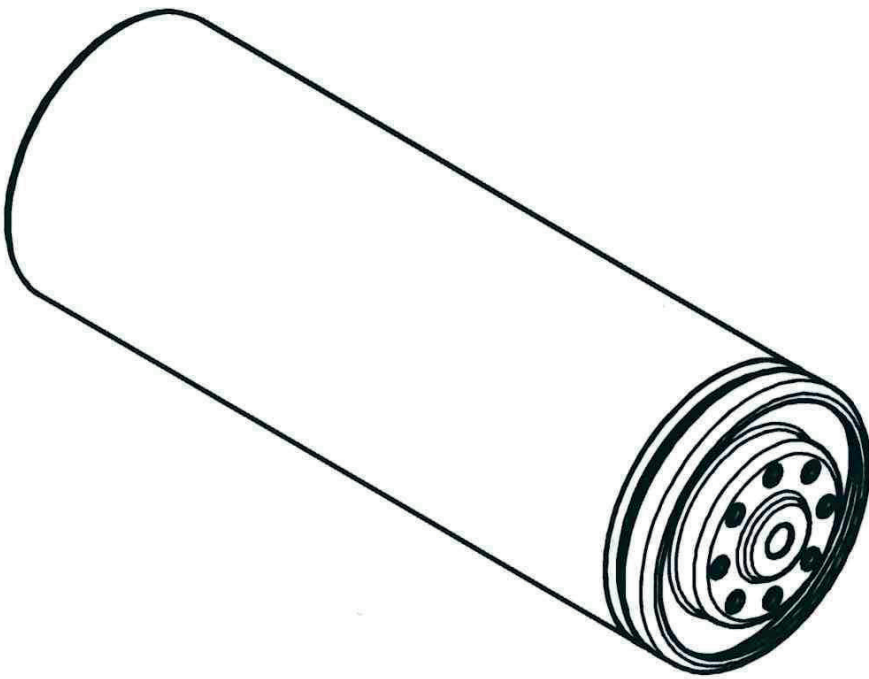


## Handling instructions for the lithium ion cell LFPP



SSL Energie GmbH  
Münchener Str. 1  
83527 Haag i. OB  
Germany

Read these handling instructions. Their  
non-compliance can be dangerous  
Have consequences or against regula-  
tions violated.

## Table of contents

1 Safety instructions	3
1.1 Possible dangers	4
1.2 First aid measures	4
1.3 Fire-fighting measures	5
2 General notes	5
3 delivery condition	5
4 transport instructions	6
5 product description	6
6 Storage and maintenance instructions	7
7 Installation instructions	7
8 Disposal instructions	8
9 service contact	8
Appendix 1: Glossary	9
Annex 2: Product data sheet	10
Annex 3: Safety Data Sheet 1907/2006 / EC - DE: RECHARGEABLE LITHIUM ION CELLS, type LFP	11

## 1 Safety instructions



Wear safety goggles when working on cells.



Keep away from open flames and strong heat sources. Explosion and Fire.



Explosion and fire hazard due to short circuit, overheating, electrical Abuse and mechanical abuse possible. blocking or modification of the bursting membrane (see Figure 1) may pose a risk of explosion produce. When building modules or batteries, the bursting membranes may the cells are never blocked.



The electrolyte fluid must not come into contact with skin and eyes. do the washing up. If you have skin or eye contact, the affected areas immediately with plenty water. In case of eye contact, a doctor should be consulted immediately after rinsing.



Dangerous tension



- Cells are loaded on delivery, accessible metal parts of the cell can lead and be electrically active. The cells can have very high short-circuit deliver currents
- Be sure to remove rings, watches and other items with metal parts, before you work with cells or batteries.
- Use insulated tools.
- Take protective measures against dangerous contact voltages
- Avoid possible electrostatic charging of clothing tion and / or tools by means of suitable ESD protective measures.
- The handling and storage of cells should be at a cell voltage
- $U < 3.3V$  take place.
- Cells must not be charged above 3.8V.
- Cells must not be discharged below 2.5V.

## 1.1 Possible dangers

There is no risk if the cells are used in accordance with their intended use and handling instructions. used wisely and the cell housing is not injured. In accordance with the regulations  
The substances contained in the cell, some of which are hazardous, are safely confined.

However, use cells only within the specified operating conditions with respect to discharge, storage, temperatures and under dry ambient conditions.

In case of electrical abuse (eg overload), exposure to extreme environmental conditions (eg high temperatures. Contact with chemicals), strong mechanical loads (eg shock or Dropping, deforming, covering the terminals, manipulating or opening the case as well the bursting membranes) can cause a violent reaction of the cell with strong heat and Eventual fire phenomenon come. This can include materials contained in the cell, as well as their Combustion products are released into the ambient air as dusts. In the case of non-determining Accordingly, it may result in leakage of, among others, iron phosphate and soybean Dusts come and it can produce hydrogen fluoride.

## 1.2 First aid measures

Breathe in	Bring people out of the exposure area and provide fresh air, quiet and accommodate warm. In severe cases, seek medical help.
Skin contact	Thoroughly rinse the skin with warm tap water for at least 15 minutes Wash. Take off contaminated clothing and clean thoroughly before reuse clean or dispose of. In severe cases, seek medical help.
Eye Contact Rinse	Thoroughly with water for at least 15 minutes. The eyelid stop them. See a doctor.
Further treatment	In all cases of eye contamination, persistent skin irritation and in case of who swallowed these substances or inhaled the vapors a doctor will be consulted.

### 1.3 Fire-fighting measures

Alert the fire department and evacuate all persons from the direct fire environment. It exists the Danger of flaming burning parts or flammable particles from the source of the fire.

When fighting fires, positive pressure respirators with a closed breathing circuit should be used as well Full protective clothing can be used.

A CO<sub>2</sub> extinguisher can be used to cool hot batteries or cells . The cooling serves the Suppression of subsequent reactions and further spread of the fire. To additional shorts and Avoiding high-voltage hazards, water should not be used in the case of a battery.

CO<sub>2</sub> quenchers, large volumes of water or water can be used to cool hot, non-switched single cells Water-based foam can be used.

The environment of the fire should not be re-entered before the fire occurred Vapors are removed (ventilation).

## 2 General notes

- The cells are loaded on delivery. Short circuit between the - +/- poles, because the cells deliver a very high short-circuit current.
- The bursting membrane can open in case of improper loading and unloading. Combustible gas mixtures can escape.
- The bursting membranes of the cells must not be damaged or blocked.
- Do not disassemble, open or crush cells.
- Do not expose cells to heat or fire. Avoid storage in direct sunlight.
- Do not expose cells to strong mechanical loads.
- Keep cells out of the reach of children.
- Always keep cells clean and dry.
- Dirty cell poles can be wiped with a clean, dry cloth.
- Cells must not come into contact with solvents, such as with dilution, alcohol, oil, rustprotective or surface-attacking agents, eg detergents
- Store cells so that no short circuits can occur. (Use of electrically non-conductive Materials)
- Use cells only for their intended purpose.
- Use only chargers recommended by the manufacturer.
- The specifications of the manufacturer regarding charging and discharging currents, charging algorithms and permissible temperature must be complied with.
- Pay attention to the correct polarity of the cell during use. (Illustration 1)
- Cells with different capacities, dimensions, types or from different manufacturers may not mixed in one application.
- **If all of the above points are met, the cell is intrinsically safe.**

### 3 Delivery condition

Unpack the cells immediately upon delivery and check if the goods are in perfect condition was delivered. Immediately report damage to the supplier or manufacturer.

For safety reasons, the cells are delivered partially charged and have a voltage from 3.25V to 3.35V. After delivery, the individual cell voltages must be measured and noted. The Voltages should be in the range of 3.2V to 3.35V. Cells with voltages <2.5V (OCV) should not be put into operation. Cells with a voltage from 2.5V to 3.2V must be taken before commissioning, as described in point 6 storage and maintenance instructions, be reloaded.

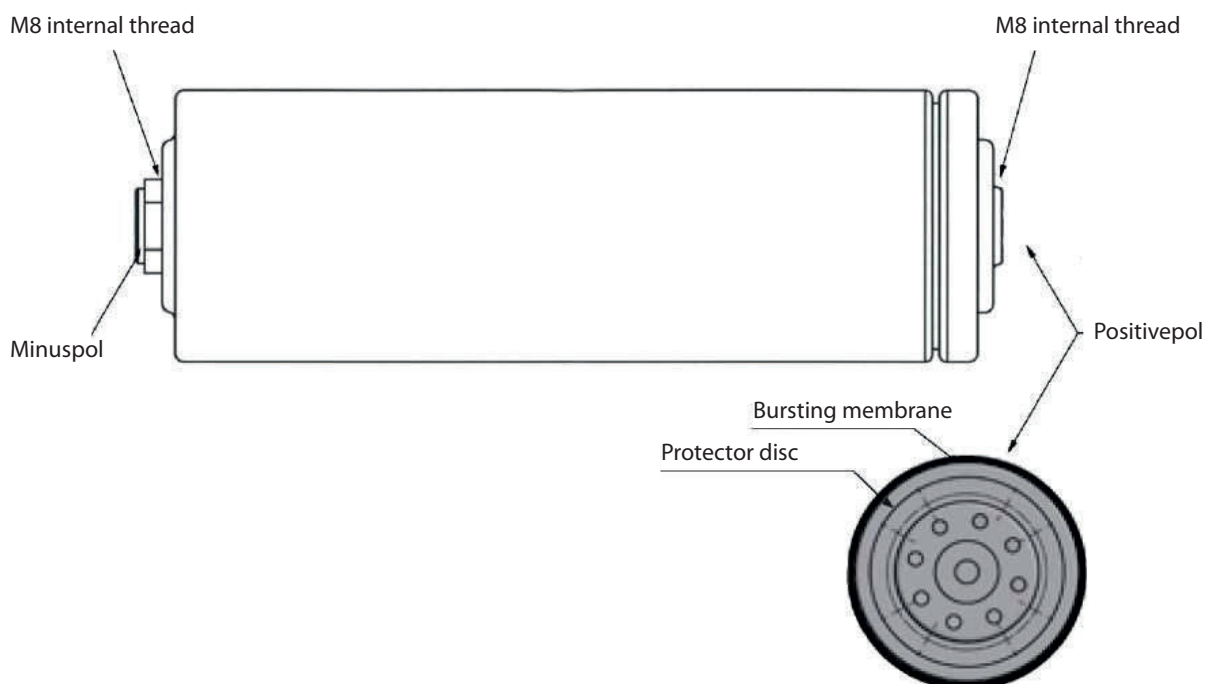
### 4 Transport instructions

Lithium ion cells are dangerous goods with the following classification:

- UN 3480 Lithium Batteries
- Class 9
- Packing group II

To ensure transport safety, the required tests have been carried out in conformity with the valid Directive UN 38.3 and passed.

For more information on transportation, including used lithium ion cells, contact to your supplier or the manufacturer.



## 6 Storage and maintenance instructions

The cells should be stored in dry, clean and cool places.

Lithium ion cells are maintenance-free and hermetically sealed. The voltages of the cells should be measured and noted. It is recommended to keep a maintenance booklet in which the values of the measured voltages are entered.

Due to the self-discharge recharging is necessary depending on the storage time.

After the following storage times, a recharge is recommended:

6 months at +18 °C

3 months at +30 °C

1 months at +40 °C

A recharge is required at the latest after the following storage times:

12 months at +18 °C

6 months at +30 °C

2 months at +40 °C

The recharge up to about 50% charge state is carried out with 5-hour current (0.2 C) with a constant current charge (CC) up to 3.35V at + 20 °C. Once 3.35V is reached, charging will be at constant voltage set until the charging current is 1/20 of the value of the nominal capacity of the cell (see appendix 2, product data sheet) has reached.

Thereafter, the cells can be stored again as described above.

If the open-circuit voltage (OCV) has fallen to a value of <2.5V due to storage for too long, it must the further usability can be clarified with the supplier or manufacturer.

### Temperature

The optimum working range for lithium-ion cells is in the temperature range of + 10 °C to + 25 °C.

The usual operating range for charging and discharging is between + 0 °C and + 40 °C. The temperature limit They are at -15 °C and + 60 °C.

The temperature has the following effect: High temperatures shorten the lifetime low temperatures reduce the capacity and efficiency.

## 7 Installation instructions

For interconnection, the SSL company approved connectors and brass nuts (according to DIN 439 Form M 8).

With a compact battery assembly of single cells, the distance between the opposing the cells should be at least 4 mm. Compliance with the required creepage distances and clearances according to the in accordance with applicable standards (eg ECE R100, VDE 0110). Before mounting the connector is to note that the contact surfaces are clean. The brass screws (according to DIN 439 Form M8) are with

Tighten the torque specified in the item „Fastening the connecting nuts“. Before the start of

Mening is to pay attention to a uniform state of charge of the cells. The voltages of the cells should be

do not differ more than +15 mV. If necessary, the cells should be balanced accordingly. At the connection of the battery poles to the charger must be ensured correct polarity. Short circuits are to be avoided.

In the event of a short circuit, the service must be contacted by SSL.

## Interconnection of cells to batteries

When interconnecting cells, pay attention to the correct polarity. The fixation of the cells takes place via their End faces, where the cell holders are not allowed to cover the protector discs (see Figure 1).

Note:

Insufficiently assembled connectors can cause loading and unloading malfunctions and damage to the device Battery and / or personal injury.

Installation in housing or cabinets

Lithium ion cells are hermetically sealed and maintenance free.

Depending on the application, it may be necessary to cool cells or batteries with GAIA to vote.

## 8 Disposal instructions



Cells must be disposed of properly. For information about the disposal of for used lithium batteries contact your supplier or the manufacturer. (see point 4 Transport instructions) Lithium Ion cells must not be disposed of with household waste.

## 9 Service contact

SSL Energie GmbH  
Münchener Str.1  
83527 Haag i. OB  
Tel.+49 80723767-0  
info@ssl-energie.de  
www.ssl-energie.de



## Appendix 1: Glossary

Cell is a single, encapsulated electrochemical unit (one positive and one negative Electrode), which has a differential voltage across two terminals.

Modules denote a unit of several cells which are electrically and mechanically connected to each other. they are. Modules are usually not individually usable but are interconnected in batteries and provided with a higher-level electronics.

Battery is called an interconnection (series or parallel fading) of several cells or modules in a unit. Apart from cells, electronic components (eg BMS) are also integrated.

Battery Management System (BMS) refers to the monitoring electronics within a battery. The BMS Takes over, among other things, the tasks of monitoring individual cell voltages, temperatures and currents, and the balance individual cells with each other (balancing). Lithium ion batteries always require a BMS.

## Chemical description

Positive electrode  
Negative electrode

Lithium iron nanophosphate P  
Graphite

## Electrical Properties

Nominal voltage at 0.2 C; 25 ° C	3.3 V
Specific energy content at 0.2 C; 25 ° C	148 Wh
Nominal capacity at 0.2 C; 25 ° C	45 Ah
Nominal capacity at 0.2 C; 20 ° C	45 Ah
Capacity at 1 C	45 Ah
Internal resistance / impedance up to 1 kHz	0.75 mOhm
DC Resistance (VDA) - 2s Discharge 5 C to 50% SOC; 25 ° C	<1.5 mOhm
Specific gravimetric energy density	129 Wh / kg
Specific volumetric energy density	235 Wh / l
Specific gravimetric power density	2582 W / kg
2 s pulsed discharge to 100% SOC; 25 ° C	
Specific volumetric power density	4550 W / l
2 s pulsed discharge to 100% SOC; 25 ° C	

## Physical and mechanical properties

diameter	63.5 mm
overall length	197.5 mm
mass	1.15 kg
Volume without connector	569 cm <sup>3</sup>
cup material	pure aluminum


## Terms Of Use

Recommended charging method	Constant current
Recommended charge current	up to 45 A (= C)
Max. Continuous charging current	I < 50 A
Max. Charge current for 10 sec.	I < 180 A
End of charge voltage	3.48 V
Discharge voltage at 0.2C	U = 2.8 V
Recommended continuous discharge current	8 to 45 A
Max. Continuous discharge current	I < 90 A
Max. Discharge current for 10 sec (C5)	I = 225 A
Max. Pulse discharge current for 2sec (CS)	I = 360 A
Recommended operating temperature range	-10 ° to + 50 ° C
Recommended charging temperature range	5 ° to + 40 ° C
Storage and transport temperature range	-20 ° to + 45 ° C
Cycle resistance 100% DOD at 25 ° C; 1C / 1C	> 6000 cycles
Cycle resistance 90% DOD at 25 ° C; 1C / 1C	> 8000 cycles

### 1 Substance / preparation and company name

Product: RECHARGEABLE LITHIUM-ION CELLS, type LFP  
 Registration number: not applicable  
 Use: battery  
 Identified use: no  
 Mode of action: See product information  
 Company: SSL Energie GmbH  
 Münchener Straße 1  
 83527 Haag i. OB / Germany  
 Phone: +49 8072 3767-0  
 Fax: +49 8072 3767-109  
 Homepage: www.ssl-energie.de  
 E-mail: info@ssl-energy.de  
 Responsible: georg.bauer@ssl-energie.de

### 2 Possible dangers

Physico-chemical hazards: At temperatures above 70 ° C, there is a risk of bursting and leakage of electrolyte fluid.  
 Heat development in case of short circuit. Risk of ignition.  
 Reactions of the electrolyte and the electrodes with water and moisture possible.  
 Health Hazards: See chapter 15.  
 The contained hazardous ingredients are not freely available during foreseeable use.  
 Environmental hazards: See R phrases.  
 Other dangers: no  
 Symbols:   
 unhealthy  
 Risk phrases: R 10: Flammable.  
 R 36 irritates the eyes.

### 3 Composition / information on ingredients

1 - <20% ethylmethyl carbonate  
 Xi, R10-36 / 38 CAS: 623-53-0, EINECS / ELINCS ;, EU-INDEX ;, ECBnr:  
 1 - <5% lithium hexafluorophosphate  
 T, R22-24-34 CAS: 21324-40-3, EINECS / ELINCS: 244-334-7, EU INDEX ;, ECBnr:  
 1 - <20% soot  
 CAS: 1333-86-4, EINECS / ELINCS: 215-609-9, EU-INDEX ;, ECBN:  
 1 - <5% ethylene carbonate  
 Xi, R41 CAS: 96-49-1, EINECS / ELINCS: 202-510-0, EU INDEX ;, ECBno:

Ingredient commentary: Due to structural measures of the cells, the hazardous ingredients contained in foreseeable use not freely available. The wording of the listed R-phrases can be found in chapter 16.

### 4 First aid measures

General information: Measures apply only to damaged cells.  
 After inhalation: Call a doctor immediately.  
 Remove the victim to fresh air and store in a quiet place.  
 After skin contact: In case of contact with skin, wash immediately with plenty of soap and water.  
 Consult a doctor if skin irritation persists.  
 After eye contact: In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. Protect the injured eye.  
 After swallowing: Call a doctor immediately. Do not induce vomiting.  
 Informations for the doctor: Treat symptomatically.

## 5 Fire-fighting measures

Suitable extinguishing agents:	Dry powder. Carbon dioxide. Metal fire extinguishing powder.
Unsuitable extinguishing media:	Water spray.
Special hazards caused by the product or its combustion products:	Hydrogen fluoride (HF). Danger of formation of toxic Pyrolysis products. Bursting batteries can be thrown out of a fire with great force.
Special protective equipment for firefighters:	Use self-contained breathing apparatus. Wear full protective suit.
Additional information:	Cool endangered containers with water spray. Fire residues and contaminated extinguishing water must be in accordance with local regulations be disposed of in accordance with official regulations.

## 6 Accidental release measures

Security measures related to persons:	Lock affected area. Use personal protective equipment. Keep people away and stay on the windward side. Use respiratory protection when exposed to vapors / dust / aerosol.
Environmental precautions:	Do not allow leaks into drains / surface water / groundwater.
Method for cleaning:	Pick up mechanically. Residues with liquid-binding material (eg sand, sawdust, universal binder, Diatomaceous earth). The captured material disposed of properly.

## 7 Handling and storage

Advice on safe handling:	It is the manufacturer's information regarding the charging and discharging parameters and the to observe recommended temperature ranges. If used properly no special measures required.
Information about fire and explosion protection:	No special actions required.
Requirements for storerooms and containers:	No special actions required.
Advice on common storage:	Do not store together with flammable substances.
Further information on storage conditions:	Protect against heating / overheating. Protect from sunlight. Store in a dry place. Recommended storage temperature: 0 ° C - 40 ° c. Ensuring the protection of the battery connections during storage.

## 8 Exposure controls / personal protection

Additional information about the design of technical systems:	not applicable
Ingredients with occupational exposure limits to be monitored:	not relevant
Respiratory protection:	not applicable
Hand protection:	Butyl rubber,> 120 min (EN374).
Eye protection:	Safety goggles.
Body protection:	Solvent-resistant protective clothing.
General protective measures:	Measures apply only to damaged cells.
Hygiene measures:	Wash hands before breaks and at the end of work.
Environmental exposure controls:	undetermined

## 9 Physical and chemical properties

Shape:	capsule
Colour:	not determined
Odor:	not determined
PH value:	not applicable
pH [1%]:	not applicable
Boiling point [° C]:	not determined
Flash point [° C]:	not applicable
Flammability [0 C]:	not determined
Lower explosion limit:	not applicable
Upper explosion limit:	not applicable
Combustible properties:	No
Vapor pressure [kPa]:	not determined
Density [g / ml]:	not determined
Density at [° C]:	not determined
Bulk density [kg / m3]:	not applicable
Solubility in water:	not applicable
Partition coefficient [n-octanol / water]:	not determined
Viscosity:	not applicable
Relative vapor density [reference value: air]:	not determined
Evaporation rate:	not determined
Melting point [° C]:	not determined
Auto-ignition [° C]:	not determined
Decomposition point [° C]:	not determined

## 10 Stability and reactivity

Dangerous reactions:	At temperatures above 70 ° C, there is a danger of bursting and leakage of electrolyte fluid. Heat development in case of short circuit. Risk of ignition. Reactions of the electrolyte and the electrodes with water and moisture possible.
Hazardous decomposition products:	No dangerous decomposition products known.

## 11 Toxicological information

Acute oral toxicity:	not determined
Acute dermal toxicity:	not determined
Acute inhalation toxicity:	not determined
Irritant effect on the eye:	not determined
Irritant effect on the skin:	not determined
sensitization:	not determined
Subacute toxicity:	not determined
Chronic toxicity:	not determined
Mutagenicity:	not determined
Reproductive toxicity:	not determined
carcinogenicity:	not determined
Experiences from practice:	no
General remarks:	Toxicological data are not available.




## 12 Environmental information

Fish toxicity:	not applicable
daphnia:	not applicable
Behavior in environmental compartments:	not applicable
Behavior in sewage treatment plant:	applicable
Bacteria toxicity:	not applicable
Biodegradability:	not applicable
COD:	not applicable
BSBS:	not applicable
AOX:	not applicable
2006/11 / EC:	Yes
General information:	Ecological data of the entire product are not available. Do not allow the product to escape uncontrolled into the environment and into the sewage system.


## 13 Instructions for disposal

Product:	Dispose of as hazardous waste. Because of recycling manufacturers appeal.
Uncleaned packaging:	Uncontaminated packaging can be recycled. Non-cleanable packaging must be disposed of in the same way as the material.
EWC no. (recommended):	160605 Other batteries and accumulators.

## 14 Information for transport

Classification according to ADR:	UN 348 0/3481 Lithium ion batteries 9 II
- Classification code:	M4
- danger label:	
-ADR LQ	
-ADR 1.1.3.6 (8.6):	Transport category (tunnel restriction code): 2 (E)
Classification according to IMDG:	UN 348 0/3481 Lithium ion batteries 9 II
- EMS:	FA, SI
- danger label:	
- IMDG Limited Quantities: LQ: 0 I	
Classification according to IATA:	UN 348 0/3481 Lithium ion batteries 9 II
- danger label:	

## 15 Legislation

Exposure scenario:	not determined
Chemical Safety Assessment:	not determined
Identification:	This preparation is a product, therefore it is according to EC directives / GefStoffN does not require labeling.
Symbols:	
Risk phrases:	unhealthy R 10: Flammable R 36 irritates the eyes. Safety phrases: S 26: In case of contact with eyes, rinse immediately with plenty of water and consult a doctor. S 36/37/39: suitable protective clothing, protective gloves and wear protective goggles / face protection. S 60: This product and its container must be disposed of as hazardous waste.
Special labeling:	not applicable
Authorization, TITLE VII:	not applicable
Restriction, TITLE VIII:	not applicable
EU REGULATIONS:	1967/548 (2008/58, 30. ATP/31. ATP); 1991/689 (2001/118); 1999/13; 2004/42; 648/2004; 1907/2006.
TRANSPORT-REGULATIONS:	ADR (2009); IMDG-Code (34. Arndt.); IATA-DGR (2009).
NATIONAL PROVISIONS:	Hazardous Substances Ordinance - GefStoffN 2004; Washing and Cleaning Agents Act - WRMG; Water Resources Act - WHG; TRG 300; TRGS: 200, 220, 615, 900, 905.
- Water hazard class:	3, like. VwVwS vom 27.07.2005 (as of 2009)
- accident decree:	Yes
- Classification according to TA-Luft:	not applicable
- GISBAU, product code:	not determined
- VCI storage class:	not applicable
- Other regulations:	not determined
- BfR registration number:	not determined

## 16 Other information

R-Phrases for Ingredients (Chapter 3):	R 22: Harmful if swallowed. R 43 May cause sensitization by skin contact. R 41 Risk of serious eye damage. R 36/38: Irritating to eyes and skin. R 36/37/38: Irritating to eyes, respiratory system and skin. R 24: Toxic in contact with the skin. R 20/22: Harmful by inhalation and if swallowed. R 10: Flammable. R 34: Causes burns.
Changed positions:	Chapter: 05; Plus bursting batteries can blow from a fire with great force be thrown out. Chapter: 07; Plus Ensuring the protection of the battery connections during storage. Chapter: 14; plus Chapter: 14; plus Chapter: 14; plus
Employment restrictions:	yes
VOC (1999/13 / EC):	not applicable
Tariff:	not determined

A product of SSL Energie GmbH



SSL Energie GmbH  
Münchener Str. 1  
83527 Haag i. OB  
Germany