Safety Data Sheet
MSDS 2.001.020

Lithium thionyl chloride cylindrical cell

1. Identification of the product and of the company undertaking

Product details

Trade name:	Lithium thionyl chloride cylindrical cell
Voltage:	3.6 V (or multiples of this in case of multi-cell configurations)
Electrochemical system:	Lithium metal | inorganic electrolyte | thionyl chloride
Anode (negative):	Lithium metal
Cathode (positive):	Thionyl chloride

Type:	**Lithium content per cell:**
ER 1/2 AA	0,30 g
ER AA	0,62 g
ER A	0,97 g
ER C	2.2 g
ER D	4,9 g

Supplier details

Address:	VARTA Microbattery GmbH Daimlerstr. 1 D-73479 Ellwangen/Jagst Germany
Emergency telephone number:	+49-7961-921-110 (VAC)

Legal Remark (U.S.A.)

Safety Data Sheets are a sub-requirement of the Occupational Safety and Health Administration (OSHA) Hazard Communication Standard, 29 CFR Subpart 1910.1200. This Hazard Communication Standard does not apply to various subcategories including anything defined by OSHA as an "article". According to OSHA, Article means a manufactured item other than a fluid or particle: (i) which is formed to a specific shape or design during manufacture; (ii) which has end use function(s) dependent in whole or in part upon its shape or design during end use; and (iii) which under normal conditions of use does not release more than very small quantities, e.g., minute or trace amounts of a hazardous chemical (as determined under paragraph (d) of this section), and does not pose a physical hazard or health risk to employees.

Because all of our batteries are defined as "articles", they are exempted from the requirements of the Hazard Communication Standard.

Legal remark (EU)

These batteries are no “substances” or “mixtures” according to Regulation (EC) No 1907/2006 EC. Instead they have to be regarded as “articles”, no substances are intended to be released during handling. Therefore there is no obligation to supply a “safety data sheet according to Regulation (EC) 1907/2006, Article 31”.

General remark

This Safety Data Sheet is provided as a service to our customers. The details presented are in accordance with our present knowledge and experiences. They are no contractual assurances of product attributes.

2. Hazards identification

The battery is sealed hermetically. Thus, the ingredients have no hazard potential, except the battery is violated or dismantled.

If in case of mistreatment the ingredients may be released, their properties are described in chapter 3.

Attention: If batteries are treated wrong the danger of burns or bursts occurs. Batteries must not be heated above 85°C or incinerated. The battery contents must not get in contact with water. If the negative electrode gets in contact with water or humidity hydrogen gas is formed, which may inflame spontaneously, accordingly, a contact of the positive electrode material with water or humidity generates a very corrosive reaction mixture.

3. Composition/information on ingredients

Ingredients

Contents	CAS No.	Hazard Categories	Hazard Statements	Material
1 - 6 %	7439-93-2	Water-react. 1 Skin Corr. 1B	H260 H314	Lithium
20 - 47 %	7719-09-7	Acute Tox. 4 * Acute Tox. 4 * Skin Corr. 1A	H332 H302 H314	Thionyl chloride
2 - 5 %	1333-86-4	-	-	Carbon
2 - 5 %	7446-70-0	Skin Corr. 1B	H314	Aluminium chloride
1 - 2 %	7447-41-8	Acute Tox. 4 * Skin Corr. 2 Eye Irrit. 2	H302 H315 H319	Lithium chloride

Full text of Hazard statements: see section 16.

Heavy Metals

Contents	CAS No.	Material
< 1 mg/kg	7440-43-9	Cadmium
< 10 mg/kg	7439-92-1	Lead
< 0,1 mg/kg	7439-97-6	Mercury (none intentionally introduced, see Chapter 12)
< 5 mg/kg		Hexavalent Chromium (Cr^{6+})

Other Ingredients

Contents	CAS No.	Material
33 – 74 %		Steel and nickel
2 – 10 %		Plastic

4. First-aid measures

Measures at accidental release

After inhalation:	Remove to fresh air, rest, half-upright position, use artificial respiration if needed, and refer to medical attention
After skin contact:	Remove contaminated clothes and rinse skin with plenty of water or shower for 15 min. Refer to medical attention.
After eye contact:	First rinse with plenty of water for 15 minutes (remove contact lenses if easily possible), then take to a doctor.
After ingestion:	Rinse mouth, DO NOT induce vomiting, give plenty of water to drink, and refer to medical attention.

5. Fire-fighting measures

Suitable extinguishing media:	Metal fire extinction powder, rock salt or dry sand shall be used. If the fire is in adjacent area and the cells that are either packed in their original containers or unpacked, the fire can be fought based on fuelling material, e.g., paper and plastic products. In these cases the use of copious amounts of cold water is effective extinguishing media. Storage area may employ sprinkler system with cold water.
Extinguishing media with limited suitability:	Carbon dioxide (CO_2) is not suitable. Water in small quantities may have adverse effects.
Special protection equipment during fire-fighting:	Wear self-contained breathing apparatus to avoid breathing of irritant fumes (NIOSH approved SCBA & full protective equipment). Wear protective clothing and equipment to prevent body contact with electrolyte solution.
Special hazard:	Battery may explode when subject to: excessive heat (above 150ºC), recharged, over-discharged (discharge below 0V), punctured and crushed. During thermal decomposition, generation of chlorine (Cl_2), hydrogen chloride (HCl), and sulfur dioxide (SO_2) is possible.
Attention:	Do not let used extinguishing media penetrate into surface water or ground water. Dispose off properly.

6. Accidental release measures

Person related measures:	Wear personal protective equipment adapted to the situation (protection gloves, cloth, face protection, breathing protection).
Environment protection measures:	In the event of battery rapture and leakage: contain the spill while wearing proper protective clothing and ventilate the area. Then, cover with sodium carbonate (Na_2CO_3) or 1:1 mixture of soda ash and slaked slime. Keep away from water, rain, and snow. Place in approved container (after cooling if necessary) and dispose according to the local regulations. NEUTRALIZING AGENT: Sodium carbonate (Na_2CO_3) or 1:1 mixture of sodium carbonate and slaked lime ($Ca(OH)_2$). WASTE DISPOSAL METHOD: Product decomposed by water must be neutralized. May be added to waste water in sufficiently diluted form.

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7. Handling and storage

Guideline for safe handling:	Always follow the warning information on the batteries and in the manuals of devices. Only use the recommended battery types. Keep batteries away from children. For devices to be used by children, the battery casing should be protected against unauthorized access. Unpacked batteries shall not lie about in bulk. In case of battery change always replace all batteries by new ones of identical type and brand. Do not swallow batteries. Do not throw batteries into water. Do not throw batteries into fire. Do not short-circuit batteries. Do not recharge primary batteries. Do not open or disassemble batteries.
Storage:	Storage preferably in cool (below 30ºC), dry and ventilated area, which is subject to little temperature change. Do not place the battery near heating equipment, nor expose to direct sunlight for long periods. Elevated temperatures can result in shortened battery life and degrade performance. Keep batteries in original packaging until use and do not jumble them. Do not store batteries in high humidity environment for long periods. If possible, store the batteries in original packaging (because of short circuit protection and exemptions according to transport regulations).
Storage category according to TRGS 510:	It is recommended to consider the “Technical Rule for Hazardous Substances TRGS 510 - Storage of hazardous substances in nonstationary containers” and to handle lithium thionyl chloride cylindrical cells according to storage category 11 (“combustible solids“).
Storage of large amounts:	Follow the recommendations of the German Insurance Association (GDV - “Gesamtverband der Deutschen Versicherungswirtschaft e.V.”) concerning lithium batteries: http://vds.de/fileadmin/vds_publikationen/vds_3103_web.pdf In case of storage of large amounts (used storage volume > 7 m^3 and/or more than 6 pallets) batteries shall be stored in fire-resistant or separated rooms or areas (e.g. warehouse or container for hazardous materials). Mixed storage with other products is not allowed. The storage area shall be monitored by an automatic fire detection system, connected to a permanently manned place. A fire-extinguishing system shall reflect the extinguishing agents mentioned in chapter 5.

8. Exposure controls/personal protection

Under normal conditions (during discharge) release of ingredients does not occur.

9. Physical and chemical properties

Not applicable if closed.

10. Stability and reactivity

Dangerous reactions: When heated above 85°C the risk of rupture occurs.

11. Toxicological information

Under normal conditions (during charge and discharge) release of ingredients does not occur. In case of accidental release see information in chapter 2.

Swallowing of a battery can be harmful. Call the local Poison Control Centre for advice and follow-up.

12. Ecological information

VARTA lithium thionyl chloride cylindrical cells do not contain heavy metals as defined by the European directives 2006/66/EC Article 21; they comply with the chemical composition requirements of this Directive.

Mercury has not been “intentionally introduced (as distinguished from mercury that may be incidentally present in other materials)” in the sense of the U.S.A. “Mercury-Containing and Rechargeable Battery Management Act’’ (May 13 1996).

The Regulation on Mercury Content Limitation for Batteries promulgated on 1997-12-31 by the China authorities including the State Administration of Light Industry and the State Environmental Protection Administration defines ‘low mercury’ as ‘mercury content by weight in battery as less than 0.025%’, and ‘mercury free’ as ‘mercury content by weight in battery as less than 0.0001%’. And therefore: VARTA lithium thionyl chloride cylindrical cells belong to the category of mercury-free battery (mercury content lower than 0.0001%).

13. Disposal considerations

USA: Lithium thionyl chloride cylindrical cells are classified by the federal government as non-hazardous waste and are safe for disposal in the normal municipal waste stream.

In the European Union, manufacturing, handling and disposal of batteries is regulated on the basis of the DIRECTIVE 2006/66/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 6 September 2006 on batteries and accumulators and waste batteries and accumulators and repealing Directive 91/157/EEC. Customers find detailed information on disposal in their specific countries using the web site of the European Portable Batteries Association (http://www.epbaeurope.net/legislation_national.html).

Importers and users outside EU should consider the local law and rules.

In order to avoid short circuit and heating, used lithium thionyl chloride cylindrical cells should never be stored or transported in bulk. Proper measures against short circuit are:

- Storage of batteries in original packaging
- Coverage of the terminals
- Embedding in dry sand

14. Transport information

General considerations

Lithium thionyl chloride cylindrical cells sold by VARTA Microbattery are considered to be UN3090 Lithium Metal Batteries and are tested according to 38.3 of the “UN Manual of Tests and Criteria” for compliance with the requirements of the Dangerous Goods regulations ADR, RID, IMDG,as well as the requirements of DOT / 49 CFR § 173.185, and the General Requirements of IATA DGR packing instruction 968. Positive test results as well as other relevant information required for transportation are stated in dedicated “Declarations of Conformity”.

Transportations of cells or batteries packed with equipment or contained in equipment have to follow the appropriate regulations for UN3091.

During the transportation of large amounts of batteries by ship, trailer or railway, do not store them in places of high temperature and do not allow them to be exposed to condensation. During the transportation do not allow the packaging to be damaged, as a damage of the packaging may cause fire. In the event packaging is damaged, special procedures must be used including inspection and repackaging if necessary and handle with care.

Compilations of transport requirements for Lithium batteries can be found in:
https://www.lithium-batterie-service.de/en/
http://www.hyperedizioni.com/news/the-lithium-batteries/3139/The-lithium-batteries.html

USA

Primary (non-rechargeable) lithium batteries and cells are forbidden for transport aboard passenger carrying aircraft. The outside of each package that contains primary (non-rechargeable) lithium batteries or cells must be marked "PRIMARY LITHIUM BATTERIES-FORBIDDEN FOR TRANSPORT ABOARD PASSENGER AIRCRAFT" on a background of contrasting color.

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IEC 60086-1

Code of practice for packaging and shipment of primary batteries given in IEC 60086-1:

The packaging shall be adequate to avoid mechanical damage during transport, handling and stacking. The materials and pack design shall be chosen so as to prevent the development of unintentional electrical conduction, corrosion of the terminals and ingress of moisture.

Shock and vibration shall be kept to a minimum. For instance, boxes 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.

15. Regulatory information

Marking consideration:	European Union: According to Directive 2006/66/EC, the batteries have to be marked with the crossed wheel bin symbol.
International safety standards:	The basis cells are approved according to UL 1642.
Water hazard class:	The regulations of the German Federal Water Management Act (WHG) are not applicable as lithium thionyl chloride cylindrical cells/batteries are articles and not substances, thus there is no risk of water pollution, except the batteries are violated or dismantled.

16. Other information

Full text of Hazard Statements referred to under section 3

H260	In contact with water releases flammable gases which may ignite spontaneously.
H302	Harmful if swallowed.
H314	Causes severe skin burns and eye damage.
H315	Causes skin irritation.
H319	Causes serious eye irritation.
H332	Harmful if inhaled.

Note:	Date of issue of the transport regulations: ADR 2015, RID 2015, IATA 2016 (57th edition), IMDG 2014, DOT / 49 CFR 2015. Latest covered modification of the European Battery Directive 2006/66/EC: Directive 2013/56/EU.
Issued by:	VARTA Microbattery GmbH Quality/Environmental Management
Contact:	http://contact.varta-microbattery.com
Updates:	Current SDS can be downloaded from VARTA's web page following the link: http://www.varta-microbattery.com/en/news-downloads/downloads.html

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