



Material - Safety - Data Sheet (MSDS)
for
Ansmann Lithium-Manganese-Dioxide (Li-metal) Batteries
single cells and multi-cell batteries

No.4

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The information contained within is provided as a service to our customers and for their information only. The information and recommendations set forth herein are made in good faith and are believed to be accurate at the date of preparation. ANSMANN AG makes no warranty expressed or implied.

Section 1

Product and Supplier Identification

Product name: **Primary (non-rechargeable) Lithium Battery**; nominal voltage: 3.0V
Models / types: Photo Batteries: CR123, CR2, 2CR5, CR-P2,
Button Cells: CR1025, CR1216, CR1220, CR1225, CR1616, CR1620, CR1632, CR2016, CR2025, CR2032, CR2330, CR2354, CR2430, CR2450, CR2477, CR3032
E-Block, 9V, (CR-V9, ER9V)
Electrochemical system: **Lithium Manganese Dioxide** ($\text{Li} + \text{MnO}_2 \rightarrow \text{LiMnO}_2$)
Primary, **not** designated for Recharge

Supplier:
Germany ANSMANN AG
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EMERGENCY CONTACT: For chemical emergency only (spill, leak, fire, exposure or accident)
call CHEMTREC at: 800-424-9300 within the USA and Canada
+1 703-527-3887 outside the USA and Canada
Non-emergency calls cannot be serviced at this number.

Legal remark (USA)

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 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.



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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 1907/2006EC. 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.

Section 2 Hazards Identification

2.1 Classification of the substance or mixture

Classification according to UN-GHS

Batteries are considered as articles 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 in section 3 and 16; this is for information purposes only.

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 the 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 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.

Section 3 Composition and Informations 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:

Ingredients	Content	CAS No.	Hazard Categories	Hazard Statements
Manganese Dioxide (MnO ₂)	15 - 50%	1313-13-9	Acute Tox. 4 STOT RE2	H302, H332, H373
Lithium (Li)	1.1 - 3.3%	7439-93-2	Water-react. 1 Skin Corr. 1B	H260, H314
Propylene Carbonate (PC)	2 - 9%	108-32-7	Skin Irrit. 2	H319
1,2 Dimethoxy Ethane (DME)	1 - 3.5%	110-71-4	Flam Liq.2, Acute Tox.4 Repr. 1B	H225, H332, H360FD
Lithium Trifluoromethyl Sulfonate (CF ₃ SO ₃ Li) (only Photo Batteries)	< 5%	33454-82-9	Skin Irrit. 2 Eye Irrit. 2 STOT SE3	H315, H319, H335
Lithium Perchlorate (LiClO ₄) (only Button Cells)	< 1%	7791-03-9	Ox. Sol. 2, Skin Irrit. 2 Eye Irrit. 2A STOT SE3	H272, H315, H319, H335
Graphite, synthetic (C) (only Button Cells)	3 - 10%	7440-44-0	Eye Irrit. 2A STOT SE3	
Stainless steel (Fe)	30 - 80%	65997-19-5		
Plastics, paper, water	10 - 20%			

Full text of Hazard Statements and GHS pictograms: see chapter 16
Approximate weight of metallic lithium per cell/battery: see chapter 16



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Section 4 **First Aid Measures**

None, unless internal material exposure

4.1 Description of necessary first aid measures

Skin Contact: Wash off skin thoroughly with water. Remove contaminated clothing and wash before re-use. If irritation persists, get medical help.

Eye Contact: Irrigate thoroughly with water for at least 15 minutes. Lifting upper and lower lids, until no evidence of the chemical remains. Obtain medical attention immediately.

Ingestion: Seek medical attention immediately.

Inhalation: If battery is leaking, contents may be irritating to respiratory passages. Move to fresh air. If irritation persists, seek medical advice.

Further treatment: All cases of eye contamination, persistent skin irritation and casualties who have swallowed this substance or been affected by breathing its vapours should be seen by a doctor.

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 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 emergency phone number in section 1.

In case of exposure to inner components/material of the battery:

Harmful if swallowed (Manganesedioxide)

Harmful if inhaled (Manganesedioxide, DME; LiClO_4)

May cause damage to organs (brain) through prolonged or repeated exposure (inhalation) (Manganesedioxide)

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. 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 chemical

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 firefighters

Firefighters should wear positive pressure self-contained breathing apparatus to avoid inhalation of hazardous decomposition products. Fight fire from a distance or protected area while using full protective clothing.

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 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 (EN374) and tightly sealed protective goggles (EN166). Avoid direct contact with internal components.

Section 7 Precautions for safe Handling and Storage

When used correctly, alkaline batteries provide a safe and dependable source of power. However, if they are misused or abused, leakage, heating or in extreme case, explosion may result. Therefore pay attention to the following recommendations:

- 7.1 Storage:** Store batteries in a dry place at normal room temperature (+10°C...+25°C), never exceeding +30°C, away from moisture, sources of heat, open flames, food and drink. Elevated temperatures can result in shortened battery life. Temperatures above 100°C may result in battery leakage and rupture. Storage at low temperature will make them last longer; however do not refrigerate! Storage of unpacked batteries can cause electrical short circuit and heat generation. Avoid large temperature changes and direct sunlight.
- 7.2 Storage of big quantities:** If possible, store the batteries in the original packaging, isolated from unnecessary combustibles. A fire alarm is recommended. Do not stack battery cartons on top of each other exceeding a specified height. For automatic fire extinguisher consider section 5 "Fire Fighting Measures"
- 7.3 Handling:** Avoid mechanical or electrical abuse. Do not short circuit or install incorrectly. Install batteries in accordance with equipment instructions. In case of battery change always replace all batteries by new ones of identical type and brand. Do not carry batteries loose in a pocket or bag. Keep batteries away from children. For devices to be used by children, the battery casing should be protected against unauthorized access. Do not swallow batteries. Do not throw batteries into fire or water.
- 7.4 Charging:** **Do not charge this batteries!** This battery type is manufactured in a ready-to-use-state. It is not designed for recharging.
- 7.5 Disposal:** Dispose in accordance with all applicable federal, state and local regulations. Do not incinerate or subject battery cells to temperatures in excess of 100°C (212°F). Such treatment can cause cell rupture.

Section 8 Exposure Controls / Special Protection Information

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).

Ventilation Requirements: Not necessary under conditions of normal use. Room ventilation may be required in areas where there are open or leaking batteries.

Respiratory Protection: Not necessary under conditions of normal use. Avoid exposure to electrolyte fumes from open or leaking battery. In all fire situations, use self-contained breathing apparatus



Eye Protection: Not necessary under conditions of normal use. Wear tightly sealed protective goggles if handling an open or leaking battery.



Hand Protection: Not necessary under conditions of normal use. Use neoprene or natural rubber gloves if handling an open or leaking battery



Other protective clothing or equipment:

Not necessary under conditions of normal use.



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Section 9 **Physical and Chemical Properties**

9.1 Basic physical and chemical properties

Physical state:	solid	Vapour Pressure:	n/a*
Melting/Freezing Point:	n/a*	VOC Content:	n/a*
Boiling Point/Range:	n/a*	Solubility:	n/a*
Evaporation Rate:	not determined	pH:	n/a*
(Relative) Density:	n/a*	Auto-Ignition Temperature:	n/a*
Relative Vapour Density:	n/a*	Kinematic Viscosity:	n/a*
Flammability (Limit):	not determined	Colour:	according to product specific.
Odour:	n/a*		
Flash Point:	flash point of electrolyte solvents: DME: -6°C, PC: 123°C, Mixture: 20°C		
Decomposition Temperature:	no decomposition under normal conditions of use		

n/a*: not applicable for closed batteries

Section 10 **Stability and Reactivity**

Lithium batteries are contained in a stable 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



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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 entry

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 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.

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.

ANSMANN Lithium manganese cells described in this MSDS do not contain heavy metals as defined by the European Directive 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 USA "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: ANSMANN Lithium manganese cells/batteries belong to the category of mercury-free battery (mercury content lower than 0.00001%)

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 and other adverse effects

No further information available.



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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.

EU: 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 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.

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)

Section 14

Transport Information

Lithium metal batteries are classified as Class 9 Dangerous Goods in the United Nations Recommendation. In case of transport, compliance with all the relevant UN regulations is required.

Even though the batteries are classified as lithium metal batteries (UN3090, 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, for batteries the lithium content is not more than 2g
2. Each cell / battery is type proven to meet the requirements of each test in the UN Manual of Tests and Criteria, Part III, subsection 38.3 (edition 5) - (DGR 39.2.6).
3. Each cell / battery is manufactured in ISO9001 certified factory

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

ADR

UN-Number: 3090
description: Lithium metal batteries
class: 9
packaging order: P903
special provision: 188; 230; 310; 376; 377; 636
tunnel forbidden code: E

UN-Number: 3091
description: Lithium metal batteries contained in equipment / packed with equipment
class: 9
packaging order: P903
special provision: 188; 230; 310; 376; 377; 636
tunnel forbidden code: E

IATA

UN-Number: 3090
description: Lithium metal batteries
class: 9
packaging order: 968 Section II if Li content is: < 0.3g / cell or < 0.3g / battery
Section I B if Li content is: > 0.3g < 1g / cell or > 0.3g < 2g / battery
special provision: A88; A99; A154; A164; A183; A201; A206



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UN-Number: 3091
description: Lithium metal batteries contained in equipment
class: 9
packaging order: 970 Section II if Li content is: < 1g / cell or < 2g / battery
special provision: A48; A88; A99; A154; A164; A181; A185; A206

UN-Number: 3091
description: Lithium metal batteries packed with equipment
class: 9
packaging order: 969 Section II if Li content is: < 1g / cell or < 2g / battery
special provision: A88; A99; A154; A164; A181; A185; A206

IMDG-Code 2015

UN-Number: 3090
description: Lithium metal batteries
class: 9
packaging order: P903
special provision: 188; 230; 310; 376; 377; 384

UN-Number: 3091
description: Lithium metal batteries contained in equipment / packed with equipment
class: 9
packaging order: P903
special provision: 188; 230; 310; 360; 376; 377; 384

USA (DOT 49 CFR)

special provision: 49 CFR Section 173.185

Other:

All Ansmann CR Lithium Metall cells and batteries fulfil the conditions pursuant to the requirements for partly regulated transportation of the relevant rules and regulations according to the above mentioned technical guidelines.

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

Note:

Lithium metal cells and batteries are forbidden for transportation aboard passenger-carrying aircraft

General Handling Instructions

Battery cartons should be handled with care. Rough handling may result in batteries being short circuited or damaged. This may cause leakage, explosion or fire. (Refer also to section 7)

General Remark

The exemptions from dangerous goods regulations are only applicable with the respect to the delivery form / packaging in which the lithium batteries are dispatched by ANSMANN. Any re-packing or assembly of the cells and batteries is in the responsibility of the customer.

Section 15 Regulatory Information

Environment-related law of batteries: EU nations have applicable law in accordance with Directive 2006/66/EC and some other 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

Aproximate weight of metallic lithium per cell / battery:

CR1025: 0.008 g	CR1620: 0.02 g	CR2032: 0.07 g	CR2450: 0.18g	CR123: 0.6 g
CR1216: 0.008 g	CR1632: 0.04 g	CR2330: 0.08 g	CR2477: 0.29g	CR2: 0.33 g
CR1220: 0.01 g	CR2016: 0.03 g	CR2354: 0.17 g	CR3032: 0.15g	per battery:
CR1616: 0.02 g	CR2025: 0.05 g	CR2430: 0.09 g	CR1/3N: 0.06g	CR-V9: 1.36 g
				2CR5: 1.2g
				CR-2P: 1.2g

Full text of Hazard Statements referred to under section 3

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
H335	May cause respiratory irritation
H360FD	May damage fertility. May damage the unborn child.
H373	May cause damage to organs (brain) through prolonged or repeated exposure



Abbreviations

Acute Tox.4	Acute toxicity, Hazard category 4
Eye Dam. 1	Serious eye damage / irritation, Hazard category 1
Eye Irrit. 2	Serious eye damage / 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 RE2	Specific target organ toxicity - repeated exposure, Hazard category 2
STOT SE3	Specific target organ toxicity - single exposure, Hazard category 3
Water-react. 1	Water reactive, Hazard category 1
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 of Dangerous Goods
SVHC	substance of very high concern

Note: Date of issue of the transport regulations: ADR 2017; RID 2017, IATA 2018 (59th edition), IMDG 2016, DOT / CFR 2017
Latest covered modification of the European Battery Directive 2006/66/EC: Directive 2013/56/EU

Issued by: Ansmann AG, Industriestrasse 10, 97959 Assamstadt / Germany

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