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MATERIAL SAFETY DATA SHEET

Section 1. Chemical Product and Company Identification

Products Name	Rare earth silica gel lead acid battery
Model Number	6-EVF-120,6-EVF-150,6-EVF-100,6-EVF-80,6-EVF-135,4-EVF-150,3-EVF-200,3-EVF-150
Manufacture Name	Tianneng Battery Group Co., Ltd
Address	Meishan Industrial Zone,Changxing, Zhejiang Province, China
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Date Prepared	2015-04-17

Section 2. Composition/Information on Ingredients

Substance/preparation: preparation

Chemical Name	Percent of Content	CAS No.	OSHA (PEL)	ACGIH (TLV)
Lead (Pb, PbO2, PbSO4)	70%	7439-92-1	0.05mg/m^3	0.05mg/m^3
Sulfuric Acid	20%	7664-93-9	1.0mg/m^3	1.0mg/m^3
Fiberglass Separator	5%	/	N/A	N/A
ABS or PP	5%	9003-56-9/ 9003-07-0	N/A	N/A

ACGIH: American Council of Government Industrial Hygienists
TLV: Threshold Limit Value are personal exposure limits determined by the ACGIH

Section 3. Hazards Summarizing

Routes of entry	Sulfuric Acid: Harmful by all routes of entry. Lead Compounds: Hazardous exposure can occur only when product is heated, oxidized or otherwise processed or damaged to create dust, vapor or fume.
Inhalation	Sulfuric Acid: Breathing of sulfuric acid vapors or mists may cause severe respiratory irritation. Lead Compounds: Inhalation of lead dust or fumes may cause irritation of upper respiratory tract and lungs.
Ingestion	Sulfuric Acid: May cause severe irritation of mouth, throat, esophagus and stomach. Lead Compounds: Acute ingestion may cause abdominal pain, nausea, vomiting, diarrhea and severe cramping. This may lead rapidly to systemic toxicity and must be treated by a physician.
Skin Contact	Sulfuric Acid: Severe irritation, burns and ulceration. Lead Compounds: Not absorbed through the skin.
Eye Contact:	Sulfuric Acid: Severe irritation , burns, cornea damage, and blindness. Lead Components: May cause eye irritation.
Effects of Overex posure - Acute	Sulfuric Acid: Severe skin irritation, damage to cornea, upper respiratory irritation. Lead Compounds: Symptoms of toxicity include headache, fatigue, abdominal pain, loss of appetite, muscular aches and weakness, sleep disturbances and irritability.
Effects of Overex posure - Chronic	Sulfuric Acid: Possible erosion of tooth enamel, inflammation of nose, throat and bronchial tubes. Lead Compounds: Anemia; neuropathy, particularly of the motor nerves, with wrist drop; kidney damage; reproductive changes in males and females.

Section 4. First Aid Measures

Skin contact	Sulfuric Acid: Flush with large amounts of water for at least 15 minutes; remove contaminated clothing completely, including shoes. Lead: Wash immediately with soap and water.
Eye contact	Sulfuric Acid and Lead: Flush immediately with large amounts of water for a least 15 minutes; consult physician.
Inhalation	Sulfuric Acid: Remove to fresh air immediately. If breathing is difficult, give oxygen. Lead: Remove from exposure, gargle, wash nose and lips; consult physician.
Ingestion	Sulfuric Acid: Give large quantities of water; do not induce vomiting; consult physician. Lead: Consult physician immediately.

Section 5. Fire Fighting Measures

Unusual Fire and Explosion Hazards	Highly flammable hydrogen gas is generated during charging and operation of batteries. To avoid risk of fire or explosion, keep sparks or other sources of ignition away from batteries. Do not allow metallic materials to simultaneously contact negative and positive terminals of cell and batteries. Follow manufacturer's instructions for installation and service.
Flammable Limits	LEL = 4.1% (Hydrogen Gas) UEL = 74.2%
Extinguishing Media	CO2; foam; dry chemical.
Special Fire Fighting Procedures	If batteries are on charge, shut off power. Use positive pressure, self-contai ned breathing apparatus. Water applied to electrolyte generate sheat and causes it to spatter. Wear acid-resistant clothing.

Section 6. Accidental Release Measures

Procedures for cleanup: Stop release, if possible. Avoid contact with any spilled material. Contain spill, isolate hazard area, and deny entry. Limit site access to emergency responders. Neutralize with sodium bicarbonate, soda ash, lime or other neutralizing agent. Place battery in Suitable container for disposal. Dispose of contaminated material in accordance with applicable local, state and federal regulations. Sodium bicarbonate, soda ash, sand, lime or other neutralizing agent should be kept on-site for spill remediation. Personal Precautions: Acid resistant aprons, boots and protective clothing. ANSI approved safety glasses with side shields/face shield recommended. Ventilate enclosed areas. Environmental Precautions: Lead and its compounds and sulfuric acid can pose a severe threat to the environment. Contamination of water, soil, and air should be prevented.

Section 7. Handling and Storage

Handling and Storage	Store batteries in cool, dry, well-ventilated areas with impervious surfaces and adequate containment in the event of spills. Batteries should also be stored under roof for protection against adverse weather conditions. Separate from incompatible materials. Store and handle only in areas with adequate water supply and spill control. Avoid damage to containers. Keep away from fire, sparks and heat. Precautionary Labeling: POISON - CAUSES SEVERE BURNS DANGER - CONTAINS SULFURIC ACID

Section 8. Exposure Controls/Personal Protection

Engineering Controls	Store and handle in well-ventilated area. If mechanical ventilation is used, components must be acid-resistant.
Work Practices	Handle batteries cautiously to avoid spills. Make certain vent caps are on securely. Avoid contact with internal components. Wear protective clothing when filling or handling batteries.
Respiratory Protection	None required under normal conditions. When concentrations of sulfuric acid mist are known to exceed the PEL, use NIOSH or MSHA-approved respiratory protection.
Eye Protection	Chemical goggles or face shield.
Protective Gloves	Rubber or plastic acid-resistant gloves with elbow-length gauntlet.
Others	Acid-resistant apron. Under severe exposure emergency conditions, wear acid-resistant clothing and boots.

Section 9. Physical and Chemical Properties

Electrolyte:	
State	Clear liquid
Odor	Sharp and pungent odor
pH	<2
Vapor pressure	10 mm Hg
Vapor density	Greater than 1 (AIR = 1)
Boiling point	203 - 240° F
Melting point	N/A
Solubility in water	100%
Specific gravity	1.215 to 1.350 (H2O = 1)
Density	N/A

Section 10. Stability and Reactivity

Stability	Stable
Conditions to Avoid	Prolonged overcharge; sources of ignition
Incompatibility	Sulfuric Acid: Contact with combustibles and organic materials may cause fire and explosion. Also reacts violently with strong reducing agents, metals, sulfur trioxide gas, strong oxidizers and water. Contact with metals may produce toxic sulfur dioxide fumes and may release flammable hydrogen gas. Lead Compounds:Avoid contact with strong acids, bases, halides, halogenates, potassium nitrate, permanganate, peroxides, nascent hydrogen and reducing agents.
Hazardous Polymerization	Will not occur
Hazardous Decomposition Products	Sulfuric Acid: Sulfur trioxide, carbon monoxide, sulfuric acid mist, sulfur dioxide, and hydrogen. Lead Compounds: High temperatures likely to produce toxic metal fume, vapor, or dust; contact with strong acid or base or presence of nascent hydrogen may generate highly toxic arsine gas.

Section 11. Toxicological Information

General: The primary routes of exposure to lead are ingestion or inhalation of dust and fumes.
Acute:
Ingestion/Inhalation: Exposure to lead and its compounds may cause headache, nausea, vomiting, abdominal spasms, fatigue, sleep disturbances, weight loss, anemia, and pain in the legs, arms and joints. Kidney damages, as well as anemia, can occur from acute exposure.
Chronic:
Ingestion/Inhalation: Prolonged exposure to lead and its compounds may produce many of the symptoms of short-term exposure and may also cause central nervous system damage include fatigue, headaches, tremors, hypertension, hallucinations, convulsions and delirium. Kidney dysfunction and possible injury has also been associated with chronic lead poisoning. Chronic over-exposure to lead has been implicated as a causative agent for the impairment of male and female reproductive capacity, but there is, at present, no substantiation of the implication. Pregnant women should be protected from excessive exposure. Lead can cross the placental barrier and unbom children may suffer neurological damage or developmental problems due to excessive lead exposure in pregnant women.

Section 12. Ecological Information

In most surface water and groundwater, lead forms compounds with anions such as hydroxides, Carbonates, sulfates, and phosphates and precipitates out of the water column. Lead may occur As sorbed ions or surface coating on sediment mineral particles or may be carried in colloidal Particles in surface water. Most lead is strongly retained in soil, resulting in little mobility. Lead May be immobilized by ion exchange with hydrous oxides or clays or by chelation with humic or fulvic acids in the soil. Lead(when in the dissolved phase) is bio-accumulated by plants and animals, both aquatic and terrestrial.

Section 13. Disposal Considerations

Waste Disposal Methods:
Spent batteries: Send to secondary lead smelter for recycling.
Place neutralized slurry into sealed containers and handle as applicable with state and federal regulations. Large water-diluted spills, after neutralization and testing, should be managed in accordance with approved local, state and federal requirements. Consult state environmental agency and/or federal EPA.

Section 14. Transport Information

Proper Shipping Name: Sealed Lead Acid Battery

IMDG:

Batteries that are classified as Nonspillable have been tested and meet the nonspillable criteria listed in Special Provision 238. Non-spillable batteries must be packed according to IMDG Packing Instruction P003.These batteries are excepted from all IMDG code provided that the batteries' terminals are protected against short circuits per PP16.

IATA:

Batteries that are classified as Nonspillable have been tested and meet the nonspillable criteria listed in IATA Packing Instruction 806 and Special Provision A67.Nonspillable batteries must be packed according to IATA Packing Instruction 806. These batteries are excepted from all IATA regulations provided that the batteries' terminals are protected against short circuits.
The Li-ion Battery according to Section II/Section IB of PACKING INSTRUCTION 965, or Section II of PACKING INSTRUCTION 966～967 of the 2015 IATA Dangerous Goods regulations 56th Edition may be transported and applicable U.S. DOT regulations for the safe transport of Li-ion Battery.

Section 15. Regulatory Information

U.S. Hazardous Under Hazard Communication Standard:
Lead – YES, Sulfuric Acid – YES, Antimony- Yes, Arsenic – YES
Ingredients Listed on TSCA inventory: YES
CERCLA Section 304 Hazardous Substances:
Lead – YES, Sulfuric Acid – YES, Antimony- Yes, Arsenic – YES
EPCRA Section 302 Extremely Hazardous Substance:
Sulfuric acid - YES

Section 16. Other Information