



**TRUE BLUE POWER**®   
A division of Mid-Continent Instrument Co., Inc.

SMART.  
CERTIFIED.  
SAFE.  
LITHIUM-ion  
BATTERIES.

LITHIUM-ION TECHNOLOGY

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FREQUENTLY ASKED QUESTIONS  
and ANSWERS

### Who is True Blue Power?

True Blue Power specializes in the design and manufacturing of electrical power systems for the global aerospace industry. Products include USB and wireless chargers, power conversion products, emergency power supplies, and advanced lithium-ion batteries.

True Blue Power benefits from more than 5 decades of technical innovation, engineering and design excellence, mature manufacturing capabilities, demonstrated quality processes, and unsurpassed customer service and satisfaction in the aviation marketplace.

True Blue Power is the first company in the world to achieve [FAA TSO](#), [EASA ETSO](#), and [Supplemental Type Certification \(STC\)](#) for lithium-ion batteries.

# Frequently Asked Questions and Answers



TS835 SERIES  
LITHIUM-ION  
EMERGENCY  
BATTERY

## Where are lithium-ion batteries used today?

Rechargeable lithium-ion batteries are commonly found in cell phones, watches, laptop computers, tablet devices, power tools, flashlights, landscape lighting, electronic toys, commercial power grids, satellites, hybrid vehicles, buses, trains, marine vessels, recreational vehicles, unmanned aerial vehicles (UAVs), medical equipment, and aircraft.

## Why use lithium-ion batteries in aviation applications?

Rechargeable lithium-ion batteries are the newest technology and offer a quantum leap in performance. Lithium-ion cells store 3 times as much energy per kilogram and offer longer life, faster recharging, more voltage, no memory effects, and are consistently and reliably manufactured.

Offering a 40 – 75% weight savings, lithium-ion technology will soon dominate the aviation industry. Airbus, Bell Helicopter, Boeing, Leonardo, Lockheed Martin, Northrop Grumman, Robinson Helicopter Company, Sikorsky, and Textron are committed to utilizing this game-changing technology.

## How is lithium-ion technology superior to lead-acid and nickel-cadmium (NiCad) technology?

### More power

*3x as much energy per kilogram*

### 40 – 75% less weight

*Improved fuel savings, useful payload, and range*

### 50 – 90% less scheduled maintenance cost

*Advantages in time, cost, and dispatch*

### Multiple layers of protection

*Chemistry, electronic monitoring, case design, and additional testing*

### Advanced testing requirements

*Lithium-ion regulatory standards far exceed the requirements of lead-acid and NiCad designs*

### Successive engine starts

*Faster recharge immediately after engine starts*

### Extremely low internal resistance

*Cells recharge very quickly*

### Faster, cleaner, and cooler engine starts

*Less wear and increased useful life*

### Superior hot and cold weather performance

*Operable in temperatures ranging from -40°C to +70°C (-40°F to +158°F)*

## More power. Less weight. What does this mean?

Lithium-ion cells have 3 times the energy density per kilogram when compared to lead-acid and NiCad alternatives. The result is a battery system that is significantly lighter than traditional batteries, while capable of delivering higher power with noticeably faster engine starts — a perfect match for aerospace applications.

## What aircraft applications utilize lithium technology?

### Main Ship Batteries

<i>Airbus A350 XWB</i>	<i>Pilatus PC-12</i>
<i>Airbus EC130</i>	<i>Pilatus PC-24</i>
<i>Airbus H125/AS350</i>	<i>Robinson R44</i>
<i>Beechcraft Bonanza</i>	<i>Robinson R66</i>
<i>Beechcraft King Air 300 Series</i>	<i>Sikorsky CH-53K King Stallion</i>
<i>Bell 206</i>	<i>Tecnam Traveller P2012</i>
<i>Bell 505 Jet Ranger X</i>	
<i>Boeing 787 Dreamliner</i>	
<i>Boeing F/A-18 Hornet</i>	
<i>Cessna Caravan</i>	
<i>Cessna Citation Longitude</i>	
<i>Cirrus G2 Vision Jet</i>	
<i>De Havilland Canada Dash 6</i>	
<i>De Havilland Canada Dash 8</i>	
<i>Hawker/Beechjet 400</i>	
<i>Lockheed Martin F-35</i>	
<i>Northrop Grumman B-2</i>	
<i>Northrop Grumman Global Hawk</i>	



## Who is using True Blue Power lithium-ion products?

True Blue Power lithium-ion battery packs are utilized by a wide array of aircraft. True Blue Power lithium-ion emergency batteries are flying on Part 23, 25, 27, and 29 aircraft.

True Blue Power is a market leader integrating lithium-ion batteries on OEM business jets, commercial aircraft, and rotorcraft.

### Standard Equipment

<i>Bell 505 Jet Ranger X</i>	<i>Robinson R44</i>
<i>Cessna Citation Longitude</i>	<i>Robinson R66</i>
<i>Cirrus G2 Vision Jet</i>	<i>Tecnam Traveller P2012</i>
<i>Pilatus PC-24</i>	

### Federal Aviation Administration (FAA) Supplemental Type Certificates (STC)

<i>Airbus EC130</i>	<i>De Havilland Canada Dash 6</i>
<i>Airbus H125/AS350</i>	<i>De Havilland Canada Dash 8</i>
<i>Beechcraft Bonanza</i>	<i>Hawker/Beechjet 400</i>
<i>Beechcraft King Air 300 Series</i>	<i>Pilatus PC-12</i>
<i>Bell 206</i>	<i>Robinson R44</i>
<i>Cessna Caravan</i>	

## Which rechargeable lithium-ion cell chemistry is utilized by True Blue Power?

True Blue Power lithium-ion batteries and emergency power supplies feature cylindrical NanoPhosphate® (LiFePO<sub>4</sub>) lithium iron phosphate cells. This proprietary NanoPhosphate chemistry was developed at Massachusetts Institute of Technology (MIT). It offers stable and safe chemistry, faster charging, consistent output, excellent cycle life, and superior cost performance.

Several million NanoPhosphate cells are produced annually. Applications include passenger and commercial electric vehicles (EVs), commercial energy grid storage, aerospace and marine. Through repeated cell testing during the manufacturing process, True Blue Power finds the consistency and reliability of NanoPhosphate cells to be excellent.

## Are True Blue Power lithium-ion aircraft batteries different than the Boeing 787 battery?

Yes. True Blue Power aircraft batteries utilize a very different lithium-ion cell chemistry compared to the GS Yuasa-brand battery used on the Boeing 787 Dreamliner.

True Blue Power batteries feature *NanoPhosphate® lithium iron phosphate* cell chemistry, which is more stable and less reactive than our competitor's *lithium metal oxide* battery chemistry.

At True Blue Power, safety is addressed on multiple levels, including chemistry, cell design, containment, and the integration of sophisticated electronic protection systems.

## What testing has been completed and what qualifications have True Blue Power lithium-ion aircraft batteries received?

True Blue Power aircraft batteries are the first lithium-ion main ship batteries to receive Federal Aviation Administration (FAA) Technical Standard Order (TSO) and European Aviation Safety Agency (EASA) European Technical Standard Order (ETSO) certification, using extremely rigorous Radio Technical Commission for Aeronautics (RTCA) standards for lithium-ion aviation products.

Additional testing includes life testing and the accumulation of 20,000 simulated flights with no safety or performance issues. The full assessment comprised of 60 batteries undergoing 230 separate qualification tests, including 20 G crash testing, -40°C to 70°C operational temperature, shock and vibration tests. All batteries confirmed the ability to manage overvoltage, over-current, undervoltage and short circuit with absolutely no possibility of damage allowed to the aircraft.

## What is a worst-case scenario for a True Blue Power lithium-ion battery?

In the unlikely event of an internal short circuit or thermal runaway, a white, electrolyte vapor is directed outside the craft, away from passengers and critical components.

True Blue Power lithium-ion batteries are tested to withstand a scenario in which all redundant levels of protection are disabled and over-current/overcharge is applied. The battery is proven to deliver 100% containment and reach a temperature not to exceed 204°C. No damage to the aircraft occurs.

## How long will a True Blue Power lithium-ion battery last?

A True Blue Power lithium-ion battery will typically last 8 years or more. End-of-life contributors are high operating temperature, extreme mission profile, emergency power requirements, and APU start versus main engine start.

The True Blue Power TB44 battery has been tested to exceed 11,000 engine start cycles. In most cases, lithium-ion batteries last 3 to 4 times longer than lead-acid batteries.

## How quickly can I receive a new True Blue Power lithium-ion battery?

True Blue Power lithium-ion batteries ship next-day air cargo to most countries worldwide.

True Blue Power batteries have been rigorously tested to United Nations (UN) 38.3, Department of Transportation (DOT) and International Air Transport Association (IATA) standards. Lithium-ion batteries are rated Class 9 Hazardous Goods.

## How do I monitor the health of a True Blue Power lithium-ion battery?

True Blue Power lithium-ion batteries are intelligent battery systems. Battery Management System (BMS) control modules and one central monitoring system board constantly communicate battery health to the cockpit or console. It reports information such as temperature, module faults and over/under voltage indications, while internally monitoring established safety thresholds.

True Blue Power Gen5 batteries feature a Built-in Test (BIT) indicator that provides state-of-charge (SOC) data without the need for external test equipment, load banks or auxiliary power.

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Learn more  
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