

Article Safety Data Sheet - Lithium Ion Polymer Batteries

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Section I - Product identification

Product Name: **Lithium-ion Polymer Battery Pack** Nominal Voltage: 3.7 V
 Models: **ICP / AHB Series see Annex I (Pouch cell construction)**
 Chemical System: Lithium - Graphit - Cobalt oxide

Section II - Hazardous ingredients

IMPORTANT NOTE: The battery should not be opened or exposed to heat because exposure of the following ingredients contained within could be harmful under some circumstances.

Chemical Name	CAS No.	Content % of total weight
LiCoO ₂	12190-79-3	29.36 - 35.88
Carbon black	1333-86-4	15.26 - 18.66
Aluminium	7429-90-5	13.14 - 16.06
Copper	7440-50-8	7.08 - 8.66
Ethylene carbonate	96-49-1	4.55 - 5.57
Nylon		3.47 - 4.24
Ethyl methyl carbonate	623-53-0	3.45 - 4.21
Diethyl carbonate	105-58-8	3.36 - 4.10
Polyethylene	9002-88-4	3.26 - 3.98
Polypropylene	9003-07-0	2.40 - 2.94
Poly(vinylidene difluoride)	24937-79-9	2.11 - 2.57
Lithium hexafluorophosphate	21324-40-3	1.64 - 2.00
Nickel	7440-02-0	0.54 - 0.66
Polyester		0.13 - 0.15
Polyimide		0.09 - 0.11
Activated Carbon	7440-44-0	0.08 - 0.10
Acrylic		0.05 - 0.07
Oxalic acid	00144-62-7	0.04 - 0.06

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

1) This Article Safety Data Sheet is provided as a service to our customers.

Based on the definition of the term 'article' in the Occupational Safety and Health Administration (OSHA) Hazard Communication Standard, 29 CFR Subpart 1910.1200, there is no requirement for a Material Safety Data Sheet (MSDS) for lithium primary coin cells. Notification is not required because these products are 'articles' that do not release a covered toxic chemical under the normal conditions of processing or use.

Disclaimer:

The batteries are exempt articles and are not subject to hazard Communication Standard Requirement. This sheet is provided as technical information only. The information contained in this Product Safety Data Sheet has been established to the best of RENATA SA's knowledge and belief. RENATA SA makes no representation and provides no warranty or guarantee regarding the contents of this Product Safety Data Sheet and excludes its liability, express or implied.

Section III - Possible Hazards

**Cells or Batteries may explode when placed in a fire, when exposed to excessive heat, when opened or during inappropriate use; which could release hydrogen fluoride gas and smoke.
Use only suitable extinguishing media.**

The chemicals mentioned in Section II are contained in a sealed can.

Risk of exposure occurs only if the battery is mechanically or electrically abused (see Safety precautions in Section VII).

The most likely risk is acute exposure when a cell vents or opened, can cause irritation when inhaled.

Carcinogenicity - NTP: NO

Carcinogenicity - IARC: NO

Carcinogenicity - OSHA: NO

Contact with electrolyte with skin and eyes should be avoided.

3.2 Risk and Safety sentences:

(1) – Nature of special risks :

R14 Reacts with water

R21 Harmful in contact with skin

R22 Harmful if swallowed

R41 Risk of serious damage to the eye

R42/43 May cause sensitization by inhalation and skin contact

R43 May cause sensitization by skin contact

(2) – Safety advices :

S2 Keep out of reach from children

S8 Keep away from moisture

S22 Do not breathe dust

S24 Avoid contact with skin

S26 In case of contact with eyes, rinse immediately with plenty of water and get medical advice / attention

S36 Wear suitable protective clothing

S37 Wear suitable gloves

3.3 EU-GHS Classification:

Hazard statements:

H302 Harmful if swallowed

H312 Harmful in contact with skin

H315 Causes skin irritation

H318 Causes serious eye damage

H332 Harmful if inhaled

Precautionary statements:

P102 Keep out of reach of children
 P223 Keep away from any possible contact with water, because of violent reaction and possible flash fire
 P232 Protect from moisture
 P260 Do not breathe dust/fume/gas/mist/vapors/spray
 P262 Do not get in eyes, on skin, or on clothing
 P305+P351+P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
 P280 Wear protective gloves / protective clothing / eye protection / face protection

Section IV - First Aid Procedures

None unless internal material exposure.

Explanation Carcinogenicity: NOT RELEVANT

Skin contact with contents of an opened battery can cause irritation, wash immediately with soap and water. Remove contaminated clothing. If irritation persists, get medical help

Eye contact:

Contents of an opened battery can cause severe irritation, IMMEDIATELY FLUSH THOROUGHLY WITH COPIOUS AMOUNTS OF WATER FOR AT LEAST 15 MINUTES. SEEK MEDICAL ATTENTION.

Ingestion:

CALL MEDICAL PRACTITIONER IMMEDIATELY

Inhalation:

Do not inhale leaked material. PROVIDE IMMEDIATELY FRESH AIR, IF IRRITATION PERSISTS, GET MEDICAL HELP.

Section V - Fire Fighting Instructions

5.1 Fire and explosion hazard:

The battery can leak and/or spout vaporized or decomposed and combustible electrolyte fumes in case of exposure above 70°C resulting from inappropriate use or the environment.

Cells or batteries may flame or leak potentially hazardous organic vapors if exposed to excessive heat or fire. Fire, excessive heat, or over voltage conditions may produce hazardous decomposition products.

Damaged or opened cells or batteries can result in rapid heating and the release of flammable vapors.

Vapors may be heavier than air and may travel along the ground or be moved by ventilation to an ignition source and flash back fire, excessive heat, or over voltage conditions may produce hazardous decomposition products.

During water application, caution is advised as burning pieces of flammable particles may be ejected from the fire.

5.2 Extinguishing Media:

Suitable CO₂

Dry chemical or Foam extinguishers.

Not to be used : Type D extinguishers.

Special Fire Fighting Procedure: WEAR NIOSH APPROVED SCBA & FULL PROTECTIVE EQUIPMENT.

Unusual Fire and Explosion Hazards: NONE SPECIFIED BY MANUFACTURER.

As with any fire, wear self-contained breathing apparatus to avoid inhalation of hazardous decomposition products.

Section VI - Accidental Release

Steps to be taken in case material is released or spilled:

Wear appropriate personal protective equipment.

Isolate hazard area.

Keep unnecessary and unprotected personnel from entering.

Carefully recover spillages with appropriate ladle and/or clothe and transfer to a suitably labelled, sealable container for safe disposal.

Wash the spillage area, neutralize with calcium hydroxide.

Wear suitable personal protection during removal of spillages.

Spontaneous fire and/or explosion can occur when material is released or spilled. Only use appropriate fire extinction equipment.

Section VII - Handling and Storage

When used correctly, Lithium-ion Polymer Battery Pack provides a safe and dependable source of power. However, if they are misused or abused, leakage, venting, or in extreme cases explosion and/or fire may result.

Make sure to observe amongst others, following warnings.

Handling:

- Do not insert batteries in reverse. Observe the polarity markings on battery and equipment
- Do not short-circuit batteries
- Do not overcharge batteries
- Do not force discharge batteries
- Do not mix batteries
- Do not overheat batteries by exposure to high temperatures and direct sunlight.
- Do not weld or solder directly to batteries
- Do not dismantle batteries
- Do not deform batteries
- Do not dispose of batteries in fire
- A battery with a damaged pouch should not be exposed to water
- Do not allow children to replace batteries without adult supervision
- Keep batteries out of the reach of children. In case of ingestion of a cell or battery, the person involved should seek medical assistance promptly.
- Equipment intended for use by children should have battery compartments which are tamper-proof
- Do not encapsulate and/or modify batteries
- Exhausted batteries should be immediately removed from equipment and disposed of (see section XIII)
- When discarding batteries with solder tags, insulate the tags by wrapping them with tape, foil, etc.

Storage:

- Store unused batteries in their original packaging and keep them away from metal objects which may short-circuit them. Storing unpackaged cells together could result in cell shorting and heat build-up.
- Store and display batteries in their original packaging in well ventilated, dry and cool conditions.
- Avoid storing or display batteries in direct sun or in places where they get exposed to rain
- Do not stack battery cartons on top of each other exceeding a specified height. The height is clearly dependent on the strength of the packaging. As for general rule this height should not exceed 1.5 m for cardboard packages or 3 m for wooden cases. The above recommendations are equally valid for storage conditions during

prolonged transit. Thus, batteries should be stored away from ship engines and not left for long periods in unventilated metal box cars (containers) during summer.

Section VIII - Exposure Controls / Personal Protection

<u>Respiratory protection (specify type):</u>	Not necessary under conditions of normal use (see section VI)
<u>Ventilation:</u>	Not necessary under conditions of normal use (see section VI)
<u>Protective gloves:</u>	Not necessary under conditions of normal use (see section VI)
<u>Eye protection:</u>	Not necessary under conditions of normal use (see section VI)
<u>Other protective clothing or equipment:</u>	Not necessary under conditions of normal use (see section VI)

Section IX - Physical and Chemical Properties

The chemicals mentioned in Section II are contained in a sealed pouch. Under conditions of normal use, the chemicals will not be released.

Section X - Stability and Reactivity

Lithium-ion Polymer Battery Pack are stable, no chemical release under conditions of normal use.

Conditions to avoid: See Sections VII & VIII

Section XI - Toxicological Information

In case electrolyte is spilled and exposed to air, HF could be released.
May include hydrogen fluoride and carbon oxides gas.
May cause skin and eye Irritation when contacted.

Section XII - Ecological Information

The chemicals mentioned in Section II are contained in a sealed pouch. Under conditions of normal use, the chemicals will not be released. It does not pose a physical or health risk to users, see section XIII for disposal.

Section XIII - Disposal Considerations

Waste disposal method:

a) **Be sure to comply with your federal, state and local regulation disposal of used batteries.**

Dispose in accordance with appropriate national and international regulations, below some references.

European Community: according to Directive 2002/96/EC on Waste Electrical and Electronic Equipment (WEEE), Annex II, batteries have to be removed from any separately collected WEEE. The removed batteries have to be treated according to the Battery directive

2006/66/EC
 US: Lithium batteries are neither specifically listed nor exempted from the Federal Environmental Protection Agency (US EPA) hazardous waste regulations. The only material of possible concern due to its reactivity is lithium metal. However, button cells contain so little lithium that they can be disposed off in the normal municipal waste stream.

Use a professional disposal firm for disposal of mass quantities of undischarged lithium batteries.

b) Open cells should be treated as hazardous waste

DO NOT INCINERATE or subject battery cells to temperatures in excess of 212°F (100°C). Such treatment can cause cell rupture.

Section XIV - Transportation Information

UN No: UN3480

The battery models listed have aggregate equivalent lithium content below 8g and the Watt hour is not more than 100Wh.

Shipment contains no item listed under IATA DGR Special Provision PI-965 -PI-967 and meets all requirements under UN Manual of Tests and Criteria Part III, subsection 38.3

UN 38.3 Lithium Battery			Remarks
No	Test item	Test results	
T1	Altitude Simulation	OK	Test 1 to 5 must be conducted in sequence on the same cell or battery
T2	Thermal test	OK	
T3	Vibration	OK	
T4	Shock	OK	
T5	External Short Circuit	OK	
T6	Impact	OK	
T7	Overcharge	OK	Only battery do need this test item
T8	Forced Discharge	OK	For cell only

The product is not classified as dangerous under the current edition of the 2011 IATA dangerous goods regulations. The products are safe for air transportation and not regulated by IATA DGR. Also they comply with the P1-965~P1-967 accordingly.

Section XV - Regulatory Information

See ACGIH exposure limits Information as noted in Section III.

US: This MSDS meets/exceeds OSHA requirements

International: this MSDS conforms to European Union (UN), the International Standards Organisation (ISO) and the International Labor Organization (ILO) and as documental in ANSI (American National Standards Institute) Standard Z400.1-1993.

Section XVI - Other Information

Compliance: In accordance with the RoHS Directive 2002/95/EC, and its amendment directives

Test Method: With reference to IEC 62321, Ed.1 111/54/CDV

Procedures for the Determination of Levels of Regulated Substances in Electrotechnical Products.

- (1) Determination of Cadmium by ICP-AES.
- (2) Determination of Lead by ICP-AES
- (3) Determination of Mercury by ICP-AES
- (4) Determination of Hexavalent Chromium for non-metallic samples by UVA/vis Spectrometry
- (5) Determination of PBB and PBDE by GC'MS

Test Item (s):	Methode (Refer to)	Result	MDL
		No.1	
Cadmium- Cd	(1)	n.d	2
Lead (Pb)	(2)	n.d	2
Mercury (Hg)	(3)	n.d	2
Hexavalent Chromium CR(VI) by alkaline extraction	(4)	n.d	2
Sum of PBBs	(5)	n.d	
Monobromobiphenyl		n.d	5
Dibromobiphenyl		n.d	5
Tribromobiphenyl		n.d	5
Tetrabromobiphenyl		n.d	5
Pentabromobiphenyl		n.d	5
Hexabromobiphenyl		n.d	5
Heptabromobiphenyl		n.d	5
Octabromobiphenyl		n.d	5
Nonabromobiphenyl		n.d	5
Decabromobiphenyl		n.d	5
Sum of PBDEs (Mono to Nona) (Note 4)		n.d	-
Monobromobiphenyl ether		n.d	5
Dibromobiphenyl ether		n.d	5
Tribromobiphenyl ether		n.d	5
Tetrabromobiphenyl ether		n.d	5
Pentabromobiphenyl ether		n.d	5
Hexabromobiphenyl ether		n.d	5
Heptabromobiphenyl ether		n.d	5
Octabromobiphenyl ether		n.d	5
Nonabromobiphenyl ether		n.d	5
Decabromobiphenyl ether		n.d	5
Sum of PBDEs (Mono to Deca)		n.d	-

Reference:

Chemical substances Information: Japan Advanced Information center of Safety and Health
International Chemical Safety Cards (ICSCs): International Occupational Safety and Health
Information Centre (CIS)
2002 TLVs and BELs: American Conference of Governmental Industrial Hygienists (ACGIH)
Dangerous Goods Regulations-52nd Edition Effective 1 January 2011: International Air Transport
Association (IATA)
IMDG Code-2008 Edition: International Maritime Organization (IMO)
The European Agreement concerning the International Carriage of Dangerous Goods by Road-2009
The United Nations Economic Commission for Europe (UNECE)
MSDS of raw materials prepared by the manufactures

ANNEX I

MODELS OVERVIEW

Model no.	Approx. Weight of battery [g]	Nominal Capacity [mAh]	Nominal Voltage [V]
ICP241019	1.2	24	3.7
AHB701218	2.5	75	3.7
ICP501022	2.6	80	3.7
ICP641414	2,7	95	3.7
ICP591519	3.1	110	3.7
ICP501421	3.1	115	3.7
ICP651321	3.3	120	3.7
AHB331242	3.5	125	3.7
ICP401230	3.5	130	3.7
ICP501230	3.3	135	3.7
ICP581323	3.7	145	3.7
ICP402025	4.0	155	3.7
ICP591524	3.7	160	3.7
ICP641620	3.9	165	3.7
ICP501233	4.2	175	3.7
ICP402035	4.8	195	3.7
ICP591530	4.8	220	3.7
ICP502030	5.6	230	3.7
ICP621333	5.5	240	3.7
ICP521630	5,4	250	3.7
ICP552030	6.3	300	3.7
ICP422339	7.3	340	3.7
ICP602823	7.3	350	3.7
ICP402050	8.8	420	3.7
ICP582930	9.1	450	3.7
ICP622540	11.0	600	3.7
ICP543759	26.0	1320	3.7

ANNEX II



ANNEX III

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Primary Lithium Batteries Forbidden for transport aboard passenger aircraft

This label is required for shipments containing one or more cells/batteries into, out of, or within the U.S. via highway, rail, vessel or cargo-only aircraft. The label must be in contrasting colour and the letters must be 6 mm (0.25 in) in height for packages weighting not more than 30 kg.

ANNEX IV

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Regulatory References: SP 188 UN Model Regulations, 188 ADR/RID, 310 IMDG Code, ICAO/IATA Packing Instruction 968 Section II (Lithium Metal Batteries) and ICAO/IATA Packing Instruction 965 Section II (Lithium Ion Batteries)

SHIPPER'S CERTIFICATION for Lithium Metal Batteries and Lithium Ion Batteries

Hereby we declare that the cells and batteries contained in this shipment qualify in accordance with above provisions for transportation "partly regulated"

DÉCLARATION DE L'EXPÉDITEUR pour piles au Lithium Metal et Lithium Ion

Par la présente, nous certifions que les piles contenues dans cet envoi sont conformes aux conditions de transport exigées pour la mention "partiellement réglementés"

ERKLÄRUNG DES VERSENDERS für Lithium Metall Batterien und Lithium Ionen Batterien

Wir bestätigen hiermit, dass die Batterien und Zellen in dieser Sendung entsprechend oben genannten Bestimmungen als "teilweise eingeschränkt" transportiert werden können

For emergency information call RENATA SA at +41 61 319 28 27
referring to the below Packing List No.

This certification is on every packing list for shipments containing Lithium Metal and Lithium Ion Batteries.

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ANNEX V

CAUTION

The packages in this consignment consist of

Lithium Metal Batteries

Shipment must be handled with care

Flammable if damaged

If the package is damaged it must be
quarantined, inspected and repacked

For further information contact:

Phone: +41 61 319 28 27

(24 hrs / 7 days per week)

ANNEX VI

OVERPACK