PRODUCT SAFETY DATA SHEET

Lithium Ion Rechargeable Battery

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Gemäß Verordnung (EG) Nr. 1907/2006 (REACH) muss ein Sicherheitsdatenblatt lediglich für Stoffe und Zubereitungen zur Verfügung gestellt werden. Batterien sind von den Anforderungen dieser Verordnung nicht betroffen.

According 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.

Section I - Product identification

Product Name:	Lithium Ion Rechargeable Battery 18650-26
Nominal Voltage:	3.63 V
Models:	Lithium Ion
Chemical System:	Anode - based on intercalation graphite
	Cathode - based on lithiated metal oxide (Cobalt, Nickel, Manganese)

Section II - Possible Hazards

For the battery cell, chemical materials are stored in a hermetically sealed metal or metal laminated plastic case, designed to withstand temperatures and pressures encountered during normal use. As a result, during normal use, there is no physical danger of ignition or explosion and chemical danger of hazardous materials' leakage.

However, if exposed to a fire, added mechanical shocks, decomposed, added electric stress by miss-use, the gas release vent will be operated. The battery cell case will be breached at the extreme, hazardous materials may be released.

Moreover, if heated strongly by the surrounding fire, acrid gas may be emitted.

- GHS classification: Not available
  (This product is outside the scope of GHS system since it's considered as an "article".)

- Most important hazard and effects
  Human health effects:
  Inhalation: The steam of the electrolyte has an anesthesia action and stimulates a respiratory tract.
  Skin contact: The steam of the electrolyte stimulates a skin. The electrolyte skin contact causes a sore and stimulation on the skin.
  Eye contact: The steam of the electrolyte stimulates eyes. The electrolyte eye contact causes a sore and stimulation on the eye. Especially, substance that causes a strong inflammation of the eyes is contained.
  Environmental effects: Since a battery cell remains in the environment, do not throw out it into the environment.

- Specific hazards:
  If the electrolyte contacts with water, it will generate detrimental hydrogen fluoride.
  Since the leaked electrolyte is inflammable liquid, do not bring close to fire.

Section III – Composition/Information on ingredients

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 components:

CAS-No.	Chemical name	Quantity
1307-96-6	Cobalt oxide	< 30 %
1313-13-9	Manganese dioxide	< 30 %
1313-99-1	Nickel oxide	< 30 %
7440-44-0	Carbon	< 30 %
	Electrolyte (*)	< 20 %
24937-79-9	Polyvinylidene fluoride (PVdF)	< 10 %
7429-90-5	Aluminium foil	2 - 10 %
7440-50-8	Copper foil	2 - 10 %
	Aluminium and inert materials	5 - 10 %

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Section IV - First Aid Procedures

None unless internal material exposure.
Explanation Carcinogenicity: NOT RELEVANT
Skin contact with contents of an opened battery can cause irritation, wash immediately with soap and plenty of water. Remove contaminated clothing. If irritation persists, get medical help.

Eye contact:
Contents of an opened battery can cause severe irritation, IMMEDIATELY FLUSH THOROUGHLY WITH COPIOUS AMOUNTS OF WATER FOR AT LEAST 15 MINUTES. SEEK MEDICAL ATTENTION.

Ingestion:
CALL MEDICAL PRACTIONER IMMEDIAIELY

Inhalation:
Do not inhale leaked material. Make victim blow his/her nose, gargle. PROVIDE IMMEDIATELY FRESH AIR, IF IRRITATION PERSISTS, GET MEDICAL HELP.

Section V - Fire Fighting Instructions

5.1 Fire and explosion hazard:
The battery can leak and/or spout vaporized or decomposed and combustible electrolyte fumes in case of exposure above 70℃ resulting from inappropriate use or the environment. Cells or batteries may flame or leak potentially hazardous organic vapors if exposed to excessive heat or fire. Fire, excessive heat, or over voltage conditions may produce hazardous decomposition products. Damaged or opened cells or batteries can result in rapid heating and the release of flammable vapors. Vapors may be heavier than air and may travel along the ground or be moved by ventilation to an ignition source and flash back fire, excessive heat, or over voltage conditions may produce hazardous decomposition products. During water application, caution is advised as burning pieces of flammable particles may be ejected from the fire.

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5.2 Extinguishing Media:
Suitable CO2
Dry chemical or Foam extinguishers.
Not to be used: Type D extinguishers.
Special Fire Fighting Procedure: WEAR NIOSH APPROVED SCBA & FULL PROTECTIVE EQUIPMENT.
Unusual Fire and Explosion Hazards: NONE SPECIFIED BY MANUFACTURER.

As with any fire, wear self-contained breathing apparatus to avoid inhalation of hazardous decomposition products.

Section VI - Accidental Release

General
Chemical contents are sealed in metal can. But if the battery is mechanically or electrically abused, contents may leak out. In such case, take action as showing below.
The preferred response is to leave the area and allow the batteries to cool and the vapours to dissipate.

Personal precautions
Avoid skin and eye contact or inhalation of vapours. Temporary inhalation of odor and attaching of electrolyte to skin does not cause serious health hazard. Be sure the ventilation and washing out of electrolyte quickly.

Environmental precautions
Collect all released material in a plastic lined metal container and remove spilled liquid with absorbent. Doing this, protect your skin and eyes with gloves and protection glasses. Avoid direct contact with internal components. Specific environmental precaution is not necessary.

Section VII – Handling and Storage

When used correctly, Lithium-ion Polymer Battery Pack (Rechargeable Single cell Battery) provides 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.

Make sure to observe amongst others, following warnings.

Handling:
- Do not insert batteries in reverse. Observe the polarity markings on battery and equipment
− Do not short-circuit batteries
− Do not deform or disassemble batteries
− Do not incinerate or dispose batteries in fire
− Do not place battery on metal case, metal plate or antistatic material.
− Do not mix batteries types or brands. In case of multi cell application, replace all batteries to new at once when replacing used batteries.

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- Do not heat batteries or exposure direct sunlight.
- Do not weld or solder directly to batteries
- 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 immediately.
- 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
- When discarding batteries with solder tags, insulate the tags by wrapping them with tape, foil, etc.

Storage:
- 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
- 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 VIII – Exposure Controls / Personal Protection

Respiratory protection (specify type):	Not necessary under conditions of normal use (see section VI)
Ventilation:	Not necessary under conditions of normal use (see section VI)
Protective gloves:	Not necessary under conditions of normal use (see section VI)
Eye protection:	Not necessary under conditions of normal use (see section VI)
Other protective clothing or equipment:	Not necessary under conditions of normal use

In the event, however, a large amount of electrolyte should be released by mechanical or electrical abuse, use:

Respiratory protection	Mask (with a filter preferably)
Hand protection	Synthetic rubber gloves
Eye protection	Goggles or glasses (see section VI)

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Section IX – Physical and Chemical Properties

The chemicals mentioned in Section II are contained in a sealed pouch.
Under conditions of normal use, the chemicals will not be released.

Appearance:	Single cell: Cylindrical cell
Nominal voltage:	Single cell: 3.63 volts

Section X – Stability and Reactivity

Since batteries utilize a chemical reaction they are actually considered a chemical product. As such, battery performance will deteriorate over time even if stored for a long period of time without being used. In addition, the various usage conditions such as charge, discharge, ambient temperature, etc. are not maintained within the specified ranges the life expectancy of the battery may be shortened or the device in which the battery is used may be damaged by electrolyte leakage.

Conditions to avoid: See Sections VII & VIII

Section XI – Toxicological Information

In case electrolyte is spilled and exposed to air, HF could be released.
May include hydrogen fluoride and carbon oxides gas.
May cause skin and eye Irritation when contacted.

Organic Electrolyte

- Acute toxicity:
  LD_{50}, oral - Rat 2,000mg/kg or more
- Irritating nature: Irritative to skin and eye

Section XII – Ecological Information

The chemicals mentioned in Section II are contained in a sealed pouch.
Under conditions of normal use, the chemicals will not be released.
It does not pose a physical or health risk to users, see section XIII for disposal.

Heavy metal in battery: Mercury(Hg), Cadmium(Cd) and Lead (Pb) <0.1mg/kg.

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Section XIII – Disposal Considerations

Waste disposal method:
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 2002/96/EC on Waste Electrical and Electronic Equipment (WEEE), Annex II, 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

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 XIV – Transportation Information

Dangerous Goods Classification	Class 9 Miscellaneous
UN-No.	UN 3480, UN3481
Proper Shipping Name:	Lithium Ion Batteries (including lithium polymer batteries)

Lithium Ion cells and batteries are subject to the following transport rules:

Method	**Technical Guidelines**
Air	ICATO/IATA 57th Ed. 2016
Road and Rail Europe	ADR / RID 2015
Sea	IMDG Code 2014 (Amdmt.37)
USA	DOT 49 CFR

Please use the transportation information for reference. Exact packaging, shipping documentation and labelling requirements vary depending on energy content of cell/battery, quantity, method of shipping, airline or forwarder. Make sure to confirm concrete actions in advance with your shipping company.

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All cells and batteries of Jauch Quartz GmbH fulfil the conditions pursuant to the requirements for partly regulated transportation. UN Manual of Tests and Criteria Part III Subsection 38.3 (DGR 3.9.2.6)
Lithium Ion cells and batteries transported after UN3480 by air have to be shipped at a state of charge (SoC) not exceeding 30% of their rated design capacity from April 1st 2016. Packages must be labelled with the “Cargo Aircraft Only” label.

Even classified as lithium ion batteries UN3480 or UN3481(Contained in Equipment or Packed with Equipment), the product is handled as Non-Dangerous Goods by meeting the UN Recommendations on the Transportation of Dangerous Goods Model Regulations Packaging Instruction PI 965-967 and Special Provision SP188. (1)

(a) For a lithium-ion cell, the Watt-hour rating is not more than 20 Wh;
(b) For a lithium-ion battery, the Watt-hour rating is not more than100 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 which may be transported in accordance with this special provision and without this marking until 31 December 2010;
(c) Each cell or battery is of the type proved to meet the requirements of each test in the UN Manual of Tests and Criteria, PartⅢ, sub-section 38.3 ;
(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;
(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. 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:
(i) an indication that the package contains “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;
(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 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;

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(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 contained in or packed with equipment, packages shall not exceed 30 kg gross mass for marine transportation. (not exceed10kg for air transportation)

● For marine transportation the product is handled as Non-Dangerous Goods by meeting the IMO International Maritime Dangerous Goods (IMDG Code) 2014 Edition (Amendment 37-08) SP188 (Same as UN Special Provision SP188 above).(3)

● For air transportation the product is handled as Non-Dangerous Goods by meeting the IATA Dangerous Goods Regulations 57st Edition Effective 1 January 2016 Packing Instruction 965-967 General Requirement and SectionⅡ(Excepted) and UN Special Provision SP188 above.(2)
(j) Lithium ion batteries identified by manufacturer as being defective for safety reasons, or that have been damaged, that have the potential of producing a dangerous evolution of heat, fire or short circuit are forbidden for transport (e.g. those being returned to the manufacturer for safety reasons).
(k) Each package contains more than four cells or more than two batteries must be labeled with a lithium battery handling label. The width 120mm X length 110mm sized lithium battery handling label must be labeled onto the side of a package without bending it.
(l) The words “Lithium ion batteries”, “not restricted” and “PI number” must be included in the Additional Handling Information on the air waybill, when an air waybill is used.
(PI number Cell and Battery: PI965, Packed with Equipment: PI966, Contained in Equipment: PI967)
(m) Any person preparing or offering cells or batteries for transport must receive adequate instruction on these requirements commensurate with their responsibilities.
(n) Except when batteries are installed in or packed with equipment, packages shall not exceed 10kg net mass (PI965 IB).

● The Lithium-Ion cells or batteries as stated in Appendix are made in compliance to the requirements stated in the latest edition of the IATA Dangerous Goods Regulations Packing Instruction 965 General requirements and SectionⅡ, such that they can be transported as a NOT RESTRICTED (non-hazardous/non-dangerous) goods. However, if those lithium-ion cells or batteries are pack with or contained in an equipment, then it is the responsibility of the shipper to ensure that the consignment are packed in compliance to the latest edition of the IATA Dangerous Goods Regulations General requirements and SectionⅡ Packing Instruction 966 or 967 in order for that consignment to be declared as NOT RESTRICTED (non-hazardous/non-Dangerous).

● During the transportation of a large amount of batteries by ship, trailer or railway, do not leave them in the places of high temperatures and do not allow them to be exposed to condensation.

● During the transportation do not allow packages to be fallen down or damaged.

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Section XV – Regulatory Information

- UN (United Nations): Recommendations on the Transportation of Dangerous Goods Model Regulations, Sixteenth revised edition
- ICAO (International Civil Aviation Organization) : Technical Instructions for the safety transport of dangerous goods by air
- IATA (International Air Transport Organization) : Dangerous Goods Regulations 57th Edition Effective 1 January 2016
- IMO (International Maritime Organization) : International Maritime Dangerous Goods (IMDG) Code 2014 Edition (Amendment 37)

Section XVI – Other Information

This information has been compiled accurately to the best of our knowledge and belief. However, Jauch Quartz GmbH 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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