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**Datasheet for the decision
of 19 November 2013**

Case Number: T 1002/12 - 3.3.06

Application Number: 03707468.9

Publication Number: 1490161

IPC: B01D61/22, B01D61/12, B01D65/10

Language of the proceedings: EN

Title of invention:
Method of monitoring membrane separation processes

Applicant:
Nalco Company

Headword:
Inert fluorescent tracer / NALCO

Relevant legal provisions:
EPC Art. 84
RPBA Art. 13(1)

Keyword:
Clarity (main request and auxiliary request 1): no
Admissibility of auxiliary request 2 (no) - claims not clearly
allowable

Decisions cited:
T 0728/98

Catchword:



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Case Number: T 1002/12 - 3.3.06

D E C I S I O N
of Technical Board of Appeal 3.3.06
of 19 November 2013

Appellant: Nalco Company
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Decision under appeal: **Decision of the Examining Division of the
European Patent Office posted on 10 November
2011 refusing European patent application No.
03707468.9 pursuant to Article 97(2) EPC.**

Composition of the Board:

Chairman: B. Czech
Members: L. Li Voti
U. Lokys

Summary of Facts and Submissions

- I. This appeal lies from the decision of the Examining Division to refuse European patent application no. 03 707 468.9.

As regards the then pending sets of claims the Examining Division found *inter alia* that the claimed subject-matter lacked an inventive step.

- II. With its statement setting out the grounds of appeal dated 20 March 2012, the Appellant (Applicant) submitted two sets of amended claims as main request and auxiliary request 1, respectively.

Claim 1 according to said main request reads as follows:

"1. *A method of monitoring a membrane separation process in an industrial water system comprising the steps of:*

- (a) providing a membrane capable of removing solutes from a feed stream; wherein the membrane separates the feed stream into a concentrate stream with a greater amount of solutes in it and a permeate stream with a lesser amount of solutes in it, wherein said membrane is suitable for use in an industrial water system;*
- (b) adding an inert fluorescent tracer to the feed stream wherein said fluorescent tracer is not appreciably or significantly affected by the chemistry of the industrial water system; wherein the concentration of the inert fluorescent tracer in the feed stream is from about 5 ppt to about 1000 ppm;*
- (c) removing solutes from the feed stream by contacting the membrane with the feed stream and having the*

membrane separate the feed stream into a permeate stream and a concentrate stream;

(d) providing a fluorometer to detect, on an intermittent, semi-continuous or continuous basis, the fluorescent signal of the inert tracer in the feed stream, and providing one or more fluorometers to detect, on an intermittent, semi-continuous or continuous basis, the fluorescent signal of the inert fluorescent tracer in at least one of the permeate stream and the concentrate stream;

(e) using the detected fluorescent signal in the feed stream to determine the concentration of the inert fluorescent tracer in the feed stream, and using the detected fluorescent signal in at least one of the permeate and the concentrate stream to determine the concentration of the fluorescent tracer in at least one of the permeate stream and the concentrate stream, respectively; and

(f) evaluating a process parameter of the membrane separation process based on the concentration of the inert fluorescent tracer in the feed stream and at least one of the permeate and the concentrate stream determined from the respective detected signal, wherein the process parameter is selected from the group consisting of normalized permeate flow, driving force, differential pressure and percent rejection."

Claim 1 according to said auxiliary request 1 differs from claim 1 according to said main request only insofar as the process parameter evaluated in step (f) is restricted to "percent rejection".

The respective claims 3 and 4 according to both the main request and auxiliary request 1 have the following wordings:

"3. The method of claim 1 wherein the membrane separation process is selected from the group consisting of a cross-flow membrane separation process and a dead-end flow membrane separation process."

"4. The method of claim 1 wherein the membrane separation process is selected from the group consisting of reverse osmosis, ultrafiltration, microfiltration, nanofiltration, electrodialysis, electrodeionization, pervaporation, membrane extraction, membrane distillation, membrane stripping and membrane aeration and combinations thereof."

III. In its communication posted on 9 September 2013 the Board raised objections *inter alia* regarding the allowability (under Articles 84 (clarity) and 123(2) EPC) of the amended claims according to both pending requests.

The Board also informed the Appellant that any amended claims filed in order to overcome these objections had to reach the Board at least two weeks before the date of oral proceedings and that new requests in the form of amended claims and/or description pages might be disregarded by the Board, even when filed within the deadline set, if they raised further issues under Articles 84 and 123(2) EPC.

IV. The Appellant submitted with letter of 5 November 2013 a new set of amended claims to be considered as auxiliary request 2.

Claim 1 according to auxiliary request 2 reads as follows:

"1. A membrane separation process capable of treating feed streams suitable for use in industrial processes, the process performed by means of a membrane separation system comprising the steps of:

(a) providing a membrane capable of removing solutes from an aqueous feed stream; wherein the membrane separates the feed stream into a concentrate stream with a higher concentration of dissolved and/or suspended solutes in it and a permeate stream with a lower concentration of dissolved and/or suspended solutes in it; wherein said membrane is suitable for use in an industrial water system;

(b) adding an inert fluorescent tracer to the feed stream wherein said fluorescent tracer is not appreciably or significantly affected by the chemistry of the industrial water system; wherein the amount of the inert fluorescent tracer added to the membrane separation system is at least sufficient to provide a measurable concentration in the permeate stream or concentrate stream of from about 5 ppt to about 1000 ppm by weight;

(c) contacting the membrane with the feed stream and removing solutes from the feed stream by separating the feed stream into a permeate stream and a concentrate stream;

(d) providing fluorometers to detect, on an intermittent, semi-continuous or continuous basis, the fluorescent signal of the inert tracer in the feed stream, and in at least one of the permeate stream and the concentrate stream;

(e) using the detected inert fluorescent tracer in the feed stream to determine the concentration of the inert fluorescent tracer in the feed stream, and using the detected fluorescent tracer in at least one of the permeate and the concentrate stream to determine the concentration of the fluorescent tracer in at least one

- of the permeate stream and the concentrate stream, respectively;*
- (f) monitoring a process parameter of the membrane separation process based on the determined concentration of the inert fluorescent tracer in the feed stream and at least one of the permeate and the concentrate stream, wherein the process parameter is selected from the group consisting of normalized permeate flow and percent solute(s) rejection;*
- (g) evaluating the process parameter monitored in step (f); and*
- (h) adjusting the membrane separation process based on the evaluation of the process parameter conducted in step (g) to optimize the performance of the membrane."*
- V. Oral proceedings were held on 19 November 2013. The debate at the oral proceedings focussed on the *prima facie* allowability under Articles 84 and 123(2) EPC of the amended claims according to auxiliary request 2 and, hence, on the admissibility of this late filed request.
- VI. The Appellant requested that the decision under appeal be set aside and that a patent be granted on the basis of the claims according to the main request or auxiliary request 1, both submitted with the statement of the grounds of appeal, or on the basis of the claims according to auxiliary request 2 submitted with letter dated 5 November 2013.
- VII. As regards the objections under Article 84 EPC raised by the Board with respect to the claims according to the main request and auxiliary request 1 in its communication of 9 September 2013, the Appellant did not submit any argument during oral proceedings. It

expressly relied only upon the written statement setting out the grounds of appeal.

In the Appellant's view the claims according to auxiliary request 2 were admissible since they had been filed within the time limit set by the Board in its communication and attempted to address the objections raised by the Board.

In particular, the Appellant stated that the claimed membrane separation process concerned a sensitive monitoring of the aqueous streams upstream and downstream of the membrane in order to control relevant changes in the process parameters which could indicate a variation of the membrane performance due, for example, to fouling or scaling. The operating conditions of the process could then be appropriately adjusted in order to maintain the desired performance.

In the Appellant's view, claim 1 as amended according to auxiliary request 2 contained all the technical features necessary for realizing this goal. Moreover, its wording was clear and supported by the description.

Reasons for the Decision

Main request and auxiliary request 1

1. Clarity
 - 1.1 Claims have to be clear (Article 84 EPC) for the sake of legal certainty. They must define the matter for

which protection is sought in terms of the technical features of the invention (Rule 43(1) EPC). These requirements serve the purpose of ensuring that the public is not left in any doubt as to which subject-matter is covered by a particular claim and which is not (see e.g. decision T 728/98, OJ 2001, 319, point 3.1 of the reasons).

- 1.2 The respective claims 1 according to both the main and auxiliary request 1 both concern "*A method of monitoring a membrane separation process in an industrial water system comprising the steps of... (c) removing solutes from the feed stream by contacting the membrane with the feed stream and having the membrane **separate the feed stream into a permeate stream and a concentrate stream...***" (emphasis added).

Claim 1 according to both requests is thus restricted to processes wherein a liquid feed stream is split into a liquid retentate (concentrate) stream and a liquid permeate stream.

- 1.3 However, as indicated in point 5.3 of the Board's communication posted on 9 September 2013, dependent claims 3 and 4 at issue (see point II above) are directed inter alia to processes wherein such a splitting into two streams does not occur, namely a "*dead end flow membrane separation*", "*pervaporation*", "*membrane extraction*", "*membrane distillation*", "*membrane stripping*" and "*membrane aeration*". This finding of the Board remained undisputed.

- 1.4 These contradictions between the wordings of independent claim 1 and the dependent claims 3 and 4 (of both requests) lead to doubts as to the subject-matter for which protection is sought.

If only for these reasons, the claims according to the main request and auxiliary request 1 lack clarity (Article 84 EPC).

- 1.5 Consequently none of the main request and auxiliary request 1 is allowable.

Auxiliary request 2

2. Admissibility of the request

- 2.1 The claims according to auxiliary request 2 were filed on 5 November 2013, i.e. exactly two weeks before the date of the oral proceedings. Therefore, they were filed within the time limit set by the Board in its communication of 5 September 2013 (see point III above).

- 2.2 However, amendments to a party's case after it has filed its statement of grounds of appeal may be admitted and considered only at the Board's discretion (Article 13(1) RPBA). In particular, according to settled case law, late filed requests based on amended claims may be disregarded by the Board if the amended claims are not *prima facie* clearly allowable in the sense that they do not overcome all outstanding objections and/or raise further issues.

- 2.3 The Appellant indicated in its letter of 5 November 2013 and during oral proceedings those passages of the application as filed (in this respect, reference was made to the published application WO 03/082447 A1) which it considered to form a sufficient basis (with respect to the requirements of Article 123(2) EPC) for the amendments to the wording of claim 1.

2.4 However, as remarked by the Board at the oral proceedings, the indicated passages of the application as filed do not appear to provide *prima facie* a sufficient support for all of the amendments made, e.g. for the three amendments identified hereinafter:

2.4.1 Firstly, step (b) of the process of claim 1 at issue requires that "*the amount of the inert fluorescent tracer added to the membrane separation system is at least sufficient to provide a measurable concentration in the permeate stream or concentrate stream of from about 5 ppt to about 1000 ppm by weight*" (emphasis added).

The Appellant cited as basis for the features of step (b) claim 15; page 4, lines 20 to 21; page 5, lines 4 to 5; page 6, line 2; page 17, lines 6 to 7 and page 19, lines 14 to 20 of the application as filed. Moreover, the Appellant held that the information that the ppt and ppm amounts were meant to be "by weight" could be derived from page 40, lines 3 to 7 of the application as filed.

As pointed out by the Board at the oral proceedings, none of the cited passages discloses that the measurable concentration of the inert fluorescent tracer in the permeate stream or concentrate stream was expressed in parts by weight. On the contrary, the original description contains, in the passage from page 45, line 19 to page 46, line 1, various possible definitions for the "amount" or "concentration" of the fluorescent inert tracer. More particularly, said passage reads: "*The "amount" or "concentration" of inert tracer is meant herein to refer to the concentration of the inert tracer in the specified*

fluid in terms of weight of the inert tracer per unit volume of the fluid, or weight of the inert tracer per unit weight of the fluid, or some characteristic of the inert tracer that is proportional to its concentration in the fluid and can be correlated to a numerical value of the inert tracer concentration in the fluid (whether or not that correlation conversion is calculated), and can be a value of zero or substantially zero."

Since none of these definitions can be equated to the expression "by weight" contained in claim 1, it is prima facie questionable whether the range of from "about 5 ppt to about 1000 ppm **by weight**" now defined in claim 1 at issue meets the requirements of Article 123(2) EPC.

- 2.4.2 Secondly, the Board notes that the process of claim 1 requires in step (g) the evaluation of a process parameter selected from normalized permeate flow and percent solute rejection and being monitored in step (f) on the basis of the inert fluorescent tracer concentration determined in the feed stream and in "**at least one of the permeate and the concentrate stream**". Therefore, step (f) requires the determination of at least two fluorescent tracer concentrations, i.e. either
- i) in the feed and permeate streams, or
 - ii) in the feed and concentrate streams, or
 - iii) in the feed, permeate **and** concentrate streams.

The parts of the application as filed indicated by the Appellant as basis for steps (f) and (g) are the following: claim 2; page 6, lines 8 to 10; page 15, lines 22 to 23; page 31, lines 1 to 6; page 32, lines 14 to 21 and page 35, lines 3 to 7.

As remarked by the Board at the oral proceedings, the indicated passages relate more generically to the possibility of evaluating various parameters including the two process parameters still referred to in claim 1 at issue by determining the inert tracer concentration in **at least one** of the feed, permeate and concentrate streams.

Only the passage on page 31, lines 3 to 6 specifies that "*...when the parameter of interest is the percent rejection (discussed below), it is believed that the most sensitive determinations are of the feedwater inert tracer concentration and the permeate inert tracer concentration...*". As remarked by the Board, the latter passage is in agreement with the disclosed method of evaluating the **percent rejection** variation according to the invention given on page 32, lines 1 to 7 and page 38, lines 21 to 23.

However, none of the passages relied upon by the Appellant relates to the determination of the process parameter **percent rejection** by measuring the inert tracer concentration in the **concentrate** stream or in both **concentrate and permeate** streams, i.e. to two alternatives expressly addressed by the wording of claim 1.

Therefore, it is *prima facie* questionable whether a process comprising the combination of features defining these two alternatives referred to in step (f) of claim 1 at issue finds a basis in the application as filed, as required by Article 123(2) EPC.

2.4.3 Thirdly, the process parameter **normalized permeate flow** to be evaluated in step (g) and monitored according to step (f) is, according to the original description,

derived from the difference of concentrate flow and feed water flow in which the concentration of inert fluorescent tracer is measured (see page 36, lines 19 to 20).

The passages indicated by the Appellant do not address monitoring normalized permeate flow based on the determination of tracer concentration in the **permeate** stream or in both **permeate and concentrate** streams.

Therefore, also in this case, it is *prima facie* questionable whether a process comprising the combination of features defining these two alternatives referred to in step (f) of claim 1 at issue finds a basis in the application as filed, as required by Article 123(2) EPC.

2.5 If only for the reasons given under points 2.4.1 to 2.4.3, claim 1 according to the auxiliary request 2 is thus not clearly allowable.

2.6 Therefore, the Board decided not to admit the late filed auxiliary request 2 into the proceedings (Article 13(1) RPBA).

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:

The Chairman:



D. Magliano

B. Czech

Decision electronically authenticated