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Fuses for the automotive industry according to AEC-Q200

Fossil fuels are only available until they are exhausted and when they are burned, they release harmful gases. The role of the electric car is certain to be in our future. But even here, there are challenges ahead, especially when it comes to fuse protection of the battery.



In recent decades, cars have increased in numbers as well as dimensions. They have become more comfortable, more powerful, safer and therefore heavier as well, with mid-range cars already weighing 1.5 tons. It goes without saying that a significant amount of energy will be required to adequately power an electric car of this class in the future.

Thousands of battery cells

This is achieved by interconnecting small battery cells - size 4 VDC/3200 mAh per cell - in parallel and in a row. 100 cells in a row are needed to attain an operating voltage of approximately 400 VDC. The endurance, range and performance of the overall package are then achieved by connecting many of these 400 V strings in

parallel. In very powerful electric vehicles, several thousand cells are quickly assembled in this way.

You may recall ...

Not long ago, a smartphone manufacturer in Korea had to deal with a battery problem, which cost them a fortune. A single, small battery led to panic; it even went so far as the smartphone being banned. Airlines declared that this type of mobile phone would no longer be allowed on the aircraft. Ordinary paying passengers were faced with the choice to hand over their mobile phone or get off the plane.

Was this panic justified? It's hard to say. But when you know how much energy can be stored in a small battery nowadays, it is advisable to err on the side of caution.

Battery Balancing

Bearing in mind that thousands of such battery cells are fitted in an electric vehicle, the charging process is of great importance. The cells must ultimately be charged within the shortest amount of time possible. The solution for this tricky task is referred to as "Battery Balancing". This describes an electronic circuit - usually part of a battery management system - which ensures a steady even electrical charge of numerous battery cells within a battery pack, that are similar in their construction but with slightly differing manufacturing tolerances.

And this is how it works: The cells that absorb energy very quickly are slowed down a little. The weakest link in the chain sets the pace during the charging

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process. Each cell needs to be handled individually. This is the only way to use the maximum capacitance of a battery pack and to counteract any aging/weakening of individual cells.

Protect against a short circuit: Cell by cell

Of course each individual cell in the battery pack must be protected against overcurrents. This takes several thousand fuses per battery pack, depending on each individual one. There is no tolerance for errors here. So what demands are placed on this kind of fuse? Complete reliability is key. Such protection must work for at least 15 years without any hitches. Fuses must perform their function just as well in the coldest of winters as in the sweltering heat. Shock, vibration? Daily grind. Switching on, switching off, accelerating - cyclical strength is indispensable. The demands made on these fuses are enormous.

AEC-Q200

Behind the acronym AEC (Automotive Electronics Council) there is a US-based organization that focuses on the standardization of the qualification of electronic components in the automotive supply industry.

The standard Q200, which was introduced in the middle of the 1990s, describes the requirements for passive components, while standard Q100 and its spinoffs concentrate on the active components. These AEC standards are recognized worldwide and are accepted by all the leading manufacturers in the automotive industry.

What about fuses in the context of AEC-Q200?

Specific tests and a set of specifically defined requirements for fuses used in cars were not relevant throughout automotive development history. However, this has completely changed with the introduction of electronic control units and electric drives. Fuses will also be included as a topic in the next update of the Q200 standard.

SCHURTER focused on the high reliability requirements of the aerospace industry, which were developed in cooperation with ESA. This, together with the specifications for other passive components according to AEC-Q200, was also taken into account. Test procedures were developed for fuses, which meet the Q200 set of requirements, by working in close cooperation with key global players in the automotive industry. Fuses manufactured in this way may

bear the unrestricted and internationally recognized Q200 "seal of approval".

Competent contact

SCHURTER now supplies a complete range of fuses for the automotive industry in accordance with AEC-Q200, supporting a wide variety of applications (battery management, air conditioning, close-coupled electronics for diesel and petrol engines, and much more). SCHURTER's close networking with international automotive organizations and the industry itself makes us highly competent to address all issues relating to the protection of electronics in the manufacturing of vehicles.

Company

SCHURTER continues to be a progressive innovator and manufacturer of electronic and electrical components worldwide. Our products ensure safe and clean supply of power, while making equipment easy to use. We offer a broad range of standard products including circuit protection, connectors, EMC products, switches and input systems, as well as electronic manufacturing services. Moreover, SCHURTER is ready to work with our customers to meet their application specific requirements, not covered in our standard range. You can rely on SCHURTER's global network of companies and partners to guarantee a high level of local service and product delivery.

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