



BATTERY INFORMATION FACTSHEET (EC 1907/2006)
Lithium-Ion Battery contained in Equipment (UN 3481)

Pag: 1 di 7
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1. PRODUCT AND COMPANY IDENTIFICATION

WARNING: According to REACH (Regulation (EC) No 1907/2006) batteries are identified as articles with no intended release of the substances they contain. Therefore providing a Safety Data Sheet is not mandatory for articles. This document provides some relevant information for Good Practice Guidance and Emergency Response Guidance as well as some complementary information regarding the Transport & Environment Protection Legislation. The information contained in this document is not legally binding.

Product Name:	MAUI BATTERY STORAGE SYSTEM RACK BATTERY STORAGE SYSTEM	
Product Code:	17012 - XX - 000 - CC 17002 - YY - 000	
Company Reference:	Name:	TAWAKI S.r.l.
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2. COMPOSITION / INFORMATION ON INGREDIENTS

LITHIUM-ION BATTERY MAIN COMPONENTS

A list of generic constituents of a Lithium-Ion battery is presented below.

Components	CAS Number	Content (wt. %)
Lithium transition metal oxide - Li_xMO_2 (*)	Base Cell Content	37,3 %
Carbon - C (graphite)	7782-42-5	21,0 %
Aluminium - Al	7429-90-5	3,27 %
Copper - Cu	7440-50-8	7,69 %
Steel can - Fe	7439-89-6	13,53 %
Electrolyte	Base Cell Content	10,67 %

(*) M means a combination of Co, Ni, or Mn. This component may consist of a mixture of compounds, each of which may contain these elements.

Mixed materials like "Lithium transition metal oxide" and "Electrolyte" did not have CAS No.

Please address your inquiry for more specific compositions to the battery manufacturer.

3. HAZARDS IDENTIFICATION

A Li-ion battery cell is a sealed article, with a typical voltage of 3.6V DC per cell. A Li-ion battery is an article with no intended release of its substances.

Under normal conditions of use, the battery does not release its content as it is sealed. In case of accidental release of the battery content, the operator may be exposed to one or more of the battery constituents. Please refer to the paragraph No. 6 "Accidental Release Measures".

EXPOSURE TO HIGH VOLTAGE

In case of large electrical serial assembly, modules and full battery may offer high Voltage hazard (> 36 Volts).

The presence of the High Voltage warning sign requires dedicated intervention equipment.





Lithium-ion batteries used in Hybrid and full Electric Vehicles (also in other applications) may have Voltage larger than 60V. Therefore the approach of a battery used in an EV should consider the hazard of Electrical Shock which characterize these batteries.

The following prevention measures should be taken when approaching a high voltage battery or rescue a victim.

Use insulating gloves or protections.



Turn off the source of electricity, if possible. If not, move the source away from you and the person (victim), using a dry, no conducting object made of cardboard, plastic or wood.

Check for signs of life (breathing, coughing or movement). If absent, begin cardiopulmonary recovery (CPR) immediately.

Prevent shock. Lay the person down and, if possible, position the head slightly lower than the body with the legs elevated.

After coming into contact with electricity, the person should see a doctor to check for internal injuries, even if he or she has no obvious signs or symptoms.

SPECIAL HAZARDS FOR HUMAN HEALTH AND ENVIRONMENT

There is no hazard when the measures for handling and storage are followed.
In case of cell damage, possible release of dangerous substances and a flammable gas mixture.

4. FIRST AID MEASURES

Lithium-ion batteries (cells) are not hazardous under normal circumstances. In case of fire or rupture, the leakage of internal hazardous substance and formation of hazardous substances may occur, and the following measures should be taken.

Inhalation in no-fire situations.

Immediate medical attention is required. Move to fresh air immediately and ventilate the contaminated area. If symptoms persist, call a physician.

Skin contact

Immediate medical attention is required. Wash off immediately with plenty of clean water for at least 15-20 minutes, as necessary. Remove and wash contaminated clothing before re-use. If skin irritation persists, visit a physician.

Eye contact

Immediate medical attention is required. Remove any contact lenses.
Rinse immediately with plenty of clean water for at least 15-20 minutes, as necessary.

Ingestion

Immediate medical attention is required. Rinse immediately mouth with clean water. Make the victim vomit and seek medical assistance. Call a physician or a Poison Control Centre immediately.

5. FIRE FIGHTING MEASURES

In case of small confined fire, use dry media, if you can approach the source of fire. Dry media shall be used to avoid oxygen to access the batteries under fire.

In case of large fire, use plenty of water. Water shall be used in all cases as a cooling agent to prevent heat propagation from the burning cells to neighbouring ones. By-products of combustion may be toxic (carbon monoxide, carbon dioxide, hydrogen fluoride, phosphorus fluoride).





Suitable extinguishing media

- Dry powder, carbon dioxide (CO₂), sand, sodium bicarbonate, vermiculite, foam (not combustible),...
- Water (see below).

Dry media

Use dry-powder extinguisher only in case of size-limited local fire. CO₂ extinguishers, or copious quantities of water or water-based foam can be used to cool down burning Li-ion cells and batteries.
Use dry materials to reduce access of oxygen to the combustible materials.

Caution for the use of water

- Use water to cool down cells or batteries adjacent to the ones that have caught fire (maintain low temperature).
- If water is used on active batteries, caution should be taken to avoid the electrical hazard that may be present (in case of high voltage battery > 36 Volts).
- On large quantity of batteries taking fire, control the temperature of the surroundings by abundant flow of water to cool the batteries.

Special issue

In case of risk of mixes between **Primary Li metal** batteries and **Lithium-Ion rechargeable** batteries, avoid the use of water but use abundantly dry media (sand, vermiculite,...) as recommended above (suitable extinguishing media).

Request complementary information for firefighting tools to the battery manufacturer.

Environmental precautions

Eliminate all possible sources of heat or ignition.

Prevent further leakage or spillage if safe to do so (use absorbent cloth or other inert absorbent non-conductive material mineral such as sand, sodium bicarbonate, alumina or vermiculite).

Dry clothes can also be used as an absorbent material in absence of fire. Do not allow material to contaminate ground water system.

Treatment of waste water

Confine the effluent or the contaminated material and collect it for further as hazardous waste (water) for appropriate treatment. Pick up and transfer to properly labelled containers.

Dispose of in accordance with local waste management legislation and emissions regulations.

6. ACCIDENTAL RELEASE MEASURES

IN NORMAL CONDITIONS OF USE, THE LITHIUM-ION BATTERY IS A SEALED ARTICLE.

Lithium-ion Batteries are manufactured in accordance with very strict quality and safety standards. Access to these quality standards can be obtained by contacting directly the battery manufacturer.

The information below is aiming at delivering guidance to respond to an emergency situation in case of:

- Accidental release of the battery content (see the below information).
- Exposure to a fire (see the previous paragraph No. 5).

This may happen in case of damage to the battery or in case of not-foreseeable use or misuse of the battery or of the equipment containing the battery.

MEASURES IN CASE OF ACCIDENTAL RELEASE OF THE BATTERY CONTENT (SPILLAGE IN ABSENCE OF FIRE)





The potential hazard offered by damaged lithium batteries in absence of fire is mainly the release of an electrolyte containing a corrosive salt. Measures should also be taken to protect operators from inhalation of volatile organic substances. Reaction of the electrolyte with water/humidity may generate hydrofluoric acid and irritate the eyes, nose, throat and skin.

Personal precautions

Use personal protective equipment. Avoid contact with skin and eyes. Ventilate the area. Position yourself in the wind direction and not upwind. The information below refers to exposure to the substances contained in the battery.

Respiratory track protection

Protective mask for acidic vapours or Self Contained Breathing Apparatus (SCBA).

Hand protection

Neoprene gloves (EN 374) or equivalent.

Eye protection

Safety glasses with side-shields conforming to EN166 or equivalent.

Skin and body protection

Boots, apron, long sleeved clothing.

Hygiene measures

General industrial hygiene practice.

7. HANDLING AND STORAGE

7.1 HANDLING

Safe handling advice

When handling the batteries (cells), use personal protective equipment (gloves), specifically to avoid short-circuits between the battery poles.

Technical measures/precautions

- Follow the instructions reported in the user manual prepared by the manufacturer.
- Do not short (+) or (-) battery terminals with conductors, do not allow battery terminals to contact each other.
- Do not reverse the polarity.
- Do not mix different types of batteries or mix new and old ones together e.g. in a power pack.
- Do not open the battery system or modules.
- Do not use the unit without its electronic management system.
- Do not submit to static electricity risks to avoid damages to the protecting electronic circuit.
- Do not submit to excessive mechanical stress.
- Do not expose the battery to water or humidity (avoid water condensation).
- Do not expose to heat, solder or throw into fire. Such unsuitable use can cause leakage or evacuate through a safety valve gaseous electrolyte fumes that may cause fire.
- Immediately disconnect the batteries if, during operation, they emit an unusual smell, develop heat, change shape/geometry, or behave abnormally. Contact the manufacturer if any of these problems are observed.

7.2 STORAGE

- Keep in a dry, cool and well-ventilated place, check the recommended storage temperature usually reported in the user manual prepared by the manufacturer (e.g. 35°C).
- Keep away from heat sources (max 60°C) and sources of ignition. Protect from direct exposure to sunlight.
- Keep away from water and condensation.



- Store in closed container and packaging, in such a way to prevent short circuits and damages during storage or transportation.
- In case of mixed storage of goods and articles, organize separate storage area for lithium-ion batteries (e.g. by maintaining a distance of 2.5 meters between the Lithium-ion batteries storage area and other goods).
- Store in limited quantities and in isolated area under external surveillance.

It may be advisable to store limited quantities in a given area, such as for a 60 m² area, the quantity should not be larger than six euro pallets or an equivalent of 6.0 m³ of batteries or equipment containing batteries. The storage of the pallets should not be higher than 2 meters.

Safety measures for storage shall be organized with the relevant safety team at the plant. It shall be adapted to the local Emergency Response Capacity.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION (EXPOSURE LIMIT VALUES)

There is no protection required under normal conditions. During normal charging and discharging there is no release of product. In case of leakage ventilation is required. Respirator, eye protection, protective gloves and protective clothes are required when dealing with fire and leakage.

9. PHYSICAL AND CHEMICAL PROPERTIES

Form: Solid

Color: Various

Odor: Odorless

pH: Not available

Flash point: Not available

Flammability: Not available

Vapor pressure: Not available

Solubility (water): Insoluble

10. STABILITY AND REACTIVITY

Batteries (cells) are stable under normal conditions. The following substances may appear in case of fire or leakage: organic carbonate, hydrogen fluoride, carbon monoxide, carbon dioxide, phosphorus fluoride.

11. TOXICOLOGICAL INFORMATION

Batteries (cells) are not hazardous when used properly. In case of fire or leakage combustion and decomposition products may cause irritation and toxicity to skin, eye and respiratory systems.

Toxicity data of some substances is listed:

Hydrogen fluoride: extremely toxic, may be fatal if inhaled or ingested. Readily absorbed through the skin contact may be fatal. Possible mutagen. LCLO: 50 ppm/30m (human beings), LC50: 1276 ppm/1h (rats).

Carbon and graphite: slightly hazards in case of skin contact (irritant), ingestion, inhalation, which will cause chronic damage to upper respiratory tract and cardiovascular system.

Copper: dust may cause respiratory irritation. LD50: 3,5 mg/kg (rats).

12. ECOLOGICAL INFORMATION

There is no influence on ecology or environment when used and disposed of properly.

Do not let internal components enter marine environment. Avoid releasing to water ways, waste water or ground water.



13. DISPOSAL CONSIDERATIONS

Discarded batteries (cells) should not be treated as ordinary trash. Recycling is recommended and is required by law in many jurisdictions (in accordance with local regulations). Do not incinerate. Leaking or damaged cells should be treated as chemical waste. Packaging is normally not contaminated by cells.

14. TRANSPORT INFORMATION

14.1 Inside a plant

Internal transfer of Lithium-ion batteries should follow the minimum safety rules imposed by the local legislation/regulation regarding the handling of Dangerous Goods.

Infra-red cameras may be used to detect any excessive temperature raise in stored quantities (e.g. > 85°C).

14.2 Shipment outside a plant

The shippers of Lithium-ion batteries, packed with equipment to an outside facility, should be aware that these batteries before being offered for transport have to be tested according to UN Tests and Manual Requirements Chapter 38.3. The shipper is responsible for the implementation of the UN Regulation and may be subject to heavy penalty in case of infringement to the UN Transport Regulation.

Li-ion batteries are classified as Dangerous Goods for the Transport by Road/Rail, Sea and Air, according to the UN Model Regulation for the Transport of Dangerous Goods.

They are classified under Class 9 Dangerous Goods due to their dual hazard properties associated with their chemical and electrical content.

UN 3480 : Lithium-Ion Batteries

UN 3481 : Lithium-Ion Batteries contained in equipment or packed with equipment.

Prior to any shipment, the compliance of the following points must be checked.

- The Transport of Li-ion batteries (Dangerous Goods) is organized by appropriately trained persons and/or the shipment is accompanied by corresponding experts or qualified companies.
- **The Lithium-ion battery is of the type proved to meet the requirements of each test in the UN Manual of Tests and Criteria, Part III, Sub-section 38.3.**
- In accordance with the requirements of the UN Model Regulation, Chapter 2.9.4, the manufacturer of the battery or the battery pack shall make available on request of the Competent Authority the evidences that a Quality Certification program is in place in its manufacturing facility for Lithium-ion batteries.

UN-No: 3480 or 3481

Lithium-Ion Batteries / Lithium-Ion batteries contained in equipment or packed with equipment.

ADR/RID

Class 9 Packing group II, tunnel category E ADR/RID-Labels 9

Proper shipping name: Lithium-Ion batteries, UN 3480

ADR SP 188, 230,310, 636 will apply and Packing Instruction P903, P903a and P903b.

Note: For ADR, see the following address

www.unece.org/trans/danger/publi/adr/adr2011/11contentse.html

IMO

Class: Packing group II IMO-Labels 9

Proper shipping name: Lithium-Ion batteries, UN 3480

IMDG Code: 188, 230, 310, P903

EmS: F-A, S-I

Stowage category A



**BATTERY INFORMATION FACTSHEET (EC 1907/2006)
Lithium-Ion Battery contained in Equipment (UN 3481)**

Pag: 7 di 7

Rev. 00 del
25/01/2018

IATA-DGR

Class: Packing group II ICAO-Labels 9
Proper shipping name: Lithium-Ion batteries, UN 3480
IATA: A88, A99, A154, A164, P965, P966, P967, P968, P969, P970

Note: For the IATA Guidance Document on lithium batteries, see the address:
<http://www.iata.org/whatwedo/cargo/dgr/Pages/lithium-batteries.aspx>

Please, keep updated on the Transport Regulation by contacting your National Competent Authority.

15. REGULATORY INFORMATION

15.1 Marking Requirements for Lithium-ion batteries placed on the European Union market.

In accordance with the Batteries Directive 2006/66/EC, the batteries have to be marked with the crossed wheel bin symbol.



Lithium-ion batteries, which contain electronic modules and which are subject to the EMC Directive 2014/30/EU, must be approved and must wear the CE marking.
The Batteries Directive 2006/66/EC applies also to battery packs.

15.2 Environmental Legislation Applicable

Waste treatment

Directive 2006/66/EC on batteries and accumulators, and waste batteries and accumulators, applies. Dispose of waste batteries in accordance with national legislation. When collected waste batteries must undergo recycling to comply with national regulations. Batteries should not be disposed of into the environment. Clean packing material may be recycled according to local and national regulations.

Further information

According to the European Waste Catalogue (EWC), Waste Codes are not product specific, but application specific. Waste codes should be assigned by the user, preferably in discussion with the waste disposal authorities.

Suggested EWC-codes according waste disposal are:

N°: 16 06 05 - Other batteries and accumulators.

N°: 20 01 34 - Unsorted batteries and accumulators containing these batteries.

16. OTHER INFORMATION

WARNING / DISCLAIMER ON LIABILITY

The information provided in this Battery Information Factsheet is indicative and only valid at the date of its publication. The information given is designed only **as a guidance for safe handling, storage and transportation of these batteries. It is not to be considered as a warranty or quality specification.**

It is the responsibility of each individual handling these batteries to obtain from the supplier of the batteries the most appropriate information in order to complement, adapt or correct the content of this BIF.

ADDITIONAL SOURCE OF INFORMATION

Detailed chemical information is available separately from the battery manufacturer.