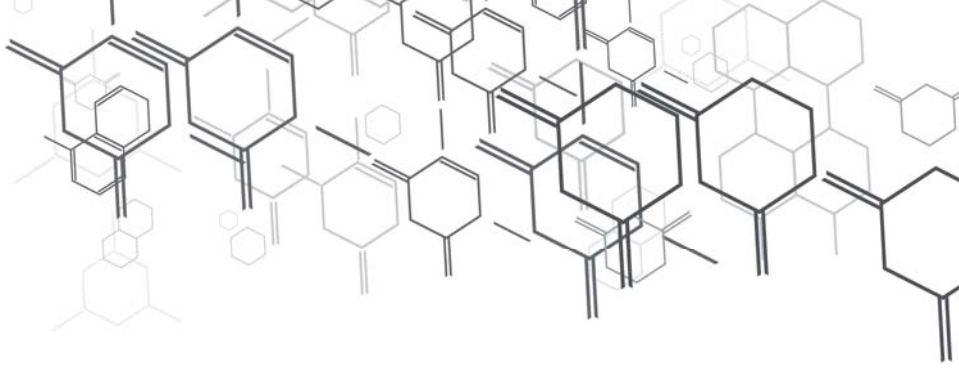
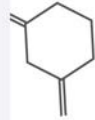


## Principle of Operation



NEG pumps sorb gases by a chemical reaction. They use very reactive alloys, generally made of zirconium or titanium, which are configured in a high efficiency getter cartridge structure.

Active gases, like  $O_2$ ,  $N_2$ ,  $H_2O$ ,  $CO$ ,  $CO_2$  impinging on the cartridge surface are dissociated and permanently trapped, in the form of stable chemical compounds. Also hydrogen is very effectively pumped by the NEG.

However, in the case of hydrogen (and its isotopes) the hydrogen atoms diffuse inside the getter bulk and dissolve as a solid solution. Noble gases (and  $CH_4$  at room temperature) are not pumped.

NEG pumps are therefore efficient and clean sinks for molecules, with pumping speed and sorption capacity that can be optimized by selecting the type of getter material, its configuration and the operating temperature. To sorb gases NEG pumps need first to be "activated".

The activation process is carried out under vacuum (or noble gas atmosphere) heating the getter cartridge at a certain temperature (typically at  $\sim 400-500^\circ C$ ) and for a given time ( $\sim 1$  hour).

This treatment allows surface oxides and carbides covering the surface to decompose and diffuse inside the getter material bulk structure, leaving a clean and reactive metal surface, available to gas sorption. The activation process requires a very small power ( $\sim 30-500$  W depending on the pump models) for a short time.

After activation, NEG pumps remove all active gases, like  $O_2$ ,  $N_2$ ,  $H_2O$ ,  $CO-CO_2$ ,  $H_2$ . Some hydrocarbons and organics can also be sorbed. In this case, to get the best results, it is generally advisable to operate the getter pump hot (e.g.  $200-300^\circ C$ ) to favor the molecule cracking and the carbon/hydrogen surface to bulk diffusion. Under these conditions, methane can also be pumped.

making innovation happen, together

**saes**  
group

[neg\\_technology@saes-group.com](mailto:neg_technology@saes-group.com)

[www.saesgetters.com](http://www.saesgetters.com)

*This paper contains no confidential information*

