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**Datasheet for the decision  
of 15 July 2021**

**Case Number:** T 2245/19 - 3.3.05

**Application Number:** 14716000.6

**Publication Number:** 2958659

**IPC:** B01D53/58, B01D53/86

**Language of the proceedings:** EN

**Title of invention:**

METHOD FOR REMOVING AMMONIA FROM A VENT GAS STREAM OF A UREA  
PLANT

**Patent Proprietor:**

Saipem S.p.A.

**Opponents:**

thyssenkrupp Industrial Solutions AG  
Stamicarbon B.V.

**Headword:**

Removing Ammonia/Saipem

**Relevant legal provisions:**

RPBA Art. 12(4)  
EPC Art. 83, 54, 56, 2  
EPC R. 103(4)(c)

**Keyword:**

Sufficiency of disclosure - (yes)

Novelty - (yes)

Inventive step - (yes)

**Decisions cited:**

T 1110/03

**Catchword:**



**Beschwerdekammern**

**Boards of Appeal**

**Chambres de recours**

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Case Number: T 2245/19 - 3.3.05

**D E C I S I O N**  
**of Technical Board of Appeal 3.3.05**  
**of 15 July 2021**

**Appellant:** Stamicarbon B.V.  
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**Decision under appeal:** **Interlocutory decision of the Opposition  
Division of the European Patent Office posted on  
21 June 2019 concerning maintenance of the  
European Patent No. 2958659 in amended form.**

**Composition of the Board:**

**Chairman**            E. Bendl  
**Members:**            G. Glod  
                             R. Winkelhofer

## Summary of Facts and Submissions

- I. The appeal of opponent 2 (appellant) lies from the opposition division's decision finding that European patent EP-B1-2 958 659 as amended based on the then auxiliary request 3 met the requirements of the EPC.
- II. The following documents cited in the decision are of relevance here:
- E9: Verbrennung NH<sub>3</sub>-haltiger Prozeßgase, Umweltschutz, Chem. Ing. Tech. 67(2), 1995, 199-202
- E10a: 25<sup>th</sup> AFA International Fertilizers Technology Conference Sustainability Driving the Future July 09-11, 2012, From flaring to environmental friendly ammonia firing and that even done in an economical way
- E12: DE 41 16 362 A1
- E15: US 2011/0158875 A1
- E17: Chapter Urea in Ullmann's Encyclopedia of Industrial Chemistry, edition 2010
- III. With the reply to the appeal, the respondent (patent proprietor) submitted an **auxiliary request (hereinafter auxiliary request 6a)** and the following document, among other things:
- E24: L. Chmielarz, M. Jablonska, RSC Adv., 2015, 5, 43408-43431
- IV. In the communication pursuant to Article 15(1) RPBA 2020, the board was of the preliminary opinion that the then auxiliary request 6a met the requirements of the EPC.

- V. In reply, the respondent withdrew the request for oral proceedings and also withdrew the requests ranked higher than auxiliary request 6a, effectively making the latter the new main request.

The only independent claim of the now main request is as follows:

*"1. A method of removing ammonia from a continuous vent gas stream of a urea plant (1), in particular of a medium-pressure section (6) of a urea plant, the method comprising a step of removing ammonia from the continuous vent gas stream of the urea plant (1) by means of a controlled-combustion process comprising at least a first lean, oxygen-poor combustion step performed in the presence of an understoichiometric amount of oxygen acting as the sole comburent, and in a hydrogen-containing reducing atmosphere so as to favour oxidation of ammonia to nitrogen and impede and strongly reduce the formation of nitric oxides, and in which ammonia is oxidized; wherein the continuous vent gas stream for treatment contains passivating oxygen, and the passivating oxygen used in the urea plant (1) and already present in the continuous vent gas stream for treatment is exploited to remove ammonia in said first combustion step; and wherein, in addition to said first lean combustion step, the controlled-combustion process comprises a second combustion step performed in the presence of a stoichiometric or even greater amount of oxygen, to burn the gases remaining from the first combustion step, and in particular methane and hydrogen; said second combustion step being performed with the addition of secondary air or oxygen to complete*

*combustion of the unburned gases in the gases from the first combustion step;  
and wherein said first and second combustion steps are two catalytic oxidation steps performed in respective oxidation sections (13, 14), with understoichiometric oxygen in the first oxidation section (13), and stoichiometric or over-stoichiometric oxygen in the second oxidation section (14)."*

Claim 2 is a preferred embodiment of claim 1.

VI. The appellant also withdrew its request for oral proceedings, so the decision can be given in writing.

VII. The appellant's arguments can be summarised as follows.

The new main request should not be admitted into the appeal proceedings under Article 12(4) RPBA 2007, because it corresponded in substance to auxiliary request 4, which had been filed late and without substantiation in the first-instance proceedings.

There was a lack of sufficiency of disclosure, since the patent did not disclose suitable catalysts.

The subject-matter of claim 1 was obvious in view of E17 in combination with E9 or in view of E10 in combination with E9 when additionally considering E15 or E12.

VIII. The respondent's arguments are reflected in the reasoning below.

IX. Opponent 1 is party as of right and has not filed any requests or submissions as to the substance of the impugned decision during the appeal proceedings.

- X. The appellant requests that the impugned decision be set aside and that the patent be revoked.

The respondent requests that the patent be maintained in amended form on the basis of the main request submitted with the reply to the appeal, or, alternatively, on the basis of auxiliary request 7, filed on 11 February 2019.

### **Reasons for the Decision**

#### Main request

1. Article 12(4) RPBA 2007

This request was submitted as auxiliary request (6a) with the reply to the appeal at the earliest possible moment in the appeal proceedings. It is considered to be a reaction to the Article 84 EPC objection against auxiliary requests 4 to 6 discussed for the first time during the oral proceedings before the opposition division. It is a combination of claims 1, 2, 3 and 5 as granted and limits claim 1 of the main request to embodiment (A) by the inclusion of the features of claim 5 as granted. There is no reason to exclude it from the appeal proceedings.

2. Article 100(b) EPC

The board does not see any reason to deviate from the opposition division's conclusion, for the following reasons.



Claim 1 relates to a method for removing ammonia from a continuous vent gas stream of a urea plant which comprises two combustion steps.

The appellant argued that the patent did not disclose a catalyst that would favour oxidation of ammonia to nitrogen and impede and strongly reduce the formation of nitric oxides.

Paragraph [0032] indicates that catalysts used in the selective catalytic oxidation of ammonia can be used in the process as claimed. As indicated in the impugned decision and confirmed by E24, such catalysts were known before the priority date of the patent. E24 is a post-published review article that contains several lists of catalysts known before the priority date. In accordance with T 1110/03 (Reasons 2.3), E24 is an account of the common general knowledge in the art. The appellant has not provided any proof that such catalysts would not work in the process of claim 1.

3. Article 100(a) EPC in combination with Article 54 EPC

The appellant no longer contests the novelty of claim 1 (submission of 12 November 2020, paragraphs [21] and [22]). The board sees no reason to take a different stance.

4. Article 100(a) EPC in combination with Article 56 EPC

4.1 The invention relates to a method for removing ammonia from a continuous vent gas stream of a urea plant.

4.2 E10a is the closest prior art, since it also relates to the removal by combustion of ammonia from a gas stream of a urea plant. It appears to be undisputed that it

discloses a first combustion step in the presence of a burner.

E17 seems less relevant than E10a because the Snamprogetti process shown in Figure 25 does not include the removal of ammonia by combustion but by stripping. The argument that the washed inerts would not be completely free of ammonia and that the term "abatement" would also encompass ammonia oxidation cannot be accepted. It is apparently based on speculation for which no proof was provided. E17 clearly teaches the removal of ammonia in an ammonia scrubber and is silent about ammonia removal via combustion.

- 4.3 The problem to be solved is to provide an alternative process for the treatment of the vent gas from a urea plant.
- 4.4 The problem is solved by a process according to claim 1 characterised in that in addition to said first lean combustion step, the controlled-combustion process comprises a second combustion step performed in the presence of a stoichiometric or even greater amount of oxygen, to burn the gases remaining from the first combustion step, and in particular methane and hydrogen; said second combustion step being performed with the addition of secondary air or oxygen to complete combustion of the unburned gases in the gases from the first combustion step and wherein said first and second combustion steps are two catalytic oxidation steps performed in respective oxidation sections with under stoichiometric oxygen in the first oxidation section, and stoichiometric or over-stoichiometric oxygen in the second oxidation section.

4.5 There is no reason to doubt that the problem is solved.

4.6 It needs to be determined whether the proposed solution is obvious in view of the prior art.

E10a and E9 relate to combustion in the presence of a burner and do not disclose catalytic oxidation steps. Although E15 generally discloses the catalytic oxidation of ammonia (paragraph [0015]), it does not contain any suggestion to replace the combustion as disclosed in E10a by two catalytic combustion steps under different oxygen conditions (understoichiometric and stoichiometric/over-stoichiometric).

Such teaching is not present in E12 either. In addition, there is no reason why the skilled person would combine E15 or E12 with E10a and/or E9.

4.7 The proposed solution is not obvious and the subject-matter of claim 1 involves an inventive step. The same applies to the dependent claim 2.

4.8 The requirements of Article 56 EPC are met.

5. Rule 103(4)(c) EPC

The request for oral proceedings was withdrawn within one month of notification of the communication issued by the board of appeal, and the decision can be rendered in writing without the need for oral proceedings. The conditions for a partial reimbursement of the appeal fee are fulfilled.

## Order

### For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The case is remitted to the opposition division with the order to maintain the patent on the basis of the claims of the main request submitted as "new auxiliary request" with the reply to the appeal, then re-labelled as auxiliary request 6a, and a description to be adapted accordingly.
3. 25% of the appeal fee is reimbursed.

The Registrar:

The Chairman:



A. Voyé

E. Bendl

Decision electronically authenticated