

BASF Catalyst O3-85

Extrudates Catalysts for N₂O Decomposition

- Confidential -

Short and simplified

Installation, start-up and shut-down procedure

N₂O (“laughing gas”) is a significant green house gas. One ton of N₂O is judged to have the same impact as 310 tons of CO₂. BASF N₂O decomposition catalyst series O3-85 reduce N₂O especially from nitric acid plants and are installed just downstream of the Pt gauzes of such plants within the ammonia oxidation reactor.

Please find within this document some basic recommendations for installation, start- up and shut-down. Please contact your BASF representative for further information and advice.



This general procedure has to be adapted according to the specific design and requirements of the individual ammonia oxidation unit.

The catalyst O3-85 features are presented in the referring Product Data Sheet.

The MSDS (Material Safety Data Sheet) of catalyst O3-85 has to be consulted mandatory prior to any operation or handling of the product.

In principle, simply all or a part of the Raschig Ring bed (if any) in a basket just downstream of the ammonia oxidation Pt/Pd gauzes will be substituted by BASF decomposition catalyst O3-85 in order to decompose N_2O .

1. Catalyst Installation

- Empty and inspect basket, if needed clean it.
- Check that the construction is suitable for catalyst O3-85 installation.
- Before catalyst filling the ammonia, oxidation reactor has to be protected by an awning against rain.
- To prevent O3-85 extrudates to fall through basket bottom add a Megapyr gauze (high temperature resistant, mesh finer than extrudates 3 mm or 6 mm) on top of the baskets bottom; such gauze should cover as well the baskets inside wall to prevent smaller particles falling through the basket.
- It is favorable to mark the future filling height of catalyst O3-85 prior to its installation by marks at the baskets inner wall.
- BASF decomposition catalyst O3-85 is shipped in sealed drums.
- The catalyst is filled by emptying carefully the drums into the basket (If there would be at drums bottom any catalyst dust, caused by transportation, do not empty such dust into basket).
- Don't use equipment which could harm the catalyst such like hard-working filling or sieving machines. Simply empty drums and straighten the catalyst bed afterwards.
- It is favorable to walk on wooden planks to not break the catalyst (although we experienced it can be handled just like Raschig Rings).
- Ensure an even N_2O decomposition catalyst O3-85 bed, providing constant filling height over the baskets cross section.
- Note the amount and volume of installed N_2O decomposition catalyst.
- Take photos of empty basket and of N_2O decomposition catalyst bed after its installation.
- If Raschig Rings are only partially substituted by BASF N_2O decomposition catalyst O3-85 it is favorable to separate both layers from each other by laying a Megapyr gauze in between. That will enable faster inspection or de-installation (e. g. to inspect downstream heat exchanger).

2. Start-up and operation

- Ammonia oxidation plant can be started up and operated as usual.
- The chemical reaction of N₂O decomposition on catalyst O3-85: $N_2O \rightarrow N_2 + \frac{1}{2} O_2$
- The referring exothermal heat is as low as 2 K for 1,000 vppm N₂O reduced.
- Please note the operation parameters (flow rate, operation pressure, temperature, N₂O concentration etc.) and share with BASF in order to allow further analysis and advice.
- Monitor product quality as usual. Although we have not experienced catalyst contamination or poisoning we advise to analyze this with recommended methods.
- Any steam boiler malfunction should trigger plant emergency shut-down. Temporary catalyst exposure to steam does not alter its performances, however extended long time exposure to steam has to be avoid, especially in winter time.

3. Shut-down

- Shut down plant as usual.
- If new Pt gauzes have been installed note type of new and old gauzes. (Was the complete gauze set renewed? New type?)
- Take pictures of the N₂O decomposition catalyst bed.
- Check if the N₂O decomposition catalyst bed is still even. Straighten it if not. Check if the basket is in good and even shape.
- Take N₂O decomposition catalyst sample and send to BASF for further analysis and advice. We recommend filling catalyst sample into 1 ltr PE plastic bottle for shipment. Please note your plants name, sample date and sample location within catalyst bed on sample.

4. Monitoring

- Sharing plants monitoring data with BASF allows to better monitor, recommend and advise on the installed N₂O decomposition technology in order to reach highest N₂O decomposition efficiencies and longest lifetimes
- Please consider that the N₂O raw emission increases during usual ammonia oxidation Pt/Pd gauzes operation period due to Pt/Pd gauze fouling.

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