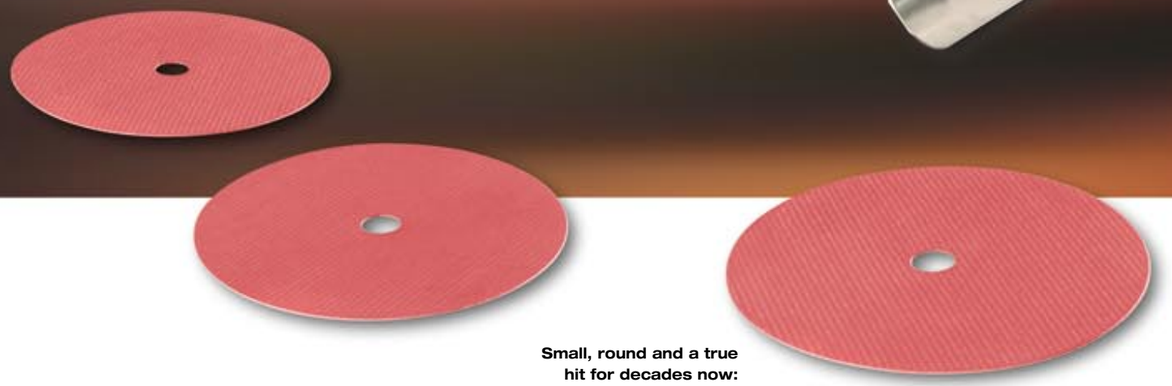
# At the heart of any fuel pump nozzle

By cutting off the flow of petrol at the right time, small diaphragms – like the kind ContiTech produces for ELAFLEX, the fuel nozzle specialist – keep things safe when motorists top up.



**Small, round and a true hit for decades now:** flat diaphragms from ContiTech.

**Fuel on the march:** The flat disc diaphragms from ContiTech make for safety.

In our day-to-day lives we take many things for granted simply because they function so well. We place blind faith in the technology involved, rarely giving it a second thought or even trying to form a picture of the complex behind-the-scenes control sequences. Electrical appliances, for example, automatically shut off when something goes wrong, preventing worse from happening. Safety belts respond to changes in speed and unobtrusively hinder the driver from lunging forward in the case of panic braking.

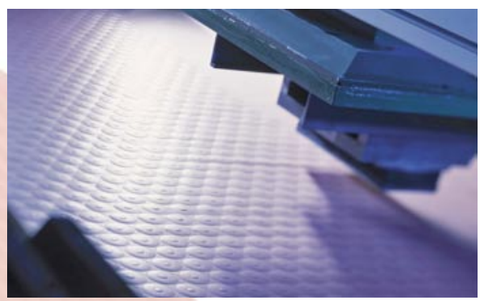
The automatic fuel pump nozzle is another commonplace device providing faithful service thanks to its complex inner workings. The process is well-known: The fuel pump nozzle is inserted into the fuel tank opening. Its small lever is then clicked into place so that the petrol can flow smoothly. When the tank is full, the fuel nozzle switches off automatically. It's convenient and thoroughly reliable. But how does it really function?

## The vacuum makes for safety

As the fuel flows into the tank, a vacuum forms in the fuel pump nozzle. To offset this, air is sucked in by means of a sensing nozzle. Petrol can continue to flow as long as the nozzle is not blocked. As soon as the tank is full, the sensing nozzle drops down into the liquid cutting off the further intake of air and immediately triggering formation of a vacuum in the valve. This causes the diaphragm to rise, which releases the shut-off mechanism. "Forty years ago we were on the lookout for a suitable diaphragm material for this simple sounding principle," reports Karlheinz Ehlers of ELAFLEX Tankstellentechnik GmbH & Co. in Hamburg. "We finally found it in a Volkswagen fuel pump, and the manufacturer was ContiTech in Northeim. Over the years the diaphragm material has, of course, adapted to changes in the composition of the fuel additives, but it has pretty much stayed the same otherwise. And even the latest fuel pump nozzle generation, the ZVA Slimline 2, which hit the market in 2004, operates with a diaphragm made of ContiTech diaphragm material.

At the heart of the fuel pump nozzle – i.e. the tank fill pipe – is a small red disk-shaped diaphragm from ContiTech Elastomer Coatings. "The diaphragm consists of a fabric substrate and a nitrile butadiene rubber compound of a kind found in virtually all of today's car fuel systems," says Hans-Peter Paulsen, head of the diaphragm material segment at ContiTech Elastomer Coatings GmbH in Northeim.

**The diaphragms are** highly flexible and respond quickly to pressure changes. That makes them interesting for a number of applications.



Fuel pump nozzles give diaphragms a good opportunity to show their worth. They are highly flexible and respond quickly to pressure changes. They have a constant effective surface at their disposal and can be counted on even in aggressive environments. They perform well within a temperature range of –30° C. to +90° C. What's more, they have a long service life and do not require any servicing or lubrication. "Diaphragms are absolutely reliable," explains Paulsen. "Whether they are used regularly, as in the case of fuel pump nozzles, or are not normally used at all, as in the case of diaphragms in nuclear power station safety systems, they can be counted on to provide service from the moment installed. And they'll function when needed!"

## Temperature-stable and accurate

In the case of the fuel pump nozzle, the diaphragm ensures that the flow of petrol is cut off reliably and accurately millions of times each day – during subzero temperatures in winter or scorching heat in summer. They're so predictable throughout the life of the fuel pump nozzle that even in the future, motorists topping up won't have to give any thought to what makes the devices tick. ■


**CONtact**

Hans-Peter Paulsen
Diaphragm materials segment
**ContiTech Elastomer Coatings**
Ph. +49 (0)5551 702-288
hans-peter.paulsen@elastomer.contitech.de