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ALTECH – CERENERGY® BATTERY INDIVIDUAL CELL TESTS PROVEN SAFE UNDER EXTREME CONDITIONS

Highlights

- Rigorous testing protocol of individual cells
- Safety and operational robustness confirmed
- Long term cycling
- Over discharge, all safety mechanisms work, no damage
- Over Charge tests - high voltage, no damage
- C Rate Tests – no performance degradation, no cell damage
- High Temperature Tests – stable, no damage
- CERENERGY® batteries proven safe under extreme conditions

Altech Batteries Limited (ASX: ATC, FRA: A3Y) is pleased to announce that an individual single-cell stress-testing program conducted by JV partner Fraunhofer IKTS has confirmed the safety and operational robustness of the CERENERGY® battery technology. On 1 October 2024, the Company announced that the first CERENERGY® ABS60 battery prototype was successfully brought online and is operating as intended.

During the production of the first prototype, additional individual cells were set aside for a rigorous testing protocol designed to evaluate performance under abnormal or stressed conditions, beyond standard operating parameters. These tests aimed to verify the performance, integrity, and resilience of the individual CERENERGY® battery cells—and have delivered excellent results, as detailed below.

Long Term Cycling

Daily charge and discharge cycling at 300 °C with a state of charge (SoC) range of 20–100% is ongoing, demonstrating that individual cells are performing consistently across the full capacity range, in line with the expected scientific forecasts.

Over-discharge Test

While the battery system includes protective mechanisms against overcharging, the test program is designed to evaluate performance under extreme conditions, including scenarios where these protections may fail. One such test—the over-discharge test—assesses the durability of CERENERGY® batteries at low voltage levels (<1.7 V). All tested cells successfully passed, demonstrating exceptional resilience, safety, and the ability to recover without damage, even under demanding conditions.

Over Charge Test

The overcharge test evaluates the performance of CERENERGY® batteries under high-voltage conditions (>10 V for 15 hours—four times higher than the nominal voltage), simulating worst-case scenarios in which protection mechanisms may fail. All tested cells successfully passed, demonstrating the battery's robustness, effective integrated safety features, and strong resistance to damage caused by overcharging.

C Rate Test

The C-rate is a measure used in CERENERGY® batteries to indicate the rate of charge or discharge relative to the battery's nominal capacity, expressed as a multiple of its ampere-hour (Ah) rating. It is a key parameter for evaluating battery performance across various applications. While high C-rates are typically employed in fast charge/discharge scenarios, they can often lead to performance degradation, cell damage, heat buildup, or efficiency losses. However, CERENERGY® battery cells have shown none of these negative effects and have proven to be as resilient as anticipated. Conversely, low C-rates are used to extend battery life and maintain optimal efficiency. The cells were tested across a range of C-rate regimes, including C/8, C/5, C/4, and C/3. The results demonstrated strong C-rate flexibility, enabling a wide range of potential use cases.

Critical Operating Temperatures

Thermal stability testing under overheating conditions has been conducted to evaluate the upper limits of the CERENERGY® battery's operating temperature range. Cells were cycled at a C/8 rate up to 400 °C—50 °C above the maximum expected operational temperature. Additional cells are currently undergoing cycling at C/8 and 350 °C, showing stable and consistent performance. These tests are ongoing to further assess the battery's thermal behaviour and overall robustness under elevated temperature conditions.

Full Thermal Cycle Tests

Thermal cycle testing is ongoing, with cells being cycled at C/8 between 20–100% state of charge (SoC) at 300 °C. The testing protocol includes cells starting at 100% SoC (fully charged anode) and others at 20% SoC (nearly empty anode). Each thermal cycle comprises three electrical cycles, followed by a temperature transition between 300 °C and room temperature (hot-cold cycles). To date, the cells have successfully completed a significant number of thermal cycles, highlighting the durability of the CERENERGY® battery technology. The results confirm that the cells remain both mechanically and electrically stable throughout the process.

C-Rate Test at high temperature

The cells were tested across a range of C-rate regimes, including C/8, C/5, C/4, and C/3, under extreme temperature conditions—specifically at 400 °C, significantly above the typical operating temperature of below 300 °C. No failures were recorded during these tests, demonstrating the robustness of the CERENERGY® battery cells even under severe conditions. Higher C-rate testing, including C/2 and beyond, is planned as part of the ongoing test regime to further evaluate and define the physical performance limits of the cells.

Cell Failure Test

Individual cell failure testing was conducted to assess whether electrical current flow would be disrupted in the event of one or more cell failures. This test is critical to evaluating the real-world performance and reliability of the ABS60 BatteryPack. The results demonstrated that cell failure does not negatively impact the overall system performance. The CERENERGY® BatteryPack continues to operate safely and reliably, maintaining functionality and continuous operation without significant risk or performance degradation, even when individual cells fail.

Cell Circuit Test

IKTS performed a cell short-circuit test, which included a subsequent short circuit at 100% SoC with a discharge to 0.2 V. During the test, the current reached up to 120 A. The results indicated no leakage, gassing, or fracturing of the cell casing, demonstrating the cell's stability and safety under extreme conditions. Additional evaluations will be conducted to ensure ongoing reliability.

Conclusion

Group Managing Director Iggy Tan said "*These tests are crucial for evaluating potential risks, mismanagement, or external factors. Expert testing conducted by Fraunhofer IKTS, in accordance with international standards, has validated the robustness of CERENERGY® technology, showing no critical behaviour. The cells continued to operate for days or even weeks under extreme conditions that would cause typical lithium-ion cells to fail and require safety interventions. CERENERGY® batteries have proven to be safe under all conditions, ensuring uninterrupted operation without risk or performance degradation, even in the event of individual cell failure.*"

End

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Altech Batteries Interactive Investor Hub

Altech's interactive Investor Hub is a dedicated channel where management interacts regularly with shareholders and investors who wish to stay up-to-date and to connect with the Altech Batteries leadership team. Sign on at our Investor Hub https://investorhub.altechgroup.com or alternatively, scan the QR code below.

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About Altech Batteries Ltd (ASX:ATC) (FRA:A3Y)

CERENERGY® Batteries Project

Altech Batteries Ltd is a specialty battery technology company that has a joint venture agreement with world leading German government battery institute Fraunhofer IKTS ("Fraunhofer") to commercialise the revolutionary CERENERGY® Sodium Chloride Solid State (SCSS) Battery. CERENERGY® batteries are the game-changing alternative to lithium-ion batteries. CERENERGY® batteries are fire and explosion-proof; have a life span of more than 15 years and operate in extreme cold and desert climates. The battery technology uses table salt and is lithium-free; cobalt-free; graphite-free; and copper-free, eliminating exposure to critical metal price rises and supply chain concerns.

The joint venture is commercialising its CERENERGY® battery, with plans to construct a 120 MWh production facility on Altech's land in Saxony, Germany. The facility intends to produce CERENERGY® battery modules to provide grid storage solutions to the market.

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Sodium Chloride Solid State Batteries

Silumina Anodes™ Battery Materials Project

Altech Batteries has licenced its proprietary high purity alumina coating technology to 75% owned subsidiary Altech Industries Germany GmbH (AIG), which has finalised a Definitive Feasibility Study to commercialise an 8,000tpa silicon alumina coating plant in the state of Saxony, Germany to supply its Silumina Anodes™ product to the burgeoning European electric vehicle market.

This Company's game changing technology incorporates high-capacity silicon into lithium-ion batteries. Through in house R&D, the Company has cracked the "silicon code" and successfully achieved a 30% higher energy battery with improved cyclability or battery life. Higher density batteries result in smaller, lighter batteries and substantially less greenhouse gases, and is the future for the EV market. The Company's proprietary silicon product is registered as Silumina Anodes™.

The Company is in the race to get its patented technology to market, and recently announced the results of a Definitive Feasibility Study for the construction of a 8,000tpa Silumina Anodes™ material plant at AIG's 14-hectare industrial site within the Schwarze Pumpe Industrial Park in Saxony, Germany. The European silicon feedstock supply partner for this plant will be Ferroglobe. The project has also received green accreditation from the independent Norwegian Centre of International Climate and Environmental Research (CICERO). To support the development, AIG has commenced construction of a pilot plant adjacent to the proposed project site to allow the qualification process for its Silumina Anodes™ product. AIG has executed NDAs with German and North American automakers and battery material supply chain companies.

Silumina Anodes™