且通风较好的区域。
3	温度过高会导致电池发生一系列的问题，如泄漏或生锈。
4	请勿将电池置于明火中。

8 接触控制/个体防护

重要提示：锂电池正常处于密封状态，粉料无流动性，不会给接触人员带来危险性。非专业人员严禁私自拆解电芯/电池。无必要请勿接触泄露的电解液，若需主动接触电解液，需佩戴防化手套、口罩。

工程控制方法

远离热源和明火，存储于干燥凉爽的区域。

9 理化特性

理化特性

物料状态	固体
颜色	不适用
气味	无
闪点	不适用
在乙醇中的溶解度	不适用
沸点	不适用
在水中的溶解度	不适用
蒸气压力	不适用
爆炸极限	不适用
自燃性	不适用
熔点	不适用
凝固点	不适用

10 稳定性和反应活性

稳定性和反应活性

稳定性	在标准温度下稳定性很好。
反应作用	无
注意	不要接触到水或酸性物质。 分解后产物：如果电池的铝箔包装破损，那么就不要接触强氧化剂、酸性物质和高温环境，且电解液可能挥发形成氟化氢。

11 毒理学资料

常规操作和使用时，不会产生有毒物质。

注意：根据欧盟批准的统一分类和标签 (CLP00)，1,3 丙烷磺酸内酯可能致癌，吞咽有害，皮肤接触有害。符合法规(EC)No 1272/2008 附件 I 第 3.7 节规定的危险等级生殖毒性 1A 或 1B 类、对性功能和生育力或发育的不利影响分类标准的物质。

12 生态学资料

如果电池要报废，那么应当由专业公司进行挑选和处理。

13 废弃处置

不能直接将电池丢弃至下水道或直接排放到环境中，应当基于当地的法律法规进行回收和处理。

14 运输信息

空运要求

锂离子电池芯或电池应根据国际航空运输协会 IATA DGR 第 65 版相关要求进行运输。锂离子电池芯或电池按国际航空运输协会危险物品的规定，应依照下表要求进行包装和粘贴标签。

UN 号	运输品	功率	包装要求	需粘贴的标签
UN3480	锂离子电池	电池芯＞20Wh 电池＞100Wh	PI965 Section IA 每个包装件限量： 客机禁运 全货机≤35kg	第 9 类危险性标签-锂电池,仅限货机标签  
		电池芯≤20Wh 电池≤100Wh	PI965 Section IB 每个包装件限量：	第 9 类危险性标签-锂电池 电池标记，仅限货机标签

			客机禁运 全货机≤10Kg	
UN3481	锂离子电池安装在设备中	电池芯＞20Wh 电池＞100Wh	PI967 Section I 每个包装件限量： 客机≤5kg 全货机≤35kg	第 9 类危险性标签-锂电池， 
		电池芯≤20Wh 电池≤100Wh	PI967 Section II 每个包装件限量： ≤2 电池或≤4 电池芯，且≤2 包装件/票货物 客机≤5kg 全货机≤5kg	\
			PI967 Section II 每个包装件限量： ＞2 电池或＞4 电池芯，或＞2 包装件/票货物 客机≤5kg 全货机≤5kg	电池标记 
UN3481	锂离子电池与设备包装在一起	电池芯＞20Wh 电池＞100Wh	PI966 Section I 每个包装件限量： 客机≤5kg 全货机≤35kg	第 9 类危险性标签-锂电池， 
		电池芯≤20Wh 电池≤100Wh	PI966 Section II 每个包装件限量： 客机≤ 5kg 全货机≤5kg	电池标记 

注意事项

1	如果电池（芯）或电池的电荷载量大于 30%的荷电容量上限，需要获得原产地和运营商主管当局批准。
2	锂电池收运后，标志丢失、脱落或难以辨识时，经营人必须按照“托运人危险品申报单”提供的信息更换标签。
3	符合包装说明 PI965 要求的锂电芯和电池货物不得与其它危险品装入同一个外包装中。
4	禁止锂离子电池（UN 3480、PI965 Section IA or IB）与包括第 1 类爆炸物质（除第 1.4 类弹药）、第 2.1 类易燃气体、第 3 类易燃液体、第 4.1 类易燃固体、第 5.1 类氧化剂等危险品货物包装在同一个外包装中。
5	必须确保设备在外包装中不能移动；如包装中有多件设备的必须包装牢固在一起，以防止与包装中的其他设备接触而造成损坏。
6	不能损坏或错误处理电芯，如果电芯损坏，必须隔离、检查和重新包装。

7	禁止运输被厂商确定为出于安全原因的缺陷、已损坏、有潜在产生发热、着火或短路危险的电芯和电池。
8	除非经原产地国家相关的国家机关批准，禁止空运废锂电池（芯）和锂电池去回收或处理。
9	锂离子电池需经过 UN38.3 测试，如果未通过该测试，则不能运输，需重新设计。
10	使用新的锂电池操作标记，允许此标记为 100 x 100mm 正方形，最小的标记尺寸为 100x70mm。
11	PI966 和 PI969，已修订，以澄清第一节的包装选项：锂电芯或锂电池包装在 UN 箱中，然后与设备一起放入坚固外包装；或锂电芯或锂电池与设备一起包装在 UN 箱中。 第 II 部分的包装选择被删除，因只有一种包装方式，没有 UN 箱的要求。
12	锂离子电池 UN3480 PI965 Section IB，每个包裹须承受 3 米堆码试验。
13	UN3481 PI 966 Section II, 967 Section II 中，当包装放入合成包装内时，包件必须固定在合成包装中，且合成包装不得影响每个包装件预期应有的功能。

海运要求

运输参考《国际海运危险货物规则》(第 41-22 版)，按 UN NO 3480/3481 的要求管控，采用第II类包装。安装牢固，互相隔离，防止短路，装有多于 24 个锂电池或 12 个锂电池组的包件：须标记说明破损时遵守的特殊程序；随船备有一份破损时遵守的特殊程序说明文件。

《国际海运危险货物规则》(第 41-22 版)第 188 条规定：

（1）对于锂离子电池瓦特-小时的额定值不超过 20Wh，锂离子电池组瓦特-小时的额定值不超过 100Wh，不作为危险货物运输。但须在外壳标明瓦特-小时的额定值。

（2）对于电池和电池组或与设备一起包装的电池和电池组（安装在设备上的除外），应使用内容器包装，将电芯和电池组完全包裹。应防止电池和电池组发生短路，包括防止在同一容器内与导电材料接触而导致的短路。内容器（与设备（如果有））应放置于符合《规章范本》4.1.1.1、4.1.1.2 和 4.1.1.5 规定的坚固外容器内。

《国际海运危险货物规则》(第 41-22 版)第 230 条规定：

（1）每个电池或电池组的型号应符合联合国《试验和标准手册》第三部分第 38.3 节的各项试验的要求。

（2）电池和电池组装有安全的排气装置，或在正常运输条件下，其设计能防止发生剧烈破裂现象。

（3）电池和电池组装有防止外部短路的有效装置。

《国际海运危险货物规则》(第 41-22 版) LP906 规定：

（1）包装物的具体说明应由包装物制造商和随后的销售者提供给发货人。

陆运要求

根据《危险货物品名表》（GB12268-2012）、《危险货物国际道路运输欧洲公约》（ADR）、《国际铁路运输危险货物规则》（RID）里的特殊规定 188 条款、《试验和标准手册》的相关规定进行运输。

获取更多信息，请拨打联系电话：+86-769-88989338。

15 法规信息

法规信息	见 ACGIH 第三部分规定暴露限值信息。
美国	本物质安全数据资料符合 OSHAS 相关要求。
国际	本物质安全数据资料符合欧盟（联合国），国际标准化组织（ISO）和国际劳工组织（ILO）和美国（美国国家标准协会）标准 Z400.1-2010。
空运	参考民航行业规范 MH/T1020-2018《锂电池航空运输规范》与 IATA DGR、ICAO 的要求是一致的。目前国际运输及商检都是采用的这个标准
海运	运输参考《国际海运危险货物规则》，按 UN NO 3480/3481 的要求管理。
陆运	参考《危险货物品名表》（GB12268-2012）,ADR、RID。
防触电	参照工作场所电气安全标准 NFPA-70E。

16 其他信息

其他信息

充电	本电池可多次重复充电。请使用原装电池充电器。不要使用改装或损坏的电池充电器。当充电超过规定的充电时间可停止充电，来防止电池过充。充电温度应在 0℃-45℃（从安全角度考虑，没有快充时的经验值），电池充电过程中有正常的发热现象。
充电电压和电流	当电压超过规定的值后受到电池内部保护电路限制。如果出现保护电路受损情况，请停止使用。请在规定的电压和电流下充、放电。如果电池的电压下降到低于规定的最低电压时，请停止使用。
警告	应使用设备制造商提供的充电器并按操作指南使用。禁止将电池打开，靠近火源，以及短路，可能引起着火、爆炸、泄漏造成人身伤害。
处置	依照联合国、国家、地方相应规程进行处置。

声明

这里包含的信息是没有任何授权下完成的。该信息只作为一个参考，使用者应该根据自己实际搜集的完整可靠的信息来定制独立的体系，从而确保能够适当的使用并处理员工和顾客的安全及健康。