

Article Safety Data Sheet - Lithium Metal Batteries

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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 1 - Product identification

1.1 Product identifier

Product Name: **Primary (non-rechargeable) Lithium Battery** Nominal Voltage: 3.0 V

Models: **Coin Type Cells CR Series see Annex I**

Chemical System: **Lithium Manganese Dioxide (Li + MnO₂ → LiMnO₂)**
Primary **NOT** designated for Recharge

1.2 Recommended use and restrictions on use

Recommended use: battery, no restrictions, see section 7 handling and storage.

1.3 Suppliers details

Renata SA
Kreuzenstrasse 30
CH-4452 ITINGEN / Switzerland
Tel: +41 61 975 75 75
Mail: sales@renata.com
www.renata.com

1.4 Emergency phone number

For US call The National Poison Control Center (1-800-222-1222) day or night – for advice and follow-up.

**Swallowed a Button Battery? Battery in the Nose or Ear?: National Capital Poison Center
Call 1-202-625-3333 for guidance.**

For other countries please contact the local Tox Centers
(EU: http://ec.europa.eu/growth/sectors/chemicals/poison-centres/index_en.htm).

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.

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 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 - 50	Acute Tox. 4, Acute Tox. 4, STOT RE 2	H302, H332, H373 (Brain) (Inhalation)
Lithium*	7439-93-2	1.1 - 3.3	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 - 3.5	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

* Approximate weight content of lithium in each model can be found in Annex I

** 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)

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 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.

See 1.4 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 CO₂ 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 for example LITH-X (Graphite Base). 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 (EN374) and tightly sealed protective goggles (EN166). 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

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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 (PPE)

In case of exposure to inner component/material (i.e. when handling damaged batteries), protect your skin and eyes with chemical resistant protective gloves (EN374) and tightly sealed protective goggles (EN166).

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

Section 9 - Physical and Chemical Properties

9.1 Basic physical and chemical properties

Physical state:	Solid
Colour:	according to product specifications
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

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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 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 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 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 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 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
 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 – See Section 7, Annex I.

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

UN-No. UN 3090
Proper Shipping Name: Lithium metal batteries

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

Shipping Method	Dangerous Goods Regulations	Packing Instructions and Special Provisions
Air Cargo aircraft only (Forbidden for transport aboard passenger aircraft)	ICAO TI 2021-2022 related to: IATA Dangerous Goods Regulations 2022 (63 rd Edition)	Packing Instruction 968, Section II* Only applies for shipments, were the total net weight of the batteries does not exceed 2.5 kg and the shipment does not exceed more than one package (handling unit). Shipper's Declaration (DGD) is not required. <i>*IATA DGR: Section II have been removed for PI 965. There is a 3-month transition period until 31 March 2022, during this time shippers may continue use Section II.</i> Packing Instruction 968, Section IB Applies for shipments with more than one package, total net weight do not have to exceed 2.5 kg pro package (handling unit). Shipper's Declaration (DGD) is required.
Road and Rail Europe	ADR / RID 2021	Special Provision 188
Marine	IMDG Code, 2020 Edition (Amdt. 40-20) comes into force on 01-Jun-2022 and may be applied voluntarily as from 01-Jan-2021	Special Provision 188
USA	DOT/ HMR; 49 C.F.R.	Parts 171-180

Summary of Transport Packing Instructions and Special Provisions of above mentioned Technical Guidelines:

1. For all lithium metal (button) cells, listed in Annex I the lithium content is not more than 0.3 g and for lithium metal batteries the lithium content is not more than 0.3 g.
2. For all the lithium metal (button) cells, listed in Annex I, that the cells are fully and successfully tested to meet the requirements of each test in the UN Manual of *Tests and Criteria*, Part III, subsection 38.3 - (IATA DGR 3.9.2.6).
3. Our cells are safe for transport when build-in equipment¹ (IATA - PI 970) or packed with equipment² (IATA - PI 969) shipped under UN3091. Proper shipper name vary, see below:

UN No.	IATA DGR - Proper Shipper Name	IATA DGR - Packaging Instruction
¹ UN3091	Lithium metal batteries contained in equipment	970
² UN3091	Lithium metal batteries packed with equipment	969

Important: assembly of the cells and batteries is the responsibility of the customer and may makes new safety tests related to devices necessary.

For download the UN38.3 Test summary, press the link of the requested model, mentioned in the [Annex I](#)

4. 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 II
 Example of Cargo Aircraft Only Label, see Annex III
 Example of Dangerous Goods Class 9 Label, see Annex IV
 For information about 49 CFR visit <https://www.phmsa.dot.gov>

Section15 - Regulatory Information

Environment-related law of batteries: EU nations have applicable law in accordance with Directive 2006/66/EC and other some countries, China, Korea, Brazil, some provinces of USA and Canada or so have similar law.

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).

Section 16 - Other Information

RENATA's lithium batteries are registered by UNDERWRITERS LABORATORIES INC., NORTHBROOK, IL, U.S.A., under file number MH14002.

Further information is given in RENATA Designer's Guide.

For lithium cells and batteries in general, Safety Standard IEC 60086-4 applies, which also contains detailed recommendations for manufacturers of equipment and users.

For further information on RENATA's lithium cells and batteries visit our website: www.renata.com.

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
 H318: Causes serious eye damage
 H319: Causes serious eye irritation
 H332: Harmful if inhaled
 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

APPROXIMATE WEIGHT CONTENT OF LITHIUM IN RENATA LITHIUM BATTERIES AND UN38.3 TEST REPORTS

Model no.	% Lithium Max	Weight of battery (in g)	Qty Li (Max in mg)	UN38.3 Test Summary (link to our homepage)
CR1025	1.50%	0.6	9	Test Summary
CR1216 MFR	1.20%	0.7	8	Test Summary
CR1220 MFR	1.20%	0.9	10	Test Summary
CR1225	1.70%	0.9	15	Test Summary
CR1616	1.30%	1.1	15	Test Summary
CR1620	1.80%	1.2	21	Test Summary
CR1632	2.20%	1.8	39	Test Summary
CR2016 MFR	1.50%	1.7	26	Test Summary
CR2016.MFR	1.30%	1.8	23	Test Summary
CR2025 MFR	2.00%	2.5	50	Test Summary
CR2025.MFR	1.90%	2.5	48	Test Summary
CR2032 MFR	2.00%	2.8	56	Test Summary
CR2032.MFR	2.20%	2.9	65	Test Summary
CR2320	1.60%	2.7	43	Test Summary
CR2325	1.80%	3	55	Test Summary
CR2430	2.00%	4.1	80	Test Summary
CR2450HT	2.20%	6.7	149	Test Summary
CR2450N	2.70%	5.9	160	Test Summary
CR2450N-MFR	2.60%	6	156	Test Summary
CR2477N	3.30%	8.3	270	Test Summary

Power Modules / used cell Modell	% Lithium Max	Weight of battery (in g)	Qty Li (Max in mg)	UN38.3 Test Summary <i>(link to our homepage)</i>
338A / CR1225	1.70%	1.7	15	Test Summary
1000-0 / CR2477N	3.30%	15	270	Test Summary

Power Modules (Non self-running device)

The encapsulated battery is hermetically sealed and therefore suitable for applications in harsh environmental conditions.

For download the UN38.3 Test Summary, please press on the link of each model above.

ANNEX II

Lithium Battery Mark

For further Information consult the IATA DGR, 63rd Edition, Figure 7.1.C Lithium Battery Mark 7.1.5.5



In case that the cell or battery is packed with, or contained in, equipment the UN Nr. must be amended to UN 3091

ANNEX III

Cargo Aircraft Only Label

For further Information consult the IATA DGR, 63rd Edition, 7.4.2 Cargo Aircraft Only Figure 7.4.B



ANNEX IV

Class 9 – Miscellaneous Dangerous Goods - Lithium Batteries

For further Information consult the IATA DGR, 63rd Edition, 7.3.18.2 – Figure 7.3.X

