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**Datasheet for the decision  
of 1 October 2014**

**Case Number:** T 2431/10 - 3.3.05  
**Application Number:** 04733003.0  
**Publication Number:** 1626934  
**IPC:** C02F1/04, B01D1/22, B01D1/26  
**Language of the proceedings:** EN  
**Title of invention:**  
METHOD AND DEVICE FOR TREATING WATER  
**Applicant:**  
STERIS EUROPE INC. SUOMEN SIVULIIKE  
**Headword:**

**Relevant legal provisions:**  
RPBA Art. 13(1)  
EPC Art. 54, 56, 84, 123(2)

**Keyword:**  
Main request - not admitted  
Main request - not clearly allowable  
Auxiliary request - admitted- clearly allowable  
Auxiliary request - amendments: added subject-matter (no) -  
clarity (yes) - novelty (yes) - inventive step (yes -  
no reformulation of the problem)

**Decisions cited:**  
T 1634/09

**Catchword:**



**Beschwerdekammern  
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Chambres de recours**

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Case Number: T 2431/10 - 3.3.05

**D E C I S I O N**  
**of Technical Board of Appeal 3.3.05**  
**of 1 October 2014**

**Appellant:**  
(Applicant)

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**Representative:**

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**Decision under appeal:**

**Decision of the Examining Division of the  
European Patent Office posted on 22 July 2010  
refusing European patent application No.  
04733003.0 pursuant to Article 97(2) EPC.**

**Composition of the Board:**

**Chairman** G. Rath  
**Members:** G. Glod  
P. Guntz

## Summary of Facts and Submissions

- I. The present appeal lies from the decision of the examining division to refuse European patent application No. 04733003 published as WO-A-2004 101 440 (hereinafter "the original application") for lack of inventive step.
- II. The documents cited during the examination proceedings were the following:
- D1: US-A-4 981 555  
D2: WO-A-02 24299  
D3: WO-A-04020066  
D4: JP 10 328501  
D5: Werner Hemming, Verfahrenstechnik,  
3rd edition 1984, page 145
- III. With the statement setting out the grounds of appeal dated 18 November 2010, the applicant (hereinafter "the appellant") submitted a new set of claims as main request.
- IV. In its communication under Article 15(1) of the Rules of Procedure of the Boards of Appeal (RPBA), the Board expressed its preliminary non-binding opinion that the requirements of Articles 54, 56 and 84 EPC were not met. The following document was introduced into the proceedings:
- D6: US 3 768 539
- V. By letter dated 19 September 2014, the appellant submitted a new main request.

VI. Oral proceedings took place on 1 October 2014.

During oral proceedings the appellant was given the opportunity to submit amended claims in response to the discussion.

The arguments of the appellant, insofar as they are pertinent to the present decision, are set out below in the reasons for the decision.

VII. The claims of the **main request** are as follows:

*"1. A method for producing purified water using a multi-effect falling-film evaporation process, whereby in each evaporation effect comprising a falling-film evaporation section and a separation section steam and water are produced from feed water, and residual water from each evaporation effect is supplied as feed water to the subsequent effect until a residual water phase is withdrawn from the last effect, characterized in that*

- condensate from each effect beginning from the second is collected and fed to the shell side of the falling film section of the next effect, the combined condensates being taken out from the final effect and cooled in a heat exchanger together with the steam phase of the final effect;*
- from each evaporation effect, an impurity-enriched fraction of the steam phase produced in the respective effect, separated by means of a spiral rising channel having apertures in its outer wall and outside the apertures a cool surface, is permanently removed from the process as a reject stream."*

*"2. A device for the production of purified water comprising a plurality of effects, each effect having*

- a falling film evaporation section having a shell side providing condensate, and  
- a separation section having a channel for conducting steam from the effect and a channel for conducting liquid water to a subsequent effect or to withdrawal in the final effect, characterized in each effect having  
- in the separation section, in the channel for conducting steam, a spiral channel having apertures in its outer wall and outside the apertures a cool surface, for separating an impurity-enriched fraction of the generated steam to form a reject stream, and  
- a conduit for conducting said reject stream out of the effect, permanently removing it from the process."

The **auxiliary request** only contains a method claim. It differs from claim 1 of the main request by the features underlined below:

"1. A method [...] characterized in that  
- condensate from the shell side of the falling-film section of each effect beginning from the second is collected, which condensate stems from the steam produced in the previous effect and is fed to the shell side of the falling film section of the next effect, the combined condensates being taken out from the final effect and cooled in a heat exchanger together with the steam phase of the final effect;  
- from each evaporation effect, [...] as a reject stream."

VIII. Requests:

The appellant requests that the contested decision be set aside and that a patent be granted on the basis of the main request or, alternatively, of the auxiliary

request, both submitted during the oral proceedings on 1 October 2014.

## **Reasons for the Decision**

### 1. Main request

#### 1.1 Article 13(1) RPBA

Since the main request was filed after the grounds of appeal had been submitted, it constitutes an amendment to the party's case within the meaning of Article 13(1) RPBA.

Thus, its admission is at the board's discretion to be exercised inter alia in view of the complexity of the new subject-matter, the state of the proceedings and the need for procedural economy. According to an approach frequently adopted by the boards (see T 1634/09, Reasons 3.2), a request filed at a very late stage in the proceedings (after oral proceedings have been arranged and the board has already given a preliminary opinion) may be admitted and considered at the board's discretion

- i) if sound reasons exist for filing this request so far into the proceedings,
- ii) if the auxiliary request does not extend the scope of discussion,
- iii) if the auxiliary request is clearly or obviously allowable.

Conditions i) and ii) are met, since the request is a reaction to the objection under Article 84 EPC first raised by the board in its communication under Article 15(1) RPBA and further discussed during oral

proceedings.

The scope of discussion has not really been extended, since the subject-matter of the claim has been restricted and the arguments put forward previously with respect to inventive step still apply.

However, condition iii) is not met, since claims 1 and 2 do not meet the requirements of Article 123(2) EPC.

Claim 1 specifies that condensate from each effect beginning from the second is collected and fed to the shell side of the falling-film section of the next effect. This is disclosed in the original application on page 5, lines 14 to 16.

However, from this passage it is quite clear that the condensate is from the shell side of the falling-film section and is the condensed steam that was produced in the previous effect by evaporating the feed water. This is also apparent from figure 1, where it is shown by an arrow (10) that steam taken out from the separation section enters the falling-film evaporation section of the next effect. It is explained that the steam is led through the transfer line to the shell side of the falling-film evaporation unit of the subsequent effect (page 4, lines 14 to 16). It is, therefore, quite clear from the original application that, in the process described, the condensate collected is from the shell side of the falling-film section and stems from the steam produced in the previous section.

This combination of features is not present in claim 1, so that information concerning the origin and the formation of the condensate is generated that is not unambiguously derivable from the original application.



Claim 2 of the main request contains the wording "having a shell side providing condensate" that was not present in the original device claim 4. This wording originates from page 5, line 14 of the original application. This passage of the description, in combination with page 4, lines 14 to 16, explains that the condensate originates from the steam of the previous effect, as indicated above, and that the condensate is fed to the shell side of the falling-film section of the next effect. Claim 2 does not contain any features reflecting such a process, so that the device of claim 2 is much less specific than the original application, thereby providing new information regarding how the steam and the condensate are processed.

The general formulation present in the claim is not unambiguously derivable from the original application.

The applicant argued that the transfer of steam from the effect where it was produced to the subsequent effect where it condensed was so obvious that it did not need to be mentioned in the claims. The skilled person would know this process step. Furthermore, it was not important at which stage the condensate was collected.

The board does not accept these arguments. It is clear from the original application that the combined condensates are taken out from the final effect. This is not reflected in claim 2. Other set-ups such as one in which the condensate is collected in each effect are now covered by the wording of claim 2, thus providing the information to the skilled person that the invention could also be carried out in this alternative

manner. However, such a device has not been originally disclosed and is also not unambiguously derivable by the skilled person from the original application.

In addition, it was originally disclosed only that the steam is transferred to the shell side of the falling-film evaporation and the condensate is collected therefrom. A different processing of the steam or part of it and the condensate was not disclosed in the application although now covered by claim 1.

Since claims 1 and 2 do not meet the requirements of Article 123(2) EPC, the main request is not clearly allowable and condition iii) is not fulfilled.

Therefore, the board exercises its discretion not to admit the main request into the proceedings.

## 2. Auxiliary request

### 2.1 Article 13(1) RPBA

Conditions i) and ii) above, which were already fulfilled by the main request, are also met by this request, which has been further restricted in view of the discussion during oral proceedings. In addition, this request is clearly allowable, since it meets the requirements of the EPC (see points 2.2 to 2.6 below). Therefore, it is admitted into the proceedings.

### 2.2 Article 123(2) EPC

The subject-matter of claim 1 is based on original claims 1 and 2 in combination with page 4, lines 11 and 14, where it is indicated that each effect has a falling-film evaporation section and a separation

section (see also original claim 4). On page 5, line 27 it is disclosed that the residual water is withdrawn from the last effect. From the third paragraph on page 5, in combination with page 4, lines 14 to 16 and figure 1, it is unambiguously derivable that condensate from the shell side of the falling-film section of each effect beginning from the second is collected, which condensate stems from the steam produced in the previous effect and is fed to the shell side of the falling-film section of the next effect, the combined condensates being taken out from the final effect and cooled in a heat exchanger together with the steam phase of the final effect.

The sentence "a contaminant enriched fraction is permanently removed as reject stream" finds its basis on page 5, lines 2 to 5 and on page 3, line 12. On page 4, lines 26 to 31 in combination with page 2, lines 11 to 16 it is disclosed how this impurity-enriched fraction is produced.

Therefore, the subject-matter of the sole claim of this request is unambiguously derivable from the original application.

### 2.3 Article 84 EPC

The method according to claim 1 clearly indicates that in each effect steam and water are produced from the feed water. While the non-evaporated water (residual water) is supplied as feed water to the subsequent effect, an impurity-enriched fraction is permanently removed from the steam phase in each effect. The remaining steam phase is led to the shell side of the next effect where it condenses and is transferred to the shell side of the subsequent effect. The condensate

produced is collectively taken out from the final effect and represents the product, namely the purified water.

The term "cool" is considered to be clear. It is not a relative term in the present context, since it is part of the expression "cool surface" that is understood by the skilled person as a cooling surface. This means that the temperature of the surface has to be such that the impurity-enriched fraction condenses on this surface.

The requirements of Article 84 EPC are met.

#### 2.4 Article 54 EPC

2.4.1 D1 discloses a multiple-effect evaporation to concentrate a solution. D1 does not disclose that an impurity-enriched fraction that is separated from the steam phase in each effect is permanently removed.

In addition, D1 does not disclose that the condensate in the shell side of the effect beginning from the second effect stems from the steam from the previous effect. In fact the vapours produced in evaporators B and C of figure 1 are not forwarded to the next effect, but to another part of the evaporation plant (see column 3, lines 40 to 43).

2.4.2 D2 discloses a falling-film evaporator for the production of pure steam. The evaporation product (steam) rises along a spiral pathway, whereby impurity-containing droplets entrained in the steam migrate through apertures in the outer wall and condense outside on a cool surface. They mix at the bottom of the device with the non-evaporated feed water. This

water is rejected (see page 3, lines 18 to 31; page 4, lines 6 and 7 and figure 2 of D2).

D2 does not disclose a multi-effect falling-film evaporation process.

- 2.4.3 The present application validly claims the priority of FI 2003 0735 filed on 16 May 2003. D3 was published on 11 March 2004 and validly claims the priority of FI 2002 1538, filed on 28 August 2002. D3 is prior art under Article 54(3) EPC.

D3 discloses a falling-film evaporator similar to the one of D2 except that the impurity-containing fraction is withdrawn through a special opening 10 (see page 5, lines 3 to 5 of D3).

D3 does not disclose a multi-effect falling-film evaporation process.

- 2.4.4 Figure 1 in combination with Figure 2 of D4 discloses a two-effect falling-film evaporator wherein the steam (2) leaving the first effect enters a droplet separator (3) positioned on the outer peripheral part of the second effect, wherein droplets are removed from the steam phase. The droplets are evacuated (7) whereby at least a fraction thereof (see also Figure 3) is rejected. The steam remaining after the removal of the droplets enters the second effect.

D4 does not disclose a separation section in each effect and the collection of the combined condensates in the final effect. It also does not disclose the separation of the impurity-enriched fraction by means of a spiral rising channel having apertures in its outer wall and a cool surface outside the apertures.

2.4.5 D5 does not disclose the removal from each effect of an impurity-enriched fraction from the steam phase.

2.4.6 D6 discloses a falling-film multi-effect evaporator comprising a plurality of compartmented shell sections (see figure 1).

D6 does not disclose the removal from each effect of an impurity-enriched fraction separated from the steam by means of a spiral rising channel having apertures in its outer wall and a cool surface outside the apertures.

2.4.7 Therefore, the subject-matter of claim 1 fulfills the requirements of Article 54 EPC.

2.5 Article 56 EPC

2.5.1 The invention concerns the production of highly purified water using falling-film evaporators (see page 1, lines 3 to 6 of the original application).

2.5.2 The appellant took D4 as closest prior art during the discussion at the oral proceedings. The board can agree. D4 relates to multi-effect falling-film evaporation, whereby the steam produced in the first effect is demisted prior to its introduction into the second effect. This demisting improves the quality of the steam. As indicated above, Figures 1 and 2 show a two-effect falling-film evaporation device, but more than two effects are possible (see paragraph [0024] of D4).

2.5.3 According to the application in suit, the problem underlying the present application can be seen in

providing a method which makes it possible to obtain highly purified water while reducing the total amount of reject water and avoiding scaling (see page 3, lines 20 to 25 of the original application).

- 2.5.4 As a solution to this problem the application proposes a method according to claim 1, characterised in that from **each** evaporation effect an impurity-enriched fraction of the steam phase, produced in the respective effect, and separated by means of a spiral rising channel having apertures in its outer wall and a cool surface outside the apertures, is permanently removed as a reject stream.
- 2.5.5 As to the success of the solution, it is plausible that the problem has indeed been solved.

The process according to claim 1 ensures the removal of an impurity-enriched fraction of the steam phase from each effect including the last one so that the steam obtained in the last effect can also be used as a highly purified product after condensation.

In the set-up of D4 the steam of the ultimate effect is not separated from the droplets so that it is questionable that it can be used as a product. In addition, according to the present invention, the removal of the impurity-enriched fraction inside the separation section of each effect avoids scaling, especially in the transfer line from one effect to the next, as compared to a set-up as disclosed in D4. According to D4 the steam is first transferred to a cyclone positioned on the outer peripheral part of the next effect prior to removal of the droplets.

In view of the success of the solution in the light of

D4, the board is satisfied that there is no need to reformulate the problem.

2.5.6 As to obviousness, it is noted that the other prior-art documents (D1, D5 and D6) relating to multiple-effect evaporation do not disclose that an impurity-enriched fraction is separated from the steam phase in each effect and is permanently removed (see 2.4.1, 2.4.5 and 2.4.6). These documents do not provide any guidance towards the solution of the problem.

As indicated above (2.4.2), D2 discloses a single-effect falling-film evaporation process whereby an impurity-enriched fraction is separated from the steam by the same steps as present in current claim 1 (see page 3, lines 18 to 31 of D2). However, this impurity-enriched fraction is not separated from the non-evaporated feed water, but removed together with it (see page 4, lines 6 to 7 and Figure 2).

The replacement of droplet separator 3 of D4 by a separator unit as shown in Figure 2 of D2 to solve the problem posed would not be contemplated by the skilled person. The aim of D4 is to provide a compact falling-film evaporator having reduced installation costs (see abstract of D4). The replacement of the droplet separator by a separation unit as disclosed in D2 would run counter to that objective. Therefore, the skilled person would not consider D2 when trying to find a solution to the problem posed.

Even if he were to consider D2, he would not find a solution to the problem posed. D2 is completely silent about multi-effect devices and does not give any indication about the advantages a separation device (as shown in figure 2 of D2) could have in a multi-effect



device. In addition, in a multi-effect device having evaporators comprising a separator according to Figure 2 of D2 but arranged in serial connection, the impurity-containing fraction would not be separated from the feed of the next section, with the result that the impurities would be taken over from one effect to the next.

D2 does not provide a solution to the problem posed.

As mentioned above, D3 is prior art under Article 54(3) EPC and is not to be taken into consideration for the question of inventive step.

2.5.7 The solution to the problem is not obvious in view of the prior art, so the requirements of Article 56 EPC are met.

2.6 The auxiliary request thus fulfills the requirements of the EPC.

## Order

### For these reasons it is decided that:

1. The decision of the examining division is set aside.
2. The case is remitted to the department of first instance with the order to grant a patent on the basis of the auxiliary request filed during oral proceedings on 1 October 2014, a description to be adapted thereto and Figure 1.

The Registrar:

The Chairman:



C. Vodz

G. Rath

Decision electronically authenticated