SECTION 1: PRODUCT AND COMPANY IDENTIFICATION

Vertical Manufacturing, LLC

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Greenwood Village, CO 80111

24 Hour Emergency Phone:

CHEMTREC 800-424-9300

Product Name: Lead/Acid Battery, Wet, Filled with Acid

SECTION 2: COMPOSITION INFORMATION/INGREDIENTS

Material	% by Wt.	CAS Number	Eight Hour Exposure Limits		
			OSHA PEL	ACGIH TLV	NIOSH REL
Lead	34	7439-92-1	50 µg/m3	150 µg/m3	100 µg/m3
Lead Oxide	31	1309-60-0	50 µg/m3	150 µg/m3	100 µg/m3
Lead Sulfate	< 1	7446-14-2	50 µg/m3	150 µg/m3	100 µg/m3
Battery Electrolyte (Sulfuric Acid, 35%)	34	7664-93-9	1 mg/m3	0.2 mg/m3 (respirable thoracic fraction)	1 mg/m3

SECTION 3: HAZARDS IDENTIFICATION

NOTE: Under normal conditions or battery use, internal components will not present a health hazard. The following information is provided for battery electrolyte (sulfuric acid, 35%) and lead for exposure that may occur during battery production or container breakage or under extreme heat conditions, such as fire.

Emergency Overview: Acid filled battery. Contact with the electrolyte will cause burns to the eyes and skin. Contains lead. Absorption of lead potentially may cause poisoning and reproductive effects.

ROUTES OF ENTRY

EYE CONTACT: Contact with the battery electrolyte can cause severe irritation, burns, and cornea damage upon contact.

SKIN CONTACT: Battery electrolyte (sulfuric acid, 35%) can cause severe irritation, burns and ulceration.

SKIN ABSORPTION: Not a significant route of entry.

INHALATION: Acid mist generated during battery charging or spillage of the electrolyte in a confined area may cause respiratory irritation.

INGESTION: Hands contaminated by contact with internal components of a battery can cause ingestion of lead/lead compounds. Ingestion of battery electrolyte will cause severe burns to mouth and gastrointestinal tract.

ACUTE HEALTH EFFECTS: Acute effects of overexposure to lead compounds are gastrointestinal (GI) upset, loss of appetite, diarrhea, constipation with cramping, difficulty in sleeping and fatigue. Exposure and/or contact with battery electrolyte (sulfuric acid, 35%) may lead to acute irritation of the skin, corneal damage of the eyes, and irritation of the mucous membranes of the eyes and upper respiratory systems, including lungs.

CHRONIC HEALTH EFFECTS: Lead and it's compounds may cause chronic anemia, damage to the kidneys and nervous system. Lead may also cause reproductive system damage and can affect developing fetuses in pregnant women. Battery electrolyte (sulfuric acid, 35%) may lead to scarring of the cornea and chronic bronchitis.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Inorganic lead and it's compounds can aggravate chronic forms of kidney, liver, and nuerological diseases. Contact of battery electrolyte (sulfuric acid, 35%) with the skin may aggravate skin diseases such as eczema and contact dermatitis.

SECTION 4: FIRST AID MEASURES

EYE CONTACT: Immediate rinse with cool running water for at least 15 minuts. Seek medical attention immediately after rinsing.

SKIN CONTACT: Wash throughly with soap and water. If acid is splashed on clothing, remove and discard. If acid is splashed in shoes, remove them immediately and discard.. Acid cannot be removed from leather.

INHALATION: Remove from exposure and consult a physician if any of the acute effects listed above develop.

INGESTION: **Lead:** Consult a physician. **Battery Electrolyte:** Do not induce vomitting. Refer to a physician immediately.

SECTION 5: FIRE FIGHTING MEASURES

FLASH POINT: For Hydorgen = N/A

TEST METHOD: N/A

AUTOIGNITION TEMPERATURE: Hydrogen = 580°C

FLAMMABLE LIMITS: For Hydrogen: **LEL** = 4.1 **UEL** = 74.2

EXTINGUISHING MEDIA: Dry Chemical, Foam or CO2

SPECIAL FIRE FIGHTING PROCEDURES: Use positive pressure, self contained breathing apparatus.

UNUSUAL FIRE AND EXPLOSION HAZARD: Hydrogen and oxygen gases are produced in the cells during normal battery operations, hydrogen is flammable and oxygen supports combustion. These gases enter the air through vent ports. To avoid the chance of a fire or explosion, keep sparks and other sources of ignition away from the battery.

SECTION 6: ACCIDENTAL RELEASE MEASURES

Remove combustible materials and all sources of ignition. Contain spill using sodium bicardonate (soda ash, baking soda) or calcium oxide (quicklime). Cover spill with either material. Make certain the mixture is neutral, and then collect residue and place in a drum or other suitable container. Dispose of as a hazardous waste. Wear acid-resistant boots, chemical face shield, chemical splash goggles, and acid-resistant gloves.

SECTION 7: HANDLING AND STORAGE

WORK PRACTICES: Place a minimum of two layers of corrugated cardboard between layers of batteries. When stacking in a trailer, stack no more than three layers high. Use a battery carrier to lift batteries or place hands at opposite corners to avoid spilling of acid. Avoid contact with internal components of the batteries. Wash hands thoroughly before eating, drinking or smoking after handling batteries.

SPECIAL PRECAUTIONS: Keep open flames and sparks away from charging batteries.

STORAGE: Store lead acid batteries with adequate ventilation. Room ventilation is required for batteries utilized for standby power generation. Never recharge batteries in an unventilated, enclosed space.

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

VENTILATION: Store lead acid batteries with adequate ventilation. Room ventilation is required for batteries utilized for standby power generation or in area designated for battery charging

RESPIRATORY PROTECTION: None required under normal handling conditions. During battery formation (high-rate charge condition), acid mist can be generated, which may cause respiratory irritation. If irritation occurs, wear a respirator suitable for protection against acid mist.

GLOVES: Vinyl-coated, PVC, gauntlet-type gloves with rough finish.

EYE PROTECTION: Chemical splash goggles are preferred. Also acceptable are chemical face shields worn over safety glasses with solid side shields.

OTHER PROTECTIVE EQUIPMENT: Safety shoes worn with rubber or neoprene boots or steel-toed rubber or neoprene boots worn over socks. Place pants legs over boots to keep acid out of boots.

SECTION 9: PHYSICAL and CHEMICAL PROPERTIES

PHYSICAL STATE: Battery is solid case with solid and liquid internal components.

APPEARANCE AND ODOR: Battery Electrolyte (acid) is a clear to cloudy liquid with slight acidic odor. Acid saturated lead oxide is a dark reddish-brown solid with slight acidic odor.

pH: electrolyte - 1.0

SPECIFIC GRAVITY: electrolyte - 1.200 -1.300

BOILING POINT: Lead - 1755°C, electrolyte - 110-112°C

VAPOR PRESSURE: electrolyte - 11.7

MELTING POINT: Lead - 327°C

VAPOR DENSITY: electrolyte - 3.4

SOLUBILITY IN WATER: electrolyte - 100%

PERCENT VOLATILE: Not determined

COEFFICIENT WATER/OIL: N/A

EVAPORATION RATE: Not determined

SECTION 10: STABILITY and REACTIVITY

STABILITY: ☐ Unstable ☑ Stable

CONDITIONS TO AVOID: Sparks and other sources of ignition may ignite hydrogen gas.

INCOMPATIBILITY: Lead/lead compounds: Potassium, carbides, sulfides, peroxides, phosphorus, sulfur. Battery electrolyte (acid): Combustible materials, strong reducing agents, most metals, carbides, organic materials, chlorates, nitrates, picrates, and fulminates.

HAZARDOUS DECOMPOSITION PRODUCTS: Lead/lead compounds: Oxides of lead and sulfur. Battery electrolyte (acid): Hydrogen, sulfur dioxide, sulfur trioxide.

HAZARDOUS POLYMERIZATION: Will not occur.

CONDITIONS TO AVOID: High temperature. Battery electrolyte (acid) will react with water to produce heat. Can react with oxidizing or reducing agents.

SECTION 11: TOXICOLOGICAL INFORMATION

ACUTE TOXICITY DATA: Lead/lead compounds: No data is available.

Sulfuric Acid: LD50 oral rat: 2140 mg/kg, LD50 inhalation: 510 mg/m^3/2 hour

CARCINOGENICITY: The National Toxicological Program (NTP) and the International Agency for Research on Cancer (IARC) have classified "strong inorganic acid mist containing sulfuric acid" as a Category 1 carcinogen, a substance that is carcinogenic to humans. The ACGIH has classified "strong inorganic acid mist containing sulfuric acid" as an A2 carcinogen (suspected human carcinogen). These classifications do 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.

The NTP and IARC have classified lead as an A3 carcinogen (animal carcinogen). While the agent is carcinogenic in experimental animals at relatively high doses, the agent is unlikely to cause cancer in humans except under uncommonly high levels of exposure. For further information, see the ACGIH's pamphlet, *1996 Threshold Limit Values and Biological Exposure Indices.*

REPRODUCTIVE TOXICITY: Lead is known to cause birth defects in humans and animals

TERATOGENICITY: Lead is known to cause birth defects in humans and animals

MUTAGENICITY: Lead has been found to be mutagenic.

SYNERGISITC EFFECTS: Other heavy metals (arsenic, cadmium, mercury) may cause additive toxic effects.

SECTION 12: ECOLOGICAL INFORMATION

EFFECTS OF MATERIALS ON PLANTS OR ANIMALS: Lead and it's components may cause an adverse effect to animals and plants that come into contact with them.

EFFECTS OF MATERIALS ON AQUATIC LIFE: Lead and it's components may cause an adverse effect to animals and plants in an aquatic environment that come into contact with them.

SECTION 13: DISPOSAL

BATTERY ELECTROLYTE (ACID): Neutralize as above for a spill, collect residue, and place in a drum or suitable container. Dispose of as a hazardous waste.

DO NOT FLUSH LEAD-CONTAMINATED ACID INTO SEWER!

BATTERIES: Send to a lead smelter for reclamation following applicable laws and regulations.

SECTION 14: TRANSPORTATION INFORMATION

US DOT SHIPPING NAME: UN 2794, Batteries, Wet, Filled with acid, Class 8, PG, III

DOT LABEL: Corrosive 8

IATA SHIPPING NAME: UN 2794, Batteries, Wet, Filled with acid, Class 8, PG, III

IATA LABEL: Corrosive 8

SECTION 15: REGULATORY INFORMATION

TSCA REGISTRY: Ingredients listed in the TSCA Registry are lead, lead oxide, lead sulfate and sulfuric acid.

CALIFORNIA PROPOSITION 65 WARNING: The state of California has listed lead as a material known to cause cancer or cause reproductive harm (July 9, 2004 California List of Chemicals Known to Cause Cancer or Reproductive Toxicity).

SARA TITLE III: The contents of this product are toxic chemicals that are subject to the reporting requirements of section 302 and 313 of the Emergency Planning and Community Right-To-Know Act of 1986 (40CFR 355 and 372).

SECTION 16: OTHER INFORMATION

Disclaimer: This information has been compiled from sources considered to be dependable and is, to the best of our knowledge and belief, accurate and reliable as of the date compiled. However, no representation, warranty (either express or implied) or guarantee is made to the accuracy, reliability or completeness of the information contained herein. This information relates to the specific material designated and may not be valid for such material used in combination with any other materials or in any process. It is the user's responsibility to satisfy himself as to the suitability and completeness of this information for his own particular use. We do not accept liability for any loss or damage that may occur, whether direct, indirect, incidental or consequential, from use of this information.