

Permeaflon pressure equalisation membrane

Degassing unit for high-voltage batteries

data

Industries	Automotive, energy and electric
Products	Traction batteries for hybrid & electric vehicles Vehicle starter batteries Fixed high-voltage batteries
Customer:	MANN+HUMMEL GmbH
Project	Degassing unit for high-voltage batteries
Series production	> 200,000 p.a.

Therefore battery compartments in electric vehicles are often very large and weigh several hundred kilograms. For maximum safety, they are usually installed in sealed enclosures in the underbody of the vehicle under the seats. It is thus essential to fully protect the cells of high-voltage batteries against water penetration when vehicles encounter puddles, the car wash or a body of water (for example, in difficult terrain or during floods). Moisture can cause short circuits, thus endangering the safety and functioning of the vehicle.

The requirements and goals

The marketability of hybrid and electric vehicles depends largely on their traction batteries. These must have high energy density, high performance and a long service life while also complying with strict safety standards.

In electric cars, lithium-ion batteries currently dominate this field. To achieve the highest possible capacities and voltages, numerous Li-ion cells are connected together in traction batteries.

The challenge

However, the battery compartments cannot simply be hermetically sealed. Significant fluctuations in the internal pressure of high-voltage batteries can occur due to changes in temperature and altitude. An excessive increase in pressure can lead to deformation and even rupture of the battery enclosure. Therefore, high-voltage battery compartments in electric vehicles require a pressure equalisation system, which allows dissipation of excess pressure and at the same time keeps water out of the enclosure.

The solution: Permeafion® membranes by Berghof

To meet this challenge, well-known system and component suppliers to the international automotive industry, such as the company MANN+HUMMEL, depend on Permeafion-pressure equalisation membranes from Berghof. These membranes are able to compensate for pressure differences and at the same time prevent the ingress of water, dust, dirt, and even oils. They have enabled the development of degassing units which can not only protect high-voltage batteries from heavy rain or temporary submersion, but which can even repel water jets from high pressure cleaners.

New safety feature with burst function

During an impermissible pressure increase, the degassing unit reacts by acting as a pressure relief valve — it directs the excess pressure outwards and thus functions like an automatic emergency degassing system. This safety function for battery enclosures is made possible by the unique properties of the Permeafion membrane which, like a bursting disk, works using a defined bursting pressure.

For the most demanding automotive applications

The name Permeafion refers to a granulate of symmetric porous polytetrafluorethylene (PTFE/Teflon®) developed by Berghof. Processed into a film, Permeafion acts as a semi-permeable membrane which is extremely permeable to gas and yet impervious to liquids thanks to its porous structure and hydrophobic surface on both sides. In addition, the special nature of the membrane's surface prevents the adhesion of solids. Permeafion pressure equalisation membranes allow the most demanding automotive applications to be successfully realised — even directly inside the engine environment. They are temperature-resistant from -200 to 250°C and resistant to virtually all media used in the automotive environment. If required, they are available as double-sided oleophobic (oil-repellent) membranes.

Your contact partners

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Safety for your enclosures Pressure equalisation elements from Berghof

As a specialist in ventilation solutions, Berghof provides personalised pressure equalisation elements for demanding applications.

Berghof supports its customers as an expert partner and accompanies them throughout the development process, from determining the required performance in terms of air flow and water retention to designing the geometry and assembly for optimum integration into the client's component.

Permeafion pressure compensation elements are available as foil membranes in the form of rolled strips and also as precise stamped and turned parts according to customer specifications.

Customer benefits

- Safety — burstable membrane allows emergency degassing
- Removal of health risks — controlled dissipation of toxic gases
- Increased system service life — continuous pressure compensation in the enclosure with simultaneous water tightness



Fig. 1: Degassing unit for high-voltage battery
Source: MANN+HUMMEL GmbH