Material Safety Data Sheet

SMA Storage M Battery Module (STM-BM-4.09-10)

SMA Storage M 8.2 / SMA Storage M 12.3 / SMA Storage M 16.4 / SMA Storage M 20.5 / SMA Storage M 24.6 / SMA Storage M 28.7 / SMA Storage M 32.8 / SMA Storage M 36.8 / SMA Storage M 40.9 / SMA Storage M 45.0 / SMA Storage M 49.1

1 Identification of the substance or mixture and of the company

Product name	Lithium Iron Phosphate (LiFePO4) rechargeable battery
Model	SMA Storage M Battery Module (STM-BM-4.09-10)
Type designation	For use in following configuration: • SMA Storage M 8.2 • SMA Storage M 12.3 • SMA Storage M 16.4 • SMA Storage M 20.5 • SMA Storage M 24.6 • SMA Storage M 28.7 • SMA Storage M 32.8 • SMA Storage M 36.8 • SMA Storage M 40.9 • SMA Storage M 45.0 • SMA Storage M 49.1
Material number	STM-BM-4.09-10
Product use	Rechargeable battery

2 Chemical product and company identification

Sample Name	Lithium Iron Phosphate (LiFePO4) rechargeable battery
Model	SMA Storage M Battery Module STM-BM-4.09-10
Nominal Voltage	57,6 V
Rated Capacity	71,06 Ah
Rated Energy	4,09 kWh
Distributed by	SMA Solar Technology AG
Address	Sonnenallee 1, 34266 Niestetal, Germany
Phone number	+49 561 95 22-0
E-mail	info@SMA.de

3 Hazards identification

Classification of the substance or mixture [Regulation (EC) No. 1272/2008]	As a whole, the battery is not dangerous in the correct use.
Label elements	This product is classified as an "article" and is not subject to the labeling requirements under EU regulations [REACH/CLP].
Other Hazard	
Explosive risk	This article does not belong to the explosion dangerous goods.
Flammable risk	This article does not belong to the flammable material.
Oxidation risk	This article does not belong to the oxidation of dangerous goods.
Toxic risk	This article does not belong to the toxic dangerous goods.

4 Composition/information on ingredients

Substances	Not applicable

Mixtures

Important note: The battery should not be opened or burned. Exposure to the ingredients contained within or their combustion products could be harmful.

Component	CAS NO.	EC No.	%/wt.
Lithium iron Phosphate	15365-14-7	476-700-9	15–40
Ethyl propionate	105-37-3	203-291-4	15–40
Copper foil	7440-50-8	231-159-6	10–30
Aluminum foil	7429-90-5	231-072-3	10–30
Graphite	7782-42-5	231-955-3	7–25

Component	CAS NO.	EC No.	%/wt.
Hexafluoropropylene-vinylidene fluoride Copolymer	9011-17-0	618-470-6	3–15
Ethylene Carbonate	96-49-1	202-510-0	0–15
Propylene Carbonate	108-32-7	203-572-1	0–15
Lithium Hexafluorophosphate(1-)	21324-40-3	244-334-7	0–15
Separator	9002-88-4	618-339-3	0–5

5 First aid measures

Eye Contact: The ingredients in the battery can cause severe allergies and chemical burns. Open the upper and lower eyelids immediately and rinse the eyes with water for more than 15 minutes until no chemical remains. Then seek medical attention immediately.

Skin Contact: The ingredients in the battery may cause skin irritation or chemical burns. Remove contaminated clothing and wash skin with soap and water. Seek medical attention if chemical burns or irritation persists.

Ingestion: Ingesting the battery is harmful. The composition of the battery can cause severe chemical burns in the mouth, esophagus, and gastrointestinal tract. Do not induce vomiting or food or drink if you ingest the battery or disassemble the battery. Seek medical attention immediately.

Inhalation: Ingredients in the battery may cause respiratory allergies, and inhalation of vapor may cause upper respiratory tract and lung allergies. Breathe fresh air and seek medical attention immediately.

Most important symptoms and effects, both acute and delayed: No information available.

Indications of immediate medical attention or special treatment: Treat symptomatically.

6 Fire-fighting measures

Extinguishing media

Suitable fire extinguishing media	Water or water mist, sand, fire blanket, dry powder or carbon dioxide fire extinguisher
Inappropriate extinguishing medium	None

Special hazards arising from the substance or mixture

- Risk of formation of toxic pyrolysis products.
- In transportation and test engineering, risk factors such as electric box drop, extrusion, puncture, metal short circuit, liquid immersion may occur, and electric shock and fire risk may occur.
- If in a confined space, there may be a risk of gas explosion.
- Liquids leaking from accidents, including improper handling of fire water, pose a risk of environmental pollution.

Material prepare & training

- Water-based fire extinguishers or carry electric sprayer and manual sprayer as water mist fire extinguisher. Suspended water-based fire extinguishers can be hung on vehicles and goods.
- Waterproof supplies: raincoat, rain boots, rubber gloves; Plastic wrap. Rags.
- PPE: mask, high temperature gloves, safety glasses, half mask.
- Smoke exhaust tools: The storage place should be well ventilated. It is recommended to set up a wall smoke exhaust fan every 20 meters or move the smoke exhaust fan.

- Turn on or move fan to exhaust smoke
- After fire control disposal, the product quality department will confirm whether it is necessary to scrap.
- Use emergency materials to dispose of leaked electrolyte

Material prepare & training

- Water-based fire extinguishers or carry electric sprayer and manual sprayer as water mist fire extinguisher. Suspended water-based fire extinguishers can be hung on vehicles and goods.
- Waterproof supplies: raincoat, rain boots, rubber gloves; Plastic wrap. Rags.
- PPE: mask, high temperature gloves, safety glasses, half mask.

Fire extinguishing precautions and protective measures

- Water-based fire extinguishers or carry electric sprayer and manual sprayer as water mist fire extinguisher. Suspended water-based fire extinguishers can be hung on vehicles and goods.
- Waterproof supplies: raincoat, rain boots, rubber gloves; Plastic wrap. Rags.
- PPE: mask, high temperature gloves, safety glasses, half mask. Alarm immediately when battery smoke or combustion is detected
- Wear protective equipment, including respirators and masks. If water is used, PPE should include raincoats, rain boots, insulated gloves, etc.
- Cut off the power supply
- Using solid fire extinguishers, it is recommended to use fire extinguishers in the following order: water or mist, sand, fire blanket, dry powder, carbon dioxide fire extinguishers;
- Exhaust smoke through fans or air circulation.

7 Accidental release measures

On-site: Place the material a suitable container and alert the local police.

In water: When the battery pack is in water, there is a risk of slight electric shock; when electrolyzing water, hydrogen will be generated. Ventilation must be maintained to prevent hydrogen accumulation and explosion in closed space.

8 Handling and storage

One of the most important risks in the transportation of batteries and battery power equipment is the short circuit of batteries caused by contact between the two poles of batteries with other batteries, metal objects or other conductors.Therefore, packaged batteries and battery cells must be separated in an appropriate way to prevent short circuit and electrode damage. In addition, batteries and battery cells must be packaged in strong external packaging or installed in equipment.

*Standards for Determining the Potential Risks of Major Accidents of Industry and Trade Enterprises: for batteries with a single cell voltage greater than 3 volts and safety defects such as swelling, short circuit, damage, overcharging, etc., excluding batteries continuously immersed in water, i.e., faulty batteries, effective physical separation measures shall be taken; otherwise, they will be defined and determined as major accident hazards.

Handling

- Do not make excessive physical impact or vibration on batteries.
- Short circuit should be avoided, although a few seconds of short circuit will not have a serious impact on the battery. A long short circuit can cause the battery to lose energy quickly and generate enough heat to burn the shell.
- The sources of short circuit include the random placement of batteries in bulk containers or various metal objects used in battery assembly on equipment. In order to minimize the risk of short circuit of batteries, the protection measures of batteries should be provided when the batteries are transported and stored.

- Do not expose the battery to water when it breaks. Operators need insulation protection when handling battery packs that exceed 50V.
- Batteries cannot be disassembled or deformed.

Storage

- When lithium-ion batteries are stored for a long time, their charging capacity should be between 25% and 75%.
- Store in a cool, dry and well ventilated area.
- Excessive temperature can lead to a series of battery problems, such as leakage or rust.
- Do not put batteries in open fire.
- Physical Separation measures for faulty batteries refer to isolating faulty batteries from non-faulty batteries through means such as solid walls, explosion-proof cabinets, steel cabinets, individual containers, fireproof rolling shutters, etc.

9 Exposure Control/Personal Protection

National occupational exposure and biological limit values

Graphite (7782-42-5)

Germany - Occupational Exposure Limits (TRGS 900)

Local name	Allgemeiner Staubgrenzwert - Alveolengängige/Einatembare Fraktion
AGW (OEL TWA)	1.25 mg/m³ (A) 10 mg/m³ (E)
Peak exposure limitation factor	2(II)
Remark	AGS - Ausschuss für Gefahrstoffe; DFG - Senatskommission zur Prüfung gesundheitsschädlicher Arbeitsstoffe der DFG (MAK-Kommission); Y - Ein Risiko der Fruchtschädigung braucht bei Einhaltung des Arbeitsplatzgrenzwertes und des biologischen Grenzwertes (BGW) nicht befürchtet zu werden
Regulatory reference	TRGS900

Sweden - Occupational Exposure Limits

Local name	Damm – kol inkl. kimrök
NGV (OEL TWA)	3 mg/m³ (inhalerbar fraktion)
Remark	25 (Med inhalerbar och respirabel fraktion menas de dammfraktioner som definieras i svensk standard SS-EN 481, Arbetsplatsluft – Partikelstorleksfraktioner för mätning av luftburna partiklar (utgåva 1, 1993). Med totaldamm menas de partiklar (aerosoler) som fastnar på ett filter i en totaldammprovtagare)
Regulatory reference	Arbetsmiljöverkets föreskrifter och allmänna råd (AFS 2023:14) om gränsvärden för luftvägsexponering i arbetsmiljön

Keep away from heat sources and fires and store in dry and cool areas.

Copper (7440-50-8)

EU - Indicative Occupational Exposure Limit (IOEL)

Local name	Copper

IOEL TWA	0.01 mg/m³ (respirable fraction)
Remark	(Year of adoption 2014)
Regulatory reference	SCOEL Recommendations

Germany - Occupational Exposure Limits (TRGS 900)

Local name	Kupfer und seine Verbindungen
AGW (OEL TWA)	0.045 mg/m³ (A) 0.2 mg/m³ (E)
Peak exposure limitation factor	(A): 8(II);(E): 4(II)
Remark	AGS - Ausschuss für Gefahrstoffe; 10 - Der Arbeitsplatzgrenzwert bezieht sich auf den Elementgehalt des entsprechenden Metalls
Regulatory reference	TRGS900

Sweden - Occupational Exposure Limits

Local name	Koppar och oorg. föreningar
NGV (OEL TWA)	0.01 mg/m³ (respirabel fraktion som Cu)
Remark	25 (Med inhalerbar och respirabel fraktion menas de dammfraktioner som definieras i svensk standard SS-EN 481, Arbetsplatsluft – Partikelstorleksfraktioner för mätning av luftburna partiklar (utgåva 1, 1993). Med totaldamm menas de partiklar (aerosoler) som fastnar på ett filter i en totaldammprovtagare)
Regulatory reference	Arbetsmiljöverkets föreskrifter och allmänna råd (AFS 2023:14) om gränsvärden för luftvägsexponering i arbetsmiljön

Aluminum (7429-90-5)

Germany - Biological limit values (TRGS 903)

Local name	Aluminium 50 µg/g creatinine Parameter: Aluminium - Untersuchungsmaterial: U = Urin -
Biological limit value	Probenahmezeitpunkt: c) am Schichtende, bei Langzeitexposition nach mehreren vorangegangenen Schichten - Festlegung/Begründung: 11/2018 DFG
Regulatory reference	TRGS 903

Sweden - Occupational Exposure Limits

Local name	Aluminium – metall och oxid
NGV (OEL TWA)	5 mg/m³ (totaldamm som Al) 2 mg/m³ (respirabel fraktion som Al)

Remark	25 (Med inhalerbar och respirabel fraktion menas de dammfraktioner som definieras i svensk standard SS-EN 481, Arbetsplatsluft – Partikelstorleksfraktioner för mätning av luftburna partiklar (utgåva 1, 1993). Med totaldamm menas de partiklar (aerosoler) som fastnar på ett filter i en totaldammprovtagare)
Regulatory reference	Arbetsmiljöverkets föreskrifter och allmänna råd (AFS 2023:14) om gränsvärden för luftvägsexponering i arbetsmiljön

Engineering Control

Under routine handling of intact cells, special controls are not usually required aside from basic electrical safety. In industrial settings (battery pack assembly or repair), use local exhaust ventilation (LEV) if operations could release fumes or dust (e.g. soldering near batteries or cutting cells). For large scale charging areas, ensure ventilation to avoid accumulation of any off-gassed electrolyte vapors, especially at elevated temperatures. Maintain ambient temperature to prevent thermal runaway. Use explosion-proof ventilation equipment in storage of large quantities (due to flammable vapor risk in fire).

Personal protection equipment

Personal protective equipment symbol(s):

Eye protection	Not required for normal conditions of use. In case of electrolyte leakage: Safety glasses. EN 166.
Skin protection	Not required for normal conditions of use. In case of electrolyte leakage: Wear protective clothing
Hand protection	Nitrile rubber (Nitrile) - 0.4 mm thickness. Protective gloves made of PVC
Respiratory protection	Not necessary with sufficient ventilation. In case of electrolyte leakage: Wear suitable respiratory equipment in case of insufficient ventilation. EN 143. EN 14387
Thermal hazards	If there is a risk of thermal burns (battery fire), firefighters wear thermal protective gear. Otherwise, thermal PPE not typically required – avoid handling hot batteries.

10 Physical/Chemical Properties

Physical state	Solid
Color	Not Applicable
Odor	No Odor
Flash point	Not applicable, flash point for electrolyte is about 25°C
Solubility in ethanol soluble	Not Applicable
Boiling Point	Not Applicable
Solubility in water:	Not Applicable

Vapor pressure	Not Applicable
Explosion limit	Not Applicable
Auto flammability	Not Applicable, When >150 degree C, there is a chance for thermal runaway event occur.
Melting Point	Not Applicable
Freezing Point	Not Applicable

11 Stability and reactivity

Stability: Good stability at standard temperature.

Reactivity: None

Notice: Do not touch water or acidic substances. Products after decomposition: If the aluminum foil packaging of the battery is damaged, then do not contact strong oxidants, acidic substances and high temperature environment, and the electrolyte may volatilize to form hydrogen fluoride.

12 Toxicological information

No toxic substances will be produced during routine operation and use.

Caution: according to the harmonized classification and labelling (CLP00) approved by the European Union, 1,3 Propanesultone may cause cancer, is harmful if swallowed and is harmful in contact with skin. This substances meeting the criteria for classification in the hazard class reproductive toxicity category 1A or 1B, adverse effects on sexual function and fertility or on development in accordance with section 3.7 of Annex I to Regulation(EC) No 1272/2008.Information on hazard classes as defined in Regulation (EC) No. 1272/2008

13 Ecological information

If batteries are to be scrapped, they should be selected and disposed of by professional companies.

14 Transport information

Air transportation

The lithium battery should accord with the International Air Transport Association (IATA DGR 67th Edition) requirements for transportation. The battery or cell should be packed and signed as following table.

Material data sheet (EN)
Lithium Iron Phosphate (LiFePO4) rechargeable battery
Article number: STM-BM-4.09-10
Xiamen Ampace Technology Limited

UN NO.	Proper Shipping Name	Power	Package requirements	Label which need to paste
UN 3480	Lithium ion batteries	Cells > 20 Wh Batteries > 100 Wh Weight > 35 kg	Pax: Forbidden CAO: Forbidden	Class9 the lithium battery 

Notes

Cells and/or batteries at a SOC of greater than 30% of their rated capacity may only be shipped with the approval of the State of Origin and the State of the Operator under the written conditions established by those authorities.

After receiving the lithium battery, if the mark is lost, fallen off or difficult to identify, the operator must replace the label according to the information provided in the "shipper's dangerous goods declaration form".

The lithium core and battery goods required by the packaging specification PI965 shall not be packed in the same outer package as other dangerous goods.

Ban lithium ion battery (UN 3480, PI965 Section IA or IB) with category 1 explosive material (except ammunition) 1.4, 2.1 flammable gas, flammable liquid, 4.1 3 flammable solid, 5.1 class antioxidant and other dangerous goods packaging in the same package.

Ensure that the equipment cannot be moved in the outer packing; If there are more than one piece of equipment in the package, it must be packed tightly together to prevent damage caused by contact with other equipment in the package.

Do not damage or mishandle this package. If package is damaged, batteries must be quarantined, inspected, and repacked.

Cells and batteries identified by the 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.

Waste lithium batteries and lithium batteries being shipped for recycling or disposal are prohibited from air transport unless approved by the appropriate national authority of the State of origin and the State of the operator.

The lithium battery should pass the UN38.3 test, if the battery cannot pass the testing, it cannot transport, should redesign.

The new battery mark allows to be 100mm x 100mm square, the minimum mark size is 100mm x70mm.

PI 966 and PI 969—Have been revised to clarify the packing options for Section I, which are: The lithium cells or batteries are packed in a UN specification packaging, then placed with the equipment in a strong rigid outer packaging; or the cells or batteries are packed with the equipment in a UN specification packaging.

The packing options in Section II have been deleted, as there is only one option available given that there is no requirement for UN specification packaging.

Lithium ion battery UN3480 PI965 Section IB, each package must withstand 3m stacking test.

In UN3481 PI 966 Section II, 967 Section II, when the package is put into the overpack, the package must be fixed in the overpack, and the overpack shall not affect the expected function of each package PI 965 and PI 966—Both packing instructions have several notes added to reiterate that batteries shipped at a reduced SoC are less prone to thermal runaway.

PI 967—Has been revised to introduce the recommendation that batteries contained in equipment should not be offered with an SOC>30% or an indicated battery capacity exceeding 25%.

Ocean shipping

Transportation refers to the IMDG CODE 42-24 Edition, which are managed according to UN NO 3480/3481 and packaged in the second category. Firm installation, isolation from each other, short circuit prevention, and packages with more than 24 lithium cells or 12 lithium batteries: special procedures to be followed when damaged must be marked; special procedures document to be followed when damaged is available on board. The clause 188 of IMDG CODE 42-24 Edition required:

1. The watt-hour rating of lithium ion cell is less than 20 Wh and the watt-hour rating of lithium-ion battery is less than 100 Wh is not classified as dangerous cargo, but each package shall be marked with below lithium battery mark.
2. For cells and battery or those packed with equipment (not applicable when contained in equipment), the cells and battery must be packed in inner packaging, which shall completely enclose the cell and battery, inner packaging (and equipment (if any))shall be packed in strong outer packaging that in accordance with < Model Regulation>4.1.1.1、4.1.1.2、4.1.1.5.

The clause 230 of IMDG CODE 42-24 Edition required:

3. The model of each lithium ion cell and battery should meets all testing requirements under Part III, subsection 38.3 of <UN Manual of Tests and Criteria>.
4. Shall be equipped with safe exhaust equipment, prevent violent rupture under normal transportation conditions.

5. Shall be equipped with effective devices to prevent external short circuit.

   The LP906 of IMDG CODE 42-24 Edition required: The specific instructions for use of the package should be made available by the packaging manufacturers and subsequent distributors to the consignor.

Land transportation

Transport shall be carried out in accordance with the relevant provisions of the List of Dangerous Goods (GB12268-2025), the European regulations concerning the international transport of dangerous goods by road (ADR), Regulations concerning road transportation of dangerous goods(JT/T 617-2018), List of dangerous goods in railway(TB/T 30006-2022), the Rules for the International Carriage of Dangerous Goods by Rail (RID), special provisions 188, and the Manual of Tests and Standards.

For more information, Call: +86-592-3952222.

15 Disposal consideration

Batteries cannot be discarded directly into sewers or directly discharged into the environment. They should be recycled and treated in accordance with local laws and regulations.

16 Regulation information

Regulatory Information	See ACGIH exposure limits information as noted in Section3
US	This SDS meets/exceeds OSHA requirements.
GER	According to the AwSV regulations, the hazard class of lithium-ion batteries to the water environment is WGK2.
International	This SDS conforms to European Union (UN), the International Standards Organization (ISO) and the International Labor Organization (ILO) and as documental in ANSI (American National Standards Institute) Standard Z400.1-2010.
Air transportation	According to Civil aviation industry standard MH/T1020-2018 Lithium Battery Air Transport Standard and IATA DGR and ICAO. The international transport and commodity inspection is used this standard at the moment (IMDG CODE).
Ocean shipping	According to International Maritime Dangerous Goods Code to transport and According to the requirements of UN NO 3480/3481 to management the goods.
Land transportation	According to List of Dangerous Goods (GB12268-2025).
Avoid electrical shock	According to Standard for Electrical Safety in the Workplace, NFPA-70E.

17 Other information

Charging and labeling

Charging	The battery can be recharged repeatedly. Please use the original battery charger. Do not use modified or damaged battery chargers. When the charge exceeds the prescribed charging time, the charge can be stopped to prevent the battery from overcharging. Charging temperature should be between 0 and 45 (32° F and 113° F) from the safety point of view, there is no experience value during fast charging. There is normal heating phenomenon in the process of battery charging.

Charging Voltages and Currents	When the voltage exceeds the specified value, it is limited by the internal protection circuit of the battery. If the protective circuit is damaged, please stop using it. Please charge and discharge under specified voltage and current. If the battery voltage drops below the specified minimum voltage, please stop using it.
Warning	Chargers provided by the equipment manufacturer shall be used and used in accordance with the operating guidelines. It is forbidden to open the battery, close to the source of fire, and short circuit, which may cause fire, explosion, leakage and personal injury.
Disposal	Disposal shall be carried out in accordance with the relevant regulations of the United Nations, the state and the local authorities.

(2) Shall be equipped with safe exhaust equipment, prevent violent rupture under normal transportation conditions.

(3) Shall be equipped with effective devices to prevent external short circuit. The LP906 of IMDG CODE 41-22 Edition required: The specific instructions for use of the package should be made available by the packaging manufacturers and subsequent distributors to the consignor.

Declaration

The information contained here is completed without any authorization. This information is only a reference. Users should customize an independent system based on the complete and reliable information they collect, to ensure the proper use and handling of the safety and health of employees and customers.