

Thermal Battery: a specific source of energy

PRESENTATION

A thermal battery is an exceptionally reliable source of specific energy. It is a non-rechargeable, single use battery that is completely inert before being activated.

It can be stored without requiring maintenance for 15 years and then brought into use at any time, requiring only several tenths of a second before it is ready for use. Activation is effected internally either by mechanical or electrical ignition. Certain batteries can also be activated automatically, for example through an accelerating effect or a sudden increase in temperature. It can function under severe climatic and mechanical environments. Its intrinsic qualities mean that it is impervious to high stresses, sudden shocks and sharp pressure drops.

Thermal batteries can supply the highest level of specific powers available on the market. It is also possible to provide several output voltages from a single battery.

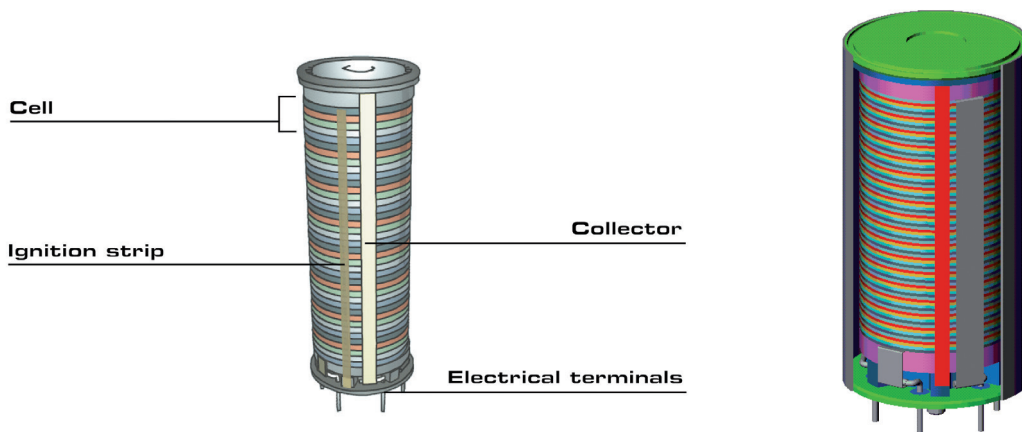
Thermal batteries are generally created to order and are designed to satisfy the most demanding requirements of clients who have at the outset their own parameters: power requirements, service life, size, weight, design and other requirements.

At the heart of the energy: how does it work

The thermal battery is composed of a series of cells each one having an anode, electrolyte, cathode and a heating pellet. The electrolyte, which functions as a separator between the anode and the cathode, remains solid and non-conductive until activation. The battery remains completely inert while being stored. In each battery, the necessary number of cells is connected in series or parallel, or a combination of both, in order to produce the required voltage level(s).

At the moment of activation the pyrotechnic material (heat source) is ignited and releases energy into the cells. The temperature increases, the electrolyte melts and ion exchange takes place: the power in the cell is thus liberated. The electrical current is transmitted through the terminals to external cabling to provide the energy required to the load.

A thermal battery provides its power not by converting thermal energy to electrical energy, but from a reactive electrochemical couple. Discharge is either terminated by exhaustion of the cell materials or by solidification of the electrolyte upon cooling.



Thermal Battery: a specific source of energy

ADVANTAGES

Due to their technologies, the Thermal Batteries offer the following advantages:

Energy reserve:

It can be stored for 15 years, either in stand-alone storage either within the system, and brought into service immediately. When the battery is installed within the system, it can support the complete storage life of the system.

Maintenance free product:

Because the battery is inert over the storage, there is no self discharge, hence no required maintenance. There is no need to exchange regularly neither to control the battery. This represents important life cycle cost saving compared to other battery solutions.

Unlimited storage conditions:

In opposition with other types of batteries and in particularly Li-ion batteries, the thermal batteries can be stored without any limitation. That is particularly convenient when installed on board of defence systems. The usual pyrotechnical storage conditions do not create any problem for the thermal batteries, and the whole system can be stored in the ready-for-use state. Thermal batteries are totally inert before their activation. This considerably reduces the risk during the other maintenance operations on the lift system.

Specific energy:

Thermal batteries are developed to order and can be adapted to individual or specific requirements. They represent an optimum specific power ratio (Watts/kg), the highest of the market.

Exceptional reliability:

These batteries are the product of the requirements of space research and the aeronautical and defence sectors. Therefore, methodologies and evidence are available to demonstrate the highest reliability performance, over the life. Thermal batteries are totally autonomous and do not require any auxiliary equipment (heater, conditioner...).

Immediate availability:

Thermal batteries can be activated within several tenths of a second, even after years of storage.

Functioning under extreme conditions:

Thermal batteries are designed to withstand extreme temperatures (very high or very low), vibrations, shocks, vacuum, very high or low pressures etc.

Proven assembly technologies:

Extensive experience has produced effective hermetic sealing of the cases, reliability of the stacking of the cells and high quality electrical connections.

Unlimited conditions of use:

Thermal batteries are classified as non-explosive and non-pyrotechnic equipment items for the purposes of transport and storage as for UN regulation. They can be handled without risk and destroyed by conventional means.

An evolving source of energy:

Nowadays, research and development have resulted in the use of chemicals that are increasingly less harmful to the environment, while increasing the areas of performance of thermal batteries.

