

Brave fuel world

How about a splash of blue to go with the green? This is a question diesel drivers might soon hear. Because they can't comply with the EURO 5 standard or the even more stringent U.S. guidelines without that blue in the green wrapper: The effective emissions-reducing aqueous urea solution with the catchy name AdBlue®.

1858: Rudolf Diesel was born on March 18th, 150 years ago. In 1893 he began development of the self-igniting internal combustion engine that bears his name. His first functional engine was already running just four years later. For a long time thereafter, the diesel engine's reputation among motorists was plagued by its cold-start sequence, its objectionable knocking and clattering sounds and the dark clouds of smoke belching from the exhaust pipe. But times have changed: Diesel has developed into a key technology offering high horsepower, long service life and comparatively low fuel consumption – fringe benefits jealously guarded today. At the same time vehicles should pollute as little as possible. But the diesel engine's combustion process inevitably produces nitrogen oxides and fine particles (particulates). Nitrogen oxides are responsible, among other things, for the formation of ozone and so-called acid rain. AdBlue® can almost completely neutralize the nitrogen oxides in diesel exhaust and lower particulate emissions.

New technologies for clean air

The emissions values of internal combustion engines are now attracting the attention of developers everywhere.

Options range from diesel fuel and petrol to natural gas, bio-fuels, hydrogen and electricity – and no one knows today which system will ultimately win the race. Nor will the decision rest solely with the consumer. In the face of growing environmental concerns, rising oil prices and increasingly restrictive legislation, competition is driving development of these new technologies in the automotive industry. The latest example is a diesel engine designed for use with the additive AdBlue® and new technology that will soon be rolled-out in the USA where strict emission regulations continue to hold back sales of diesel vehicles.

AdBlue® is also playing a major role in Western Europe because of the EURO 5 standard. After all, half of all new passenger vehicles registered in 2007 were diesel-powered vehicles.

AdBlue® – challenging and sustainable

In this new development, German manufacturers like Mercedes and Volkswagen are leading the pack. One of the sticking points that they have to address is that not all materials withstand long-term exposure to AdBlue®. Automakers can still rely on lightweight polymers that contribute to weight reduction and

therefore to reduced fuel consumption. The mechanical and chemical properties of a selection of high performance polymers were thoroughly tested after storage in AdBlue® at different temperatures (60 and 80 °C). The result: Ticona polymers Fortron® PPS, Hostaform® POM and long fiber reinforced Celstran® with PP and PA matrixes are suitable for applications in direct contact with AdBlue® such as sensors, pumps, valves and timing cases. As the urea solution remains free of any measurable contamination, the catalyst remains intact.

Europe already has a good AdBlue® infrastructure. The five suppliers that offer the additive through their network of service stations sold between 250 and 300 million liters across Europe in 2007, most of which was used in trucks and buses. Because the newer models are no strangers to European roads, where this exhaust treatment system has helped them reduce particulate and nitrogen oxide emissions for quite some time already. And the aqueous urea solution is also used in stationary applications, such as flue gas desulfurization units in power plants. Finally, "all" that was missing were the diesel cars...

Lower emissions with AdBlue®

AdBlue® is an extremely pure aqueous urea solution used as a NO_x reduction agent in SCR technology (Selective Catalytic Reduction). The ammonia generated by AdBlue® converts the dangerous nitrogen oxides – which contribute to the greenhouse effect – into harmless nitrogen.

Contrary to systems that use NO_x storage catalysts, the use of SCR in vehicles eliminates the need to switch to the so-called 'rich-burn mode' to regenerate the storage. This can reduce diesel consumption.

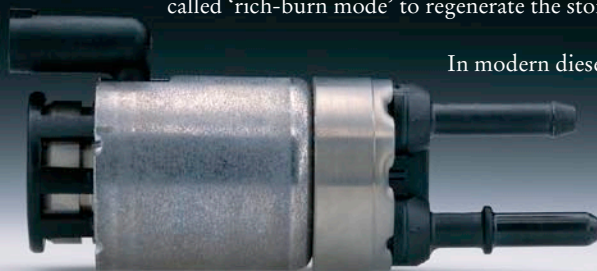


photo: AdBlue® transfer pump Thomas Magnete GmbH

In modern diesel vehicles, AdBlue® is injected from an extra tank. The quality requirements for AdBlue® are specified in ISO 22241 and the associated test methods are specified in DIN V 70071. Exceeding these limit values can cause irreparable damage to the catalytic system.

To reduce pollutant emissions, AdBlue® is sprayed into the exhaust stream before the SCR catalyzer. Fortron® PPS components used in the transfer pump withstand permanent contact with the additive.