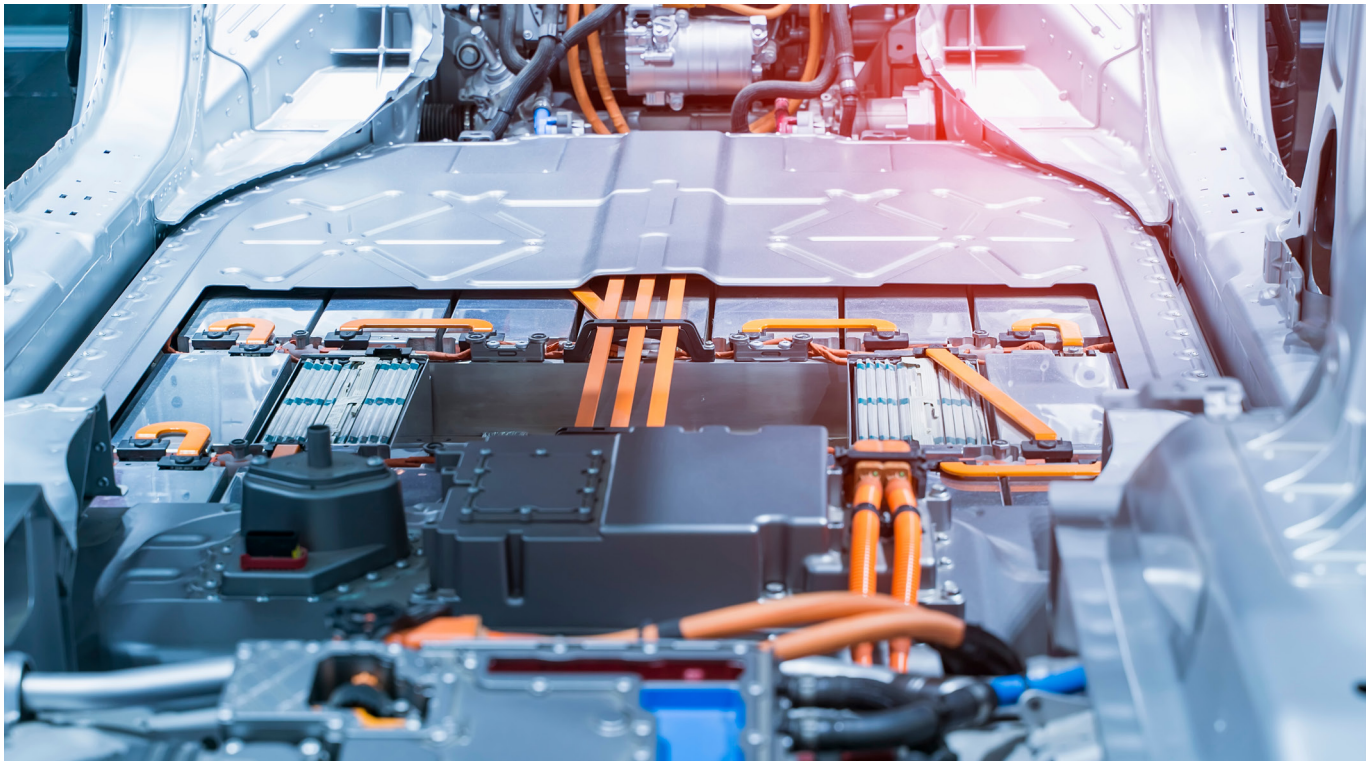
AEROXIDE® – Fumed Metal Oxides

EFFECTIVE HEAT STABILIZER FOR SILICONE RUBBER IN AUTOMOTIVE APPLICATIONS



Heat ageing of silicone rubber begins at approximately 200 °C, which is noticeable by the weight loss and reduction of elasticity, linked with the overall reduction of the mechanical properties of the silicone rubber.

Adding 1.0–3.0 wt.-% of AEROXIDE® TiO_2 P 25 or 0.25–1.0 wt.-% of AEROXIDE® TiO_2 PF 2 is an effective solution to improve the thermal stability of silicones.

The reason for high efficiency is the ability of AEROXIDE® fumed titanium dioxide grades to capture free electrons, forming titanium (III) ions, and, as a result, inhibiting hydroxyl radical formation.

Figure 1 shows the change of elongation at break of a 60 Shore-A HCR compound after storage at 275 °C over different periods of time.

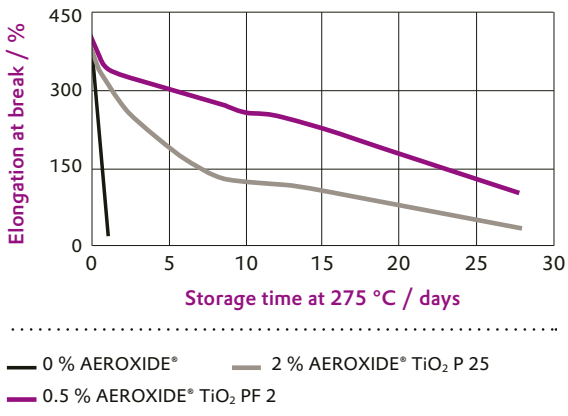


Figure 1 *Change of Elongation at Break during Heat Ageing of High Consistency Silicone Rubber (HCR)*

AEROXIDE® TiO_2 P 25 is manufactured by flame hydrolysis of titanium tetrachloride, which results in ultrafine powder with special phase composition and strong heat stabilizing properties.
AEROXIDE® TiO_2 PF 2 is based on a mixed oxide of titanium dioxide and iron oxide.

Figure 2 shows the weight loss of the same HCR compound.

Figure 3 demonstrates the efficiency of different loading levels at elevated temperatures.

Clearly, a certain loading level is necessary to achieve the required thermal stability of silicone rubber. The higher the temperature, the higher the loading level should be, but typically not more than 1 to 2 wt.-%. At the same time, thermal stability suffers at a too high concentration and the formulators need to find optimum loading levels, based on their final application, to avoid degradation of the heat aging performance.

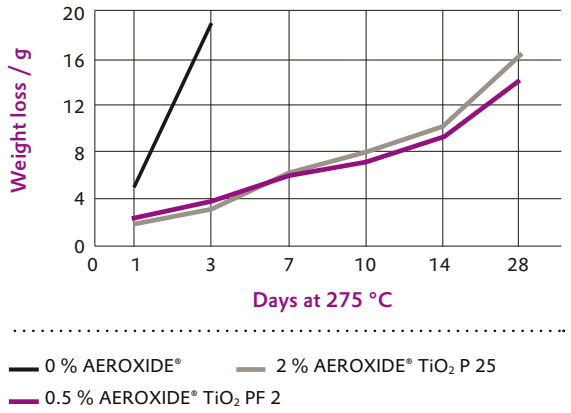


Figure 2 *Weight loss at 275 °C of High Consistency Silicone Rubber (HCR)*

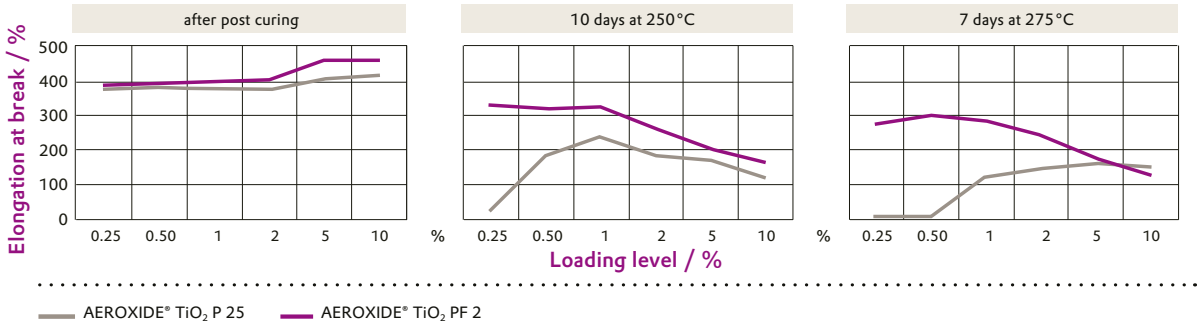


Figure 3 *Change of Elongation at break during Heat Ageing of High Consistency Silicone Rubber (HCR)*

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