Energy sources for missiles and rockets are required to store high energy in small volumes for extended periods. They must deliver high power density and perform in extreme temperatures under narrow electromagnetic constraints and in stressful dynamic conditions. Above all, once ignited, they must not fail.

In the past, such requirements could only be delivered by thermal batteries. Today, Epsilor’s rechargeable Lithium batteries offer a superior performance envelope and an extended shelf life. In addition, several new features have been incorporated: communication, testability and battery management.

Epsilor’s operationally and space proven missile batteries successfully replace primary and thermal batteries.
Built-in smart battery management system (BMS) provides battery monitoring and communications, enabling full range testing prior to launch and monitoring system’s health and readiness throughout the weapon’s life span.

**APPLICATIONS**
- Ground guided missiles and launchers
- Naval guided missiles and launchers
- Ground, sea and air launched loitering weapons
- Artillery rockets
- Space launchers

**LITHIUM BATTERIES VS. TRADITIONAL THERMAL BATTERIES**

<table>
<thead>
<tr>
<th>Property</th>
<th>Thermal Battery</th>
<th>Hybrid LiFePO4</th>
<th>Li-Ion/Polymer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calculated Reliability</td>
<td>99.95%</td>
<td>98%</td>
<td>98%</td>
</tr>
<tr>
<td>Shelf-Life</td>
<td>&gt;15yrs</td>
<td>15yrs</td>
<td>5 – 10 years</td>
</tr>
<tr>
<td>Environment</td>
<td>-54°C - 80°C</td>
<td>-60°C (heater supported)</td>
<td>-60°C (heater supported)</td>
</tr>
<tr>
<td>Acceleration</td>
<td>&gt;1000g</td>
<td>100g</td>
<td>100g</td>
</tr>
<tr>
<td>Cell Specific Energy</td>
<td>120 Wh/kg</td>
<td>120 Wh/kg</td>
<td>200-250 Wh/kg</td>
</tr>
<tr>
<td>Cell Specific Power</td>
<td>1000 W/kg</td>
<td>3000 W/kg</td>
<td>3000 W/kg</td>
</tr>
<tr>
<td>Cell type</td>
<td>Primary</td>
<td>Rechargeable</td>
<td>Rechargeable</td>
</tr>
<tr>
<td>BMS</td>
<td>N/A</td>
<td>Protection, communication, control, monitor</td>
<td>Protection, communication, control, monitor</td>
</tr>
</tbody>
</table>
Epsilor's charger and battery monitoring systems support our advanced rechargeable and hybrid technology batteries. Designed in single and multi-channel configurations, our missile battery chargers perform a triple role:

- Charging, discharging and management of the battery
- Long term battery monitoring while installed in the missile, providing malfunction and health alerts
- Performing periodical and prelaunch self-testing and controlled testing procedures up to a full functionality pre-launch procedure prior to a missile launch

Epsilor’s battery chargers are offered in OEM and in external system configurations, and can be installed as integral parts of missile launchers, or as external test and maintenance equipment. These charging systems can be controlled from within a missile control station or from a remote location.
Epsilor is the Defense and Aerospace activity of Epsilor-Electric Fuel Ltd. which forms part of Arotech Corporation’s Power Systems Division (NASDAQ: ARTX). The division operates R&D and manufacturing facilities in the United States and in Israel.

Epsilor-Electric Fuel is a recognized world leader in the development and production of portable power products for the defense, aerospace, marine, medical and automotive industries. The product range includes batteries in a wide variety of electrochemistries, including Lithium Ion, Lithium Polymer, Nickel Metal Hydride and Zinc Air.

**BENEFITS**

- Proprietary electro-chemistry technology with up to 15 years shelf life
- High power and energy densities
  - over 250 Wh/kg
  - over 3,000 W/kg
- Smart battery management system (BMS) that enables connectivity, testability, monitoring and pre-launch testing throughout the system life cycle
- Flexible design and form factor of battery that meets complex geometries
- Performs over a wide environmental range: hot and cold-weather conditions (supported by internal heaters) and elevated pressures
- Cost effective in limited and large production runs
- High readiness, zero maintenance

**ABOUT EPSILOR**

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**HOW CAN WE HELP YOU? CONTACT EPSILOR AT:**

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