

ULM[®] Ultra Low Maintenance batteries for aircraft

Because you have a choice.



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Designed by Saft engineers and tested in the air, not on paper.

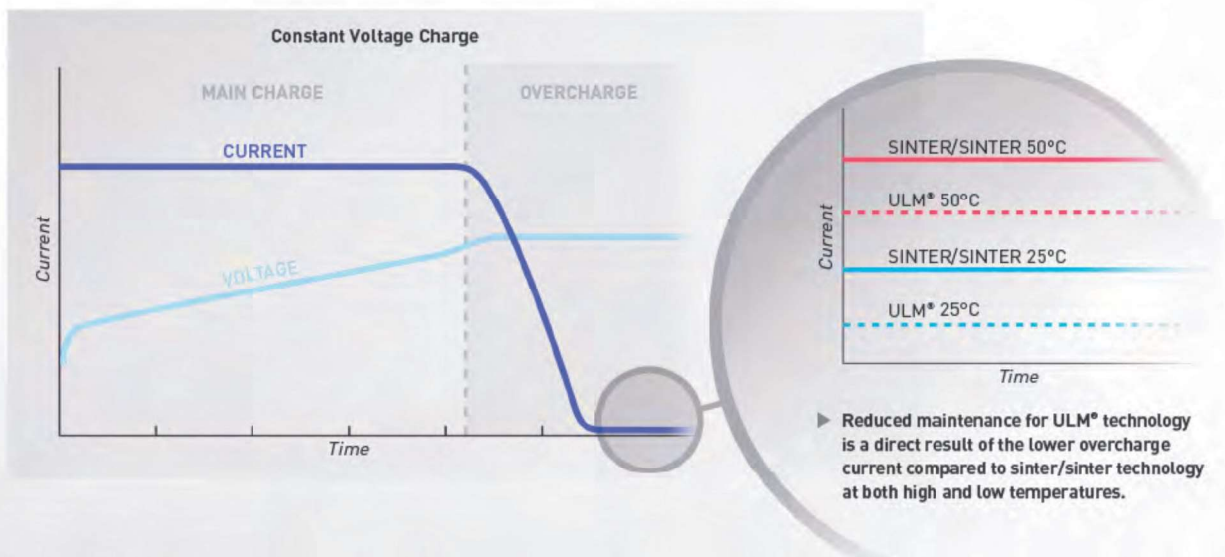


How ULM[®] technology works

ULM[®] performance hinges on Saft's plastic bonded electrode (PBE) technology. This innovative engineering solution has the effect of measurably reducing water consumption thanks to a reduction in overcharge current

compared to sinter/sinter technology. Reduced overcharge also considerably slows down intrinsic aging and provides added safety, particularly at high temperatures where the overcharge current is normally higher.

Thanks to PBE technology, Saft ULM[®] batteries provide added safety and longer life even at high operating temperatures as a result of the lower overcharge current.



Ultra Low Maintenance



Reliable by design

- 1 **Intelligent:**
Temperature sensor along with Saft's superior separator design prevent any risk of thermal runaway
- 2 **Long-lasting:**
High quality proprietary membrane and separator used to extend service life
- 3 **Safe:**
Nylon vent valves avoid safety hazards
- 4 **Robust:**
Will recover from the most abusive conditions including deep discharge
- 5 **Durable:**
Nickel-plated copper cell links and terminals for maximum durability
- 6 **Protective:**
Leak-proof thermo-welded cells protect aircraft structure
- 7 **Efficient:**
Seam-welded plate tabs ensure efficient energy transfer
- 8 **Easy:**
Cells designed to allow for easy individual exchange instead of replacing the entire battery
- 9 **Tough:**
Maintenance-free stainless steel case provides extreme toughness

Don't just spend on aircraft batteries. Invest in them.



You have a choice
to spend on a battery
for your aircraft...
or to invest in one.

The most advanced Ni-Cd technology, first developed by Saft, is used in its ultra low maintenance ULM® batteries. Investing in a Saft ULM® means investing in a battery that has the industry's lowest Total Cost of Ownership (TCO) thanks to its reduced maintenance and extended life duration.

Plus, since the battery serves a flight critical function, Saft ULM® batteries must meet more than 100 different qualification criteria – giving you full confidence that your investment will provide the necessary safety for your passengers.



Saft ULM®: Designed to keep you flying for the lowest Total Cost of Ownership (TCO)

■ Reduced maintenance

Plastic bonded electrodes (PBE), first developed by Saft, reduce maintenance intervals by over 50%

One example: A330 operators choosing the Airbus approved Saft ULM® batteries have extended their maintenance intervals from 1000 oph to 3000 oph and, as a result, have significantly reduced their operating cost.

■ Long service life

High quality proprietary separator systems extend life duration by up to 10 years
The longer the life the lower the TCO.

■ Less weight

The use of lightweight plastic bonded electrodes reduces weight

The decrease in weight means less fuel burn resulting in a reduction in aircraft operating costs.

■ Travel anywhere

Combination of Saft plastic bonded electrodes and superior separator systems reduce overcharge current

The decrease in overcharge current results in a longer life even under the most difficult climates both hot and cold. Temperature range from -40°C to +70°C (-40°F to +158°F).

■ Exceptional storage life

Long-term storage of up to 10 years without any intervention ever required
Zero maintenance cost during storage.

■ Easily replaceable spare parts

Designed for individual cell replacement

Instead of buying an entire battery, opt to easily replace cells for a low cost.

■ For new installations or retrofit solutions

Form, Fit & Function interchangeable with standard high-performance products

No aircraft modification necessary, which allows for commonality between interchangeable components resulting in cost-effective inventory solutions.

A dedicated partner for the aerospace community.



Saft ULM® batteries have been extensively tested onboard real aircraft, in the air.

We work in full co-operation with nearly all aircraft manufacturers (OEMs) worldwide to create batteries that are fully compliant with all recognised international aviation, safety, environmental, and quality standards.

We will always remain fully committed to our partnership with OEMs to develop original battery solutions that are optimised to work in conjunction with the rest of the aircraft electrical system in order to:

- Provide you with a battery that has total compatibility with other critical components of your aircraft
- Ensure that the battery will be up to par to power the most extreme requirements, including repeated engine starts or emergency back-up power

Cooperation with OEMs is especially important when you consider that the longevity of various equipments such as an aircraft engine – a multi-million dollar component – depends in part on the battery. In fact, up to 85% of the life of an engine is consumed during start sequences: so having a battery designed to deliver the necessary power and energy when required is crucial. The only way to achieve this is to work directly with OEMs right from the start of the conception of the battery.



Unparalleled product portfolio

Over 60 different ULM® batteries are currently in serial production for aircraft including jetliners, military jets, regional jets, turboprops, business jets, helicopters – and even drones!



Maintenance - your battery's life insurance.



Continued airworthiness and safety depend on maintenance.

Low-maintenance Saft ULM® batteries are designed to allow operators to perform the maintenance necessary to ensure guaranteed performance and collect valuable data to avoid any onboard problems or unscheduled removals, with a high degree of reliability.

Choosing not to perform preventive maintenance on your aircraft battery can ultimately result in an Aircraft On Ground (AOG) incident – a costly event both in terms of money and in negative impact to your company's reputation.

Other electrochemistries, such as valve-regulated lead-acid, are assembled so that preventive maintenance is impossible to perform. As a result, problems – such as the corrosion of the current collecting structure – are undetectable, which can ultimately lead to sudden premature failure.

Even with the cost of maintenance included, Saft ULM® provides a lower Total Cost of Ownership (TCO) compared to other types of batteries – especially when you consider that with proper maintenance, the life of your Saft ULM® battery can reach up to 10 years.

Typical case study

An airline with 10 Bombardier CRJ700 aircraft that chooses Saft ULM® Ni-Cd batteries over valve-regulated lead acid batteries will end up saving over \$60,000 USD over the lifetime of the Saft batteries.

Saft batteries are assumed to last 6 years and lead-acid batteries 1.5 years. Results will vary according to aircraft utilisation, battery start frequency, maintenance capability, and ambient temperature.



A battery is a flight-critical component. Insist on Saft ULM[®].



- **Only Saft** can boast 80 years of experience in aircraft batteries.
- **Only Saft** has tried and trusted ULM[®] batteries – over 30,000 of which had already entered service around the world as of December 2010.
- **Only Saft** has more than 130 OEM-approved batteries.
- **Only Saft** has first-hand experience working with Airbus, AgustaWestland, ATR, Bell, Boeing, Bombardier, Cessna, Dassault, Eurocopter, Embraer, Gulfstream, Hawker Beechcraft, Piaggio, Pilatus, Piper, Sukhoi, Sikorsky, Socata, and XAC, among many others.
- **Only Saft** has ULM[®] batteries which will maintain 100% rated capacity throughout their entire life.
- **Only Saft** has world-class, high quality manufacturing production facilities in France and the United States.
- **Only Saft** batteries can assure you the same consistent level of quality, no matter when you buy one. Independently of when and where it was manufactured, the Saft battery you purchase will always deliver the same outstanding performance.
- **Only Saft** can provide you with more than just a battery in a box:
 - Dedicated, technical & product support teams
 - Worldwide distribution network including AOG services
 - Worldwide network dedicated to recycling batteries
 - Regularly updated website with downloadable technical documentation and other free resources
 - Free technical updates by e-mail
 - FAA-approved training courses in service life optimisation and operational cost control.



Certificat AEO
n°FR00000942

www.saftbatteries.com

Saft is committed to the highest standards of environmental stewardship.

Saft works with a worldwide network of collection partners for the recycling of its industrial batteries. By bringing their end-of-life batteries to this network, users of Saft batteries are ensured that they will be received, stored and shipped to recycling facilities in full compliance with local, national and international laws and regulations which regulate trans-boundary waste shipment and recycling. A list of our collection points is available on our website.

Environmental benefits of Ni-based batteries:

- **Unmatched long life** reduces the need to transport new/used batteries and associated environmental impact
- Reliable thus requiring **fewer replacement cells** over the life of the battery
- Over 75% of the components can be **recycled** including the electrolyte, the plastic casing, connecting components, cadmium, nickel and steel

