SHENZHEN M&LAK INDUSTRY CO. LTD.
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Ref. No: MLK-CR-260101M

MATERIAL SAFETY DATA SHEET(MSDS)

Section 1 - Product and Company Identification

Supplier	:	SHENZHEN M&LAK INDUSTRY CO., LTD.
Address	:	2F, Haigu Science And Technology Building T4, Luozu Community, Shiyan Street, Baoan District, Shenzhen City, Guandong Province, China.
Product Name	:	3.0V Lithium Metal Battery, Primary (non-rechargeable)
Chemical System	:	Lithium Manganese Dioxide (Li + MnO_2 → $LiMnO_2$) Primary **NOT** designated for Recharge
Model	:	CR632、CR927、CR1025、CR1130、CR1212、CR1216、CR1220、CR1225、CR1612、CR1616、CR1620、CR1625、CR1632、CR1654、CR2016、CR2020、CR2025、CR2032、CR2032H、CR2050、CR2050H、CR2320、CR2325、CR2330、CR2335、CR2354、CR2412、CR2430、CR2450、CR2450H、CR2477、CR2477T、CR3032; CR1632LT、CR2025LT、CR2032LT、CR2050LT、CR2430LT、CR2450LT、CR2477LT; CR1632WT、CR2025WT、CR2032WT、CR2050WT、CR2430WT、CR2450WT、CR2477WT.
Telephone number	:	+86-755-2786 3350
Fax number	:	+86-755-2786 3351
Emergency telephone	:	+86-755-2786 3350
Email	:	sales@malak.cn

Section 2 - Hazard Identification

2.1 Classification of the substance or mixture

Classification according to UN-GHS
Batteries are considered as articles and are as such exempted from the UN-GHS classification requirements. The classification based on the hazardous substances contained in the product (electrode materials and liquid electrolyte contained in the batteries) is provided below for information purposes only.

Eye Dam. 1	H318	:	Causes serious eye damage
Skin Irrit. 2	H315	:	Causes skin irritation
Acute Tox. 4	H302	:	Harmful if swallowed
Acute Tox. 4	H332	:	Harmful if inhaled
STOT RE 2	H373	:	May cause damage to organs (Brain) through prolonged or repeated exposure (Inhalation)
Repr. 1B	H360 FD	:	May damage fertility. May damage the unborn child.
Water-react. 1	H260	:	In contact with water releases flammable gases which may ignite spontaneously

2.2 GHS Label elements, including precautionary statements

The UN GHS labeling information is not provided in this section as batteries are articles and therefore are exempted from the UN GHS labeling requirements. Other labeling requirements apply for batteries according to EU Directive 2006/66/EC and EU Regulation (EU) 2023/1542.
Nevertheless the following warning must be observed:
Keep out of reach of children.

2.3 Other hazards which do not result in classification

The chemicals mentioned in Section 3 are contained in a sealed stainless steel can.
Risk of exposure occurs only if the battery is mechanically or electrically abused or if it is ingested (see Safety precautions in Section VII). Swallowing of a battery can lead to chemical burns, perforation of soft tissues and death. Severe burns can occur within 2 hours of ingestion. In case of ingestion, seek medical attention immediately.

Section 3 - Composition / Information on Ingredients

3.1 Substances

Not applicable

3.2 Mixtures

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.

Hazardous substances contained in the product according to UN-GHS:

Chemical Name	CAS No.	Content % of total weight	Hazard class and category	Hazard statement
Manganese Dioxide (MnO_2)	1313-13-9	12 ~ 55	Acute Tox. 4, Acute Tox. 4, STOT RE 2	H302, H332, H373 (Brain) (Inhalation)
Lithium*	7439-93-2	1.0 ~ 3.0	Water-react. 1 Skin Corr. 1B	H260, H314
Propylene Carbonate (PC)	108-32-7	2 ~ 9	Eye Irrit. 2	H319
1,2 dimethoxy ethane (DME)**	110-71-4	1 ~ 4.0	Flam Liq. 2, Acute Tox. 4, Repr. 1B	H225, H332, H360FD
Lithium Perchlorate ($LiClO_4$)	7791-03-9	0.2 ~ 0.8	Ox. Sol. 2, Skin. Irrit. 2, Eye Irrit. 2, STOT SE 3	H272, H315, H319, H335

** DME (CAS 110-71-4) is listed in the European candidate list as a SVHC (Reason for inclusion: Toxic for reproduction - REACH Regulation 1907/2006/EC, Article 57c)

* Lithium content per cell

Model Number	Lithium content(g)	Model Number	Lithium content(g)	Model Number	Lithium content(g)	Model Number	Lithium content(g)	Model Number	Lithium content(g)
CR632	0.008	CR1616	0.015	CR2032H	0.065	CR2430	0.09	CR2430LT	0.085
CR927	0.009	CR1620	0.02	CR2050	0.11	CR2450	0.18	CR2450LT	0.165
CR1025	0.009	CR1625	0.023	CR2050H	0.13	CR2450H	0.21	CR2477LT	0.275
CR1130	0.009	CR1632	0.036	CR2320	0.05	CR2477	0.29	CR1632WT	0.034
CR1212	0.009	CR1654	0.06	CR2325	0.06	CR2477T	0.29	CR2025WT	0.046
CR1216	0.008	CR2016	0.02	CR2330	0.08	CR3032	0.17	CR2032WT	0.057
CR1220	0.01	CR2020	0.035	CR2335	0.09	CR1632LT	0.034	CR2430WT	0.085
CR1225	0.015	CR2025	0.05	CR2354	0.17	CR2025LT	0.046	CR2450WT	0.165
CR1612	0.01	CR2032	0.062	CR2412	0.03	CR2032LT	0.057	CR2477WT	0.275

Section 4 - First Aid Measures

None unless internal material exposure.

4.1 Description of necessary first aid measures

Skin contact : Skin contact with contents of an opened battery causes irritation, flush immediately with copious amounts of water. Remove contaminated clothing. If irritation persists, get medical help.

Eye contact : Contents of an opened battery causes serious eye damage, flush immediately thoroughly with copious amounts of water for at least 15 minutes. Get medical attention immediately.

Ingestion : Seek medical attention immediately.

Inhalation : Do not inhale leaked material. Provide immediately fresh air, if irritation persists, get medical help.

4.2 Most important symptoms / effects, acute and delayed
The chemicals mentioned in Section 3 are contained in a sealed stainless steel can.
Risk of exposure occurs only if the battery is mechanically or electrically abused or if it is ingested (see Safety precautions in Section 7). Swallowing of a battery can lead to chemical burns, perforation of soft tissues and death. Severe burns can occur within 2 hours of ingestion. In case of ingestion, seek medical attention immediately.
See Section 1 Emergency phone number.

In case of exposure to inner component/material of the battery:
Harmful if swallowed (Manganese Dioxide)
Harmful if inhaled (Manganese Dioxide, DME)
May cause damage to organs (Brain) through prolonged or repeated exposure (Inhalation) (Manganese Dioxide)
May damage fertility. May damage the unborn child. (DME)

4.3 Indication of immediate medical attention and special treatment needed
No further information available.

Section 5 - Fire Fighting Measures

5.1 Suitable extinguishing media
In case of fire in an adjacent area, use water. Use CO_2 or dry chemical extinguishers if cells are packed in their original containers since the fuel of the fire is basically paper products. For bulk quantities of unpackaged cells use, in this case, do not use water.
In a small room, remember that the supply of oxygen is quickly consumed in feeding a lithium fire.

5.2 Specific hazards arising from the chemicals
When exposed to heat, the battery may rupture and release hazardous substances.
Burning lithium manganese dioxide batteries produce toxic and corrosive lithium hydroxide fumes. Lithium metal reacts with water and forms flammable hydrogen gas.

5.3 Special protective actions for fire-fighters
Wear self-contained breathing apparatus to avoid inhalation of hazardous decomposition products. Wear protective clothing and equipment.

Section 6 - Accidental Release Measures

6.1 Personal precautions, protective equipment and emergency procedures
Steps to be taken in case material is released or spilled:
The preferred response is to leave the area and allow the batteries to cool and the vapours to dissipate. Avoid skin and eye contact or inhalation of vapours.

6.2 Environmental precautions
Do not allow product to reach sewage system or any water course.
In the event of spill or accidental release, notify relevant authorities in accordance with all applicable regulations.

6.3 Methods and material for containment and cleaning up
In the event of spill or accidental release, collect all released material in a plastic lined metal container and remove spilled liquid with absorbent. Doing this, protect your skin and eyes with chemical resistant protective gloves and tightly sealed protective googles . Avoid direct contact with internal components.

Section 7 - Handling and Storage

When used correctly, lithium batteries provide 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.
7.1 Precautions for safe handling
– Do not insert batteries in reverse. Observe the polarity markings on battery and equipment
– Do not short-circuit batteries
– Do not charge 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 container 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 13)
– When discarding batteries with solder tags, insulate the tags by wrapping them with tape, foil, etc.

7.2 Conditions for safe storage, including any incompatibilities
– 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.
– The normal storage of lithium coin cells is made at temperature between +10°C and +25°C, never exceeding +30°C (also according to IEC 60086-4). In this way the maximum shelf-life (i.e. max. retention of cell performances after storage periods) of lithium coin cells is achieved. Storage temperatures above room.temperature will increase the rate of self-discharge, reducing the available capacity of the cell. Humidity above 95% R.H. and below 40% R.H. should also be avoided for sustained periods, as these extremes are detrimental to batteries. Storing the cells at low temperature is also suggested, but attention must be paid when transferring the cells to warmer environments, because of the possibility of having water condensing on to the cells (risk of short-circuits).
– 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 8 - Exposure Controls / Personal Protection

8.1 Control parameters
Occupational exposure limits are observed as long as the battery remains intact.

8.2 Appropriate engineering controls
Ventilation is not necessary under conditions of normal use. Avoid contact with water.

8.3 Individual protection measures, such as personal protective equipment
In case of exposure to inner component/material (i.e. when handling damaged batteries), protect your skin and eyes with chemical resistant protective gloves and tightly sealed protective googles .

Respiratory protection (specify type)	:	Not necessary under conditions of normal use.
Ventilation	:	Not necessary under conditions of normal use.
Protective gloves	:	Not necessary under conditions of normal use.
Eye protection	:	Not necessary under conditions of normal use.
Other protective clothing or equipment	:	Not necessary under conditions of normal use.

Section 9 - Physical and Chemical Properties

9.1 Basic physical and chemical properties

Physical state	:	Solid, Coin shape
Colour	:	Silver
Odour	:	Not applicable

Melting point / Freezing point	:	Not applicable
Boiling point/Boiling range	:	Not applicable
Flammability	:	Not determined
Lower and upper explosion limits / Flammability limit	:	Not determined
Flash point	:	Flash point of electrolyte solvents (°C): DME: -6°C, PC: 123°C, **Mixture: 20°C**
Auto-ignition temperature	:	Not applicable
Decomposition temperature	:	No decomposition under normal conditions of use
pH	:	Not applicable
Kinematic viscosity	:	Not applicable
Solubility	:	Not applicable
Partition coefficient (n-octanol/water) log value	:	Not applicable
Vapour pressure	:	Not applicable
Density or relative density	:	Not applicable
Relative vapour density	:	Not applicable
Particle characteristics	:	Not applicable

Section 10 - Stability and Reactivity

Lithium batteries are contained in a stable stainless steel container and are sealed to avoid any chemical release under conditions of normal use.

10.1 Reactivity
No reactions if article is used according to specifications.

10.2 Chemical stability
No decomposition if article is used according to specifications.

10.3 Possibility of hazardous reactions
No dangerous reactions if article is used according to specifications.

10.4 Conditions to avoid
See section 7

10.5 Incompatible materials
See section 7

10.6 Hazardous decomposition products
No further information available

Section 11 - Toxicological Information

11.1 Information on toxicological effects
The chemicals mentioned in Section 3 are contained in a sealed stainless steel can.
Risk of exposure occurs only if the battery is mechanically or electrically abused or if it is ingested (see safety precautions in section 7).

Classification based on the hazardous substances contained in the product (electrode materials and electrolyte solution contained in the batteries):

Acute toxicity	:	Harmful if swallowed (Manganese Dioxide) Harmful if inhaled (Manganese Dioxide, DME)
Skin corrosion/irritation	:	Causes skin irritation (Lithium)
Serious eye damage/irritation	:	Causes serious eye damage (Lithium)
Respiratory or skin sensitization	:	Based on classification of ingredients, the classification criteria are not met.
Germ cell mutagenicity	:	Based on classification of ingredients, the classification criteria are not met.
Carcinogenicity	:	Based on classification of ingredients, the classification criteria are not met.

Reproductive toxicity	:	May damage fertility. May damage the unborn child. (DME)
STOT-single exposure	:	Based on classification of ingredients, the classification criteria are not met.
STOT-repeated exposure	:	May cause damage to organs (Brain) through prolonged or repeated exposure (Inhalation) (Manganese Dioxide)
Aspiration hazard	:	Based on classification of ingredients, the classification criteria are not met.

11.2 Information on the likely routes of exposure
The chemicals mentioned in Section 3 are contained in a sealed stainless steel can.
Risk of exposure occurs only if the battery is mechanically or electrically abused or if it is ingested (exposure via ingestion, skin or eye contact or inhalation). The most likely risk is acute exposure when a cell vents.

11.3 Symptoms related to the physical, chemical and toxicological characteristics
No further information available.

11.4 Delayed and immediate effects and also chronic effects from short and long term exposure
The chemicals mentioned in Section 3 are contained in a sealed stainless steel can.
Risk of exposure occurs only if the battery is mechanically or electrically abused or if it is ingested (see Safety precautions in Section VII). Swallowing of a battery can lead to chemical burns, perforation of soft tissues and death. Severe burns can occur within 2 hours of ingestion. In case of ingestion, seek medical attention immediately.

11.5 Numerical measures of toxicity
No further information available.

11.6 Interactive effects
No further information available.

Section 12 - Ecological Information

The chemicals mentioned in Section 3 are contained in a sealed stainless steel battery can. Under conditions of normal use, the chemicals will not be released.

12.1 Toxicity
Aquatic toxicity: Based on classification of ingredients, the classification criteria are not met.

12.2 Persistence and degradability
Not biodegradable.

12.3 Bioaccumulative potential
No further information available.

12.4 Mobility in soil
No further information available.

12.5 Other adverse effects
No further information available.

Section 13 - Disposal Considerations

13.1 Disposal methods
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 2012/19/EU on Waste Electrical and Electronic Equipment (WEEE), Annex VII, 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 and EU Regulation (EU)2023/1542.
European Waste Catalogue: 16 06 05 other batteries and accumulators.

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 of 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 14 - Transport Information

Lithium Metal Batteries are classified as Dangerous goods under Class 9 per the United Nations. Our cells and batteries are in compliance of the United Nation Transport Recommendations and meets all the requirements of UN Manual of Test and Criteria (IATA DGR 3.9.2.6). For transporting our cell or batteries, depending of the shipping method used, the dangerous goods regulations and/or rules are fulfilled and must be followed in case of further transportation.
Our button cells or batteries are packed and shipped under compliance of IEC 60086-1. Our original packaging are adequate to avoid mechanical damages during the transport, handling and stacking. The materials used prevent the development of unintentional electrical conduction, corrosion of the terminals and ingress of moisture, shock and vibration are kept to a minimum. For the transport, handling and storage the boxes must be handled with care – cartons should not be thrown off trucks, slammed into position or piled so high as to overload battery containers below. Protection from inclement weather should be provided.

Provisions for the international transportation (pursuant to ICAO-TI/IATA-DGR, IMDG Code, ADR, RID, DOT):

Proper Shipping Name : Lithium metal batteries
IMO/IMDG : not regulated
UN Number, UN Class : UN3090, Class9 (for the Air transport by PI968 Section IA or IB)
Exemption (for the Marine transport SP188 and the Air transport by Section Ⅱ of PI969 or 970)
Even though the cells are classified as lithium metal batteries (UN3090 or UN3091) , they are not subject to some requirements of Dangerous Goods Regulations because they meet the following:

1. For cells, the lithium content is not more than 1g;
2. Each cell is of the type proven to meet the requirements of each test in the UN Manual of Tests an Criteria, PartⅢ, sub-section 38.3 - (IATA DGR 3.9.2.6)
3. Each cell is manufactured in ISO9001 certified factory.

Lithium metal cells and batteries are subject to the following dangerous goods regulations / rules:

Shipping Method	Dangerous Goods Regulations	Packing Instruction (PI)/ Special provision (SP)	UN Number	Note
Air transport (Forbidden for transport aboard passenger aircraft)	IATA DGR	PI 968 Section Ⅰ A	UN3090	Cells, Cargo Aircraft only; Net quantity per package Max. 35kg
		PI 968 Section Ⅰ B		Cells, Cargo Aircraft only; Net quantity per package Max. 2.5kg
		PI 969 Section Ⅱ	UN3091	Cells packed with equipment
		PI 970 Section Ⅱ		Cells contained in equipment
Marine transport	IMDG Code	SP188	Not applicable	IMO/IMDG: not regulated.
Road and Rail	ADR / RID	SP188	Not applicable	IMO/IMDG: not regulated.
USA	DOT/ HMR; 49 C.F.R.	Parts 171-180	Not applicable	IMO/IMDG: not regulated.

Lithium Content Per Cell	Product Name	Air *See Section 15			Marine *See Section 15
		Cell only	Cell packed with equipment	Cell contained in equipment	
Not more than 0.3 g	All Lithium Metal Button Cell	PI968 Section IB	PI969 Section II	PI970 Section II	SP188
More than 0.3 g but not more than 1 g	(No)		PI969 Section II	PI970 Section II	SP188
More than 1 g	(No)	PI968 Section IA	PI969 Section I	PI970 Section I	SP230

Packing, marking, labelling and weight limitations must be observed as per the latest edition of the technical guidelines of the respective transport mode.

Note I: Example of Lithium Metal Battery Mark see Annex I
Example of Cargo Aircraft Only Label, see Annex II
Example of Dangerous Goods Class 9 Label, see Annex III
For information about 49 CFR visit https://www.phmsa.dot.gov

Section15 - Regulatory Information

- IATA Dangerous Goods Regulations 67th Edition (IATA DGR 2026)
- IMO International Maritime Dangerous Goods Code 2025 Edition (IMDG Code)
- International Civil Aviation Organization Training Guide-Training Implementation(ICAO TI 2025-2026 Edition)
- UN Recommendations on Transportation of Dangerous Goods, Model Regulations
- UN Recommendations on Transportation of Dangerous Goods, Manual of Tests and Criteria
- EU Battery Regulation【EU Directive 2006/66/EC and EU Regulation (EU) 2023/1542 of the European Parliament and of the Council】
- REACH regulation (1907/2006/EC)
  Duty to communicate information on substances in articles (REACH, Article 33):
  The product contains the following substance of very high concern (SVHC) in concentrations above 0.1 % w/w: DME (CAS 110-71-4): reason for inclusion in the European candidate list -Toxic for reproduction (REACH, Article 57c).
- Act on Preventing Environmental Pollution of Mercury (China)

Section 16 - Other Information

This MSDS is provided to customers as reference information in order to handle batteries safely.
It is necessary for the customer to take appropriate measures depending on the actual situation such as the individual handling, based on this information.

Prepared by: Engineering Department
Shenzhen M&LAK Industry Co., Ltd.

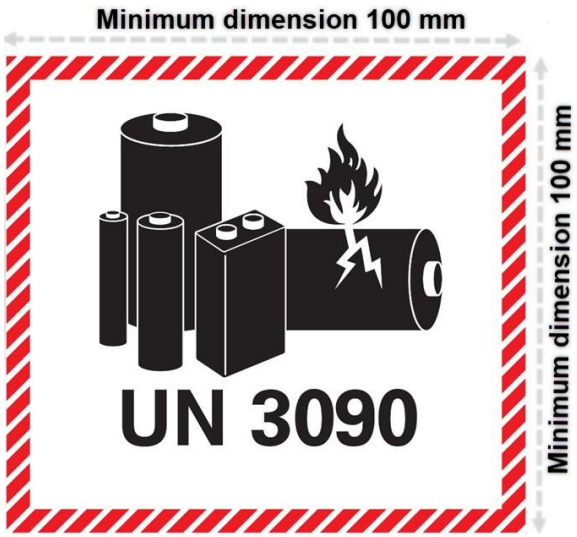
Abbreviations

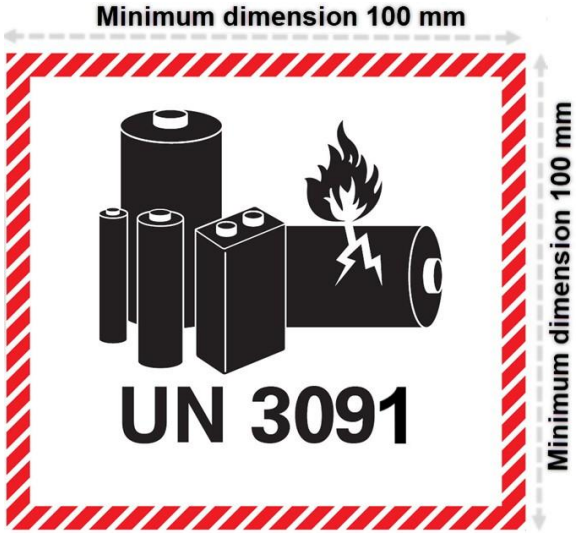
Acute Tox. 4	:	Acute toxicity, Hazard Category 4
Eye Dam. 1	:	Serious eye damage/eye irritation, Hazard Category 1
Eye Irrit. 2	:	Serious eye damage/eye irritation, Hazard Category 2
Flam Liq. 2	:	Flammable liquids, Hazard Category 2
Ox. Sol. 2	:	Oxidising Solids, Hazard Category 2
Repr. 1B	:	Reproductive toxicity, Hazard Category 1B
Skin Irrit. 2	:	Skin corrosion/irritation, Hazard Category 2
STOT RE 2	:	Specific target organ toxicity — Repeated exposure, Hazard Category 2
STOT SE 3	:	Specific target organ toxicity — Single exposure, Hazard Category 3
Water-react. 1	:	Water-reactive, Hazard Category 1
H225	:	Highly flammable liquid and vapour
H260	:	In contact with water releases flammable gases which may ignite spontaneously
H272	:	May intensify fire; oxidiser
H302	:	Harmful if swallowed
H314	:	Causes severe skin burns and eye damage
H315	:	Causes skin irritation
H332	:	Harmful if inhaled
H318	:	Causes serious eye damage
H319	:	Causes serious eye irritation
H335	:	May cause respiratory irritation
H373	:	May cause damage to organs (…) through prolonged or repeated exposure (…)
H360 FD	:	May damage fertility. May damage the unborn child.
ADR	:	European Agreement concerning the International Carriage of Dangerous Goods by Road
CAS	:	Chemical Abstracts Service (division of the American Chemical Society)
GHS	:	Globally Harmonized System of Classification and Labelling of Chemicals
IATA	:	International Air Transport Association
IMDG	:	International Maritime Code for Dangerous Goods
SVHC	:	Substance of very high concern

ANNEX I

Lithium Battery Mark

For further Information consult the IATA DGR, 67th Edition, Figure 7.1.C Lithium Battery Mark 7.1.5.5

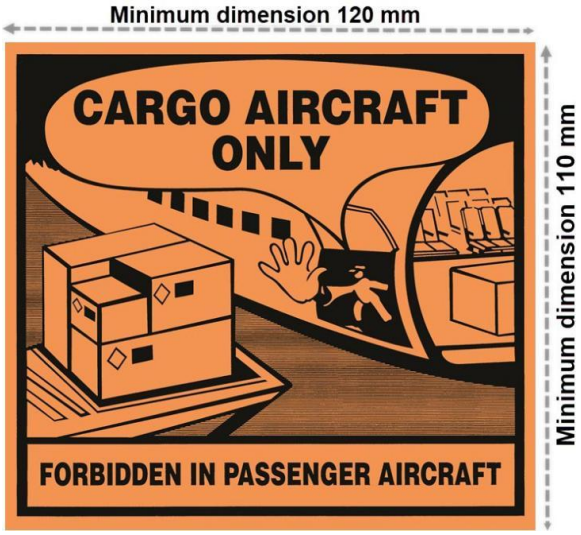




In case that the cell or battery is **packed with**, or **cointained in, equipment** the UN No. must be amended to UN 3091 (See the right figure above).

ANNEX II

Cargo Aircraft Only Label
For further Information consult the IATA DGR, 67th Edition, 7.4.2 Cargo Aircraft Only Figure 7.4.B



ANNEX III

Class 9 – Miscellaneous Dangerous Goods - Lithium Batteries
For further Information consult the IATA DGR, 67th Edition, 7.3.18.2 – Figure 7.3.X