

# UL Provides Certification for 370 Lithium-Ion Batteries with Nominal Voltage Range between 24 V and 80 V

TRIATHLON® produces batteries for a wide range of industrial applications including electric forklifts, mobile lifting platforms and pallet trucks. They wanted to achieve global market access for 370 varieties of lithium-ion batteries with a nominal voltage range between 24 V and 80 V and different pack weights and capacities. After obtaining certification for its LIBs to UL 2580, the Standard for Batteries for Use in Electric Vehicles, and an informative test report to IEC 62619, TRIATHLON grew its sales significantly in the U.S. and Australian markets.

## Introduction

When compared to traditional lead-acid batteries, lithium-ion technology proves more valuable, despite its complex design. Developed in the late 1970s, lithium-ion batteries (LIBs) have a longer lifespan, greater energy efficiency, more stability and less weight. Electric cars, hoverboards, laptops and smartphones represent only a few examples of devices powered by LIBs.

Many global organizations invest highly in manufacturing lithium-ion batteries. One such organization is Triathlon Batterien GmbH, a German manufacturer of batteries for use in electric forklifts, electric industrial trucks, mobile lifting platforms and other vehicles.

TRIATHLON® wanted to achieve U.S. and Australia market access for all of its 370 lithium-ion battery varieties with a nominal voltage range between 24 V and 80 V, available system energy content between 1.2 kWh and 138 kWh and capacities between 52 Ah and 1,716 Ah, designed for industrial products such as electric forklifts.

They relied on UL, a global safety science leader, to certify the batteries based on UL 2580, the Standard for Batteries for Use in Electric Vehicles, and obtain an informative test report based on IEC 62619:2017, Secondary Cells and Batteries Containing Alkaline or Other Non-Acid Electrolytes - Safety Requirements for Secondary Lithium Cells and Batteries, for Use in Industrial Applications.

The batteries also had to be assessed for their safety-related systems (functional safety) within the associated hardware and software. This involved an assessment to ISO 13849-1, Safety of Machinery - Safety-Related Parts of Control Systems - Part 1: General Principles for Design.

“The certification would help boost our international recognition, especially in the North American and APAC regions,” said Ralf Kölzer, TRIATHLON’s key account manager.



getty images/ Scientist testing Lithium-Ion batteries



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## Lithium-ion battery packs review and testing

Following the initial meetings between TRIATHLON and UL, the companies agreed that UL would identify representative samples among all 370 batteries to cover the entire range of the lithium-ion batteries. Given the nominal voltage range between 24 V and 80 V, pack weights, capacities, battery configurations and other different lithium-ion battery characteristics, UL and TRIATHLON agreed on a select number of samples covering these varying parameters for review and testing that would fully represent the entire range of models within the family of lithium-ion batteries. This defined list of models included numerous samples of the full range of 24 V-80 V batteries.

Based on the construction and components evaluation that UL performed, TRIATHLON changed its product design. “To meet the standard requirements, they added additional safety layers, such as double isolation systems, particularly into the 80 V lithium-ion batteries,” said Tobias Plettner, UL’s engineering leader, Energy and Industrial Automation. “From a safety perspective, usually the larger a lithium-ion battery size is, the more challenging it is to help ensure its overall reliability.”

After TRIATHLON made changes to its product design, UL ran a new round of construction and components evaluation to the requirements of UL 2580 and IEC 626109 standards. Once UL confirmed construction and component compliance with both standards, the project reached the electrical and mechanical testing phases. During the electrical testing phase, tests assessed overcharge control of voltage, overheating control, the thermal stability system, etc. In the electrical safety testing, tests included crush, drop, shock, and vibration endurance, among others.

UL’s engineering team recorded the testing results in the datasheet for each test and for each tested sample. The compliant results have helped TRIATHLON obtain both certification for its lithium-ion batteries to UL 2580 and an informative test report to IEC 62619.

## UL certification’s positive impact

With UL certification, TRIATHLON has not only expanded sales of its lithium-ion batteries to prime industrial companies requiring a UL Mark for the U.S. market, such as Crown Equipment Corporation, but the project also allowed TRIATHLON to expand its sales into Australia. The UL certification also enables specific 80 V lithium-ion batteries from the manufacturer to equip heavy forklifts that previously ran on diesel, and helps TRIATHLON’s customers meet sustainability goals due to the lithium-ion batteries’ energy efficiency and charging production.

In addition to positive sales impact, the manufacturer went through a major cultural transformation. TRIATHLON’s ways of working were the biggest change within the organization. “Before this project, we used to focus on speeding up product development and going to market as quickly as possible. Now, our teams take the applicable safety standards into consideration in the early stages of every product design,” Kölzer said. “We completely changed our mindset, improved our cross-departmental collaboration and adapted internal processes for this new way of project planning.”

Kölzer concluded, “TRIATHLON has better processes and better products because UL challenged us to do that.”



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