

SAFETY DATA SHEET

Thermal Battery

SECTION 1- IDENTIFICATION

Manufacturer Name- EaglePicher Technologies, PO Box 49, Joplin, MO 64802

Emergency Telephone – CHEMTREC: 1-800-424-9300

Recommended use: Power source

Telephone for information: 1-417-623-8000

Product Identifier/Name: Thermal Battery. Applicable part numbers: CAP-12115C, CAP-12181, CAP-12261, EAP-12174, EAP-12009C, EAP-12016J, EAP-12035, EAP-12097A, EAP-12166, EAP-12216, EAP-12217, EAP-12241, EAP-12297, EAP-12354

SECTION 2- HAZARD IDENTIFICATION

The thermal batteries described in this SDS are hermetically sealed units, which are not hazardous when used according to the recommendations of the manufacturer.

GHS Label Elements

None required due to thermal battery being classified as an article.

Hazard Statements

None

Precautionary Statements

P251 – Do not pierce or burn, even after use.

P370 + 378 – In case of fire: Use anhydrous salts of Potassium Chloride or Sodium Chloride dry salts, or an extinguisher rated for Class D fires.

P411 – Store at temperatures not exceeding 165° F

Other Hazards: Electrical shock, thermal burns from contact with activated or shorted battery, venting of gases or, in extreme cases, violent rupture of battery if an internal short occurs.

Precautions: The risk of chemical exposure exists only in cases of mechanical failure of the battery case allowing contents to be exposed. Thus, the batteries should not be short circuited, recharged, punctured, incinerated, dropped, crushed, immersed in water, force discharged, or exposed to temperatures above the operating temperature range of the battery. In these cases, there is risk of rupture and/or fire.

SECTION 3 - COMPOSITION, INFORMATION ON INGREDIENTS

The following list of chemicals may be found in EaglePicher Technologies thermal batteries. The specific battery number will determine the exact ingredients and percentages.

Chemical Name	C.A.S. Number	Percentage	Classification
Iron Powder (Fe)	7439-89-6	Trade Secret	Flammable Solids 1; Self-heating substances and mixtures 1
Potassium Perchlorate	7778-74-7	Trade Secret	Oxidizing solids 1; Acute Tox. Oral 4
Lithium Chloride	7447-41-8	Trade Secret	Acute Tox. 4; Skin Irrit. 2; Eye Irrit. 2A
Lithium aluminum	7429-90-5 7439-93-2	Trade Secret	Skin Corr. 1B; Serious Eye Damage 1; Flammable solids 1; Substance and mixtures which in contact with water emit flammable gases 1
Lithium Silicon	68848-64-6	Trade Secret	Eye Irrit. 1; Skin Irrit. 1
Lithium Bromide	7550-35-8	Trade Secret	Eye Irrit 2A; Skin Irrit. 2; Acute Tox. 4; Skin Sens. 1
Lithium Chloride		Trade Secret	Eye Irrit. 2A; Skin Irrit. 2; Acute Tox. 4
Lithium Fluoride	7789-24-4	Trade Secret	Acute Tox. 3; Skin Irrit. 2; Eye Irrit. 2A; STOT SE 3
Fiberfrax (RCF)	142844-00-6	Trade Secret	Resp. Irrit. 3; Eye Irrit. 3; Sin Irrit. 3
Magnesium Oxide	1309-48-4	Trade Secret	Not a dangerous substance
Potassium Chloride	7447-40-7	Trade Secret	Not a dangerous substance
Potassium Bromide	7758-02-3	Trade Secret	STOT SE 3
Iron Disulfide	12068-85-8	Trade Secret	Resp Sens. 1; Skin Sens. 1; Acute Aquatic Tox. 1; Chronic Aquatic Tox. 1
Zirconium Metal Powder	7440-67-7	Trade Secret	Substance and mixtures which in contact with water emit flammable gases 1

The specific chemical identity and/or exact percentage (concentration) of composition has been withheld as a trade secret.

Some EaglePicher Technologies thermal batteries may also contain a squib device, i.e., part number EP-250-1, within the hermetically sealed battery. Squibs are also classified as an article under OSHA's Hazard Communication standard, 29 CFR 1200 and are exempt from the requirements for an SDS. For reference, the following chemicals may be found in squibs manufactured by EaglePicher Technologies.

Chemical Name	C.A.S. Number	Percentage
Lead Mononitroresorcinol	301-04-2 and 108-46-3	Trade Secret
Boron Calcium Chromate	7440-42-8 and 13765-19-0	Trade Secret
Boron Barium Nitrate	7440-42-8 and 10022-31-8	Trade Secret
Potassium Chlorate	3811-04-9	Trade Secret
Zirconium	7440-67-7	Trade Secret
Ferric Oxide	1309-37-1	Trade Secret

The specific chemical identity and/or exact percentage (concentration) of composition has been withheld as a trade secret

SECTION 4- FIRST AID MEASURES

In case of battery rupture or major leakage, evacuate personnel from area and provide mechanical ventilation to remove fumes, gases or pungent odor. Seek immediate medical attention for any personnel experiencing symptoms of exposure.

- **Eyes** – Not a probable route of exposure.
- **Skin** - Most Common symptom: Thermal burns from contact with extremely hot battery. Remove clothing from affected area and rinse skin with plenty of cool water for at least 15 min. Seek medical attention.
- **Inhalation** – Not a probable route of exposure.
- **Ingestion** – Not a probable route of exposure.

SECTION 5- FIRE FIGHTING MEASURES

<p>Flash Point: Not Applicable</p>	<p>Flammable Limits in Air % by Volume: NA</p>	<p>Extinguishing Media: Potassium Chloride or Sodium Chloride dry salts. Extinguisher rated for Class D fires.</p>	<p>Auto-Ignition: Not Applicable</p>
<p>Special Fire Fighting Procedures</p>	<p>DO NOT UNDER ANY CIRCUMSTANCES, ATTEMPT TO PUT OUT ANY THERMAL BATTERY FIRE WITH WATER OR CO2 BASED FIRE EXTINGUISHING EQUIPMENT. Due to the lithium-alloy content of thermal batteries, water will only aggravate the shorting condition and would feed the fire. If necessary, smother the fire with an anhydrous (dry) salt such as KCl (potassium chloride) or NaCl (sodium chloride). DO NOT USE: WATER, SAND, CO2, HALON, DRY POWDER OR SODA ASH EXTINGUISHERS.</p>		
<p>Unusual Fire and Explosion Hazards</p>	<p>Physical signs of an impending rupture include a sudden dramatic drop in battery output voltage, and the development of a red (glowing) spot on the battery container surface. Should either or both of these conditions occur, immediate evacuation of all personnel from the battery area is prudent.</p> <p>Personnel should not handle a thermal battery while it is undergoing an internal short. The battery should not be handled until it has cooled to room-ambient temperature.</p> <p>Evacuate all persons from immediate area of fire.</p>		

SECTION 6- ACCIDENTAL RELEASE MEASURES

PROCEDURES TO CONTAIN AND CLEAN UP LEAKS OR SPILLS: The battery is hermetically sealed and will not leak unless the case is punctured or otherwise damaged. If the battery is punctured or damaged, the battery may react violently. Leave the immediate area of a ruptured or venting battery. Do not attempt cleanup until the battery has cooled sufficiently. Do not enter an enclosed area where a battery has vented without first using mechanical ventilation to clear the space before entry. Wear appropriate protective gloves and dispose of the battery in accordance with federal, state and local regulations. Refer to section 13.

NEUTRALIZING AGENTS: Potassium or Sodium Chloride for fire situations

WASTE DISPOSAL METHOD: Follow federal, state and local regulation for proper disposal methods.

OTHER PRECAUTIONS; Never attempt to disassemble, machine, or otherwise modify batteries or injury may result.

SECTION 7- HANDLING AND STORAGE

In general, thermal batteries are designed to safely withstand a wide variety of handling conditions including, but not limited to, bench handling shock, transportation vibration, salt air and humidity exposure, high altitude exposure, high-g ejection shocks, and cold temperature storage.

HANDLING- If the battery is designed to be activated by an electrical pulse then the possibility exists for the battery to be activated by any stray electrical pulse, such as static electricity. To prevent accidental activation, some thermal batteries are shipped with the squib contacts shorted together with copper wire. If such a wire is not present during storage, a single strand copper of 20 gauge or larger should be connected between the squib contacts to prevent accidental activation. When the battery is installed in the next assembly or system, the squib shorting wire should be removed. **Note that when the shorting wire is removed, the battery will be subject to ignition by stray electrical signals or static electricity and great care should be used to prevent such signals from contacting the squib terminals.**

Thermal batteries should not be allowed to contact bare skin either during or immediately after activation. Following performance requirements, the battery should be allowed to cool down in ambient conditions for four to six hours or until the outer case has reached room temperature. Personnel handling the battery immediately after activation should wear protective clothing as required by OSHA for handling high temperature substances. At a minimum, high temperature rated insulated gloves, a full-face shield, and protective coveralls are recommended.

If the surface of the battery container is distorted, dented, or punctured before activation, the battery must NOT be activated. The squib terminals should be shorted together and the battery should be disposed of as required by local, state, and federal EPA regulations.

STORAGE- In general, thermal batteries can be stored indefinitely at ambient temperatures of up to 165° F without affecting battery performance or causing hazards to personnel.

Elevated temperatures above 165° F can result in shortened battery life and possible damage.

OTHER- Follow manufacturer recommendations regarding maximum recommended current and operating temperature range. Apart from the uses mentioned in section 1 no other specific uses are stipulated.

SECTION 8 - EXPOSURE CONTROLS & PERSONAL PROTECTION

Exposure Limits / Guidelines		
Chemical Name	OSHA Exposure Limits	ACGIH TLV
Iron Powder (Fe)	10 mg/m ³ TWA	Not Established
Potassium Perchlorate (KClO ₄)	PEL not established	Not Established
Lithium Chloride	10 mg/m ³ TWA	Not Established
Lithium Aluminum	PEL not established	Not Established
Lithium Silicon	10 mg/m ³ TWA	Not Established
Lithium Bromide	PEL not established	Not Established
Lithium Chloride	PEL not established	Not Established
Lithium Fluoride	2.5 mg/m ³ TWA	2.5 mg/m ³ TWA
Fiberfrax (RCF)	PEL not established	0.2 f/cc TWA
Magnesium Oxide	10 mg/m ³ TWA	Not Established
Potassium Chloride	PEL not established	Not Established
Potassium Bromide	PEL not established	Not Established
Iron Disulfide	PEL not established	Not Established
Zirconium Metal Powder	5 PPM (as zirconium compounds Zr)	5 mg/m ³ (as zirconium compounds Zr)

Engineering Controls:

No specific engineering controls are required to prevent exposure to internal components of the hermetically sealed batteries.

Exposure Controls:

Personal Protective Equipment:

The following personal protective equipment is not necessary in normal use. They need only be applied if there is a risk that, in use or handling, the recommendations as outlined in Section 7 have not been followed and a battery rupture has occurred. In such cases, refer to Section 6.

RESPIRATORY PROTECTION: None required for normal use. In the event of battery rupture, the vented gases will not be present in a sufficient concentration to be harmful to personnel as long as the immediate area is well ventilated. Non-essential personnel should be evacuated from the immediate area. See Section 6 for protective measures for accidental releases.

PROTECTIVE GLOVES: Not required for normal handling of the thermal battery.

EYE/FACE PROTECTION: Not required for normal handling of the thermal battery.

OTHER PROTECTIVE EQUIPMENT: Not required for normal handling of the thermal battery.

Administrative Controls:

Follow proper handling guidelines in this SDS.

SECTION 9- PHYSICAL AND CHEMICAL PROPERTIES

BOILING POINT (760 mm Hg)	NA, unless individual components exposed
VAPOR PRESSURE (mm Hg, 25°C)	NA, unless individual components exposed
VAPOR DENSITY (air=1)	NA, unless individual components exposed
VOLATILE BY VOLUME (%)	NA
EVAPORATION RATE (butyl acetate=1)	NA, unless individual components exposed
PHYSICAL STATE	Solid
SOLUBILITY IN WATER (% by weight)	NA, unless individual components exposed
PH	NA, unless individual components exposed
APPEARANCE	Metallic Geometric Solid Object
ODOR	No odor
ODOR THRESHOLD	NA
MELTING POINT/FREEZING POINT	NA
FLAMMABILITY	NA
UPPER/LOWER FLAMMABILITY EXPLOSIVE LIMITS	NA
RELATIVE DENSITY	NA
PARTITION COEFFICIENT: N- OCTANOL/WATER	NA
AUTO IGNITION TEMPERATURE	NA, unless individual components exposed
DECOMPOSITION TEMPERATURE	NA, unless individual components exposed
VISCOSITY	NA, unless individual components exposed

SECTION 10- STABILITY AND REACTIVITY

1. REACTIVITY: Not Applicable
2. STABLE OR NOT STABLE: Stable
3. INCOMPATIBILITY (MATERIAL TO AVOID): Avoid contact with materials that degrade 300 series stainless steel.
4. HAZARDOUS DECOMPOSITION PRODUCTS: In an extreme situation of internal shorting, gases may be vented to the exterior that include hydrogen (H₂), nitrogen (N₂), carbon dioxide (CO₂), sulfur dioxide (SO₂), hydrogen sulfide (H₂S) and carbon monoxide (CO). The vented gases will not be present in a sufficient concentration to be harmful to personnel as long as the immediate area is well ventilated. Non-essential personnel should be evacuated from the immediate area.
5. DECOMPOSITION TEMPERATURE (°F):
Storage at any length of time from 200 – 650° F can cause degradation of the squib or primer. Storage at any length of time above 650° F will cause permanent degradation of the activation device and the battery.
6. HAZARDOUS POLYMERIZATION: Will Not Occur

7. **CONDITIONS TO AVOID:** Avoid mechanical abuse and electrical abuse such as short-circuiting, overcharge, over-discharge, and heating above 165° F.

SECTION 11- TOXICOLOGICAL INFORMATION

THRESHOLD LIMIT VALUE (TLV) AND SOURCE: N/A

Carcinogenicity- NTP: The Annual Report on Carcinogens (latest edition), prepared by the **National Toxicology Program (NTP)**, classified respirable RCF (Fiberfrax) as "reasonably anticipated" to be a carcinogen.

Carcinogenicity- IARC: In October 2001, the **International Agency for Research on Cancer (IARC)** confirmed that Group 2B (possible human carcinogen) remains the appropriate IARC classification for RCF (Fiberfrax).

Carcinogenicity- OSHA: RCF (Fiberfrax) is classified as Group 2B Possible Carcinogenic to Humans

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

SIGNS AND SYMPTOMS OF OVEREXPOSURE: Under normal conditions there are no exposures.

The following exposures are possible due to a ruptured or venting battery:

- **Inhalation-** Irritation of the respiratory system.
- **Eyes-** Redness, tearing
- **Skin-** May causes skin burn if personnel attempt to handle a ruptured or venting battery.
- **Ingestion-** N/A

SECTION 12- ECOLOGICAL INFORMATION

1. When properly used or disposed of the battery does not present an environmental hazard.
2. Batteries do not contain mercury, cadmium, or lead.
3. Do not let internal components enter marine environment. Avoid release to waterways, wastewater or ground water.

SECTION 13- DISPOSAL CONSIDERATIONS

Dispose in accordance with the applicable regulations in country and state. Disposal should be performed by licensed professional disposal firms knowledgeable in Federal, State or Local requirements of hazardous waste treatment and hazardous waste transportation.

SECTION 14- TRANSPORT INFORMATION

EaglePicher Technologies, LLC thermal batteries are not regulated for transportation based on Department of Transportation Guidance and Criteria for Classification of Thermal Batteries dated 8/8/1995.

SECTION 15- REGULATORY INFORMATION

1. Thermal batteries are defined as “articles” and thus are exempt from the requirements of the OSHA Hazard Communication Standard, 29 CFR 1910.1200.
2. NFPA rating- N/A due to hermetically sealed “article”. Components that make up the battery have NFPA ratings. For specific ratings for these chemicals, consult the SDS for the chemical.

SECTION 16- OTHER INFORMATION

The information and the recommendations set forth are made in good faith and believed to be accurate at the date of preparation.

This SDS is intended to provide a summary of our knowledge and guidance regarding the use of this article. The information contained here has been compiled from sources considered by EaglePicher Technologies, LLC to be dependable and is accurate to the best of the Company’s knowledge. It is not meant to be an all-inclusive document on worldwide hazard communication regulations. This information is offered in good faith. Each user of this article needs to evaluate the conditions of use and design the appropriate protective mechanisms to prevent employee exposures, property damage or release to the environment. EaglePicher Technologies, LLC assumes no responsibility for injury to the recipient or third persons or for any damage to any property resulting from misuse of the chemical.

Updated 6/21/2019