# **2.B.2 - Nitric Acid Production**

# **Short description**

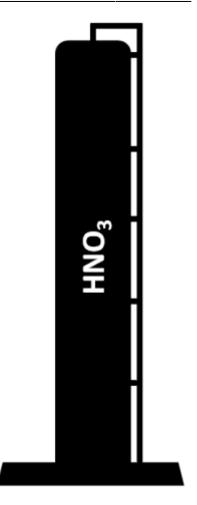
### Method AD EF Key Category

Method AD EF Key Category	<u>/</u>
T2 PS D <b>L/T</b> : NO <sub>x</sub>	
<b>T</b> = key source by Trend <b>L</b> = k	ey source by Level
Methods	
D	Default
RA	Reference Approach
T1	Tier 1 / Simple Methodology *
T2	Tier 2*
Т3	Tier 3 / Detailed Methodology *
С	CORINAIR
CS	Country Specific
М	Model
* as described in the EMEP/CO chapters.	RINAIR Emission Inventory Guidebook - 2007, in the group specific
AD - Data Source for Activi	ty Data
<b>NS</b> National Statistics	
<b>RS</b> Regional Statistics	
<b>IS</b> International Statistics	
PS Plant Specific data	
AS Associations, business orga	anisations
<b>Q</b> specific questionnaires, su	rveys
EF - Emission Factors	
<b>D</b> Default (EMEP Guidebook)	
C Confidential	
CS Country Specific	
PS Plant Specific data	

During the production of nitric acid, nitrogen oxide occurs in a secondary reaction. In Germany, there are currently seven nitric acid production plants.  $HNO_3$ , production occurs in two process stages:

- Oxidation of  $\ensuremath{\mathsf{NH}}\xspace_{3}$  to NO and
- Conversion of NO to  $NO_2$  and absorption in  $H_2O$ .

Details of the process are outlined below:



#### Catalytic oxidation of ammonia

A mixture of ammonia and air at a ratio of 1:9 is oxidised, in the presence of a platinum catalyst alloyed with rhodium and/or palladium, at a temperature of between 800 and 950 °C. The related reaction, according to the Oswald process, is as follows:

 $4 \text{ NH}_3 + 5 \text{ O}_2 \rightarrow 4 \text{ NO} + 6 \text{ H}_2\text{O}$ 

Simultaneously, nitrogen, nitrous oxide and water are formed by the following undesired secondary reactions:

 $4 \text{ NH}_3 + 3 \text{ O}_2 \implies 2 \text{ N}_2 + 6 \text{ H}_2\text{O} 4 \text{ NH}_3 + 4 \text{ O}_2 \implies 2 \text{ N}_2\text{O} + 6 \text{ H}_2\text{O}$ 

All three oxidation reactions are exothermic. Heat may be recovered to produce steam for the process and for export to other plants and/or to preheat the residual gas. The reaction water is condensed in a cooling condenser, during the cooling of the reaction gases, and is then conveyed into the absorption column.

### Methodology

### Activity data

As this source category is a key category for N,,2,,O, plant specific activity data are applied here according to the IPCC guidelines.

These data are made available basically via a co-operation agreement with the nitric acid producers and the IVA (Industrieverband Agrar). As the data provided by the producers has to be treated as confidential, it is anonymised by the IVA before submitting it to the UBA. Here, one producer is delivering its data directly to the UBA. After checking these specific data, they are merged with the IVA.

According to the IVA, catalytic reduction is used as a reduction method in some of the plants.

### **Emission factor**

For NO,,x,, the default emission factor from the EEA Emission Inventory Guidebook of 10 kg/t NH,,3,,<sup>1)</sup> is used.

# Recalculations

With **activity data** and **emission factors** remaining unrevised, no recalculations have been carried out compared to last year's submission.

# **Planned improvements**

Germany is in contact with the IVA with the aim to get a Country-specific EF for the NOx emissions. It is expected that the Country-specific EF will be lower than the Default EF.

For pollutant-specific information on recalculated emission estimates for Base Year and 2018, please see the pollutant specific recalculation tables following chapter 8.1 -Recalculations.

<sup>1)</sup> EEA, 2013: EMEP EEA Emission Inventory Guidebook 2013, Aug 2013: page 15, table 3.3 Tier 1 emission factor for source category 2.B.2 Nitric acid production