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. NOx 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 NOx sensor integrated in the adsorber identifies the moment when regeneration must take place.

NOx 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 NOx 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 NOx breakthrough
- Utilisation of the positive properties typical of a Metalit®, e.g. with regard to canning and mechanical strength

Nitrogen oxides are stored by adsorption on a storage coating

Nitrogen oxides are reduced during regeneration by reaction with carbon monoxide and hydrocarbons
Flow distribution

NO\textsubscript{X} Adsorber filling ratio

Standard substrate without internal flow equalisation

Non uniform utilisation due to non homogenous flow

Relative velocity distribution

Low

high

PE substrate with internal flow equalisation

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.

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