MATERIAL SAFETY DATA SHEET

Revision Date: Jun , 2012

Section 1：Product and Manufacturer Identity

Product Name:

Valve Regulated Lead Acid (VRLA) Batteries

Telephone：**+1-410-238-1526**

Fax: **+1-410-238-1047**

Web-site：**http://www.mkbattery.com/**

Manufacturer's Name and Address:

Kung Long Batteries Industrial Co., Ltd.

No.6, Tzu-Li 3 Rd., Nantou City, Taiwan

Section 2：Hazard Identification

Signs and Symptoms of Exposure	Acute Hazards	Do not open battery. Avoid contact with lead plates and absorbed electrolyte separator. Electrolyte: Direct skin or eye contact may cause irritation and burns. Lead: Direct skin or eye contact may cause irritation and. Inhalation or ingestion of lead dust or fumes may result in headache, nausea, vomiting, abdominal spasms, fatigue, sleep disturbances, weight loss, anemia and leg, arm and joint pain.
	Sub chronic and Chronic Health Effects	Electrolyte: Repeated skin or eye contact may cause irritation and burns. Lead: Repeated skin or eye contact may cause central nervous system damage, anemia, gastrointestinal disturbances, irritability, metallic taste, insomnia, wrist-drop, kidney dysfunction and reproductive system disturbances. Pregnant women should be protected from excessive exposure to prevent lead from crossing the placental barrier and causing infant neurological disorders. **California Proposition 65 Warning**: Battery posts, terminals, and related accessories contain lead and lead compounds, chemicals known to the State of California to cause cancer and reproductive harm, and during charging, strong inorganic acid mist containing sulfuric acid are evolved, a chemical known to the State of California to cause cancer. Wash hands after handing.
Medical Conditions Generally Aggravated by Exposure	Contact with internal components if battery is broken or opened, then persons with the following medical conditions must take precautions: pulmonary edema, bronchitis, emphysema, dental erosion.	
Routes of Entry	Inhalation -Yes Ingestion – Yes	Eye Contact - Yes

Chemical(s) Listed as Carcinogen or potential Carcinogen	Proposition 65 - Yes	National Toxicology Program - Yes	I.A.R.C. Monographs - Yes	O.S.H.A. - NO

Section 3：Composition/Information On Ingredients

Identification of single or mixed substance product：Mixed substance product.

※PBB spices or PBDE spices is not involved

Components	CAS #	Hazard Category	OSHA PEL	ACGIH TLV	% (By weight)
Lead	7439-92-1	Acute-Chronic	0.05 mg/m^3	0.15 mg/m^3	45 ~ 60%
Lead Dioxide	1309-60-0	Acute-Chronic	0.05 mg/m^3	0.15 mg/m^3	15 ~ 25%
Sulfuric Acid Electrolyte	7664-93-9	Acute-Chronic Reactive -Oxidizer	1.00 mg/m^3	1.00 mg/m^3	15 ~ 20%
Calcium (lead calcium alloy)	7440-70-2	Reactive	Not Established	Not Established	<0.06%
Tin	7440-31-5	Chronic	2mg/m^3	2mg/m^3	<0.6%
Arsenic (inorganic)	7440-38-2	Acute-Chronic	0.01mg/m^3	0.01mg/m^3	<0.0006%
Non-Hazardous Materials	N/A	Not applicable	N/A	N/A	5 ~ 10%

(The non-hazardous materials include ABS plastic, glass fiber, rubber, copper, benjamin)

Section 4：First - Aid Measures

Battery Electrolyte：

Inhalation： Remove to fresh air. Give oxygen or artificial respiration if needed. Get immediate medical attention.

Eye Contact： Flush with plenty of water for at least 15 minutes. Get immediate medical attention.

Skin Contact： Remove contaminated clothing and flush affected areas with plenty of water for at least 15 minutes.

Ingestion： Do not induce vomiting. Dilute by giving large quantities of water. If available give several glass of milk. Do not give anything by mouth to an unconscious person. Give CPR if breathing has topped. Get immediate medical attention.

Routes of Entry：

Electrolyte: Harmful by all routes of entry.

Inhalation：

Electrolyte: Breathing of sulfuric acid vapors or mists may cause severe respiratory irritation.

Ingestion：

Electrolyte: May cause severe irritation of mouth, throat, esophagus, and stomach.

Skin Contact：

Electrolyte: Severe irritation, burns, and ulceration.

Eye Contact：

Electrolyte: Severe irritation, burns, cornea damage, and blindness.

Effects of Overexposure – Acute：

Electrolyte: Severe skin irritation, damage to cornea may cause blindness, upper respiratory irritation.

Effects of Overexposure – Chronic：

Electrolyte: Possible erosion of tooth enamel; inflammation of nose, throat, and bronchial tubes.

Carcinogenic：

Electrolyte: The International Agency for Research on Cancer (IARC) has classified " strong inorganic acid mist containing sulfuric acid" as a Category 1 carcinogen, a substance that is carcinogenic to humans. This classification does not apply to liquid forms of sulfuric acid or sulfuric acid solutions contained within the battery. Inorganic acid mist (sulfuric acid mist) is not generated under normal use of this product. Misuse of the product, such as overcharging, may result in the generation of sulfuric acid mist.

Medical Conditions Generally Aggravated by Exposure：

Overexposure to sulfuric acid mist may cause lung damage and aggravate pulmonary conditions. Contact of electrolyte with skin may aggravate skin diseases such as eczema and contact dermatitis. Contact of electrolyte with eyes may damage cornea and/or cause blindness. Lead and its compounds can aggravate some forms of kidney, liver, and neurological and diseases.

Section 5：Fire - Fighting Measures

Flash Point：	Not Applicable
Flammable Limits：	Lower limit 4.10%(Hydrogen gas in air) Upper limit 74.20%
Extinguishing Media：	Class ABC, Dry chemical, CO2 or halon, or water spray
Auto – Ignition Temperature：	357℃(polypropylene), 245℃(ABS)

Special Fire Fighting Procedures：

If batteries are on charge, turn off power. Use positive pressure, self-contained breathing apparatus in fighting fire. Water applied to electrolyte generates heat and causes it to spatter. Wear acid resistant clothing. Ventilate area well.

Unusual Fire and Explosion Hazards：

Hydrogen gas may be produced and may explode if ignited. Remove all sources of ignition. Sulfuric acid vapors are generated upon overcharge and case failure. Avoid open flames/sparks/other sources of ignition near battery.

Section 6：Accidental Release Measures

Steps to be Taken in Case of Broken Battery Case or Electrolyte Leakage：

Avoid contact with acid materials. Use soda ash or lime to neutralize. Flush with water. Dispose of clean-up materials as a hazardous waste.

Waste Disposal Method：

Dispose of in accordance with Federal, State and Local Regulations. Do not incinerate. Batteries should be shipped to a reclamation facility for recovery of the metal and plastic components as the proper method of waste management. Contact distributors for appropriate product return procedures.

Other Precautions：

Do not charge in unventilated areas. Do not use organic solvents or other than recommended chemical cleaners on battery.

Procedures for cleanup.

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.

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

Precautions to be taken in handing and storage：

Store away from reactive materials, open flames and sources of ignition as defined in Section 10-Stability and Reactivity Data. Store batteries in cool, dry, well-ventilated areas. Batteries should be stored under roof for protection against adverse weather conditions. Avoid damage to containers.

Other Precautions：

Good personal hygiene and work practices are mandatory. Refrain from eating, drinking or smoking in work areas. Thoroughly wash hands, face, neck and arms, before eating, drinking and smoking. Work clothes and equipment should remain in designated lead contaminated areas, and never taken home or laundered with personal clothing. Wash soiled clothing, work clothes and equipment before reuse.

Section 8：Exposure Controls/ Personal Protection

General：

Normal room ventilation is sufficient during normal use and handling.

Personal Protective Equipment (in the Event of Battery Case Breakage)：

Always wear safety glasses with side shields or full-face shield.
Use rubber or neoprene glove.
Wear acid resistant boots, apron or clothing.

Work / Hygienic Practices：

Remove jewelry, rings, watcher and any other metallic objects while working on batteries. All tools should be adequately insulated to avoid the possibility of shorting connections. Do not lay tools on top of battery. Be sure to discharge static electricity from tools and individual person by touching a grounded surface in the vicinity of the batteries, but away from cells. Batteries are heavy. Serious injury can result from improper lifting or installation. Do not lift, carry, install or remove cells by lifting or pulling the terminal posts for safety reasons and because terminal posts and post seals may be damaged. Do not wear nylon clothes or overalls as they can create static electricity. Do keep a fire extinguisher and emergency communications device in the work area.

Section 9：Physical / Chemical Properties

Boiling Point：	110℃ ~ 112℃
Vapor Pressure：	21 mm Hg. at 25℃
Vapor Density (AIR = 1)：	Electrolyte 3.4
Specific Gravity (H_2O = 1)：	1.170 ~ 1.335
Solubility in Water：	Sulfuric Acid is 100% soluble in water.
Appearance and Odor：	The battery is a solid article consisting of an opaque plastic case with two lead terminals; no apparent odor. Electrolyte is a liquid absorbed in glass mat material, a little pungent odor.

Section 10：Stability and Reactivity

Stability：	Stable under normal conditions
Conditions to Avoid：	Avoid shorting circuit or sparks near battery. Avoid prolonged over-charging. Use only approved charging methods. Do not charge in gas tight containers. Sparks, open flames, keep battery away from strong oxidizers.
Hazardous Decomposition Products	Combustion can produce carbon dioxide and carbon monoxide.
Hazardous Polymerization	Hazardous Polymerization has not been reported.

Section 11：Toxicological Information

General:

The primary routes of exposure to lead are ingestion or inhalation of dust and fumes.

Chronic: Inhalation/Ingestion:

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, gastrointestinal disturbances, anemia, and wrist drop. Symptoms of central nervous system damage include fatigue, headaches, tremors, hypertension, hallucination, 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 unborn children may suffer neurological damage or developmental problems due to excessive lead exposure in pregnant women.

Acute: Inhalation/Ingestion:

Exposure to lead and its compounds may cause headaches, nausea, vomiting, abdominal spasms, fatigue, sleep disturbances, weight loss, anemia. Kidney damage, as well as anemia, can occur from acute exposure.

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 coatings 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(dissolved phase) is bioaccumulated by plants and animals, both aquatic and terrestrial.

Section 13：Disposal Consideration

The Lead-Acid batteries are completely recyclable. Return whole scrap batteries to distributor, manufacturer or lead smelter for recycling. For information on returning batteries to MK battery for recycling call **+1-410-238-1526.** For neutralized spills, place residue in acid-resistant containers with sorbent material, sand or earth and dispose of in accordance with local, state and federal regulations for acid and lead compounds. Contact local and/or state environmental officials regarding disposal information.

Section 14：Transport Information

NFPA Hazard Rating for Sulfuric Acid：

Flammability (Red) = 0 Health (Blue) = 3 Reactivity (Yellow) = 2

Transportation Information
Proper shipping name:
"Batteries, Wet, Non-spillable, Electric storage, Not regulated"

U.S. DOT：
DOT-Our Non-spillable batteries are **Not subject to DG regulations**, since they meet the requirements of 49 CFR 173.159(d). They do not have an assigned UN number nor do they require additional DOT hazard labeling.

IATA / ICAO：

IATA/ICAO- **MK** batteries are exempt from **DG regulations**, and classified as a "Non-Spillable battery". Our Non-spillable batteries are **Not subject to DG regulations**, since they meet the requirements of Packing Instructions **872** of Special Provision A67.
The **MK** batteries are securely packaged, protected from short circuits and labled "Non-Spillable". They are good for transportation on either passenger aircraft or cargo aircraft.

For all modes of transportation, each battery and outer package must be labeled：

"Non-Spillable" or "Non-Spillable Battery". This label must be visible during transportation.

IMDG:

MK batteries are Non-spillable batteries. They meet the requirements of Special Provision 238 and are not subject to the provisions of the IMDG code.

Section 15：Regulatory Information

U.S. Hazardous under Hazard Communication Standard:
Lead- Yes
Arsenic- Yes
Sulfuric acid- Yes

Ingredients listed on TSCA inventory:
Yes

Cercla section 304 hazardous substances:
Lead- Yes R: N/A
Arsenic- Yes R: 1 POUND
Sulfuric acid- Yes R: 1000 POUNDS
R: Reporting not required when diameter of the pieces of solid metal released is equal to or exceeds 100 micrometers.

EPCRA section 302 extremely hazardous substance:
Sulfuric acid- Yes

EPCRA section 313 toxic release inventory:
Lead- CAS NO: 7439-92-1
Arsenic- CAS NO: 7440-38-2
Sulfuric Acid- CAS NO: 7664-93-9

Applied Standard：JIS C8702-1、8702-2、8702-3, JIS C8704
IEC61056-1、61056-2、61056-3

Section 16：Additional Information

The Material Safety Data Sheet is supplied for informational purposes only. The information and recommendations contained herein have been compiled from sources believed to be reliable and represent current opinion on the subject. No warranty, guarantee, or representation is made by **MK Battery** as to the absolute correctness or sufficiency of any representation contained herein and **MK Battery** assumes no responsibility in connection therewith, nor can it be assumed that all acceptable safety measures are contained herein, or that additional measures may not be required under particular or exceptional conditions or circumstances.