

Internal distribution code:

- (A) [-] Publication in OJ
- (B) [-] To Chairmen and Members
- (C) [-] To Chairmen
- (D) [X] No distribution

**Datasheet for the decision
of 1 June 2021**

Case Number: T 1486/18 - 3.3.05

Application Number: 07397015.4

Publication Number: 1857169

IPC: B01D53/50, F01N3/04, F01N13/00,
B01D53/34

Language of the proceedings: EN

Title of invention:

A method and an equipment for reducing the sulphur dioxide emissions of a marine engine

Patent Proprietor:

Valmet Technologies Oy

Opponent:

WSL Patentanwälte Partnerschaft mbH

Headword:

Scrubbing method/Valmet

Relevant legal provisions:

RPBA 2020 Art. 13(2)
EPC Art. 100(c), 100(a), 54, 56

Keyword:

Amendment after summons - taken into account (yes)

Added subject-matter (no)

Novelty - (yes)

Inventive step - (yes)

Decisions cited:

T 1480/16, T 0995/18

Catchword:



Beschwerdekammern
Boards of Appeal
Chambres de recours

Boards of Appeal of the
European Patent Office
Richard-Reitzner-Allee 8
85540 Haar
GERMANY
Tel. +49 (0)89 2399-0
Fax +49 (0)89 2399-4465

Case Number: T 1486/18 - 3.3.05

D E C I S I O N
of Technical Board of Appeal 3.3.05
of 1 June 2021

Appellant 1: Valmet Technologies Oy
(Patent Proprietor) Keilasatama 5
02150 Espoo (FI)

Representative: Berggren Oy
P.O. Box 16
Eteläinen Rautatiekatu 10A
00101 Helsinki (FI)

Appellant 2: WSL Patentanwälte Partnerschaft mbH
(Opponent) Kaiser-Friedrich-Ring 98
65185 Wiesbaden (DE)

Decision under appeal: **Interlocutory decision of the Opposition
Division of the European Patent Office posted on
17 April 2018 concerning maintenance of the
European Patent No. 1857169 in amended form.**

Composition of the Board:

Chairman E. Bendl
Members: S. Besselmann
S. Fernández de Córdoba

Summary of Facts and Submissions

I. The appeals in this case, by the patent proprietor (appellant 1) and the opponent (appellant 2), lie from the interlocutory decision of the opposition division that European patent No. EP 1 857 169 in amended form, based on the then pending third auxiliary request of 8 March 2018, met the requirements of the EPC. The patent in suit concerns a method and an equipment for reducing the sulphur dioxide emissions of a marine engine.

II. The decision under appeal referred to, *inter alia*, the following documents:

- O1 US 3 781 407 A (25 December 1973)
- O2 EP 0 701 656 B1 (13 May 1998)
- O3 US 2005/132883 A1 (23 June 2005)
- O4 US 4 323 371 A (6 April 1982)

III. With the statement of grounds of appeal, the patent proprietor submitted a main request and first to fourth auxiliary requests. The fourth auxiliary request corresponded to the claims maintained by the opposition division.

With their reply (20 December 2018) to the opponent's statement of grounds of appeal, the patent proprietor filed additional auxiliary requests 1B, 1C, 3B, 3C, 4B and 4C and submitted a corrected translation of claim 1 as originally filed.

The patent proprietor made further submissions on 9 March 2021, including further auxiliary requests 5, 5b, 6 and 7.

During the oral proceedings before the board, the patent proprietor made auxiliary request 6 the main request and auxiliary request 7 the sole auxiliary request. All other requests were withdrawn.

IV. Claim 1 of the final main request reads as follows:

"A method for decreasing the sulphur dioxide emissions of a marine engine, the method comprising

- conveying flue gases created in the marine engine to a scrubber (1, 23),*
- scrubbing the flue gases with a scrubbing solution in the scrubber (1, 23), characterized by*
- using fresh water having sodium hydroxide (NaOH) added to it as the scrubbing solution,*
- cooling the scrubbing solution circulating in the scrubber in an external heat exchanger (18, 28),*
- using sea water in the external heat exchanger (18, 28) as a cooling medium to cool the scrubbing solution, and*
- condensing water vapor contained in flue gases in the scrubber (1, 23) by means of cooled scrubbing solution to produce fresh water used in the scrubbing solution."*

Claims 2 to 3 relate to preferred embodiments.

V. The opponent held that this claim request should not be admitted into the proceedings and raised objections of extending beyond the disclosure of the original application and lack of inventive step.

VI. The opponent's arguments, where relevant to the present decision, can be summarised as follows.

The claims filed as auxiliary request 6 on 9 March 2021 should not be taken into account pursuant to Article 13(2) RPBA 2020, because there were no exceptional circumstances and the patent proprietor had not brought forward cogent reasons for the late filing. This request should also be disregarded for lack of convergence with the preceding requests.

The subject-matter of claim 1 extended beyond the content of the application as originally filed because the method steps relating to "conveying flue gases", "cooling the scrubbing solution", "using sea water", "condensing water vapor" and "using fresh water having sodium hydroxide (NaOH) added to it as the scrubbing solution" had not been directly and unambiguously disclosed in the application as originally filed.

The subject-matter of claims 2 and 3 also extended beyond the content of the application as originally filed. It was not directly and unambiguously derivable from this application that grey water or fresh water made from sea water was additionally used in the scrubbing solution. The term "also" on page 3 of the application meant "alternatively".

Starting from O1 as the closest prior art, the use of fresh water would have been obvious. It was common general knowledge that sea water was corrosive. It would therefore have been obvious to use fresh water to avoid corrosion. O1 mentioned water, so the use of fresh water suggested itself. It could have been implemented easily.

Using fresh water was also obvious in view of O2, which mentioned the corrosive effect of salt. O2 taught the use of fresh water in the last scrubber stage. The

skilled person would have applied this to the top stage of the scrubber of O1.

Inventive step was also lacking in view of O1 seen in combination with O3 and O4, respectively.

VII. Appellant 1 (patent proprietor) requested that the decision under appeal be set aside and the patent be maintained in amended form on the basis of the main request (submitted as auxiliary request 6 on 9 March 2021) or, alternatively, on the basis of auxiliary request 1 (submitted as auxiliary request 7 on 9 March 2021).

VIII. Appellant 2 (opponent) requested that the decision under appeal be set aside and that the European patent be revoked.

Reasons for the Decision

Main request

1. Admittance into the appeal proceedings

1.1 The main request was filed as auxiliary request 6 on 9 March 2021, after the summons to oral proceedings had been issued.

1.2 Claim 1 was identical to the version of this claim in the claim sets filed as main request and as auxiliary request 1 with the statement of grounds of appeal, and thus the same as the version upheld by the opposition division.

- 1.3 The following amendments were made with respect to the claims filed as auxiliary request 1 with the statement of grounds of appeal.
 - 1.3.1 The dependent claims 2 and 3 were amended to address an objection of lack of clarity raised for the first time in the preliminary opinion of the board.
 - 1.3.2 All other claims were deleted.
- 1.4 The patent proprietor limited the request under consideration to those claims which appeared to be the most promising in the light of the preliminary opinion of the board, and at the same time reduced the overall number of claims. Amending claims 2 and 3 while deleting granted claims 4 and 5 addressed different objections. The claim request under consideration is therefore not seen as a diverging line of defence, even if there were preceding auxiliary requests which did not contain granted claim 3.
- 1.5 In this case, the objection of lack of clarity could not have been addressed at an earlier stage of the proceedings. Additionally, deleting claims does not change the factual and legal framework of this case (T 1480/16, Reasons 2.3; T 995/18, Reasons 2) but, by contrast, serves procedural economy in that it facilitates and focuses the discussion. This has been explained by the patent proprietor.
- 1.6 The board is of the opinion that these are exceptional circumstances which justify admitting this request (Article 13(2) RPBA 2020).

2. Articles 100(c) and 123(2) EPC

2.1 Claim 1

2.1.1 It was under debate whether the method of claim 1, involving "conveying flue gases", "cooling the scrubbing solution", "using sea water", "condensing water vapor" and "using fresh water having sodium hydroxide (NaOH) added to it as the scrubbing solution", was directly and unambiguously disclosed in the application as originally filed.

2.1.2 The step of "conveying flue gases created in the marine engine to a scrubber" is implicit in claim 1 of the application as originally filed and the general part of the description (page 2, lines 30-33, of the translation). It is impossible to scrub the flue gases with a scrubbing solution in a scrubber without conveying the flue gases to the scrubber.

2.1.3 The use of fresh water having sodium hydroxide added to it as the scrubbing solution was disclosed in original claim 9 and in the general part of the description (page 3, line 19, of the translation). The definite article "the" in "as the scrubbing solution" is supported by the corrected translation of claim 1 (see point III.). Moreover, it merely qualifies the scrubbing solution as being the scrubbing solution mentioned in the preceding part of the claim, without implying any additional characteristic of the scrubbing solution.

2.1.4 The steps relating to "cooling the scrubbing solution circulating in the scrubber in an external heat exchanger" and "condensing water vapor contained in flue gases in the scrubber by means of cooled scrubbing

solution to produce fresh water used in the scrubbing solution" are directly derivable from page 3, lines 11-14, of the translation of the application as originally filed, where it is stated that "Fresh water can also be made by condensing moisture contained in flue gases in the scrubber. For this purpose the scrubbing solution or cooling solution circulating in the scrubber is cooled in an external heat exchanger."

It is implicit from its general context, in particular the three preceding paragraphs, that this passage refers to the fresh water used in the scrubbing solution. This understanding is furthermore confirmed by the specific embodiment illustrated in Figure 2 (page 7, first full paragraph).

- 2.1.5 The use of sea water in the external heat exchanger as a cooling medium is disclosed in the context of the embodiments according to Figures 2 and 3 (page 7, first full paragraph, and page 9, second full paragraph of the translation) and is generally disclosed in original claim 19. Sea water is the only cooling medium that is specifically mentioned in the application as originally filed. There is no reason why the nature of the cooling medium should be linked to other features of the specific embodiments in Figures 2 and 3, such as the structural details of the scrubber.
- 2.1.6 For these reasons, the indicated features have not been extracted from a specific embodiment in which they were inextricably linked to other features.
- 2.1.7 The method of claim 1 is directly and unambiguously derivable from the application as originally filed, having regard to original claim 1 in conjunction with

the passages indicated under points 2.1.3, 2.1.4 and 2.1.5 above.

2.2 Claims 2 and 3

- 2.2.1 Claims 2 and 3 specify that "grey water created on the ship is also used as fresh water used in the scrubbing solution" (claim 2), or that "fresh water is made of sea water and also used in the scrubbing solution" (claim 3), respectively.

It was under debate whether the application as originally filed disclosed these features in combination with using fresh water produced by condensing water vapour contained in flue gases in the scrubber (claim 1). The relevant original claims 2, 4 and 5 did not contain any back references resulting in these combinations of features.

- 2.2.2 The application as originally filed discloses the following ways of making fresh water on the ship: using grey water, condensing moisture contained in the flue gases in the scrubber, and making fresh water from sea water (page 3, first to fourth paragraphs).

Making fresh water by condensing moisture contained in the flue gases, i.e. the method specified in claim 1 at issue, is extensively described in the application as originally filed and illustrated by reference to the embodiment in Figure 2 (see page 7 of the translation). It involves using a specially equipped scrubber (comprising a heat exchanger), as also specified in claim 1. This method is principally different from the other ways of making fresh water on the ship in that the condensation only occurs in the course of the

process. The fresh water needed at the start of the process cannot be provided in this way.

- 2.2.3 According to the introductory first paragraph on page 3 ("and/or"), combinations of the different ways of making fresh water on the ship may be used. In this context, the term "also", when stating that "fresh water can also be made by condensing moisture" and "fresh water ... can ... also be made ... from sea water", implies their possible combination. The different ways of making fresh water on the ship cannot be construed as mutually exclusive alternatives.

In the light of this disclosure and the specific nature of the method defined in claim 1, it is therefore directly and unambiguously derivable from the application as originally filed that making fresh water by condensing moisture may be combined with either other way of making fresh water.

- 2.2.4 The dependent claims 2 and 3 therefore do not add any subject-matter which extends beyond the content of the application as originally filed.

3. Novelty

- 3.1 No objection as to lack of novelty was formally raised with regard to the main request (filed as auxiliary request 6). However, objections were raised relating to claim 1 of previously higher ranking requests which had the identical wording of claim 1 of the main request (see also the board's communication pursuant to Article 15(1) RPBA 2020, item 26).

- 3.2 It was under debate whether document O1 anticipated the method of claim 1.
- 3.3 The claimed method specifies, *inter alia*, using fresh water having sodium hydroxide (NaOH) added to it as the scrubbing solution.
- 3.4 It was undisputed that O1 did not expressly mention the use of fresh water.
- 3.5 While the most general disclosure (such as claim 1) of O1 encompasses the possibility of using fresh water, and sea water is merely considered a preferred embodiment, this does not amount to a specific disclosure of fresh water. In particular, the disclosure of sea water as a preferred embodiment (claim 7) does not amount, by reverse conclusion, to a specific disclosure of fresh water as the alternative.
- 3.6 Furthermore, the condensation of water vapour in the process of O1, in which sea water is preferably used (Figure 2; col. 3, line 25), might dilute the sea water. However, there is no indication that this dilution would be to such an extent that the scrubbing solution may be regarded as fresh water having sodium hydroxide added to it. It would be contrary to the meaning of claim 1 at issue and the purpose of the patent in suit (paragraphs [001] and [0013]) to interpret the claim as merely requiring the presence of an undefined proportion of fresh water in a scrubbing solution made from sea water, considering that the term "fresh water" is to exclude the presence of salts (paragraph [0023]). This understanding is not changed by the inevitable formation of sodium sulfite and sodium sulfate during the scrubbing process.

3.7 The use of fresh water has not been directly and unambiguously disclosed in O1. The objection of lack of novelty is therefore not convincing.

4. Inventive step

4.1 The patent in suit relates to a method for reducing the sulphur dioxide emissions of a marine engine (paragraph [0001]).

4.2 O1 relates to a method for producing inert gas on a tanker or other seagoing vessel by scrubbing a crude sulphur dioxide bearing flue gas with a liquid capable of absorbing the sulphur dioxide from the flue gas (col. 1, lines 24-27, and col. 2, first paragraph) and thus relates to the same general purpose of reducing the sulphur dioxide content of flue gas. O1 is therefore a suitable starting point for assessing inventive step.

4.3 According to the patent in suit, the use of fresh water has the effect of avoiding corrosion problems in the equipment and flue gas ducts (paragraph [0017]).

4.4 The objective technical problem is thus to be seen in the provision of an improved method, and specifically a method that avoids corrosion problems in the equipment and flue gas ducts.

4.5 As the solution to this technical problem, the patent in suit proposes the claimed method in which fresh water having sodium hydroxide added to it is used as the scrubbing solution.

- 4.6 During the oral proceedings before the board, the opponent made the comment that the equipment had to be adapted to the corrosive atmosphere in the scrubber and that there would be no additional corrosion due to the sea water.
- 4.7 Notwithstanding the question whether this submission should be taken into account pursuant to Article 13(2) RPBA 2020, the opponent did not provide any proof in support of this allegation. This allegation contradicts the very purpose of the patent in suit, namely to avoid the corrosion that was due to the sea water. The sea water introduces a further component - chloride - into the scrubbing process. As explained by the patent proprietor, the sea water did cause corrosion in a scrubbing process, which was particularly severe in the case of a closed loop scrubber, as was under consideration here.
- 4.8 It is therefore concluded that the indicated technical problem is successfully solved.
- 4.9 It consequently needs to be assessed whether the proposed solution would have been obvious in view of the closest prior art O1 taken alone or in combination with any one of O2 to O4.
- 4.10 Obviousness of the solution in view of O1
- 4.10.1 O1 mentions corrosion but is concerned with corrosion due to sulphur dioxide, in particular the corrosion observed when sulphur dioxide is insufficiently removed from the flue gas used as inert gas for flooding oil containers. For instance, the mention of corrosion in column 3 (lines 11-14) of O1 relates to the corrosion due to gaseous effluent containing residual sulphur

dioxide, observed in prior-art processes. Similarly, corrosion is mentioned in column 1 (line 46) in the context of severe corrosion damage due to sulphur oxide bearing flue gas. It is again mentioned in column 6 (lines 15-19) where corrosion is indirectly linked to acidic components in the gas.

O1 is silent, however, on avoiding corrosion due to sea water. It therefore does not provide any motivation to utilise fresh water in order to solve the technical problem of avoiding corrosion problems.

- 4.10.2 Nor is it the case that the idea of using fresh water suggests itself. Even if fresh water is encompassed by the reference to "water" in general in claim 1 of D1, and constitutes the only alternative to the specifically mentioned sea water (claim 7 of D1), this alone would not have motivated the skilled person to use fresh water in the method of O1 carried out on a seagoing vessel where fresh water is scarce.

The method at issue here is carried out on the sea, as derived from the use of sea water in the external heat exchanger.

- 4.10.3 The consideration that the use of fresh water could have been implemented with minimal structural modifications of the scrubber shown in Figure 2 of O1 is irrelevant as long as the skilled person had no incentive to make this modification.
- 4.10.4 In the absence of any teaching that corrosion due to sea water is of any concern in the scrubbing process of O1, the common general knowledge of sea water being corrosive would not, in this case, have guided the skilled person to use fresh water for making the

scrubbing solution of O1. As indicated, O1 only considers the corrosiveness of the sulphur oxides and proposes a scrubbing method for removing them.

- 4.10.5 For these reasons, the claimed method, in which fresh water having sodium hydroxide added to it is used as the scrubbing solution, would not have been obvious from O1 alone, also taking common general knowledge into account.

- 4.11 Obviousness of the solution in view of O2
 - 4.11.1 O2 discloses the use of fresh water in the context of a scrubber which is included in a gas intake system of a large supercharged diesel engine of a ship and serves to purify, cool and humidify recycled exhaust gas and intake air.

 - 4.11.2 The purpose of O2 is maintaining high engine efficiency and a long life of the engine components, such as turbochargers (col. 2, lines 18-22), which is different to the purpose of O1 and the patent in suit.

 - 4.11.3 O2 addresses the problem of corrosion only in relation to the corrosion of engine parts possibly caused by the recycled exhaust gas and intake air. For instance, there is an explicit reference to the engine not being subjected to corrosive influences from the salt (of the intake air) (col. 3, lines 52-57). Similarly, it is taught that the salt introduced by using sea water in the first stage of the scrubber will be removed from the gas together with the other pollutants (col. 4, lines 19-29), the focus thus again being on the purity of the gas and the removal of salt from the gas.

- 4.11.4 By contrast, O2 is not concerned with corrosion due to the scrubbing solution during the scrubbing process.
- 4.11.5 Furthermore, the teaching of O2 does not give any general preference to the use of fresh water over sea water in a scrubbing stage. O2 teaches the use of fresh water merely in at least the last water addition stage, but teaches the use of sea water in the first stage (col. 4, lines 19-25).
- 4.11.6 O2 mentions the advantage of an actual production of fresh water for use elsewhere on the ship (col. 4, lines 29-33). However, this advantage is linked to the temperature drop of the gas in the third and optionally the fourth stage (col. 4, lines 26-29), i.e. to the specific conditions of the scrubbing stages, and is therefore not directly applicable to other scrubbing processes.
- 4.11.7 O2 is not specifically concerned with sulphur dioxide removal. The scrubbing process known from O2 does not involve adding sodium hydroxide or another sulphur removal agent to the scrubbing solution.
- 4.11.8 The skilled person would therefore not have taken any incentive from O2 to use fresh water for the sodium hydroxide (or sodium carbonate) containing scrubbing solution used in the top stage of the scrubber shown in Figure 2 of O1, where the scrubbing solution circulates via an external heat exchanger.
- 4.12 Obviousness of the solution in view of O3
 - 4.12.1 O3 relates to a scrubbing method involving a scrubbing step for removing acid gases using a scrubbing liquid containing an alkaline agent and a step of regenerating

and cooling the scrubbing liquid (claim 1). O3 describes the use of condensed water as make-up water in the scrubber, the condensed water being obtained from the regenerator vent gas (paragraph [0056]) or, in one embodiment, from the vent gas from an oxygen electrode of a fuel cell (paragraph [0114]). However, O3 is not specifically concerned with a method for scrubbing flue gas from a marine engine, which is normally conducted on a ship, as is the case in the closest prior art O1, and does not address the technical problem of avoiding corrosion due to sea water.

4.12.2 Even if the skilled person would have derived the utility of condensed water as make-up water in the process of O1 from the document O3, this would not have motivated them to use fresh water for making the scrubbing solution in O1. The addition of fresh water as make-up water to a scrubbing solution made from sea water would not inevitably mean that the scrubbing solution as a whole is fresh water having sodium hydroxide added to it.

4.13 Obviousness of the solution in view of O4

4.13.1 Notwithstanding the admissibility of this objection, which had not been raised before the opposition division, O4 is similar to O3 in that it also describes reusing condensation water produced in a heat exchanger (col. 2, lines 2-11 and 26-31). O4 does not mention the problem of corrosion due to sea water either. Hence, the same considerations apply as set out regarding O3 (point 4.12.2).

4.14 The opponent also argued that the claim at issue encompassed methods using a marine engine conducted on

land. However, they did not specify any particular known method using a marine engine on land.

Furthermore, conducting the scrubbing process on land where fresh water is abundantly available would not result in the claimed process using sea water in the external heat exchanger.

4.15 For these reasons, the method of claim 1 involves an inventive step.

4.16 The same conclusion applies to the methods of the dependent claims 2 and 3.

Auxiliary request

5. In view of the conclusion reached in respect of the main request, there is no need to deal with the auxiliary request.

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 in amended form on the basis of claims 1 to 3 of the main request (submitted as auxiliary request 6 on 9 March 2021) and a description to be adapted thereto.

The Registrar:

The Chairman:



C. Vodz

E. Bendl

Decision electronically authenticated