

PRODUCT SAFETY DATA SHEET

Lithium ion manganese oxide battery

4S2P ICR18650HA1

BMZ Item No. **14036-1TP**

According to Regulation (EC) No 1907/2006 (REACH) a safety data sheet must be provided for substances and preparations only. Batteries are not affected by the requirements of this Regulation.

1. Identification of the substance and of the manufacturer

Identification:	Product category	Lithium ion battery
	Model name	4S2P BCMICR18650F3H
	Nominal voltage	14.4 V
	Nominal capacity	2.6 Ah
	Nominal energy	37.44 Wh
	Chemical system	Lithium manganese oxide / Graphite
	Rechargeable	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No

Manufacturer:	Name and address	Batterien-Montage-Zentrum GmbH Am Sportplatz 28-30 D-63791 Karlstein am Main
	Phone	+49 (0) 6188 / 9956-0
	Telefax	+49 (0) 6188 / 9956-900
	E-mail	mail@bmz-gmbh.de

Karlstein, 03.07.2014



i.A. Dr. Jochen Mähliß (Dipl.-Chem.)
Richtlinienbeauftragter / Compliance Officer

2. Hazards identification

Hazards: Lithium-ion batteries may present a risk of fire or explosion or chemical burn when mistreated. Do not short circuit, puncture, incinerate, crush, immerse, force discharge or expose to temperatures above the declared operating temperature range of the product. Read instructions carefully.

Geschäftsführer

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Sparkasse Aschaffenburg
Deutsche Bank

Sven Bauer

St. Nr.: 122/5044 Ust.-ID-Nr.: DE 811770243
BIC: COBADEFF795 IBAN: DE35795400490105770200BLZ 79540049
BIC: BYLADEM1ASA IBAN: DE7179550000240004283BLZ: 79550000
BIC: DEUTDEFF508 IBAN: DE85508700050010501500BLZ 50870005

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Under normal conditions of use, the chemicals and metals are contained in a sealed can and are not exposed to the outside. Risk of exposure only in case of abuse (mechanical, thermal, electrical) which leads to the activation of safety valves and/or the rupture of the battery housing. Electrolyte leakage, electrode materials reaction with moisture/water or battery vent/fire/explosion may follow, depending on the circumstances.

Touching live parts may cause electrical shock which may result in thermal heating or muscle paralyzing effects. The latter may cause ventricular fibrillation, sudden cardiac arrest or respiratory paralysis with fatal ending.

Toxicity: If a battery burns, the vapors can irritate eyes, skin and the respiratory tract.

3. Reaction equation, composition and information on ingredients

Oxidation: $\text{Li}_x\text{C}_6 \rightarrow \text{Li}_{1-x}\text{C}_6 + x \text{Li}^+ + x \text{e}^-$

Reduction: $\text{Li}_{1-x}\text{Mn}_2\text{O}_4 + x \text{Li}^+ + x \text{e}^- \rightarrow \text{LiMn}_2\text{O}_4$

The following components are found inside the sealed Li-ion battery can.

Component	Chemical name	CAS number
Cathode	Lithium manganese oxide	39457-42-6
Anode	Graphite	7782-42-5
Electrolyte	Ethyl acetate	141-78-6
	Ethylene carbonate	96-49-1
	Dimethyl carbonate	616-36-6
	Lithium hexafluorophosphate	21324-40-3
Binder	Polyvinylidene difluoride	24937-79-9

4. First aid measures

The chemicals are contained in sealed cans. Upon normal conditions of use, risk of exposure occurs only if the battery is mechanically, thermally or electrically abused.

If chemicals leak attend these advices:

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- Inhalation:** Contents of an opened battery can cause respiratory irritation.
Provide fresh air and call a doctor.
- Skin contact:** Contents of an opened battery can cause skin irritation.
Wash skin with soap and water.
- Eye contact:** Contents of an opened battery can cause eye irritation.
Immediately flush eyes thoroughly with water for 15 minutes and seek medical attention.

If it should have come to an electric shock, your acting should be based on the following:

- do not touch the injured person until you have ensured the absence of voltage;
- take away exposed live cables from the injured person by using non-conductive items;
- primary objective in the treatment of unconscious patients is the maintenance of their breathing and cardiovascular system. If necessary you have to give cardiopulmonary resuscitation.
- cool burn injuries and cover them with an aseptic and non-fluffy wound dressing.

5. Fire fighting measures

- In case of fire:** Use dry chemical extinguishers.
- Caution:** Before starting to extinguish the fire, be sure, that you are at windward of fire. So you cannot inhale toxic vapors.

6. Accidental release measures

Wipe up leaked electrolyte fluid with an absorbent cloth.

If there is a lot of leaked electrolyte, you should wear:

- protective clothing
- gas mask for organic gases
- safety goggles
- gauntlets

7. Handling and storage

- Handling:** Do not open the battery. Do not crush, disassemble, drop or solder.

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BATTERIEN-MONTAGE-ZENTRUM GMBH

Am Sportplatz 28-30 · D-63791 Karlstein am Main

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E-Mail: mail@bmz-gmbh.de · Internet: www.bmz-gmbh.de



Charging: Charge within limits of +32 °F to +113 °F temperature
Charge only with specified charger designed for this battery.

Discharging: Discharge within limits of -4 °F to +140 °F temperature.

Caution: Wrong handling can cause fire or explosion.

Storage: Temperature: -4 °F to +113 °F
Humidity range: 0 % to 80 %
Well ventilated area.
Short circuit can ransom burn.
Do not store with metal objects.

8. Exposure controls and personal protection

Advices under Point 7 must be observed. You have to check continuously that storage temperature is within the specified limits. Additionally, you have to ensure that there is a suitable ventilation in order to avoid water logging.

For normal use you don't need any protective equipment.

9. Physical and chemical properties

Appearance: 8 cells in black plastic housing.

Weight: 590 g

Chemical properties: see Point 3

10. Stability and reactivity

During a long storage the capacity will be reduced and the lifespan of the battery will be shorter. The plastic housing can be damaged by leaking electrolyte.

11. Toxicological information

Upon normal use there will be no leaking and, hence, there will be no contact with toxically ingredients of the battery.

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12. Ecological information

Upon normal use there won't be any environmental pollution.
If the battery is unusable, you must recycle it. See Point 13.

13. Disposal considerations

The battery is hazardous waste.
It is not allowed to dispose it with common waste.
If the battery is unusable, dispose it according to the applicable recycling regulations.

14. Transportation information

ADR/RID/IMDG-Code: The battery conforms with the conditions to meet all requirements of Special Provision 188.

Special Provision 188:

Cells and batteries offered for carriage are not subject to other provisions of ADR if they meet the following:

- (a) For a lithium metal or lithium alloy cell, the lithium content is not more than 1 g, and for a lithium ion cell, the Watt-hour rating is not more than 20 Wh;
- (b) For a lithium metal or lithium alloy battery the aggregate lithium content is not more than 2 g, and for a lithium ion battery, the Watt-hour rating is not more than 100 Wh. Lithium ion batteries subject to this provision shall be marked with the Watt-hour rating on the outside case, except those manufactured before 1 January 2009.
- (c) Each cell or battery is of the type proved to meet the requirements of paragraphs 2.2.9.1.7 a) and e).
- (d) Cells and batteries, except when installed in equipment, shall be packed in inner packagings that completely enclose the cell or battery. Cells and batteries shall be protected so as to prevent short circuits. This includes protection against contact with conductive materials within the same packaging that could lead to a short circuit. The inner packagings shall be packed in strong outer packagings which conform to the provisions of 4.1.1.1, 4.1.1.2 and 4.1.1.5;
- (e) Cells and batteries when installed in equipment shall be protected from damage and short circuit, and the equipment shall be equipped with an effective means of preventing accidental activation. This requirement does not apply to devices which are intentionally active in transport (radio frequency identification (RFID) transmitters, watches, sensors, etc.) and which are not capable of generating a dangerous evolution of heat. When batteries are installed in equipment, the equipment shall be packed in strong outer packagings constructed of suitable material of adequate strength and design in relation to the packaging's capacity and its intended use unless the battery is afforded equivalent protection by the equipment in which it is contained;
- (f) Except for packages containing button cell batteries installed in equipment (including circuit boards), or no more than four cells installed in equipment or no more than two batteries installed in equipment, each package shall be marked with the following:

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- (i) an indication that the package contains "lithium metal" or "lithium ion" cells or batteries, as appropriate;
 - (ii) an indication that the package shall be handled with care and that a flammability hazard exists if the package is damaged;
 - (iii) an indication that special procedures shall be followed in the event the package is damaged, to include inspection and repacking if necessary; and
 - (iv) a telephone number of additional information;
- (g) Each consignment of one or more packages marked in accordance with paragraph (f) shall be accompanied with a document including the following:
- (i) an indication that the package contains "lithium metal" or "lithium ion" cells or batteries, as appropriate;
 - (ii) an indication that the package shall be handled with care and that a flammability hazard exists if the package is damaged;
 - (iii) an indication that special procedures shall be followed in the event the package is damaged, to include inspection and repacking if necessary; and
 - (iv) a telephone number for additional information;
- (h) Except when batteries are installed in equipment, each package shall be capable of withstanding a 1.2 m drop test in any orientation without damage to cells or batteries contained therein, without shifting of the contents so as to allow battery to battery (or cell to cell) contact and without release of contents; and
- (i) Except when batteries are installed in or packed with equipment, packages shall not exceed 30 kg gross mass.

As used above and elsewhere in ADR, "lithium content" means the mass of lithium in the anode of a lithium metal or lithium alloy cell.

Separate entries exist for lithium metal batteries and lithium ion batteries to facilitate the carriage of these batteries for specific modes of carriage and to enable the application of different emergency response actions.

ICAO-TI/IATA-DGR: Packing Instruction 965, Part II or Part IB

15. Regulatory information

Notes to regulations concerning the transport of hazardous goods:

Gefahrgutbeförderungsgesetz (GGBefG)

Gefahrgutverordnung Straße, Eisenbahn und Binnenschifffahrt (GGVSEB)

Gefahrgutverordnung See (GGVSee)

Luftverkehrsgesetz (LuftVG), Luftverkehrs-Zulassungs-Ordnung (LuftVZO)

European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR)

Convention concerning International Carriage by Rail (RID)

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European Agreement concerning the International Carriage of Dangerous Goods by Inland Navigation (ADN)

International Maritime Dangerous Goods Code (IMDG-Code)

International Civil Aviation Organization / Technical Instructions for the Safe Transport of Dangerous Goods by Air (ICAO-TI)

International Air Transport Association / Dangerous Goods Regulations (IATA-DGR)

16. Other information

This information has been compiled accurately to the best of our knowledge and belief.

However, BMZ excludes any warranty for the accuracy, reliability or completeness of the information contained herein.

It is the user's responsibility to satisfy himself as to the suitability and completeness of this information for his particular use.

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