NO\textsubscript{x} Adsorber Technology

Effective NO\textsubscript{x} storage requires total and uniform utilisation of the total catalyst volume. The NO\textsubscript{x} sensor that controls the process has to be integrated in the substrate and any NO\textsubscript{x} breakthrough must be prevented by a downstream safety reservoir.
The combustion process of lean-burn petrol and diesel engines operates with excess air so that their nitrogen oxide emissions cannot be removed by a conventional three-way catalyst. NO\textsubscript{x} emissions can be eliminated by a process of adsorptive storage of nitrogen oxides. As soon as the storage capacity has been exhausted the nitrogen oxides are reduced in a brief regeneration process. A NO\textsubscript{x} sensor integrated in the adsorber identifies the moment when regeneration must take place.

NO\textsubscript{x} breakthrough is prevented by integrating the sensor in the substrate in such a way that further storage volume is created behind it. Radial open structures consisting of PE or LS/PE foils are an essential feature of optimum nitrogen oxide reduction and ensure that the NO\textsubscript{x} sensor receives a representative signal and that the best possible use is made of the total storage volume.

**Advantages:**
- PE structure permits uniform utilisation of the total available catalyst volume
- This results in the highest possible degree of efficiency and durability
- A sensor located in front of a safety reservoir reliably prevents NO\textsubscript{x} breakthrough
- Utilisation of the positive properties typical of a Metalit\textsuperscript{®}, e.g. with regard to canning and mechanical strength

Nitrogen oxides are stored by adsorption on a storage coating.

![Diagram of NO\textsubscript{x} adsorption and regeneration](image)

Nitrogen oxides are reduced during regeneration by reaction with carbon monoxide and hydrocarbons.
NO\textsubscript{x} Adsorber filling ratio

Uniform utilisation due to internal flow equalisation

A NO\textsubscript{x} sensor behind a standard substrate detects the need for regeneration only after a breakthrough.

Non uniform utilisation due to non homogenous flow

Relative velocity distribution:

- Low
- high

PE substrate with internal flow equalisation

A NO\textsubscript{x} sensor in a PE substrate detects the need for regeneration before a breakthrough.

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Status: February 2008