News Release

Low-temperature-resistant Therban seal for natural gas vehicles

Therban has the answers

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Leverkusen – Bielefeld-based Eriks GmbH, a renowned supplier of highly specialist sealing systems for all areas of technology, uses the HNBR elastomer Therban in seals for the natural gas vehicles produced by a large European automotive OEM. This oil- and ozone-resistant high-performance material from LANXESS, one of the global market leaders in synthetic rubbers, replaces fluoroelastomers, which would often be significantly more expensive while offering only comparable performance, in fiber-composite pressurized natural gas containers from Kassel-based Xperion Alpha Composites GmbH. The development work benefited from unusually close collaboration between the system supplier Eriks and LANXESS which, for instance, quickly helped ensure an optimal balance between the required low-temperature flexibility and a high swell resistance for the vulcanizate in non-polar media.

Natural gas powered cars are seen as a cost-effective alternative to vehicles with diesel or gasoline engines in times of rising oil prices, thanks to much lower tax rates for CNG and LNG fuels (compressed natural gas and liquid natural gas). They are also more environmentally friendly than cars that use “conventional” fuels. Burning natural gas produces much less CO_2 and carbon monoxide. In addition, emissions from natural gas cars do not contain any fine dust particles, and their nitrogen oxide emissions are also dramatically lower than with comparable diesel vehicles.

“However, designing natural gas vehicles presents manufacturers with new challenges,” says Oliver Lips, head of Applications Advice and Sales in the Eriks sealing technology division. “When refueling CNG-powered automobiles – where natural gas is forced into the tank at a pressure of around 200 bar – the valves cool very quickly for physical reasons, which causes seals made from conventional

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rubber materials to contract and harden." As a result, the sealing function is no longer assured and an unpleasant smell of natural gas spreads throughout the vehicle. Even many fluororubbers, which are employed as "problem-solvers" for difficult cases in the elastomer sector, fail to make the grade – at glass transition temperatures of around minus 20 °C, they also become brittle too soon. Although the market offers special low-temperature fluororubber grades, these are normally more expensive and are often not easy to process.

"We found the solution to this problem in the HNBR elastomer Therban from LANXESS," says Lips. This synthetic rubber offers a resistance to non-polar media such as natural gas that is sufficient for usage, yet the rubber has a much better low-temperature flexibility of -40 °C compared to fluororubbers. The Therban solution can also meet the other key requirements for sealant materials in CNG tanks, as set out in ECE regulation R 110. Its change in volume after 72 hours of storage in n-pentane is well below the required maximum of 20 percent (and well below 5 percent even after redrying). The elongation at break after 168 hours at a maximum operating temperature remains in the required range between +10 and -30 percent; after 120 hours of contact with ozone-enriched air, no cracks can be detected.

"It was also necessary to ensure that good sealing properties in cold conditions are accompanied by resistance to natural gas in the Xperion pressurized container," says Dr. Matthias Soddemann, an elastomer specialist in LANXESS' Technical Rubber Products business unit. "As ACN content increases, the swell resistance of HNBR elastomers in oil improves. However, at the same time, their low-temperature flexibility falls. A good balance had to be found here through careful selection of a suitable Therban grade and an appropriate mix. And this is where we have been on hand to provide Eriks with advice and support."

In this case, as LANXESS experts were in direct contact with Eriks engineers and therefore the component supplier, they were able to

target their expertise to the given application extremely effectively and develop the optimal solution even faster and more precisely than usual. Close collaboration has been a prerequisite for success in the eyes of Oliver Lips too. “The OEM has approved the new seal and expressly adopted Therban in the specification. In the final analysis, we can even offer the Therban solution at a far lower cost than a solution made using low-temperature fluoroelastomers.”

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LANXESS is a leading specialty chemicals company with sales of EUR 5.06 billion in 2009 and currently around 14,300 employees in 23 countries. The company is represented at 42 production sites worldwide. The core business of LANXESS is the development, manufacturing and marketing of plastics, rubber, intermediates and specialty chemicals.

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