



MATERIAL SAFETY DATA SHEET

Form #: MSDS 853020
Revised: 07/05/09
Supersedes: 01/02/08
ECO #: 1000751

Table with sections: I. PRODUCT IDENTIFICATION, II. HAZARDOUS INGREDIENTS/IDENTIFY INFORMATION, III. PHYSICAL DATA, IV. FIRE AND EXPLOSION HAZARD DATA, V. REACTIVITY DATA. Includes chemical trade name, manufacturer info, CAS numbers, and safety data.

VI. HEALTH HAZARD DATA	
Routes of Entry:	<p><u>Sulfuric Acid:</u> Harmful by all routes of entry.</p> <p><u>Lead Compounds:</u> Hazardous exposure can occur only when product is heated, oxidized or otherwise processed or damaged to create dust, vapor or fume.</p>
Inhalation:	<p><u>Sulfuric Acid:</u> Breathing of sulfuric acid vapors or mists may cause severe respiratory irritation.</p> <p><u>Lead Compounds:</u> Inhalation of lead dust or fumes may cause irritation of upper respiratory tract and lungs.</p>
Ingestion:	<p><u>Sulfuric Acid:</u> May cause severe irritation of mouth, throat, esophagus and stomach.</p> <p><u>Lead Compounds:</u> 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.</p>
Skin Contact:	<p><u>Sulfuric Acid:</u> Severe irritation, burns and ulceration.</p> <p><u>Lead Compounds:</u> Not absorbed through the skin.</p>
Eye Contact:	<p><u>Sulfuric Acid:</u> Severe irritation, burns, cornea damage, and blindness.</p> <p><u>Lead Components:</u> May cause eye irritation.</p>
Effects of Overexposure - Acute:	<p><u>Sulfuric Acid:</u> Severe skin irritation, damage to cornea, upper respiratory irritation.</p> <p><u>Lead Compounds:</u> Symptoms of toxicity include headache, fatigue, abdominal pain, loss of appetite, muscular aches and weakness, sleep disturbances and irritability.</p>
Effects of Overexposure - Chronic:	<p><u>Sulfuric Acid:</u> Possible erosion of tooth enamel, inflammation of nose, throat and bronchial tubes.</p> <p><u>Lead Compounds:</u> Anemia; neuropathy, particularly of the motor nerves, with wrist drop; kidney damage; reproductive changes in males and females.</p>
Carcinogenicity:	<p><u>Sulfuric Acid:</u> The International Agency for Research on Cancer (IARC) has classified "strong inorganic acid mist containing sulfuric acid" as a Category I 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 a 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.</p> <p><u>Lead Compounds:</u> Lead is listed as a 2B carcinogen, likely in animals at extreme doses. <u>Proof of carcinogenicity in humans is lacking at present.</u></p> <p><u>Arsenic:</u> Listed by National Toxicology Program (NTP), International Agency for Research on Cancer (IARC), OSHA and NIOSH as a carcinogen only after prolonged exposure at high levels.</p>
Medical Conditions Generally Aggravated by Exposure:	<p>Overexposure to sulfuric acid mist may cause lung damage and aggravate pulmonary conditions. Contact of sulfuric acid with skin may aggravate diseases such as eczema and contact dermatitis. Lead and its compounds can aggravate some forms of kidney, liver and neurologic diseases.</p>
EMERGENCY AND FIRST AID PROCEDURES:	
Inhalation:	<p><u>Sulfuric Acid:</u> Remove to fresh air immediately. If breathing is difficult, give oxygen.</p> <p><u>Lead:</u> Remove from exposure, gargle, wash nose and lips; consult physician.</p>
Ingestion:	<p><u>Sulfuric Acid:</u> Give large quantities of water; do not induce vomiting; consult physician.</p> <p><u>Lead:</u> Consult physician immediately.</p>
Skin:	<p><u>Sulfuric Acid:</u> Flush with large amounts of water for at least 15 minutes; remove contaminated clothing completely, including shoes.</p> <p><u>Lead:</u> Wash immediately with soap and water.</p>
Eyes:	<p><u>Sulfuric Acid and Lead:</u> Flush immediately with large amounts of water for a least 15 minutes; consult physician.</p>
Proposition 65:	<p><u>Warning:</u> Battery posts, terminals and related accessories contain lead and lead compounds, chemicals known to the State of California to cause cancer and reproductive harm. Batteries also contain other chemicals known to the State of California to cause cancer. Wash hands after handling.</p>
VII. PRECAUTIONS FOR SAFE HANDLING AND USE	
Spill or Leak Procedures:	<p>Stop flow of material, contain/absorb small spills with dry sand, earth, and vermiculite. Do not use combustible materials. If possible, carefully neutralize spilled electrolyte with soda ash, sodium bicarbonate, lime, etc. Wear acid-resistant clothing, boots, gloves, and face shield. Do not allow discharge of unneutralized acid to sewer.</p>
Waste Disposal Methods:	<p><u>Spent batteries:</u> Send to secondary lead smelter for recycling.</p> <p>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.</p>

VII. PRECAUTIONS FOR SAFE HANDLING AND USE (Cont.)	
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
VIII. CONTROL MEASURES	
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.	
Protective Gloves:	
Rubber or plastic acid-resistant gloves with elbow-length gauntlet.	
Eye Protection:	
Chemical goggles or face shield.	
Other Protection:	
Acid-resistant apron. Under severe exposure emergency conditions, wear acid-resistant clothing and boots.	
Emergency Flushing:	
In areas where sulfuric acid is handled in concentrations greater than 1%, emergency eyewash stations and showers should be provided, with unlimited water supply.	
IX. OTHER REGULATORY INFORMATION	
NFPA Hazard Rating for Sulfuric Acid:	
Flammability (Red) = 0	Reactivity (Yellow) = 2
Health (Blue) = 3	Sulfuric acid is water-reactive if concentrated.
U.S. DOT:	
The transportation of wet and moist charged (moist active) batteries within the continental United States is regulated by the U.S. DOT through the Code of Federal Regulations, Title 49 (CFR49). These regulations classify these types of batteries as a hazardous material. Refer to CFR 49, 173.159 for more details pertaining to the transportation of wet and moist batteries.	
<u>The shipping information is as follows:</u>	
Proper Shipping Name: Batteries, wet, filled with acid	Packing Group: III
Hazardous Class: 8	Label/Placard Required: Corrosive
UN Identification: UN2794	
Contact your EnerSys representative for additional information regarding the classification of batteries.	
IATA:	
The international transportation of wet and moist charged (moist active) batteries is regulated by the International Air Transport Association (IATA). These regulations also classify these types of batteries as a hazardous material. The batteries must be packed according to IATA Packing Instruction 800.	
<u>The shipping information is as follows:</u>	
Proper Shipping Name: Batteries, wet, filled with acid	Packing Group: III
Hazardous Class: 8	Label/Placard Required: Corrosive
UN Identification: UN2794	
Contact your EnerSys representative for additional information regarding the classification of batteries.	

IX. OTHER REGULATORY INFORMATION (Cont.)

IMDG:

The international transportation of wet and moist charged (moist active) batteries is regulated by the International Maritime Dangerous Goods code (IMDG). These regulations also classify these types of batteries as hazardous material. The batteries must be packed according to IMDG code pages 8120 and 8121.

The shipping information is as follows:

Proper Shipping Name: Batteries, wet, filled with acid	Packing Group: III
Hazardous Class: 8	Label/Placard Required: Corrosive
UN Identification: UN2794	

Contact your EnerSys representative for additional information regarding the classification of batteries.

RCRA:

Spent lead-acid batteries are not regulated as hazardous waste by the EPA when recycled, however state and international regulations may vary.

CERCLA (Superfund) and EPCRA:

- (a) Reportable Quantity (RQ) for spilled 100% sulfuric acid under CERCLA (Superfund) and EPCRA (Emergency Planning Community Right to Know Act) is 1,000 lbs.. State and local reportable quantities for spilled sulfuric acid may vary.
- (b) Sulfuric acid is a listed "Extremely Hazardous Substance" under EPCRA, with a Threshold Planning Quantity (TPQ) of 1,000 lbs.
- (c) EPCRA Section 302 notification is required if 1,000 lbs. or more of sulfuric acid is present at one site. The quantity of sulfuric acid will vary by battery type. Contact your EnerSys representative for additional information.
- (d) EPCRA Section 312 Tier 2 reporting is required for batteries if sulfuric acid is present in quantities of 500 lbs. or more and/or if lead is present in quantities of 10,000 lbs. or more.
- (e) Supplier Notification: This product contains toxic chemicals, which may be reportable under EPCRA Section 313 Toxic Chemical Release Inventory (Form R) requirements.

If you are a manufacturing facility under SIC codes 20 through 39, the following information is provided to enable you to complete the required reports:

<u>Toxic Chemical</u>	<u>CAS Number</u>	<u>Approximate % by Wt.</u>
Lead	7439-92-1	60
Sulfuric Acid	7664-93-9	10 - 30
* Antimony	7440-36-0	2
* Arsenic	7440-38-2	0.2

If you distribute this product to other manufacturers in SIC Codes 20 through 39, this information must be provided with the first shipment of each calendar year.

The Section 313 supplier notification requirement does not apply to batteries, which are "consumer products".

* Not present in all battery types. Contact your EnerSys representative for additional information.

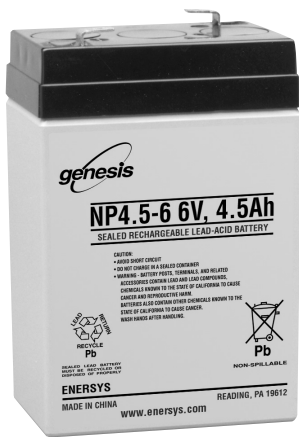
TSCA:

Ingredients in EnerSys' batteries are listed in the TSCA Registry as follows:

	<u>Components</u>	<u>CAS Number</u>	<u>TSCA Status</u>
<u>Electrolyte:</u>	Sulfuric Acid (H ₂ SO ₄)	7664-93-9	Listed
<u>Inorganic Lead Compound:</u>			
	Lead (Pb)	7439-92-1	Listed
	Lead Oxide (PbO)	1317-36-8	Listed
	Lead Sulfate (PbSO ₄)	7446-14-2	Listed
	Antimony (Sb)	7440-36-0	Listed
	Arsenic (As)	7440-38-2	Listed
	Calcium (Ca)	7440-70-2	Listed
	Tin (Sn)	7440-31-5	Listed

CAA:

EnerSys supports preventative actions concerning ozone depletion in the atmosphere due to emissions of CFC's and other ozone depleting chemicals (ODC's), defined by the USEPA as Class I substances. Pursuant to Section 611 of the Clean Air Act Amendments (CAAA) of 1990, finalized on January 19, 1993, EnerSys established a policy to eliminate the use of Class I ODC's prior to the May 15, 1993 deadline.



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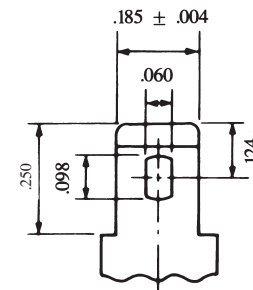
*Sealed Rechargeable
Lead-Acid Battery*

6V, 4.5Ah

Specifications

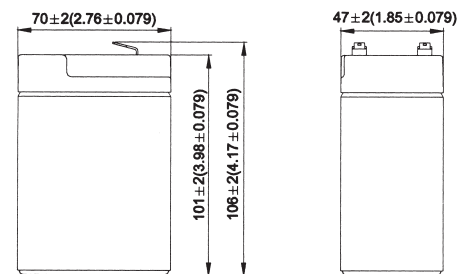
- **NOMINAL VOLTAGE:** 6V
- **NOMINAL CAPACITY:**
 - 20 hr. rate of .23A to 5.25V 4.50Ah
 - 10 hr. rate of .42A to 5.25V 4.20Ah
 - 5 hr. rate of .72A to 5.10V 3.60Ah
 - 1 hr. rate of 2.70A to 4.80V 2.70Ah
- **WEIGHT (approx.):** 1.87 pounds (0.85 kgs.)
- **ENERGY DENSITY (20 hr. rate):** 1.32 WH/cubic inch (80.6 WH/liter)
- **SPECIFIC ENERGY (20 hr. rate):** 14.4 WH/pound (31.8 WH/kg)
- **INTERNAL RESISTANCE OF CHARGED BATTERY:** 20 milliohms (approx.)
- **MAXIMUM DISCHARGE CURRENT WITH STANDARD TERMINALS:** 45 amperes
- **MAXIMUM SHORT-DURATION DISCHARGE CURRENT:** 135 amperes
- **OPERATING TEMPERATURE RANGE:**
 - CHARGE 5°F to 122°F (-15°C to 50°C)
 - DISCHARGE -4°F to 140°F (-20°C to 60°C)
- **CHARGE RETENTION (shelf life) at 68°F (20°C):**
 - 1 month 97%
 - 3 months 91%
 - 6 months 85%
- **LIFE EXPECTANCY:**
 - STANDBY USE 3 to 5 years
 - CYCLE USE (approx.):
 - 100% depth of discharge 250 cycles
 - 50% depth of discharge 550 cycles
 - 30% depth of discharge 1200 cycles
- **SEALED CONSTRUCTION:** Can be operated, charged or stored in any position without leakage.
- **STANDARD TERMINAL:** Quick Disconnect .187 or Optional .250
- **HOUSING MATERIAL:** ABS Resin
- **OPTIONAL:**
 - Container and cover made from Flame Retardant ABS (UL94-V0/L.O.I.>28%)
- Approved for shipping as non-hazardous, non-spillable

Terminal



INCH = MM	
.250	6.35
.185	4.70
.124	3.15
.098	2.49
.060	1.52
.031	0.79
.020	0.51
.004	0.10

Dimensions



UL listing pending - File No MH16464

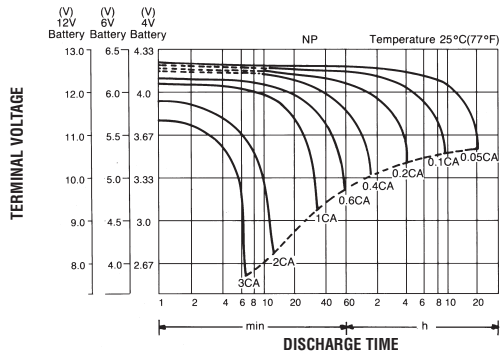
EnerSys[™]

Power/Full Solutions[™]

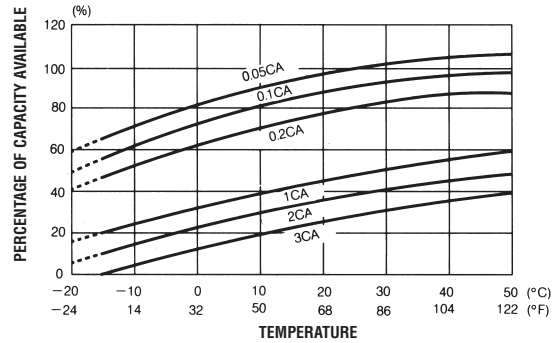


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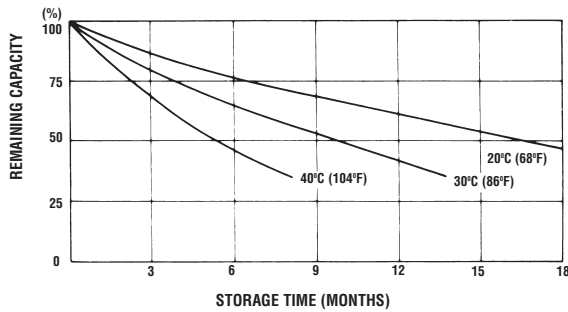
DISCHARGE CHARACTERISTIC CURVES AT 25°C (77°F)



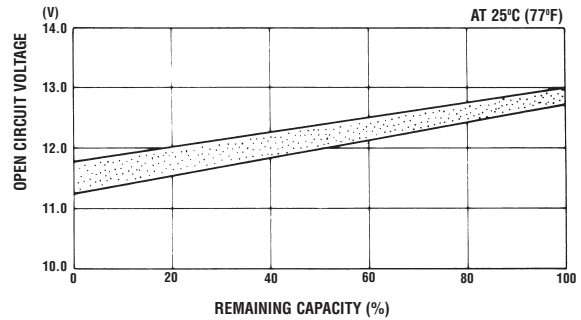
TEMPERATURE EFFECTS IN RELATION TO BATTERY CAPACITY



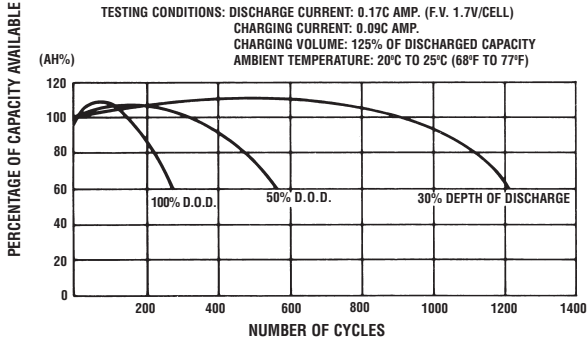
SELF DISCHARGE CHARACTERISTICS



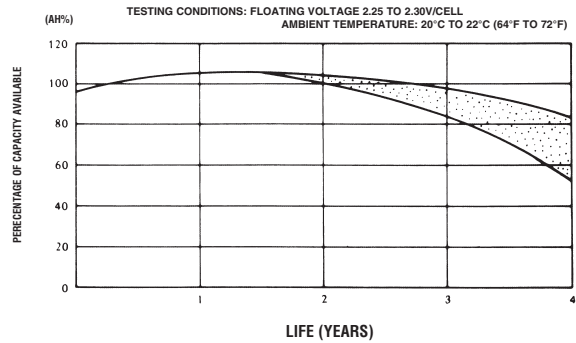
OPEN CIRCUIT VOLTAGE VS REMAINING CAPACITY



CYCLE SERVICE LIFE IN RELATION TO DEPTH OF DISCHARGE



FLOAT SERVICE LIFE



When the battery will be used by current in excess of 3C, consult with EnerSys prior to use.

CHARGING METHODS (At 20°C)

Cycle use: Maximum charging current 1.1A
Charging voltage 7.2 to 7.5V

CAUTION

- Avoid short circuit
- Do not charge in a sealed container.

Standby use: Float charging voltage 6.75 to 6.90V



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